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BLM Utah 2025 Second Quarter Competitive Oil and Gas Lease Sale Environmental Assessment

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Uintah County, Utah

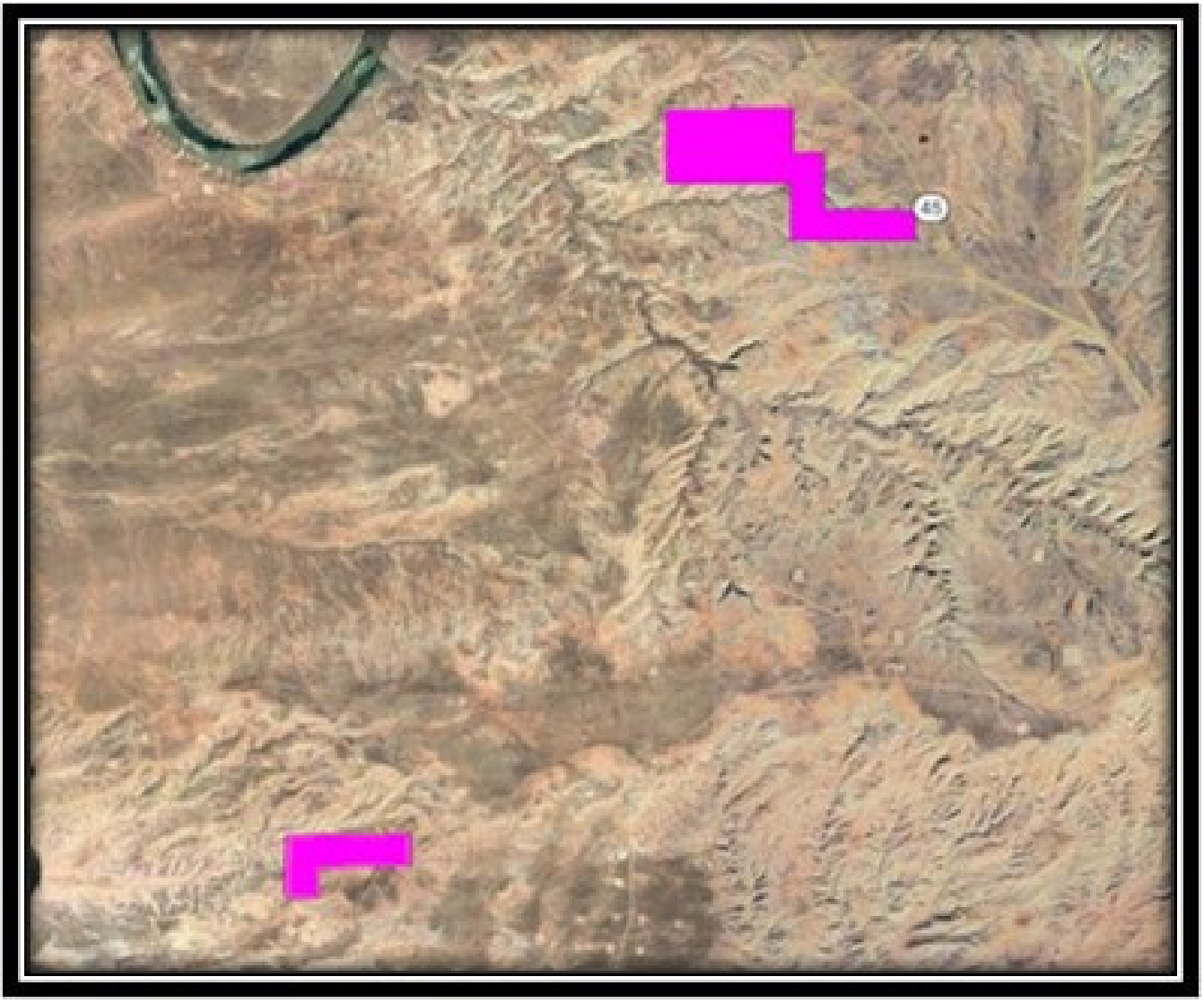

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TABLE 1. ACRONYMS

ACHP	Advisory Council on Historic Preservation
AIRFA	American Indian Religious Freedom Act
AMR	Air Monitoring Report
AO	Authorized Officer
AOI	Area of Influence
APD	Application for Permit to Drill
APE	Area of Potential Effects
bbl	barrel(s)
Bcf	Billion Cubic Feet
BLM	Bureau of Land Management
CAA	Clean Air Act
CAP	Criteria Air Pollutants
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COA	condition of approval
CSU	Controlled Surface Use
EA	Environmental Assessment
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EJ	environmental justice
EOI	Expression of Interest
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EUR	Estimated Ultimate Recovery
FLPMA	Federal Land Policy and Management Act of 1976
FOOGLRA	Federal Onshore Oil and Gas Leasing Reform Act
GHG	Greenhouse Gas
GIS	geographic information system
HAP	hazardous air pollutant
IDT	interdisciplinary team
IPCC	Intergovernmental Panel on Climate Change

IWG	Interagency Working Group on Social Cost of Greenhouse Gases, United States Government
IRA	Inflation Reduction Act
kgS/ha/yr	Kilograms of Sulfur per hectare per year
km	kilometer(s)
m	meter(s)
mcf	thousand cubic feet
MLA	Mineral Leasing Act of 1920
Mt	megatonnes
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NO_2	nitrogen dioxide
NO_x	nitrogen oxide(s)
NORM	naturally occurring radioactive material
NRCS	Natural Resources Conservation Service
National Register	National Register of Historic Places
NSO	no surface occupancy
O_3	ozone
OHV	off highway vehicle
PFYC	Potential Fossil Yield Classification
PLPCO	Utah Public Lands Policy Coordinating Office
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in diameter
PM_{10}	particulate matter equal to or less than 10 microns in diameter
ppb	parts per billion
ppm	parts per million
PRPA	Paleontological Resources Preservation Act
PSD	prevention of significant degradation
RFD	reasonably foreseeable development
RMP	resource management plan
ROD	Record of Decision
ROW	right of way
SC-GHG	social cost of greenhouse gases
SE	socioeconomics
SHPO	State Historic Preservation Office
UTLA	Utah Trust Lands Administration

SME	Surface Management Entity
SQM	Sky Quality Meter
SO_2	sulfur dioxide
STEO	short-term energy outlook
T&E	Threatened and Endangered
THPO	Tribal Historic Preservation Office
UDOGM	Utah Division of Oil, Gas, and Mining
UDWR	Utah Division of Wildlife Resources
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFO	Vernal Field Office
VOC	volatile organic compound
VRM	Visual Resource Management

CHAPTER 1. INTRODUCTION

1.1. BACKGROUND

This Environmental Assessment (EA) documents the Bureau of Land Management's (BLM) review of two lease parcels (totaling 833.28 acres) on public lands managed by the BLM's Vernal Field Office (VFO) which have been nominated for auction in the BLM Utah Second Quarter 2025 Competitive Oil and Gas Lease Sale (Lease Sale). Maps of the nominated lease parcels are contained in Appendix A.

Table 2 Surface Ownership

County	Parcels	Surface Management Entity (SME)	Acres
Uintah	7688	BLM	201.2
Uintah	1551	BLM	632.08

The two lease parcels cover all acres of the previously expired leases (UTU88053 encompassing 632.08 acres and UTU82701 encompassing 201.2 acres) that expired within their 10-year primary term. Lease UTU88053 was issued on March 1, 2011, and expired on Feb. 28, 2021. Lease UTU82701 that was segregated out of UTU80636 on Feb. 16, 2005, and expired on Dec. 17, 2016. The entirety of the acreage of these terminated leases were re-nominated for lease by Topaz Energy Resources. Lease parcel 1551 covers acreage of previously terminated lease UTU88053 which had development in 1985 and 2012. A well was drilled in 1985, was a dry hole and immediately plugged (Horseshoe Bend Fed 21-4, API 43-047-31671), and in 2012 another oil well was drilled by Anschutz Exploration Corporation in 2012, produced for a short period and plugged in 2021 (HSB Fed 22-04, API 43-047-51790).

1.2. PURPOSE AND NEED

The BLM's purpose is to respond to Expressions of Interest (EOIs) to lease federal oil and gas resources through a competitive leasing process. The need for the action is established by the BLM's responsibility under the Mineral Leasing Act of 1920 (MLA), as amended, to promote the exploration and development of oil and gas on the public domain.

1.3. DECISION TO BE MADE

The BLM Authorized Officer (AO) will decide whether to offer for lease one or both nominated lease parcels with or without constraints, in the form of lease stipulations, as provided for in the approved land use plan. If the decision is to offer the federal minerals for lease, and to subsequently issue a lease if a successful bid is received, standard terms and conditions under Section 6 of the BLM Lease Form (Form 3100-11, Offer to Lease and Lease for Oil and Gas), herein referred to as standard terms and conditions, would apply. The BLM AO also has the authority to defer the parcels, based on the analysis of potential effects presented in this EA. The Decision Record will identify whether the BLM decided to offer for lease the nominated lease parcels and the rationale for the decision.

1.4. BLM LAND USE PLAN CONFORMANCE

The Proposed Action complies with the Vernal Field Office Resource Management Plan (Vernal RMP), October 2008, as amended (BLM, 2008; 2015). The nominated lease parcels are in areas that are open to leasing (decisions MIN-10, MIN-11, MIN-12) under the Vernal RMP. In addition, the Vernal RMP Appendix K provides surface stipulations applicable to all surface-disturbing activities. Stipulations attached to the nominated lease parcels are identified and summarized in Appendix B of this EA.

1.5. RELATIONSHIP TO STATUTES, REGULATIONS, POLICIES, AND OTHER PLANS

One of BLM's mandates, as derived from various laws, including the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, is to promote the exploration and development of oil and gas on the public domain.

The Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOOGLRA), states that lease sales shall be held for each state where eligible lands are available at least quarterly and more frequently if the Secretary of the Interior determines such sales are necessary.

Purchasers of oil and gas lease parcels are required to comply with all applicable federal, state, and local laws and regulations, including obtaining all necessary permits prior to any lease development activities. A listing of relevant statutes, regulations, and policies is provided in Table 3. Other plans are discussed in Section 1.5.1.

Table 3 Relationship to Statutes, Regulations, and Policies

RELEVANT STATUTE, REGULATION, OR POLICY	RELATIONSHIP TO THE PROPOSED ACTION
Endangered Species Act (ESA)	The ESA requires all federal departments and agencies to consult with the U.S. Fish and Wildlife Service on all actions authorized, funded, or carried out by the agency to ensure that the action will not likely jeopardize the continued existence of any threatened and endangered species or adversely modify critical habitat. See the text of stipulation HQ-TES-1 in Appendix C. Lease Stipulation and Notice Summary for details.
Federal Land Policy and Management Act (FLPMA)	FLPMA established guidelines to provide for the management, protection, development, and enhancement of public lands (Pub. L. No. 94-579). Section 103 of FLPMA defines public lands as any lands and interest in lands owned by the United States. For split-estate lands where the mineral estate is an interest owned by the United States, the BLM has no authority over use of the surface by the surface owner; however, the BLM is required to disclose potential effects connected to the authorization to lease and develop federal mineral estate and to declare how federal mineral estate is managed in the RMP, including identification of all appropriate lease stipulations (43 CFR 3101.1 and 43 CFR 1601.0-7(b); BLM Handbook H-1601.09 and H-1624-1).
Federal Onshore Oil and Gas Leasing Reform Act (FOOGLRA)	This act directs the BLM to conduct quarterly oil and gas lease sales whenever eligible lands are available for leasing.

RELEVANT STATUTE, REGULATION, OR POLICY	RELATIONSHIP TO THE PROPOSED ACTION
Inflation Reduction Act of 2022 (IRA)	Section 50265 of the IRA states that the BLM may not issue a right-of-way for wind or solar energy development on federal land unless it has 1) held an onshore oil and gas lease sale during the past 120 days and 2) offered the lesser of a "sum total" of either 2,000,000 acres or 50 percent of the acreage for which EOIs have been submitted for lease sales during the previous 1-year period. The BLM issued policy guidance to implement the oil and gas leasing provisions in the IRA and provided updated direction on other program components (Headquarters Office [HQ][1] Instruction Memorandum [IM] 2023-006, IM 2023-007, IM 2023-008, and IM 2023-010).
Mineral Leasing Act (MLA)	The MLA establishes 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 the rules and regulations prescribed by the Secretary of the Interior, where consistent with FLPMA, the National Environmental Policy Act of 1969, as amended (NEPA; Pub. L. No. 91-90, 42 United States Code [U.S.C.] Section 4321 et seq.), and other applicable laws, regulations, and policies.
National Historic Preservation Act (NHPA)	Leasing is considered an undertaking pursuant to 54 U.S.C. Section 300101 et seq., commonly known as the NHPA, as amended, and 54 U.S.C. Section 306108, commonly known as Section 106 of the NHPA (Section 106). Section 106 requires all federal agencies to take into account the effects on historic properties from a federal undertaking. As a part of Section 106, federal agencies consult with the State Historic Preservation Office (SHPO) on all undertakings authorized, funded, or carried out by the agency. Agencies may follow a phased approach to Section 106 compliance. At the leasing level, BLM conducts an existing records review and consultation with SHPO, Native American Tribes, consulting parties, and public-driven identification of historic properties. Class III cultural resource surveys are an important part of identification at the lease-development level. See the text of stipulation HQ-CR-1 in Appendix C. Lease Stipulation and Notice Summary for details. All nominated lease parcels for this Lease Sale lie within the exterior boundary[2] of the reservation of the Ute Indian Tribe of the Uintah & Ouray Reservation (Ute Indian Tribe). The Ute Indian Tribe entered into an agreement with the National Park Service and the U.S. Department of the Interior to establish a Tribal Historic Preservation Office (THPO) on September 22, 2021, and thereby assumed the functions of a SHPO overseeing Section 106 responsibilities and undertakings that lie within the exterior boundary of their reservation. Per 36 CFR 800.2(c)(2)(i)(A), an Agency consults with the THPO "in lieu of the SHPO regarding undertakings occurring on or affecting historic properties on tribal lands."

[1] Prior to September 4, 2020, the BLM's Headquarters Office was referred to as the "Washington Office." IMs predating this change in designation contain the prefix "WO," whereas IMs issued afterwards contain the prefix "HQ."

[2] The term "exterior boundary" of a reservation refers to the initial boundary established by the first applicable treaty between the United States government and the affected Tribe(s). The originally established exterior boundary for a reservation may be larger than the present-day boundaries. The United States restructured land status and ownership of Tribal lands through various mechanisms such as the Dawes Act (1887) which reduced reservation lands for many Tribes, including the Ute Indian Tribe. Land within a current "exterior boundary" of a reservation may not be administered by Tribes or held in trust for them; many are owned either by private parties or other federal and state agencies.

RELEVANT STATUTE, REGULATION, OR POLICY	RELATIONSHIP TO THE PROPOSED ACTION
Clean Air Act (CAA)	The Clean Air Act's (CAA) General Conformity Rule mandates that Federal agencies evaluate reasonably foreseeable emissions that result from its actions in a nonattainment area to determine if they conform with the applicable regulatory agency implementation plans (40 CFR 93.153). The rule takes into account air pollution emissions associated with actions that are federally funded, licensed, permitted, or approved, and ensures emissions do not contribute to air quality degradation, thus preventing the achievement of state and federal air quality goals. In short, general conformity refers to the process of evaluating plans, programs, and projects to determine and demonstrate they meet the requirements of the CAA and an applicable implementation plan.
43 CFR Part 3100 and 43 CFR Subpart 3120	43 CFR Part 3100 regulations govern onshore oil and gas leasing, development, and production of federal minerals. 43 CFR Subpart 3120 regulations govern competitive oil and gas lease sales. The BLM recently updated these oil and gas leasing regulations to implement provisions of the IRA pertaining to royalty rates, rentals, and minimum bids; updates the bonding requirements for leasing, development, and production; and revises some operating requirements.
HQ IM 2023-006, Implementation of Section 50265 in the Inflation Reduction Act for Expressions of Interest for Oil and Gas Lease Sales	Implements provisions of the Inflation Reduction Act (IRA) pertaining to royalty rates, rentals, and minimum bids; updates the bonding requirements for leasing, development, and production; and revises some operating requirements.
HQ IM 2023-007, Evaluating Competitive Oil and Gas Lease Sale Parcels for Future Lease Sales*	This IM provides guidance to BLM offices in selecting parcels to be offered in oil and gas lease sales, and it also supplements HQ IM 2023-010, *Oil and Gas Leasing – Land Use Planning and Lease Parcel Reviews*. This IM informs the agency's organization, procedures, and practice.
HQ IM 2023-008, Impacts of the Inflation Reduction Act of 2022 (Pub. L. No. 117-169) to the Oil and Natural Gas Leasing Program	This IM provides the BLM State Offices with guidance for implementing the provisions of the IRA pertaining to EOIs, noncompetitive lease offers, pending competitive leases, and reinstatements. This IM updates expired policy WO[3] IM 2014-004, *Oil and Gas Informal Expressions of Interest*.
HQ IM 2023-010, Oil and Gas Leasing – Land Use Planning and Lease Parcel Reviews	This IM sets out the policy of the BLM to ensure that oil and gas lease sales are held in accordance with the MLA (30 U.S.C. 226), IRA (Pub. L. No. 117-169), and other applicable laws. This policy addresses land use planning, lease parcel review, lease sales, lease issuance, and IM implementation and directs the BLM to incorporate the revised policy, as appropriate, into the affected BLM handbooks and manuals.

* See Appendix E for BLM's evaluation of the nominated lease sale parcels in accordance with HQ IM 2023-007.

[3] *Id.*

1.5.1 Other Plans

There are two non-federal resource management planning documents that have a relationship to the Proposed Action. Each of these is identified and discussed below. The Proposed Action directly aligns with these plans because it contemplates making available for competitive leasing nominated oil and gas lease parcels.

- State of Utah Resource Management Plan (State RMP). The State RMP defines the State's policies, goals, and objectives for the management of natural resources on public lands. With respect to energy production (including petroleum and natural gas), the State RMP indicates that "Utah's general policy on energy production is that it supports all forms of energy. Utah is an 'all-of-the-above' state and believes there is room in its energy portfolio for all forms of energy" (State of Utah, 2023).
- Uintah County Resource Management Plan (Uintah County RMP) (Uintah County, 2022) The Uintah County RMP was updated on October 31, 2022. The objectives from chapter six "Energy" include:
    - "Support balanced and responsible natural-resource development that benefits the public and generates revenues for public service providers to help pay for public infrastructure improvements needed to achieve economic diversity."
    - "Expedite the processing, granting, and streamlining of mineral and energy leases and applications to drill, extract, and otherwise develop all existing energy and mineral resources located within the Uintah Basin Energy Zone, including oil, natural gas, oil shale, oil sands, gilsonite, phosphate, gold, uranium, copper, solar, and wind resources."

1.6. INTERNAL SCOPING

Beginning on December 18, 2023, the BLM interdisciplinary team (IDT) conducted internal scoping to identify issues, potential alternatives, and data needs by reviewing the leasing actions within the context of the applicable land use plan under the National Environmental Policy Act (NEPA) framework. Weekly meetings were held with IDT members during the parcel review process. In addition, other resource-specific meetings with resource specialists were held to aid in refining issues related to the nominated lease parcels.

1.7. EXTERNAL SCOPING

The BLM held a public scoping period from February 13, 2024, until March 14, 2024. BLM received 21 comment submittals via ePlanning during the scoping period. Comment submittals contained comments on the following topics:

- Objections to oil and gas leasing in general
- Potential restrictions on public access to the area
- Potential harm to waterways from spills
- Climate change
- Potential damage to Lands with Wilderness Characteristics
- Potential harm to special status species
- Concern for declining air quality and contributions to water shortages
- General support for resource extraction

The preliminary Lease Sale EA has been made available for a public comment period from June 24 to July 24, 2024. All comments received will be reviewed and analyzed. Substantive comments will be responded to in Appendix D.

1.8. ISSUES

The Council on Environmental Quality (CEQ) regulations at 40 CFR 1500.4(i) state that the scoping process should be used "not only to identify significant environmental issues deserving of study, but also to deemphasize insignificant issues narrowing the scope of the [NEPA] process accordingly." 40 CFR 1501.9(f)(1) provides that the lead agency shall "[i]dentify and eliminate from detailed study the issues that are not significant or have been covered by prior environmental review(s), . . . narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect on the human environment or providing a reference to their coverage elsewhere."

Through internal and external scoping, the following issues were identified for detailed analysis in this EA:

- What quantities and types of air pollutants would be produced from potential development of the nominated lease parcels? How would air pollutant emissions affect air quality and air quality related values?

- How would potential development of the nominated lease parcels contribute to greenhouse gas (GHG) emissions and climate change?

An additional two issues were identified, considered, and analyzed in brief during review of the Proposed Action. These issues, and rationale for why they were not analyzed in detail, are presented in Section 2.4.

Table 4 lists resources or concerns that were considered but determined to not warrant further analysis in this EA.

Table 4 Resources not Analyzed in this EA

RESOURCE OR CONCERN	RATIONALE FOR NOT ANALYZING IN EA
Special Designations	Special designations include Areas of Critical Environmental Concern, National Scenic and Historic Trails, Research Natural Areas, Special Recreation Management Areas, designated Wilderness, National Monuments, National Conservation Areas, National Parks, National Wildlife Refuges, Wilderness Study Areas, and Wild and Scenic Rivers. There are no special designations located within the nominated lease parcels. The closest special designation is the Ouray National Wildlife Refuge which is over 3 miles away and topographically screened from the nearest parcel. The nearest National Monument and Wilderness Study Area are over 17 miles to the northeast. A suitable Scenic segment of the Green River is over 14 miles to the southwest. The closest Special Recreation Management Areas are over 7 miles distant. There are no issues associated with special designations because of their distance from the nominated lease parcels and the general topography that separates them.
Lands With Wilderness Characteristics	There are no inventory findings or determinations per BLM Manual 6310 that any areas within the nominated lease parcels contain lands with wilderness characteristics. The nearest area determined to possess lands with wilderness characteristics is over 7 miles away. Therefore, there are no issues with impacts associated with lands with wilderness characteristics.

RESOURCE OR CONCERN	RATIONALE FOR NOT ANALYZING IN EA
Prime and Unique Farmlands	Based on the Natural Resource Conservation Service's Soil Survey Geographic Database (SSURGO (NRCS, 2024)), parcel 7688 contains 13 acres of land that could be prime farmland if irrigated. Based on the U.S. Department of Agriculture definition, prime farmland must also be available for crop production. There are no current agricultural leases on parcel 7688 and therefore there is no conflict between potential development and the area identified as prime farmland if irrigated.
Wild Horses and Burros	The nominated lease parcels do not intersect with any designated herd areas (HAs) or herd management areas (HMAs) for wild horses or burros in the Vernal Field Office, therefore there are no issues for analysis associated with wild horses and burros.
Greater Sage-Grouse	The nearest identified greater sage-grouse (*Centrocercus urophasianus*) habitat is located 4.9 miles northwest of1551 therefore there are no specific issues associated with greater sage-grouse.
Lands, Access, and Realty	Potential development of the nominated lease parcels would be subject to existing land rights and interests (e.g., easements and water rights). Any potential land use conflicts would be resolved through other processes, such as administrative or legal proceedings, independent from this NEPA review. Access to the area would not be curtailed or prohibited though roads constructed expressly for oil and gas development and production. These roads are not open for public use.
Woodland and Forest Resources	There are no woodland or forest resources on the nominated lease parcels therefore there are no issues for analysis associated with these resources.
Fuels and Fire Management	The potential for ignition of wildland fire from activities associated with future potential development of the nominated lease parcels would be minimized to the extent practicable through adherence to all applicable federal, state, and local fire safety requirements. No specific concerns or conflicts were identified through internal scoping relating to the effects of future potential development following leasing on fuels and fire management.
Travel and Transportation Management	Leasing and potential development of the nominated lease parcels would not affect the status (i.e., OHV-Open, OHV-Closed, OHV-Limited) of any routes designated by the BLM. New roads may be constructed and maintained for purposes of oil and gas activities. However, these roads would not be available for public use. Existing roads that are available for public use would continue to be available for this use regardless of leasing and potential development.

1.9. PUBLIC PROTEST PERIOD

In compliance with BLM IM 2023-010 and 43 CFR 3120.1-3, the Notice of a Competitive Lease Sale (NCLS) will be made available for a 30-day protest period.

CHAPTER 2. DESCRIPTION OF ALTERNATIVES

2.1. INTRODUCTION

The BLM lease parcels are in Uintah County, between the Green and White Rivers in the central area of the VFO. Parcel 1551 is approximately 2.5 miles east of the Horseshoe Bend area on the Green River and parcel 7688 is approximately three miles east of the Ouray National Wildlife Refuge boundary. The locations of the nominated lease parcels are depicted in Appendix A. Figures/Maps.

This EA addresses two alternatives in detail: Section 2.2 Alternative A – Proposed Action, Section 2.3 Alternative B – No Action Alternative.

2.2. ALTERNATIVE A – PROPOSED ACTION

Under the Proposed Action, the BLM would offer for competitive leasing federal minerals associated with the two nominated lease parcels (see Appendix A. Figures/Maps). Surface management, the legal land description of the nominated lease parcels (totaling 833.28 acres), and lease stipulations and notices attached to the parcels are included in Appendix B.

An issued lease may be held for ten years, after which the lease expires unless oil or gas is being produced in paying quantities (43 CFR 3107.2-1).[4] The drilling of wells on leased parcels is not permitted until the leaseholder submits, and the BLM approves (subsequent to additional site-specific environmental review documentation), a complete Application for Permit to Drill (APD) package (Form 3160-3) following the requirements specified under Onshore Oil and Gas Orders listed in 43 CFR Subpart 3162.[5] The BLM has authority, according to the standard terms and conditions of the leases, to attach conditions of approval (COAs) to an APD that reduce or avoid impacts to BLM-managed public land, resources, and/or resource values.

Under 43 CFR 3101.1-2, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Measures shall be deemed consistent with lease rights granted provided that they do not require relocation of proposed operations by more than 200 meters (m); require that operations be sited off the leasehold; or prohibit new surface-disturbing operations for a period in excess of 60 days in any lease year.

2.3. ALTERNATIVE B – NO ACTION ALTERNATIVE

Under the No Action Alternative, the BLM would not offer either of the nominated lease parcels for competitive leasing in this Lease Sale. However, in the absence of land use plan amendments closing the lands to leasing, the nominated lease parcels could be considered for inclusion in one or more future competitive oil and gas lease sales.

2.4. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

The BLM considered two action alternatives in addition to Alternatives A and B but eliminated these alternatives from detailed analysis. These alternatives, along with rationale for their dismissal from detailed analysis, are discussed below.

2.4.1. Implementing a Managed Decline of Production to GHG Emissions/Imposing a Climate Requirement on Leases Alternative

The MLA allows BLM, under certain circumstances, to 'alter or modify from time to time the rate of prospecting and development and the quantity and rate of production under such plan.' 30 U.S.C. § 226(m). Moreover, nearly every BLM lease for onshore oil and gas contains a provision allowing BLM to 'reserve the right to specify rates of development and production in the public interest.'" For example, the recent updates to oil and gas leasing regulations in the Waste Prevention, Production Subject to Royalties,

[4] The regulations, however, recognize an exception to this rule for a lease that is within an operating Unit and the Unit is held by production of wells on other leases within the Unit.

[5] Additional Information regarding the BLM's oil and gas management program can be accessed online at: https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/.

and Resource Conservation Rule says that "Where substantial volumes of oil-well gas are flared the BLM may order the operator to curtail or shut-in production as necessary to avoid the undue waste of Federal or Indian gas." 43 CFR 3179.70 (b)

This alternative does not respond to the purpose and need described in Section 1.2 and is beyond the scope of the decision to be made described in Section 1.3 because it relates to the approach to management of leased parcels rather than responding to EOIs as required under MLA. In addition, this potential mitigating measure is already in place under the MLA as noted by the commenter.

2.4.2. No New Greenhouse Gas Emissions Alternative

Under this alternative the BLM would defer all lease parcels so that no new greenhouse gas emissions would occur. This alternative was dismissed from detailed analysis because it is the same as the No Action Alternative (Alternative B), which is already analyzed.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1. INTRODUCTION

This chapter contains the effects analysis related to the issues. Section 3.2 describes the analysis assumptions for the future potential development of the nominated lease parcels. Section 3.3 describes the effects of the No Action Alternative for all issues. Section 3.4 presents the issues that are analyzed in brief. Section 3.5 presents the issues that are analyzed in detail.

Lease stipulations and notices are referred to throughout the analysis in Sections 3.4 and 3.5 in terms of their protective influence on resources that may be impacted by future potential development of the nominated lease parcels. Lease stipulations "are conditions of lease issuance which provide protection for other resources values or land uses by establishing authority for substantial delay or site changes or the denial of operations within the terms of the lease contract" (BLM, 1990). Lease stipulations are enforceable terms of the lease contract and supersede any inconsistent provisions of the standard lease form. Lease notices (also referred to as Information Notices in BLM Handbook H-1624) provide "notice of existing requirements and may be attached to a lease by the AO at the time of lease issuance to convey certain operational, procedural, or administrative requirements relative to lease management within the terms and conditions of the standard lease form" (BLM, 1990). Lease notices may not serve as the basis for denial of lease operations. However, they offer resource protections because they result in information gathering and the identification of resource values and land uses that the BLM, based on its authority under section 6 of the lease form, can require protection for within the constraints enumerated in the lease form (e.g., terms and conditions that would be attached at the APD stage) (also see Section 2.2).

3.2. ANALYSIS ASSUMPTIONS

While leasing would not directly authorize any oil and gas development or production, future oil and gas development and production is a reasonable outcome of a granted lease right. Leasing is a precursor to development and, therefore, there are currently no development proposals for the nominated lease parcels and the BLM is unable to complete an analysis that uses information related to a specific proposed project or projects. However, for the purpose of this analysis, Section 3.2.1 outlines the methods for estimating number of wells, acres of surface disturbance, and potential production volumes associated with the future potential development of the two nominated lease parcels.

It is unknown when, where, or to what extent subsequent well sites, roads, and associated infrastructure would be proposed in the event the BLM decides to lease the nominated lease parcels. Future potential

development of the nominated lease parcels could include the following phases (Appendix E provides a summary of the phases of oil and gas development):

- Construction of new access roads or expansion of existing roads,
- Pad construction/expansion,
- Drilling of a well,
- Hydraulically fracturing a well,
- Installation of pipeline,
- Well production operations, including vehicle traffic; hauling of produced fluids such as oil or produced water; compression to move gas through pipeline systems; potential venting from storage tanks; regular well monitoring; and work-over tasks for the life of the well,
- Well plugging and abandonment, and
- Reclamation and remediation.

3.2.1. Methods Used for Estimating Number of Oil and Gas Wells, Surface Disturbance, and Production Volumes

The Vernal RMP included a Reasonably Foreseeable Development Scenario for oil and gas development (RFD) in the Mineral Potential Report (Appendix A to the Final EIS and Proposed RMP). The Vernal RMP addresses various RFD areas. Parcels 1551 and 7688 are within the Vernal RMP's Monument Butte-Red Wash RFD area. This RFD identified the area to have moderate to high potential for development with 3,100 gas wells and 1,799 oil wells projected if this area is fully developed. This RFD is based on historic data, but also considers projected economic trends and advances in technology. As a planning and analysis tool, the RFD predicts new development as well as continued production from existing fields. The BLM recognizes that there will be a greater degree of predictive uncertainty associated with estimates of new discoveries. The BLM prepared these RFDs in compliance with Washington Office Instruction Memorandum 2004-89.

To estimate the 2025 Quarter 2 parcel-specific potential development for the purposes of NEPA analysis, the BLM considered the Monument Butte-Red Wash RFD. The BLM also considered more recent data from BLM experience, existing well production, new permitting, geologic studies, and economic studies and projections. The BLM gathered the more recent information from BLM experts, industry professionals, the Energy Policy and Conservation Act (EPCA) Oil and Gas Inventory Report, the Utah Division of Oil, Gas, and Mining, and the Utah Geological Survey.

Based on current development of surrounding leases, it is assumed that potential development would occur entirely on the nominated lease parcels and on multi-well pads. It is assumed that all development would occur on the parcels because applicable no surface occupancy (NSO) stipulations target specific resources that are not present on most of the proposed lease area. Current development of surrounding leases is on 32-well pads that require 25 acres of disturbance for the pads, roads, pipelines, and powerlines. This results in a disturbance ratio of 0.8 acre per well bore. This ratio was rounded up to approximately one acre of disturbance per well bore to simplify the calculations and to account for the possibility of longer roads and routes for infrastructure.

The number of wells on each parcel was estimated based on the development pattern of surrounding leases. The observed development pattern for the surrounding leases is consistent with the standard State siting rule (Utah, 2020) of one well per 40 acres.

The BLM identified and reviewed ten comparable wells in T7S-R22E Sec 15, 16, 21, and 22. Estimated gas production is based on the total Estimated Ultimate Recovery (EUR) of 5 billion Cubic Feet (Bcf) (5,000,000 mcf) as reported on the ten wells reviewed. Estimated oil production is based on the ratio of 10 BBLs oil per one thousand cubic foot (mcf) gas. Estimated water production is based on the ratio of 70 BBLs water per 1,000 mcf gas. These ratios were developed from the production review of the ten wells.

The BLM's estimates of foreseeable well development, surface disturbance, oil and gas production, and produced water associated with parcels 1551 and 7688 are provided in Tables 3 and 4.

Table 5 Reasonably Foreseeable Development

Parcel	Foreseeable Wells Assumption (For NEPA Analyses)	Surface Disturbance Assumption (Acres)
1551	15	15
7688	5	5
Total:	20	20

Table 6 Estimated Well Count and Production for the Nominated Lease Parcels

SME/ PARCEL	Acres	Total Estimated Wells†	Surface Disturbance (acres)	Oil Production (bbl)	Gas Production (mcf)	Produced Water Production‡ (bbl)
BLM/Totals	20	20	20	5,000	5,000,000	350,000
BLM/1551	15	15	15	3,750	3,750,000	262,500
BLM/7688	5	5	5	1,250	1,250,000	87,500

Note: bbl = barrels; mcf = thousand cubic feet.

* All acreages contained in the EA analysis were calculated using geographic information system (GIS) data sets for resources and the parcels, which may differ slightly from the acreages contained in legal description here and. Difference in total acres between the parcels and acres analyzed in the EA can vary slightly due to geoprocessing operations where slivers of area are created when two or more data sets intersect. Any inaccuracies are negligible and do not change the overall impact analysis conclusions presented in this EA.

† In cases where the methods used for estimating the number of wells per nominated lease parcel resulted in a fractional value of less than one well per nominated lease parcel (because of low anticipated drilling rate), the fractional value was adjusted upward to the next whole number to represent a rational outcome of the number of potential wells that could be drilled and developed on the nominated lease parcel, as well as to provide meaningful inputs to the oil, gas, and produced water production projections.

‡Produced water amounts were estimated by using a ratio of 1:1 for water produced during oil production and 80 bbl:1,000 mcf for water produced from natural gas extraction.

