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

Oklahoma Field Office Oil and Gas Lease Sale, November 2023
Environmental Assessment
Pittsburg and Woods Counties, Oklahoma
November 2023
DOI-BLM-NM-0040-2023-0008-EA

U.S. Department of the Interior
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The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

DOI-BLM-NM-0040-2023-0008-EA

TABLE OF CONTENTS

Appendices

Figures

Tables

LIST OF ACRONYMS AND ABBREVIATIONS

ACEC	area of critical environmental concern
AF	acre-feet
AIB	analyzed in brief
AirToxScreen	Air Toxics Screening Assessment
AO	Authorized Officer
AOI	area of interest
APD	Application for Permit to Drill
AQI	Air Quality Index
bbl	barrel(s)
BCC	Birds of Conservation Concern
Bcf/d	billion cubic feet per day
BCR	Bird Conservation Region
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	best management practice
BOEM	Bureau of Ocean Energy Management
b/d	barrels per day
CAA	Clean Air Act
CEQ	Council on Environmental Quality
C.F.R.	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
DOI	U.S. Department of the Interior
DR	Decision Record
EA	Environmental Assessment
EIA	U.S. Energy Information Administration
EIS	environmental impact statement
EJ	environmental justice

EOI	Expression of Interest
EOR	enhanced oil recovery
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
EUR	estimated ultimate recovery
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act of 1976
FONSI	Finding of No Significant Impact
GHG	greenhouse gas
GIS	geographic information system
GWP	global warming potential
HAP	hazardous air pollutant
HUC	hydrologic unit code
IDT	interdisciplinary team
IM	Instruction Memorandum
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
IRA	Inflation Reduction Act of 2022
IWG	Interagency Working Group on the Social Cost of Greenhouse Gases
LANDFIRE	Landscape Fire and Resource Management Planning Tools
LN	lease notice
LPC	lesser prairie chicken
LWC	Land with Wilderness Characteristics
m	meters
MAGICC	Model for the Assessment of Greenhouse Gas Induced Climate Change
mcf	thousand cubic feet
MLA	Mineral Leasing Act of 1920
MLAA	Mineral Leasing Act for Acquired Lands
MMst	million short tons
Mt	megatonnes
MW	megawatts
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards

NABCI	North American Bird Conservation Initiative
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act of 1969
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
NHPA	National Historic Preservation Act of 1966
NMSO	New Mexico State Office
NORM	naturally occurring radioactive material
NO_2	nitrogen dioxide
NO_X	nitrogen oxide(s)
NRCS	Natural Resources Conservation Service
NSO	No Surface Occupancy
NSPS	New Source Performance Standards
NTL	Notice to Lessees
O_3	ozone
OAS	Oklahoma Archeological Survey
OCC	Oklahoma Corporation Commission
ODWC	Oklahoma Department of Wildlife Conservation
OFO	Oklahoma Field Office
OWRB	Oklahoma Water Resources Board
PAH	polycyclic aromatic hydrocarbons
PFYC	Potential Fossil Yield Classification
PL	Public Law
PM	particulate matter
$PM_{2.5}$	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
RfC	reference concentration
RFD	reasonably foreseeable development
RMP	resource management plan
ROD	Record of Decision
SC-CH_4	social cost of methane
SC-CO_2	social cost of carbon dioxide
SC-GHG	social cost of greenhouse gas

SC-N_2O	social cost of nitrous oxide
SCR	selective catalytic reduction
SHPO	State Historic Preservation Office
SMA	Special Management Area
SO_2	sulfur dioxide
STEO	short-term energy outlook
SWD	saltwater disposal
TCP	traditional cultural property
THPO	Tribal Historic Preservation Office
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
VRM	Visual Resource Management
WMA	Wildlife Management Area

CHAPTER 1. INTRODUCTION

1.1 BACKGROUND

This Environmental Assessment (EA) documents the Bureau of Land Management (BLM) Oklahoma Field Office (OFO) review of five parcels (162.00 acres) nominated for auction in the OFO November 2023 Competitive Oil and Gas Lease Sale (the Proposed Action). The nominated parcels are in Pittsburg and Woods Counties, Oklahoma (see parcel maps in Appendix A). The nominated parcels consist of federal sub-surface minerals managed by the BLM, and private surface lands. For detailed information on the leasing process, see the following website: https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/parcel-nominations.

1.2 PURPOSE AND NEED

The BLM's purpose in preparing the EA is to respond to an Expression of Interest (EOI) 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 make mineral resources, such as oil and gas, available for development as part of the BLM's multiple-use and sustained-yield mandate.

1.3 DECISION TO BE MADE

The BLM Authorized Officer (AO) will decide whether to make available for lease the nominated 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 make the lands available for lease and subsequently issue a lease, 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 lease terms and conditions, would apply. The BLM Authorized Officer also has the authority to defer the parcels, based on the analysis of potential effects presented in this EA. The Decision Record (DR) will identify whether the BLM decided to lease the nominated lease parcels and the rationale for the decision.

1.4 BLM LAND USE PLAN CONFORMANCE AND RELATIONSHIP TO STATUTES, REGULATIONS, AND OTHER PLANS

1.4.1 BLM Land Use Plan Conformance

The BLM, under the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, must make mineral resources, such as oil and gas, available for development as part of the BLM's multiple-use and sustained-yield mandate. Additionally, the Federal Onshore Oil and Gas Leasing Reform Act of 1987 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.

Under FLPMA, the BLM must manage public lands, resources, and resource values according to its multiple-use sustained-yield mandate in a manner that will best meet the present and future needs of the public, and in accordance with an approved land use plan or resource management plan (RMP). 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 estate; however, the BLM is required to declare how the federal mineral estate will be managed, including the identification of all appropriate lease stipulations. 43 Code of Federal Regulations (C.F.R.) § 3101.1 and 43 C.F.R. § 1601.0-7(b); BLM Handbook H-1601-1 and H-1624-1

(BLM 2005, 2018a). This Proposed Action is in conformance with the March 2020 Oklahoma, Kansas, and Texas BLM-approved RMP, with Record of Decision (ROD) (BLM 2020).

The nominated lease parcels fall within an area that is open to leasing under the RMP (BLM 2020), subject to certain stipulations. The nominated lease parcels, lease parcel surface ownership, lease parcel legal descriptions and total acreages, and lease stipulations and notices that apply are detailed in Chapter 2, and lease notice (LN) descriptions are detailed in Appendix B.

1.4.2 Relationship to Statutes, Regulations, Policies, and Other Plans

Purchasers of oil and gas leases 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. The BLM is also required to comply with all applicable federal, state, and local laws and regulations as well as U.S. Department of the Interior (DOI) policies when leasing mineral estate and responding to EOIs. Table 1.1 provides a listing of statutes, regulations, policies, and other plans applicable to the leasing decision.

Table 1.1. Relationship to Statutes, Regulations, Policies, and Other Plans

Relevant Statute, Regulation, Policy, or Plan	Relationship to the Proposed Action
Federal Land Policy and Management Act (FLPMA)	FLPMA established guidelines to provide for the management, protection, development, and enhancement of public lands, Public Law (PL) 94-579. Section 103l of the 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 limited 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 in the RMP how federal mineral estate is managed, including identification of all appropriate lease stipulations. 43 C.F.R. § 3101.1 and 43 C.F.R. § 1601.0-7(b); BLM Handbook H-1601-1 and H-1624-1 (BLM 2005, 2018a). Within the context of the National Environmental Policy Act of 1969, as amended (NEPA), the BLM considers FLPMA compliance when conducting NEPA analyses for mineral leasing actions, and the BLM issues a Finding of No Significant Impact (FONSI) when it is determined that the proposed action would not violate any federal, state, tribal, or local law protecting the environment, including but not limited to the FLPMA's mandate to ensure that undue and/or unnecessary degradation would not occur.
Mineral Leasing Act of 1920 (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 the FLPMA, NEPA; PL 91-90, 42 United States Code (U.S.C.) § 4321 *et seq*., and other applicable laws, regulations, and policies.
43 C.F.R. § 3100 *et seq*.	These regulations govern onshore oil and gas leasing, development, and production of federal minerals.
Federal Onshore Oil and Gas Leasing Reform Act of 1987	This act directs the BLM to conduct quarterly oil and gas lease sales whenever eligible lands are available for leasing.
Endangered Species Act of 1973 (ESA)	The ESA requires all federal departments and agencies to conserve threatened, endangered, and critical and sensitive species and the habitats on which they depend as well as consult with the U.S. Fish and Wildlife Service (USFWS) on all actions authorized, funded, or carried out by the agency to ensure the action will not likely jeopardize the continued existence of any threatened and endangered species or adversely modify critical habitat.

Relevant Statute, Regulation, Policy, or Plan	**Relationship to the Proposed Action**
Mineral Leasing Act for Acquired Lands (MLAA)	The MLAA allows for mineral leasing on "acquired lands." The MLAA defines "acquired lands" as including "all lands heretofore or hereafter acquired by the United States to which the 'mineral leasing laws' have not been extended, including such lands acquired under the provisions of sections 480, 500, 513 to 519, 521, 552, and 563 of Title 16." 30 U.S.C. § 351. The MLAA states acquired lands "may be leased by the Secretary under the same conditions as contained in the leasing provisions of the mineral leasing laws, subject to the provisions hereof." 30 U.S.C. § 352.
National Historic Preservation Act of 1966 (NHPA)	Leasing is considered an undertaking pursuant to 54 U.S.C. § 300101 *et seq*., commonly known as the NHPA, and 54 U.S.C. § 306108, commonly known as Section 106 of the NHPA (Section 106). Agencies may follow a phased approach to Section 106 compliance. At the leasing level, existing records reviews and consultation drive identification of historic properties. Class III field inventories are an important part of identification at the lease-development level. See the text of stipulation HQ-CR-1 in Appendix B for details.
Inflation Reduction Act of 2022 (IRA)	The IRA made the following major changes to BLM's oil and gas leasing program: • Rescinded the BLM's authority to issue noncompetitive leases under the MLA by striking 30 U.S.C. § 226(c) • Removed BLM's authority to issue reversionary noncompetitive leases • Updated the royalty rate and rental rate lease terms for competitive leases • Changed the grounds and conditions for certain reinstatements In addition, 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% of the acreage for which EOIs have been submitted for lease sales during the previous 1-year period. The BLM has issued policy guidance to implement the oil and gas leasing provisions in the IRA and provided updated direction on other program components (i.e., Instruction Memorandum [IM] 2023-006, IM 2023-007, IM 2023-008, and IM 2023-010).
IM 2023-006 - Implementation of Section 50265 in the Inflation Reduction Act for Expressions of Interest for Oil and Gas Lease Sales	This IM provides guidance regarding BLM's implementation of IRA Section 50265 with regard to EOIs. The BLM is using the National Fluid Lease Sale System (https://nflss.blm.gov/eoi/list) to track the acreage of EOIs submitted. As stated in IM 2023-006, *Implementation of Section 50265 in the Inflation Reduction Act for Expressions of Interest for Oil and Gas Lease Sales*, and IM 2023-036, *Inflation Reduction Act Conditions for Issuing Rights-of-way for Solar or Wind Energy Development*, the BLM will run a national report and document the review prior to issuing a wind or solar energy right-of-way.
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 IM 2023-010, *Oil and Gas Leasing – Land Use Planning and Lease Parcel Reviews*. This IM informs the agency's organization, procedures, and practice.
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 IM 2014-004, *Oil and Gas Informal Expressions of Interest*.
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, PL 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 C for BLM's evaluation of the nominated lease sale parcels in accordance with IM 2023-007, *Evaluating Competitive Oil and Gas Lease Sale Parcels for Future Lease Sales*.

1.5 PUBLIC INVOLVEMENT AND ISSUES

1.5.1 Internal Scoping

The BLM OFO 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 RMP under the National Environmental Policy Act of 1969 (NEPA) framework. An IDT meeting was held at the BLM OFO on March 1, 2023, as were weekly meetings with additional BLM OFO IDT members during the parcel review process. Additionally, other resource-specific meetings with resource specialists were held to aid in refining issues related to the proposed lease sale.

1.5.2 External Scoping

A project summary page for the OFO November 2023 Competitive Oil and Gas Lease Sale was posted on the BLM's National NEPA Register website (https://eplanning.blm.gov/eplanning-ui/home). The nominated lease parcel information was posted on that website for a public scoping period from February 17 to March 20, 2023.

The BLM OFO received four comment letters via ePlanning during the scoping period for the November 2023 Competitive Oil and Gas Lease Sale. Concerns and comments presented by the public and non-governmental organizations are summarized below.

Concerns were presented regarding the following:

- Effects of lease sales on greenhouse gas (GHG) emissions and climate change
- Air quality and associated health impacts
- Compliance with the Inflation Reduction Act of 2022 (IRA)
- Compliance with BLM Instruction Memorandum (IM) 2021-027, *Oil and Gas Leasing – Land Use Planning and Lease Parcel Reviews*[1]
- Tribal consultation and public participation
- Cumulative impacts of BLM's leasing program and other similar actions nationwide
- Public health and environmental justice
- Big game habitat and migration corridors
- Lesser-prairie chicken
- Impacts to groundwater quality and quantity from hydraulic fracturing and injection wells

In addition, the following requests were presented:

- Defer parcels with no or low potential for oil and gas development and/or with resource concerns.
- Perform analysis of potential effects on big game, cultural resources, special status species, and special designations; requested that BLM perform this analysis.
- Complete a programmatic environmental impact statement for the BLM's federal oil and gas program.
- Consider and recommend a reasonable range of alternatives.

[1] This IM has been superseded by IM 2023-010, *Oil and Gas Leasing – Land Use Planning and Lease Parcel Reviews*.

- Incorporate climate costs.
- Impose climate change impact requirements and GHG emissions mitigation on leasing.
- Public requests were made for BLM to consult with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service pursuant to Section 7 of the Endangered Species Act (ESA).

1.5.3 Draft EA Public Comment and Response

The draft November 2023 Competitive Oil and Gas Lease Sale EA will be made available for a public comment period from May 16 to June 15, 2023. The BLM received two comment letters on the OFO nominated lease sale parcels. The BLM extracted, reviewed, analyzed, and responded to substantive comments (Appendix F).

1.5.4 Recent Court Decisions

On February 1, 2023, the Tenth Circuit issued a judgment holding that BLM violated NEPA because it failed to take a hard look at specific resource impacts in New Mexico's San Juan Basin. *Diné Citizens Against Ruining Our Env't v. Haaland*, 59 F.4th 1016 (Tenth Cir. 2023) (Diné CARE 2).

The Tenth Circuit held that it was inappropriate for the BLM to use different methods to estimate direct and indirect annual GHG emissions. For direct emissions, the BLM had calculated the annual emissions from the wells and used this number to represent the total emissions for the 20-year life span of the wells. But for indirect emissions, the BLM incorporated a 20-year decline curve. *Diné CARE 2*, 59 F.4th at 1036-37. The Court directed the BLM to incorporate a decline curve for direct emissions just as the BLM does for indirect emissions. *Id*. This analysis is now included in the 2021 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends (herein referred to as the 2021 Annual GHG Report [BLM 2022c]), which is incorporated by reference.

The Court also found insufficient the BLM's percentage comparisons to describe the impacts of projected lease sale emissions; instead, the Court directed BLM to either employ an available protocol like carbon budgeting or the social cost of carbon to analyze the impacts of the projected GHGs or explain why it declined to do so. *Id*. at 1044. This EA addresses both methodologies in Section 3.6.2 and in the 2021 Annual GHG Report, incorporated by reference.

The Tenth Circuit also found the BLM's analyses arbitrary and capricious because the BLM did not evaluate hazardous air pollutant (HAP) emissions from the construction of oil and gas wells cumulatively anticipated by the reasonably foreseeable development scenario over a period of years. *Diné CARE 2*, 59 F.4th at 1047. In response, the BLM is working to develop an analytical model to evaluate cumulative HAP emissions.

The Tenth Circuit upheld the BLM's analysis of water resources and the health impacts of criteria pollutants by using the National Ambient Air Quality Standards (NAAQS). Those analyses are substantively the same in the EAs but with the added inclusion of newly available information in the 2021 Annual GHG Report.

1.5.5 Public Protest Period

The Oil and Gas Lease Sale Notice was made available for a protest period from August 14 to September 13, 2023. Four protests were received from non-governmental organizations. After review, the BLM has determined that protests of the OFO parcels in the November 2023 Competitive Oil and Gas

Lease Sale, as amended, have been dismissed or denied. The protests and the resolution letters are available on www.eplanning.gov.

1.5.6 Issues

The Council on Environmental Quality (CEQ) regulations at 40 C.F.R. § 1500.4(i) direct 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." In accordance with 40 C.F.R. §1501.9 (f)(1), the lead agency "shall identify 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 scoping, three issues were identified for detailed analysis in this EA:

- How would future potential development of the nominated lease parcels affect air quality (particularly with respect to National Ambient Air Quality Standards [NAAQS] and volatile organic compounds [VOCs]) in the analysis area?
- How would future potential development of the nominated lease parcels contribute to GHG emissions and climate change?
- How would future potential development of the nominated lease parcels affect surface water and groundwater quantity?

An additional 19 issues were identified, considered, and analyzed in brief (AIB) by members of the IDT in review of the Proposed Action. These issues are presented in Chapter 3, Section 3.5.

Table 1.2 lists resources or concerns that were considered but determined to not warrant analysis in this EA and provides the rationale for the determination.

Table 1.2. Issues Considered but Not Analyzed in this EA

Resource or Concern	Rationale for Not Analyzing in EA
Lands with Wilderness Characteristics (LWCs)	There are no designated LWCs within the OFO planning area. Therefore, analysis of potential effects on LWCs is not warranted.
Areas of Critical Environmental Concern (ACECs) or Special Management Areas (SMAs)	There are no designated ACECs or SMAs within the OFO planning area. Therefore, analysis of potential effects on ACECs or SMAs is not warranted.
Invasive Plants/Noxious Weeds	BLM does not have authority to manage vegetation on private or non-BLM-administered surface lands, other than to direct the potential operator to control invasive species during development and production. The nominated lease parcels do not contain any BLM-administered surface land; therefore, analysis of potential effects on invasive species or noxious weeds is not warranted.
Grazing	There are no grazing allotments within the nominated lease parcels, and no private grazing operations are evident from aerial imagery. Therefore, analysis of potential effects on grazing is not warranted.
BLM Sensitive Species	BLM sensitive species are only managed on BLM-administered surface lands. The nominated lease parcels do not contain any BLM-administered surface land; therefore, analysis of potential effects on BLM sensitive species is not warranted.
Dark Night Skies	There are no dark night sky monitoring locations within or near the nominated lease parcels. The closest monitoring locations are located approximately 162 miles from the nominated lease parcels. Therefore, analysis of potential effects on dark night skies is not warranted.