3.3. CUMULATIVE EFFECTS SCENARIO

This section outlines past, present, and reasonably foreseeable future actions and environmental trends in the vicinity of the nominated lease parcels that have a relationship to potential resource effects associated with the alternatives. This section appears prior to the impacts analysis because it is intended to provide broad context for those analyses and the activities occurring and trends influencing the environment in the

area. In recent decades, the influences on the landscape in the vicinity of the nominated lease parcels include the following:

- Oil and gas development and reclamation: within the HUC 10 watersheds that encompass the two parcels (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011), as of April 25, 2024, there are 1,023 drilled or drilling oil and gas or service wells, 475 plugged and abandoned well locations that may be at various levels of reclamation, and 529 proposed well locations. These watersheds overlap the 2008 RMP's Monument Butte-Red Wash and Tabiona-Ashley Valley Reasonably Foreseeable Development areas which predicted 1,700 oil wells and 3,100 gas wells (Monument Butte-Red Wash) and 30 oil and gas wells (Tabiona-Shley Valley) drilled over 15 years (BLM, 2002). Across the whole VFO, on all land management types, there are 13,375 drilled or drilling oil and gas or service wells, 4,400 plugged and abandoned well locations that may be at various levels of reclamation, and 1,386 proposed well locations.
- Other minerals – within the HUC 10 watersheds that encompass the two parcels (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011), as of April 30, 2024, there are five mineral material sites.
- Livestock grazing (in particular, in the Split Mountain Allotment, which the nominated lease parcels fall within): The Split Mountain Allotment (124,027 acres in total inclusive of non-BLM-managed lands) is grazed by five permittees. The season of use is October to May. The allotment has been grazed for several decades. There are 111 range improvements on the allotment. AIB-19 contains a more detailed analysis.
- Transmission lines: within the HUC 10 watersheds that encompass the two parcels (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011), as of April 29, 2024, there are numerous existing and proposed pipelines associated with the oil and gas field development previously described. In addition, there are three existing high voltage transmission lines and one high voltage transmission lines approved for construction, but the Utah portion has not yet been constructed. Agricultural development (e.g., farm fields): within HUC 10 watersheds that encompass the two parcels (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011; approximately 210,000 acres), roughly 25,000 acres (12%) are private lands with agricultural developments such as plowed and planted fields and irrigation lines.
- Interstate pipelines: within the HUC 10 watersheds that encompass the two parcels (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011), as of April 29, 2024, there are numerous existing and proposed pipelines associated with the oil and gas field development previously described. In addition, the watersheds contain three major interstate pipelines, and one major inter-field pipeline application the BLM is reviewing.
- Ouray National Wildlife Refuge: the HUC 10 watersheds that encompass the two parcels (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011; approximately 210,000 acres) completely contain the approximately 12,000-acre Ouray National Wildlife Refuge managed by the USFWS. The Refuge was established in 1960, and it is managed to provide diverse habitats supporting over 350 fish and wildlife species.
- Towns: within the HUC 10 watersheds that encompass the two parcels (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011), there are no municipalities. However, there are three unincorporated population areas: Jensen, Leota, and Ouray. These are rural areas containing mostly agricultural land and a few farm or ranch houses.
- Highways: within the HUC 10 watersheds that encompass the two parcels (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011), there are three highways, Highways 88, 40, and 45. Branching off the highways are numerous roads supporting access to

various land ownerships (BLM, BOR, FWS, SITLA, and private), agricultural developments, oil and gas fields, recreational opportunities on the Green River. The highways are two to four lane roads, while other roads range from bladed two-lane roads to unmaintained two tracks. Many of the roads are included in the BLM's Ground Transportation Linear Feature (GTLF) system (BLM, 2016).

- Recreation activities: within the HUC 10 watersheds that encompass the two parcels (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011), as of April 25, 2024, recreation activities on BLM-managed lands include dispersed recreation such as fishing, hunting, camping, OHV-riding, hiking, and Green River floating. The area is adjacent to but outside the McCoy Flats trail system designated by the Public Law 116-9, the John D. Dingell Jr. Conservation, Management, and Recreation Act. However, a portion of the area encompassed by the watersheds is used for dispersed camping by people using that trail system.

Current ongoing global climate change is caused, in large part, by the atmospheric buildup of GHGs, which may persist for decades or even centuries. The buildup of GHGs such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases since the Industrial Revolution (1760-1840) has substantially increased atmospheric concentrations of these compounds compared to background levels. Several types of activities contribute to the phenomenon of climate change, including emissions of GHGs from fossil fuels used as a primary energy source, large wildfires, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). Between 1850 and 2019, cumulative anthropogenic CO_2 emissions emitted to the atmosphere were approximately 2,400 ± 240 Gigatonnes of CO_2 ($GtCO_2$). About 43% of these emissions have remained in the atmosphere, while the rest was removed from the atmosphere and stored in natural terrestrial ecosystems (plants and soils – 29%) and in the oceans (28%).

Multi-model climate projections under a high emissions scenario (SSP5-8.5) indicate that Utah could warm as much as 4 °C above current levels by 2074. Under a lower emissions scenario (SSP2-4.5), warming is projected to increase about 3 °C relative to the 1981-2010 mean (Alder & Hostetler, 2013). Increases in average temperatures would be accompanied by increases in heat wave intensity and decreases in cold wave intensity. Under these conditions, precipitation would more likely fall as rain instead of snow, reducing water storage in the snowpack.

Uintah County, where the nominated lease parcels are located, has been experiencing intermittent drought conditions for at least the past 24 years, with the most notable drought periods (severe, extreme, and exceptional drought) in the following timeframes: 2002-2005, 2012-2014, 2018-2019, and 2021-2023. Droughts such as those experienced in Uintah County, are a natural part of Utah's climate. However, these droughts are expected to become more intense with climate change. Higher temperatures will amplify the effects of naturally occurring dry spells by increasing the rate of loss of soil moisture. Additionally, higher spring temperature can cause early melting of the snowpack, decreasing water availability during the already dry summer months. The projected increase in the intensity of naturally occurring droughts will increase the occurrence and severity of wildfires.

Further discussion about climate change science and predicted impacts can be found in the 2022 *BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends* (BLM, 2023) (Annual GHG Report). An emissions discussion detailing a quantitative analysis of GHGs related to the potential develop of the lease parcels can be found in Section 3.6.2.

3.4. NO ACTION ALTERNATIVE IMPACT FOR ALL ISSUES

Under the No Action Alternative, the BLM would not offer for lease the nominated lease parcels and the existing conditions and trends related to each issue would continue. Potential impacts associated with

future potential development of the nominated lease parcels would not occur under this alternative, current land and resource uses would continue, and the federal mineral acreage would remain open to future oil and gas leasing unless land use plan amendments are completed to close these areas to leasing. No natural gas or crude oil from the nominated lease parcels would be produced, and no royalties would accrue to federal or state treasuries. Selection of the No Action Alternative would forgo new oil and gas development opportunities on approximately 833.28 acres of federal minerals in the VFO. Reducing total oil and gas development opportunities in the area is likely to incrementally reduce local and regional employment and revenue opportunities related to the oil and gas and service support industries over time. This is because the oil and gas sector of the economy relies on both ongoing operational activities (development of existing leases) and new development opportunities (acquisition and development of new leases) to continue to provide local and regional jobs and revenue on a sustained basis. In the 5.5 million-acres within the boundary of the VFO, there are approximately 1.9 million acres of federal mineral estate that are open to oil and gas leasing. Of these acres, 1,168,221 acres are already leased (62% of the federal mineral estate open to oil and gas leasing) across 1274 total leases.

3.5. ISSUES ANALYZED IN BRIEF (AIB)

Following internal and external scoping, 22 issues were identified, considered, and eliminated from detailed analysis by members of the IDT in review of the Proposed Action. Each of these issues is outlined below with a concise discussion regarding the context and intensity of the impact related to each issue. Stipulations HQ-TES-1 (compliance with the ESA), HQ-CR-1 (compliance with the NHPA), and Lease Notice HQ-MLA-1 (compliance with the MLA), as well as standard terms and conditions as described in the lease form, would apply to all nominated lease parcels.

For the purposes of this analysis, short-term effects are those that cease after well construction and completion (30–60 days) or cease after interim reclamation (2–5 years). Long-term effects are considered to be those associated with operation and production activities over the life of the well (for example, noise) or that otherwise extend beyond the short-term time period (for example, surface disturbance subject to final reclamation). As such, some long-term effects would cease immediately upon the end of operations, whereas other long-term effects would remain until successful landscape reclamation and remediation is accomplished. Note that the time frame for successful reclamation would vary by vegetation type and other factors such as the amount and timing of annual precipitation (see AIB-9 for more information).

AIB-1 Threatened and Endangered (T&E) Species

How would potential development of the nominated lease parcels affect federally listed species or their habitats?

The nominated lease parcels were analyzed individually for occurrence of federally listed species, in coordination with the USFWS. In accordance with lease stipulation HQ-TES-1, which applies to all the nominated lease parcels, the BLM would not approve any ground-disturbing activity that may affect listed species or critical habitat until it completes its obligations under the applicable requirements of the ESA. The BLM may also require modifications to or disapprove of a 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 (see Appendix B. BLM Parcel List with Stipulations and Appendix C. Lease Stipulation and Notice Summary). In addition, due to the potential for currently or future listed species to be identified within the parcels, lease notice T&E-05 applies to all lease parcels. Section 4.1 further discusses how the Proposed Action would comply with threatened and endangered species management guidelines outlined in the Vernal RMP, as well as ESA Section 7 consultation requirements. For all parcels, applying the identified T&E lease notices –

which were developed through formal ESA Section 7 consultation with the USFWS during development of the applicable land use plan – would mitigate potential impacts from mineral development on the nominated lease parcels and adjacent lands. As discussed below, the application of the identified lease stipulations and notices to the nominated lease parcels, as well as the requirements outlined in the applicable land use plan, would adequately mitigate potential impacts to listed or candidate T&E species at the leasing stage. At the lease development stage, site-specific ESA Section 7 consultation with USFWS would occur as necessary and would take into consideration infrastructure siting, habitat suitability determinations, survey results, and any additional site-specific considerations or avoidance measures. The following subsections describe the species whose USFWS published range map (also referred to as an area of influence (AOI)) intersects one or more nominated parcels.

Uinta Basin hookless cactus (Sclerocactus wetlandicus) – threatened

Parcel 7688 intersects the USFWS AOI for Uinta Basin hookless cactus and intersects modeled suitable habitat. However, no populations are located within the parcel and nearest population is located approximately 2.2 miles to the west of the parcel.

Using the future development assumptions in Section 3.2, 5 acres of disturbance would occur within parcel 7688 and 5 acres of potential habitat would be directly impacted by the development (less than 0.1% of the 516,674-acre potential habitat for the species). Given the requirements to perform surveys and avoid individuals by 300-feet, it is expected that impacts to occupied habitat at the lease development stage would be less than those presented.

Potential impacts of future development of the nominated parcel on the potential habitat for Uinta Basin hookless cactus occurs within the context of the cumulative effects scenario (Section 3.3). This includes within the AOI for the species (as of April 25, 2024) 5,949 drilled or drilling oil and gas or service wells, 1,349 plugged and abandoned well locations, 251 proposed well locations, conversion of native vegetation communities to agriculture or rural development, grazing across all land ownership types, existing transmission powerlines, existing interstate transmission pipelines, paved and unpaved roads, and community trends associated with global climate change.

Implementation of the below lease notices and Section 6 of the standard terms and conditions of the lease would help minimize potential impacts to the species.

Lease Notices

- T&E-05: Listed Plant Species: All Parcels
- T&E-12: Pariette cactus (*Sclerocactus brevispinus*) and Uinta Basin hookless cactus [*Sclerocactus glaucus* (*brevispinus* and *wetlandicus*)]: Parcel 7688

Mexican spotted owl (Strix occidentalis lucida) – threatened

Parcel 7688 intersects the USFWS AOI for the Mexican spotted owl and intersects the 1997 Willey-Spotskey Mexican Spotted Owl Habitat Model. (Willey and Spotskey, 1997). However, these areas are isolated and do not contain complex canyon habitats necessary to support Mexican spotted owl. In consultation with the USFWS, it was determined that there is no potential habitat for the species within ½ mile of the nominated parcels.

Listed Fish of the Upper Colorado River Drainage Basin

The nominated lease parcels do not intersect the AOI for the four resident listed fish of the Upper Colorado River Basin (bonytail [*Gila elegans*] endangered, Colorado pikeminnow [*Ptychocheilus lucius* endangered, humpback chub [*Gila cypha*] threatened, and razorback sucker [*Xyrauchen texanus*] endangered). However, water depletions from any portion of the Upper Colorado River drainage basin above Lake Powell are considered to adversely affect or adversely modify the critical habitat of the four resident listed fish species of the Upper Colorado River Basin and must be evaluated with regard to the criteria described in the Upper Colorado River Endangered Fish Recovery Program. At the leasing stage, it would be too speculative to identify the potential source and status of permitted water sources used in the lease development. However, to account for the potential that water from a non-historic source within the Upper Colorado River drainage is used, lease stipulations and lease notices are applied to all nominated lease parcels.

Past, present, and reasonably foreseeable future actions and environmental trends as described in Section 3.3 have resulted in decreased flows and an altered hydrograph, non-native fish, and loss of habitat. This has occurred through development within and beyond the area of cumulative effects analysis. Implementation of the below lease notices and Section 6 of the standard terms and conditions of the lease would help minimize potential impacts to the species.

Lease Notices:

- T&E-03: Endangered Fish of the Upper Colorado River Drainage Basin: All Parcels

AIB-2 Utah BLM Sensitive Species

How would potential development of the nominated lease parcels affect BLM sensitive species or their habitats?

BLM sensitive species are those species that require additional conservation to prevent the decline of populations to the point where they may be considered for listing under the Endangered Species Act.

Aquatic Animal Species

Sensitive aquatic species are not known to occur within any of the nominated lease parcels. The mainstem of the Green River downstream and in the same Hydrologic Unit Code (HUC) 10s (Pelican Lake -Green River 1406001012 and Walker Hollow-Green River 1406001011) of the lease parcels have populations of bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Flannelmouth sucker*), and roundtail chub (*Gila robusta*). While these species are not known and are unlikely to occur in the lease parcels, there is potential for impacts to downstream populations by increased sediment, or reduced water flows. Lease Notices T&E-03 for the Endangered fish of the Upper Colorado River Basin will also protect these species from potential impacts of increased water withdrawals. Potential impacts to habitat through changes in surface water quality is covered in the water resource AIB.

Past, present, and reasonably foreseeable future actions and environmental trends as described in Section 3.3 have resulted in decreased flows and an altered hydrograph, non-native fish, and loss of habitat. This has occurred through development within and beyond the area of cumulative effects analysis. Implementation of the below lease notices and Section 6 of the standard terms and conditions of the lease would help minimize potential impacts to the species.

The following lease notice is applied to all nominated lease parcels to inform the applicants of sensitive species. Also see AIB-13 Riparian Areas, Wetlands, and Floodplains for stipulations and notices that

provide buffers and NSO from streams, riparian areas, and wetlands that would reduce the potential for downstream impacts than could impact aquatic species.

Lease Notices:

- UT-LN-49: Utah Sensitive Species: All Parcels

Terrestrial Animal Species

The nominated lease parcels occurs in salt desert shrub habitat. There are hills and broken cliffs as well as flat areas. Development would cause the direct loss of 20 acres of habitat. Oil and gas development may cause raptors to flush from nests and this may cause nest abandonment and lower reproduction. There may be direct loss of the preybase, for raptors including rabbits and rodents. It may also decrease the insects reducing the preybase for foraging bats. Development can cause direct loss of burrows used by many organisms for nesting including prairie-dogs, burrowing owls. An increase of traffic may cause direct mortalities of some individuals.

Table 7 identifies the sensitive terrestrial animal species and their habitat with potential to occur on the nominated lease parcels.

Table 7 Sensitive terrestrial animal species potentially occurring in the nominated lease parcels

COMMON NAME	SCIENTIFIC NAME	STATUS	BACKGROUND AND DOCUMENTATION FOR SPECIES/POTENTIAL HABITAT OCCURRENCE IN PARCELS	LEASE PARCEL ID
white-tailed prairie dog	*Cynomys leucurus*	BLM Sensitive	Known occurrence. Potential habitat	7688 1551 Potential habitat
big free-tailed bat	*Nyctinomops macrotis*	BLM Sensitive	Habitat occurs within VFO managed land but the species is rare in Utah. Individuals rarely occur in northern Utah and species occurs primarily in southern portion of state. No known occurrences within parcels.	7688, 1551
fringed myotis	*Myotis thysanodes*	BLM Sensitive	Potential Habitat Species distribution is mostly in southern portion of state.	7688, 1551
Townsend's' bat	*Corynorhinus townsendii*	BLM Sensitive	Species distribution is widely spread throughout state but no known occurrences of the species are documented within parcels.	7688, 1551
spotted bat	*Euderma maculatum*	BLM Sensitive	Potential Habitat but no known occurrences	7688, 1551
burrowing owl	*Athene cunicularia*	BLM Sensitive	Potential habitat. Primary and secondary breeding habitat is widely distributed throughout the	7688, 1551

COMMON NAME	SCIENTIFIC NAME	STATUS	BACKGROUND AND DOCUMENTATION FOR SPECIES/POTENTIAL HABITAT OCCURRENCE IN PARCELS	LEASE PARCEL ID
			state of Utah. This species prefers open areas within deserts, grasslands, and sagebrush steppe communities. This small owl nests and roosts in underground burrows in open and short-grass habitats. Habitat consists of well-drained, level to gently sloping areas characterized by sparse vegetation and bare ground such as moderately or heavily grazed pasture.	
golden eagle	*Aquila chrysaetos*	BLM Sensitive	Suitable habitat occurs within both parcels and the species is widely distributed statewide. A known nest occurs within parcel 7688.	7688, 1551
Monarch butterfly	*Danaus Plexippus*	BLM Sensitive	Isolated breeding or nectaring habitat may be found within both parcels. However, the habitat is modeled as low suitability for both breeding and adults (Dilts, et al., 2019)	7688, 1551

The following lease notices apply to nominated lease parcels to mitigate potential impacts to sensitive terrestrial animal species.

Lease Notices:

UT-LN-25: White-tailed and Gunnison prairie dog: Parcel 7688, 1551

UT-LN-49 Utah Sensitive Species: Parcel 7688, 1551

UT- LN-156 Pollinators and Pollinator Habitat: Parcel 7688, 1551

Plant Species

Within the nominated lease parcels, there are known populations of one BLM sensitive plant species, Horseshoe milkvetch. Based upon desktop review, two other sensitive species were determined to have potential habitat within the nominated lease parcels, see Table 6. Sensitive Plant Species with Potential to Occur within Nominated Lease Parcels. The desktop review consisted of identifying all STATSGO2 soil units (NRCS, 2014) that contain a soil component associated with a STATSGO2 soil unit that intersect known plant locations. This identified area could be considered the outer potential bounds of the species range. However, the identification of suitable habitat within that broad range has not been completed for the majority of BLM sensitive plant species.

Table 8 Sensitive Plant Species with Potential to Occur within Nominated Lease Parcels

COMMON NAME	SCIENTIFIC NAME	BACKGROUND AND DOCUMENTATION FOR SPECIES/POTENTIAL HABITAT OCCURRENCE IN PARCELS
Horseshoe milkvetch	*Astragalus equisolensis*	Populations of the species have been identified within parcel 1551. Additional potential habitat exists within parcel 7688.
Hamilton milkvetch	*Astragalus hamiltonii*	No known populations exist within the nominated parcels. However, potential habitat exists within parcel 7688
Sterile yucca	*Yucca sterilis*	No known populations exist within the nominated parcels. *Yucca sterilis* is associated with sandy soils throughout the Uinta Basin and potential habitat may exist in all nominated parcels.

Implementation of the below lease notices and section 6 of the standard terms and conditions of the lease would help minimize potential impacts to the species.

Lease Notices:

- UT-LN-49: Utah Sensitive Species: All Parcels
- UT-LN-51: Special Status Plants Not Federally Listed: All Parcels

Horseshoe milkvetch (Astragalus equisolensis)

Lease parcel 1551 intersects known occupied habitat for Horseshoe milkvetch. Using a 2-kilometer separation distance to delineate subpopulations (NatureServe, 2020), one subpopulation intersects the parcel. This subpopulation is the primary subpopulation for the species and covers the majority of the occupied habitat for the species. The subpopulation covers 15,263.2 acres of occupied habitat and covers all of lease parcel 1551.

Using the reasonably foreseeable disturbance assumptions in Section 3.2, 15 acres of disturbance would occur within parcel 1551 and 15 acres of occupied habitat in the parcel would be directly impacted by the development (less than 0.1% of the occupied habitat in the 15,263-acre subpopulation intersecting the lease parcel). Given the requirements to perform surveys and avoid individuals by 300-feet where feasible, it is expected that impacts to occupied habitat at the lease development stage would be less than those presented.

Potential impacts of future development of the nominated lease parcel on the occupied subpopulation of Horseshoe milkvetch occurs within the context of the cumulative effects scenario (Section 3.3). This includes within the subpopulation (as of April 25, 2024) 79 drilled or drilling oil and gas or service wells, 48 plugged and abandoned well locations, 99 proposed well locations, grazing across all land ownership types, existing transmission powerlines, paved and unpaved roads, and community trends associated with global climate change.

Implementation of the below lease notices and section 6 of the standard terms and conditions of the lease would help minimize potential impacts to the species.

Lease Notices:

- UT-LN-89: Horseshoe milkvetch (*Astragalus equisolensis*): Parcel 1551

AIB-3 Migratory Birds

How would future potential development of the nominated lease parcels impact migratory birds in Bird Conservation Region 16?

Both parcels occur primarily in salt desert shrub communities in Bird Conservation Region (BCR)16. The habitat includes geographical features in the area with cliffs and hills along with flat topography. A ferruginous hawk nest is known to occur in parcel 1551 and red-tailed hawk nests are known within a half mile of the parcels. There is a golden eagle nest in parcel 7688. The Migratory Bird Treaty Act (MBTA) protects migratory birds; Executive Order 131186 requires the BLM to address the potential effects of the projects on migratory bird populations and their habitat and implement best management practices to avoid or minimize the possibility of impacts, through such measures as timing limitations during nesting seasons, surveys for bird nests, and monitoring.

The BLM monitors many birds using Integrated Bird Monitoring in Bird Conservation Regions (IMBCR) program. This program provides BLM with information on species present and density trends. There are two IMBCR inventory grids located near the parcels UT-BCR16-VE6 and VE4, they have identified the following bird species: American kestral, ash-throated flycatcher, bank swallow, black-billed magpie, black-chinned hummingbird, black-throated Sparrow, blue-gray gnatcatcher, brewers Sparrow, brown-headed cowbird, Bullock's oriole, burrowing owl, chipping sparrow, cliff swallow, common nighthawk, common raven, golden eagle, gray flycatcher, horned lark, lark sparrow, house finch, loggerhead shrike, mountain bluebird, mourning dove, northern mockingbird, pine siskin, pinyon jay, plumbus vireo, rock wren, sage thrasher, sagebrush sparrow, Say's phoebe, Scott's oriole, tree swallow, violet-green swallow, western kingbird, western meadowlark, western tanager, white-throated swift, woodhouse, scrub-jay, yellow-rumped warbler. Not all these species are expected to occupy the parcels however they may fly over or use the area for foraging.

Oil and gas development fragments the habitat and causes direct loss of habitat including foraging and nesting areas. Also, lighting associated with developments can cause problems during migration such as interfering with navigation. Construction of new developments causes perturbation to the area by increasing noise and increased human and vehicle traffic.

To minimize effects to migratory birds Utah BLM has several lease notices and stipulations that are applied during lease sales, ranging from those applied statewide (UT-LN-45: Stipulations and Notices of this document) to more narrow groups of taxa (see UT-LN-44 Raptors). In addition, several migratory birds have been designated as BLM Sensitive Species, and these may have additional protections through notices to potential buyers of potential for occurrence on a given parcel. UT-LN-49).

For the lease sale, the BLM analysis of potential for occurrence indicated that application of the following lease notices was appropriate for every parcel in the sale: UT-LN-44 Raptors, and UT-LN-45: Migratory Birds.

UT-LN-44 provides that raptor habitat exists in a given parcel, and those surveys will be required to identify any nesting birds. UT-LN-45 gives prospective buyers notice that surveys for nesting migratory birds may be required during migratory bird breeding season whenever surface disturbances and/or occupancy is proposed in association with fluid mineral exploration and development within priority habitats. Based on these surveys, buffers and timing limitations may be applied. In combination, these lease notices provide mitigation measures which will mitigate impacts to migratory birds by allowing the opportunity to make adjustments, such as design modifications, at the site-specific level when an Application for Permit to Drill is received.

Lease stipulations: UT-S-261 Timing Limitation and Raptor Buffers: All Parcels

Lease notices: UT-LN-44 Raptors, UT-LN-45: Migratory Birds: All Parcels

AIB-4 Cultural Resources

How would future potential development of the nominated lease parcels impact cultural resources?

The BLM conducted a literature review for the nominated lease parcels using survey and site information from BLM Utah's cultural resources database (CURES), Utah Division of State History Sego database, J. Willard Marriott Library of the University of Utah online archaeological record collection (UDAM), and VFO to identify currently known sites within the lease parcels. These data sources contain information on all the recorded cultural resource sites and cultural resource surveys conducted within and adjacent to the nominated lease parcels. See Chapter 4 for the NHPA Section 106 process that is used to help inform, but is separate from, the NEPA analysis of impacts to cultural resources.

To broadly summarize the results of the literature review, within these two parcels, seventeen cultural resource surveys have been completed. Previous cultural resource inventory intensity varies widely across the parcels covering up to 34%. One cultural resource site has been documented within the parcels, which is not eligible for listing in the National Register of Historic Places (National Register). Within a 0.5 mile-buffer of the two parcels, four cultural resources have been documented. Of these four sites, one is eligible for the National Register.

BLM Archaeologists at the Field and State Office reviewed this data against the lease sale parcel locations, including their respective applicable stipulations and lease notices, to determine if oil and gas development could occur, without incurring adverse effects to historic properties, taking into consideration impacts to all known cultural resources as well.

The Cultural Resource Stipulation, as required by BLM Handbook H-3120-1, applies to all parcels on BLM-managed lands. The stipulation reads as follows:

> This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM would not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations 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.

Based on the currently known cultural resources within the two parcels, which consists of a single non-National Register eligible lithic scatter within the parcels, three non-National Register eligible historic artifact scatters and one National Register-eligible historic rock writing site within 0.5 mile of the parcels, current cultural resource survey coverage within the parcels, and the previous oil and gas development history of the area, the BLM anticipates to encounter similar site types and density across both parcels should future development necessitate additional cultural resource survey and identification. Additionally, based on the individual sizes of the parcels, the application of the cultural resources protection stipulation, and the existing disturbance from previous development within each parcel, the BLM anticipates that potential development can occur within the two parcels without adverse impacts to cultural resources and without an adverse effect to historic properties. The NHPA Section 106 review process is ongoing (see Chapter 4) and will conclude before BLM makes a final decision for the lease sale.

For future oil and gas developments related to this lease sale, the BLM would not approve any ground disturbing activities until it completes its obligations to consider cultural resources and historic properties under the NEPA, the NHPA, and other authorities specific to those future developments. This includes the Native American Graves Protection and Repatriation Act (NAGPRA), which may require the development of a Plan of Action for potential inadvertent discoveries, as defined by 43 CFR Subtitle A § 10.2. New analysis of impacts to cultural resources and potential adverse effects to historic properties would be conducted during the review stage of any future site-specific development plans through new NEPA and NHPA Section 106 review processes. Future site-specific analysis may identify and document currently unknown and unrecorded cultural resources.

Lease stipulations: HQ-CR-1 Cultural Resource Protection: All Parcels

AIB-5 Paleontological Resources

How would potential development of the nominated lease parcels affect known or unknown paleontological resources?

Paleontological resources are defined by the Paleontological Resources Preservation Act of 2009 (PRPA) as "any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth" (16 U.S.C. 470aaa(4)). Department of the Interior regulations, implementing PRPA, direct the BLM to "preserve, manage, and protect paleontological resources' on Federal land using scientific principles and expertise" (43 CFR 49.1(a) and 49.30(b)). The Potential Fossil Yield Classification (PFYC) system is a tool used to assess resource impacts and mitigation needs by providing estimates of the potential for paleontological resources within a geologic unit (BLM PIM 2022-009) which allows the 5.5-million-acre BLM VFO to predict the likelihood of encountering paleontological resources. The PFYC system is based on numeric classes of 1–5 and unknown (U). A geologic unit identified as PFYC 1 has very low likelihood of containing paleontological resources, whereas a geological unit identified as PFYC 5 is a geologic unit that has a very high likelihood to contain and predictably produces scientifically significant paleontological resources. A class U assignment indicates that there is not enough information available for a formal class assignment. Until additional information is available, and a provisional or formal assignment made, these units should be considered to have paleontological potential. Within areas identified as PFYC 2 or 3, paleontological resource management concern is generally low to moderate because the likelihood of encountering scientifically significant fossils is relatively low to moderate. Within areas identified as PFYC 4, paleontological resource management concerns are moderate to high, as the probability of affecting scientifically significant paleontological resources is generally high. Areas of moderate to very high and unknown PFYC class (3-5, U) should be assessed prior to authorizing land use action (BLM PIM 2022-009).

Utilizing 1:100,000 scale published geological mapping, the BLM has determined that both lease parcels, 7688 and 1551, are primarily in areas of mapped geologic units with a PFYC 5 designation and a limited amount of PFYC 2 (Table 9). The two PFYC 5 geological units within the lease areas are the Eocene Uinta Formation and Duchesne River Formation (46 to 36 million years ago). These geological units cover over 1,577,465 total acres within the Uinta Basin and are known to contain a diverse assemblage vertebrate including mammals, turtles, crocodilians, lizards, invertebrates plant body and trace fossils (Murphey, et al., 2017) According to confidential paleontological locality data managed by the Utah Geological Survey (UGS), approximately 7,280 localities within the Unita Basin occur within the Uinta or Duchesne River Formations. Based on this UGS managed data, there is one known paleontological locality within the nominated lease parcels and that it is located near the edge of one parcel. Additionally, both nominated lease parcels have extensive exposures of geologic units with paleontological potential.

Table 9 Geologic Units and PFYC Designations of the Nominated Lease Parcels

Mapped Geologic Unit	PFYC Class	Parcel number: acres of PFYC class (percent of total parcel acreage)	Total Acres of Geologic Unit
Mixed alluvium and colluvium	Class 2	7688: 3 (1%)	3
Mixed alluvium and eolian deposits	Class 2	7688: 22 (10%)	22
Brennan Basin Member of Duchesne River Formation	Class 5	1551: 634 (100%) 7688: 147 (72%)	781
Member C of Uinta Formation	Class 5	7688: 33 (16%)	33

Potential development of both nominated lease parcels would result in up to 20 acres of surface disturbance all of which could occur within areas of higher potential for paleontological resources. Effects could result in the immediate physical loss of fossils and their contextual data. Ground disturbance could also subject fossils to long-term damage or destruction from erosion and create improved access to the public and increased visibility, potentially resulting in unauthorized collection or vandalism. Ground disturbance can also reveal scientifically significant fossils that would otherwise remain buried and unavailable for scientific study. Such fossils can be collected properly and curated into the museum collection of a qualified repository, making them available for scientific study and education.

Effects to paleontological resources would be mitigated as future development of the nominated lease parcels would be analyzed further through separate NEPA processes, as directed by FLPMA, BLM regulations, and current policy. For these two nominated lease parcels specifically, the BLM has applied Lease Notice UT-LN-72 (High Potential Paleontological Resources), which specifies that surveys will be required and modifications to the Surface Use Plan of Operations may be required in order to protect paleontological resources from surface disturbing activities in accordance with Section 6 of the lease terms and 43 CFR 3101.1-2. In addition, monitoring may be required during surface disturbing activities. If an APD is filed, specific clearances would be conducted and incorporated into that future NEPA process at the development stage. Additional mitigation measures such as BMPs, standard operating procedures (SOPs), and site-specific mitigation may be applied at the APD stage as COAs. For example, pursuant to a standard discovery requirements, if paleontological resources are discovered during operations within the nominated lease parcels they would be protected when the lessee must cease any operations that would result in the destruction of such specimens and contact the BLM AO. Scientifically significant paleontological resources discovered through surveys or monitoring would be collected by a qualified paleontologist and curated at an appropriate repository (43 CFR Part 49).

Additionally, the BLM applied stipulation UT-S-123 for Riparian, Floodplains, and Public Water Reserves and UT-S-99, UT-S-100 Fragile Soils/Slopes for both parcels 7688 and 1551, and US-S-96 Fragile Soils/Slopes for parcel 7688 (see Appendix B.1) which would provide protection for geologic exposures along drainages and on slopes that may have paleontological potential. With consideration of these protections, potential effects on paleontological resources of scientific interest would be avoided or mitigated.

The cumulative impact scenario described in Section 3.3 provides an overview of cumulative actions. The risk of impacts on paleontological resources from the cumulative scenarios would depend on the locations of proposed disturbance relative to PFYC class. When the potential development of these lease parcels is combined with these other actions, the cumulative impacts to paleontological resources are anticipated to be minimal due to the requirements for resource assessments and mitigation combined with the low

percent of total acreage that could be impacted by ground disturbing activities or increases in human use of areas.

Lease Notices: UT-LN-72: High Potential Paleontological Resources: All Parcels

AIB-6 Native American Concerns

How would future potential development of the nominated lease parcels impact Native American Concerns?

As discussed in further detail in Section 4.2, the BLM provided project information and an invitation to consult on resources of concern to potentially affected Tribes on February 13, 2024. To-date, no Tribes have requested government-to-government consultation for the lease sale or identified any specific areas or resources of concern. Data available to the BLM does not indicate any documented Traditional Cultural Properties or Sacred Sites located within or proximal to the nominated lease parcels; however, resources and locations of concern to Native American Tribes may be present. Further information regarding the potential for additional resources of concern for Tribes may be obtained through on-going outreach, coordination, or consultation. Additional opportunities to engage with Tribes regarding areas or resources of concern remain available throughout the leasing process and in subsequent NEPA and NHPA reviews that would be required if the nominated parcels are leased and development is proposed.

AIB-7 Environmental Justice

How would future potential development of the nominated lease parcels impact Environmental Justice (EJ) populations in Uintah and Duchesne Counties?

Environmental justice refers to the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, implementation, and enforcement of environmental laws, regulations, programs, and policies (CEQ, 1997). Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 16, 1994), requires federal agencies to determine whether proposed actions would have disproportionately high and adverse environmental impacts to minority, low-income, and American Indian populations of concern. BLM policy, as contained in BLM Land Use Planning Handbook H-1601-1 and BLM IM 2022-059, provides direction on how to fulfill agency responsibilities under Executive Order 12898.

The CEQ developed guidance (CEQ, 2023) to assist federal agencies with their NEPA procedures so that EJ concerns are effectively identified and addressed. The guidance focuses on identifying minority and low-income EJ populations using census data. The BLM's IM 2022-059 builds upon CEQ's guidance and provides further direction for considering EJ concerns in BLM-prepared NEPA documents, including a detailed framework for identifying EJ populations using census data as well as several other recommended data sources.

The environmental justice analysis areas for this lease sale are Duchesne and Uintah Counties, Utah because this is where the parcels are located. The reference area is the State of Utah. Additionally, several census tracts in the immediate vicinity of the Proposed Action are included.

Table 10 Demographic data

Geography	Population (2022)	Low Income	Minority	Native American
Duchesne County	19,443	32.9%	15.7%	3.4%
Uintah County	35,473	34.3 %	20.0%	6.1%
Census Block Group 490479402011	324	46%	49%	22%
Reference Area: State of Utah	3,151,239	26%	22.7%	2.0%[6]

Data sources: EPA EJScreen: http://www.epa.gov/ejscreen (accessed April 2024); BLM Environmental Justice Mapping Tool; not publicly available (accessed April 2024). Both rely on the same Census Bureau American Community Survey data.

A low-income community of concern is present if a low-income population in one or more study area geographies is at or above the low-income level of the reference area or is at or above 50 percent. This screening identified that both counties and the very sparsely populated census block group met or exceeded these criteria. A low-income EJ community of concern, therefore, is identified for the purposes of this analysis. It should be noted that the low-income data for these areas is of relatively low reliability, according to the Census Bureau, due to sampling error inherent in small populations. A minority community of concern is present if the percentage of the population identified as belonging to a minority group in a study area is equal to or greater than 50 percent, or it is more than 10 percentage points higher than that of the reference area; neither county meets this threshold, but the census block group does. BLM has defined a separate threshold for Native American populations, to distinguish this group from other minority populations. Since the Native American population in both counties exceeds the state reference level, itis considered a population of concern (BLM 2024). It is also worth noting that lease parcel 7688 lies in very close proximity to the Hillcreek Extension of the Uintah & Ouray Reservation. The BLM realizes that additional adverse impacts may be identified by local communities as specific development locations and types are proposed. The parcels in question are far removed from population centers. Reducing the likelihood of adverse impacts to local residents, including identified EJ communities. The BLM would provide EJ communities of concern with opportunities to identify any perceived adverse environmental impacts at the time of site- specific analysis during the APD stage. As a result, the above discussion assesses only the effects for the issues identified by the BLM during scoping associated with this leasing process. The BLM would continue to work with potentially affected communities of concern to identify and address additional EJ issues as they arise. Oil and gas activity is expected to continue within the project area for the foreseeable future, with attendant potential impacts to EJ communities, as described above.

AIB-8 Pronghorn

How would future potential development of the nominated lease parcels impact pronghorn and pronghorn crucial year long and crucial fawning habitat?

The parcels both occur in the Utah Division of Wildlife Resources (UDWR) Pronghorn Management Unit Bonanza and Diamond Mountain. The entire management unit (approximately 521,000 acres) is year-long crucial and fawning habitat. Both parcels are contained in the salt desert shrub habitat type. The Unit contains areas with large flats and varied geography including hills and cliffs. There is a large oil field south of the parcels that was observed in aerial photos and other oil and gas development along with service roads nearby. The pronghorn generally prefer the flatter more open areas because they have very powerful eyesight and can detect predators better in open country, however they can be found in the

[6] The Utah Native American population is actually 1.3%, but BM recommends 2.0% as the statewide threshold .

broken county as well. The flats in the unit have oil and gas development but some are still unoccupied. There is also, domestic livestock grazing in the unit where some competition for forbs occurs between the pronghorn and domestic livestock. There are a few agricultural center pivots mostly located near the Green River and some in the south end of the Unit. Pronghorn probably benefit by using those as forage.

Pronghorn population numbers have varied widely in this herd unit and have ranged from 295 to 389 between 2000 and 2022 (see Figure 1). Potential development of the nominated lease parcels would result is direct loss of vegetation on 20 acres and habitat fragmentation would be increased in the herd unit with any additional roads built and pad construction. Habitat fragmentation is a major concern for pronghorn and may reduce production especially if development occurs on migration corridors (Sandoval Lambert, 2022). There are no GPS collared pronghorn in this area that could show migration patterns.

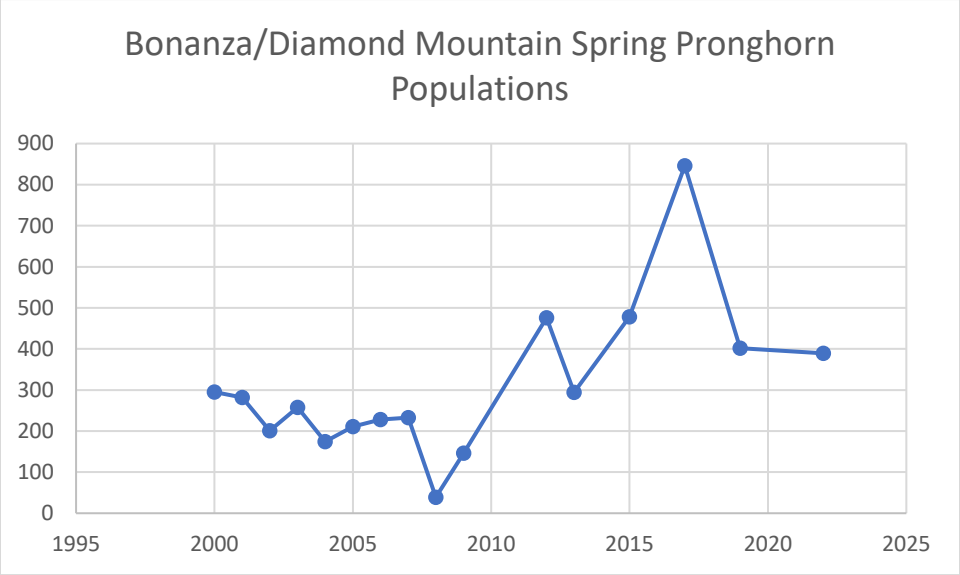

Figure 1 Bonanza/Diamond Mountain Spring Pronghorn Populations

Bonanza/Diamond Mountain Pronghorn Unit Lease Notices:

UT-LN-13 Pronghorn Fawning Habitat UT-LN-14

AIB-9 Vegetation Communities and Animal Habitat

How would potential development of the nominated lease parcels impact terrestrial vegetation communities and the animals that use them as habitat?

Potential development of the nominated lease parcels would result in new surface disturbance and potential loss of vegetation in approximately 20 acres of the 833.3 acres based on the RFD in Section 3.2.1. Any activity that involves surface disturbance or direct resource impacts would have to be authorized as a lease operation through future NEPA analysis, on a case-by-case basis, at the APD stage. Reclamation provisions/procedures including re-vegetation (utilizing appropriate seed mix based on the ecological site, elevation, and topography) would be a part of the APD analysis.

Terrestrial upland vegetation within the nominated lease parcels is dominated by globally and regionally common vegetation communities including Great Basin saltbush scrub and Intermountain shadscale – saltbush scrub. Additional upland terrestrial vegetation communities within the parcels that are more uncommon at the watershed scale include: Intermountain Basins cliff scree & badland sparse vegetation and Great Basin & Intermountain tall sagebrush shrubland & steppe.

Potential impacts to different vegetation communities are highly dependent upon the siting of facilities at the APD stage. Considering the analysis assumptions in Section 3.2, the median percentage of disturbance to vegetation communities at the watershed level would be less than 0.1% assuming random distribution of disturbance and 3.0% assuming disturbance in each watershed was fully placed within one upland terrestrial vegetation type.

Animal community composition is correlated with the vegetation community composition and structure. Impacts associated with future potential development to the animal community would likely follow the vegetation community trends. There are many species of wildlife that occur in the salt desert scrub and shrublands including many species of rodents (e.g. mice, voles, kangaroo rats), jackrabbits, foxes, coyotes and many reptiles such as snakes and lizards. Additionally, a large variety of insects species from many different insect orders are also found in this ecotype including pollinators. All species of wildlife are involved in many food webs as either predators or prey and direct loss of habitat could lower the prey base for raptors including rabbits, mice and prairie dogs. Loss of insect diversity and abundance many reduce prey base for bats and lead to a reduction in pollinators for plant community.

Potential impacts of future development of the nominated lease parcels on the vegetation communities and the associated animal communities occurs within the context of the cumulative effects scenario (Section 3.3). This includes within the encompassing HUC 10 watersheds (as of April 25, 2024) 1,023 drilled or drilling oil and gas or service wells, 475 plugged and abandoned well locations, 529 proposed well locations, conversion of native vegetation communities to agriculture or rural development, grazing across all land ownership types, existing transmission powerlines, existing interstate transmission pipelines, paved and unpaved roads, and community trends associated with global climate change.

AIB-10 Invasive Species (Noxious Weeds)

How would potential development of the nominated lease parcels impact the introduction and/or spread of invasive species and noxious weeds?

There are currently various populations of noxious weeds in the larger overall area of the leased parcels. Noxious and invasive weeds present in the general area are primarily associated with existing areas of development and disturbance. These species are present along roads, ditches, well locations, and other disturbance areas near the parcels. Typical early seral species in this area are Russian thistle, Halogeton, tumble mustard, annual wheatgrass and cheatgrass. Existing roads, wildlife and livestock grazing throughout the general area are a common source of weeds, therefore, elimination of weedy species from the general area is unlikely. The extent of infestation and persistence of weeds would be dependent on monitoring and treatment in accordance with the site-specific implementation level actions.

Anticipated total surface disturbance for the Proposed Action is approximately 20 acres. The proposed surface disturbance would remove native herbaceous and woody shrub vegetation, primarily from the desert shrub community. Some surface disturbance would be temporary in overall nature (areas used for initial staging would be interim reclaimed), taking potentially a minimum of three growing years to establish vegetation once reclamation begins.

Removal of topsoil and native vegetation would result in a localized loss of individual plants and a chemical and spatial niche for invasive and noxious weed species to proliferate. New ground disturbance

that exposes underlying soils creates the ideal seed bed for invasive and non-native weeds species to germinate. Disturbance from heavy construction exposes subsurface parent material which is often high in salts and low in organic matter – creating potential niches for invasive species like cheatgrass and Halogeton as well as other potential noxious weeds like knapweed found along transportation routes within this area of the VFO. Uncleaned construction equipment and vehicles entering the project area are potential vectors for introducing invasive weeds not currently present.

Reasonably foreseeable effects to the resources, when added to effects from other actions in and near the project area and the local watersheds, would include short-term and long-term effects from removal of existing herbaceous and shrubland vegetation that creates niches for invasive species. This removal is expected to increase with the current level of oil and gas development, and the recent filing pattern of Applications for Permits to Drill and right-of-way applications within the VFO BLM during 2023 and 2024.

Industry practices that minimize weed transport from construction equipment such as power washing and appropriate staging (avoiding weed infestation areas) and proper spraying (both timing and herbicide selection) may lessen the density of new weed colonization within the construction area and aid in reclamation efforts. Seed mixes that maximize management of weed emergence are important for returning the site's sustainability and production.

Prior to any potential development authorized under an APD or a right-of-way application, the lessee or applicant would be required to contact BLM prior to any seeding and weed management to document the activities occurring and coordinate potential site visits by the BLM.. Weed management would be in adherence to the Vernal Planning Area Invasive Weed Management Plan DOI-BLM-UT-G010-2016-011-EA, signed May 2017 and the 2008 VFO RMP ROD (Record of Decision) MCA; page 65 Goals and Objective, bullet no. 3. The well pads, roads, access corridors and any other long-term exposed surface would be treated through either chemical or mechanical means to control weeds. It is mandatory that a Pesticide Use Permit be obtained for applying herbicides on public lands managed by BLM.

Denial of the Proposed Action would have little impact on the cumulative effects of oil and gas development impacts to the vegetative communities within the area because other similar projects have been implemented and are ongoing.

AIB-11 Surface Water

How would potential development of the nominated lease parcels impact the quality of surface water resources?

The lease parcels have been reviewed for proximity to surface waters. The two parcels are within the Zone 4 surface drinking water area, which is an area upstream from a public water supply intake to the extent of the watershed boundary above the Green River Intake per Utah Division of Drinking Water Source Protection rules. The site-specific SOPs, BMPs, COAs, and lease stipulations attached to each parcel would minimize impacts from the Proposed Action to surface water resources because surface disturbing activities would occur outside of riparian and wetland areas where surface water is present, refer to UT-LN-56 in Appendix B for further details. Other development activity with potential impact on surface water such as stream crossings and culvert installations would be designed per BLM standards with existing SOPs and BMPs. Surface water resources would not be impacted to the degree that requires detailed analysis in the EA.

The nominated lease parcels are located in the Green River-2 Tribs-4 DEQ water quality assessment unit. The beneficial uses of this unit are Class 1C = Domestic/Drinking Water Source, Class 2A = Frequent Primary Contact Recreation (e.g. swimming), Class 3B = Warm Water Fishery/Aquatic Life, Use Class 4 = Agriculture (crop irrigation, stock watering). This unit is listed as impaired TMDL required for E. coli in Class 1C and 2A.

While a TMDL and identification of sources of this surface water contamination has not been completed for these assessment units, E. coli contamination may be from fecal matter or may be natural in the environment. Surface water is limited in the analysis area outside of the Green and White Rivers and not present within the parcels with the exception of ephemeral flow following storm events. Changes in status of streams from perennial to intermittent or intermittent to ephemeral have occurred regionally due to water development and drought as described in the cumulative effects scenario Section 3.3. The site-specific SOPs, BMPs, COAs, and lease stipulations attached to each parcel would minimize impacts from the Proposed Action to surface water resources because surface disturbing activities would occur outside of riparian and wetland areas where surface water is present. Other development activity with potential impact on surface water such as stream crossings and culvert installations would be designed per BLM standards with existing SOPs and BMPs. Surface water resources would not be impacted to the degree that requires detailed analysis in the EA.

While there are no specific BLM Utah water quality specific notices or stipulations, the buffers on surface occupancy in riparian areas and floodplains, UT-LN-53 and UT-LN-128 as well as those associated with sensitive soils and steep slopes, UT-S-96, UT-S-99, and UT-S-100 will result in protection of water quality by minimizing sediment inputs and other water quality contaminants. A construction storm water permit is required by the Utah Division of Water Quality if the development activities (industrial or construction) result in a discharge of a reportable quantity release or that contribute pollutants to a violation of a water quality standard.

Surface water demands from similar activities within the basin require water for the use of dust suppression along routes which are typically obtained from municipal sources or through a temporary change application on valid existing water rights. Surface water sources typically include rivers, streams, or canals that are in proximity to potential development areas. The Utah Division of Water Rights (UDWRi) are responsible for the approval of such applications. These water sources would be from state permitted sources with valid water rights as managed by Utah water appropriation policy per each water basin. Valid permits and supporting water rights, if necessary, that involve these beneficial uses are verified and analyzed for potential impacts prior to approval at the APD stage.

AIB-12 Groundwater

How would potential development of the nominated lease parcels impact groundwater quality and quantity?

Groundwater Resources- Quantity/Needs

Water obtained from aquifers and surface water could result in the drawing down of the water table and reduction of available water resources for wildlife, vegetation, springs, streams, or public consumption. Withdrawal could affect local groundwater flow patterns and create changes in quality and quantity of the remaining groundwater based on the quantity of water required for surface management and downhole operations. The quantity and quality of water used, produced, and disposed of or re-used varies enormously depending on local geology, financial constraints, and regulations, with implications for the environmental impacts of oil and gas production (American Geosciences Institute, 2018).

Water produced along with oil and gas is often naturally salty and may contain oil residues, chemicals from hydraulic fracturing and drilling fluids, and natural contaminants from the rocks themselves. It is usually either disposed of deep underground or treated and reused, though some is allowed to partially evaporate in surface pits. During the production phase the amount of water produced by a well can vary from almost none to over 100 barrels of water per barrel of oil. Nationally, an average of about 10 barrels of water are produced for each barrel of oil (American Geosciences Institute, 2018).

According to a Survey Note produced by the Utah Geological Survey regarding water use and production within the Uintah Basin, where these parcels are located (Volume 50, No 2), Their study evaluated the thickness, structure, porosity, permeability, water quality, and temperature of all aquifer/reservoir units in the basin from the Eocene-age Green River Formation through the Jurassic-age Glen Canyon Group. Large volumes of produced saline water are typically disposed of by several techniques. Less than 3 percent of the produced water is used for hydraulic fracking in the Uinta Basin. As of 2018, the hydrocarbon production generates over 78 million barrels of saline (briny) non-potable water that requires disposal.

About 11 percent of produced water is hauled from the well site to specially designed, lined storage ponds where it evaporates; evaporation rates are often increased by huge water sprayers (about 8 percent of the water evaporates from these ponds, allowing continued delivery of new water annually). Extensive drilling for gas in tight sandstones in the eastern part of the basin (e.g., Natural Buttes field) generates significant quantities of water, while in the central basin (e.g., Monument Buttes field) expanding enhanced oil recovery (EOR) programs, called waterflooding recovery (injecting oil-bearing sandstone reservoirs with water to push remaining oil towards producing wells to increase recovery), creates a need for water.

Waterflooding projects use 18 percent of the total produced water, but this accounts for only 50 percent of the need, so the shortage is made up with freshwater supplies. Thus, excess compatible produced water from gas wells could increasingly be transported to oil fields undergoing EOR. Finally, about 60 percent of the produced water in the Uintah Basin is injected via wells into porous rock at a sufficient depth as to not cause contamination of shallow freshwater aquifers (Utah Geological Survey, 2018)

The amount of water used depends on the rock formation, the operator, whether the well is vertical or horizontal, and the number of portions (or stages) of the well that are fractured. (USGS, 2019)

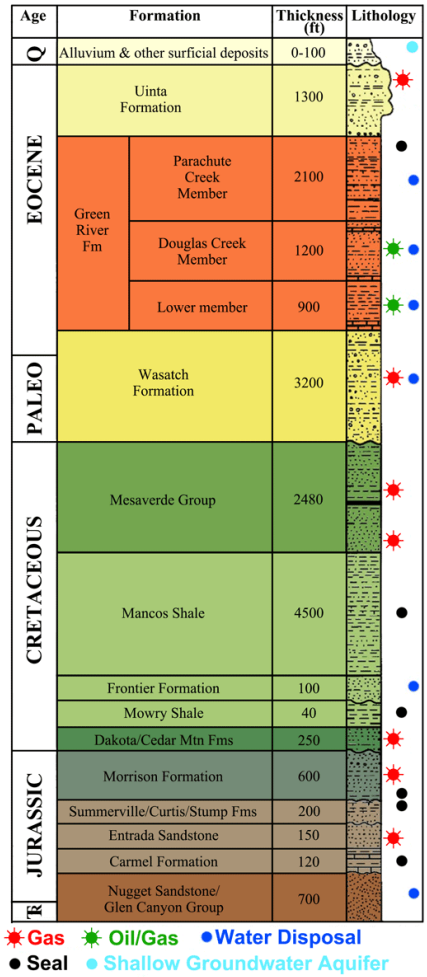

Figure 2 Stratigraphic column

Utah Geological Survey, 2018. Stratigraphic column from the surface down through the Upper Triassic-Lower Jurassic-age Nugget Sandstone in the Uinta Basin showing major oil- and gas-producing reservoirs, seals, water disposal zones, and shallow groundwater aquifers. Modified from Hintze and Kowallis (2009), Geologic History of Utah.

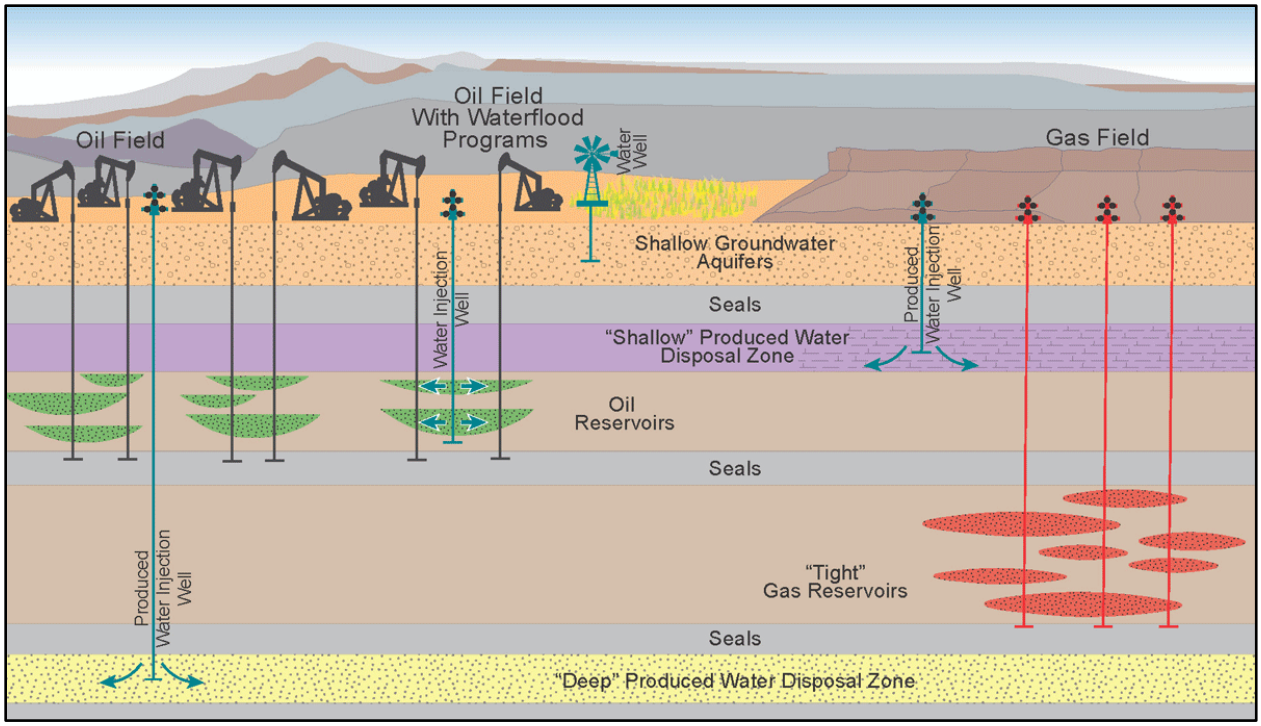

Figure 3. Utah Geologic Survey, 2018. Schematic diagram showing oil and gas wells and hypothetical zones to dispose of the produced water (actual zones presented in Figure 2).

The source, volume of water, and transportation methods involved is identified in the drilling plan per 43 CFR Subpart 3171[7] (BLM, 2023).

Detailed impacts of this water use cannot be addressed until site specific operations identify the water source. The U.S. Geological Survey (USGS) estimates that well use per well can range from 1.5 million gallons to about 16 million gallons (USGS, 2023) however, much of this water is often recycled from other nearby operations depending on local conditions. 43 CFR Subpart 3171 requires the submission of a drilling plan and surface use management plan where the source and transportation of usable water is identified. Potential site-specific impacts relating to future authorizations would be reviewed and possibly analyzed in detail when an APD is received. Prior to approving an APD, hydrologic and engineering reviews would be conducted on all proposed down-hole activities, including hydraulic fracturing (if proposed). All appropriate regulatory and mitigation measures would be included in any approved APD, and all potential impacts would be identified and addressed during the site-specific NEPA process.

Groundwater Quality

The lease parcels have been reviewed for proximity of Sole Source Aquifers or Public Drinking Water Source Protection Zones as designated and delineated by the U.S. Environmental Protection Agency (EPA) and State of Utah Division of Drinking Water. Lease parcels that have been identified to fall within these protection zones have a lease notice and or stipulation attached. Refer to UT-LN-56 in Appendix B for further details. No parcels within this lease sale are within delineated groundwater source protection zones or sole source aquifers. The parcels were also reviewed for potential water right conflicts for

[7] All Onshore Orders were published in the Federal Register and codifies in the CFR. The only changes made to the Onshore Orders pertain to formatting. https://www.federalregister.gov/documents/2023/06/16/2023-11742/onshore-oil-and-gas-operations-federal-and-indian-oil-and-gas-leases-codification-of-onshore-orders.

potential water quality degradation or quantity impairment. Per State of Utah Anti-Degradation policy (UAC R317-2-3) water quality must continue to be acceptable to meet the beneficial uses of the water right under all conditions.

Groundwater quality protection for oil and gas leasing, exploration and development are outlined in Instruction Memorandum (IM) No. UT 2010-055: Protection of Ground Water Associated with Oil and Gas Leasing, Exploration and Development- Utah BLM. The purpose of this IM is to clarify the process for the protection of usable ground water zones (< 10,000 mg/L as defined in Onshore Oil and Gas Order No. 2) associated with oil and gas exploration and development activities. The downhole intervals of water aquifers with usable water would be fully cased and cemented to prevent comingling of water. All potential usable water aquifers would be cased and cemented. Well casings would be pressure tested to ensure long-term integrity throughout the life of the well. The appropriate selection of casing materials and cementing schedule is required and reviewed by the BLM, for the prevention of intermixing or water quality degradation of identified usable water formations. This would eliminate the intermixing of ground water encountered from various aquifers encountered during the drilling process.

AIB-13 Sensitive Soils

How would potential development of the nominated lease parcels impact sensitive soils?

Soil movement disrupts the existing structure of the soil horizons to the depth of disturbance. Soil forming processes are halted, and compaction of underlying horizons and loss or degradation of soil microbes may occur. These issues are compounded when fragile and/or sensitive soils are present. Fragile soils are soil types that are easily damaged by use or disturbance and/or are those that are difficult to reclaim to pre-disturbance condition. Additionally, sensitive soils may include those that have components that can be characterized as susceptible to compaction or other mechanical damage and/or are highly erodible when disturbed. Surface disturbance of fragile and/or sensitive soils occurring on increased slope profiles has the potential to affect soil stability and may lead to accelerated soil erosion and potential sedimentation to proximal water bodies during saturated and runoff conditions within the soil profile.

Soils can be rated based on their susceptibility to degradation. Fragile soils are those that are most vulnerable to degradation. In other words, they can be easily degraded and have a low resistance to degradation processes. They tend to be highly susceptible to erosion and can have a low capacity to recover after degradation has occurred (low resilience). Fragile soils are generally characterized by a low content of organic matter, low aggregate stability, and weak soil structure. They are generally located on sloping ground, have sparse plant cover, and tend to be in arid or semiarid regions. The index can be used for conservation and watershed planning to assist in identifying soils and areas highly vulnerable to degradation.

Depending on inherent soil characteristics and the climate, soils can vary from highly resistant, or stable, to vulnerable and extremely sensitive to degradation. Under stress, fragile soils can degrade to a new altered state, which may be less favorable or unfavorable for plant growth and less capable of performing soil functions. To assess the fragility of the soil, indicators of vulnerability to degradation processes are used. They include organic matter, soil structure, rooting depth, vegetative cover, slope, and aridity.

Within the lease parcels there are fragile soils, soils that are on slopes greater than 40%, and soils that are not suitable for road construction. The nominated lease parcels contain the following Soil Map Units:

Table 11. Soil types

Lease Parcel	Soil Map Unit
7688	Badland-Rock outcrop complex, 1 to 100 percent slopes, 103 acres Badland-Denco complex, 4 to 25 percent slopes, 92 acres Nakoy loamy fine sand, 1 to 5 percent slopes, 12 acres
1551	Milok-Montwel-Badland association, fine sandy loam, 3 to 25 percent slopes- 620 Acres

It is expected that reclamation procedures would be required to ensure long-term vegetation, physical and biological impacts to affected soil profiles are minimized. Reclamation provisions/procedures would include re-vegetation (utilizing appropriate seed mix based on the ecological site, elevation and topography), topsoil preservation, road reclamation, noxious weed controls, etc. The parcels contain areas of steep topography, so SOPs, BMPs and site-specific design features applied at the APD stage, including reclamation, would be applied as COAs.

Lease Stipulations:

- UT-S-96: No Surface Occupancy – Fragile Soils/Slopes Greater than 40%: All parcels
- UT-S-99: Controlled Surface Use – Fragile Soils/Slopes: All parcels
- UT-S-100: Controlled Surface Use – Fragile Soils/Slopes (21%-40%): All parcels

AIB-14 Riparian Areas, Wetlands, and Floodplains

How would potential development of the nominated lease parcels impact riparian areas, wetlands, and floodplains?

The nominated lease parcels have been reviewed for proximity to riparian areas, wetlands, and floodplains. Through resource knowledge and/or GIS analysis of the National Wetlands Inventory layer, the BLM identified intermittent drainages and mapped wetland habitats within the lease parcels. Wetlands were identified in parcels 1551 that intersect the United States Forest Service (USFS) National Wetland Inventory data layer. The other parcels contain intermittent drainages. Floodplains (as defined in EO 11988) are associated with perennial lentic and lotic systems as well as intermittent/ephemeral streams which are present on all parcels.

Riparian and wetland habitats naturally comprise a very small percentage of habitat in the analysis area. Some of this habitat has likely been lost due to development and water use as described in the cumulative effects scenario Section 3.3.

Notice LN-128 would be added to all parcels to inform potential lessees of the requirements of EO 11988: UT- Federal Flood Risk Management Standard.

BMPs, SOPs, and site-specific mitigation may be applied at the APD stage as COAs. Protective measures for riparian and wetland areas and floodplains would include no surface occupancy within active flood plains, wetlands, public water reserves, or 100 meters of riparian areas (UT-S-123), or avoidance of disruptive activity within 100-year floodplains (UT-LN-128) or a combination of all of these.

Applying these protective measures (stipulations and lease notices) at the time of leasing would inform the lessee of the resource. No further analysis is needed at the leasing stage, but additional mitigation measures and buffers may be applied at the APD stage, as necessary to protect these areas. Additional site-specific NEPA analysis would occur at that time.

Lease Stipulations:

- UT-S-123: NSO within 100 meters of riparian, floodplains, or wetlands

Lease Notices:

- UT-LN-53: NSO within 100 meters of riparian areas
- UT-LN-128: locate facilities outside 100-year floodplain

AIB-15 Recreation

How would potential development of the nominated lease parcels affect recreation opportunities and activities?

Recreational opportunities and activities within or near the nominated lease parcels consist mainly of off-highway vehicle (OHV) driving, hunting, and wildlife viewing. There are no designated Special Recreation Management Areas or developed recreation sites located within the parcels. Recreational visitor use within the project area is dispersed, seasonal, and low intensity.

The VFO attracted 510,000 visitors to BLM lands in 2023 (BLM, 2024). The two parcels proposed for lease are in an Extensive Recreation Management Area (ERMA), which is managed to provide a more primitive recreation experience with minimal facilities and development. The closest developed recreation site to Parcel 7688 is the Fantasy Canyon Geologic Site, 9 aerial miles distant, which attracted 11,500 visitors in 2023. The closest recreation facility to Parcel 1551 is the McCoy Flats Mountain Biking Area, 9 aerial miles distant, but on the opposite side of the Green River and not readily accessible by vehicle from the parcel. The closest accessible site by road to Parcel 1551 is the Musket Shot Spring Scenic Overlook on US Highway 40, which attracted 53,000 visitors in 2023. Most of these presumably were highway travelers not necessarily recreating on or near Parcel 1551.

Per the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development – The Gold Book (BLM, 2007), temporary or longer-term impacts from the Proposed Action, such as road upgrades, increased vehicle traffic, construction, noise, dust, and/or surface disturbances, would be localized and minimally disruptive to recreational access and dispersed recreation opportunities within the parcels as alternative travel routes and public lands would still be available in the vicinity.

AIB-16 Visual Resources

How would potential development of the lease parcels affect the visual landscape?

Lease parcel 1551 is located mostly within Visual Resource Management (VRM) Class 3 and partly in Class 4. Lease parcel 7688 is located entirely within VRM Class 4. Management goals and objectives for

VRM Class 3 allow for a moderate degree of change or visual contrast with the landscape. Management activities may attract the attention of the casual observer but should not dominate the view of the casual observer. The management objective for VRM class 4 is to 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. Management activities may dominate the view and may be the major focus of viewer attention. However, in all VRM Classes, the impact of these activities should be minimized through careful siting, minimal disturbance, and repeating the basic elements of form, line, color, and texture within the existing setting (BLM 2024).

Lease parcel 7688 is adjacent to previously developed gas fields of the Uinta Basin where the landscape is generally flat and uniform in form, line, texture, and color. Parcel 7688 is already crisscrossed with linear disturbances such as roads, well pads, and/or pipelines. Lease parcel 1551 is more distant from existing development but still bisected by existing roads. The presence of existing linear disturbances within or adjacent to the parcels would reduce the level of visual contrast with any new surface disturbances associated with lease development. For these reasons, potential changes or visible contrast with the form, line, texture, and color of the characteristic landscape are likely to be low for these lease parcels and would meet the prescribed objectives for VRM management. VRM resources will also be analyzed at the APD stage.

Past and reasonably foreseeable oil and gas development in the areas adjacent to the lease parcels will continue to cause alterations and impacts to the visual landscape, but within the objectives of the relevant VRM management classes.

AIB-17 Soundscapes

How would noise associated with potential development of the nominated lease parcels impact the local soundscape?

The EPA has identified a 24-hour exposure level of 70 dBA as the level of environmental noise which will prevent any measurable hearing loss over a lifetime. Likewise, levels of 55 decibels outdoors and 45 decibels indoors are identified as preventing activity interference and annoyance. The levels are not single event, or "peak" levels. Instead, they represent averages of acoustic energy over periods of time such as 8 hours or 24 hours, and over long periods of time such as years. The 55 dBA threshold is generally recognized as a level below which no public health or safety risks to the general population would be anticipated to occur.

In rural areas, ambient sound levels are typically 30 to 40 A-weighted decibels (dBA) (EPA, 1974). As a basis for comparison, the sound level of a normal conversation between two people standing 5 feet apart is 60 dBA. Highway traffic noise typically range from 70 to 80 dB(A) at a distance of 50 feet from the highway (USDOT, 2003). Typical noise levels associated with oil and gas activity are presented in Table 3.

Table 12 Noise Levels Associated with Oil and Gas Activity

NOISE SOURCE	SOUND LEVEL AT 50 FEET (DBA)
Well drilling	83
Pump jack operation	82
Produced water injection facilities	71
Gas compressor facilities	89

Source: BLM (2000:4-29).
Note: Sound levels are based on highest measured sound levels and are normalized to a distance of 50 feet from the source.

It is estimated that noise levels could be approximately 83 dBA during the drilling phase. The Inverse Square Law, which states that noise decreases by 6 dBA with every doubling of distance from the source, is often used to estimate noise impacts from a specific source. As such, if the noise level is 83 dBA at 50 feet from drilling operations, then the noise level would be 77 dBA at 100 feet and 71 dBA at 200 feet. At approximately 1250 feet (0.24 miles) from the drilling, sound levels will drop below the EPA threshold of 55 dBA. However, the actual noise levels experienced by the receptor will depend on the distance between the receptor and the equipment, vegetation (e.g. trees), meteorological conditions (e.g. wind speed and directions, temperature, humidity), the type of equipment used, etc., so sound levels could vary slightly.

A review other noise sources with a quarter mile of the lease parcels shows that common noise sources within this rural area are expected to be from livestock, oil and gas development activities, vehicular traffic, and wildlife. Parcel 1551 is from 0.2 miles to 2 miles from Highway 45 and Parcel 7688 is from 1.2 miles to 2 miles from Wonsits Valley Road. Potential development of the nominated lease parcels is expected to generate noise above ambient levels for the area during drilling and completion of the well Noise impacts during these phases of development would be short-term. As discussed, development, drilling, including spudding and completion, is estimated to take 30-60 days.

Over the long-term (approx. 30 years), noise impacts would decrease during the production phase. Production from gas wells does not require pumping, therefore the main source of noise during production would be traffic associated with monitoring and maintenance of the well. However, during maintenance and well workover operations, noise levels would temporarily increase above those associated with routine well production. In addition, during final abandonment of the well and reclamation, there would be temporarily increased noise levels associated with operation of earth moving construction equipment. Overall, increases in noise levels above ambient rural levels would only occur for short durations during drilling and completion, maintenance and well workover (if needed) and reclamation. As oil and gas development has been ongoing in the area for decades the potential development of lease parcels will not substantially change the soundscape.

AIB-18 Dark Night Skies

How would potential development of the nominated lease parcels impact the quality of night skies on public lands?