Resource or Concern	Rationale for Not Analyzing in EA
Cave and Karst Resources	There are no cave or karst resources within or near the nominated lease parcels. Therefore, analysis of potential effects on cave and karst resources is not warranted. See AIB-19 (Solid Minerals) for analysis of potential impacts to coal mines, including uncharted, underground coal mines in Pittsburg County, Oklahoma.
Forestry and Woodlands	Forest and woodland vegetation types are either absent or occur in negligible amounts within the nominated lease parcels (see AIB-7). No specific concerns or conflicts were identified through internal scoping relating to the effects of future potential development following lease reinstatement on forestry and woodlands.
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 lease reinstatement on fuels and fire management.

CHAPTER 2. PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

Under the Proposed Action, the BLM would offer for lease federal minerals associated with five nominated lease parcels. Surface management, the legal land description of the nominated lease parcels totaling 162.00 acres, and lease stipulations and notices attached to the lease parcel are included in Table 2.1. Appendix A contains parcel maps. Appendix B provides a summary of stipulations and lease notices. Under the Proposed Action, the BLM AO has the authority to lease the parcels, or to defer the parcels, based on the analysis of potential effects presented in this EA.

Table 2.1. Nominated Lease Parcel Description

Parcel Number (acres)*	Surface Management	Legal Land Description	Lease Notices and Stipulations
0053 (40 acres) (previously 0047†)	Private	T. 5 N., R. 14 E., INDIAN MER Sec. 33 NE1/4SE1/4. Pittsburg County EOI# NM00018618	**HQ-TES-1††** BLM Lease Notice for Endangered Species Act Section 7 Consultation **HQ-CR-1††** BLM Lease Notice for Cultural Resources and Tribal Consultation Stipulation **HQ-MLA-1** BLM Lease Notice for MLA Section 2(a)(2)(A) Compliance **NM-11-LN** BLM Lease Notice for Special Cultural Resource **NM-14-LN** BLM Lease Notice for Paleontological Resources **OFO-2-CSU** American Burying Beetle **OFO-4-CSU** Special Status Bat Species **OFO-1-NSO** Floodplains **OFO-4-NSO** Riparian-Wetland Areas and Waterbodies **OFO-4-LN** Migratory Birds and Birds of Conservation Concern **OFO-5-LN** Federal Minerals **OFO-8-LN** Cultural Resources and Tribal Consultation

Parcel Number (acres)*	**Surface Management**	**Legal Land Description**	**Lease Notices and Stipulations**
0047 (2 acres) (previously 0048†)	Private	T. 5 N., R. 14 E., INDIAN MER Sec. 34 LOTS 1. Pittsburg County EOI# NM00018643	**HQ-TES-1** BLM Lease Notice for Endangered Species Act Section 7 Consultation **HQ-CR-1** BLM Lease Notice for Cultural Resources and Tribal Consultation Stipulation **HQ-MLA-1** BLM Lease Notice for MLA Section 2(a)(2)(A) Compliance **NM-11 LN** BLM Lease Notice for Special Cultural Resource **NM-14-LN** BLM Lease Notice for Paleontological Resources **OFO-2-CSU** American Burying Beetle **OFO-4-CSU** Special Status Bat Species **OFO-4-LN** Migratory Birds and Birds of Conservation Concern **OFO-5-LN** Federal Minerals **OFO-8-LN** Cultural Resources and Tribal Consultation
0049 (40 acres)	Private	T. 23 N., R. 14 W., INDIAN MER Sec. 25 SW1/4NE1/4. Woods County EOI# NM00018643	**HQ-TES-1** BLM Lease Notice for Endangered Species Act Section 7 Consultation **HQ-CR-1** BLM Lease Notice for Cultural Resources and Tribal Consultation Stipulation **HQ-MLA-1** BLM Lease Notice for MLA Section 2(a)(2)(A) Compliance **NM-11-LN** BLM Lease Notice for Special Cultural Resource **NM-14-LN** BLM Lease Notice for Paleontological Resources **OFO-1-CSU** Sensitive Soils **OFO-4-CSU** Special Status Bat Species **OFO-8-LN** Cultural Resources and Tribal Consultation
6883 (40 acres) (previously 0050†)	Private	T. 23 N., R. 14 W., INDIAN ME Sec. 25 SW1/4SE1/4. Woods County EOI# NM00018643	**HQ-TES-1** BLM Lease Notice for Endangered Species Act Section 7 Consultation **HQ-CR-1** BLM Lease Notice for Cultural Resources and Tribal Consultation Stipulation **HQ-MLA-1** BLM Lease Notice for MLA Section 2(a)(2)(A) Compliance **NM-11 LN** BLM Lease Notice for Special Cultural Resource **NM-14-LN** BLM Lease Notice for Paleontological Resources **OFO-1-CSU** Sensitive Soils **OFO-4-CSU** Special Status Bat Species **OFO-8-LN** Cultural Resources and Tribal Consultation

Parcel Number (acres)*	Surface Management	Legal Land Description	Lease Notices and Stipulations
6884 (40 acres) (previously 0051†)	Private	T. 23 N., R. 14 W., INDIAN MER Sec. 25 SW1/4SW1/4. Woods County EOI# NM00018643	**HQ-TES-1** BLM Lease Notice for Endangered Species Act Section 7 Consultation **HQ-CR-1** BLM Lease Notice for Cultural Resources and Tribal Consultation Stipulation **HQ-MLA-1** BLM Lease Notice for MLA Section 2(a)(2)(A) Compliance **NM-11 LN** BLM Lease Notice for Special Cultural Resource **NM-14-LN** BLM Lease Notice for Paleontological Resources **OFO-1-CSU** Sensitive Soils **OFO-4-CSU** Special Status Bat Species **OFO-8-LN** Cultural Resources and Tribal Consultation

* All acreages contained in the EA analysis were calculated using geographic information system (GIS) data sets for resources and parcels, which may differ slightly from the acreage contained in the legal description here. The difference in total acres between parcels can vary 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.

† Parcel number changes that occurred between the Lease Sale Comment Period and the Protest Period was due to an automated numbering schema adjustment made by the BLM's National Fluids Lease Sale System database. For clarity, Table 2.1 notes the revised and previous parcel number, however, the analysis reflects the revised parcel number that is reflected in the Lease Sale Notice.

†† Stipulations HQ-TES-1 and HQ-CR-1 were formerly referred to as WO-ESA 7 and WO-NHPA, respectively. Although the titles of these stipulations have changed, the content of the stipulations have not (see stipulation text in Appendix B).

The drilling of wells 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 in 43 C.F.R. § 3162.3-1 and 43 C.F.R. § 3171. The BLM has authority, according to the standard terms and conditions of the leases, to attach conditions of approval (COAs) to the APD that reduce or avoid impacts to public land, resources, and/or resource values. Under 43 C.F.R. § 3101-1-2, such reasonable measures may include modification to the 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 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.

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, the BLM would not offer the nominated parcels for competitive leasing in the November 2023 Competitive Oil and Gas Lease Sale. As a result, there would not be any development of the parcels at this time. The parcels would have the potential to be nominated again for a future oil and gas lease sale.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

3.1 INTRODUCTION

This chapter contains the impacts analysis related to the three issues listed in Section 1.5.6. Section 3.2 describes the analysis assumptions related to future potential development of the nominated lease parcels.

Section 3.3 presents an overview of reasonably foreseeable environmental trends and planned actions considered in the impact analysis. Section 3.4 describes the effects of the No Action Alternative for all issues. Section 3.5 presents the issues analyzed in brief, and Section 3.6 presents the issues analyzed in detail.

3.2 ANALYSIS METHODOLOGY

While leasing itself 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. Because there is currently no development proposal for the nominated lease parcels, site-specific details are unknown. This analysis conservatively assumes future potential development of the nominated lease parcels would include the development of up to one well. Sections 3.2.1 and 3.2.2 outline the methodology for estimating number of wells, potential production volumes, and surface disturbance associated with the future potential development of the nominated lease parcels. Estimates of future potential development are based on known historical data and reasonable assumptions.

3.2.1 Methodology for Estimating Number of Oil and Gas Wells and Production Volumes

Reasonably foreseeable quantitative well development estimates were derived from the well densities that were analyzed in the *Oklahoma, Kansas and Texas Final Joint Environmental Impact Statement/ Proposed BLM Resource Management Plan and Proposed BIA Integrated Resource Management Plan* (OFO RMP Final EIS) (BLM and Bureau of Indian Affairs [BIA] 2019a). To calculate the volumes of oil, natural gas, and water expected to be produced from the parcels, the projected number of wells was multiplied by the estimated ultimate recoveries (EURs) of oil, natural gas, and produced water per well. These EURs are generated by performing decline curve analyses of existing production within the OFO planning area.

The projected number of wells and associated oil, gas, and produced water production for the nominated lease parcels are summarized in Table 3.1.

Table 3.1. Estimated Well Count and Production for the Nominated Lease Parcels

Parcel Number (acres)*	State	Surface Ownership	Total Horizontal Wells†	Surface Disturbance (acres)	Oil Production (bbl)	Gas Production (mcf)	Produced Water Production (bbl)
0053 (40 acres)	**Oklahoma**	Private	1	8.06	84,000	961,000	1,382,000
0047 (2 acres)	**Oklahoma**	Private	1	8.06	84,000	961,000	1,382,000
0049 (40 acres)	**Oklahoma**	Private	1	8.06	84,000	961,000	1,382,000
6883 (40 acres)	**Oklahoma**	Private	1	8.06	84,000	961,000	1,382,000
6884 (40 acres)	**Oklahoma**	Private	1	8.06	84,000	961,000	1,382,000
Total OFO (162.00 acres)			**5**	**40.3**	**420,000**	**4,805,000**	**6,910,000**

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 in Table 2.1. Difference in total acres for the parcel can vary because of 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 methodology 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.

3.2.2 Methodology for Estimating Surface Disturbance

It is unknown when, where, and to what extent subsequent well sites, roads, and associated infrastructure would be proposed in the event the BLM decides to lease the nominated parcels. Future potential development of the nominated lease parcel could include the following phases:

- Constructing new access roads or expansion of existing roads
- Pad construction
- Drilling a well
- Hydraulically fracturing a well
- Installing pipeline
- Production, 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
- Reclamation and remediation

Appendix D provides a summary of the phases of oil and gas development.

Based on surface disturbance values identified in the 2016 reasonably foreseeable development (RFD) scenario for Kansas, Oklahoma, and Texas (BLM 2016), the BLM estimates 4.5 acres of surface disturbance per new horizontal well pad, 2.7 acres per new vertical well pad, and 3.56 acres of surface disturbance for each well pad's associated access road and pipeline infrastructure. The OFO RMP projects a "maximum buildout" of 1,230 federal wells on 4,480,100 acres of land and calculates a well density (wells per acre) using this maximum buildout value. Based on the RMP well density, acres of land, and number of parcels available for leasing, and rounding to ensure that the number of wells per parcel is a nonzero, whole number, one well per parcel was estimated for this lease sale. Assuming future potential development of one horizontal well per parcel (five horizontal wells total), along with any associated access roads and pipelines, 40.3 total acres of new surface disturbance are anticipated (see Table 3.1). Disturbance would remain on the landscape until final abandonment and reclamation of facilities (generally assumed to occur after 20 years). Interim/ongoing reclamation procedures must be completed within 6 months of well completion and would be used to limit impacts by restoring disturbed areas as soon as they are no longer required for operations.

3.3 REASONABLY FORESEEABLE ENVIRONMENTAL TRENDS AND PLANNED ACTIONS

The BLM OFO planning area encompasses 269,650,000 acres of BLM, other federal surface management agency, tribal (trust, allotted, and/or restricted), state, county, and private lands across Oklahoma, Kansas, and Texas. Surface land managers within the OFO planning area include the BIA; Bureau of Reclamation; U.S. Department of Defense; International Boundary and Water Commission; National Park Service; U.S. Department of Agriculture; USFWS; U.S. Army Corps of Engineers; the States of Oklahoma, Kansas, and Texas; and private landowners. Of the 270-million-acre OFO planning area, the BLM decision area is limited to BLM-administered surface and subsurface mineral estate, which covers approximately 15,100 acres (0.01% of OFO planning area) and 4,810,900 acres (1.8% of OFO planning area), respectively (BLM and BIA 2019a). BLM-administered surface estate (15,100 acres total) includes approximately 3,300 acres of isolated scattered tracts in Oklahoma and 11,800 acres at the Cross Bar Management Area near Amarillo, Texas. BLM-administered mineral estate consists of approximately

4,810,900 acres underlying BLM-administered surface land, federal minerals underlying other federal surface management agency lands, and federal minerals underlying split-estate tracts (BLM and BIA 2019a).

The following sections outline the reasonably foreseeable environmental trends and planned actions within the OFO planning area that are closely related to the Proposed Action and the RFD of the nominated lease parcels. The BLM is able to identify and analyze reasonably foreseeable environmental trends and planned actions expected to occur over the next 20 years, as this time period is aligned with available RMP and RFD scenario information. Additional information related to environmental impacts of BLM management decisions can be found in the Oklahoma, Kansas, and Texas BLM RMP, with ROD (BLM 2020), and the OFO RMP Final EIS (BLM and BIA 2019a). More information related to air resources environmental trends is available in the *BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas 2021* (BLM 2022a); this document is incorporated by reference into the EA.

3.3.1 Energy Development and Other Land Uses

3.3.1.1 *Oil and Gas Development*

The OFO planning area contains 40 existing and potential oil and gas plays (BLM and BIA 2019a). Some of these play areas are on a decline or near the end of their life, whereas others are relatively new. Portions of eight plays overlap BLM-administered lands, and 26 plays overlap BLM-administered federal mineral estate. BLM administered surface lands overlap plays almost exclusively in Oklahoma, but some overlapping also occurs in Texas.

According to the 2016 RFD scenario for Kansas, Oklahoma, and Texas (BLM 2016; herein incorporated by reference), historical well counts total 541,301 in Oklahoma, 344,511 in Kansas, and 1,397,108 in Texas, for a total of 2,282,920 historical wells drilled on the OFO planning area. Federal and trust wells comprise only 0.3% of all historical wells drilled in the OFO planning area (BLM 2016). Approximately 409,000 (18%) of the total historical wells are currently producing (BLM 2016). Most of the historical wells drilled are vertical wells. Assuming an average disturbance of 2.7 acres per vertical well, there would be approximately 1,104,300 acres of existing surface disturbance from the 409,000 producing wells across the OFO planning area (BLM 2016). It is assumed the other 1,873,920 wells drilled in the past are in some stage of reclamation, and these are not included in Table 3.2. Injection wells have also been drilled in the BLM OFO. As of 2016, there were six injection wells on BLM-administered surface lands in Texas (plus one in Oklahoma) and 499 injection wells on BLM-administered federal mineral estate across all four states (BLM and BIA 2019a).

The OFO RMP Final EIS predicts that over the next 20 years, the approximate number of federal and trust wells[2] to be drilled would range from 775 to 3,054 wells (BLM and BIA 2019a). Additionally, the 2016 RFD scenario estimates the associated surface disturbance would range from approximately 6,598 to approximately 13,466 acres (BLM 2016). These estimates were made using an average total surface disturbance of 4.41 acres per well, for all horizontal and vertical well types, which accounts for well pads and related infrastructure including roads, electric lines, and pipelines (BLM 2016).

The total amount of surface disturbance associated with existing and planned oil and gas development within the OFO planning area is estimated to entail 1,117,766 acres of surface disturbance (see Table 3.2). Energy and mineral development on federal lands or mineral estate is expected to continue under the

[2] Trust wells are wells drilled on tribal trust lands or lands where subsurface mineral estates are held in trust by the United States for American Indians, Indian tribes, and Alaska Natives.

management and conditions outlined in the Oklahoma, Kansas, and Texas BLM RMP (BLM 2020). This represents a continued trend of human use of land and mineral resources. Continued oil and gas development could contribute to landscape-level modifications over time, including habitat loss or degradation; changes in plant communities; fluctuating but generally increasing levels of emissions of pollutants; changes in land use patterns and the amount of landscape unaltered by human activities; changes to the visual landscape; and changes in the quantity or quality of water resources. Sections 3.5 and 3.6 consider the effects of these environmental trends and planned actions related to oil and gas development on resource issues analyzed in brief and in detail, respectively.

3.3.1.2 *Other Mineral and Energy Development*

In addition to oil and gas development, OFO-managed lands provide additional surface and subsurface resources used for other types of mineral and energy development, including coal, helium, geothermal, mineral materials, non-energy leasable minerals, wind, and solar. Past and planned actions associated with these resources are summarized below.

COAL

Most of the BLM-administered federal coal within the BLM OFO decision area is in eastern Oklahoma (BLM and BIA 2019a). There are seven federal coal leases in Oklahoma, composed of approximately 10,900 acres of BLM-administered mineral estate. Three of these leases are for underground mining operations, while the remaining four leases are for surface mines.

Approximately 1.6 billion tons of economically recoverable coal reserves remain in Oklahoma. Most (73%) of the federal coal resources in the OFO planning area are beneath State-owned surface or surface administered by other federal surface management agencies. Except for the approximately 100 acres beneath BLM-administered surface, the remaining federal coal resources are beneath privately owned parcels. Because most privately owned parcels over BLM-administered federal mineral estate are small, i.e., scattered tracts of less than 1 acre throughout the planning area, the federal coal resources beneath these parcels are less likely to be leased and developed. This is because coal mines typically involve multiple acres of surface disturbance and/or mineral extraction (BLM and BIA 2019a). Overall, coal development is anticipated to continue at current levels, but it is likely to include more underground mining and less surface disturbance (BLM 2016).

HELIUM

Four helium areas overlap BLM-administered surface lands and federal mineral estate in the western portion of the planning area: Hugoton/Panoma/Panhandle, Greenwood/Keyes, Bradshaw, and Cliffside. These areas contain natural gas fields with high concentrations of helium and overlap approximately 150 acres of BLM-administered surface lands within the OFO planning area. Because helium is a by-product of natural gas, the RFD considered helium development in its oil and gas well development scenario (BLM 2016).

GEOTHERMAL

The areas in the OFO planning area with the highest geothermal energy potential are along its southern border and in east Texas. North Oklahoma and central Kansas also have moderate geothermal potential. Although portions of the BLM decision area have moderately high geothermal resource potential, geothermal resource development in the decision area is not expected in the next 20 years (BLM and BIA 2019a).

MINERAL MATERIALS

The planning area contains numerous mineral materials, such as sand and gravel, limestone, granite, chalk, and pumice. Public domain federal mineral estate (mineral estate that has always been under federal jurisdiction, rather than having been acquired by the federal government) does exist along the Red River in the BLM decision area along the Texas/Oklahoma border. Sand and gravel are the most common mineral materials in this area; however, no mineral material activity has occurred on BLM-administered surface or federal mineral estate in this area to date. Because of the small area of public domain federal mineral estate in the BLM decision area, mineral material activity is not expected to be significant in the next 20 years (BLM and BIA 2019a).