Dark night skies contribute to the remote experience that many people seek when they remote public lands. Light pollution diminishes the aesthetic and values of the night sky by making it difficult to see fainter stars or other faint celestial objects (BLM, 2023). Optimal night skies are free of scattered light or skyglow, which is generated by anthropogenic light from development, transportation, or industrial operations. The scattering of artificial light in the atmosphere increases night sky luminance and erodes the visual appearance of stars and planets (BLM, 2018a).

The Bortle Dark-Sky Scale is a nine-level numeric scale that measures the night sky and star brightness (naked-eye and stellar limiting magnitude) of a particular location. It quantifies the observability of celestial objects (significant naturally occurring physical entities, associations or structures which current science has demonstrated to exist in outer space) and the interference caused by artificial light pollution and skyglow (wide scale illumination of the sky or parts of the sky at night). The most common cause of skyglow is man-made lights that give off light pollution. John E. Bortle created the scale and published it

in the February 2001 edition of Sky & Telescope magazine to help amateur astronomers compare the darkness of observing sites. The scale ranges from class 1, the darkest skies available on Earth, through class 9, inner-city skies.

Bortle scale classes are correlated with a sky quality meter (SQM) rating that is derived from an instrument used to measure the luminance of the night sky. It is used, typically by amateur astronomers, to quantify the skyglow aspect of light pollution and uses units of "magnitudes per square arcsecond" favored by astronomers. Scientists, in the process of creating the SQM, devised a scale: between the numbers of 16.00-22.00. At the lowest number—16.00—the sky is the brightest. Customarily, this class would transpire in urbanized areas. Meanwhile, a number of 22.00 represents the least luminance—in other words, the least light pollution and the very darkest night sky. Typically, this reading would generally materialize in remote, uninhabited areas.

SQM values for any point on Earth can be determined from http://www.lightpollutionmap.info. This global map of artificial night sky radiance is produced by the Light Pollution Science and Technology Institute (ISTIL) using both satellite imagery and SQM readings, as described in the paper "The New World Atlas of Artificial Night Sky Brightness" (Falchi et al. 2016) (Falchi, et al., 2016).

The table below shows the different Bortle classes, their respective SQM value range, and description of the human night sky viewing experience:

Table 13 Bortle Classes

Bortle Class	Title	SQM[3] mag/arcsec^2	Description
1	Excellent dark-sky site	21.75~	• the zodiacal light is visible and colorful • the gegenschein is visible • the zodiacal band is visible • airglow is readily visible • the Scorpius and Sagittarius regions of the Milky Way cast obvious shadows • many constellations, particularly fainter ones, are barely recognizable amid the large number of stars • many Messier and globular clusters are naked-eye objects • M33 (the Triangulum Galaxy) is a direct vision naked-eye object • Venus and Jupiter affect dark adaptation

2	Typical truly dark site	21.6–21.75	• the zodiacal light is distinctly yellowish and bright enough to cast shadows at dusk and dawn • airglow may be weakly visible near horizon • clouds are only visible as dark holes against the sky • surroundings are barely visible silhouetted against the sky • the summer Milky Way is highly structured • many Messier objects and globular clusters are naked-eye objects • M33 is easily seen with naked eye
3	Rural sky	21.3–21.6	• the zodiacal light is striking in spring and autumn, and color is still visible • some light pollution evident at the horizon • clouds are illuminated near the horizon, dark overhead • nearer surroundings are vaguely visible • the summer Milky Way still appears complex • M15, M4, M5, and M22 are naked-eye objects • M33 is easily visible with averted vision
4	Brighter rural	20.8–21.3	• the zodiacal light is still visible, but does not extend halfway to the zenith at dusk or dawn • light pollution domes visible in several directions • clouds are illuminated in the directions of the light sources, dark overhead • surroundings are clearly visible, even at a distance • the Milky Way well above the horizon is still impressive, but lacks detail • M33 is a difficult averted vision object, only visible when high in the sky
4.5	Semi-Suburban/Transition sky	20.3–20.8	• clouds have a grayish glow at zenith and appear bright in the direction of one or more prominent city light domes • the Milky Way is only vaguely visible – 10–15 degrees above the horizon. However the Great

			Rift, when overhead and with good transparency, is still obvious. • Although the views of bright globular clusters through 10" aperture and larger are striking, the outer regions of galaxies are difficult or impossible to see.
5	Suburban sky	19.25–20.3	• only hints of zodiacal light are seen on the best nights in autumn and spring • light pollution is visible in most, if not all, directions • clouds are noticeably brighter than the sky • the Milky Way is invisible near the horizon, and looks washed out overhead. The winter Milky Way, even directly overhead, is fairly subtle. • when it is half moon (first/last quarter) in a dark location the sky appears like this, but with the difference that the sky appears dark blue
6	Bright suburban sky	18.5–19.25	• the zodiacal light is invisible • light pollution makes the sky within 35° of the horizon glow grayish white • clouds anywhere in the sky appear fairly bright • even high clouds (cirrus) appear brighter than the sky background • surroundings are easily visible • the Milky Way is only visible near the zenith • M33 is not visible, M31 is modestly apparent
7	Suburban/urban transition	18.00–18.5	• the zodiacal light is invisible • light pollution makes the sky within 35° of the horizon glow grayish white • clouds anywhere in the sky appear fairly bright • even high clouds (cirrus) appear brighter than the sky background • surroundings are easily visible • the Milky Way is only visible near the zenith • M33 is not visible, M31 is modestly apparent

8	City sky	<18.00	• the sky is light gray or orange – one can easily read • stars forming familiar constellation patterns may be weak or invisible • M31 and M44 are barely glimpsed by an experienced observer on good nights • even with a telescope, only bright Messier objects can be detected
9	Inner-city sky	<18.00	• The sky is brilliantly lit • many stars forming constellations are invisible and many fainter constellations are invisible • aside from the Pleiades, no Messier object is visible to the naked eye • the only objects to observe are the Moon, the planets, bright satellites, and a few of the brightest star clusters

Based on 2023 data from http://www.lightpollutionmap.info, both nominated lease parcels 1551 and 7668 are located in areas of SQM scores between 22.0 and 21.8, placing them in Bortle Class 1, the highest quality of dark night skies possible. Bortel Class 1 areas are described as Excellent Night Sky sites where portions of the Milky Way cast obvious shadows, many constellations are difficult to distinguish within the heavy background of visible stars, sources of zodiacal light, airglow, and globular clusters are readily visible to the naked eye, and both Jupiter and Venus are bright enough to affect night adaptation. However, Parcel 1551 is just north of and immediately adjacent to numerous light pollution sources to the south and east that have SQM values up to Bortle Class 4, Brighter Rural sky. Parcel 7668 is approximately 1.5 kilometers north of a similar area of Bortle Class 4 light pollution. See figure below.

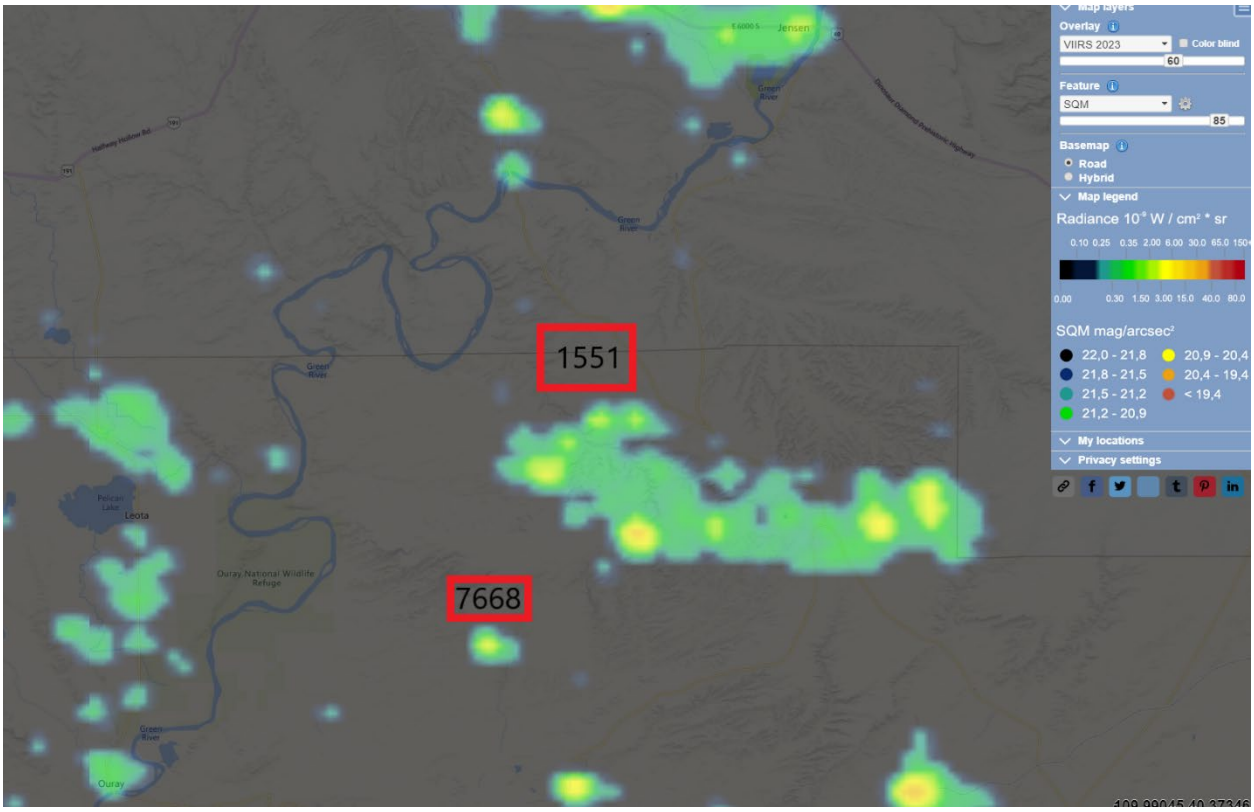

Figure 4 Light pollution sources near the nominated sale parcels (www.lightpollutionmap.info, accessed May 2024)

Potential impacts to night skies associated with development of the leases would include flaring and temporary lighting during nighttime construction activities. Long-term nighttime impacts would include lighting at facilities as well as oil and gas developments as needed for safety and security that would contribute to sky glow and adversely affect night skies. Impacts on night skies would last for the duration of the leases, if developed, and would begin during construction and would last through operations, maintenance, and decommissioning until the reclamation process is completed. These effects would be temporary and transient in nature and would vary based on conditions such as cloud cover, weather (precipitation events), and wind speed or direction. For example, most artificial lighting would occur during the drilling, completion, and potential flaring of a well. Lighting from the other phases of development and production would occur from vehicle traffic or safety lighting. While these impacts would be temporary, they would also be considered long-term as the lighting impacts would remain in effect for more than 2 years. This analysis assumes that lease areas will be developed in the future, with up to 20 wells totaling 20 acres of disturbance spanning over 10 years. Whether potential impacts would change the SQM values in the sale parcels or immediate vicinity is difficult to determine at the leasing phase. Further detailed analysis of the potential impacts to night skies would be analyzed as appropriate when oil and gas development plans and APDs are submitted.

Impacts related to light pollution of night skies would be mitigated and minimized through development of a lighting plan at the APD stage, including the planning principles and the identification of BMPs, as detailed in *Night Sky and Dark Environments: Best Management Practices for Artificial Light at Night on BLM-Managed Lands* (BLM 2023d). Six principles frame the selection and presentation of artificial light at night, as follows:

1. Light only if needed: Use alternatives to permanent lighting.
2. Light only when needed: Use lighting control technologies.
3. Light only where needed: Shield lights and direct them properly.
4. Light color matters: Select amber, orange, or red whenever possible.
5. Use the minimum level of illumination necessary: Avoid over-illumination.
6. Use energy-efficient lights and advanced lighting controls: Save energy while adding useful lighting capabilities.

Specific BMPs include having a lighting plan prepared by a qualified lighting designer, selecting luminaires certified to minimize light pollution, identifying light-sensitive receptors, conducting a baseline study of existing light pollution and night sky conditions, and establishing a lighting and light pollution monitoring program. Additionally, mitigation measures for impacts to night skies associated with oil and gas development such as flaring would include using enclosed flare systems for gas flaring and similar operations to shield light, noise, and heat release. This would result in no visible flame protruding above the structures and could include shaded or directional lighting on structures and shrouded gas flare stacks. The application of BMPs and design features would mitigate, limit, and prevent impacts on night skies associated with future development of any of the leases. The MFO ROD and RMP does not mention night skies as a resource and does not provide any direction or management for the leases identified; therefore, conformance with the MFO ROD and RMP was not assessed.

Lease Notices:

- None.

Lease Stipulations:

- None.

AIB-19 Livestock Grazing

How would surface disturbance associated with potential development of the nominated lease parcels impact the availability of forage in the Split Mountain Allotment?

The parcels are located within a permitted livestock allotment; Split Mountain (UT03111). The Split Mountain allotment consists of the following acres and animal unit months (AUMs):

Table 14 Split Mountain allotment

	Acres	**AUMs**
Public	103,973	7,974
Other Federal	301	0
State	12,607	859

Private	7,146	906

There are currently five BLM issued term permits authorized for grazing privileges within the Split Mountain allotment. Sheep and cattle use are authorized for grazing between October and May of each year. The current permits were fully processed initially through the NEPA process; however, they have been renewed "as is" under the existing terms and conditions and are presently authorized per the FLMPA section 402 (c) stated authority. Oil and gas development has and continues to occur throughout this allotment; however, the BLM does not currently have spatial data quantifying the amount of disturbance that has occurred or what stage the reclamation of such disturbance is.

There are approximately 111 recorded range improvements on the allotment that include: 11 cattleguards, 10 corrals, 1 study exclosure, 1 guzzler, 5 springs, 1 permanent trough, 7 sites connected to a pipeline and trough system, 1 well, 11 gates and 62 reservoirs (water impoundments). One of the reservoirs is the Horseshoe Bend reservoir (*water right 49-746*), located on the boundary of lease parcel, UT-2025-03-1551. Water on these desert allotments is crucial for livestock survival and proper dispersal of animals for proper forage utilization. The potential full development of the parcel with access from this location stated above may affect the functionality of the water impoundment; this would be addressed at the site-specific scale to address any potential APD and/or Right of Way (ROW) request.

Reasonably foreseeable cumulative actions within the parcels proposed for leasing would result in an estimated 20 acres (Table 5) of new surface disturbance on the Split Mountain allotment. Fragmentation of the allotment from the proposed action may affect forage availability; however, permitted readjustments occur through a separate process (NEPA and Decision Records). Rangeland Health Evaluation have not been assessed for more than 10 years for this allotment. The evaluation of rangeland health for attainment of *Standards* per 43 CFR 4180 regulations is a separate action and facilitated most often through the permit renewal process. Therefore, it is not within the scope and scale of this project analysis. Reclamation actions of disturbed areas within the allotment may offset potential impacts on allotment fragmentation and forage available for livestock.

AIB-20 Mineral Resources and Energy Production

How would potential development of the nominated lease parcels impact mineral resources and energy production?

There are currently 1,168,221 acres leased within the BLM VFO. Current annual production within VFO area is estimated to be 8,944,611 bbl of oil and 43,488,525 mcf of gas (CITE). The two lease parcels cover all acres of the previously terminated leases (UTU88053 encompassing 632.08 acres and UTU82701 encompassing 201.2 acres) that terminated within their 10-year primary term. Lease UTU88053 was issued on March 1, 2011, and expired on Feb. 28, 2021. Lease UTU82701 that was segregated out of UTU80636 on Feb. 16, 2005, and expired on Dec. 17, 2016. The entirety of the acreage of these terminated leases were re-nominated for lease by Topaz Energy Resources. Lease parcel 1551 covers acreage of previously terminated lease UTU88053 which had development in 1985 and 2012. A well was drilled in 1985, was a dry hole and immediately plugged (Horseshoe Bend Fed 21-4, API 43-047-31671), and in 2012 another oil well was drilled by Anschutz Exploration Corporation in 2012, produced for a short period and plugged in 2021 (HSB Fed 22-04, API 43-047-51790). Reasonably foreseeable cumulative actions (which includes the RFD scenarios for VFO) would result in potential for development of 20 wells in addition to other mineral development. As with the potential development of the nominated lease parcels, development of the RFD scenario is consistent with laws mandating

development of mineral resources on public lands. Oil and gas development associated with reasonably foreseeable cumulative actions, including development of the nominated lease parcels, is consistent with various laws, including FLPMA (43 U.S.C. § 1701 et seq.), that mandate that the BLM administer the exploration and development of these mineral resources on public lands for the benefit of the citizens of the United States. Potential development of the nominated lease parcels would include 20 acres of surface disturbance and would add 833.28 acres (0.004% increase) to the total amount of the 1,168,221-million-acre VFO that is leased. The total future estimated production from the nominated lease parcels is 5,000 bbl of oil and 5,000,000 mcf of gas (see Table 6) and would contribute an additional .055% oil and 12% gas production within the VFO. Potential development of the nominated lease parcels (20 wells) would comprise 1.1% of all past and reasonably foreseeable future oil and gas development (0% wells) and depending on the success of oil and gas well drilling, non-renewable natural gas and/or oil would be extracted and delivered to market.

AIB-21 Socioeconomics

How would potential development of the nominated lease parcels affect socioeconomics, including quality-of-life? The study area includes Uintah County in the State of Utah, which encompasses 2,882,592 acres. Because socioeconomic (SE) data are typically available at the county level, county boundaries are used to define the SE study area. Data were obtained from the U.S. Department of Labor, the Bureau of Labor Statistics, local area unemployment statistics, the U.S. Department of Commerce, and the Census Bureau, as compiled by the Headwaters Economics Socioeconomic Profiles Tool developed for the BLM (BLM, 2023).

Of the total study area, 1,677,915 acres – 58.2 percent of the total – are federally owned lands, and 1,347,482 of those acres are managed by BLM. 507,201 acres within the study area are privately owned, 426,229 are Tribal lands, and 271,255 are owned by state, county, city, or other non-federal agencies. The total population in the study area was 37,141 in 2022, representing an increase of 14.5 percent from 2010 to 2022. The largest contributor to this change in total population was natural change. The number of employed workers in the study area in 2022 was 19,510. In 2022, the average annual unemployment rate was 3.6 percent. In 2022, 87 percent of workers aged 16 and over within the study area worked in their county of residence. Per capita income in the study area in 2022 was $37,958.

In 2022, the total number of people living in poverty, as defined by the U.S. Census Bureau, was 11.6 percent of the population. Out of all persons living within the study area in 2022, 7,205, or 20 percent, self-identified as being a member of a minority group. Of those, 2,209, or 6.1 percent of the total population, self-identified as American Indians. The total number of housing units was 13,689 of which

84.4 percent were occupied, and 1.8 percent were seasonal, recreational, or occasionally occupied properties. Of those living within the study area aged 25 or older, 18 percent had earned a bachelor's degree or higher in 2022. In 2022, there were approximately 5,127 total jobs in non-services industries in the study area. In the same year there were approximately 11,158 jobs in services related industries, and there approximately 3,225 jobs in the government sector. This total includes federal, state, county, and local government jobs. In 2022, the industries employing the largest numbers of employees in the study area were: government (primarily state, county, and local government); retail trade, and mining (including fossil fuels).

Within the study area, the average annual wage for all reported jobs was $48,166 in 2022. The highest paying industries, on average, were mining, financial activities, and construction. Non-labor income—which includes dividends, interest payments, rent, age-related transfer payments, hardship-related

payments, and other transfer payments—can be important in local economies. Where non-labor income is a relatively high percentage of all income, it is likely that there are a higher number of retirees and/or families receiving assistance, in comparison to other regions. In 2022, total non-labor income within the study area represented 39 per cent of all income. The highest category of non-labor income was dividends, interest, and rent, at 16.2 per cent of total county income. In fiscal year 2019, a total of $4,235,474 (2023 dollars) was paid by federal land management agencies to state and local governments. Of those payments, $3,663,407 were Payments In Lieu of Taxes (PILT).

The only direct impact of issuing new oil and gas leases on quantifiable market socioeconomic values within the analysis area would be generation of revenue from the lease sale, as the State of Utah retains approximately 49 percent of the proceeds. Revenues generated by royalties on production totaled $138.79 million in the county study area for calendar year 2022. (ONRR, 2023). Subsequent oil and gas exploration, development and production could affect the local economy in terms of additional jobs, income and tax revenues. Subsequent oil and gas exploration and development activities could include road and drill pad construction, which could be contracted to local contractors. Wells would typically be drilled over a period of time and not at the same time. Local businesses may realize increased revenue from the purchase of supplies, meals, rooms, etc. Local trucking and delivery companies may also benefit economically by transporting supplies, building materials and oil products.

Oil production from federal lands is subject to a 16.67 percent royalty payment to the federal government. Approximately 49 percent of that amount is provided to the state government, which then provides a portion to the county. Fiscal impacts could result from bonus bids (the amount paid at time of auction), annual rent fees (for 10 years regardless of activity on a leased parcel), and royalties (if and when production occurs). These may provide income to the county government for schools and other expenditures. The Proposed Action would not be expected to induce substantial growth or concentration of population, displace many people, cause a substantial reduction in employment, reduce wage and salary earnings, cause a substantial net increase in county expenditures, or create a substantial demand for public services. With a reduction in output from the oil and gas sector, converse effects would be expected to occur. Increased activity in oil and gas development and operations could have an impact on the demand for community services as well as having some effect on available housing and demand for goods and services within the affected county.

Under the Proposed Action, BLM would offer two parcels for lease, totaling 833 acres. In the 5.5 million-acres within the boundary of the VFO, there are approximately 1.9 million acres of federal mineral estate that are open to oil and gas leasing. Of these acres, 1,168,221 acres are already leased (62% of the federal mineral estate open to oil and gas leasing) across 1274 total leases. Total oil and gas employment in Uintah County totaled 1,823 employees in September 2023 (BLS Bureau of Labor and Statistics, 2024). Given the number of employees relative to the acreage currently under lease, impacts even if the six parcels were eventually developed, would be very minor relative to the current level of activity in the county.

Expansion of the oil and gas industry may be perceived as having a negative effect on quality-of-life considerations for people who value undeveloped landscapes, opportunities for isolation, and activities such as wildlife viewing, other forms of recreation, or rangeland management. The total landscape-level surface disturbance associated with reasonably foreseeable environmental trends and planned actions would include activities that generate increased human activity, traffic, noise, dust, odor, light pollution, and visual effects. These activities have the potential to affect quality of life of any existing nearby residences or facilities, depending on the intensity of development activities and proximity of structures to a given parcel. While the majority of these impacts to any significantly proximal residences or facilities would be short term and cease during operations (e.g., increased human activity, traffic, noise, dust, and odor during drilling and completion phases), residences may continue to experience long-term visual or

other impacts that have potential to affect quality of life if they are located in areas in which oil and gas development is not currently nearby or visible.

Oil and gas activity is expected to continue at current levels for the foreseeable future. As such, this activity will continue to impact the local economy in terms of economic and fiscal effects. Issues identified to quality of life will continue to be present.

AIB-22 Human Health and Safety

How would potential development of the nominated lease parcels contribute risks to human health and safety concerns?

Within the 5.5 million-acre VFO planning area encompassing lands in Daggett, Duchesne, and Uintah Counties, there are 11,362 existing active well bores of all well types across all land jurisdictions as of January 2024 (UDOGM, 2024). This level of development has resulted in the following public health and safety–related risks: occasional fire starts; spills of hazardous materials, hydrocarbons, produced water, or hydraulic fracturing fluid (see Appendix E) and corresponding potential contamination of air, soil, or water; exposure to naturally occurring radioactive material (NORM) in drill cuttings or produced water (see Appendix E); traffic congestion and collisions from commercial vehicles and heavy use, especially along Highway 40; infrequent industrial accidents; presence of hydrogen sulfide (H_2S); or increased levels of fugitive dust (PM_{10} and $PM_{2.5}$), other criteria air pollutants (CAPs), volatile organic compounds (VOCs), and hazardous air pollutants (HAPs). See the air quality analysis in Section 3.6.1 (Air Quality) for projected levels of CAPs and HAPs, their effects on air quality, and the air quality notices and stipulations that may impact human health and safety.

HAPs are known or suspected to cause cancer or other serious health effects, such as compromises to immune and reproductive systems, birth defects, developmental disorders, or adverse environmental effects resulting from either chronic (long-term) and/or acute (short-term) exposure, and/or adverse environmental effects. Breathing ground-level ozone (O_3) can trigger a variety of health problems, including coughing and sore or scratchy throat; difficulty breathing deeply and vigorously and pain when taking deep breaths; inflammation and damage to the airways; increased susceptibility to lung infections; aggravation of lung diseases such as asthma, emphysema, and chronic bronchitis; and an increase in the frequency of asthma attacks. Some of these effects have been found even in healthy people, but effects are more serious in people with lung diseases such as asthma. Particulate matter, also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. Smaller particles (PM2.5 or smaller) are associated with more negative health effects, including respiratory and cardiovascular problems, because they can become more deeply embedded in the lungs and may even get into the bloodstream.

The following sources provide additional information on air pollution health effects from the six criteria air pollutants and HAPs:

- Ozone (EPA, 2023a)
- Particulates (EPA, 2023b)
- Nitrogen dioxide (EPA, 2023c)
- Carbon monoxide (EPA, 2023d)
- Lead (EPA, 2023)

- Sulfur dioxide (EPA, 2023f)
- Hazardous air pollutants (EPA, 2023g)

The air quality analysis in Section 3.6.1 estimates the risk of cancer from Hazardous Air Pollutants (HAPs) and the risk of other health impacts based on exposure to CAPs. In addition to HAP and Criteria Air Pollutants (CAP) levels, economic or social indicators can also influence the general health risks of a population, such as poverty status, educational attainment, or language proficiency. Headwaters Economics data for populations at risk (i.e., more likely to experience adverse health outcomes due to demographic or socioeconomic factors) show that most of the indicators for populations at risk are lower for Utah compared with the nation as a whole (Headwaters Economics, 2024). Compared with Utah, several of the indicators for populations at risk in the combined counties in the VFO planning area (Daggett, Duchesne, and Uintah Counties) are similar to state levels. However, certain indicators are noticeably higher in the combined counties than those of Utah as a whole: these include indicators such as percent of population without a high school diploma, percent of population in "deep poverty" (earning less than half of the federal poverty level), percent of families below poverty, percent of households receiving food stamps, percent of housing that are mobile homes, and percent of population without health insurance (Headwaters Economics, 2024).

Human health risk assessments cannot be performed until project-specific details are known so that frequency, timing, and levels of contact with potential stressors may be identified (EPA, 2023h). However, each of the reasonably foreseeable environmental trends and planned actions have been, or will be, subject to relevant rules and regulations regarding public health and safety. Ongoing and potential development would continue to present aggregate risks to human health as detailed above. When wells reach the end of their useful life and are properly plugged and reclaimed, they would no longer contribute to health and safety effects; however, depending on the level and duration of individual's exposure during well operation, some of the public health effects from air pollution may endure beyond the life of the wells (e.g., chronic respiratory problems such as asthma).

Potential development on the nominated lease parcels is estimated to be 20 new wells. This is a 0.2% increase to the 11,362 existing active wells in Daggett, Duchesne, and Uintah Counties. When authorizing development, federal and state laws, regulations, and policy are applied to reduce effects or respond to incidents. These include the following:

- Federal, state, county, and municipal fire managers shall coordinate fire response and mitigation.
- Developers who install and operate oil and gas wells, facilities, and pipelines are responsible for complying with the applicable laws and regulations governing hazardous materials and for following all hazardous spill response plans and stipulations. The Utah Division of Oil, Gas and Mining requires similar spill response measures after release of hydrocarbons, produced water, or hydraulic fracturing fluids.
- All well pads, vehicles, and other workplaces must comply with worker safety laws as stipulated by the Occupational Safety and Health Administration (OSHA).
- Vehicular traffic and pipelines are regulated according to safety laws as stipulated by the Department of Transportation.
- Onshore Order No. 6 provides the requirements and standards for conducting oil and gas operations in an environment known to or expected to contain H_2S. Compliance with this Order will protect public health and safety and those personnel essential to maintaining control of the well.

Hazardous materials are not known to exist on any lease. Hazardous materials associated with oil and gas operations, if not handled properly, have the potential to be spilled at the lease/drill site and would be handled during that stage of development. Such materials could include methanol, diesel fuel, unrefined petroleum, produced water, and acid. Spills during operation would be contained, reported, and cleaned up by the operator as written in the Spill Prevention, Control, and Countermeasure (SPCC) rule for wells.

See AIB-10 and AIB-11 for further information regarding potential surface and groundwater effects and relevant regulations, stipulations, and lease notices offering protections to groundwater and surface water quality. While there are no water quality specific notices or stipulations, the buffers on surface occupancy in riparian areas and floodplains, UT-LN-53 and UT-LN-128 as well as those associated with sensitive soils and steep slopes, UT-S-96, UT-S-99, and UT-S-100 would result in protection of water quality by minimizing sediment inputs and other water quality contaminants. Risks from hazardous or solid wastes would be mitigated by BMPs, SOPs, and site-specific COAs.

3.6. ISSUES ANALYZED IN DETAIL

The issues identified for detailed analysis in this EA were developed in accordance with CEQ regulations and the guidelines set forth in the BLM NEPA Handbook H-1790-1 (BLM, 2008b) using input from internal and external scoping. Issues were retained for detailed analysis if that analysis is necessary to make a reasoned choice between alternatives; to determine significance; if there is disagreement about the best way to use a resource; or if there is conflict between resource impacts or uses.

3.6.1. Issue 1: Air Quality

What quantities and types of air pollutants would be produced from potential development of the nominated lease parcels? How would air pollutant emissions affect air quality and air quality related values?

Air quality is determined by the quantity and chemistry of atmospheric pollutants in consideration of meteorological factors (i.e., weather patterns) and topography, both of which influence the dispersion and concentration of those pollutants. The presence of air pollutants is due to several different and widespread sources of emissions. The impact analysis area for air quality is the airshed in which the lease parcels are located, including Uintah and Duchesne Counties. This spatial scope of analysis was identified based on the regional nature of air pollution and to facilitate analysis using the best available air quality data, which are generally provided at the county level. For the purposes of this analysis, short-term effects to air quality are considered those that cease after well construction and completion (30–60 days); long-term effects are considered those associated with operations and production and would cease after operations/production are concluded.

Affected Environment

The BLM Utah 2023 Air Monitoring Report (AMR) (BLM, 2023) discusses past, present, and foreseeable emissions and air quality data for Utah. Information from the AMR is incorporated by reference to help describe the air quality affected environment in the impact analysis area. The EPA has primary responsibility for regulating air quality, including six nationally regulated criteria air pollutants (CAPs): carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} & $PM_{2.5}$), sulfur dioxide (SO_2) and lead. Volatile organic compounds (VOCs) are also regulated by the EPA as sunlight causes it to react with NO_2 to form O_3. The National Emissions Inventory (NEI) (EPA, 2024) is a comprehensive and detailed estimate of air emissions of criteria pollutants, criteria precursors, and

hazardous air pollutants. The NEI is released every three years based primarily upon data provided by state, local, and tribal air agencies for sources in their jurisdictions and supplemented by data developed by the US EPA. The most recent reporting year for the NEI is 2020. County emissions inventories relevant to the analysis area are listed in Table 3. Total emissions include both natural (e.g., wildfires and biogenic) and anthropogenic (e.g., fuel combustion, mobile, etc.) sources.

Table 15 Existing Criteria Air Pollutant Emissions in the Airshed in Tons Per Year (TPY)

County	Source	CO	NO_x**	PM_{10}	$PM_{2.5}$	SO_2	VOC
Uintah County	Anthropogenic*	1,546.5	7,929.9	5,973.9	1,232.9	134.8	47,424.8
	Total	13,613.7	8,641.8	5,996.3	1,251.8	136.8	58,104.0
Duchesne County	Anthropogenic*	8,664.3	5,113.8	5,164.1	1,014.9	213.7	14,747.6
	Total	407,970.8	8,890.8	43,717.9	33,687.6	2,556.8	117,205.0

Source: The National Emissions Inventory.
* Anthropogenic emissions are considered all emissions omitting wildfires and biogenic sources.
** nitrogen oxide(s)

The EPA has established National Ambient Air Quality Standards (NAAQS) for CAPs (EPA, 2024). The NAAQS are protective of human health and the environment. Compliance with the NAAQS is typically demonstrated through monitoring of ground-level concentrations of atmospheric air pollutants. Areas where pollutant concentrations are below the NAAQS are designated as attainment or unclassifiable. Locations where monitored pollutant concentrations are higher than the NAAQS are designated nonattainment, and air quality is considered unhealthy. Air pollutant concentrations are reported using design values. A design value is a statistic that describes the air quality status of a given location relative to the level of the NAAQS. Design values are used to designate and classify nonattainment areas, as well as to assess progress towards meeting the NAAQS. Design values that are representative for the airshed of interest are incorporated from the AMR (see Table 17 in the AMR) and listed in Table 4. Based on design values, the EPA has designated portions of Duchesne and Uintah Counties below 6,250 ft elevation (i.e., Uinta Basin) as nonattainment for O_3. EPA has issued a draft rule concluding that the Uinta Basin has attained the standard for O_3 by the attainment date (August 3, 2023) but this does not change the airshed status to attainment. Continued periods of high O_3 levels in the Uinta Basin may still be observed, even though the area has been shown to attain the standard, therefore continued efforts and commitments are needed to reduce precursor emission in the region (EPA, 2024). It is assumed that counties without reported design values for a particular pollutant have air pollutant concentrations below the NAAQS and good air quality since air monitoring is usually needed only when concentrations exceed 80% of the NAAQS (40 CFR 58.14 management (1)). The EPA changed the annual $PM_{2.5}$ standard to 9 $\mu g/m^3$.

Table 16 2020-2022 Criteria Air Pollutant Design Values

Pollutant	County	Averaging Time	Concentration[1]	NAAQS	Percent of NAAQS
O_3	Uintah	8-hour	0.067 ppm	0.070 ppm	95.7%
NO_2	Uintah	Annual	4 ppb	53 ppb	7.5%
NO_2	Uintah	1-hour	30 ppb	100 ppb	30.0%
$PM_{2.5}$	Uintah	Annual	6.3 $\mu g/m^3$	9 $\mu g/m^3$	70.0%
$PM_{2.5}$	Uintah	24-hour	22 $\mu g/m^3$	35 $\mu g/m^3$	62.9%
$PM_{2.5}$	Duchesne	Annual	6.9 $\mu g/m^3$	9 $\mu g/m^3$	76.7%
$PM_{2.5}$	Duchesne	24-hour	24 $\mu g/m^3$	35 $\mu g/m^3$	68.6%

Source: The National Emissions Inventory.
[1]Concentrations in parts per million (ppm), parts per billion (ppb), microgram per cubic meter ($\mu g/m^3$).

Hazardous air pollutants (HAPs), also known as toxic air pollutants, are known, or suspected to cause cancer or other serious health effects, or adverse environmental effects. Emissions of HAPs are included as part of the NEI. HAPs emitted by the oil and gas industry include benzene, toluene, ethyl benzene,

mixed xylenes, formaldehyde, normal-hexane, acetaldehyde, and methanol. Statewide, these individual pollutants make up 95% of the HAPs emitted from the oil and gas production. Total HAPs emissions for the state of Utah and Uintah and Duchesne counties are listed in Table 17.

Table 17 Hazardous Air Pollutant Emissions (TPY)

Area	Total Emissions (TPY)	Vegetation and Soils (TPY)	Wildfire (TPY)	Prescribed Fire (TPY)	Oil and Gas Production (TPY)
Duchesne County	21,877.393	1,604.719	18,933.882	4.584	1171.808
Uintah County	4,812.961	2,410.686	16.352	10.051	2,199.959

Source: The National Emissions Inventory.