NON-ENERGY LEASABLE MINERALS

The primary non-energy leasable minerals in the planning area are evaporites, which include salt and gypsum, along with other minerals that are less commercially viable. Large salt deposits lie beneath west Texas, west Oklahoma, and west and central Kansas. Based on low historical demand and the widespread availability of hardrock minerals and mineral materials on private lands, the BLM does not expect leasing activity associated with hardrock minerals and mineral materials in the next 20 years (BLM and BIA 2019a).

WIND

Wind energy development is a rapidly growing industry throughout the planning area, particularly in Kansas, west Oklahoma, northwest Texas, and the Texas Gulf Coast. In 2021, Texas ranked first in the nation for wind energy generation, with over 35,000 megawatts (MW) of wind capacity in 2022 (U.S. Energy Information Administration [EIA] 2022a). As of 2022, Kansas ranks among the top five states in wind energy generation with nearly 8,250 MW of installed wind generating capacity (EIA 2022b). In Oklahoma, several large wind projects came online in 2021, and in March 2022, the 998- MW Traverse Wind Project became operational (EIA 2022c). Wind energy development in the OFO planning area is expected to increase substantially over the next 20 years, especially in Texas, where state policies have proactively encouraged wind energy development. Although Kansas and Oklahoma also contain large undeveloped areas with high wind potential, development in these states is slower because of fewer incentives from state and local regulations and policies (BLM 2016). For these reasons, the number, location, and size of future wind projects within the OFO planning area over the next 20 years are difficult to predict.

SOLAR

Solar energy development potential exists in the OFO planning area, with areas of highest solar potential in the western portions of Texas, Oklahoma, and Kansas (BLM and BIA 2019a). Texas is the state with the largest amount of solar development in the OFO planning area, with over 10,000 MW of generating capacity in 2021 (EIA 2022a). Both Oklahoma and Kansas have small but growing amounts of solar energy generation, with notable increases in solar development over recent years (2017–2021) (EIA 2022b, 2022c). For example, the 250-MW Skeleton Creek Solar and Battery Storage project was approved for construction in March 2022 and will have an estimated footprint of 2,472 acres in Garfield County, Oklahoma (U.S. Department of Agriculture 2022). Solar development, along with other renewable energy sources (i.e., wind, biomass, and hydropower), is expected to grow over the next 20 years to meet state goals or mandates for renewable energy generation. However, forecasting the number, location, and size of solar developments is difficult because of the influence of market factors and state regulations, policies, and incentives that can encourage or dissuade solar development

(BLM 2016). In addition, the size of solar developments and associated surface disturbance can vary widely (BLM 2016).

3.3.1.3 *Municipal and Other Land Uses*

Existing municipal and other land use within the OFO planning area, such as urban development, grazing, recreation, off-road travel, and transmission or pipeline rights-of-way, are expected to continue at current or slightly increased levels. Urban growth is expected to increase, particularly near Dallas, Amarillo, Austin, San Antonio, and Houston, Texas; Oklahoma City and Tulsa, Oklahoma; and Wichita, Kansas.

Livestock grazing is pervasive throughout the OFO planning area, but generally occurs on private lands and is uncommon on BLM-administered surface lands (BLM 2015). Presently, there are four BLM grazing leases being administered in Oklahoma, totaling 435 acres and none in Texas or Kansas (BLM and BIA 2019a). The BLM anticipates grazing to continue at current rates, especially on private lands.

Recreation opportunities (e.g., hunting, fishing, camping, hiking, and off-highway vehicle use) are present throughout the OFO planning area on BLM-administered lands as well as state parks, national forests, and state and federally managed reservoirs (BLM 2015). Recreation on BLM-administered lands in the planning area is concentrated in the Red River area and Canadian River corridor in Oklahoma, and Cross Bar Management Area in Texas (BLM and BIA 2019a). Recreation uses are expected to continue in the planning area, with potential for increased use at developed recreation areas near urban areas experiencing population growth (BLM and BIA 2019a).

The OFO planning area currently includes approximately 41,000 miles of transmission lines, pipelines, and other rights-of-way. Over the next 20 years, planned developments include multiple reservoirs and interstate water pipelines, including the Plains and Eastern Clean Line proposed transmission line project (700 miles crossing Oklahoma) and Grain Belt Express proposed transmission line project (includes 370 miles in Kansas). There are also several gas pipelines and compressor stations in the permitting or construction phase in the planning area in Texas.

Associated effects would correspond to the resources present at the specific development location with contribution to landscape-level conditions and could result in landscape modifications over time including habitat loss or degradation, changes in plant communities, fluctuating but generally increasing levels of emissions of pollutants, changes in land use patterns and the amount of landscape unaltered by human activities, changes to the visual landscape, and changes in the quantity or quality of water resources. The analyses presented in Sections 3.5 and 3.6 consider the effects of these environmental trends and planned actions related to oil and gas development on resource issues analyzed in brief and in detail, respectively.

3.3.1.4 *Quantification of Landscape Disturbance*

Table 3.2 summarizes the number of wells and estimated acreage of landscape disturbance associated with energy and mineral development and other land uses within the OFO.

Based on the information provided in Table 3.2, future potential development of five wells under the Proposed Action would represent 0.2% of the maximum projected wells in the oil and gas RFD scenario and 0.001% of the total number of existing and projected wells in the OFO planning area. Table 3.2 also shows the estimated acreage of surface disturbance (40.3 acres) associated with future potential development under the Proposed Action would represent 0.3% of the projected surface disturbance in the

oil and gas RFD scenario and 0.004% of the total existing and projected landscape disturbance in the OFO planning area.

Table 3.2. Estimated Landscape Disturbance Associated with Environmental Trends and Planned Actions within the OFO

Environmental Trends and Planned Actions within OFO Planning Area (Analysis Area) (Total Acres: 269,650,000)	Number of Wells	Acreage of Surface Disturbance	Percent of Analysis Area (acreage)
OFO existing oil and gas development (construction of oil and gas well pads and associated access roads and pipeline infrastructure)	409,000	1,104,300	0.41%
Oil and gas RFD*	Up to 3,054	Up to 13,466	0.005%
OFO existing other development and surface use (mining, renewable energy, grazing, roads, transmission lines, and urban expansion)†	Not applicable	13,435	0.005%
Total	**412,054**	**1,131,201**	**0.42%**
Future potential development under the Proposed Action	5	40.3	0.00001%

* Source BLM (2016). New surface disturbance from potential wells in the RFD scenario is estimated at 4.41 acres per well.

† This estimate includes approximately 13,000 acres of surface disturbance associated with existing coal leases and 435 acres of surface disturbance from existing grazing allotments. Some additional land uses discussed in Section 3.3.1 are not accounted for in this estimate due to a lack of past and planned surface disturbance estimates. Therefore, this acreage is likely an underestimate of the total past and planned surface disturbance associated with all energy development and other land uses.

3.3.2 Land Restoration and Conservation Activities

Fuels treatments that include mechanical, biological, and chemical treatments and prescribed fire to reduce hazardous fuels and undesirable vegetation would likely continue on public and private lands. Manual, biological, chemical, and mechanical treatments of noxious weeds and invasive plants are also likely to continue in the foreseeable future (BLM and BIA 2019a).

Prairie restoration vegetation treatments are ongoing in the Cross Bar Management Area (11,800 acres) near Amarillo, Texas. Native and invasive woody shrubs, including mesquite (*Prosopis* spp.), saltcedar (*Tamarix ramosissima*), and cholla cactus (*Cylindropuntia* spp.), are being treated through mechanical and chemical treatments and prescribed burning (BLM and BIA 2019a). To date, approximately 7,500 acres of mesquite on the Cross Bar Management Area have been sprayed and/or masticated, and an additional 1,100 acres of mesquite were aerially treated in 2020. Prescribed burning is integrated into the restoration process with the goal of maintaining a fire return interval of every 3 to 5 years, as funding and personnel resource availability allows. Cholla cactus and saltcedar are targeted on an individual-plant basis. Chemical and mechanical treatments are expected to slow over time, but follow-up treatments would occur as needed for maintenance (Escobar 2021).

3.3.3 Changes to Regional Environmental Conditions Related to Climate Change

Climate change, as further discussed in Section 3.6.2, is a global process that is impacted by the total of GHGs in the Earth's atmosphere. Currently, global climate models are unable to forecast local or regional effects on resources (Intergovernmental Panel on Climate Change [IPCC] 2013). However, there are general projections regarding potential impacts to natural resources and plant and animal species that may be attributed to climate change from GHG emissions over time. These effects are likely to be varied, including those in the southwestern United States (Karl 2009). Climate models project robust differences in regional changes related to precipitation patterns, average temperatures, and frequency or severity of drought (IPCC 2013). Impacts of climate change on regionally variable ecosystem processes have also

been observed and have been used to make general projections regarding potential future effects of climate change on natural resources and plant and animal species for different regions (Karl 2009).

The OFO planning area is part of the Great Plains region (including Texas, Oklahoma, and Kansas), which is expected to be affected in both the short and long term by variations in global and regional environmental conditions related to climate change. The Great Plains region is projected to experience higher temperatures and more frequent drought in the future. Temperature increases and precipitation decreases would stress the region's primary water supply, the Ogallala Aquifer. Seventy percent of the land in this area is used for agriculture. Threats to the region associated with climate change include pest migration as ecological zones shift northward; increases in weeds; and decreases in soil moisture and water availability (BLM 2022a). Additional information related to global, regional, and state climate change projections can be found in the *BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas* (BLM 2022a) and the 2021 Annual GHG Report (BLM 2022c). Lastly, information regarding climate impacts to the Great Plains ecoregion, which three of the nominated lease parcels occur in (see AIB-10, General Wildlife), can be found in the U.S. Geological Survey (USGS) Southern Great Plains Rapid Ecological Assessment (Reese et al. 2017, incorporated by reference).

3.4 NO ACTION ALTERNATIVE FOR ALL ISSUES

Under the No Action Alternative, the BLM would not 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 lease development. Oil and gas development on previously leased BLM-managed lands surrounding the nominated lease parcels and adjacent privately owned lands would continue. No natural gas or crude oil from the nominated lease parcels would be produced, and no royalties would accrue to federal or state treasuries. A choice on the part of the BLM not to lease the nominated lease parcels would eliminate five oil and gas development opportunities in the BLM OFO. The parcels would have the potential to be nominated again for a future oil and gas lease sale. Reduction or elimination of 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 OFO planning area, development of federal leases is approximately 0.3% of total oil and gas development activities (BLM 2016).

3.5 ISSUES ANALYZED IN BRIEF

Following internal and external scoping, 19 issues were identified, considered, and analyzed in brief 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, HQ-CR-1, HQ-MLA-1 and Lease Notice NM-11-LN, as well as standard terms and conditions as described in the lease form, would apply to all nominated lease parcels. For all issues analyzed in brief that follow, it is assumed that the effects of reasonably foreseeable environmental trends and planned actions to relevant elements of the environment would be consistent with the landscape disturbance acreages presented in Section 3.3.

For the purposes of this analysis, short-term effects are considered 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 production activities over the life of the well (for example, noise) or 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 (e.g., visual and noise impacts associated with well infrastructure), whereas other long-term effects would remain until successful landscape reclamation is accomplished (e.g., vegetation disturbance) dependent on the nature of the effect. Note that the time frame for successful reclamation would vary by vegetation type and other facts such as the amount and timing of annual precipitation.

AIB-1 Groundwater Quality

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

Leasing and future potential development of the nominated lease parcels would result in oil and gas activities, including well pad construction, drilling, and completion of an estimated five wells. It is assumed the wells would be horizontal wells that would employ standard industry practices related to well completion (i.e., perforation and hydraulic fracturing). Types of chemical additives used in well completion activities may include acids, hydrocarbons, thickening agents, gelling agents, lubricants, and other additives that are operator- and location-specific. The largest components in hydraulic fracturing fluid are water and sand.

The RFD scenario projects up to 3,054 additional new wells over 20 years (BLM 2016) (see Section 3.3). When a well is drilled, it would most likely pass through a usable groundwater aquifer currently or potentially supplying stock, residential, and/or irrigation water. If proper cementing and casing programs are not followed, there may be a loss of well integrity, surface spills, or loss of fluids in the drilling and completion process that may result in large volumes of high concentrations of chemicals reaching groundwater resources. If contamination of usable water aquifers (resulting in total dissolved solids greater than 10,000 parts per million) from any source occurs, springs and water wells that are sourced from the affected aquifers could be subject to long-term decreases in water quality depending on the size and severity of the contamination event. A further list of the potential environmental effects of hydraulic fracturing can be found in the U.S. Environmental Protection Agency (EPA) report *Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States* (EPA 2016). In summary, this report examines six different scenarios in which drinking water resources may be affected by hydraulic fracturing: 1) water withdrawals during periods of low water availability, 2) spills of hydraulic fracturing fluids/chemicals and/or produced water, 3) release of hydraulic fracturing fluids from wells with inadequate casing, 4) direct injection of hydraulic fracturing fluids into groundwater, 5) discharge of insufficiently treated wastewater to surface water, and 6) contamination of groundwater from unlined storage/disposal pits.

The BLM requires operators to comply with the regulations at 43 C.F.R. § 3160, 43 C.F.R. § 3171, and 43 C.F.R. § 3177. These regulations also require oil and gas development to comply the orders of the AO. The regulations at 43 C.F.R. § 3162.3-3 and 43 C.F.R. § 3162.3-5 provide regulatory requirements for hydraulic fracturing such as casing specifications, monitoring and recording, and management of recovered fluids. At the state level, the Oklahoma Corporation Commission (OCC) is responsible for permitting oil and gas wells in accordance with the commission's rules under Oklahoma Administrative Code Title 165, Chapter 10.

Complying with BLM and state regulations regarding casing and cementing, implementing best management practices (BMPs), testing casings and cement prior to continuing to drill or introducing

additional fluids, and continual monitoring during drilling and hydraulic fracturing allow producers and regulators to check the integrity of casing and cement jobs and greatly reduce the chance of aquifer contamination. Casing specifications are designed and submitted to the BLM together with an APD. The BLM independently verifies the casing program, and the installation of the casing and cementing operations are witnessed by certified BLM Petroleum Engineering Technicians. Should a spill occur on-site or during material transport, the BLM would work with operators to immediately remediate spills in accordance with federal and state standards (see AIB-2 for related surface water quality concerns). Site-specific mitigation tools would be developed as appropriate for the individual circumstances and could include surface water or groundwater quality monitoring studies. Title 43 C.F.R. § 3162.5-2(d) gives the BLM the authority to require an operator to monitor water resources to ensure that the isolation procedures used to protect water and other resources are effective.

Of the 3,054 wells identified in the RFD scenario, five wells (0.2%) would be attributed to future potential development of the nominated lease parcels (see Section 3.3.1.4). Nominated lease parcels 0053 and 0047 are within the Pennsylvanian aquifer, which has a depth to water of approximately 20 to 60 feet based on review of groundwater well records in the area (Oklahoma Water Resources Board [OWRB] 2023a). Nominated lease parcels 0049, 6883, and 6884 are within the Cimarron River aquifer, which has a depth to water of approximately 20 feet, and a maximum saturated thickness of about 30 feet (OWRB 2016, 2023b). Based on estimated aquifer thickness and depth within the analysis area, future potential development of the nominated lease parcels would likely result in a well drilled beyond (deeper than) the regional aquifers, and below any underground sources of drinking water. Whereas a well drilled would likely pass through these aquifers, the evidence indicates that the regulatory programs described previously would be protective of these water resources.

In summary, the BLM and OCC have put in place numerous requirements for oil and gas producers so that drilling fluids, hydraulic fracturing fluids, and produced water and hydrocarbons remain within the well bore and do not enter groundwater or any other formations. These include BLM regulations covered under 43 C.F.R. § 3160; 43 C.F.R. § 3171; 43 C.F.R. § 3172; 43 C.F.R. § 3177; 43 C.F.R. § 3162.3-3; 43 C.F.R. § 3162.3-5; and Notice to Lessees (NTL)-3A. With these requirements in place, including the use of casing and cementing measures, contamination of groundwater resources is highly unlikely. In addition, the BLM has authority under standard terms and conditions to require additional measures to protect water quality if site-specific circumstances require them. Site-specific mitigation tools would be developed as appropriate for the individual circumstances, including groundwater quality monitoring studies. The regulations at 43 C.F.R. § 3162.5-2(d) give the BLM the authority to require an operator to monitor water resources to ensure that the isolation procedures used to protect water and other resources are effective.

AIB-2 Surface Water Quality

How would future potential development of the nominated lease parcels impact watershed hydrology and surface water quality?

The OFO encompasses 330 watersheds, as mapped by the USGS eight-digit hydrologic unit codes (HUCs). Within the OFO, existing surface disturbance associated with past and present activities is estimated to be 1,117,735 acres (see Table 3.2), which comprises approximately 0.41% of the OFO. Reasonably foreseeable environmental trends and planned actions within the OFO are estimated to result in approximately 13,466 acres of new surface disturbance, which represents 0.005% of the approximately 270 million-acre OFO (see Table 3.2). These actions would result in long-term disturbance to vegetation, soils, and mineral substrate, which would create fugitive dust and increase runoff rates during precipitation events. By increasing runoff and removing vegetation, disturbed areas would become more susceptible to erosion. Soil that is carried downgradient by runoff due to upslope erosion may create

sedimentation issues in streams. Sedimentation would be most likely to occur during construction of stream crossings for access roads and flowlines, and at disturbance nearest streams; however, effects would remain until disturbed areas stabilized or were restored to pre-construction conditions. Development also carries a risk of spills that could result in the delivery of contaminants to surface water depending on the proximity of development activities to surface water and the measures applied to address the possibility of spills reaching surface waterbodies.

The nominated lease parcels fall within two HUC-10 watersheds (HUCs 1109020404 and 1105000107) which encompass 451,488 acres. The total acreage of the nominated lease parcels (162.0 acres) comprises 0.04% of these two HUC-10 watersheds combined. The nominated lease parcels do not contain any Clean Water Act 303(d) Impaired Waters. An analysis was conducted using the best available data to assess the potential for water resources to be present within the nominated lease parcels. The analysis included review of the following geographic information system (GIS) datasets: USGS's National Hydrography Dataset, USFWS's National Wetlands Inventory dataset, and the Federal Emergency Management Agency's (FEMA's) National Flood Hazard Layer. Of the five nominated lease parcels, only one parcel (0053) contains mapped surface water features (Table 3.3).