The EPA Air Toxics Screening Assessment is used to evaluate impacts from existing HAP emissions in Utah (EPA, 2023). Air Toxics Screening Assessment results for counties relevant to the analysis area are reported in Table 18. The total cancer risk is within the acceptable range of risk published by the EPA of 100 in 1 million as discussed in the National Contingency Plan, 40 CFR § 300.430 also see (EPA, 1999). Hazard index values less than one mean it is unlikely that air toxics would cause adverse noncancer health effects over a lifetime of exposure. Potential development on the lease parcels would contribute to HAP emissions and associated carcinogenic and noncancer risks.

Table 18 Total Cancer Risk and Noncancer Respiratory Hazard from Existing HAP Emissions (2019 Reporting Year).

County	Total Cancer Risk/Million	Background Cancer Risk/Million	Oil & Gas Cancer Risk/Million	Total Respiratory Hazard Index
Duchesne	15.89	2.60	5.16	0.13
Uintah	12.75	2.63	1.32	0.13

Source: EPA's Air Toxics Screening Assessment.

The Clean Air Act (CAA) Prevention of Significant Deterioration (PSD) requirements give more stringent air quality and visibility protection to national parks and wilderness areas that are designated as Class I areas, but a PSD designation does not prevent emission increases. The five national parks in Utah are Federally designated Class I areas, and the rest of the state is designated as Class II. Federal land managers are responsible for defining specific Air Quality Related Values (AQRVs), including visual air quality (haze), and acid (nitrogen and sulfur) deposition, for an area and for establishing the criteria to determine an adverse impact on the AQRVs. Each of the parcels in this lease sale are located within PSD Class II areas. Visibility trends based on air monitoring data from four Utah monitoring sites for the clearest, haziest, and most impaired categories is incorporated by reference from the AMR (see Figures 3 through 6 of the AMR). Progress toward Regional Haze Rule goals is demonstrated by the marked improvement on the most impaired days at Utah Class I areas. The National Park Service monitors and evaluates deposition to determine which parks are most at risk from air pollution and where conditions are declining or improving. Nitrogen deposition conditions in Utah National Parks are fair to poor with no trend for improving or worsening conditions, while sulfur deposition conditions are good with trend data unavailable for most locations (see Table 22 of the AMR).

Air Quality Design Considerations

Leases within Indian Country must comply with permitting requirements in the Federal Implementation Plan (FIP) for Managing Emissions from Oil and Natural Gas Sources on Indian Country Lands Within the Uintah and Ouray Indian Reservation in Utah (EPA, 2022).

The BLM looks to minimize air pollutants via lease stipulations and notices and COAs throughout the leasing and permitting processes. Stipulations and notices (i.e., UT-S-01, UT-S-VFO-96, UT-S-VFO-123, UT-S-VFO-157, and UT-S-VFO-195), including those for non-air quality resources that would have beneficial impacts to air quality are listed in Appendix B. BLM Parcel List with Stipulations would be applied to leases when issued to notify the operator of what would be required (stipulation) and what could potentially be required (notice) at the APD stage. This informs the potential lessee, at the time of bidding on the parcel, of the range of requirements that could be expected when lease rights are exercised. Examples of additional air quality control measures imposed at the APD stage may include submission of an emissions inventory for the plan of development, air quality modeling, or implementation of mitigation measures and BMPs. The BLM would do this in coordination with the EPA, UDAQ, and other agencies that have jurisdiction on air quality. By applying stipulations and notices, leasing would have little impact on air quality. At the APD stage, COAs could be applied based on site specific environmental analysis for the APD. Also, any future development in nonattainment areas would be subject to the conformity process of the CAA which may require additional mitigation or offsets.

Environmental Effects Impacts of the Proposed Action (Alternative A)

There are four general phases of post-lease development that would generate air pollutant emissions: 1) well development (well site construction, well drilling, and well completion), 2) well production operations (extraction, separation, gathering), 3) mid-stream (refining, processing, storage, and transport/distribution), and 3) end-use (combustion or other uses) of the fuels produced. While well development and production operation emissions (phases 1 and 2) occur on-lease and the BLM has program authority over these activities, mid-stream and end-use emissions (phases 3 and 4) typically occur off-lease where the BLM has no program authority. During well development, there could be emissions from earth-moving equipment, vehicle traffic, drilling, and completion activities. NO_2, SO_2, and CO would be emitted from vehicle tailpipes. Fugitive dust concentrations would increase with additional vehicle traffic on unpaved roads and from wind erosion in areas of soil disturbance. Drill rig and fracturing engine operations would result mainly in NO_2 and CO emissions, with lesser amounts of SO_2. These temporary emissions would be short-term during the drilling and completion phases, which is expected to last between 30 to 60 days. During well production and operations there could be continuous emissions from separators, condensate storage tanks, flares or combustors, and daily tailpipe and fugitive dust emissions from operations traffic. During the operational phase of a well, NO_2, CO, VOC, and HAP emissions would result from the long-term use of storage tanks, pumps, separators, and other equipment. Additionally, dust (PM_{10} and $PM_{2.5}$) would be produced due to wind erosion on well pads and roads, and by vehicles servicing the wellsite infrastructure. Single well emission estimates for well development and production operations are based on typical development and production operations scenarios identified for each field office in the AMR (BLM, 2023). The single well emissions and assumptions for analysis from this lease sale are input into the BLM Lease Sale Emissions Tool to provide the maximum year and average year emissions over the anticipated production life of lease parcels (approximately 30 years), see Table 19. More emissions detail is provided in Appendix G. Actual development of individual lease parcels may result in higher or lower emissions for various reasons including differences with geologic formations, proximity to existing support infrastructure, differences in pace of development, different development methods and control technology used by a lessee, and other reasons. A lessee has 10 years to establish production on a lease and if production is not attempted within the 10-year timeframe, the lease would be terminated with no development or emissions occurring.

Table 19 Estimated Annual Emissions Estimates from Well Development and Production Operations of the Lease Parcels (TPY)

Year	PM_{10}	$PM_{2.5}$	VOC	NO_x	CO	SO_2	HAPs
Max Year	4.3	1.2	17.7	20.2	8.0	0.149	1.400
Average Year	1.4	0.3	13.3	3.8	2.6	0.031	1.026
Percentage of Uintah County Anthropogenic Emissions	0.02%	0.02%	0.03%	0.05%	0.17%	0.02%	0.07%

Emissions of CAPs would also occur outside the planned area from transport, processing, distribution, and end-use. Generally, crude oil (including condensate from a gas well) from the Uinta Basin is trucked to refineries in Salt Lake City, or to the Price River Terminal in Wellington, Utah. Crude oil offloaded at the Price River Terminal is transported via railway to refineries throughout the country which produce a multitude of refined products. Refineries in Utah produce mostly gasoline, diesel fuel, and jet fuel. Products from Utah's refineries are transported via pipeline to markets in Utah, Idaho, Nevada, Wyoming, eastern Washington, and Oregon (EIA, 2022). Regarding natural gas, Utah is crossed by several interstate pipelines that transport natural gas from the Opal Hub in Wyoming, from the Piceance Basin in western Colorado, and from Utah's in-state production to markets in Nevada, Idaho, and Colorado (EIA, 2022).

Since combustion of all petroleum products emit CAPs and HAPs, local ambient concentrations of these pollutants could increase in areas where products from the Uinta Basin (oil and gas) are combusted. This could contribute to an area exceeding either national or local air quality standards. Air quality involves complex physical and chemical transformations at a local/regional level, so impacts would vary considerably depending on background concentrations, meteorology, and other local pollutant sources. If any pollutant concentration is near or above its standard in a particular area, the combustion of oil and gas products could contribute to or exacerbate nonattainment. Potential pollutant concentration change resulting from combustion is therefore often a key driver of public policy to mitigate air quality and public health impacts in such areas. Downstream combustion and end uses are regulated by the EPA or delegated to state agencies. This regulatory process is designed to avoid downstream impacts to regional and local air quality.

At the leasing stage it is not possible to accurately estimate potential air quality impacts by modeling due to the variation in emission control technologies as well as construction, drilling, and production technologies applicable to oil versus gas production and utilized by various operators. Should development on the parcels be proposed, and prior to authorizing specific proposed projects on the subject leases, emission inventories would need to be developed. Nearfield air quality dispersion modeling, which may also be required at that time, includes direct and cumulative impact analysis for demonstrating compliance with the NAAQS, plus analysis of impacts to AQRVs (i.e., deposition, visibility), particularly as they might affect nearby Class I areas (some National Parks and Wilderness areas) and Class II areas of interest.

Studies have demonstrated that oil and gas activity is a primary contributor to wintertime O_3 NAAQS exceedances in the Uinta Basin (Mansfield, 2021). While emissions from an individual well or well pad are too small to have a substantial impact on O_3 concentrations, they contribute with emissions from other regional oil and gas operations to produce a cumulative O_3 impact. These impacts are discussed further in the air quality cumulative analysis section. Impacts to AQRVs from existing oil and gas wells and future lease development is projected to be minimal, see air quality cumulative analysis section.

The CAA general conformity rule (40 CFR 93 Subpart B) provides Federal agencies a method for determining if the emissions in a nonattainment area, from an action under consideration, will delay an

area from attaining the NAAQS. This is done by showing that emissions are either de minimis or conform to a State or Federal Implementation Plan. The parcels being offered are located within the Uinta Basin O_3 nonattainment area and thus require a general conformity applicability assessment. The applicability assessment is documented in Appendix G and demonstrates that the emissions associated with this lease sale are not reasonably foreseeable as defined by the CAA and general conformity is not applicable to this leasing action. Another conformity applicability assessment is needed at the permitting stage when information is available (location with respect to nonattainment area, non-permitted emissions sources, control technology, emissions offsets, new implementation plans, etc.) to create an emissions inventory based on actual plans for development.

Substantial air resource impacts are not anticipated from leasing as it is an administrative action. Lease development has the potential to contribute to the O_3 problem in the Uinta Basin. At the permitting stage a precise emissions inventory can be evaluated to ensure emissions are below de minimis levels or conform to state and Federal implementation plans that are in effect at the time. As identified in notice UT-LN-102 additional analysis or mitigation may be required when parcels are developed to ensure no adverse impacts occur.

Cumulative Effects

This document incorporates by reference the projected changes to air quality and AQRVs that are evaluated in the BLM's Regional Air Quality Model (Ramboll, 2023). This modeling study provides a reference for potential changes to the affected environment occurring from existing and foreseeable emissions producing activities, including development of oil and gas leases, coal mining, and other cumulative emissions sources in the region.

Emissions Trends

Past and present actions that have affected and would likely continue to affect air quality in the analysis area include surface disturbance resulting from oil and gas development and associated infrastructure, geophysical exploration, ranching and livestock grazing, range improvements, recreation (including OHV use), authorization of ROWs for utilities and other uses, and road development. These types of actions and activities can reduce air quality through emissions of CAPs (including fugitive dust), VOCs, and HAPs, as well as contribute to deposition impacts and to a reduction in visibility. Emissions from these activities are included in the inventory contained in Table 3. In the future, emissions from vehicle exhaust, and from residential and commercial activities would likely increase as population and tourist visitation increases in the area.

Estimates of future criteria and hazardous emissions are made in the BLM Regional Air Quality Model (Ramboll, 2023). Emissions estimates are based on the EPA2016v2 modeling platform (Ramboll, 2023), the Western Regional Air Partnership Oil and Gas Working Group emission inventory, and BLM reasonably foreseeable development estimates for oil, gas, and coal production. Sources included coal mining, coal combustion, oil and gas development, other anthropogenic sources (mobile and non-point), and natural emissions (open land fires, biogenic). The effects of these emissions are evaluated in the modeled air quality projections section below. Emissions in the oil and gas sector are provided in Table 8. Oil and gas sector emissions roughly parallel oil and gas production. Development and production estimates associated with these emissions projections for oil, gas, and coal are listed in the AMR (see Appendix D of the AMR). Current Federal oil and gas development and production in Utah is below that which was modeled in the BLM Regional Air Quality Model by 10.5 million bbl/yr of oil, 34 billion cf/yr of gas, 98 new spuds per year, and 3,819 total producing wells. Potential development on the lease parcels would not cause existing development to exceed those that were projected in the BLM Regional Air

Quality model. The modeled air quality projections fully capture past and present oil and gas development, including potential development on the lease parcels.

Table 20 Modeled Circa 2032 (New Plus Existing Wells) Oil and Gas Emissions in Utah by Mineral Owner

State	Air Pollutant Emissions (TPY)						
	NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	HAPs
Federal (excluding Tribal)							
UT	10,113	117,584	9,540	288	489	489	7,227
Non-Federal							
UT	5,449	26,535	5,670	185	267	267	1,985
Tribal							
UT	3,763	30,953	3,651	156	189	189	1,673
Total							
UT	19,325	175,071	18,861	629	944	944	10,885

Modeled Air Quality Projections

Results from the BLM Regional Air Modeling Study show that there are no projected exceedances of the NAAQS for NO_2, SO_2, and CO. Source apportionment analysis shows that exceedances of the $PM_{2.5}$ and PM_{10} standards are due to wildfires, and there are no exceedances due to anthropogenic emissions. Modeled concentrations of O_3 throughout Utah are in the 55-65 ppb range, which is also below the NAAQS. The existing federal oil and gas sources in the BLM Green River District (Carbon, Daggett, Duchesne, Emery, and Uintah counties) contribute up to 3.7 ppb of O_3, while the new federal oil and gas sources in the Green River District contribute up to 2.5 ppb to the O_3 concentrations.

The BLM used the Regional Model Study modeling platform to evaluate the cumulative health effects of specific HAPs originating from oil and gas production ***(BLM, 2023)***. A photochemical model is used to estimate the cumulative ambient air concentrations of six HAPs (benzene, toluene, ethylbenzene, xylenes, n-hexane, and formaldehyde) resulting from emissions from federal and non-federal oil and gas sources. These six HAPs were selected by BLM for study as they are subject to emissions standards (New Source Performance Standards [NSPS] and National Emissions Standards for Hazardous Air Pollutants [NESHAPs]) regulated for the oil and gas sectors. Cancerous and non-cancerous risk factor results from the HAPs modeling are provided in the AMR (see Tables 28 and 29 of the AMR) and are incorporated by reference here. The health-based inhalation thresholds used in the BLM HAPs modeling study are the same as those used in EPA's AirToxScreen ***(EPA, 2022)***. Total cancer risk from oil and gas production in Duchesne and Uintah Counties is 5 and 9 in a million respectively, which is below EPA's 100 in 1 million cumulative thresholds. Chronic noncancer health effects from oil and gas production are also below levels of concern.

Air Quality Related Values

Regional Haze modeling (WRAP/WAQS, 2021) was performed by the EPA and Western Region Air Partnership states evaluate if reasonable progress is being made toward natural visibility conditions to be achieved by 2064. The model uses source apportionment to isolate the contributions of U.S. anthropogenic emissions, along with other sources (e.g., international anthropogenic emissions, fires, and natural sources), to visibility extinction at monitoring sites representing Class I areas in the western U.S. This allows for the estimation of the changes in visibility impairment due to U.S. anthropogenic emissions at Class I areas over time and whether they are trending toward no impairment due to U.S.

anthropogenic emissions by 2064. The modeling study shows that the current trendline would reach the no impairment goal before 2064.

The BLM Regional Model Study also evaluated deposition of nitrogen and sulfur. The critical load for deposition is 5 kg/ha/yr, and projected deposition rates for both nitrogen and sulfur are below the critical load value. Cumulative annual nitrogen deposition over the Utah analysis area varies between 0.6 and 4.5 kg N/ha. Deposition values are less than 4 kg N/ha throughout most of Utah, with exceptions of two grid cells in Salt Lake County showing impacts between 4 and 4.5 kg N/ha. Cumulative annual sulfur deposition over Utah varies between 0.01 and 1.1 kg S/ha within Utah, with the maximum deposition occurring near the Carbon-Emery County border.

In summary, the cumulative air quality in the impact analysis area is maintained at current levels or projected to improve. Atmospheric concentrations for CAPs are projected to be below the NAAQS or show improvement (i.e., decreasing concentrations). Visibility is generally projected to improve at nearby National Parks and deposition is estimated to remain below critical load criteria. Emissions of HAPs are not anticipated to substantially change the cancer and noncancer respiratory risks in the area of analysis.

3.6.2. Issue 2: Greenhouse Gas and Climate Change

How would potential development of the nominated lease parcels contribute to greenhouse gas (GHG) emissions and climate change?

Future development of lease parcels under consideration could lead to emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O); the three most common greenhouse gases associated with oil and gas development. These GHG emissions would be emitted from activities occurring on the leased parcels, and from the consumption of any fluid minerals produced. However, the BLM cannot reasonably determine at the leasing stage whether, when, and in what manner a lease would be explored or developed. The uncertainty that exists at the time the BLM offers a lease for sale includes crucial factors that would affect actual GHG emissions and associated impacts, including but not limited to the future feasibility of developing the lease, well density, geological conditions, development type (vertical, directional, or horizontal), hydrocarbon characteristics, specific equipment used during construction, drilling, and production, abandonment operations, product transportation, and potential regulatory changes over the 10-year primary lease term. Actual development on a lease is likely to vary from what is analyzed in this EA and will be evaluated through a site-specific NEPA analysis when an operator submits an APD or plan of development to the BLM.

For the purposes of this analysis, the BLM has evaluated the potential climate change impacts of the proposed leasing action by estimating and analyzing the projected potential GHG emissions from oil and gas development on the parcels. Projected emissions estimates are based on previous actual oil and gas development analyses, and any available information from existing development within the State.

Further discussion of climate change science and predicted impacts, as well as the reasonably foreseeable and cumulative GHG emissions associated with BLM's oil and gas leasing actions and methodologies are included in the 2022 *BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends* (BLM, 2023) (Annual GHG Report). This report presents the estimated emissions of greenhouse gases attributable to development and consumption of fossil fuels produced on lands and mineral estate managed by the BLM. The Annual GHG Report is incorporated by reference as an integral part of this analysis and is available at https://www.blm.gov/content/ghg/2022

Affected Environment

Climate change is a global process that is affected by the sum total of GHGs in the Earth's atmosphere. GHGs act to contain solar energy loss by trapping long wave radiation emitted from the Earth's surface and act as a positive radiative forcing component. GHGs influence the global climate by increasing the amount of solar energy retained by land, water bodies, and the atmosphere. GHGs can have long atmospheric lifetimes, which allows them to become well mixed and uniformly distributed over the entirety of the Earth's surface no matter their point of origin. The buildup of these gases has contributed to the current changing state of the climate equilibrium towards warming. A discussion of past, current, and projected future climate change impacts is described in Chapters 4, 8, and 9 of the Annual GHG Report. These chapters describe currently observed climate impacts globally, nationally, and in each State, and present a range of projected impact scenarios depending on future GHG emission levels.

The incremental contribution to global GHGs from a single proposed land management action cannot be accurately translated into its potential effect on global climate change or any localized effects in the area specific to the action. Currently, global climate models are unable to forecast local or regional effects on resources resulting from a specific subset of emissions. However, there are general projections regarding potential impacts on natural resources and plant and animal species that may be attributed to climate change resulting from the accumulation of GHG emissions over time. In this EA, the BLM uses GHG emissions as a proxy for impacts and provides context with other proxies such as GHG equivalents and the social cost of GHGs.

For the purposes of this EA, the projected emissions from the proposed action can be compared to modeled emissions that have been shown to have definitive or quantifiable impacts on the climate in order to provide context of their potential contribution to climate change. Table 8 shows the total estimated GHG emissions from fossil fuels at the global, national, and state scales over the last six years. Emissions are shown in megatonnes (Mt) per year of carbon dioxide equivalent (CO_2e). Chapter 3 of the Annual GHG Report contains additional information on GHGs and an explanation of CO_2e. State and national energy-related CO_2 emissions include emissions from fossil fuel use across all sectors (residential, commercial, industrial, transportation, and electricity generation) and are released at the location where the fossil fuels are consumed.

Additional information on current state, national, and global GHG emissions as well as the methodology and parameters for estimating emissions from BLM fossil fuel authorizations and cumulative GHG emissions is included in the Annual GHG Report (see Chapters 5, 6, and 7).

Table 21 Global and U.S. Fossil Fuel GHG Emissions 2016 - 2021 (Mt CO2/yr)

Scale	2016	2017	2018	2019	2020	2021
Global	36,465.6	36,935.6	37,716.2	37,911.4	35,962.9	37,500
U.S.	4,909.9	4,852.5	4,989.8	4,855.9	4,344.9	4,639.1
Utah	58.1	58.2	60.0	60.4	56.7	N/A

Source: Annual GHG Report, Chap. 5, Table 5-1 (Global and U.S.) and Table 5-2 (State).
Mt (megatonne) = 1 million metric tons
NA = Not Available

Environmental Effects

Impacts of the Proposed Action (Alternative A)

While the leasing action does not directly result in development that would generate GHG emissions, emissions from future potential development of the leased parcels can be estimated for the purposes of this analysis. There are four general phases of post-lease development processes that would generate GHG emissions: 1) well development (well site construction, well drilling, and well completion), 2) well production operations (extraction, separation, gathering), 3) mid-stream (refining, processing, storage, and transport/distribution), and 4) end-use (combustion or other uses) of the fuels produced. While well development and production operation emissions (phases 1 and 2) occur on-lease and the BLM has program authority over these activities, mid-stream and end-use emissions (phases 3 and 4) typically occur off-lease where the BLM has no program authority.

Emissions inventories at the leasing stage are imprecise due to uncertainties including the type of mineral development (oil, gas, or both), scale, and duration of potential development, types of equipment (drill rig engine tier rating, horsepower, fuel type), and the mitigation measures that a future operator may propose in their development plan. Due to these uncertainties, the BLM applies several assumptions to estimate emissions at the leasing stage. The number of estimated well numbers per parcel are based on State data for past lease development combined with per-well drilling, development, and operating emissions data from representative wells in the area. The amount of oil or gas that may be produced if the offered parcels are developed is unknown. For purposes of estimating production and end-use emissions, potential wells are assumed to produce oil and gas in similar amounts as existing nearby wells. While the BLM has no authority to direct or regulate the end-use of the products, for this analysis, the BLM assumes all produced oil or gas will be combusted (such as for domestic heating or energy production). The BLM acknowledges that there may be additional sources of GHG emissions along the distribution, storage, and processing chains (commonly referred to as midstream operations) associated with production from the lease parcels. These sources may include emissions of methane (a more potent GHG than CO_2 in the short term) from pipeline and equipment leaks, storage, and maintenance activities. These sources of emissions are highly speculative at the leasing stage, therefore, the BLM has chosen to assume that mid-stream emissions associated with lease parcels for this analysis would be similar to the national level emissions identified by the Department of Energy's National Energy Technology Laboratory (NETL, 2009) (NETL, 2019). Chapter 6 of the Annual GHG Report includes a more detailed discussion of the methodology for estimating midstream emissions.

The emission estimates calculated for this analysis were generated using the assumptions previously described above in the BLM Lease Sale Emissions Tool and lease development analysis. Emissions are presented for each of the four phases of post-lease development processes described above.

- Well development emissions occur over a short period and may include emissions from heavy equipment and vehicle exhaust, drill rig engines, completion equipment, pipe venting, and well treatments such as hydraulic fracturing.
- Well production operations, mid-stream, and end-use emissions occur over the entire production life of a well, which is assumed to be 30 years for this analysis based on the productive life of a typical oil/gas field.
- Production operation emissions may result from storage tank breathing and flashing, truck loading, pump engines, heaters and dehydrators, pneumatic instruments or controls, flaring, fugitives, and vehicle exhaust.
- Mid-stream emissions occur from the transport, refining, processing, storage, transmission, and distribution of produced oil and gas. Mid-stream emissions are estimated by multiplying the EUR of produced oil and gas with emissions factors from NETL life cycle analysis of U.S. oil and

natural gas. Additional information on emission factors can be found in the Annual GHG Report (Chapter 6, Table 6-8 and 6-10).

- For the purposes of this analysis, end-use emissions are calculated assuming all produced oil and gas is combusted for energy use. End-use emissions are estimated by multiplying the EUR of produced oil and gas with emissions factors for combustion established by the EPA (Tables C-1 and C-2 to Subpart C of 40 CFR § 98). Additional information on emission factors and EUR factors can be found in the Annual GHG Report (Chapter 6).

Table 9 shows the estimated maximum year and average year GHG emissions over the life of the lease for both 100-yr and 20-yr global warming potentials (GWP). Section 3.4 of the Annual GHG Report provides a detailed explanation of GWP.

Table 22 Estimated Direct and Indirect Emissions from Lease Parcels on an Annual and Life of Lease Basis (tonnes)

	CO_2	CH_4	N_2O	CO_2e (100-yr)	CO_2e (20-yr)
Max Year	594,538	1,292.94	2.488	633,747	701,885
Average Year	178,900	400.13	0.732	191,023	212,110
Life of Lease	6,997,086	15,605.03	28.565	7,449,914	8,272,299

Source: BLM Lease Sale Emissions Tool

Table 10 lists the estimated direct (well development and production operations) and indirect (mid-stream and end-use) GHG emissions in metric tonnes (t) for the subject leases over the average 30-year production life of the lease. In summary, potential GHG emissions from the Proposed Action could result in GHG emissions of 7,449,914 t CO_2e over the life of the lease. More emissions detail is provided in Appendix G.

Table 23 Estimated Life of Lease Emissions from Well Development, Well Production Operations, Mid-stream, and End-use (tonnes)

Activity	CO_2	CH_4	N_2O	CO_2e (100-yr)	CO_2e (20-yr)
Well Development	19,228	0.60	0.140	19,284	19,316
Well Production Operations	26,514	342.00	0.012	36,709	54,732
Mid-Stream	1,055,354	15,142.44	14.676	1,510,605	2,308,612
End-Use	5,875,990	119.99	13.738	5,883,316	5,889,639
Total (Life of Lease)	6,977,086	15,605.03	28.565	7,449,914	8,272,299

Source: BLM Lease Sale Emissions Tool

GHG emissions vary annually over the production life of a well due to declining production rates over time. Figure 2 shows the estimated GHG emissions profile over the production life of a typical lease including the four phases of lease development processes: well development, well production operations, mid-stream, end-use, and gross (total of well development, well production, mid-stream, and end-use) emissions.

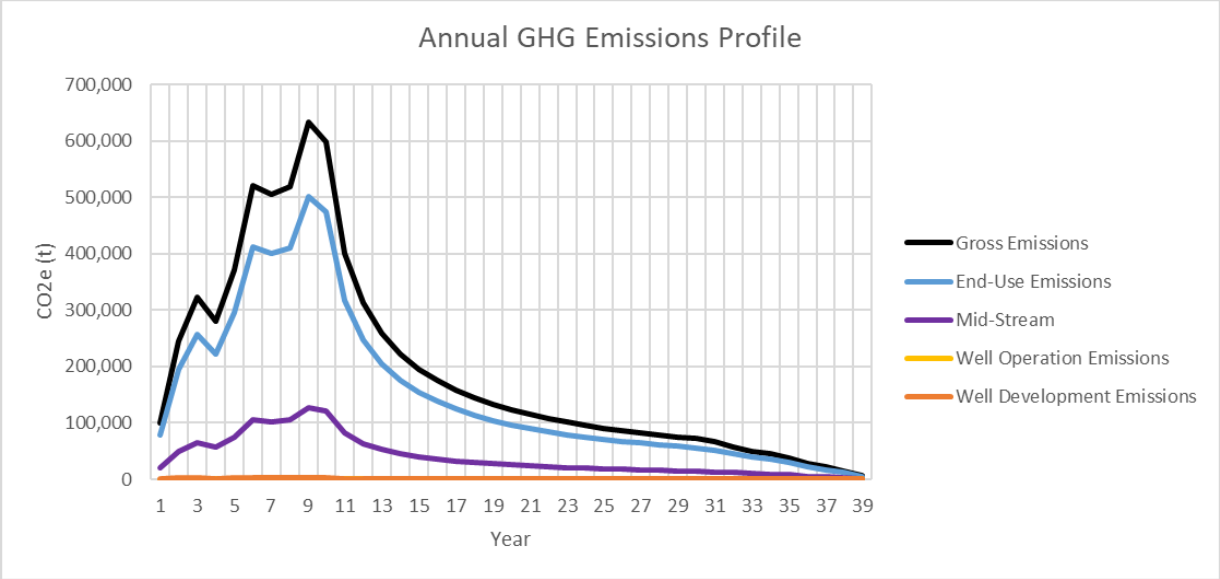

Figure 5 Estimated GHG Emissions Profile over the Life of a Lease
Source: BLM Lease Sale Emissions Tool

To put the estimated GHG emissions for this lease sale in a relatable context, potential emissions that could result from development of the lease parcels for this sale can be compared to other common activities that generate GHG emissions. The EPA GHG equivalency calculator (EPA , 2022) can be used to express the potential average year GHG emissions on a scale relatable to everyday life (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator). For instance, the projected average annual GHG emissions from potential development of the subject lease are equivalent to 41,169 gasoline-fueled passenger vehicles driven for one year, or the emissions that could be avoided by operating 52 wind turbines as an alternative energy source or offset by the carbon sequestration of 227,409 acres of forest land.

Table 24 compares the estimated annual lease sale emissions to existing Federal fossil fuel (oil, gas, and coal) emissions, State, and U.S. total GHG emissions.

Table 24 Comparison of Lease Sale Emissions to Other Sources (Megatonnes)

Reference	Mt CO_2e[1] (Per Year)
Lease Sale Emissions (Maximum Year)	0.634
UT Onshore Federal (Oil & Gas)[2]	13.90
UT Onshore Federal (Oil, Gas, and Coal)[2]	41.35
U.S. Onshore Federal (Oil & Gas)[2]	542.06

Reference	Mt CO_2e[1] (Per Year)
U.S. Federal-All (Oil &Gas)[2]	933.87
U.S. Federal Onshore (Oil, Gas and Coal)[2]	1,033.21
U.S. Total	6,899.49

1 – Mt (megatonne) = 1 million metric tons. Estimates are based on 100-GWP values.
2 – Federal values come from the BLM Specialist Report on Annual Greenhouse Gas Emissions. Tables ES-1 and ES-2. U.S Federal-All includes offshore and onshore oil and gas production.

The "social cost of carbon," "social cost of nitrous oxide," and "social cost of methane" – together, the "social cost of greenhouse gases" (SC-GHG) are estimates of the monetized damages associated with incremental increases in GHG emissions each year. These numbers were monetized; however, they do not constitute a complete cost-benefit analysis, nor do the SC-GHG numbers present a direct comparison with other impacts analyzed in this document. SC-GHG is provided only as a useful measure of the benefits of GHG emissions reductions to inform agency decision-making. For Federal agencies, the best currently available estimates of the SC-GHG are the interim estimates of the social cost of carbon dioxide, methane, and nitrous oxide developed by the Interagency Working Group (IWG) on the SC-GHG.

Table 25 presents the SC-GHGs associated with estimated emissions from future potential development of the lease parcels. The IWG's SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the models is the discount rate, which is used to estimate the present value of the stream of future damages associated with emissions in a particular year. A higher discount rate assumes that future benefits or costs are more heavily discounted than benefits or costs occurring in the present (i.e., future benefits or costs are a less significant factor in present-day decisions). The current set of interim estimates of SC-GHG have been developed using three different annual discount rates: 2.5%, 3%, and 5% (IWG 2021).

To address uncertainty in the estimates, the IWG recommends reporting four SC-GHG estimates in any analysis. Three of the SC-GHG estimates reflect the average costs from the multiple simulations at each of the three discount rates. The fourth value represents higher-than-expected economic impacts from climate change. Specifically, it represents the 95th percentile of impacts estimated, applying a 3% annual discount rate for future economic effects. This is a low probability, but high impact scenario, and represents an upper bound of impacts within the 3% discount rate model.

The estimates below follow the IWG recommendations and represent the present value (from the perspective of 2021) of future market and nonmarket costs associated with CO_2, CH_4, and N_2O emissions from potential well development and operations and potential end-use. Estimates are calculated based on IWG estimates of social cost per metric ton of emissions for a given emissions year and BLM's estimates of emissions in each year, rounded to the nearest $1,000.

Table 25 SC-GHGs Associated with Future Potential Development

	Social Cost of GHGs ($)			
	Average Value, 5% discount rate	**Average Value, 3% discount rate**	**Average Value, 2.5% discount rate**	**95th Percentile Value, 3% discount rate**
Development and Operations	$758,000	$2,676,000	$3,973,000	$7,940,000
Mid-Stream and End-Use	$100,282,000	$361,214,000	$539,870,000	$1,088,162,000
Total	$101,040,000	$363,890,000	$543,843,000	$1,096,102,000

Impacts of the No Action Alternative (Alternative B)

Under the No Action Alternative, the BLM would not offer any of the nominated parcels in the lease sale. However, in the absence of a Land Use Plan Amendment closing the lands to leasing, they could be considered for inclusion in future lease sales. Although no new GHG emissions would result under the No Action Alternative, the national and global demand for energy is not expected to differ regardless of BLM decision-making.

The BLM does not have a model to estimate energy market substitutions at a spatial resolution needed for this onshore production scenario. Reductions in oil and natural gas produced from Federal leases may be partially offset by non-Federal production (state and private) in the United States (in which case the indirect GHG emissions would be similar), or overseas, in which case the GHG emissions would likely be higher, to the extent environmental protection requirements for production are less vigorous, and the produced energy would need to be physically transported into the United States. There may also be substitution of other energy resources to meet energy demand. These substitution patterns will be different for oil and gas because oil is primarily used for transportation, while natural gas is primarily used for electricity production and manufacturing, and to a lesser degree by residential and commercial users (EIA, 2023). Coal and renewable energy sources are stronger substitutes for natural gas in electricity generation. The effect of substitution between different fuel sources on indirect GHG emissions depends on the replacement energy source. For example, coal is a relatively more carbon intense fuel than natural gas and hydroelectricity is the least carbon intense energy source (see Table 10-3 of the Annual GHG Report (BLM, 2023). In the transportation sector, alternatives to oil are likely to be less carbon intensive.

Finally, substitution across energy sources or oil and gas production from other locations may not fully meet the energy needs that would otherwise have been realized through production from these leases. Price effects may lower the market equilibrium quantity demanded for some fuel sources. This would lead to a reduction in indirect GHG emissions. These three effects are likely to occur in some combination under the no action alternative, but the relative contribution of each is unknown. Regardless, GHG emissions under the no action alternative are not expected to be zero.

Emission Control Measures Considered in the Analysis

The relationship between GHG emissions and climate impacts is complex, but a project's potential to contribute to climate change is reduced as its net emissions are reduced. When net emissions approach

zero, the project has little or no contribution to climate change. Net-zero emissions can be achieved through a combination of controlling and offsetting emissions. Emission controls (e.g., vapor recovery devices, no-bleed pneumatics, leak detection and repair, etc.) can substantially limit the amount of GHGs emitted to the atmosphere, while offsets (e.g., sequestration, low carbon energy substitution, plugging abandoned or uneconomical wells, etc.) can remove GHGs from the atmosphere or reduce emissions in other areas. Chapter 10 of the Annual GHG Report provides a more detailed discussion of GHG mitigation strategies.

Several Federal agencies work in concert to implement climate change strategies and meet U.S. emissions reduction goals all while supporting U.S. oil and gas development and operations. The EPA is the Federal agency charged with regulation of air pollutants and establishing standards for protection of human health and the environment. The EPA has issued regulations that will reduce GHG emissions from any development related to the proposed leasing action. These regulations include the New Source Performance Standard for Crude Oil and Natural Gas Facilities (40 CFR 60, OOOOa), Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After November 15, 2021 (40 CFR 60, OOOb) and Waste Emissions Charge for Petroleum and Natural Gas Systems (40 CFR 99). These regulations impose emission limits, equipment design standards, and monitoring requirements on oil and gas facilities and a waste emissions charge on methane emissions that exceed 25,000 metric tonnes of CO_2e for applicable petroleum and natural gas facilities currently required to report under the Greenhouse Gas Reporting Rule. A detailed discussion of existing regulations and Executive Orders that apply to BLM management of federal lands as well as current Federal and state regulations that apply to oil and gas development and production can be found in Chapter 2 of the Annual GHG Report.

The EPA recently finalized a FIP that covers existing, new, and modified oil and gas emissions sources for the Uintah and Ouray Reservation and surrounding Indian Country. The purpose of the FIP is threefold: (1) improve air quality in the Uinta Basin by controlling sources that contribute to O_3 formation, (2) make Indian Country air permitting regulations consistent with State of Utah regulations in other parts of the Uinta Basin, and (3) provide streamlined O&G (oil and gas) authorizations while ensuring emissions reductions. Details concerning the FIP are incorporated by reference in the AMR (BLM, 2023) and include emissions control devices (e.g., combustors, closed loop systems), leak detection and repair, and equipment maintenance.

The majority of GHG emissions resulting from federal fossil fuel authorizations occur outside of the BLM's authority and control. These emissions are referred to as indirect emissions and generally occur off-lease during the transport, distribution, refining, and end-use of the produced federal minerals. The BLM's regulatory authority is limited to those activities authorized under the terms of the lease, which primarily occur in the "upstream" portions of natural gas and petroleum systems (i.e., the well-development and well-production phases). This decision authority is applicable when development is proposed on public lands and the BLM assesses the specific location, design, and plan of development. In carrying out its responsibilities under NEPA, the BLM has developed Best Management Practices (BMPs) designed to reduce emissions from field production and operations. BMPs may include limiting emissions from stationary combustion sources, mobile combustion sources, fugitive sources, and process emissions that may occur during development of the lease parcel. Analysis and approval of future development may include the application of BMPs within BLM's authority, included as Condition of Approval (COA), to reduce or mitigate GHG emissions. Additional measures proposed at the project development stage may be incorporated as applicant-committed measures by the project proponent or added to necessary air quality permits. Additional information on mitigation strategies, including emissions controls and offset options, are provided in Chapter 10 of the Annual GHG Report.

Cumulative Effects

The analysis of GHGs contained in this EA includes estimated emissions from the lease as described above. An assessment of GHG emissions from other BLM fossil fuel authorizations, including coal leasing and oil and gas leasing and development, is included in the Annual GHG Report in Chapter 7. The Annual GHG Report includes estimates of reasonably foreseeable GHG emissions related to BLM lease sales anticipated during the fiscal year, as well as the best estimate of emissions from ongoing production, and development of parcels sold in previous lease sales. It is, therefore, an estimate of cumulative GHG emissions from the BLM fossil fuel leasing program based on actual production and statistical trends as they are presently known.

The methodologies used in Annual GHG Report provide estimates of foreseeable short-term and projected long-term GHG emissions from activities across the BLM's oil and gas program. The foreseeable short-term methodology includes a trends analysis of (1) leased federal lands that are held-by-production[8] (2) approved applications for permit to drill (APDs), and (3) leased lands from competitive lease sales projected to occur over the next annual reporting cycle (12 months). The data is used to provide a 30-year life of lease projection of potential emissions from all Federal oil and gas activities and potential lease actions over the next 12 months. The projected long-term methodology uses oil and gas production forecasts from the Energy Information Administration (EIA) to estimate GHG emissions out to 2050 that could occur from past, present, and future development of Federal fluid minerals. For both methodologies, the emissions are calculated using life-cycle-assessment data and emission factors. These analyses are the basis for projecting GHG emissions from lease parcels that are likely to go into production during the analysis period of the Annual GHG Report and represent both a hard look at GHG emissions from oil and gas leasing and the best available estimate of reasonably foreseeable cumulative emissions related to any one lease sale or set of quarterly lease sales that could occur annually across the entire federal onshore mineral estate.

Table 26 presents the summation of the 30-year life-of-project emissions estimates for both the short and long-term as previously described for each state where federal mineral actions have been authorized. The differences between the short- and long-term emissions estimates can be thought of as an approximation of additional leasing that could occur on federal lands and does not take into consideration additional policies, technological advancements in production or end-use efficiency standards, or an accelerated economy-wide transition away from fossil fuel derived energy production.

A detailed explanation of the short-term and long-term emissions estimate methodologies are provided in sections 6.6 and 6.7 of the Annual GHG Report.

Table 26 GHG Emissions from Past, Present, and Reasonably Foreseeable Federal Onshore Lease Development (Megatonnes CO2e)

State	Existing Wells (Report Year)	Existing Wells (Projected)	Approved APDs	New Leasing	Short-Term Foreseeable Totals	Long-Term Projected Totals
AL	0.51	7.56	0.00	0.18	7.74	15.28

[8] held-by-production - A provision in an oil or natural gas property lease that allows the lessee to continue drilling activities on the property as long as it is economically producing a minimum amount of oil or gas. The held-by-production provision thereby extends the lessee's right to operate the property beyond the initial lease term.

AK	1.31	19.47	23.13	34.70	77.31	39.67
AZ	0.00	0.00	0.00	0.00	0.00	0.00
AR	0.55	8.72	0.24	0.24	9.19	16.63
CA	4.92	67.90	5.93	2.13	75.96	151.15
CO	46.16	399.35	30.80	23.95	454.10	1,395.90
ID	0.00	0.00	0.00	0.29	0.30	0.01
IL	0.01	0.11	0.00	0.02	0.13	0.26
IN	0.00	0.00	0.00	0.02	0.02	0.00
KS	0.26	3.81	0.00	0.11	3.92	7.80
KY	0.01	0.07	0.00	0.03	0.10	0.25
LA	3.84	48.54	44.95	13.11	106.60	115.95
MD	0.00	0.00	0.00	0.00	0.00	0.00
MI	0.07	1.36	0.00	0.58	1.94	2.11
MS	0.12	1.59	0.38	0.38	2.35	3.62
MT	2.52	25.68	0.42	12.63	38.73	77.12
NE	0.02	0.22	0.00	0.03	0.25	0.47
NV	0.13	1.01	0.01	0.19	1.22	4.07
NM	326.00	2,318.83	745.21	119.12	3,183.17	9,961.81
NY	0.00	0.01	0.00	0.00	0.01	0.01
ND	33.32	279.03	57.62	3.57	340.22	1,020.91
OH	0.40	3.83	0.00	4.64	8.47	12.20
OK	1.25	12.23	0.95	1.66	14.83	37.81
OR	0.00	0.00	0.00	0.12	0.12	0.00
PA	0.00	0.06	0.00	0.67	0.72	0.12
SD	0.11	1.77	0.11	0.11	1.98	3.23
TN	0.00	0.00	0.00	0.00	0.00	0.00
TX	3.31	36.52	19.00	1.97	57.49	99.95
UT	13.90	175.34	16.33	36.75	228.41	421.63
VA	0.01	0.14	0.00	0.03	0.16	0.27
WV	0.00	0.06	0.00	0.59	0.65	0.14
WY	103.34	920.76	178.16	317.98	1,416.91	3,134.55
Total Onshore Federal	**542**	**4,334**	**1,123**	**576**	**6,033**	**16,523**

Source: BLM Annual GHG Report, Section 7

As detailed in the 2022 Annual GHG Report, which the BLM has incorporated by reference, the BLM also looked at other tools to inform its analysis, including the Model for the Assessment of Greenhouse Gas Induced Climate Change (MAGICC) (see Section 9.0 of the Annual GHG Report). BLM conducted MAGICC runs evaluating potential contributions to global climate change and related values for two climate change projection scenarios. These two scenarios were chosen because they most

closely approximate or frame the desired outcomes of the Paris Climate Accord and would also reflect the greatest contribution as a percent of BLM's authorized cumulative emissions relative to the global emissions levels contained in the scenarios. The Intergovernmental Panel on Climate Change's (IPCC) most optimistic scenario evaluates global CO_2 emissions cut to net zero around 2050. This is the only scenario that meets the Paris Agreement's goal of keeping global warming to around 1.5 °C above pre-industrial temperatures. The second "middle of the road" scenario leaves global CO_2 emissions around current levels before starting to fall by 2050 but does not reach net-zero by 2100. In this scenario, temperatures rise 2.7 °C by the end of the century. The maximum BLM fossil fuel (oil, gas, and coal) contribution to global temperature increases under these two scenarios is 0.015 °C and 0.013 °C, respectively. This is an assessment of what BLM has projected could come from the entire Federal fossil fuel program, including the projected emissions from the leases, over the next 30 years.

Recent short-term energy outlook reports (STEO) published by the EIA (https://www.eia.gov/outlooks/steo/) (EIA, 2023) predict that the world's oil and gas supply and consumption will increase over the next 18-24 months. The STEO projections are useful for providing context for the cumulative discussion as the global forecast models used for the STEO are not dependent on whether the BLM issues onshore leases but are based on foreseeable short-term global supply and demand and include oil and gas development /operations on existing U.S. onshore leases. Recent STEOs includes the following projections for the next two years:

- U.S. liquid fuels consumption is projected to increase to 20.40 million barrels per day (b/d) in 2024 up from 20.25 million b/d in 2023.
- U.S. crude oil production is expected to average 13.19 million b/d in 2024 and rise to 13.65 million b/d in 2025.
- U.S natural gas consumption is expected to average 89.68 Bcf/d in 2024, decreasing slightly to 89.21 Bcf/d in 2025.
- U.S. LNG exports are expected to increase from 11.9 billion cubic feet/day (Bcf/d) in 2023 to 12.34 Bcf/d in 2024 and 14.43 Bcf/d in 2025.
- U.S. Coal production is expected to total 496.6 million short tons (MMst) in 2024 and 465.8 MMst in 2025 and decrease to 15% of total U.S. electricity generation in 2024 compared to 17% in 2023 driven by on-going retirement of coal-fired generating plants.

Energy generation from renewable sources will make up an increasing share of total U.S. electricity generation, rising from 21% in 2023 to 24% in 2024. Recent events, both domestically and internationally, have resulted in abrupt changes to the global oil and gas supply. EIA studies and recent U.S. analyses (associated with weather impacts, etc.) regarding short-term domestic supply disruptions and shortages or sudden increases in demand demonstrate that reducing domestic supply (in the near-term under the current supply and demand scenario) will likely lead to the import of more oil and natural gas from other countries, including countries with lower environmental and emission control standards than the United States (EIA, 2023). Recent global supply disruptions have also led to multiple releases from the U.S. Strategic Petroleum Reserve in order to meet consumer demand and curb price surges.

The EIA 2023 Annual Energy Outlook (EIA, 2023)projects energy consumption increases through 2050 as population and economic growth outweighs efficiency gains. As a result, U.S. production of natural gas and petroleum and liquids will rise amid growing demand for exports and industrial uses. United States natural gas production increases by 15% from 2022 to 2050. However, renewable energy will be the fastest-growing U.S. energy source through 2050. As electricity generation shifts to using more renewable sources, domestic natural gas consumption for electricity generation is expected to decrease by 2050 relative to 2022. As a result, energy-related CO_2 emissions are expected to fall 25% to 38% below

2005 level, depending on economic growth factors. Further discussion of past, present and projected global and state GHG emissions can be found in Chapter 5 of the Annual GHG Report.

Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad" (January 27, 2021), directs the executive branch to establish policies or rules that put the United States on a path to achieve carbon neutrality, economywide, by no later than 2050. This goal is consistent with IPCC's recommendation to reduce net annual global CO emissions between 2020 and 2030 to reach carbon neutrality by mid-century. Federal agencies are still in the process of developing policies that align with a goal of carbon neutrality by 2050. In the short-term, the order has a stated goal of reducing economy wide GHG emissions by 50 to 52% relative to 2005 emissions levels no later than 2030.

Carbon budgets are an estimate of the amount of additional GHGs that could be emitted into the atmosphere over time to reach carbon neutrality while still limiting global temperatures to no more than 1.5 °C or 2 °C above preindustrial levels (see Section 9.1 of the Annual GHG Report (BLM, 2023)). The IPCC Special Report on Global Warming of 1.5 ºC is the most widely accepted authority on the development of a carbon budget to meet the goals of the Paris Agreement. None of the global carbon budgets or pledges that countries have committed to stay within as part of the Paris Agreement are binding. At present, no national or Federal agency carbon budgets have been established, primarily due to the lack of consensus on how to allocate the global budget to each nation, and as such the global budgets that limit warming to 1.5 ºC or 2.0 ºC are not useful for BLM decision making, particularly at the leasing stage, as it is unclear what portion of the budget applies to emissions occurring in the United States.

The Council on Environmental Quality discourages Federal agencies from comparing emissions from an action to global or domestic levels as "such comparisons and fractions also are not an appropriate method for characterizing the extent of a proposed action's and its alternatives' contributions to climate change because this approach does not reveal anything beyond the nature of the climate change challenge itself (CEQ, 2023)." However, stakeholders and members of the public have requested that the BLM consider comparing the estimated Federal oil and gas emissions in the context of global carbon budgets. In the interest of public disclosure, Table 9-1 in the Annual GHG Report provides an estimate of the potential emissions associated with Federal fossil fuel authorizations in relation to IPCC carbon budgets. Total Federal fossil fuel authorizations including coal, natural gas and oil represents approximately 1.37% of the remaining global carbon budget of 380 $GtCO_2$ needed to limit global warming to 1.5 ºC.

While continued fossil fuel authorizations will occur over the next decade to support energy demand and remain in compliance with the leasing mandates in the Inflation Reduction Act (IRA) passed in 2022, the U.S. Energy Information Administration International Energy Outlook expects renewable energy consumption to double between 2020 and 2050 and nearly equal liquid fuels consumption by 2050. The U.S. has committed to the expansion of renewable energy through infrastructure investments in clean energy transmission and grid upgrades include in the Bipartisan Infrastructure Investment and Jobs Act as well as clean energy investments and incentives included in the Inflation Reduction Act. This energy transition is reflected projected U.S. GHG emissions, see Figure 2

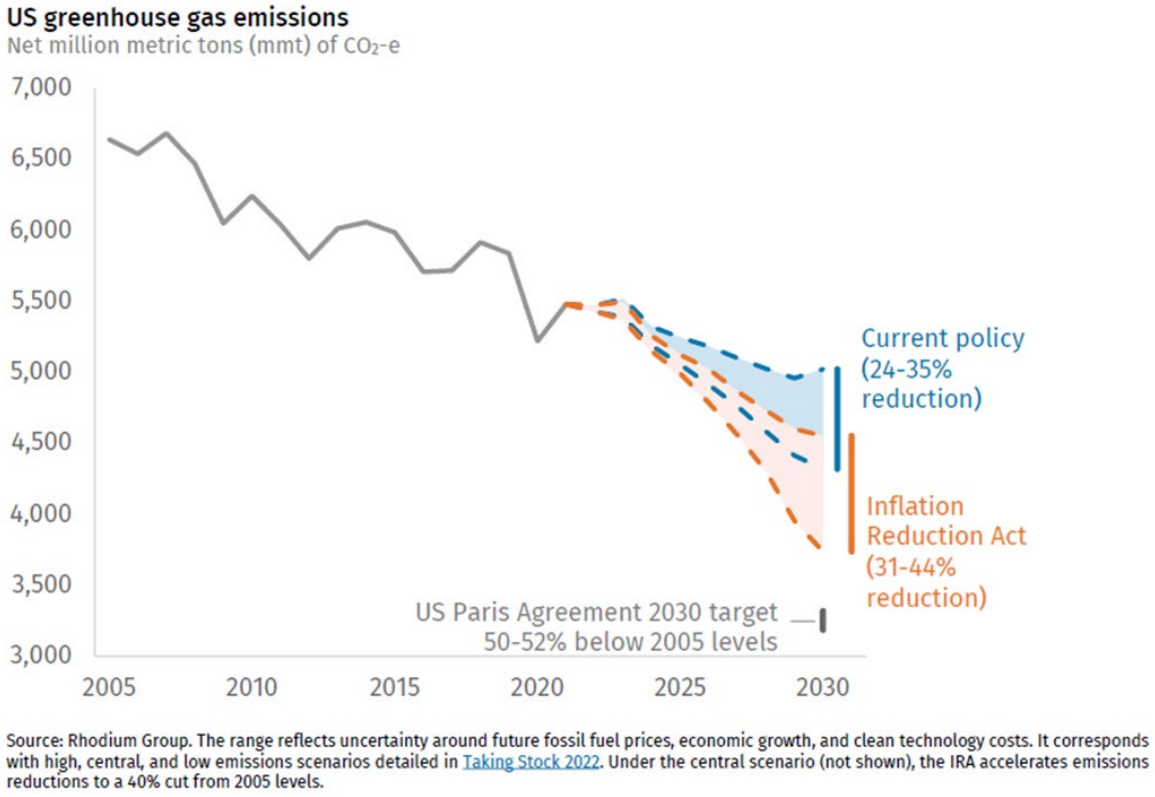

Figure 6 Projected Short-Term Emissions Reductions Associated with the IRA

CHAPTER 4. CONSULTATION AND COORDINATION

4.1. ENDANGERED SPECIES ACT CONSULTATION

The effects of oil and gas leasing development on T&E species were analyzed through Section 7 consultation as follows:

- Vernal RMP: 2008 (including the 2018 re-initiation to add the geographic area for yellow-billed cuckoo in the Vernal Field Office)

During the consultations, Lease Notices to inform the potential lessees of the potential that T&E species may be affected by oil and gas activities were developed and have been attached to parcels as appropriate. The lease action is in compliance with T&E species management outlined in accordance with the requirements under the FLPMA and the NEPA.

While Federal regulations and policies require the BLM to make its public land and resources available on the basis of multiple use principles, it is BLM policy to conserve special status species and their habitats, and to ensure that actions authorized by the BLM do not contribute to the need for the species to become listed as T&E by the USFWS.

For lease sales conducted within the range of listed species covered by the referenced consultation actions, the BLM regularly coordinates with the USFWS to assure agreement that the Proposed Action does not exceed the impacts analyzed in the existing consultations.

- April 24, 2024 – The BLM provided the USFWS with the list of nominated parcels, geospatial data, and list of species potentially impacted by the nominated parcels.

- April 24, 2024 – The USFWS agreed with the BLM's species determinations and did not identify that the Proposed Action would exceed the impacts analyzed for any listed species.

When or if APDs are submitted to develop these parcels, further evaluation, and Section 7 consultation with the USFWS will occur as necessary.

4.2. TRIBAL CONSULTATION

Tribal consultation for leasing actions is done on a government-to-government basis. On February 13, 2024, the BLM provided project information and an invitation to consult on resources of concern to potentially affected Tribes for the Lease Sale as provided for by the NEPA, the NHPA, the American Indian Religious Freedom Act (AIRFA), and Executive Order 13007. The BLM contacted the Confederated Tribes of the Goshute Reservation, Eastern Shoshone Tribe of the Wind River Reservation, Hopi Tribe of Arizona, Navajo Nation, Northwestern Band of the Shoshone Nation, Paiute Indian Tribe of Utah and the five constituent Bands (Cedar, Indian Peaks, Kanosh, Koosharem, and Shivwits Bands) Pueblo of Jemez, Pueblo of Laguna, Pueblo of Santa Clara, Pueblo of Santa Clara, Pueblo of Zia, Santo Domingo Pueblo, Southern Ute Indian Tribe of the Southern Ute Reservation, Ute Indian Tribe of the Uintah and Ouray Reservation, Ute Mountain Ute Tribe including the White Mesa Ute Community.

As of June 24, 2024, no Tribes have responded to BLM's notification about the lease sale. The BLM will remain available to engage with Tribes and respond to any consultation requests until the lease sale date. If the nominated parcels are leased, future potential development would be subject to additional Tribal consultation NEPA, NHPA, AIRFA, and Executive Order 13007 as directed by regulation and current policy.

4.3. NATIONAL HISTORIC PRESERVATION ACT CONSULTATION

The BLM prepared a literature review and analysis of cultural resources for the parcels nominated for the Lease Sale as part of its reasonable and good faith effort to identify historic properties and any potential adverse effects this undertaking may have on historic properties, as required by the National Historic Preservation Act of 1966, 54 U.S.C 306108 (commonly and referred to as Section 106).

The Advisory Council for Historic Preservation's (ACHP) document titled Meeting the "Reasonable and Good Faith" Identification Standards in Section 106 Review, from https://www.achp.gov/sites/default/files/guidance/2018-05/reasonable_good_faith_identification.pdf outlines the steps to determine when a reasonable and good faith identification effort has been met. The ACHP states:

- Prior to beginning the identification stage in the Section 106 process, the regulations (at 36 CFR 800.4) require the federal agency to do the following:
    - Determine and document the APE [Area of Potential Effect] in order to define where the agency will look for historic properties that may be directly or indirectly affected by the undertaking;
    - Review existing information on known and potential historic properties within the APE, so the agency will have current data on what can be expected, or may be encountered, within the APE;

- Seek information from others who may have knowledge of historic properties in the area. This includes the State Historic Preservation Officer/Tribal Historic Preservation Officer and as appropriate, Indian tribes or Native Hawaiian organizations who may have concerns about historic properties of religious and cultural significance to them within the APE.

Following these initial steps, the regulations (36 CFR 800.4(b)(1)) set out several factors the agency must consider in determining what is a "reasonable and good faith effort" to identify historic properties:

Take into account past planning, research, and studies; the magnitude and nature of the undertaking and the degree of federal involvement; the nature and extent of potential effects on historic properties; and the likely nature and location of historic properties within the APE. The Secretary of the Interior's standards and guidelines for identification provide guidance on this subject. The agency official should also consider other applicable professional, state, tribal, and local laws, standards, and guidelines. The regulations note that a reasonable and good faith effort may consist of or include 'background research, consultation, oral history interviews, sample field investigation, and field survey.'

For lease sales, BLM's identification efforts include: (1) completing a comprehensive "literature review," which is a review and analysis of available pertinent cultural resource records and information for each parcel and the surrounding areas that are included in the undertaking APE; and (2) proactively seeking information from others who may have knowledge of historic properties in the area.

As part of the Section 106 process, the BLM provided project information and an invitation to consult on resources of concern to potentially affected Tribes via certified letter sent February 13, 2024:

Confederated Tribes of the Goshute Reservation, Eastern Shoshone Tribe of the Wind River Reservation, Hopi Tribe of Arizona, Navajo Nation, Northwestern Band of the Shoshone Nation, Paiute Indian Tribe of Utah and the five constituent Bands (Cedar, Indian Peaks, Kanosh, Koosharem, and Shivwits Bands) Pueblo of Jemez, Pueblo of Laguna, Pueblo of Santa Clara, Pueblo of Santa Clara, Pueblo of Zia, Santo Domingo Pueblo, Southern Ute Indian Tribe of the Southern Ute Reservation, Ute Indian Tribe of the Uintah and Ouray Reservation, Ute Mountain Ute Tribe including the White Mesa Ute Community.

The BLM Utah State Office also sent invitations to potential Section 106 consulting parties on May 2, 2023. Invitations were sent to Utah Rock Art Research Association (URARA), Utah Trust Lands Administration (UTLA), Utah Public Lands Policy Coordination Office (PLPCO), Utah Professional Archaeological Council (UPAC), LDS Church History, and Uintah County.

All nominated lease parcels for the lease sale lie within the exterior boundary of the Ute Indian Tribe of the Uintah & Ouray Reservation (Ute Indian Tribe) reservation. The Ute Indian Tribe entered into an agreement with the National Park Service and the U.S. Department of the Interior to establish a Tribal Historic Preservation Office (THPO) on September 22, 2021, and thereby assumed the functions of a State Historic Preservation Officer (SHPO) overseeing Section 106 responsibilities and undertakings that lie within the exterior boundary of their reservation. Per 36 CFR 800.2(c)(2)(i)(A), an Agency consults with the THPO "in lieu of the SHPO regarding undertakings occurring on or affecting historic properties on tribal lands." On [ongoing], BLM sought concurrence regarding its finding of effect for the lease sale with the Ute Indian Tribe THPO.

CHAPTER 5. LIST OF PREPARERS

Table 27 contains a list of individuals that contributed to preparation of this EA.

Table 27 List of EA Preparers

NAME	AREA OF EXPERTISE	ORGANIZATION
Dave Cook	Wildlife Biologist	BLM UTSO
April Crawley	Planning and Environmental Specialist	BLM UTSO
Jared Dalebout	Hydrologist	BLM UTSO
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Ray Kelsey	National Conservation Lands Program Lead	BLM UTSO
Cassie Mellon	Aquatic Ecologist	BLM UTSO
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Aaron Roe	Botanist	BLM UTSO
Bill Stevens	Economist	BLM MbFO
Tylia Varilek	Archaeologist	BLM UTSO
Erik Vernon	Air Quality Specialist	BLM UTSO
Angela Wadman	Fluid Minerals Branch Chief	BLM UTSO
Catherine Chachere	Physical Scientist	BLM UTSO
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Jessica Montcalm	Tribal Liaison	BLM UTSO
Nathan Thomas	Branch Chief for Outdoor and Heritage Resources	BLM UTSO
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CHAPTER 6. LITERATURE CITED

Alder, J. R., & Hostetler, S. W. (2013). *USGS National Climate Change Viewer. US Geological Survey*. Retrieved from https://doi.org/10.5066/F7W9575T

American Geosciences Institute. (2018, 06 01). Water in the Oil and Gas Industry. Retrieved from American Geosciences Institute: https://www.americangeosciences.org/geoscience-currents/water-oil-and-gas-industry

BLM. (1990, 5 07). Handbook H-1624-1, Planning for Fluid Mineral Resources.

BLM. (2002). Mineral Potential Report for the Vernal Planning Area Encompassing Approximately 5.1 million Acres, Duchesne, Dagget, Uintah, and Grand Counties. Retrieved from https://eplanning.blm.gov/eplanning-ui/project/68145/570

BLM. (2007). *BLM.gov*. Retrieved from The Gold Book: https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/operations-and-production/the-gold-book

BLM. (2008b). BLM National Environmental Policy Act Handbook H-1790-1. Retrieved from https://www.blm.gov/sites/blm.gov/files/uploads/Media_Library_BLM_Policy_Handbook_h1790-1.pdf

BLM. (2014, 9 29). *ISSUANCE OF THE BUREAU OF LAND MANAGEMENT FACT SHEET ON THE AIR QUALITY GENERAL CONFORMITY RULE*. Retrieved 1 13, 2020, from https://www.blm.gov/policy/ib-2014-084

BLM. (2016). Manual 1626 - Travel and Transportation Management Manual. Retrieved from https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual1626.pdf

BLM. (2018a). Canyon County District March 2018 Oil and Gas Lease Sale - Environmental Assessment. NEPA Register No. DOI-BLM-UT-Y010-2017-0240-EA. Retrieved from https://eplanning.blm.gov/eplanning-ui/project/82261/510.

BLM. (2023). *2022 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends*. Retrieved from https://www.blm.gov/content/ghg/2022

BLM. (2023, 11 27). *2023 Air Resource Management Strategy Monitoring Report.* Retrieved from https://eplanning.blm.gov/eplanning-ui/project/101390/570

BLM. (2023). Night Sky and Dark Environments: Best Management Practices for Artificial Light at Night on BLM-Managed lands. Tech Note 457. Retrieved from https://www.blm.gov/sites/default/files/docs/2023-04/Library_BLMTechnicalNote457_final.pdf.

BLM. (2023). *REGULATIONS, ONSHORE ORDERS AND NOTICES TO LESSEES*. Retrieved from BLM.gov: https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/operations-and-production/onshore-orders

BLM. (2024). Recreation Management Information System (RMIS).

BLS Bureau of Labor and Statistics. (2024). Quarterly Census of Employment and Wages. Retrieved from https://data.bls.gov/cew/apps/table_maker/v4/table_maker.htm#type=2&st=49&year=2023&qtr=3&own=5&ind=1011&supp=0

CEQ. (2023, 1 8). *Guidance: National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*. Retrieved from https://www.regulations.gov/document/CEQ-2022-0005-0001

Dilts, T. E., Steele, M. O., Engler, J. D., Pelton, E. M., Jepsen, S. J., Stephanie, J. M., . . . Forister, M. L. (2019). Host Plants and Climate Structure Habitat Associations of the Western Monarch Butterfly. *Frontiers in Ecology and Evolution*. doi:10.3389/fevo.2019.00188

EIA. (2022). *EIA, Utah State Energy Analysis.* Retrieved from https://www.eia.gov/state/analysis.php?sid=UT

EIA. (2023, 03 16). *Annual Energy Outlook 2022.* Retrieved 10 01, 2021, from https://www.eia.gov/outlooks/aeo/

EIA. (2023, 3 7). *Short-Term Energy Outlook*. Retrieved from https://www.eia.gov/outlooks/steo/

EPA . (2022, 4 28). *GHG Equivalancy Calculator*. Retrieved from https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

EPA. (1974). *Information on noise levels identified as a requistine to protect public health and welfare an adequate margin of safety. EPA-550/9-74-004.* Retrieved from https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF

EPA. (1999, 03). *Residual Risk Report to Congress 1999.* Retrieved from https://www.epa.gov/fera/residual-risk-report-congress-1999

EPA. (2022). *2017 AirToxScreen: Assessment Results*. Retrieved 3 21, 2022, from https://www.epa.gov/AirToxScreen/2017-airtoxscreen-assessment-results#emissions

EPA. (2022, 12 8). *FIP for Oil and Natural Gas Sources on the Uintah and Ouray Indian Reservation.* Retrieved from https://www.epa.gov/air-quality-implementation-plans/fip-oil-and-natural-gas-sources-uintah-and-ouray-indian#:~:text=Per%2040%20CFR%2049.172%2C%20the,is%20due%20April%2015%2C%202024.

EPA. (2023, 1 9). *2019 AirToxScreen: Assessment Results*. Retrieved from https://www.epa.gov/AirToxScreen/2019-airtoxscreen-assessment-results

EPA. (2023, 7 5). *Basic Information about Lead Air Pollution*. Retrieved from https://www.epa.gov/lead-air-pollution/basic-information-about-lead-air-pollution#health

EPA. (2023, 1 30). *Technologically Enhanced Naturally Occurring Radioactive Material: Oil and Gas Production Wastes*. Retrieved from https://www.epa.gov/radiation/tenorm-oil-and-gas-production-wastes

EPA. (2023a, May). *Ground-level Ozone Pollution*. Retrieved from https://www.epa.gov/ground-level-ozone-pollution

EPA. (2023b, May). *Particulate Matter Basics*. Retrieved from https://www.epa.gov/pm-pollution/particulate-matter-pm-basics

EPA. (2023c, May). *Basic Information about NO2*. Retrieved from https://www.epa.gov/no2-pollution/basic-information-about-no2

EPA. (2023d, May). *Basic Information about Carbon Monoxide Outdoor Air Pollution*. Retrieved from https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution#What%20is%20CO

EPA. (2023f, May). *Sulfur Dioxide Basics*. Retrieved from https://www.epa.gov/so2-pollution/sulfur-dioxide-basics#effects

EPA. (2023g, May). *Health Effects Notebook for Hazardous Air Pollutants*. Retrieved from https://www.epa.gov/haps/health-effects-notebook-hazardous-air-pollutants

EPA. (2023h, May). *Human Health Risk Assessment*. Retrieved from https://www.epa.gov/risk/human-health-risk-assessment

EPA. (2024, 4 29). *2020 National Emissions Inventory (NEI) Data.* Retrieved from https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data

EPA. (2024, 4 10). *Extension of the Attainment Date and Determination of Attainment by the Attainment Date of the Uinta Basin Marginal Nonattainment Area Under the 2015 Ozone National Ambient Air Quality Standards*. Retrieved from Federal Register: https://www.federalregister.gov/documents/2024/04/10/2024-07501/extension-of-the-attainment-date-and-determination-of-attainment-by-the-attainment-date-of-the-uinta

EPA. (2024, 2 7). *NAAQS Table*. Retrieved from https://www.epa.gov/criteria-air-pollutants/naaqs-table

Falchi, F., Cinzano, P., Duriscoe, D., Kyba, C. C., Elvidge, C. D., Baugh, K., . . . Furgoni, R. (2016). Supplement to: The New World Atlas of Artificial Night Sky Brightness. *V. 1.1. GFZ Data Services*. Retrieved from https://doi.org/10.5880/GFZ.1.4.2016.001

Groundwater Protection Council. (2017). *State Oil and Natural Gas Regulations Designed to Protect Water* . Retrieved from https://www.gwpc.org/sites/gwpc/uploads/documents/

Headwaters Economics. (2024). *Economic Profile System*. Retrieved from https://headwaterseconomics.org/apps/economic-profile-system/49047+49009+49013+49000

Mansfield. (2021). Winter Ozone Pollution in Utah's Uinta Basin is Attenuating. *Atmosphere*.

Murphey, P. C., Townsend, K. B., Friscia, A. R., Westgate, J., Evanoff, E., & Gunnell, G. F. (2017). Paleontology And Stratigraphy of Middle Eocene Rock Units In the Southern Green River and Uinta Basins, Wyoming and Utah. *Geology of the Intermountain West, 4*, pp. 1-53. doi:10.31711/giw.v4.pp1-53

NatureServe. (2020). *Habitat-based Plant Element Occurrence Delimitation Guidance - Revised.* Arlington, VA: NatureServe.

NETL. (2009). *2008 Development of Baseline Data and Analysis of Life Cycle Greenhouse Gas Emissions of Petroleum-Based Fuels. Tables 3-10, 4-55, and 5-10.* DOE/NETL-2009/1346.

NETL. (2019). *Life Cycle Analysis of Natural Gas Extraction and Power Generation. Appendix F, Table F-31.* DOE/NETL-2019/2039.

NRCS. (2014). *Web Soil Survey - Digital General Soil Map of the United States (STATSGO2).* Retrieved from http://websoilsurvey.nrcs.usda.gov

NRCS. (2024). *Soil Survey Geographic (SSURGO) Database.* Retrieved from https://websoilsurvey.urcs.usda.gov

Ramboll. (2023). *BLM Western US Photochemical Air Quality Modeling for 2032.*

Sandoval Lambert, M. H. (2022). Natural Gas Development and Migratory Ungulates on Western Rangelands. *Bull Ecol Soc Am*.

State of Utah. (2023). *rmp.utah.gov.* Retrieved from State Resource Management Plan (Utah): https://storymaps.arcgis.com/collections/81d4406668e34acca4d98275ee41cd07?item=8

UDOGM. (2024, 1). *Monthly Production Reports - By County*. Retrieved from https://oilgas.ogm.utah.gov/oilgasweb/publications/monthly-rpts-by-cnty.xhtml?rptType=CNTY

Uintah County. (2022, October 31). Retrieved from https://utah-resource-management-planning-plpco.hub.arcgis.com/: https://ago-item-storage.s3.us-east-1.amazonaws.com/b638e72b971b4720835d801e125ddbb3/Uintah_CRMP_2019_.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjECQaCXVzLWVhc3QtMSJIMEYCIQDGvSRGupfOpci13zoJ33FqSpTtu0iAwFzUIlye1gwBPwIhAPaRlIGZz2vqvb38mKyuKvNywN3jI%2FxLJyVGH

USDOT. (2003). *Living with Noise. Public Roads.* Retrieved from https://highways.dot.gov/public-roads/julyaugust-2003/living-noise#:~:text=Levels%20of%20highway%20traffic%20noise,to%20carry%20on%20a%20conversation.