Table 3.3. Surface Water Feature Summary

Parcel (total parcel acreage)	Water Features Present in Parcel (acres/miles)	HUC-10 Watershed (portion of parcel within each watershed)
0053 (40 acres)	• Perennial Streams (0.33 mile) • Forested/shrub wetlands* (11.4 acres [28.3% of parcel]) • Zone A floodplains (16.35 acres [41% of parcel])	Brush Creek (40 acres [0.02% of watershed])
0047 (2 acres)	No water features are present in the parcel.	Brush Creek (2 acres [0.001% of watershed])
0049 (40 acres)	No water features are present in the parcel.	Cheyenne Valley-Cimarron River (40 acres [0.02% of watershed])
6883 (40 acres)	No water features are present in the parcel.	Cheyenne Valley-Cimarron River (40 acres [0.02% of watershed])
6884 (40 acres)	No water features are present in the parcel.	Cheyenne Valley-Cimarron River (40 acres [0.02% of watershed])

* Wetlands may overlap or surround other surface water features depending on site-specific delineation. Acreage of wetlands may therefore be included in other surface water features presented in this table.

Future potential development of the nominated lease parcels would result in approximately 40.3 acres of surface disturbance. This disturbance comprises 0.004% of the total estimated landscape disturbance associated with the reasonably foreseeable environmental trends and planned actions within the OFO (1,131,201 acres) (see Section 3.3.1.4). This surface disturbance would result in long-term disturbance to vegetation, soil, and mineral substrate, which in turn would increase the potential for dust, runoff, and sedimentation of nearby water bodies. Future potential development of the lease parcels also carries a risk of spills (see AIB-1).

Stipulations OFO-1-NSO and OFO-4-NSO would be applied to nominated lease parcel 0053 and would prohibit surface disturbance within floodplains, riparian-wetland areas, and waterbodies (up to 415 feet landward from the edge of the wetland or waterbody, as determined by the BLM biologist prior to any surface-disturbing activities) (see Appendix B). With the application of this stipulation, all surface water features within this parcel would be avoided. The ability to avoid these features would reduce the potential for direct or indirect impacts on water quality and watershed hydrology. Impacts to any surface water features that occur off-lease would be avoided or mitigated though application of standard terms

and conditions, which allow for the application of measures to avoid and mitigate accelerated soil erosion and sedimentation to waterbodies. These measures include, but are not limited to, BLM Gold Book standards (BLM 2007), operators' surface use plan of operations, and COAs.

The BLM's authority to require additional protective measures and the low level of surface disturbance relative to the total watersheds (40.3 acres [0.009%] of the 451,488-acre watersheds) would serve to minimize the risk of effects on watershed hydrology and surface water quality. Should a spill occur, the BLM would work with operators to immediately remediate spills in accordance with federal and state standards. Additionally, as groundwater is mostly used for oil and gas operations, surface water quantity is not expected to be impacted (see Section 3.6.3, Water Use and Quantity).

AIB-3 Soils and Erosion

How would future potential development of the nominated lease parcels affect soils with erosion potential?

Soil erosion 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. Areas susceptible to erosion include soils mapped by the Natural Resources Conservation Service (NRCS) with erosion hazard ratings of 3 or 4 (i.e., "severe" or "very severe"), wind erodibility group ratings of 1 or 2 (i.e., highly susceptible to wind erosion), or geomorphic attributes of dune, erosion remnants, interdunes, sand sheets, and terraces on river valleys (BLM and BIA 2019a). Surface disturbance occurring on increased slope profiles has the potential to affect soil stability and may lead to accelerated soil erosion and potential sedimentation to proximal waterbodies (see AIB-2, Surface Water Quality, for more information). Soils susceptible to erosion cover approximately 37,687,800 acres, or 13.98% of the 270-million-acre OFO planning area, and are unevenly distributed throughout the planning area, with some areas being more heavily concentrated than others. Within Kansas, soils susceptible to erosion are more prevalent in the southwestern portion of the state (BLM and BIA 2019a).

The nominated lease parcels contain predominantly sandy or silt loam soil types, with average slopes between 3.69% and 7.57%. Maximum slopes range from 6.80% to 23.21%, and there are no slopes greater than 30% across the five nominated lease parcels. Based on review of NRCS soils data, three of the nominated lease parcels (parcels 0049, 6883, and 6884) contain areas with "severe" erosion hazards, which cover approximately 34.7 acres of parcel 0049 (87.6% of the total parcel acreage), 30.9 acres of parcel 6883 (77.7% of the total parcel acreage), and 38.6 acres of parcel 6884 (97.3% of the total parcel acreage) (NRCS 2022).

The potential for significant adverse effects on sensitive soils would depend on site-specific locations. Soil effects are generally considered long term based on the amount of time it takes for soil to be rebuilt through deposition. Reasonably foreseeable environmental trends and planned actions within the OFO would result in approximately 13,466 acres of new surface disturbance and 1,131,201 acres of total landscape disturbance, of which the future potential development of the three nominated lease parcels with sensitive soils would comprise approximately 24.18 acres (0.2% and 0.002%, respectively). These actions would result in long-term disturbance to soils, with related reductions of soil-forming processes and compaction of underlying horizons, potential loss or degradation of soil microbe communities, and soil susceptibility to wind and water erosion.

Future potential development of the nominated lease parcels would affect the physical and biological integrity of soils within the footprint of surface disturbance. The anticipated surface disturbance associated with lease development of the nominated lease parcels (approximately 40.3 acres) would comprise 0.00001% of the 270 million-acre OFO.

To prevent potential impacts on sensitive soils and soil stability, stipulation OFO-1-CSU is applied to nominated lease parcels 0049, 6883, and 6884, which prohibits surface disturbance within sensitive soils, including soils susceptible to erosion (see Appendix B). Impacts on soils would be remedied upon reclamation of the well pads and associated infrastructure. Upon abandonment of the wells and/or when access roads are no longer in service, final reclamation would be implemented. Impacts on any soils that occur off-lease would be avoided or mitigated through standard terms and conditions, which allow for the application of measures to avoid and mitigate accelerated soil erosion and sedimentation to waterbodies. Additionally, site-specific analysis would occur at the lease development level, and the lessee would be required to follow applicable COAs and reclamation measures as determined by the BLM. These may include measures such as topsoil stockpiling and pad placement in respect to topography and other factors to further mitigate effects on the physical and biological integrity of soils during the development of a lease.

AIB-4 Prime Farmland

How would future potential development of the nominated lease parcels affect prime and unique farmland soil productivity?

Prime farmland soils are scattered throughout the OFO planning area (BLM and BIA 2019a). Reasonably foreseeable environmental trends and planned actions within the OFO would result in approximately 13,466 acres of new surface disturbance and 1,131,201 acres of total landscape disturbance, of which the future potential development of the nominated lease parcels would comprise approximately 40.3 acres (0.3% and 0.004%, respectively; see Section 3.3.1.4). These actions could impact prime farmland through increased farmland conversion, soil erosion, and soil compaction. The potential for adverse impacts on prime farmland soils would depend on site-specific locations. Many of the adverse impacts on prime farmland resulting from surface disturbances associated with well pads, access roads, and minerals infrastructure would be long term, while others would be short term and would cease to occur once the farmland is reclaimed to its condition before construction.

Of the five of the nominated lease parcels, two parcels (parcels 0053 and 0047) contain soils mapped by NRCS as prime farmland. Prime farmland soils cover approximately 2.7 acres of parcel 0053 (6.6% of the total parcel acreage) and approximately 1.1 acres of parcel 0047 (53.8% of the total parcel acreage). Pittsburg County, where nominated lease parcels 0053 and 0047 are located, contains approximately 251,050 acres of prime farmland soils (NRCS 2023). Future potential development of these two nominated lease parcels would result in an anticipated 16.12 acres of surface disturbance, or approximately 0.006% of the county's prime farmland. Impacts to prime farmland soils would be avoided or minimized through the application of standard terms and conditions attached as COAs to the APD, which allow for measures to reduce impacts on or avoid prime farmland soils. Plugging and abandoning the wells and final reclamation may result in the reestablishment of prime farmland or farmland of statewide importance characteristics (or similar) to the area, depending on the specific regulatory and policy context of any given well.

AIB-5 Cultural Resources

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

Cultural resources is a broad term including anything from isolated artifacts to complex cultural sites; cultural resources may or may not be considered Historic Properties as defined in the National Historic Preservation Act of 1966 (NHPA). Leasing and future potential development of the nominated lease parcels are anticipated to result in approximately 40.3 acres of disturbance. This disturbance may result in loss or damage to cultural resources. The BLM anticipates that any future potential development of the

lease parcels would include horizontal drilling up to 2 miles; therefore, the area of potential effects encompasses the nominated lease parcel boundaries and up to 2 miles from the actual location of the parcels. For this reason, a 2-mile buffer of the nominated lease parcels was used to conduct a literature search. The BLM OFO reviewed survey and site information from the Oklahoma Archaeological Survey topographical maps and reviewed the Oklahoma Historical Society and State Preservation offices websites, including National Register of Historic Places listings for Pittsburg and Woods Counties in Oklahoma within 2 miles of the parcels. During records review, the BLM found that one of the nominated lease sale parcels (0047) is located under the Chambers Cemetery in Pittsburg County, Oklahoma. This indicated a cultural resource conflict that had the potential to cause issues with the lease sale. Therefore, the BLM chose to remove the parcel from the NHPA Section 106 process. For the remaining four nominated lease sale parcels, the BLM completed a literature review on February 2, 2023, and found eight previously recorded sites reported within a 2-mile radius of these five nominated lease parcels, but none within the parcels themselves. It is possible that other undocumented cultural resources exist in this area. Future potential development would be analyzed further through separate NEPA and NHPA Section 106 processes, as directed by regulations and current policy, including Permanent Instruction Memorandum (PIM) 2018-014. Where the BLM determines its decisions regarding these future developments or undertakings have the potential to affect historic properties, an on-the-ground survey would be recommended. In that scenario, it is anticipated that adverse effects on those cultural resources that are considered historic properties would be avoided, minimized, or mitigated through the NHPA Section 106 process. The nominated lease parcels are subject to HQ-CR-1, NM-11-LN, and OFO-8-LN for any on-parcel development (see Appendix B).

There are currently approximately 1.1 million acres of surface disturbance within the 270-million-acre OFO planning area (see Table 3.2). Surface disturbance associated with reasonably foreseeable environmental trends and planned actions within the OFO may impact cultural resources. Such impacts may include, but are not limited to, loss of or damage to cultural resources or contextual information (such as distribution of cultural resources) due to the development of oil and gas facilities and related industrial development, increased vehicular traffic, unauthorized ground disturbances, inadvertent oil and produced water spills, erosion, and unauthorized collection. The magnitude of impacts associated with reasonably foreseeable environmental trends and planned actions would generally depend upon the location of RFD relative to the location of cultural resources and the degree to which the setting has already been affected. As directed by regulations and current policy, including PIM 2018-014, where the BLM determines its decisions regarding these future developments or undertakings have the potential to affect historic properties, an on-the-ground survey would be recommended. In that scenario, it is anticipated that adverse effects on those cultural resources that are considered historic properties would be avoided, minimized, or mitigated through the NHPA Section 106 process.

AIB-6 Native American Concerns

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

The BLM initiated government-to-government consultation under NEPA on January 25, 2022, and March 14, 2023 with the Caddo Nation, Cherokee Nation, Cheyenne and Arapaho Tribes of Oklahoma, Chickasaw Nation, Choctaw Nation, Kialegee Tribal Town, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, Osage Nation, Ponca Tribe of Oklahoma, Quapaw Nation, Southern Ute Indian Tribe, Keetoowah Band of Cherokee, Wichita and Affiliated Tribes, and Wyandotte Nation, (see Section 4.2). The Caddo Nation Tribal Historic Preservation Office (THPO) responded to the NEPA correspondence on February 7, 2023, and stated that they have no additional information to add at this time. The Quapaw Nation THPO responded to the NEPA consultation on February 9, 2023, stating the Nation did not wish to consult further under Section 106. As a result, no Section 106 consultation was

sent to the Quapaw Nation. The Cherokee Nation THPO, responded to NEPA correspondence on March 2, 2023, stating the Nation did not foresee the project impacting any known Cherokee Nation cultural resources.

Consultation under NHPA Section 106 was sent to the THPO of each Tribe mentioned above, except the Quapaw Nation, based upon their area of interest and/or area of jurisdiction for Section 106. In their letters to Tribes with interests in Pittsburg County, the BLM explained that one of the nominated lease sale parcels (0047) is located under the Chambers Cemetery in Pittsburg County, Oklahoma, and that, because of this cultural resource conflict, the parcel may be removed as the NEPA process continued. Therefore, the BLM chose to remove the parcel from the NHPA Section 106 process. The Caddo Nation responded to the Section 106 correspondence on March 22, 2023, and stated that they have no additional information to add at this time.

The parcels in Pittsburg County, Oklahoma (parcels 0047 and 0053) are within the confines of the Choctaw Nation Reservation. The Choctaw Nation THPO responded on April 14, 2023, and requested that the survey be completed for the parcels in Pittsburg County, Oklahoma due to the number of known sites near the parcel and the lack of recent cultural resource surveys for the area. The BLM responded via email on April 27, 2023, explaining the two-tier approach the BLM takes for oil and gas lease projects. The BLM further explained this in a phone call and email on May 15, 2023. At that time, the Choctaw Nation THPO expressed concerns about potential effects that various activities and situations around oil drilling, such as emergency mitigation due to spills or earthquakes, could have on sensitive sites. The Choctaw Nation THPO and BLM decided a meeting would be needed to discuss these concerns in detail with the appropriate BLM specialists that could provide information directly related to these concerns. That meeting occurred in July 2023, where the Choctaw Nation THPO expressed continued concerns over potential resource effects, as well as the inability of the BLM to require cultural resource surveys on private lands. No other Native American concerns have been identified; however, this consultation is considered ongoing.

There are currently approximately 1.1 million acres of surface disturbance within the 270-million-acre OFO planning area (see Table 3.2). Surface disturbance associated with reasonably foreseeable environmental trends and planned oil and gas operations within the OFO have the potential to adversely impact traditional cultural and religious properties within the vicinity. Such impacts may include temporary or long-term loss of or damage to Native American areas of concern, increased vehicular traffic, inadvertent oil and produced water spills, or erosion. The magnitude of impacts associated with reasonably foreseeable environmental trends and planned actions would generally depend upon the location of RFD relative to the areas of concern to Native American tribes. RFD on federal lands or lands with a federal nexus would undergo the same type of consultation process discussed above. In addition, on federal, tribal, or split-estate lands, the BLM may apply COAs to avoid, minimize, and/or mitigate effects on traditional cultural properties or sacred sites.

AIB-7 Vegetation

How would future potential development of the nominated lease parcels affect vegetation?

Surface disturbance associated with reasonably foreseeable environmental trends and planned actions within the 270-million-acre OFO would remove surface vegetation, altering the plant community composition, increasing potential for erosion and soil compaction, and increasing the likelihood for the introduction of noxious weeds. Removal of vegetation may leave segmented plant communities that would not recover to pre-disturbance levels without reclamation measures, which may take years to achieve (BLM 2018b). Consequently, this would be a long-term effect. Vegetation resources may also be subject to increased fragmentation of vegetative types, the introduction of invasive species, and the

potential for monocultures to develop. Many of the significant adverse effects on landscape vegetation density and type resulting from surface disturbances would also be long term. At the landscape level, vegetation restoration projects (outlined in Section 3.3.2), which include herbicide treatments and surface reclamation of well pads, roads, and facility sites, would help offset the impacts of surface disturbance to vegetation.

Reasonably foreseeable environmental trends and planned actions within the OFO would result in a total of 13,466 acres of new surface disturbance for a total of 1,131,201 acres of total landscape-level surface disturbance, of which the future potential development of the nominated lease parcels would comprise approximately 40.3 acres (0.3% and 0.004%, respectively; see Section 3.3.1.4). This surface disturbance may contribute to landscape-level variations in plant communities depending on the success of interim and final reclamation activities and concurrently anticipated effects of climate change.

Based on review of Landscape Fire and Resource Management Planning Tools (LANDFIRE) GIS data, the nominated lease parcels are covered by the vegetation types listed in Table 3.4.

Parcels 6883 and 6884 occur within the Sandhills Wildlife Management Area (WMA) and parcel 0049 is immediately adjacent to the Sandhills WMA. The WMA consists of 5,212 acres of rolling sandhills and river bottoms in southeastern Woods County. The WMA's sandhills are dominated by mixed grass prairie interspersed with sagebrush, eastern red cedar, sand plums, hackberry, chittamwood, and soapberry, and the WMA's river bottom is primarily native rangeland with scattered cottonwoods, sand plum, eastern red cedar and other patches of woody species (Oklahoma Department of Wildlife Conservation [ODWC] 2023). The habitat within parcels 0049, 6883, and 6884 is consistent with the WMA's sandhill prairie community.

Table 3.4. Vegetation Types within the Nominated Lease Parcels

Land Cover Vegetation Types	Total Area of Vegetation Type Intersected by Parcels (acres)*	Parcel within Vegetation Types (percentage of parcel containing vegetation type)
Central Mixedgrass Prairie Grassland	4.38	0049 (6.41%), 6883 (4.07%), 6884 (0.56%)
Crosstimbers Oak Forest and Woodland†	7.02	0053 (2.77%), 0049 (83.20%), 6883 (3.12%), 6884 (5.04%)
Eastern Cool Temperate Pasture and Hayland	0.08	0047 (4.14%)
Eastern Cool Temperate Row Crop	0.22	6883 (0.56%)
Eastern Cool Temperate Row Crop - Close Grown Crop†	0.13	6883 (0.33%)
Eastern Cool Temperate Urban Herbaceous	0.81	6883 (2.04%)
Eastern Cool Temperate Urban Mixed Forest	0.22	6883 (0.56%)
Eastern Cool Temperate Urban Shrubland	3.75	6883 (9.45%)
Eastern Cool Temperate Wheat	0.65	6883 (1.12%), 6884 (0.53%)
Ozark-Ouachita Dry Oak Woodland†	3.68	0053 (9.18%)
Ozark-Ouachita Dry-Mesic Oak Forest†	16.11	0053 (39.59%), 0047 (11.14%)
Ozark-Ouachita Mesic Hardwood Forest	0.41	0053 (1.01%)
Ozark-Ouachita Oak Forest and Woodland†	2.20	0053 (5.47%)
Southeastern Great Plains Riparian Forest and Woodland	3.29	0053 (8.19%)
Southeastern Great Plains Tallgrass Prairie	4.78	0053 (1.74%), 6883 (10.29%)

Land Cover Vegetation Types	Total Area of Vegetation Type Intersected by Parcels (acres)*	Parcel within Vegetation Types (percentage of parcel containing vegetation type)
Southeastern Ruderal Grassland	13.71	0053 (30.95%), 0047 (64.44%)
Southeastern Ruderal Shrubland†	0.44	0053 (1.11%)
Western Great Plains Sand Prairie	92.17	0049 (83.20%), 6883 (62.17%), 6884 (86.99%)
Western Great Plains Sandhill Steppe†	1.90	6883 (3.10%), 6884 (1.68%)
Total	**155.98**	**–**

Source: LANDFIRE GIS data

Note: The analysis contained in this EA generally provides percentage contribution rounded to two decimal points. As such, percentages may not always sum to 100 due to rounding.

*All acreages contained in the EA analysis were calculated using GIS data sets for resources and the parcels, which may differ slightly from the acreages contained in legal description here and in Table 2.1. 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 effect analysis conclusions presented in this EA.

† Indicates rare and unique vegetation types. Rare and unique vegetation types are based on existing vegetation types that encompass 1% or less of Pittsburg and Woods Counties (Sandbom 2020). This does not include vegetation types which are human-made, such as row crops or urban landscapes.

Three of the nominated lease parcels (0053, 6883, 6884) include rare and unique vegetation types (see Table 3.4). These vegetation types are categorized as rare and unique because they comprise less than 1% of present vegetation in Pittsburgh and Woods Counties. Rare and unique vegetation types cover approximately 58.1% of parcel 0053, and less than 1% of parcels 6883 and 6884. Therefore, it is expected that rare and unique vegetation types can be avoided during lease development. Additionally, controlled surface use (CSU) and no surface occupancy (NSO) stipulations applied to parcels 0053, 6883, and 6884 for other ecological concerns (e.g., special status species or sensitive soils) may provide protections to rare and unique vegetation types found on the nominated lease parcels if they intersect these same ecological features.

In the event that all surface disturbance associated with development of nominated lease parcels were to occur in a single common vegetation type, the level of estimated disturbance (40.3 acres total) would affect only a small fraction of said habitat type throughout Pittsburg and Woods Counties (non-rare and unique habitat types each cover between 850 and 333,000 acres in each county) and would not result in a substantial change to the overall characteristics or availability of the said vegetation type across the analysis area. Thus, the estimated level of disturbance would not pose a threat to the viability of species composing these communities or ecoregions, nor to any species utilizing common vegetation for habitat.

Standard lease terms and conditions provide the BLM with the authority to determine site-specific vegetation management strategies, including relocating wells up to 656 feet (200 m), at the lease development stage for any future actions within the lease parcels to determine whether effects on rare and unique or otherwise sensitive vegetation would occur. Under standard terms and conditions, which would apply to the nominated lease parcels, pre-disturbance surveys would be required at the time of the proposed lease development. The surveys would identify occurrence of rare or unique vegetation types, special status plant species, and/or vegetation providing habitat for special status wildlife species for avoidance during project siting and construction (see AIB-8 for more information). Avoidance, minimization, and/or mitigation measures would also be determined at that time.

AIB-8 Threatened and Endangered Species

How would future potential development of the nominated lease parcels affect threatened and endangered species?

The potential for threatened and endangered species and their associated habitats to occur within the nominated lease sale parcels was determined through review of the best available data and a comparison of mapped habitat types in the nominated lease parcels with known habitat requirements of the species listed in Table 3.5. Data sources reviewed include the USFWS Information for Planning and Consultation (IPaC) system (USFWS 2023) and USFWS descriptions of species habitat requirements and current mapped critical habitat. Total landscape-level disturbance associated with reasonably foreseeable environmental trends and planned actions within the OFO (1,131,201 acres) may contribute to reduction of suitable habitat and increased fragmentation, which could affect species occurring within the planning area, including those listed in Table 3.5.

Table 3.5. Threatened and Endangered Species with Potential to Occur on or in the Vicinity of the Nominated Lease Parcels

Species (*Scientific Name*) (Status)*	Suitable Habitat within Nominated Lease Parcels	Discussion†
Birds		
Lesser Prairie chicken (*Tympanuchus pallidicinctus*) (T)	0049, 6883, 6884	Inhabit shortgrass prairies of the southern Great Plains, especially areas where shinnery oak, sand sagebrush, and bluestem grasses (such as little bluestem and sand bluestem) predominate. The nominated lease parcels are outside of critical habitat for this species. Nominated lease parcels 0049, 6883, and 6884 are approximately 15.4 miles or more from the species' 2022 estimated occupied range mapped by USFWS, and approximately 5.4 miles or greater from the estimated occupied range 10-mile buffer in which long-term conservation planning efforts occur. There are no leks within or within 200m of the nominated lease parcels. Although the nominated lease parcels contain suitable habitat types for lesser prairie chicken (LPC), the species is **not likely to occur** within the parcels as they are outside of the species current estimated occupied range.
Piping plover (*Charadrius melodus*) (T)	0053	Wintering piping plovers use a variety of habitats and move among these patches in response to local weather and tidal conditions. Coastal habitats include sand spits, small islands, tidal flats, shoals and sandbars with inlets. Primary foraging habitats include sandy mud flats, ephemeral pools and seasonally emergent seagrass beds with abundant invertebrates, as documented in the draft recovery plan of 2015. The piping plover has the potential to occur in nominated lease parcel 0053 based on the presence of wetlands and waterbodies within the parcel. Stipulation OFO-4-NSO will provide protections to suitable riparian and wetland habitat.
Red knot (*Calidris canutus rufa*) (T)	0053	Red knot nesting habitat is in the high Arctic tundra. Migrating and wintering, red knots utilize coastal marine habitats like sandy beaches, estuaries and mudflats for foraging. Red knots can also be found around shorelines of large lakes or freshwater marshes at interior locations in eastern North America. The red knot has the potential to occur in nominated lease parcel 0053 based on the presence of wetlands and waterbodies within the parcel. Stipulation OFO-4-NSO will provide protections to suitable riparian and wetland habitat.

Species (*Scientific Name*) (Status)*	Suitable Habitat within Nominated Lease Parcels	Discussion†
Insects		
American burying beetle (*Nicrophorus americanus*) (T)	0053, 0047	The American burying beetle is considered a generalist in terms of the vegetation types where it is found, as the historical range include most of the eastern United States and has been successfully live-trapped in a wide range of habitats, including wet meadows, partially forested loess canyons, oak-hickory forests, shrub land and grasslands, lightly grazed pasture, riparian zones, coniferous forest and deciduous forests with open understory. This species was identified as a potential species of concern for the parcels in Pittsburg County only (parcels 0053 and 0047). The species has the potential to occur in nominated lease parcels 0053 and 0047 given that it is a habitat generalist. Stipulation OFO-2-CSU is applied to parcels 0053 and 0047 and will provide protection to the species by requiring pre-clearance surveys within suitable habitats.
Monarch butterfly (*Danaus plexippus*) (FC)	0053, 0047, 0049, 6883, 6884	Critical habitat has not been designated for this species. Monarch butterflies can feed on the nectar of many flowering plants in various habitat types (e.g., fields, roadside areas, wetlands, or urban gardens), but they only breed on milkweed species (USFWS 2022). Given the lack of site-specific flowering plant species data, and the generalist habitat requirements for monarch butterflies, the nominated lease parcels may contain suitable habitat. This species may occur within the nominated lease parcels. Suitable habitat currently cannot be determined and site-specific analysis at the lease development stage will provides an additional opportunity to evaluate suitable habitat for this species.
Mammals		
Tricolored bat (*Perimyotis subflavus*) (FPE)	0053, 0047, 0049, 6883, 6884	Tricolored bats primarily roost among live and dead leaf clusters of live or recently dead deciduous hardwood trees. In addition, tricolored bats have been observed roosting during summer among pine needles, eastern red cedar (*Juniperus virginiana*), within artificial roosts like barns, beneath porch roofs, bridges, concrete bunkers, and rarely within caves. During the winter, tricolored bats hibernate in caves and mines; although, in the southern United States, where caves are sparse, tricolored bats often hibernate in road-associated culverts, as well as sometimes in tree cavities and abandoned water wells. The species may occur in the parcels based on the presence of hardwood trees. Stipulation OFO-4-CSU is applied to all five of the nominated lease sale parcels, which would require a BLM biologist conduct a survey at the APD stage to identify any maternity roosts or hibernacula prior to surface-disturbing activities.

Source: USFWS (2023)

* Status codes: FE = Federally Endangered, FT = Federally Threatened, FC = Federal Candidate, FPT = Federally Proposed Threatened, FPE = Federally Proposed Endangered.

† See Appendix B for summaries of stipulations and lease notices.

Based on review of USFWS IPaC data (USFWS 2023), the threatened and endangered species listed in Table 3.5 were found to have potential to occur on or in the vicinity of the nominated lease parcels based on the presence of potentially suitable habitat. There is no designated critical habitat within the nominated lease parcels. The closest critical habitat is approximately 1.53 mile southwest of the parcels.

Results of the data analysis indicate that suitable habitat for the species listed in Table 3.5 has the potential to occur within the nominated lease parcels and surrounding areas within 2 miles. Future potential development of the nominated lease parcels could occur within potentially suitable habitat for threatened and endangered species. Stipulation HQ-TES-1 is applied to the lease parcels providing protections to threatened and endangered species, which would apply to off-lease development of the nominated lease parcels (see Appendix B). Future potential development is not anticipated to create short-

or long-term, significant adverse effects for the following reasons: 1) stipulations and lease notices facilitate the reduction or avoidance of effects, 2) site-specific analysis at the lease development stage provides an additional opportunity to evaluate effects and develop measures to reduce or avoid effects, and 3) the standard lease terms and conditions that apply to the nominated lease parcels provide the BLM with the authority to require reasonable measures that reduce or avoid effects.

Additionally, the BLM continues to review the available climate science in connection with its statutory responsibilities, including under NEPA, and has found that, despite advances in climate science, "global climate models are unable to forecast local or regional effects on resources as a result of specific emissions." Any contribution to global climate processes affecting listed species from the issuance of leases is simply too remote, speculative, and undetectable to trigger ESA Section 7 consultation, given accumulated and persisting GHGs already in the atmosphere, the annual volume of GHG emissions that will occur globally regardless of additional lease issuance, and projected continued climate change. The *2021 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends* concludes that "unlike other common air pollutants, the ecological impacts that are attributable to the GHGs are not the result of localized or even regional emissions but are entirely dependent on the collective behavior and emissions of the world's societies" and notes "the lack of climate analysis tools and techniques that lend themselves to describing the physical climate or earth system responses, such as changes to sea level, average surface temperatures, or regional precipitation rates, that could be attributable to emissions associated with any single [land management] action or decision" (BLM 2022c). In addition, according to Federal Register 87:64700, *Threatened Species Status for Emperor Penguin With Section 4(d) Rule* (October 26, 2022), "based on the best scientific data available we [the USFWS] are unable to draw a causal link between the effects of specific GHG emissions and take of the emperor penguin in order to promulgate more specific regulations under [ESA Section] 4(d)."

Section 4.1 further discusses how the Proposed Action would comply with threatened and endangered species management guidelines outlined in the Biological Assessment for the 2020 Oklahoma, Kansas, and Texas BLM RMP (BLM and BIA 2019b), and ESA Section 7 consultation requirements.

AIB-9 Migratory Birds

How would future potential development of the nominated lease parcels impact migratory birds?

Habitat fragmentation, alteration, and loss within the OFO has changed how birds move through landscapes and use the remaining habitat. Within the 270 million-acre OFO, existing surface disturbance associated with past and present activities is estimated to be 1,117,735 acres (see Table 3.2), which comprises approximately 0.41% of the OFO planning area. Reasonably foreseeable environmental trends and planned actions within the OFO are estimated to result in approximately 13,466 acres of new surface disturbance, which represents 0.005% of the approximately 270 million-acre OFO (see Table 3.2). This landscape-level disturbance would further contribute to migratory bird habitat loss and fragmentation. Habitat loss and fragmentation impacts are considered long term, and, in some cases, reclamation would not fully rehabilitate migratory bird habitat to pre-development conditions.

Habitat loss, alteration, or fragmentation that occurs outside of the OFO can also contribute to population declines in respective migratory bird populations within OFO. Taylor and Stutchbury (2015) states that "habitat loss in one region can effect sub-populations in regions that are not directly connected." Habitat loss on wintering grounds south of the United States border and local drought conditions can contribute to population declines in migratory birds that occur within the OFO. This regional habitat continues to provide for the life cycles of these birds notwithstanding known drivers of habitat loss as described above.

Most of the effects associated with reasonably foreseeable environmental trends and planned actions within the OFO would occur at the initial stages of lease development. These disturbances include construction and drilling, human presence, traffic, heavy equipment, and noise associated with lease development activities. Bird species not tolerant of these activities may leave and avoid the area altogether for the duration of construction or move into nearby undisturbed habitat patches. Habitat loss effects would be long term, and, in some cases, reclamation would not fully rehabilitate migratory bird habitat to pre-development conditions. For more information regarding general wildlife, including game species, see AIB-10.

The nominated lease parcels fall within the North American Bird Conservation Initiative (NABCI) Bird Conservation Region (BCR) 19 (Central Mixed Grass Prairie) and BCR 25 (West Gulf Coastal Plain/Ouachitas), which encompass a combined total of 36.8 million acres covering portions of Oklahoma, Texas, Nebraska, Kansas, Wyoming, New Mexico, and Colorado. BCR 19 is dominated by a mixture of shortgrass and tall grass prairie and features numerous sandbars, rainwater basins, and playa lakes (NABCI 2022). BCR 25 is dominated by pine species, and in the westernmost part of the region is characterized by bottomland hardwoods and associated wetlands (NABCI 2022). There are 22 migratory Birds of Conservation Concern (BCC) listed for BCR 19 and 22 listed for BCR 25 (USFWS 2021). According to the USFWS IPaC data, five migratory BCC species have the potential to occur within nominated lease parcels 0053 and 0047 and the vegetation communities present in these two nominated lease parcels provide suitable migratory bird habitat (USFWS 2023).

Future potential development of the nominated lease parcels would result in approximately 40.3 acres of disturbance, which represents 0.0001% of the BCR 19 and 25 acreages combined (36.8 million acres) and 0.004% of the total estimated landscape disturbance (1,131,201 acres) from environmental trends and planned actions within the OFO (see Table 3.2). This surface disturbance could result in long-term habitat loss and fragmentation, depending on the proximity of disturbance to migratory bird habitat. Following reclamation, these effects would decrease over time.

Stipulation OFO-4-NSO would be applied to nominated lease parcels 0053 and 0047 which contain surface water features and would prohibit surface disturbance within riparian-wetland areas and waterbodies (up to 415 feet landward from the edge of wetland or waterbody, as determined by the BLM biologist prior to any surface-disturbing activities) that provide important habitat for migratory birds. In addition, compliance with the Migratory Bird Treaty Act would be required for any future potential development and pre-disturbance surveys may be required at the time of proposed lease development in accordance with standard terms and conditions of the lease. The BLM applies measures to mitigate effects on migratory birds at the leasing stage. Developmental constraints during spring and fall migrations and nesting seasons, as well as nest surveys, may be required prior to implementation of lease development activities. Some of these include the application of netting over open tanks, raptor-safe power line construction standards, and sound mufflers. In addition, the BLM may require avoidance of active avian nests and burrows or delays of development activities to accommodate migratory birds. The BLM breeding bird surveys conducted near future proposed construction sites would be compared with the USFWS BCC list (USFWS 2021) to identify specific species of birds that would be addressed in any future site-specific biological evaluations.

AIB-10 General Wildlife

How would future potential development of the nominated lease parcels impact wildlife and wildlife habitat?

The 270 million-acre OFO contains populations of big-game species, including white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), javelina

(*Tayassu tajacu*), black bear (*Ursus americanus*), and pronghorn (*Antilocapra americana*), as well as a multitude of other non-game species. Important upland game species in the planning area are bobwhite quail (*Colinus virginianus*), scaled quail (*Callipepla squamata*), greater prairie-chicken (*Tympanuchus cupido*), wild turkey (*Meleagris gallopavo*), mourning dove (*Zenaida macroura*), white-winged dove (*Z. asiatica*), and chachalacas (*Ortalis vetula*). Other common non-game mammals include bats, bobcat (*Lynx rufus*), coyote (*Canis latrans*), and raccoon (*Procyon lotor*) (BLM and BIA 2019a).

The nominated lease parcels and surrounding areas are within the Central Great Plains and Arkansas Valley Level III ecoregions, which cover approximately 18 million acres and 3.1 million acres, respectively (Woods et al. 2005). The Central Great Plains ecoregion is characterized by a high amount of cropland (primarily wheat) and slightly lower elevations and higher precipitation than the high plains to the west. The Arkansas Valley ecoregion is characterized by forested valleys and ridges, with about a quarter of the ecoregion used for grazing and a tenth used for cropland (EPA 2013).

Parcels 6883 and 6884 occur within the WMA, and parcel 0049 occurs immediately adjacent to the WMA. The WMA consists of 5,212 acres of rolling sandhills and river bottoms in southeastern Woods County. The WMA is managed by the Oklahoma Wildlife Department for wildlife and game species and public recreation (camping, hunting, and fishing). Game species of interest for the WMA include quail, pheasant, deer, turkey, rabbit, furbearers, dove and waterfowl (ODWC 2023).

Reasonably foreseeable environmental trends and planned actions within the OFO would add to past and present disturbance, resulting in a total of 1,131,201 acres of landscape-level surface disturbance, which would impact wildlife habitat. Past, present, and future vegetation restoration projects (outlined in Section 3.3.2), which include herbicide treatments and surface reclamation of well pads, roads, and facility sites, have improved habitat availability for wildlife and big-game species. Migratory birds have also benefitted from the improved herbaceous cover associated with these vegetative treatments. It is assumed that future vegetative restoration would produce similar effects where implemented. Overall, the landscape-level habitat fragmentation and increased human presence related to surface use are considered to be long-term effects on wildlife, and a potential exists for a decline in species numbers and/or the use of the analysis area.

Surface disturbance associated with future potential development of the nominated lease parcels would result in approximately 40.3 acres of surface disturbance, which represents less than 0.00001% of the acreage in the approximately 270 million-acre OFO and 0.0002% of the combined Level III Ecoregions (21.1 million acres). Disturbance from future potential development of the nominated lease parcels can result in long-term loss of vegetation, burrows, and nests, and could also cause habitat loss and fragmentation and mortalities. Future potential development may also have effects on migratory game species by causing them to avoid areas within and near the nominated lease parcels.

Pre-disturbance surveys would be required at the time of proposed lease development in accordance with standard terms and conditions of the lease, which would apply to off-lease development. The surveys would analyze potential effects on game and non-game species habitat. Avoidance, minimization, and/or mitigation measures would also be determined at that time. The BLM has the authority under standard terms and conditions to attach COAs at the site-specific level to minimize significant adverse effects on resource values at the time operations are proposed. Examples of potential mitigation measures include design modifications to avoid or minimize effects on sensitive habitats; limiting the number of well pads under simultaneous construction; seasonal restrictions; limiting the number of proposed roads, reclaiming old and/or unnecessary roads; minimizing truck traffic; noise-buffering measures; pre-development surveys; or use of special construction techniques to minimize surface disturbance to sensitive areas.