USGS. (2019, 03 02). *USGS.* Retrieved from Hydraulic Fracturing: https://www.usgs.gov/mission-areas/water-resources/science/hydraulic-fracturing?qt-science_center_objects=0#qt-science_center_objects

USGS. (2023). How much water does the typical hydraulically fractured well require? Retrieved from https://www.usgs.gov/faqs/how-much-water-does-typical-hydraulically-fractured-well-require#:~:text=Water%20use%20per%20well%20can,to%20about%2016%20million%20gallons.

Utah. (2020). Location And Siting of Vertical Wells and Statewide Spacing for Horizontal Wells. Retrieved from https://www.law.cornell.edu/regulations/utah/Utah-Admin-Code-R649-3-2

Utah Geological Survey. (2018, May). *Survey Notes*. Retrieved from geology.utah.gov: https://geology.utah.gov/map-pub/survey-notes/uinta-basin-produced-water/#:~:text=O%20il%20and%20gas%20fields%20in%20the%20Uinta,73%20to%2066%20million-year-old%20Upper%20Cretaceous%20Mesaverde%20Group.

WRAP/WAQS. (2021). *UNITED STATES ANTHROPOGENIC EMISSIONS RATE OF PROGRESS* . Retrieved from https://views.cira.colostate.edu/tssv2/Docs/USAnthroRoP.pdf

APPENDIX A. FIGURES/MAPS

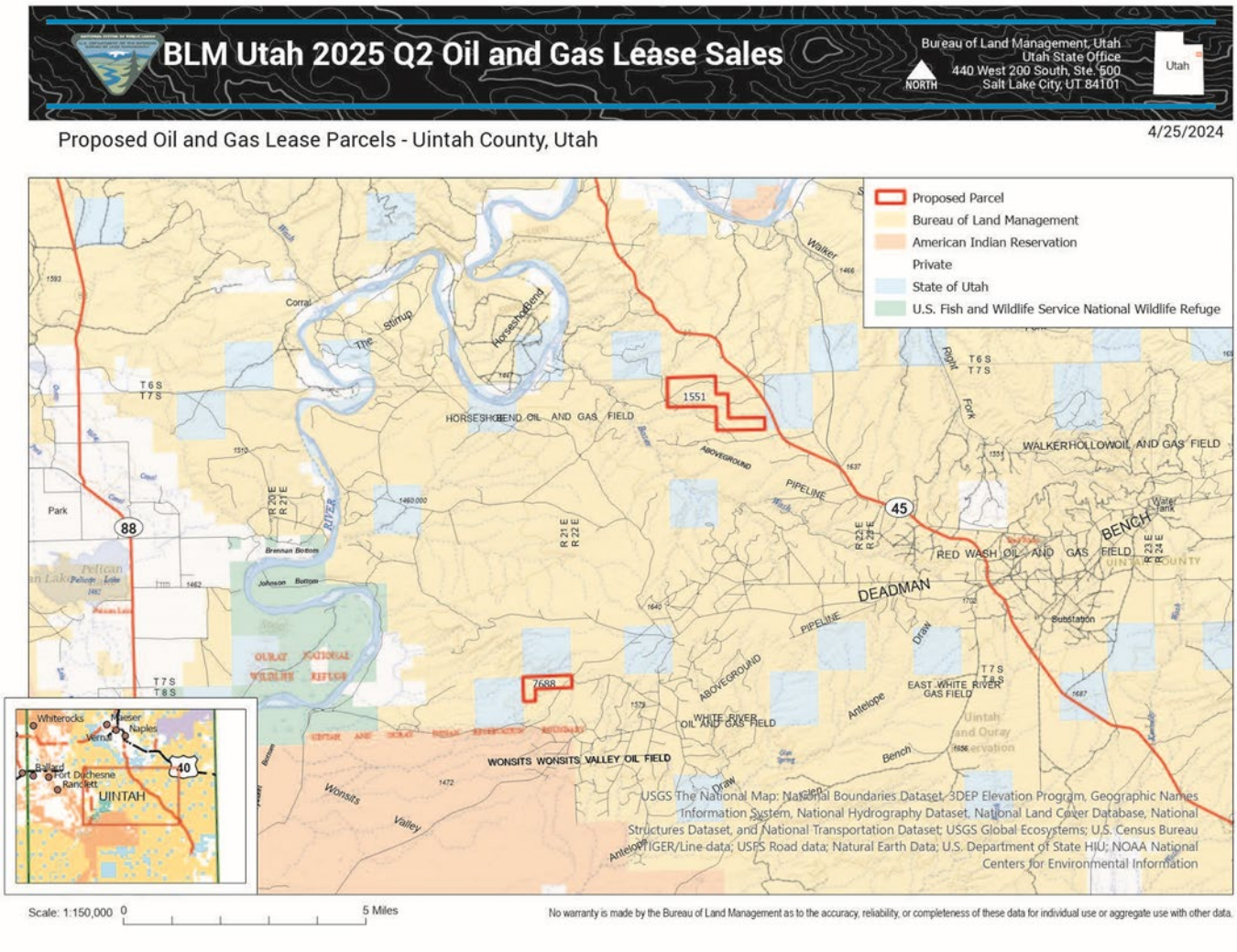

Figure 7 Proposed 2025 Oil and Gas Lease Parcels

APPENDIX B. STIPULATIONS

Lease stipulations and notices applied to each parcel are listed in B.1. For descriptions of each stipulation and notice, see section B.2.In addition to the parcel specific Stipulations and Notices listed below, the stipulations and notices presented in this table would be applied to **ALL** parcels:

Stipulations	Notices
Cultural Resources Protection (Handbook H-3120-1)	Notice to Lessee (MLA)
Threatened & Endangered Species Act (Handbook H-3120-1)	

B.1 LEASE STIPULATIONS AND NOTICES BY PARCEL

Table 28: Parcel 7688

UT-2025-03-7688 UT, Vernal Field Office, Bureau of Land Management, PD T. 8 S., R. 21 E., Salt Lake Meridian Sec. 1 LOTS 1 thru 4, SW1/4NW1/4. Uintah County 201.2 Acres EOI# UT00019071	
Stipulations	**Notices**
UT-S-1 Air Quality	T&E-03 Endangered Fish of the Upper Colorado River Drainage Basin
UT-S-96 No Surface Occupancy – Fragile Soils/Slopes Greater than 40%	T&E-05 Listed Plant Species
UT-S-99 Controlled Surface Use – Fragile Soils/Slopes	T&E-12 Pariette Cactus (*Sclerocactus brevispinus*) and Uinta Basin Hookless Cactus [*Sclerocactus glaucus* (*brevispinus and wetlandicus*)]
UT-S-100 Controlled Surface Use – Fragile Soils/Slopes (21%-40%)	UT-LN-13 Pronghorn Winter Habitat
UT-S-123 No Surface Occupancy – Riparian, Floodplains, and Public Water Reserves	UT-LN-14 Pronghorn Fawning Habitat
UT-S-157 No Surface Occupancy/Controlled Surface Use/Timing Limitation – Visual Resources	UT-LN-25 White-Tailed and Gunnison Prairie Dog
UT-S-261 Timing Limitation – Raptor Buffers	UT-LN-44 Raptors

UT-S-316 Material Site Rights-of-Way	UT-LN-45 Migratory Bird
	UT-LN-49 Utah Sensitive Species
	UT-LN-51 Special Status Plants: Not Federally Listed
	UT-LN-53 Riparian Areas
	UT-LN-72 High Potential Paleontological Resources
	UT-LN-96 Air Quality Mitigation Measures
	UT-LN-99 Regional Ozone Formation Controls
	UT-LN-102 Air Quality Analysis
	UT-LN-128 Floodplain Management
	UT-LN-156 Pollinators and Pollinator Habitat

Table 29: Parcel 1551

UT-2025-03-1551 UT, Vernal Field Office, Bureau of Land Management, PD T. 7 S., R. 22 E., Salt Lake Meridian Sec. 3 SW1/4NW1/4, NW1/4SW1/4, S1/2SW1/4, S1/2SE1, Sec. 4 LOTS 1 thru 8, S1/2NE1/4, S1/2NW1/4. Uintah County 632.08 Acres EOI# UT00019033, UT00018008	
Stipulations	**Notices**
UT-S-1 Air Quality	T&E-03 Endangered Fish of the Upper Colorado River Drainage Basin
UT-S-96 No Surface Occupancy - Fragile Soils/Slopes Greater than 40%	T&E-05 Listed Plant Species
UT-S-99 Controlled Surface Use – Fragile Soils/Slopes	UT-LN-13 Pronghorn Winter Habitat
UT-S-100 Controlled Surface Use – Fragile Soils/Slopes (21%-40%)	UT-LN-14 Pronghorn Fawning Habitat
UT-S-123 No Surface Occupancy – Riparian, Floodplains, and Public Water Reserves	UT-LN-25 White-Tailed and Gunnison Prairie Dog

UT-S-157 No Surface Occupancy/Controlled Surface Use/Timing Limitation – Visual Resources	UT-LN-44 Raptors
UT-S-261 Timing Limitation – Raptor Buffers	UT-LN-45 Migratory Bird
UT-S-316 Material Site Rights-of-Way	UT-LN-49 Utah Sensitive Species
	UT-LN-51 Special Status Plants: Not Federally Listed
	UT-LN-53 Riparian Areas
	UT-LN-72 High Potential Paleontological Resources
	UT-LN-89 Horseshoe Milkvetch *(Astragalus Equisolensis)*
	UT-LN-96 Air Quality Mitigation Measures
	UT-LN-99 Regional Ozone Formation Controls
	UT-LN-102 Air Quality Analysis
	UT-LN-128 Floodplain Management
	UT-LN-156 Pollinators and Pollinator Habitat

B.2 DESCRIPTION OF LEASE STIPULATION AND NOTICES

Table 30 Standard Lease Stipulations (from H-3120 – Competitive Leasing Handbook)

NOTICE	DESCRIPTION/PURPOSE
UT-LN-13	**PRONGHORN WINTER HABITAT** The lessee/operator is given notice that lands in this lease have been identified as containing crucial pronghorn winter habitat. Surface use or otherwise disruptive activity may be restricted for up to 60 days during pronghorn fawning season, as determined by BLM, including exploration, drilling and other development activities. Modifications may be required in the Surface Use Plan of Operations including seasonal timing restrictions to protect the species and its habitat.
UT-LN-14	**PRONGHORN FAWNING HABITAT** The lessee/operator is given notice that this lease has been identified as containing crucial pronghorn fawning habitat. Surface use or otherwise disruptive activity may be restricted for up to 60 days during pronghorn fawning season, as determined by BLM within identified crucial/important pronghorn fawning habitat from disruptive activity. Modifications to the Surface Use Plan of Operations may be required in accordance with section 6 of the lease terms and 43 CFR 3101.1-2.

NOTICE	DESCRIPTION/PURPOSE
UT-LN-25	**WHITE-TAILED AND GUNNISON PRAIRIE DOG** The lessee/operator is given notice that this lease parcel has been identified as containing white-tailed or Gunnison prairie dog habitat. Modifications to the Surface Use Plan of Operations may be required in order to protect white-tailed or Gunnison prairie dog from surface disturbing activities in accordance with the Endangered Species Act and 43 CFR 3101.1-2.
UT-LN-44	**RAPTORS** Appropriate seasonal and spatial buffers shall be placed on all known raptor nests in accordance with Utah Field Office Guidelines for Raptor Protection from Human and Land use Disturbances (USFWS 2002) and Best Management Practices for Raptors and their Associated Habitats in Utah (BLM 2006). All construction related activities will not occur within these buffers if pre-construction monitoring indicates the nests are active, unless a site-specific evaluation for active nests is completed prior to construction and if a BLM wildlife biologist, in consultation with USFWS and UDWR, recommends that activities may be permitted within the buffer. The BLM will coordinate with the USFWS and UDWR and have a recommendation within 3-5 days of notification. Any construction activities authorized within a protective (spatial and seasonal) buffer for raptors will require an on-site monitor. Any indication that activities are adversely affecting the raptor and/or it's young the on-site monitor will suspend activities and contact the BLM AO immediately. Construction may occur within the buffers of inactive nests. Construction activities may commence once monitoring of the active nest site determines that fledglings have left the nest and are no longer dependent on the nest site. Modifications to the Surface Use Plan of Operations may be required in accordance with Section 6 of the lease terms and 43 CFR 3101.1-2.
UT-LN-45	**MIGRATORY BIRD** The lessee/operator is given notice that surveys for nesting migratory birds may be required during migratory bird breeding season whenever surface disturbances and/or occupancy is proposed in association with fluid mineral exploration and development within priority habitats. Surveys should focus on identified priority bird species in Utah. Field surveys will be conducted as determined by the AO of the Bureau of Land Management. Based on the result of the field survey, the AO will determine appropriate buffers and timing limitations.
UT-LN-49	**UTAH SENSITIVE SPECIES** The lessee/operator is given notice that no surface use or otherwise disruptive activity would be allowed that would result in direct disturbance to populations or individual special status plant and animal species, including those listed on the BLM sensitive species list and the Utah sensitive species list. The lessee/operator is also given notice that lands in this parcel have been identified as containing potential habitat for species on the Utah Sensitive Species List. Modifications to the Surface Use Plan of Operations may be required in order to protect these resources from surface disturbing activities in accordance with Section 6 of the lease terms, Endangered Species Act, Migratory Bird Treaty Act and 43 CFR 3101.1-2.
UT-LN-51	**SPECIAL STATUS PLANTS: NOT FEDERALLY LISTED** The lessee/operator is given notice that lands in this lease have been identified as containing special status plants, not federally listed, and their habitats. Modifications to the Surface Use Plan of Operations may be required in order to protect the special status

NOTICE	DESCRIPTION/PURPOSE
	plants and/or habitat from surface disturbing activities in accordance with Section 6 of the lease terms, Endangered Species Act, and 43 CFR 3101.1-2.
UT-LN-53	**RIPARIAN AREAS** The lessee/operator is given notice that this lease has been identified as containing riparian areas. No surface use or otherwise disruptive activity allowed within 100 meters of riparian areas unless it can be shown that (1) there is no practicable alternative; (2) that all long-term impacts are fully mitigated; or (3) that the construction is an enhancement to the riparian areas. Modifications to the Surface Use Plan of Operations may be required in accordance with section 6 of the lease terms and 43 CFR 3101.1-2.
UT-LN-56	**DRINKING WATER SOURCE PROTECTION ZONE** This lease (or a portion thereof) is within a public Drinking Water Source Protection zone. Before application for a permit to drill (APD) submittal or any proposed surface-disturbing activity, the lessee/operator must contact the public water system manager to determine any zoning ordinances, best management or pollution prevention measures, or physical controls that may be required within the protection zones. Drinking Water Source Protection plans are developed by the public water systems under the requirements of R309-600. Drinking Water Source Protection for Ground-Water Sources. (Utah Administrative Code). There may also be county ordinances in place to protect the source protection zones, as required by Section 19-4-113 of the Utah Code. Incorporated cities and towns may also protect their drinking water sources using Section 10-8-15 of the Utah Code. This part of the Code gives cities and towns the extraterritorial authority to enact ordinances to protect a source of drinking water ... "For 15 miles above the point from which it is taken and for a distance of 300 feet on each side of such stream..." Class I cities (greater than 100,000 population) are granted authority to protect their entire watersheds. Some public water sources qualify for monitoring waivers which reduce their monitoring requirements for pesticides and volatile organic chemicals (VOCs). Exploration, drilling, and production activities within Source Protection zone 3 could jeopardize these waivers, thus requiring increased monitoring. Contact the public water system to determine what effect your activities may have on their monitoring waivers. Please be aware of other State rules to protect surface and ground water: the Utah Division of Water Quality Rules R317 Water Quality Rules; and Rules of the Utah Division of Oil, Gas and Mining, Utah Oil and Gas Conservation Rules R649. At the time of development, drilling operators will additionally conform to the operational regulations in Onshore Oil & Gas Order No. 2 (which requires the protection and isolation of all usable quality waters, ≤ 10,000 mg/L Total Dissolved Solids), Onshore Oil and Gas Order No. 7 (which prescribes measures required for the handling of produced water to insure the protection of surface and ground water sources) and the Surface Operating Standards and Guidelines for Oil and Gas Development, The Gold Book, Fourth Edition-Revised 2007 (which provides information and requirements for conducting environmentally responsible oil and gas operations). Additional mitigation measures may be necessary to prevent adverse impacts from oil and gas exploration and development activities. Mitigation measures may include submitting an erosion control plan with best management practices (BMPs) that address rigorous interim reclamation which might include surface roughening, vegetative buffer

NOTICE	DESCRIPTION/PURPOSE
	strips, etc.; and sediment control through the use of sediment logs, silt fences, erosion control blankets, outlet/inlet protection of water control features such as culverts or diversion ditches, sediment traps, run on/run off pad design features. If project activities are close to sensitive areas or water sources a semi or closed-loop drilling system should be required.
UT-LN-72	**HIGH POTENTIAL PALEONTOLOGICAL RESOURCES** The lessee/operator is given notice that lands in this lease have been identified as having high potential for paleontological resources. Surveys will be required and modifications to the Surface Use Plan of Operations may be required in order to protect paleontological resources from surface disturbing activities in accordance with Section 6 of the lease terms and 43 CFR 3101.1-2. In addition, monitoring may be required during surface disturbing activities.
UT-LN-89	**HORSESHOE MILKVETCH *(ASTRAGALUS EQUISOLENSIS)*** In order to minimize effects to the federal candidate horseshoe milkvetch, the Bureau of Land Management (BLM) in coordination with the U.S. Fish and Wildlife Service (Service) developed the following avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance) will not result in a trend toward federal listing of the species. For the purposes of this document, the following terms are so defined: Potential habitat is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment. Suitable habitat is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain horseshoe milkvetch; characteristics include sagebrush, shadscale, horsebrush, and other mixed desert shrub communities in Duchesne River Formation soils at 4,790 to 5,185 feet. Occupied habitat is defined as areas currently or historically known to support horseshoe milkvetch; synonymous with "known habitat." The following avoidance and minimization measures should be included in the Plan of Development: 1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable horseshoe milkvetch habitat is present. 2. Within suitable habitat, site inventories will be conducted to determine occupancy. Inventories: a. Must be conducted by qualified individual(s) and according to BLM and Service accepted survey protocols, b. Will be conducted in suitable and occupied habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected (usually May 1st to June 5th in the Uinta Basin; however, surveyors should verify that the plant is flowering by contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower), c. Will occur within 300' from the centerline of the proposed right-of-way for surface pipelines or roads; and within 300' from the perimeter of disturbance for the proposed well pad including the well pad, d. Will include, but not be limited to, plant species lists and habitat characteristics, and

NOTICE	DESCRIPTION/PURPOSE
	e. Will be valid until May 1st the following year. 3. Design project infrastructure to minimize impacts within suitable habitat[2]: a. Reduce well pad size to the minimum needed, without compromising safety, b. Limit new access routes created by the project, c. Roads and utilities should share common rights-of-way where possible, d. Reduce the width of rights-of-way and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat, e. Place signing to limit off-road travel in sensitive areas, and f. Stay on designated routes and other cleared/approved areas. 4. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants: a. Follow the above (3.) recommendations for project design within suitable habitats, b. Construction of roads will occur such that the edge of the right of way is at least 300' from any plant, c. Roads will be graveled within occupied habitat; the operator is encouraged to apply water for dust abatement to such areas from May 1st to June 5th (flowering period); dust abatement applications will be comprised of water only, d. The edge of the well pad should be located at least 300' away from plants, e. Surface pipelines will be laid such that a 300 foot buffer exists between the edge of the right of way and the plants, use stabilizing and anchoring techniques when the pipeline crosses suitable habitat to ensure pipelines don't move towards the population, f. Construction activities will not occur from May 1st through June 5th within occupied habitat, g. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc., h. Where technically and economically feasible, use directional drilling or multiple wells from the same pad, i. Designs will avoid concentrating water flows or sediments into occupied habitat, j. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and k. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible. 5. Occupied horseshoe milkvetch habitats within 300' of the edge of the surface pipelines' right of ways, 300' of the edge of the roads' right of ways, and 300' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service. Additional site-specific measures may also be employed to avoid or minimize effects to

NOTICE	DESCRIPTION/PURPOSE
	the species. These additional measures will be developed and implemented in coordination with the U.S. Fish and Wildlife Service.
UT-LN-96	**AIR QUALITY MITIGATION MEASURES** The lessee is given notice that the Bureau of Land Management (BLM) in coordination with the U.S. Environmental Protection Agency and the Utah Department of Air Quality, among others, has developed the following air quality mitigation measures that may be applied to any development proposed on this lease. Integration of and adherence to these measures may help minimize adverse local or regional air quality impacts from oil and gas development (including but not limited to construction, drilling, and production) on regional ozone formation. • All internal combustion equipment would be kept in good working order. • Water or other approved dust suppressants would be used at construction sites and along roads, as determined appropriate by the AO. • Open burning of garbage or refuse would not occur at well sites or other facilities. • Drill rigs would be equipped with Tier II or better diesel engines. • Vent emissions from stock tanks and natural gas TEG dehydrators would be controlled by routing the emissions to a flare or similar control device which would reduce emissions by 95% or greater. • Low bleed or no bleed pneumatics would be installed on separator dump valves and other controllers. • During completion, flaring would be limited as much as possible. Production equipment and gathering lines would be installed as soon as possible. • Well site telemetry would be utilized as feasible for production operations. • Stationary internal combustion engine would comply with the following standards: 2g NOx/bhp-hr for engines <300HP; and 1g NOx/bhp-hr for engines >300HP. Additional site-specific measures may also be employed to avoid or minimize effects to local or regional air quality. These additional measures will be developed and implemented in coordination with the U.S. Environmental Protection Agency, the Utah Department of Air Quality, and other agencies with expertise or jurisdiction as appropriate based on the size of the project and magnitude of emissions.
UT-LN-99	**REGIONAL OZONE FORMATION CONTROLS** To mitigate any potential impact oil and gas development emissions may have on regional ozone formation, the following Best Management Practices (BMPs) would be required for any development projects: • Tier II or better drilling rig engines • Stationary internal combustion engine standard of 2g NOx/bhp-hr for engines <300HP and 1g NOx/bhp-hr for engines >300HP • Low bleed or no bleed pneumatic pump valves • Dehydrator VOC emission controls to +95% efficiency • Tank VOC emission controls to +95% efficiency.
UT-LN-102	**AIR QUALITY ANALYSIS**

NOTICE	DESCRIPTION/PURPOSE
	The lessee/operator is given notice that prior to project-specific approval, additional air quality analyses may be required to comply with the National Environmental Policy Act, Federal Land Policy Management Act, and/or other applicable laws and regulations. Analyses may include dispersion modeling and/or photochemical modeling for deposition and visibility impacts analysis, control equipment determinations, and/or emission inventory development. These analyses may result in the imposition of additional project-specific air quality control measures.
UT-LN-128	**FLOODPLAIN MANAGEMENT** The lessee/operator is given notice that, in accordance with Executive Order 11988, to avoid adverse impact to floodplains: 1) facilities should be located outside the 100-year floodplain, or 2) would be minimized or mitigated by modification of surface use plans within floodplains present within the lease.
UT-LN-156	**POLLINATORS AND POLLINATOR HABITAT** In order to protect pollinators and pollinator habitat, in accordance with BLM policy outlined in Instruction Memorandum No. 2016-013, Managing for Pollinators on Public Lands, and Pollinator-Friendly Best Management Practices for Federal Lands (2015), the following avoidance, minimization, and mitigation measures would apply to this parcel: 1. Give a preference for placing well pads in previously disturbed areas, dry areas that do not support forbs, or areas dominated by nonnative grasses. 2. Utilize existing well pads where feasible. 3. Avoid disturbance to native milkweed patches within Monarch migration routes to protect Monarch butterfly habitat. 4. Avoid disturbance of riparian and meadow sites, as well as small depressed areas that may function as water catchments and host nectar-producing species, to protect Monarch butterfly habitat and nectaring sites. 5. Minimize the use of pesticides that negatively impact pollinators. 6. During revegetation treatments: a. Use minimum till drills where feasible. b. Include pollinator-friendly site-appropriate native plant seeds or seedlings in seed mixes. c. Where possible, increase the cover and diversity of essential habitat components for native pollinators by: ▪ Using site-appropriate milkweed seeds or seedlings within Monarch migration routes through priority sage-grouse habitat. ▪ Using seed mixes with annual and short-lived perennial native forbs that will bloom the first year and provide forage for pollinators. ▪ Using seed mixes with a variety of native forb species to ensure different colored and shaped flowers to provide nectar and pollen throughout the growing season for a variety of pollinators. ▪ Seeding forbs in separate rows from grasses to avoid competition during establishment. ▪ Avoiding seeding non-native forbs and grasses that establish early and out compete slower-growing natives.

NOTICE	DESCRIPTION/PURPOSE
T&E-03	**ENDANGERED FISH OF THE UPPER COLORADO RIVER DRAINAGE BASIN** The Lessee/Operator is given notice that the lands in this parcel contain Critical Habitat for the Colorado River fish (bonytail, humpback chub, Colorado pike minnow, and razorback sucker) listed as endangered under the Endangered Species Act, or these parcels have watersheds that are tributary to designated habitat. Critical habitat was designated for the four endangered Colorado River fishes on March 21, 1994(59 FR 13374-13400). Designated critical habitat for all the endangered fishes includes those portions of the 100-year floodplain that contain primary constituent elements necessary for survival of the species. Avoidance or use restrictions may be placed on portions of the lease. The following avoidance and minimization measures have been designed to ensure activities carried out on the lease are in compliance with the Endangered Species Act. Integration of and adherence to these measures will facilitate review and analysis of any submitted permits under the authority of this lease. Following these measures could reduce the scope of Endangered Species Act, Section 7 consultation at the permit stage. Current avoidance and minimization measures include the following: 1. Surveys will be required prior to operations unless species occupancy and distribution information are complete and available. All surveys must be conducted by qualified individual(s). 2. Lease activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures will be evaluated and, if necessary, Section 7 consultation reinitiated. 3. Water production will be managed to ensure maintenance or enhancement of riparian habitat. 4. Avoid loss or disturbance of riparian habitats. 5. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in suitable riparian habitat. Ensure that such directional drilling does not intercept or degrade alluvial aquifers. 6. Conduct watershed analysis for leases in designated critical habitat and overlapping major tributaries in order to determine toxicity risk from permanent facilities. 7. Implement Appendix B (Hydrologic Considerations for Pipeline Crossing Stream Channels, Technical Note 423). 8. Drilling will not occur within 100-year floodplains of rivers or tributaries to rivers that contain listed fish species or critical habitat. 9. In areas adjacent to 100-year flood plains, particularly in systems prone to flash floods, analyze the risk for flash floods to impact facilities, and use closed loop drilling, and pipeline burial or suspension according to Appendix B (Hydrologic Considerations for Pipeline Crossing Stream Channels, Technical Note 423, to minimize the potential for equipment damage and resulting leaks or spills. Water depletions from *any* portion of the Upper Colorado River drainage basin above Lake Powell are considered to adversely affect or adversely modify the critical habitat of the four resident endangered fish species and must be evaluated with regard to the criteria described in the Upper Colorado River Endangered Fish Recovery Program.

NOTICE	DESCRIPTION/PURPOSE
	Formal consultation with USFWS is required for all depletions. All depletion amounts must be reported to BLM. Additional measures to avoid or minimize effects to the species may be developed and implemented in consultation with the U.S. Fish and Wildlife Service between the lease sale stage and lease development stage to ensure continued compliance with the Endangered Species Act (ESA).
T&E-05	**LISTED PLANT SPECIES** The Lessee/Operator is given notice that the lands in this parcel contain suitable habitat for federally listed plant species under the Endangered Species Act. The following avoidance and minimization measures have been developed to facilitate review and analysis of any submitted permits under the authority of this lease. 1) Site inventories: a) Must be conducted to determine habitat suitability, b) Are required in known or potential habitat for all areas proposed for surface disturbance prior to initiation of project activities, at a time when the plant can be detected, and during appropriate flowering periods, c) Documentation should include, but not be limited to individual plant locations and suitable habitat distributions, and d) All surveys must be conducted by qualified individuals. 2) Lease activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures will be evaluated and, if necessary, Section 7 consultation reinitiated. 3) Project activities must be designed to avoid direct disturbance to populations and to individual plants: a) Designs will avoid concentrating water flows or sediments into plant occupied habitat. b) Construction will occur down slope of plants and populations where feasible; if well pads and roads must be sited upslope, buffers of 300 feet minimum between surface disturbances and plants and populations will be incorporated. c) Where populations occur within 300 ft. of well pads, establish a buffer or fence the individuals or groups of individuals during and post-construction. d) Areas for avoidance will be visually identifiable in the field (e.g., flagging, temporary fencing, rebar, etc.) e) For surface pipelines, use a 10-foot buffer from any plant locations: i) If on a slope, use stabilizing construction techniques to ensure the pipelines don't move towards the population. 4) For riparian/wetland-associated species (e.g., Ute ladies-tresses) avoid loss or disturbance of riparian habitats. 5) Ensure that water extraction or disposal practices do not result in change of hydrologic regime. 6) Limit disturbances to and within suitable habitat by staying on designated routes. 7) Limit new access routes created by the project. 8) Place signing to limit ATV travel in sensitive areas. 9) Implement dust abatement practices near occupied plant habitat. 10) All disturbed areas will be re-vegetated with native species comprised of species indigenous to the area.

NOTICE	DESCRIPTION/PURPOSE
	11) Post construction monitoring for invasive species will be required. 12) Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in plant habitat. Ensure that such directional drilling does not intercept or degrade alluvial aquifers. 13) Lease activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures will be evaluated and, if necessary, Section 7 consultation reinitiated. Additional measures to avoid or minimize effects to the species may be developed and implemented in consultation with the U.S. Fish and Wildlife Service between the lease sale stage and lease development stage to ensure continued compliance with the Endangered Species Act.
T&E-12	**PARIETTE CACTUS (SCLEROCACTUS BREVISPINUS) AND UINTA BASIN HOOKLESS CACTUS [SCLEROCACTUS GLAUCUS (BREVISPINUS AND WETLANDICUS)]** The Lessee/Operator is given notice that the lands in this parcel contain suitable habitat for the Pariette cactus and Uinta Basin hookless cactus, under the ESA. The following avoidance and minimization measures have been developed to facilitate review and analysis of any submitted permits under the authority of this lease. In order to minimize effects to the federally threatened Pariette cactus and Uinta Basin hookless cactus, the BLM in coordination with the USFWS, developed the following avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance) are in compliance with the ESA. For the purposes of this document, the following terms are so defined: Potential habitat is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment. Suitable habitat is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Uinta Basin hookless cactus. Habitat descriptions can be found in the U.S. Fish and Wildlife Service's 1990 Recovery Plan and Federal Register Notices for the Uinta Basin hookless cactus (https://www.fws.gov/program/recovery/recovery-plans). Occupied habitat is defined as areas currently or historically known to support Uinta Basin hookless cactus; synonymous with "known habitat." The following avoidance and minimization measures should be included in the Plan of Development: 1. Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable Pariette cactus and Uinta Basin hookless cactus habitat is present. 2. Within suitable habitat, site inventories will be conducted to determine occupancy. Inventories: a. Must be conducted by qualified individual(s) and according to BLM and Service accepted survey protocols, b. Will be conducted in suitable and occupied habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected, and during appropriate flowering periods:

NOTICE	DESCRIPTION/PURPOSE
	i. *Sclerocactus brevispinus* surveys should be conducted March 15th to June 30th, unless extended by the BLM ii. *Sclerocactus wetlandicus* surveys can be done any time of the year, provided there is no snow cover, c. Will occur within 300' from the edge of the proposed right-of-way for surface pipelines or roads; and within 300' from the perimeter of disturbance for the proposed well pad including the well pad, d. Will include, but not be limited to, plant species lists and habitat characteristics, and e. Will be valid until March 15th the following year for *Sclerocactus brevispinus* and one year from the survey date for *Sclerocactus wetlandicus*. 3. Design project infrastructure to minimize impacts within suitable habitat[2]: a. Reduce well pad size to the minimum needed, without compromising safety, b. Limit new access routes created by the project, c. Roads and utilities should share common right-of-ways where possible, d. Reduce width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road within habitat, e. Place signing to limit off-road travel in sensitive areas, f. Stay on designated routes and other cleared/approved areas, and g. All disturbed areas will be re-vegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas. 4. Within occupied habitat[3], project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants: a. Follow the above (3.) recommendations for project design within suitable habitats, b. Buffers of 300 feet minimum between the edge of the right of way (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated, c. Surface pipelines will be laid such that a 300 foot buffer exists between the edge of the right of way and the plants, use stabilizing and anchoring techniques when the pipeline crosses the habitat to ensure the pipelines don't move towards the population, d. Before and during construction, areas for avoidance should be visually identifiable in the field (e.g., flagging, temporary fencing, rebar, etc.), e. Where technically and economically feasible, use directional drilling or multiple wells from the same pad, f. Designs will avoid concentrating water flows or sediments into occupied habitat, g. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, and h. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible. 5. Occupied Pariette cactus and Uinta Basin hookless cactus habitats within 300' of the edge of the surface pipelines' right-of-ways, 300' of the edge of the roads'

NOTICE	DESCRIPTION/PURPOSE
	right-of-ways, and 100' from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the USFWS. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the USFWS. 6. Re-initiation of Section 7 consultation with the USFWS will be sought immediately if any loss of plants or occupied habitat for the Pariette cactus and Uinta Basin hookless cactus is anticipated as a result of project activities. 7. The lessee will observe the management and conservation measures developed for the Level 1 and 2 Core Conservation Areas that have been identified by the USFWS. These conservation measures include disturbance caps (no further disturbance in Core 1 Areas and a 5% disturbance cap in Core 2 Areas). Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the USFWS to ensure continued compliance with the ESA.

APPENDIX C. COMMENTS AND BLM RESPONSES

RESERVED

Table 31. Public submissions with assigned commentor codes and resource/topic areas.

Name	Organization	Commenter Code	Resource/Topic Area
Government			
Organizations			

Table 32. Comment summary and BLM response.

Letter number	Resource/Topic	Summarized Comment*	Addressed in the EA, Section:	Comment Response

Letter number	Resource/Topic	Summarized Comment*	Addressed in the EA, Section:	Comment Response

Letter number	Resource/Topic	Summarized Comment*	Addressed in the EA, Section:	Comment Response

Letter number	Resource/Topic	Summarized Comment*	Addressed in the EA, Section:	Comment Response

APPENDIX D. LEASING PREFERENCE RATING FOR NOMINATED LEASE PARCELS

BACKGROUND

The following states have a permanent injunction on implementation on any stop or pause on quarterly sales: Louisiana, Alabama, Alaska, Arkansas, Georgia, Mississippi, Missouri, Montana, Nebraska, Oklahoma, Texas, Utah, and West Virginia.

Upon the conclusion of the 30-day Public Scoping period, the BLM completed the parcel review as directed by Section 208 in the Executive Order 14008: Tackling The Climate Crisis at Home and Abroad, Department of Interior's *Report on the Federal Oil and Gas Leasing Program*, and HQ IM-2023-007, *Evaluating Competitive Oil and Gas Lease Sale Parcels for Future Lease Sales*.