AIB-11 Fluid Minerals

How would leasing and future potential development of the nominated lease parcels affect oil and gas availability for future extraction in Oklahoma?

Approximately 652,269 acres of the OFO are currently leased. In 2021, total production from federal minerals within the OFO (Oklahoma, Kansas, and Texas) was 747,482 barrels (bbl) of oil and 53,284,082 thousand cubic feet (mcf) of gas (Office of Natural Resources Revenue 2022). Reasonably foreseeable environmental trends and planned actions (which includes the RFD scenario) would result in potential for development of 3,054 wells in addition to other mineral development. As with the future 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 environmental trends and planned actions, including development of the nominated lease parcels, is consistent with various laws, including FLPMA, 43 United States Code (U.S.C.) §1701 *et seq*., that mandate that the BLM administer for the exploration and development of these mineral resources on public lands for the benefit of the citizens of the United States.

Future potential development of the nominated lease parcels would include 40.3 acres of surface disturbance and would add 162.0 acres (0.02% increase) to the total amount of the 270 million-acre OFO analysis area that is leased. The total future estimated production from the nominated lease parcels is 420,000 bbl of oil and 4,805,000 mcf of gas (see Table 3.1). Future potential development of the nominated lease parcels would comprise 0.16% of the maximum projected wells in the oil and gas RFD scenario and 0.3% of the projected surface disturbance in the oil and gas RFD scenario (see Table 3.2). 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-12 Socioeconomics

How would leasing and future potential development of the nominated lease parcels affect socioeconomic conditions in the area?

The oil and gas industry has been a substantial contributor to the social setting and economic basis of the BLM OFO for decades. 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 270 million-acre OFO, there are approximately 2.3 million acres of federal mineral estate. Overall development of federal leases is approximately 0.3% of total oil and gas development activities in the OFO (BLM 2016).

While the act of leasing federal minerals itself would not result in social effects, subsequent development of a lease may generate impacts on communities and individuals in the vicinity of the lease. At the lease sale stage, it is unknown where, or if, development would occur in any given nominated lease parcel; however, in general, acquisition and development of new leases provide short-term local and regional jobs and long-term revenue on a sustained basis. These may include employment opportunities related to the oil and gas and service support industries in the region, as well as federal, state, and county government revenue related to taxes, royalty payments, and other revenue streams. For example, the revenue collected from the lease sale auction is split between the U.S. Treasury and the state in which the auction is held and can be used for improvements to transportation networks and education systems. As specific types and locations of development are proposed, their effects would be analyzed and addressed at the time of proposed lease development.

Oil and gas lease sales may contribute to employment for area residents, continued demand for oil and gas industry–related goods and services, and continued demand for support goods and services. This continued demand may contribute to stability in employment in sectors outside of the oil and gas industry. To the extent that additional oil and gas development affect recreational and tourism opportunities in the area of the nominated lease parcels, there may be related effects in these economic sectors. Continued 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 and cattle ranching. The BLM uses a number of stipulations and lease notices applied to the nominated lease parcels in the current sale that may mitigate potential effects on wildlife and other resources that in turn may mitigate effects on related recreational and quality-of-life concerns (see Table 2.1 and Appendix B for specific stipulations and lease notices applied to the nominated lease parcels, and individual stipulation and lease notice summaries).

AIB-13 Paleontological Resources

How would leasing and future potential development of the nominated lease parcels affect paleontological resources in the area?

The Potential Fossil Yield Classification (PFYC) is a tool that allows the BLM to predict the likelihood of a geologic unit to contain paleontological resources. The PFYC is based on a numeric system of 1–5. An area identified as PFYC 1 has very low likelihood of containing paleontological resources, whereas an area identified as PFYC 5 is a geologic unit that has a very high likelihood to contain scientifically significant paleontological resources. 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 moderate to high.

Surface disturbance and risk of effects on paleontological resources associated with reasonably foreseeable environmental trends and planned actions within the OFO (1,131,201 acres of total landscape-level disturbance; see Table 3.2) would depend on the locations of proposed disturbance relative to PFYC class. As currently mapped, the OFO planning area contains a mix of PFYC 1–5, as well as PFYC U (i.e., unknown) geologic units. Effects would 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. Future potential development of the nominated lease parcels would be analyzed further through separate NEPA processes, as directed by regulations and current policy.

The nominated lease parcels are mapped as Pennsylvanian Boggy Formation (PFYC 3), Pleistocene Gerty (or Guertie) Sand (PFYC 3), Pleistocene terrace deposits (PFYC U), Pleistocene and Holocene dune sand (PFYC 2), and Holocene alluvial deposits (PFYC U) (Table 3.6). Concentrations and predictability vary in PFYC 3 geologic units. Fossils of the Boggy Formation are dominated by marine invertebrates including molluscs, such as, gastropods, bivalves, and cephalopods, calcareous algae, chaetetid sponges, bryozoans, brachiopods, echinoderms, as wells as plant remains, a few vertebrates, and numerous microbes (Seuß et al. 2009). This formation contains at least one exceptionally preserved diverse fossil assemblage, the Buckhorn Asphalt Quarry Lagerstätten, which formed due to early saturation by hydrocarbons that soaked into the sediments and fossils (Seuß et al. 2009). Fewer fossils are formally noted from the Gerty Sand. One published geologic map from the area specifically notes the presence of

fossil wood (Suneson 1997). The paleontological potential of the PFYC U geologic units requires further evaluation through desktop analysis, local experts, or project-specific field surveys prior to future development. Since terrace and alluvial deposits are not individually mapped within the nominated lease parcels, details specific to fossil preservation potential are not readily available at this broad scale. Holocene age deposits are typically too young to contain fossil remains, and therefore paleontological resources.

Table 3.6. Geologic Unit and PFYC Class of the Nominated Lease Parcels

Mapped Geologic Unit	PFYC Class	Parcel Coverage (acreage [%])	Total Acreage of Geologic Unit
Holocene alluvium	Class U	0053: 17.84 acres (44%)	17.84
Pleistocene and Holocene dune sand	Class 2	0049: 39.61 acres (100%) 6883: 39.69 acres (100%) 6884: 39.70 acres (100%)	119.00
Pleistocene terrace deposits	Class U	0053: 0.04 acres (<1%)	0.40
Pleistocene Gerty Sand	Class 3	0047: 2.00 acres (100%)	2.00
Pennsylvanian Boggy Formation	Class 3	0053: 22.26 acres (55%)	22.26

Note: Percentages may not be exact due to rounding.

There are no known paleontological localities within the nominated lease parcels. The four nearest paleontological localities within deposits that are similar to those mapped within the nominated lease parcels include sloth, felid, camel, horse, turtle, glyptodont, and peccary specimens from unmapped Pleistocene deposits 20 to 30 miles west, north, and northeast of parcels 0049, 6883, and 6884 and a fossiliferous Boggy Formation limestone bed containing primarily invertebrates fossils approximately 5 miles southeast of parcel 0053 (Akersten and McDonald 1991; Czaplewski 2004; Johnston 1935; Suneson 1997). Based on geologic mapping, two of the nominated lease parcels (parcels 0053 and 0047) have a low to moderate potential to contain important paleontological resources as they contain geological units designated as PFYC 3 and/or U. Future potential development of these nominated lease parcels would result in up to 16.12 acres of surface disturbance, which represents 10.0% of the total nominated lease parcel acreage (162.0 acres).

Effects on paleontological resources can be mitigated by standard terms and conditions, which require a lessee to conduct inventories or special studies at the discretion of the BLM. Site-specific projects that would cause surface disturbance in areas with moderate potential may require a paleontological survey and/or monitoring conducted at time of proposed lease development in accordance with NEPA and FLPMA. Specifically, lease notice NM-14-LN (under which lease development would be subject to compliance with the Paleontological Resources Preservation Act, NEPA, and FLPMA) (see Appendix B) is applied to all of the nominated lease parcels. Additional mitigation measures may be applied as COAs based on the results of the survey. If, during operations, paleontological resources are discovered and a permitted paleontological monitor is not on-site, the lessee must cease any operations that would result in the destruction of such specimens and contact the BLM Authorized Officer. Scientifically significant paleontological resources discovered through surveys or monitoring would be collected by a permitted paleontologist and curated at an appropriate repository. These same measures for minimizing effects at the site-specific level would be followed for resources associated with reasonably foreseeable environmental trends and planned actions. With consideration of these protections, potential impacts on paleontological resources of scientific interest would be avoided or mitigated.

AIB-14 Induced Seismicity

How would future potential development of the nominated lease parcels, particularly well completion, contribute to induced seismicity in the region?

Induced seismicity refers to seismicity events which are triggered by human activities rather than natural tectonic forces. A broad range of human activities have been attributed to induced seismicity including but not limited to underground fluid injection (e.g., for wastewater and hydraulic fracturing) and oil and gas extraction (Groundwater Protection Council [GWPC] 2021). Between 2008 and 2015, seismicity events increased in the mid-continental United States and studies pointed to a connection between increasing seismic events and the widespread disposal of wastewater into deep Class II[3] injection wells (GWPC 2021). Although the majority of disposal wells in the United States do not pose a hazard for induced seismicity, seismic events can occur when specific geologic conditions are present (e.g., sufficient pore pressure build-up near a pre-existing fault of concern) (GWPC 2021, OCC 2021a). A combination of many factors is necessary to induce felt earthquakes; the injection rate and total volume injected, the presence of faults that are large enough to produce felt earthquakes, stresses that are large enough to produce earthquakes, and the presence of pathways for the fluid pressure to travel from the injection point to faults (Machette et al. 2000; USGS 2021). High injection rates of greater than 300,000 bbl per month are much more likely to be associated with earthquakes and any earthquake within approximately 10 to 30 kilometers (6.2 to 18.6 miles) of an active injection well could be associated with that well (OCC 2021a; Weingarten et al. 2015). Although hydraulic fracturing can also contribute to induced seismicity, seismic events triggered by hydraulic fracturing are relatively uncommon (less than 4% of detectable earthquakes in Oklahoma are attributed to hydraulic fracturing) and generally have smaller magnitudes than injection-induced seismicity and are therefore considered to pose less of a risk (GWPC 2021; OCC 2018). Even relatively extreme seismic events associated with hydraulic fracturing have been well below the damage threshold for modern building codes (Petersen et al. 2018; USGS 2021).

In Oklahoma, the OCC regulates oil and gas activities and has an Induced Seismicity Department in charge of monitoring and regulating oil and gas activities found to be correlated with seismic activity in Oklahoma (OCC 2021a). OCC has identified regional areas of interest (AOIs) for induced seismicity based on consideration of previous seismicity, local geology, and other factors (GWPC 2021). AOIs represent areas having a significantly higher concentration of wells associated with seismic events (Shemeta et al. 2019). There are currently two AOIs designated by OCC: the induced seismicity AOI which overlies the Arbuckle formation in northern and central Oklahoma where swarms of seismic activity have been correlated with disposal well injections, and the hydraulic fracturing well completion AOI which covers two of the state's newest and biggest active plays in south-central Oklahoma where many smaller magnitude earthquake events are thought to be correlated with hydraulic fracturing activities (OCC 2021a). The induced seismicity AOI is further broken down into the western reduction area and central reduction area, each having their own regulations related to allowable injection volumes (OCC 2021a). Nominated lease sale parcels 0053 and 0047 are not located within either of the state's AOIs for induced seismicity. Nominated lease sale parcels 0049, 6883, and 6884 are located within the western reduction area of the induced seismicity AOI (OCC 2021a).

To minimize and mitigate for the risk of induced seismicity in AOIs, the OCC has implemented the following actions: setting regional limitations on injection volumes into the Arbuckle formation, setting 30-day average disposal limits for individual injection wells, closing the Arbuckle formation to any new injection well development, requiring operators to submit injection volume and pressure data regularly,

[3] Class II wells dispose of fluid produced in conjunction with oil and gas drilling, completion, and production operations (GWPC 2021)

and ordering injection well operations to be restricted or shut down within 3 to 30 miles of seismic events (OCC 2021b). Seismic events have been declining since 2015, which is attributed to the OCC's passage of these new regulations which address problematic injection wells and practices (GWPC 2021).

Leasing and future potential development of the nominated lease parcels would result in oil and gas activities, including well pad construction, drilling, and completion for an estimated five wells. Well drilling and completion activities associated with future potential development of the nominated lease parcels are not anticipated to noticeably contribute to induced seismicity in the western reduction area of the state's induced seismicity AOI, given the minor contribution of hydraulic fracturing activities to induced seismicity in the region (OCC 2021a; Shemeta et al. 2019). Well development for the nominated lease parcels would result in the need to dispose of approximately 6,910,000 bbl of produced water over the 20-year anticipated life of the wells (345,500 bbl per year), which on an annual basis represents approximately 0.02% of the annual produced water in Oklahoma in 2021 (estimated at 1.7 billion bbl) (ALL Consulting 2021). Assuming a 20-year production time frame, this equates to an average of approximately 28,792 bbl of produced water per month across the nominated lease parcels.

Produced water may be addressed in the following ways:

- injection into enhanced oil recovery (EOR) injection wells (typically shallower wells drilled into the hydrocarbon producing zone) to enhance oil recovery in producing oil and gas wells,
- disposal in saltwater disposal (SWD) wells (typically deeper wells drilled to depths below the hydrocarbon producing zone),
- disposal in evaporation ponds, or
- reuse in the hydraulic fracturing process elsewhere.

Currently, evaporation ponds are sparingly used for disposal of produced water due to wildlife and habitat disturbance concerns. Reuse of produced water for hydraulic fracturing is also not widespread because the chemical makeup of produced water is often not compatible with hydraulic fracturing procedures; therefore, the majority of produced water ends up in EOR or SWD wells (ALL Consulting 2021). However, the OWRB Produced Water Working Group has begun studying operator reuse and recycling of produced, flowback, and formation water to identify regulatory, technical, and economic barriers to reused of produced water and to identify opportunities and challenges associated with treating produced water for beneficial uses (OWRB 2021).

The BLM's regulations state that "for an injection well proposed on Federal or Indian leases, the operator shall obtain an Underground Injection Control (UIC) permit pursuant to 40 CFR Parts 144, 146 from the Environmental Protection Agency or the State/Tribe where the State/Tribe has achieved primacy" (43 C.F.R. § 3177.7). The EPA classifies these wells as Class II injection wells, which are wells used for disposal of fluids associated with the production of oil and natural gas (hydrocarbons); to inject fluids for EOR; or for the storage of liquid hydrocarbons.

Based on the Underground Injection Control regulatory program for injection wells, the amount of produced water anticipated from future potential development of the nominated lease parcels, and the declining trend of induced seismicity within Oklahoma, leasing and future potential development of the nominated lease parcels is not expected to contribute to additional induced seismicity hazards in the region.

AIB-15 Visual Resources

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

Reasonably foreseeable environmental trends and planned actions within the 270 million-acre OFO would create surface disturbances and visual contrasts with the surrounding landscape and adversely contribute to the existing scenic quality effects on the analysis area's landscapes. The degree of effect would depend upon the location of proposed infrastructure relative to sensitive viewsheds and areas already highly modified in character. Visual resources on BLM lands are managed using four Visual Resource Management (VRM) classes: VRM Class I, II, III, and IV (BLM 1986). The BLM does not manage visual resources on private surface estate. The nominated lease parcels (162.0 acres collectively) are all located on private land with no VRM designations (see Table 2.1). However, landscape modifications on private lands can still cause visual impacts for sensitive viewer groups in the surrounding area (e.g., residential areas).

Future potential development of the nominated lease parcels would result in approximately 40.3 acres (24.8% of total parcel acreage) of surface disturbance, and approximately five wells. This disturbance comprises 0.3% of the projected surface disturbance in the oil and gas RFD scenario (up to 13,466 acres), and 0.004% of the total landscape-level surface disturbance (1,131,201 acres) associated with existing and projected environmental trends and planned actions within the OFO (see Table 3.2). The BLM OFO reviewed aerial photography and records of existing oil and gas development to evaluate the nature and extent of visual effects as a result of future potential development of the nominated lease parcels. Nominated lease parcels 0053 and 0047 are adjacent to lands with a low degree of oil and gas development (areas of concentrated oil and gas development are approximately 4 miles away) whereas remaining parcels (0049, 6883, and 6884) are in areas with a high degree of existing oil and gas development. Future potential development of an estimated five wells on the nominated lease parcels (one well each) would lead to a new visual element and modification of the landscape, resulting in long-term visual impacts associated with the nominated lease parcels.

The spatial extent of visual impacts from oil and gas wells is highly variable at the site-specific level and depends on proximity of viewers to the structure as well as characteristics of intervening topography and vegetation. In addition, wherever oil and gas wells are visually perceptible to viewers, the magnitude of visual impacts is highly variable at the site-specific level and depends on the existing landscape characteristics and the relative amount of existing human development and infrastructure. Given these complexities, the spatial extent and magnitude of visual impacts resulting from future potential development of the lease sale parcels are difficult to predict at the lease sale stage due to a lack of development details. Given the limited scale of the existing oil and gas development surrounding nominated lease sale parcels 0053 and 0047, the presence of oil and gas development–related equipment and structures on these parcels would cause localized changes to the visual landscape which may be visible from some or all the residences within proximity of the nominated lease parcels and immediately adjacent areas. However, there is also potential for views of oil and gas development–related equipment and structures from individual residences to be obscured by intervening topography and vegetation. Conversely, future potential development of nominated lease sale parcels 0049, 6883, and 6884 is unlikely to change the visual landscape for surrounding residents given the high degree of existing oil and gas related development in the area.

Standard terms and conditions allow the BLM to consider further measures to minimize visual impacts at the time of proposed lease development. Measures could include siting of well sites, roads, and associated infrastructure to follow the contour of the landform and mimicking the lines in vegetation to screen and hide locations. In addition, per 43 C.F.R. § 3171.25(b)(2), interim reclamation (reclamation of surface

disturbance not necessary for production) and final reclamation (reclamation following well plugging and abandonment) is required within 6 months of well completion and well plugging, respectively.

AIB-16 Human Health and Safety

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

Within the OFO planning area, there are 409,000 existing wells of all well types (see Table 3.2) (BLM 2016). 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 D) and corresponding potential contamination of air, soil, or water; exposure to naturally occurring radioactive material in drill cuttings or produced water (see Appendix D); traffic congestion and collisions from commercial vehicles and heavy use; infrequent industrial accidents; presence of hydrogen sulfide; or increased levels of fugitive dust (particulate matter equal to or less than 10 microns in diameter [PM_{10}] and particulate matter equal to or less than 2.5 microns in diameter [$PM_{2.5}$]), other criteria pollutants, VOCs, and HAPs. See the air quality analysis in Section 3.6.1 for projected levels of criteria pollutants, HAPs, GHG emissions, and VOC and nitrogen oxide (NO_X) emissions that contribute to ozone (O_3) formation, as well as NAAQS.

As further described in Section 3.6.1 and the 2021 Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas, and Kansas (BLM 2022a), future potential development of the nominated lease parcels would result in emissions of air pollutants that can lead to human health effects depending on the level and duration of exposure. The distance that air pollutants can travel depends on a multitude of environmental factors which vary geographically (e.g., climate, topography, land use) and temporally (e.g., time of day, meteorological conditions), making it inexact to predict the spatial extent of potential human health effects associated with future potential development of the lease parcels. In addition, there is no single distance from oil and gas wells that has been accepted across the scientific community as conveying health effects to human populations. However, several studies have found that residents living at varying distances within 1.25 miles of active oil and gas wells are at greater risk for experiencing health effects from air pollution than those living beyond 1.25 miles (Adgate et al. 2014; Czolowski et al. 2017; Haley et al. 2016; Kroepsch et al. 2019).

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 and may result from either chronic (long-term) and/or acute (short-term) exposure, and/or adverse environmental effects. Breathing 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 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. People most at risk from breathing air containing O_3 include those with asthma, children, older adults, and those who are active outdoors, especially outdoor workers. Breathing air with a high concentration of carbon monoxide (CO) reduces the amount of oxygen that can be transported in the blood stream to critical organs like the heart and brain. At very high levels, which are possible indoors or in other enclosed environments, CO can cause dizziness, confusion, unconsciousness, and death. Very high levels of CO are not likely to occur outdoors. However, when CO levels are elevated outdoors, they can be of particular concern for people with some types of heart disease. Particulate matter, also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. PM is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. PM is measured and regulated

according to particle size. PM_{10} refers to all particles with a diameter of 10 microns or less. $PM_{2.5}$ is made up of particles with diameters of 2.5 microns or less. Smaller particles are associated with more negative health effects, including respiratory and cardiovascular problems, because they can become more deeply embedded in the lungs and some may even get into the bloodstream (BLM 2022a).

The following links provide additional information on air pollution health effects:

Criteria Pollutants:

- Ozone (https://www.epa.gov/ground-level-ozone-pollution) (EPA 2022a)
- Particulates (https://www.epa.gov/pm-pollution/particulate-matter-pm-basics) (EPA 2022b)
- Nitrogen dioxide (https://www.epa.gov/no2-pollution/basic-information-about-no2) (EPA 2022c)
- Carbon monoxide (https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution#Effects) (EPA 2022d)
- Lead (https://www.epa.gov/lead-air-pollution/basic-information-about-lead-air-pollution#health) (EPA 2022e)
- Sulfur dioxide (https://www.epa.gov/so2-pollution/sulfur-dioxide-basics#effects) (EPA 2022f)
- Hazardous air pollutants (https://www.epa.gov/haps/health-effects-notebook-hazardous-air-pollutants) (EPA 2021a)

While no formal human health risk assessments have been conducted specific to past and present development in the OFO, results of EPA's 2017 Air Toxics Screening Assessment (AirToxScreen) indicate that cancer, neurological risks, and respiratory risks in Pittsburg and Woods Counties are all lower than national levels and state of Oklahoma levels (EPA 2022g) (see Section 3.6.1.1 for state-level discussion).

While the 2019 AirToxScreen estimates the risk of cancer and/or other health impacts solely based on exposure to HAPs, other 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 in the state of Oklahoma are similar to, or slightly higher, than the nation as a whole; most notably, the state's population over 65 and living alone is 8.9% higher and the state's population without health insurance is 5.8% higher than that of the nation. A few indicators for populations at risk are lower in the state compared to the nation; most notably, the state's population Hispanic population is 7.2% lower than the nation's (Headwaters Economics 2023a). Compared with the state of Oklahoma, the indicators for populations at risk in Woods County are generally much lower than state levels, whereas indicators for Pittsburg County are mostly higher than the state, except for the Hispanic and non-English speaking populations which are much lower (Headwaters Economics 2023b, 2023c). Indicators for populations at risk which are notably higher in Pittsburg County compared to the State include people who do not work, people over the age of 65 living alone, and people with disabilities. The percentages of these populations at risk in Pittsburg County exceed those within the state of Oklahoma by 7.6% to 16.2% (Headwaters Economics 2023c). See AIB-18 for additional discussion of existing health risks for low-income and minority populations.

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 2022h). 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 future 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 air quality 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).

Future potential development on the nominated lease parcels is estimated at five new wells for this lease sale. This is a 0.001% increase in addition to the 409,000 existing active wells. Of the five nominated lease sale parcels, three parcels (0053, 0047, and 0049) have residences that occur within approximately 1.25 miles, which is where residents are generally at a higher risk for experiencing human health and safety effects of active oil and gas wells (Adgate et al. 2014; Czolowski et al. 2017; Haley et al. 2016; Kroepsch et al. 2019). For the remaining two lease sale parcels (6883 and 6884), the closest residences are all within approximately 1.6 to 1.7 miles from the parcel boundaries and would be at lower risk for experiencing health and safety effects from future potential development (see Table 3.7).

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 on 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.
- 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.
- Measures to lower risks related to hydrogen sulfide exposure include flaring or venting gas and the use of stock tank vapor recovery systems.

Fugitive dust is concentrated in the short term during construction but may be present to a lesser degree in the long term due to increased vehicle use and ground disturbance. In addition to fugitive dust, see the air quality analysis in Section 3.6.1 for potential health effects of other air pollutants, including criteria pollutants, VOCs, and HAPs. See AIB-1 and AIB-2 for further information regarding potential groundwater and surface water effects and relevant regulations, stipulations, and lease notices offering protections to groundwater and surface water quality.

AIB-17 Quality of Life

How would future potential development of the nominated lease parcels impact quality of life and residences within or near to the nominated lease parcels?

The 270 million-acre OFO has been subject to historical and ongoing minerals development activities that generate increased human activity, traffic, noise, dust, odor, light pollution, and visual effects (see Table 3.2 as well as the summary of the phases of oil and gas development in Appendix D). Human health and safety effects can also adversely affect the quality of life for residents (see AIB-16). All of these activities have potential to affect quality of life of nearby residences, depending on the intensity of development activities and proximity to residences. Surface disturbance associated with reasonably foreseeable environmental trends and planned actions (including 13,435 acres of new surface disturbance, for a total of 1,131,201 acres of landscape-level surface disturbance) would likely increase the effects of the

activities discussed above. Collective effects from noise, dust, odor, and light disturbance associated with reasonably foreseeable environmental trends and planned actions would affect the quality of life for residence and livestock facilities within or adjacent to the parcels.

For oil and gas development specifically, the distance at which residents may experience quality of life effects from increased human activity, traffic, noise, dust, odor, light pollution, and visual effects depends on a multitude of environmental factors that vary geographically (e.g., topography, landscape, and land use) and temporally (e.g., phase of development, time of day, meteorological conditions), making it inexact to predict the spatial extent of potential quality of life effects associated with future potential development of the lease parcels. In addition, there is no single distance from oil and gas wells that has been accepted across the scientific community as conveying quality of life effects to human populations. However, monitoring studies have found that residents living within approximately 0.5 mile of oil and gas wells (at varying stages of development) experienced nuisance levels of noise (≥50 dBA), with residents less than 1,000 feet away experiencing the greatest effects (Blair et al. 2018; Hays et al. 2017; Kroepsch et al. 2019); residents living within 0.5 mile of oil and gas wells experienced nuisance levels of odors (Adgate et al. 2014.); and residents living within 1.25 miles or less experienced greater risk of air pollution effects (including, but not limited to, dust) than those living beyond 1.25 miles (Adgate et al. 2014; Czolowski et al. 2017; Haley et al. 2016; Kroepsch et al. 2019). As described in AIB-15, given the low degree of existing oil and gas development surrounding the nominated lease parcels 0053 and 0047, it is assumed that some or all of the residences located within proximity of these parcels (which ranges from 0.05 to 0.12 mile) could experience visual impacts from the future potential development. Conversely, residents located near parcels 0049, 6883, and 6884 are not likely to experience visual impacts given the high degree of existing oil and gas development surrounding these parcels.

Future potential development of the nominated lease parcels would comprise approximately 40.3 acres of surface disturbance (0.004% of the total landscape-level surface disturbance associated with reasonably foreseeable environmental trends and planned actions) and five wells. Table 3.7 identifies residences nearest to the nominated lease parcels.

Table 3.7. Residential Areas in and near the Nominated Lease Parcels

Parcel Number (total parcel acreage)	Parcel Distance and Direction to Nearest Residence*	Parcel Closest to Nearest Municipality	Discussion*
0053 (40 acres)	0.05 miles south	2 miles northeast of Savanna, Oklahoma	Lands surrounding nominated lease parcel 0053 are rural, with scattered clusters of residential, commercial, and industrial land uses, including a military training center to the southwest and scattered oil and gas development.
0047 (2 acres)	0.12 miles northeast	2.5 miles northeast of Savanna, Oklahoma	Lands surrounding nominated lease parcel 0047 are rural, with scattered clusters of residential, commercial, and industrial land uses, including a military training center to the southwest and scattered oil and gas development.
0049 (40 acres)	1.14 miles north	11.5 miles west of Cleo Springs, Oklahoma	Lands surrounding nominated lease parcel 0049 are rural, sparsely populated, and include sporadically concentrated agricultural fields interspersed with oil and gas development.
6883 (40 acres)	1.63 miles north	11.5 miles west of Cleo Springs, Oklahoma	Lands surrounding nominated lease parcel 6883 are rural, sparsely populated, and include sporadically concentrated agricultural fields interspersed with oil and gas development.

Parcel Number (total parcel acreage)	Parcel Distance and Direction to Nearest Residence*	Parcel Closest to Nearest Municipality	Discussion*
6884 (40 acres)	1.72 miles northeast	12 miles west of Cleo Springs, Oklahoma	Lands surrounding nominated lease parcel 6884 are rural, sparsely populated, and include sporadically concentrated agricultural fields interspersed with oil and gas development.

* Source: Google Earth Pro (2022). Distances are calculated from residence to the closest parcel boundary.

While the majority of the effects on the nearest residences would be short term and would cease during operations (e.g., increased human activity, traffic, noise, dust, and odor during construction, drilling, completion, and interim reclamation phases), the residences may continue to experience long-term visual or health effects 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. Lands adjacent and within the vicinity of the nominated lease parcels 0053 and 0047 are rural with scattered residences and mixed land uses (e.g., combination of industrial, military, agricultural, and commercial). Areas of existing oil and gas development primarily occur within approximately 4 miles (to the north and south) of parcels 0053 and 0047. Lands adjacent and within the vicinity of parcels 0049, 6883, and 6884 are rural, sparsely populated, and include areas of agricultural use and heavy oil and gas development. Of the five nominated lease sale parcels, three parcels (0053, 0047, and 0049) have residences that occur within approximately 1.25 miles, which is where residents are generally at a higher risk for experiencing air pollution effects (Adgate et al. 2014; Czolowski et al. 2017; Haley et al. 2016; Kroepsch et al. 2019), and two nominated lease parcels (0053 and 0047) have residences located less than 0.5 mile away where noise and odor effects may reach nuisance levels, depending on the phase of development (Adgate et al. 2014; Blair et al. 2018; Hays et al. 2017; Kroepsch et al. 2019). For the remaining two lease sale parcels, the closest residences are all within 1.6 to 1.7 miles from the parcel boundaries, and future potential development of these nominated parcels is not anticipated to adversely affect quality of life for these residents.

For surface ownership of the parcels listed above, see Table 2.1 or Appendix A. While the exact location of development is unknown, there are opportunities for future potential development to reasonably be placed in areas that are less proximal to residences to minimize quality of life issues. Under the authority granted in standard terms and conditions attached to each lease, measures to reduce effects on or avoid resource values, land uses, or users would be attached as COAs to the APD. Site-specific avoidance, minimization, and/or mitigation measures would be determined at the time of proposed lease development. This could include measures to reduce noise, dust, odor, and light effects during construction and operations. As with reasonably foreseeable environmental trends and planned actions, effects on quality of life from these trends and actions would be examined at the APD level with consideration of site-specific locational information and development of COAs to reduce effects as needed. In addition, future potential development of the nominated lease parcels, as well as any reasonable foreseeable actions, would be subject to compliance with state and local laws related to noise and other public nuisances, wherever applicable.

AIB-18 Environmental Justice

What are the potential impacts from oil and gas leasing and future potential development on environmental justice populations?

Environmental justice (EJ) 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 if 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 (BLM 2005:Appendix C), provides direction on how to fulfill agency responsibilities for Executive Order 12898.

The CEQ has developed guidance 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 Instruction Memorandum 2022-059, titled Environmental Justice Implementation and issued on September 20, 2022, 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 (BLM 2022b).

The analysis area for EJ comprises Woods and Pittsburg Counties, which represents the maximum anticipated extent of potential effects (e.g., air quality, water quality) associated with future potential development of the nominated lease parcels. This analysis area is intended to represent all communities that could be affected by future potential development of the lease parcels, either directly or indirectly.

Woods County has a population of 8,731, with 5.8% of the population under the age of 5 and 17.1% of the population over the age of 65 (Headwaters Economics 2023d). Median household income is $55,933, with 63.6% of the population between the ages of 16 and 64 participating in the labor force and an unemployment rate of 2.1% (Headwaters Economics 2023d, 2023e). Pittsburg County has a population of 43,836, with 5.9% of the population under the age of 5 and 19.4% of the population over the age of 65 (Headwaters Economics 2023f). Median household income is $49,669, with 60.5% of the population between the ages of 16 and 64 participating in the labor force and an unemployment rate of 5.2% (Headwaters Economics 2023f, 2023g).

Within the analysis area (Woods and Pittsburg Counties), individual counties, census tracts, and census-mapped places (i.e., individual cities and towns) are the geographic units of analysis used for gathering information about low-income and minority populations. There are a total of 18 census tracts (four in Woods County and 14 in Pittsburg County) and 30 census-mapped places (seven in Woods County and 23 in Pittsburg County) within the analysis area (see Figure E.1 and E.2 in Appendix E). The state of Oklahoma is used as the reference area for determining whether minority or low-income EJ populations exist within the counties, census tracts, or census-mapped places.

The BLM defines low-income populations as individuals or groups of people whose income is less than or equal to twice (200% of) the federal poverty threshold, as identified by the U.S. Census Bureau (BLM 2022b). Minority populations include the following population groups: American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, Black or African American, some other race (other than White), a combination of two or more races, or Hispanic (BLM 2022b; CEQ 1997). Except for white non-Hispanics, all other racial and ethnic groups are considered minorities; therefore, the total minority population of an area is calculated by subtracting the white non-Hispanic population from the total population (BLM 2022b).

Members of tribal populations include all persons having origins in any of the original peoples of North America and South America (including Central America), and who maintain tribal affiliation or community attachment. Any American Indian or Alaska Native population qualifies as a tribal population, and membership in a federally recognized tribe is not required (BLM 2022b). All tribal populations qualify as EJ populations, regardless of the percentage of the analysis area population they constitute. In addition, dispersed tribal populations can also constitute EJ populations if they do not reside

within the analysis area but depend on cultural resources or places located on BLM-managed land within the analysis area.

Based on the percentage of the analysis area population that constitutes a low-income, minority, or tribal population, the BLM uses the following five criteria to identify EJ populations (BLM 2022b):

1. Low-income population of analysis area is the same or greater than that of the reference area.
2. Low-income population of analysis area is 50% or greater of the total analysis area population.
3. Minority population of analysis area is meaningfully greater than that of the reference area (i.e., 110% or more of reference area population).
4. Minority population of analysis area is 50% or greater of the total analysis area population.
5. Tribal populations are present within the analysis area.

After examining the most recently available data on minority and low-income populations for the analysis area and reference area (U.S. Census Bureau 2022a, 2022b, 2022c), the BLM has determined that there are minority and low-income EJ communities of concern present in the analysis area. Data concerning low-income and minority communities of concern within the analysis area are presented in Table E.1 of Appendix E. Tribal populations which reside, or rely on resources, within the analysis area are identified in AIB-6 (Native American Concerns) and Section 4.2 (Tribal Consultation). The BLM will consult with these tribal populations as part of government-to-government consultation under NEPA and the NHPA.

Pittsburg County meets both criteria for low-income and minority communities of concern. Of the 18 census tracts in the analysis area, the majority meet the criteria for minority communities of concern (15 census tracts) or low-income communities of concern (12 census tracts). When combined, all but three census tracts in the analysis area meet the criteria for either a low-income or minority community of concern (see Table E.1 in Appendix E). Of the 30 census-mapped places in the analysis area, over half meet the criteria for minority (19 places) and low-income (19 places) communities of concern. When combined, all but six census-mapped places in the analysis area meet the criteria for either a low-income or minority community of concern (see Table E.1 in Appendix E).

Specific minority groups that meet the criteria for EJ communities of concern vary by county, census tract, and census-mapped place, but the most common minority communities of concern are the two or more races populations, which is present in Pittsburg County, 72% of all census tracts, and 50% of all census mapped places, and the total minority population, which is present in 29% of all census tracts, and 23% of all census-mapped places. Other minority communities of concern present within the analysis area include Black or African-American, American Indian and Alaska Native, Asian, Native Hawaiian or other Pacific Islander, and Hispanic or Latino (see Table E.1 of Appendix E).

The minority community of concern (two or more races) in Pittsburg County increased by approximately 5% over recent years (2016–2021), compared with a 2% increase for that population in the state of Oklahoma during that same period. The low-income population (including both individuals and families) has decreased by approximately 2% over recent years (2016-2021) for both Pittsburg County and the state of Oklahoma (U.S. Census Bureau 2022a–2022f).

The communities of concern within the analysis area includes several types of populations at risk, or populations who are more likely to experience adverse health outcomes due to demographic or socioeconomic factors (Headwaters Economics 2023b). As described in AIB-16 (Human Health and Safety), the indicators for populations at risk in Woods County are generally much lower than state levels, whereas indicators for Pittsburg County are mostly higher than the state, except for the Hispanic and non-English speaking populations which are much lower (Headwaters Economics 2023b, 2023c). Indicators

for populations at risk which are notably higher in Pittsburg County compared to the State include people who do not work, people over the age of 65 living alone, and people with disabilities. The percentages of these populations at risk in Pittsburg County exceed those within the state of Oklahoma by 7.6% to 16.2% (Headwaters Economics 2023c).

While the determination of potential adverse and disproportionate effects from specific actions may initially be the assessment of the BLM, this assessment should not be assumed to be the position of specific, potentially affected communities of concern. The BLM considers that additional adverse impacts may be identified by local communities as specific development locations and types are proposed. Therefore, the BLM would provide 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 following discussion assesses only the effects for the issues identified by the BLM during scoping associated with this leasing process. BLM staff members also posted press releases at the scoping stage, in English, through various media outlets (i.e., newspapers and radio stations) in the analysis area. The BLM would continue to work with potentially affected communities of concern to identify and address additional EJ issues as they arise.