In accordance with HQ IM-2023-007, the BLM has evaluated the nominated lease parcels against five criteria to determine each parcel's leasing preference. All the parcels nominated are rated as low preference based on one or more criteria. The IM states that if there are no high-preference parcels available for the sale, the office will select one or more low-preference parcels that present the least number of conflicts based on the criteria listed. Given the BLM's ability to mitigate resource impacts through the attachment of stipulations and lease notices at the leasing stage and coupled with site-specific analysis and pre-disturbance biological surveys at the lease development stage, impacts to resources are expected to be avoided, minimized, and reduced, such that any reasonably foreseeable impacts can be effectively addressed. The Deputy State Director, in their delegated authority, determined to move forward for continued leasing analysis, furthering the intent of Section 50265 of the Inflation Reduction Act of 2022, which states that the BLM may not issue a right-of-way for wind or solar energy development on federal land unless it has 1) held an onshore oil and gas lease sale during the past 120 days, and 2) offered the lessee a "sum total" of either 2,000,000 acres or 50% of the acreage for which EOIs have been submitted for lease sales during the previous 1-year period.

Lease Parcel Preference Criteria

1. Proximity to existing oil and gas development, giving preference to lands upon which a prudent operator would seek to expand existing operations;
2. The presence of important fish and wildlife habitats or connectivity areas, giving preference to lands that would not impair the proper functioning of such habitats or corridors;
3. The presence of historic properties, sacred sites, or other high value cultural resources, giving preference to lands that do not contribute to the cultural significance of such resources;
4. The presence of recreation and other important uses or resources, giving preference to lands that do not contribute to the value of such uses or resources; and
5. Potential for development, giving preference to lands with high potential for development.

Table 33. Criteria for leasing related to IM-2023-007 for BLM's Utah Lease Sale

PARCEL NUMBER	CRITERIA FOR LEASING RELATED TO DOI'S REPORT ON THE FEDERAL OIL AND GAS LEASING PROGRAM					PREFERENCE FOR LEASING	
	O&G Proximity	Plant and Wildlife Habitat[9]	Cultural Resources	Recreation[10] (Other Resources)	Development Potential[11]	High	Low
1551	High	Low	Low	Low	High	High	
7688	High	Low	Low	Low	High	High	

[9] Low Determinations were made if the parcel(s) is within important habitat or connectivity areas. If the preference value for leasing is High if the nominated parcel(s) is NOT within important habitat or connectivity area and there is not a high potential for conflict with important habitats.

[10] Low Determinations were made if parcel(s) contains competing uses of the Federal lands that will be curtailed due to the lease issuance. If the preference value is High because the nominated parcel(s) does NOT contain incompatible uses.

[11] Low Determinations were made if the parcel(s) because of Low or Very Low potential for development based on the BLM or USFS' Reasonably Foreseeable Development (RFD) scenario where the RFD contains projections of the number of possible oil and gas wells that could be drilled and produced within each of the development potential areas specified as Very High, High, Moderate, Low, and Very Low development potential. Any nominated parcel that falls within Very High or High in the RFD will have a preference value of HIGH for this criterion.

APPENDIX E. SUMMARY OF THE TYPICAL PHASES OF OIL AND GAS DEVELOPMENT

INTRODUCTION

The phases of oil and gas development include construction, drilling operations, completion operations, hydraulic fracturing, and production. During the construction activity phase, the area is cleared of vegetation and the pad is constructed. Throughout the drilling operation phase, equipment is moved on site and used to install the drill rig and other associated infrastructure. At this stage, the well is drilled. Well completion follows well drilling. Well completion includes setting the casing to depth, cementing the casing,[12] and perforating the casing in target zones. If a well is going to be drilled directionally,[13] horizontally,[14] or vertically[15] this phase may be followed by hydraulic fracturing which involves pumping fracturing fluid into a formation at a calculated, predetermined rate and pressure to generate fractures or cracks in the target formation. The production phase begins when the well starts producing. The well abandonment and reclamation phases occur after the productive life of the well has concluded. Well abandonment and reclamation involve plugging wells and reclaiming the surface according to BLM guidelines and requirements.

Construction Activities

First, new construction areas need to be cleared of all vegetation. Clearing of the proposed well pad and access road are typically limited to the smallest area possible to provide safe and efficient work areas for all phases of construction. All clearing activities are accomplished by cutting, mowing, and/or grading vegetation, as necessary. Cut vegetation may be mulched and spread on site or hauled to a commercial waste disposal facility.

Next, heavy equipment, including but not limited to, bulldozers, graders, front-end loaders, and/or track hoes are used to construct the pad, along with other features, as needed for development. Other features may include, but are not limited to, an access road, reserve pit, pipeline, and/or fracturing pond. Cut and fills may be required to level the pad or road surfaces. Reserve pits, if authorized, are lined using an impermeable liner or other lining mechanism (i.e., bentonite or clay) to prevent fluids from leaching into the soil. Access roads may have cattle guards, gates, drainage control, or pull-outs installed, among a host of other features that may be necessary based on the site-specific situation. Long-term surface

[12] According to BLM regulations from 43 CFR 3160: 43 CFR 3172, casing and cementing programs are conducted to protect and/or isolate all usable water zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. The casing setting depth is calculated to position the casing seat opposite a competent formation which will contain the maximum pressure to which it will be exposed during normal drilling operations. Determination of casing setting depth is based on all relevant factors, including presence/absence of hydrocarbons; fracture gradients; usable water zones; formation pressures; lost circulation zones; other minerals; or other unusual characteristics. Any isolating medium other than cement shall receive approval prior to use. The deepest casing may not be cemented and may remain open hole depending on the type of formation it is located in.

[13] Vertical drilling is the process of drilling a well from the surface vertically to a subsurface location where the target oil or gas reservoir is located (U.S. Department of Energy 2015).

[14] Horizontal drilling is the process of drilling a well from the surface to a subsurface location just above the target oil or gas reservoir called the "kickoff point," then deviating the well bore from the vertical plane around a curve to intersect the reservoir at the "entry point" with a near-horizontal inclination and remaining within the reservoir until the desired bottom hole location is reached (North Dakota Department of Mineral Resources 2008).

[15] Directional drilling is the process of controlling the direction and deviation of drilling a well from the surface to a subsurface location without disturbing the land directly above the target oil or gas reservoir (U.S. Department of Energy 2015).

disturbances such as pads and roads are typically surfaced with a layer of crushed rock. Areas not needed for long-term development are reclaimed by recontouring the surface and re-establishing vegetation.

A pipeline, if needed, is laid within a right-of-way that is first cleared of vegetation. A backhoe, or similar piece of equipment, digs a trench to a depth at least 36 inches below ground surface. After the trench is dug, the pipeline is assembled by welding pieces of pipe together to fit the contour of the pipeline's path. Once inspected, the pipe can be lowered into the trench and covered with stockpiled subsoil originally removed from the trench. Each pipeline undergoes hydrostatic testing prior to natural gas being pumped through the pipeline. This ensures the pipeline is strong enough and absent any leaks. Table 3636 includes some of the common wastes (hazardous and nonhazardous) that are produced during construction.

Drilling Operations

When construction of the well-pad is complete, the drilling rig and associated equipment are moved on site and erected. Usually, a conventional rotary drill rig is used. The drill rig must be capable of withstanding all the anticipated conditions that may be encountered while drilling. Wells may be drilled directionally, horizontally, or vertically based on the target formation. The depth of the well is entirely dependent on the target formation depth and may be several hundred feet deep to over 20,000 feet deep.

When a conventional reserve pit [16]system is used, drilling fluid or mud is circulated through the drill pipe to the bottom of the hole, through the bit, up the bore of the well, and finally to the surface. When drilling mud emerges from the hole, it enters the reserve pit where it remains until all fluids are evaporated and the solids can be buried.

A closed-loop system operates in a similar fashion except that when the drilling mud emerges from the hole, it passes through equipment used to screen and remove drill cuttings (rock chips) and sand-sized solids rather than going into a pit. When the solids have been removed, the drilling mud is placed into holding tanks, and from the tank, used again.

In either situation the drilling mud is maintained at a specific weight and viscosity to cool the bit, seal off any porous zones (thereby protecting aquifers and preventing damage to producing zone productivity), control subsurface pressure, lubricate the drill string, clean the bottom of the hole, and bring the drill cuttings to the surface. Water-based or oil-based muds can be used. This choice is dependent on the site-specific conditions.

Once a well has been drilled, completion operations begin. Well completion involves setting casing to depth and perforating the casing in target zones.

Wells are often treated during completion to improve the recovery of hydrocarbons by increasing the rate and volume of hydrocarbons moving from the natural oil and gas reservoir into the wellbore. These processes are known as well-stimulation treatments, which create new fluid passageways in the producing formation or remove blockages within existing passageways. They include fracturing, acidizing, and other mechanical and chemical treatments often used in combination. The results from different treatments are additive and complement each other.

[16] A conventional reserve pit is a lined earthen pit excavated adjacent to a well pad and is commonly used for the disposal of drilling muds and fluids in gas or oil fields (USFWS 2009).

Hydraulic Fracturing

Hydraulic fracturing is a formation stimulation practice used to create additional permeability in a producing formation, thus allowing oil and/or gas to flow more readily toward and into the wellbore. Hydraulic fracturing can be used to overcome natural barriers, such as naturally low permeability or reduced permeability resulting from near wellbore damage to the flow of fluids (gas or water) to the wellbore (Groundwater Protection Council, 2017). The process has been a method for additional oil and gas recovery since the 1900s; however, with the advancement of technology, in both hydraulic fracturing and horizontal drilling, it is more commonly used than previous hydraulic fracturing and horizontal drilling technologies.

Hydraulic fracturing uses high pressure pumps to pump fracturing fluid into a formation at a calculated, predetermined rate and pressure to generate fractures or cracks in the target formation. For shale developments, fracture fluids are primarily water-based fluids mixed with additives that help the water to carry "proppants" into the fractures. Proppants, which may be made up of sand, walnut hulls, or other small particles, are needed to "prop" open the fractures once the pumping of fluids has stopped. Once the fracture has initiated, additional fluids are pumped into the wellbore to continue the development of the fracture and to carry the proppant deeper into the formation. The additional fluids are needed to maintain the downhole pressure necessary to accommodate the increasing length of opened fracture in the formation.

Hydraulic fracturing increases the flow rate and volume of reservoir fluids that move from the producing formation into the wellbore. The fracturing fluid is typically more than 99% water and sand, with small amounts of readily available chemical additives used to control the chemical and mechanical properties of the water and sand mixture. Because the fluid is composed mostly of water, large volumes of water may be needed to perform hydraulic fracturing but depends on the area being fractured. However, in some cases, water is recycled or produced water is used.

The predominant fluids currently being used for fracture treatments in the shale gas plays are water-based fracturing fluids mixed with friction-reducing additives, also known as slick water (Groundwater Protection Council, 2017). The number of chemical additives used in a typical fracture treatment varies depending on the conditions of the specific well that is to be fractured. A typical fracture treatment uses very low concentrations of between three and 12 additive chemicals, depending on the characteristics of the water and the shale formation being fractured. Each component serves a specific, engineered purpose, from limiting the growth of bacteria to preventing corrosion of the well casing. The makeup of fracturing fluid varies from one geologic basin or formation to another. Because the makeup of each fracturing fluid varies to meet the specific needs of each area, there is no one-size-fits-all formula for the volumes for each additive. In classifying fracture fluids and their additives, it is important to realize that service companies that provide these additives have developed a number of compounds with similar functional properties to be used for the same purpose in different well environments. The difference between additive formulations may be as small as a change in concentration of a specific compound (Groundwater Protection Council, 2017).

Before operators or service companies perform a hydraulic fracturing treatment, a series of tests are performed. These tests are designed to ensure that the well, including casing and cement, well equipment, and fracturing equipment are in proper working order and would safely withstand the application of the fracture treatment pressures and pump flow rates.

Hydraulic fracturing of horizontal shale gas wells is commonly performed in stages. Lateral lengths in horizontal wells for development may range from 1,000 feet to more than 5,000 feet. Depending on the lengths of the laterals, treatment of wells may be performed by isolating smaller portions of the lateral.

The fracturing of each portion of the lateral wellbore is called a stage. Stages are fractured sequentially beginning with the section at the farthest end of the wellbore, moving up hole as each stage of the treatment is completed until the entire lateral well has been stimulated. During drilling, the BLM is on location during the casing and cementing of the surface casing, which is often the string of casing that protects groundwater, along with other critical casing and cementing intervals. Before hydraulic fracturing takes place, all surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface. The cemented well is pressure tested to ensure there are no leaks and in some cases a cement bond log is run to ensure the cement has bonded to the casing and the formation. If the fracturing of the well is considered to be a "non-routine" fracturing job for the area, the BLM would always be on-site during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

Some soils and geologic formations contain low levels of radioactive material. This naturally occurring radioactive material (NORM) emits low levels of radiation, to which everyone is exposed on a daily basis. When NORM is associated with oil and natural gas production, it begins as small amounts of uranium and thorium within the rock. These elements, along with some of their decay elements, notably Radium-226 and Radium-228, can be brought to the surface in drill cuttings and produced water. Radon-222, a gaseous decay element of radium, can come to the surface along with the shale gas. When NORM is brought to the surface, it remains in the rock pieces of the drill cuttings, remains in solution with produced water, or, under certain conditions, precipitates out in scales or sludges. The radiation is weak and cannot penetrate dense materials such as the steel used in pipes and tanks. The EPA has found that Utah has very low levels of NORM associated with oil and gas production waste (EPA, 2023).

Production Operations

Production equipment used during the life of the well may include a three-phase separator-dehydrator, flowlines, a meter run, tanks for condensate, produced oil and water, and heater treater. A pumpjack may be required if the back pressure of the well is too high. Production facilities are arranged to facilitate safety and maximize reclamation opportunities. All permanent aboveground structures not subject to safety considerations are painted a standard BLM environmental color or as landowner specified.

Workovers may be performed multiple times over the life of the well. Because oil and gas production usually decline over the years, operators perform workover operations, which involve cleaning, repairing, and maintaining the well for the purposes of increasing or restoring production.

Abandonment and Reclamation

Well abandonment (whether dry hole or depleted producer) and reclamation of location, access road, and other facilities requires BLM approval. After approval, wellbores are plugged with cement as necessary to prevent fluid or pressure mitigation and to protect and isolate mineral and water resources. Wellheads are removed, and both the surface casing and the production casing are cut off below ground in compliance with federal and state regulations. The well pad, reserve pit and access are reclaimed according to BLM guidelines. This may include backfilling the pit, recontouring the surface to blend with natural surroundings and redistributing topsoil. All surfaces are then reseeded per BLM and state requirements specified in the Application for Permit to Drill (APD) approval.

Common Wastes

Table 3636 includes some of the common wastes (hazardous and nonhazardous) that are produced during oil and gas development.

Table 34. Common Wastes Produced during Oil and Gas Development

Phase	Waste	
Construction, Well Drilling and Completion (including hydraulic fracturing)	Domestic wastes (i.e., food scraps, paper, etc.)	
	Excess construction materials	Woody debris
	Used lubricating oils	Paints
	Solvents	Sewage
	Drilling muds, including additives (i.e., chromate and barite) and cuttings; Well drilling, completion, workover, and stimulation fluids (i.e., oil derivatives such as polycyclic aromatic hydrocarbons (PAHs), spilled chemicals, suspended and dissolved solids, phenols, cadmium, chromium, copper, lead, mercury, nickel)	
	Equipment, power unit and transport maintenance wastes (i.e., batteries; used filters, lubricants, oil, tires, hoses, hydraulic fluids; paints; solvents)	
	Fuel and chemical storage drums and containers	
	Cementing wastes	Rig wash
	Production testing wastes	Excess drilling chemicals
	Excess construction materials	Processed water
	Scrap metal	Contaminated soil including hazardous and non-hazardous materials (potential)
	Sewage	Domestic wastes
Production	Power unit and transport maintenance wastes (i.e., batteries; used filters, lubricants, filters, tires, hoses, coolants, antifreeze; paints; solvents, used parts)	
	Discharged produced water	
	Production chemicals	
	Workover wastes (e.g., brines)	
Abandonment / Reclamation	Construction materials	
	Decommissioned equipment	
	Contaminated soil (potential)	
	Equipment or wastes that could contain hazardous and nonhazardous materials	

LITERATURE CITED IN APPENDIX F

North Dakota Department of Mineral Resources. 2008. *Horizontal Drilling*. Available at: https://www.dmr.nd.gov/ndgs/documents/newsletter/2008Winter/pdfs/Horizontal.pdf. Accessed October 2022.

Groundwater Protection Council. State Oil and Natural Gas Regulations Designed to Protect Water Resources. 3rd edition. Available at: https://www.gwpc.org/sites/gwpc/uploads/documents/publications/ State_Regulations_Report_2017_Final.pdf. Accessed November 2022.

U.S. Department of Energy. 2015. Quadrennial Technology Review 2015, Oil and Gas Technologies. Chapter 7: Advancing Systems and Technologies to Produce Cleaner Fuels. Available at: https://www.energy.gov/sites/prod/files/2016/05/f32/ Ch.7-SI-Oil-and-Gas-Technologies.pdf. Accessed November 2022.

U.S. Fish and Wildlife Service. 2009. Reserve Pits. Available at: https://www.fws.gov/mountain-prairie/contaminants/ documents/ReservePitsBirdMortality.pdf. Accessed November 2022.

APPENDIX F. GENERAL CONFORMITY APPLICABILITY

The Clean Air Act's (CAA) General Conformity Rule mandates that the BLM evaluate reasonably foreseeable emissions that result from its actions in a nonattainment area to determine if they conform with the applicable regulatory agency implementation plans (40 CFR 93.153). The rule takes into account air pollution emissions associated with actions that are federally funded, licensed, permitted, or approved, and ensures emissions do not contribute to air quality degradation, thus preventing the achievement of state and federal air quality goals. In short, general conformity refers to the process of evaluating plans, programs, and projects to determine and demonstrate they meet the requirements of the CAA and an applicable implementation plan.

The General Conformity Rule divides the air conformity process into two distinct areas, applicability and determination. Federal agencies must initially assess if an action is subject to the Conformity Rule (Applicability Analysis) and then if the action conforms to an applicable implementation plan (Conformity Determination). Guidance from Information Bulletin 2014-084 (BLM, 2014) was used to perform an applicability analysis in order to determine if a conformity determination is needed for this lease.

The general conformity rules are not applicable to this lease sale because: 1) leasing does not directly authorize pollutant emitting activities, and no direct emissions would result, 2) indirect emissions are not reasonably foreseeable as defined in 40 CFR 93.152 as it is unknown what design features or mitigation measures an operator will use, and 3) it is unknown what emissions sources would be included in an air quality permit and not subject to a general conformity review. The BLM has evaluated the proposed lease sale in accordance with the provisions of 40 CFR Part 93, Subpart B. Based on a review of 40 CFR 93.153(c), BLM has determined that the requirement to perform a full conformity determination is not required for the Proposed Action for the following reasons:

- Under 40 CFR 93.153(c)(2), a conformity determination is not required for actions "which would result in no emissions increase or an increase in emissions that is clearly de minimis," such as the "granting of leases." Leasing does not authorize emissions generating activities, and therefore does not directly result in an emissions increase. Additionally, 40 CFR 93.153(c)(3) lists Initial Outer Continental Shelf leasing as not having reasonably foreseeable emissions and onshore leasing is similar where lease sales "are made on a broad scale and are followed by exploration and development plans on a project level." At the leasing stage the BLM does not have a development plan for lease parcels and has determined that indirect emissions are not reasonably foreseeable until the project level.
- A conformity determination also is not required "where the emissions (direct or indirect) are not reasonably foreseeable." 40 CFR 93.153(c)(3). As defined in the CAA, "Reasonably foreseeable emissions are projected future direct and indirect emissions that are identified at the time the conformity determination is made; the location of such emissions is known and the emissions are quantifiable as described and documented by the Federal agency based on its own information and after reviewing any information presented to the Federal agency." 40 CFR 93.152 While this EA provides information for the factors that should be considered to determine a reasonable *estimate* of foreseeable emissions for the proposed lease parcels and overall for the region for purposes of NEPA indirect and cumulative impacts analysis, it does not have specific information about whether or how the specific parcel under consideration will be developed during the initial 10 year lease period, such that a more precise emissions inventory could be reasonably estimated and compared to the thresholds provided in 40 CFR 93.153(b).

- Furthermore, 40 CFR 93.153(d) provides, "[notwithstanding the other requirements of this subpart, a conformity determination is not required for:
    - The portion of an action that includes major or minor new or modified stationary sources that require a permit under the new source review program (Section 110(a)(2)(c) and Section 173 of the [CAA]) or the prevention of significant deterioration program (title I, part C of the [CAA])." 40 CFR 93.153(d)(1). It is uncertain at this time, but highly likely, that several project design features, for example equipment sets, such as storage vessels, truck loading, wellsite stationary engines, VOC control devices, dehydration units, and other equipment will require at least a minor new source review (permit) prior to constructing such facilities to implement any subsequent development proposals. Emissions from such permitted facilities would not be subject to the general conformity analysis provisions. Potential sources that would be permitted, and not subject to general conformity provisions, are identified in Utah Administrative Code R307-504-511 or the Federal Implementation Plan for the Indian Country Minor New Source Review Program for the Oil and Natural Gas Industry (80 FR 51991).

For all of these reasons, a conformity determination is not required for the sale of the leases under consideration.

APPENDIX G. EMISSIONS TABLES

This appendix provides the per well emissions factors (GHG's and non-GHG's) by phase (well development and production operations) and the total emissions calculated for each alternative on an annual basis. An emissions factor is a value that relates the quantity of a pollutant released into the atmosphere with an activity that generates the pollutant. They are typically expressed in units of eight or mass (e.g. pounds, kilograms, tons) per activity (e.g. duration of equipment operation, construction of an oil or gas well). Emissions factors are the basis for developing emissions inventories that are used for air quality management decisions. The BLM uses emissions inventories to evaluate the change to county-level emissions, comparison between NEPA alternatives, and as inputs for air quality models if modeling is warranted. Over time emissions factors may change due to new emissions regulations, development of control technologies, or data and information improvements for emissions.

Air pollutant emissions from oil and gas activities occur during construction and operations of a well. Construction related emissions occur from the use of heavy machinery during pad construction, drilling, testing and completion, venting and flaring, interim reclamation, and vehicles. Construction emissions are typically a onetime occurrence. Operation related emissions occur from well workovers, pump engines, heaters, tanks, truck loading, fugitive leaks, pneumatics, dehydrators, compressor engines, reclamation, and vehicle traffic. Emissions from operation activities occur throughout the life of a well. Several factors may influence actual emissions including location, geological formation, well depth, equipment used, supporting infrastructure, and other factors. To estimate emissions for this lease sale the BLM used the emission factors from the AMR (BLM, 2023) for a vertical/direction gas well. These single well emissions are presented in Table 12. Annual emissions for each alternative are based on the single well emissions factors and the estimated number of wells developed and operating in each year and are presented in Table 13 and Table 14.

Table 35. Single Wll Emissions Factors in Tons Per Year (tpy), and Metric Tonnes (t)

Well Type	CO (tpy)	NOx (tpy)	PM10 (tpy)	PM2.5 (tpy)	SOx (tpy)	VOC (tpy)	HAP (tpy)	CO_2 (t)	CH_4 (t)	N_2O (t)
Vertical/Direction Gas - Development	2.05	6.55	1.14	0.35	0.0471	0.36	0.05	961.4	0.03	0.007
Vertical/Direction Gas - Operation	0.1	0.03	0.05	0.007	0.0004	0.85	0.065	44.19	0.57	1.98E-05

Table 36 Annual CAP and HAP emissions for the Proposed Action Alternative (Alternative A) in Tons Per Year.

	# Wells		Well Development Emissions							Well Operation Emissions							Sum of Well Development and Operation Emissions						
Year	d	Operating	PM_{10}	$PM_{2.5}$	VOC	NO_x	CO	SO_2	HAPs	PM_{10}	$PM_{2.5}$	VOC	NO_x	CO	SO_2	HAPs	PM_{10}	$PM_{2.5}$	VOC	NO_x	CO	SO_2	HAPs
1	1	1	1.1	0.4	0.4	6.6	2.1	0.05	0.05	0.1	0.0	0.9	0.0	0.1	0.00	0.07	1.2	0.4	1.2	6.6	2.2	0.05	0.12
2	2	3	2.3	0.7	0.7	13.1	4.1	0.09	0.10	0.2	0.0	2.6	0.1	0.3	0.00	0.20	2.4	0.7	3.3	13.2	4.4	0.10	0.30
3	2	5	2.3	0.7	0.7	13.1	4.1	0.09	0.10	0.3	0.0	4.3	0.2	0.5	0.00	0.33	2.5	0.7	5.0	13.3	4.6	0.10	0.43
4	1	6	1.1	0.4	0.4	6.6	2.1	0.05	0.05	0.3	0.0	5.1	0.2	0.6	0.00	0.39	1.4	0.4	5.5	6.7	2.7	0.05	0.44
5	2	8	2.3	0.7	0.7	13.1	4.1	0.09	0.10	0.4	0.1	6.8	0.2	0.8	0.00	0.52	2.7	0.8	7.5	13.3	4.9	0.10	0.62
6	3	11	3.4	1.1	1.1	19.7	6.2	0.14	0.15	0.6	0.1	9.4	0.3	1.1	0.00	0.72	4.0	1.1	10.4	20.0	7.3	0.15	0.87
7	2	13	2.3	0.7	0.7	13.1	4.1	0.09	0.10	0.7	0.1	11.1	0.4	1.3	0.01	0.85	2.9	0.8	11.8	13.5	5.4	0.10	0.95
8	2	15	2.3	0.7	0.7	13.1	4.1	0.09	0.10	0.8	0.1	12.8	0.5	1.5	0.01	0.98	3.0	0.8	13.5	13.6	5.6	0.10	1.08
9	3	18	3.4	1.1	1.1	19.7	6.2	0.14	0.15	0.9	0.1	15.3	0.5	1.8	0.01	1.17	4.3	1.2	16.4	20.2	8.0	0.15	1.32
10	2	20	2.3	0.7	0.7	13.1	4.1	0.09	0.10	1.0	0.1	17.0	0.6	2.0	0.01	1.30	3.3	0.8	17.7	13.7	6.1	0.10	1.40
11	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
12	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
13	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
14	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
15	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
16	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
17	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
18	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
19	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
20	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
21	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
22	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
23	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
24	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
25	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
26	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
27	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
28	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
29	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
30	0	20	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	17.0	0.6	2.0	0.01	1.30	1.0	0.1	17.0	0.6	2.0	0.01	1.30
31	0	19	0.0	0.0	0.0	0.0	0.0	0.00	0.00	1.0	0.1	16.2	0.6	1.9	0.01	1.24	1.0	0.1	16.2	0.6	1.9	0.01	1.24
32	0	17	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.9	0.1	14.5	0.5	1.7	0.01	1.11	0.9	0.1	14.5	0.5	1.7	0.01	1.11
33	0	15	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.8	0.1	12.8	0.5	1.5	0.01	0.98	0.8	0.1	12.8	0.5	1.5	0.01	0.98
34	0	14	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.7	0.1	11.9	0.4	1.4	0.01	0.91	0.7	0.1	11.9	0.4	1.4	0.01	0.91
35	0	12	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.6	0.1	10.2	0.4	1.2	0.00	0.78	0.6	0.1	10.2	0.4	1.2	0.00	0.78
36	0	9	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.5	0.1	7.7	0.3	0.9	0.00	0.59	0.5	0.1	7.7	0.3	0.9	0.00	0.59
37	0	7	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.4	0.0	6.0	0.2	0.7	0.00	0.46	0.4	0.0	6.0	0.2	0.7	0.00	0.46
38	0	5	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.3	0.0	4.3	0.2	0.5	0.00	0.33	0.3	0.0	4.3	0.2	0.5	0.00	0.33
39	0	2	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.1	0.0	1.7	0.1	0.2	0.00	0.13	0.1	0.0	1.7	0.1	0.2	0.00	0.13
Total (MT)			22.8	7.0	7.2	131.0	41.0	0.94	1.00	30.0	4.2	510.0	18.0	60.0	0.25	39.00	53	11	517	149	101	1	40
Max Year			3.4	1.1	1.1	19.7	6.2	0.14	0.15	1.0	0.1	17.0	0.6	2.0	0.01	1.30	4.3	1.2	17.7	20.2	8.0	0.1	1.4
Average Year			2.3	0.7	0.7	13.1	4.1	0.1	0.1	0.8	0.1	13.1	0.5	1.5	0.0	1.0	1.4	0.3	13.3	3.8	2.6	0.0	1.0
Minimum Year			1.1	0.4	0.4	6.6	2.1	0.0	0.1	0.1	0.0	0.9	0.0	0.1	0.0	0.1	0.1	0.0	1.2	0.1	0.2	0.0	0.1

Table 37 Annual GHG Emissions for the Proposed Action Alternative (Alternative A) in Metric Tonnes

	# Wells		Well Development Emissions				Well Operation Emissions				rect (Mid-Stream, End-Use) Emissi				Sum of Direct and Indirect Emissions				
Year	Developed	Operating	CO2	CH4	N2O	CO2e (100-gr)	CO2	CH4	N2O	CO2e (100-gr)	CO2	CH4	N2O	CO2e (100-gr)	CO2	CH4	N2O	CO2e (100-gr)	CO2e (20-gr)
1	1	1	961.4	0.03	0.007	964.2	44.2	0.57	0.000	61.2	91,842.3	195.91	0.392	97,787.4	92,848	196.51	0.399	98,813	109,169
2	2	3	1,922.8	0.06	0.014	1,928.4	132.6	1.71	0.000	183.5	228,163.4	488.55	0.969	242,986.7	230,219	490.32	0.983	245,099	270,939
3	2	5	1,922.8	0.06	0.014	1,928.4	221.0	2.85	0.000	305.9	301,800.7	649.31	1.274	321,498.0	303,944	652.22	1.288	323,732	358,104
4	1	6	961.4	0.03	0.007	964.2	265.1	3.42	0.000	367.1	260,742.7	565.21	1.090	277,883.6	261,969	568.66	1.098	279,215	309,183
5	2	8	1,922.8	0.06	0.014	1,928.4	353.5	4.56	0.000	489.5	346,889.9	750.24	1.455	369,644.2	349,166	754.86	1.469	372,062	411,843
6	3	11	2,884.2	0.09	0.021	2,892.6	486.1	6.27	0.000	673.0	485,415.4	1,048.56	2.039	517,219.0	488,786	1,054.92	2.060	520,785	576,379
7	2	13	1,922.8	0.06	0.014	1,928.4	574.5	7.41	0.000	795.4	471,900.2	1,024.30	1.970	502,962.2	474,397	1,031.77	1.984	505,686	560,060
8	2	15	1,922.8	0.06	0.014	1,928.4	662.9	8.55	0.000	917.7	483,707.2	1,051.94	2.015	515,605.1	486,293	1,060.55	2.029	518,451	574,342
9	3	18	2,884.2	0.09	0.021	2,892.6	795.4	10.26	0.000	1,101.3	590,858.2	1,282.59	2.467	629,752.9	594,538	1,292.94	2.488	633,747	701,885
10	2	20	1,922.8	0.06	0.014	1,928.4	883.8	11.40	0.000	1,223.6	558,838.1	1,218.06	2.321	595,769.8	561,645	1,229.52	2.335	598,922	663,717
11	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	374,411.4	826.41	1.530	399,456.0	375,295	837.81	1.530	400,680	444,832
12	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	291,567.9	647.47	1.182	311,185.1	292,452	658.87	1.182	312,409	347,131
13	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	241,514.5	538.43	0.974	257,825.8	242,398	549.83	0.974	259,049	288,026
14	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	207,196.9	463.27	0.832	221,229.6	208,081	474.67	0.833	222,453	247,468
15	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	181,909.8	407.66	0.729	194,257.1	182,794	419.06	0.729	195,481	217,565
16	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	162,376.0	364.57	0.649	173,417.4	163,260	375.97	0.649	174,641	194,455
17	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	146,770.3	330.06	0.585	156,765.9	147,654	341.46	0.585	157,989	175,985
18	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	133,983.0	301.72	0.533	143,119.9	134,867	313.12	0.533	144,344	160,845
19	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	123,295.2	277.99	0.490	131,713.0	124,179	289.39	0.490	132,937	148,188
20	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	114,217.8	257.80	0.453	122,024.0	115,102	269.20	0.453	123,248	137,435
21	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	106,405.4	240.40	0.421	113,684.5	107,289	251.80	0.422	114,908	128,178
22	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	99,606.3	225.24	0.394	106,426.1	100,490	236.64	0.394	107,650	120,121
23	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	93,632.5	211.91	0.370	100,048.3	94,516	223.31	0.370	101,272	113,040
24	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	88,340.3	200.08	0.349	94,397.9	89,224	211.48	0.349	95,621	106,766
25	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	83,618.1	189.51	0.330	89,355.6	84,502	200.91	0.330	90,579	101,167
26	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	79,377.4	180.02	0.313	84,827.3	80,261	191.42	0.313	86,051	96,139
27	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	75,547.4	171.43	0.297	80,737.4	76,431	182.83	0.298	81,961	91,596
28	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	72,070.9	163.64	0.284	77,024.7	72,955	175.04	0.284	78,248	87,473
29	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	68,900.6	156.52	0.271	73,638.9	69,784	167.92	0.271	74,863	83,712
30	0	20	0.0	0.00	0.000	0.0	883.8	11.40	0.000	1,223.6	65,997.6	150.00	0.259	70,538.4	66,881	161.40	0.260	71,762	80,268
31	0	19	0.0	0.00	0.000	0.0	839.6	10.83	0.000	1,162.4	60,716.6	138.05	0.238	64,895.6	61,556	148.88	0.239	66,058	73,904
32	0	17	0.0	0.00	0.000	0.0	751.2	9.69	0.000	1,040.1	53,114.0	120.80	0.208	56,770.7	53,865	130.49	0.209	57,811	64,687
33	0	15	0.0	0.00	0.000	0.0	662.9	8.55	0.000	917.7	45,857.7	104.32	0.180	49,015.6	46,521	112.87	0.180	49,933	55,882
34	0	14	0.0	0.00	0.000	0.0	618.7	7.98	0.000	856.5	41,530.6	94.51	0.163	44,391.5	42,149	102.49	0.163	45,248	50,649
35	0	12	0.0	0.00	0.000	0.0	530.3	6.84	0.000	734.2	34,797.5	79.21	0.136	37,195.1	35,328	86.05	0.137	37,929	42,464
36	0	9	0.0	0.00	0.000	0.0	397.7	5.13	0.000	550.6	25,724.3	58.56	0.101	27,497.1	26,122	63.69	0.101	28,048	31,404
37	0	7	0.0	0.00	0.000	0.0	309.3	3.99	0.000	428.3	19,599.3	44.63	0.077	20,950.2	19,909	48.62	0.077	21,378	23,941
38	0	5	0.0	0.00	0.000	0.0	221.0	2.85	0.000	305.9	13,702.1	31.21	0.054	14,646.8	13,923	34.06	0.054	14,953	16,748
39	0	2	0.0	0.00	0.000	0.0	88.4	1.14	0.000	122.4	5,404.2	12.31	0.021	5,776.9	5,493	13.45	0.021	5,899	6,608
Total (MT)	20		19,228	0.60	0.140	19,284	26,514	342.00	0.012	36,709	6,931,344	15,262.43	28.414	7,393,921	6,977,086	15,605.03	28.565	#####	#####
Max Year			2,884.2	0.09	0.021	2,893	883.8	11.40	0.000	1,224	590,858	1,282.59	2.467	629,752.9	594,537.8	1,292.94	2.488	633,747	701,885
Average Year							679.8	8.77	0.0	941.3	177,727	391.34	0.729	189,587.7	178,900	400.13	0.732	191,023	212,110