The BLM cannot predict where oil and gas reserves may exist on each lease sale parcel. Consequently, there may be instances where oil and gas exploration activities disproportionately and adversely affect communities of concern due to proximity and other factors, and for variable amounts of time. For example, a typical horizontal well averages from 30 to 60 days from start of drilling to completion (see Appendix D) and may have a greater effect (increased dust, traffic, etc.) on resident populations in close proximity while the drilling operations are ongoing. These types of exploration activities may result in adverse impacts to communities of concern located near the drilling operations; however, the BLM does not know exactly where drilling operations may take place until lease development is proposed, if a nominated lease parcel is developed at all. Thus, the BLM OFO uses stipulations and COAs to minimize impacts to nearby populations, including communities of concern, during construction and operations, to the extent practicable.

For purposes of the proposed leasing action, Table 3.8 provides a summary of the resource analyses presented in Sections 3.5 and 3.6 that would have potential to affect communities of concern. Those conclusions were then assessed by the BLM relative to whether the projected impacts to communities of concern may be adverse and disproportionate. As described in AIB-17 (Quality of Life), none of the nominated lease parcels contain residences, and lands surrounding the nominated lease parcels are characterized as either rural with scattered residences (parcels 0053 and 0047), or rural and sparsely populated (parcels 0049, 6883, and 6884). The closest residences to the nominated lease parcels are approximately 0.05 to 1.72 miles from the parcel boundaries. Note that any residence, community facility, or gathering space in an area with a community of concern has the chance of being significant to that community. As stated in AIB-5 (Cultural Resources) and AIB-6 (Native American Concerns), the BLM found that one of the nominated lease sale parcels (0047) is located under the Chambers Cemetery in Pittsburg County, Oklahoma. Based on this resource concern, the BLM chose to remove the parcel from the NHPA Section 106 process. For the remaining four nominated lease sale parcels no additional resources of significant to the community have been identified within the nominated lease parcels through the analysis presented in this EA. In addition, there were no other resources of significance identified during public scoping, and no specific Native American resource concerns have been identified on the subject lease parcels; however, this consultation is considered ongoing. Therefore, given the lack of any residences or other resources of concern identified within the nominated lease parcels, any impacts to EJ communities of concern associated with future potential development of the lease parcels are more likely to be indirect and may incrementally contribute to impacts associated with reasonably foreseeable environmental trends and planned actions.

Additional review would be conducted at the time of proposed lease development. Standard terms and conditions attached as COAs to the APD could include measures to reduce effects on nearby EJ communities of concern. Under the Oil and Gas Leasing Regulation for Surface Use Rights (43 C.F.R. § 3101-1-2), such reasonable measures may include modification to siting or design of facilities, including relocation of proposed operations up to 656 feet (200 m). These measures may minimize potential significant adverse effects (e.g., from dust or visual/audio effects) to members of EJ communities of concern.

Table 3.8. Summary Comparison of Conclusions from Analysis of Other Issues to Environmental Justice

Issues Analyzed	Summary of Potential Significant Adverse Effects	Are potential effects disproportionate to environmental justice communities of concern?
Air Quality (Issue 1, Section 3.6.1)	Criteria pollutants, VOC, and HAP emissions would increase as shown in Section 3.6.1.2. Future potential development of the lease parcels would result in short-term local area increases of pollutant emissions, particularly fugitive dust ($PM_{2.5}$ or PM_{10}), lasting an average of 30 to 60 days.	Potential for disproportionate impacts to communities of concern. Fugitive dust and diesel exhaust emissions from construction would result in criteria pollutant, VOC, and HAP emissions. These emissions would be short term (30–60 days) and would have the greatest impact at locations near the construction activities (1.25 miles or less). Therefore, residents near the construction activities would experience greater levels of impacts due to project construction. Air pollution and associated health effects (as described in Section 3.6.1) can disproportionately affect individuals within communities of concern in the analysis area who are already socially vulnerable and have greater difficulty accessing healthcare facilities and paying for medical treatment or have a higher likelihood of having pre-existing health conditions (EPA 2021b). Additional review would be conducted at the time of proposed lease development if development occurs; standard design features and project-specific COAs would help to minimize potential effects that could be adverse and disproportionate to communities of concern.
Greenhouse Gases and Climate Change (Issue 2, Section 3.6.2)	Based on a 100-year global warming potential, future potential development of the nominated lease parcels is estimated to result in 708,510 metric tons of carbon dioxide equivalent (CO_2e) over the average 20-year production life of the lease (Section 3.6.2.2). All GHG emissions would contribute to global GHG emissions. GHG emissions are associated with documented ongoing and reasonably foreseeable climate-related effects. For the Great Plains region (including Texas, Oklahoma, and Kansas) these may include higher temperatures, more frequent drought, reduced precipitation, and decreases in overall water availability (BLM 2022a).	Potential for disproportionate impacts to communities of concern. While any climate change–related effect from the future potential development of the parcels themselves would be minimal, climate change is the result of collective and global actions. Any climate change–related impact would be regional in nature but may disproportionately affect individuals within communities of concern in the analysis area who are already socially vulnerable and have a lower capacity to prepare for, cope with, and recover from climate change impacts, including higher temperatures, decreased overall water availability, or increased flooding (EPA 2021b).
Water Use and Quantity (AIB-1 and Issue 3, Section 3.6.3)	Drilling and completion of five horizontal wells on the nominated lease parcels is estimated to use approximately 40 to 46.5 acre-feet of water. Assuming that all wells are developed in the same year, this would increase the annual water use in the analysis area by up to 0.23% at current usage rates. With consideration of design features and regulatory requirements, no effects on groundwater or surface water quality are expected from well drilling and completion. Spills affecting groundwater or surface waters could occur.	Potential for disproportionate impacts to communities of concern. While groundwater resources are regional in nature and water withdrawals are not anticipated to affect domestic water sources, any impacts to local water wells (for example, a spill that affects groundwater) could force residents to find other means of supplying water for domestic use. BMPs and COAs would help to minimize this risk. Should a spill occur, the BLM would work with operators to immediately remediate spills in accordance with federal and state standards.

Issues Analyzed	Summary of Potential Significant Adverse Effects	Are potential effects disproportionate to environmental justice communities of concern?
Quality of Life (AIB-17)	Future potential development of the nominated lease parcels could result in localized air, noise, visual resources, and traffic and safety effects that could affect quality of life for local residences and communities of concern, particularly during construction. Continued expansion of the oil and gas industry can have a negative effect on quality of life for people who value undeveloped landscapes.	Potential for disproportionate impacts to communities of concern. In general, quality of life impacts would be greater for the residents in close proximity to future potential development (1.25 miles or less). None of the nominated lease parcels contain residences, however, three parcels (0053, 0047, and 0049) have residences within 1.25 miles or less. When evaluating placement of wells at the lease development stage, standard design features and project-specific COAs would be applied to reduce effects that could be adverse and disproportionate to communities of concern.
Human Health and Safety (AIB-16)	Future potential development of the nominated lease parcels would result in emissions of air pollutants that can lead to human health effects depending on the level and duration of exposure. Other potential health and safety risks include occasional fire starts; spills of hazardous materials and corresponding potential contamination of air, soil, or water; exposure to naturally occurring radioactive material; traffic collisions; and presence of hydrogen sulfide. The magnitude of effects on human populations would depend on the frequency, timing, and levels of contact with potential stressors. After wells are properly plugged and reclaimed, they would no longer contribute to human health and safety risks; however, some public health effects from air pollution may endure beyond the life of the wells (e.g., chronic respiratory problems such as asthma).	Potential for disproportionate impacts to communities of concern. In general, health and safety impacts would be greater for the residents in close proximity to future potential development (1.25 miles or less). The communities of concern within the analysis area includes several types of populations at risk who are more likely to experience adverse health outcomes due to demographic or socioeconomic factors including poverty, age, type of housing, lack of health insurance, and disabilities (Headwaters Economics 2023a). Therefore, the analysis area communities of concern may be more sensitive to the effects of air pollution and other health and safety risks associated with future potential development of the lease parcels, relative to non-EJ communities. Additional review of potential human health and safety risks would be conducted at the time of proposed lease development. Standard terms and conditions attached as COAs to the APD could include measures to reduce health and safety effects on nearby communities of concern. Future potential development would be subject to relevant rules and regulations regarding public health and safety.

AIB-19 Solid Minerals

How would future potential development of the nominated lease parcels impact solid minerals, such as potash or coal?

Approximately 1.8 million acres of federal coal are located on BLM-administered federal mineral estate within the BLM OFO decision area, most of which are located in Oklahoma (899,800 acres, or approximately 50%) beneath state-owned surface or surface administered by other non-BLM federal agencies (BLM and BIA 2019a). As described in Section 3.3.1.2, there are currently seven federal coal leases in Oklahoma, composed of approximately 10,900 acres of BLM-administered mineral estate. Three of the seven leases are for underground mining operations, while the remaining four leases are for surface mines.

Nominated lease parcel 0047 is within an area designated as open to coal leasing and nominated lease parcel 0053 is directly adjacent to areas designated as open to coal leasing. There are two historic mines located within proximity to both of these parcels (i.e., within the same Public Land Survey System Section as parcel 0047), but not within the parcels themselves. There are no active mines within or near to any of the nominated lease sale parcels.

Future potential development of nominated lease parcels 0047 and 0053 is not expected to interfere with any mining operations. Lease Notice OFO-LN-5, which notifies the lessee that the nominated lease parcel contains potential federal minerals and that the lease parcel is subject to certain requirements (see Appendix B), would be applied to nominated lease parcels 0053 and 0047. The BLM has the authority

under standard terms and conditions to attach COAs at the site-specific level to minimize significant adverse effects on resource values at the time operations are proposed.

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 2008) 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

How would future potential development of the nominated lease parcels affect air quality (particularly National Ambient Air Quality Standards and volatile organic compounds) in the analysis area?

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. Air pollutants result from a number of different and widespread sources of emissions. The analysis area for this issue is Pittsburg and Woods Counties, Oklahoma. 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 on air quality are considered those that cease after well construction and completion (30–60 days); long-term effects are considered those associated with operation. Long-term effects would cease after well operation.

Much of the information in this section is incorporated from the *BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas* (herein referred to as Air Resources Technical Report and incorporated into this EA by reference) (BLM 2022a).

3.6.1.1 *Affected Environment*

The Clean Air Act (CAA) (42 U.S.C. §§ 7401-7671q) requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment. *Primary standards* provide public health protection, and *secondary standards* provide for public welfare, including protection against degraded visibility and damage to animals, crops, vegetation, and buildings (EPA 2022i). The primary NAAQS are set at a level to protect public health, including the health of at-risk populations, with an adequate margin of safety (EPA 2022i).

The EPA has set NAAQS for six principal pollutants ("criteria" air pollutants): carbon monoxide (CO); nitrogen dioxide (NO_2); ozone (O_3); PM_{10} and $PM_{2.5}$; sulfur dioxide (SO_2); and lead (EPA 2022i). The Oklahoma Department of Environmental Quality, Air Quality Division (ODEQ AQD) is responsible for enforcement of air quality standards (BLM 2022a).

Pittsburg County, Oklahoma, is located in southeastern Oklahoma, and Woods County, Oklahoma, is located in northwestern Oklahoma on the border of Kansas. Both counties are in attainment for all criteria pollutants.

CRITERIA POLLUTANT CONCENTRATIONS

The EPA provides data on criteria pollutant emissions, expressed in tons per year or total volume of pollutant released into the atmosphere. Emissions data indicate which industries and/or practices are contributing the most to the general level of pollution in that area (BLM 2022a). Total emissions within the analysis area are reported in Table 3.9, based on 2020 National Emissions Inventory (NEI) in tons per year (EPA 2023).

The primary sources of air pollution in the analysis area are dust from blowing wind on disturbed or exposed soil, exhaust emissions from motorized equipment, oil and gas development, agriculture, and industrial sources. Total human-caused emissions of criteria pollutant and O_3 precursor emissions from the analysis area are shown in Table 3.9. These emissions are based on the EPA's 2020 emissions inventory in tons per year (EPA 2023).

Table 3.9. Emissions in Pittsburg and Woods Counties, Oklahoma

	Emissions (tons/year)					
National Emissions Inventory Human-Caused Current Emissions	**NO_X**	**CO**	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**
2020 NEI—Pittsburg County	7,094	43,288	31,866	12,470	4,438	316
2020 NEI—Woods County	4,625	9,816	9,177	4,650	1,339	54

Note: The table above shows emissions by county including biogenic sources.

Source: EPA (2023); data pulled from NEI as of April 27, 2023. Values include summaries for each county, including combustion, industrial, on-road/nonroad, and miscellaneous sectors.

As a secondary pollutant, O_3 is not a direct emission pollutant (that is, it is not emitted directly into the air), but it is the result of chemical reactions between a group of highly reactive gases called NO_X and VOCs (which are organic compounds that vaporize [i.e., become a gas] at room temperature) when exposed to sunlight (EPA 2022a). O_3 and NO_2 are criteria air pollutants and are regulated under the NAAQS. VOCs are not criteria pollutants, however, because O_3 is not a direct emission; emissions of NO_X (particularly NO_2, which is used as an indicator for the larger group of gases) and VOCs are used as a proxy for determining potential levels of secondary formation of O_3.

O_3 is most likely to reach unhealthy levels on hot, sunny days in urban environments and can be transported long distances by wind into rural areas (EPA 2022a). People most at risk from breathing air containing O_3 include people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers. In addition, people with certain genetic characteristics, and people with reduced intake of certain nutrients, such as vitamins C and E, are at greater risk from O_3 exposure (EPA 2022a). Major sources of both NO_X and VOCs emissions include industrial facilities like oil and gas production and motor vehicle exhaust (including off-road equipment). Biogenic sources, such as vegetation and soil, and fires (agricultural field burning, prescribed burning, and wildfires) can also represent a substantial portion of NO_X and VOC emissions in an area, including Oklahoma (BLM 2022a).

The primary sources of NO_X nationally are from the burning of fossil fuels associated with transportation and industry. The excess air required for complete combustion of fuels introduces atmospheric nitrogen into the combustion reactions at high temperatures and produces NO_X. VOCs are components of natural gas and may be emitted from well drilling, operations, and equipment leaks, valves, pipes, and pneumatic devices. Additionally, VOCs are emitted from a variety of sources, such as refineries, oil and gas production equipment, consumer products, and natural (biogenic) sources, such as vegetation and soil.

Particulate matter (also known as particle pollution) is a mixture of solid particles and liquid droplets in the air. Particulate matter varies in size: PM_{10} refers to particulate matter 10 micrometers or less in diameter (commonly considered "dust"); $PM_{2.5}$ refers to particulate matter that measures 2.5 micrometers or less (i.e., fine particles), which are the main cause of reduced visibility (haze) in the United States (EPA 2022b). The EPA regulates particulate matter 10 micrometers in diameter or smaller (PM_{10} and $PM_{2.5}$) because these smaller particles are associated with negative health effects, including respiratory and cardiovascular problems, and because they can become more deeply imbedded into the lungs and may even get into the bloodstream (BLM 2022a), but does not regulate particles larger than 10 micrometers in diameter (such as sand and larger dust particles). PM_{10} and $PM_{2.5}$ are not currently monitored in the analysis area, and there are no areas of high concentrations that would warrant monitoring. Like O_3, most particulate matter is formed by reactions between other chemicals, specifically between SO_2 and NO_X, which are emitted from vehicles, power plants, and other industrial processes (EPA 2022b). Particulate matter emissions often result directly from activities like construction, traffic on unpaved roads, fields, and fires (EPA 2022b). Particulate matter is of heightened concern when emissions are near sensitive receptors, such as residences, because PM can be present in higher concentrations in a localized area prior to settling or dispersion. The distance that particulate matter can travel from an emission source depends on several environmental factors such as meteorological conditions, topography, land use, and time of day, as well any management controls (e.g., BMPs) that are implemented at the source. Generally speaking, PM_{10} particles can travel distances as little as a hundred yards up to 30 miles, whereas $PM_{2.5}$ particles remain airborne for longer periods of time and travel even farther (many hundreds of miles) (EPA 2008, Pima County 2022).

AIR QUALITY INDEX

Air quality in a given region can also be measured by its Air Quality Index (AQI) value. The AQI is used to report daily air quality information in an easy-to-understand way by explaining how local air quality relates to human health. Calculated by the EPA, the AQI considers the following: O_3, particulate matter ($PM_{2.5}$ and PM_{10}), NO_2, and CO (all except SO_2 and lead). As of December 8, 2021, SO_2 is no longer included in the AQI report because SO_2 concentrations tend to be very localized and not necessarily representative of broad geographical areas (EPA 2021c).

The AQI translates daily air quality data into a tiered, color-coded system that helps people understand how clean outdoor air is, who may be affected if pollutant levels are higher than desired, and when individuals may want to take measures to protect their own health. The higher the AQI value, the greater the level of air pollution and the greater the concern for public health. An AQI value of 100 typically corresponds to the NAAQS set for that pollutant, and values below 100 are considered satisfactory for public health. Table 3.10 presents the AQI values (with associated color category) and levels of health concern.

Table 3.10. Air Quality Index

AQI Values	Levels of Health Concern	Meaning
0 to 50 (green)	Good	Air quality is considered satisfactory, and air pollution poses little or no risk.
51 to 100 (yellow)	Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
101 to 150 (orange)	Unhealthy for sensitive groups	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
151 to 200 (red)	Unhealthy	Everyone may begin to experience health effects, and members of sensitive groups may experience more than serious health effects.

AQI Values	Levels of Health Concern	Meaning
201 to 300 (purple)	Very unhealthy	Health alert: everyone may experience more serious health effects.
301 to 500 (maroon)	Hazardous	Health warnings of emergency conditions. The entire population is more likely to be affected.

Source: EPA (2022j).

Note: AQI values above 500 are considered beyond the AQI and represent extreme levels of particle pollution.

The AQI summary report provides annual summary information, including maximum AQI values and count of days in each AQI category (EPA 2022k). Table 3.11 lists the number of days in which the AQI was "unhealthy for sensitive groups" or worse for the past 11 years. At the time this EA was written, there were no data for Woods County nor the surrounding counties. Data were available for Pittsburg County, which had 48 days with an AQI over 100 recorded from 2011 through 2021. Over the past 11 years, Pittsburg County shows improved trends in maximum AQI.

Table 3.11. AQI Summary Data for Number of Days Classified above 100 for the Analysis Area (2011–2021)

Location	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Pittsburg County	22	11	7	0	0	0	0	1	2	1	4

Source: EPA (2022k).

Note: Data from Woods County is not available.

HAZARDOUS AIR POLLUTANTS

The CAA requires control measures for HAPs. A pollutant is classified as a HAP if it has been identified by the EPA as a compound that is known or suspected to cause cancer or other serious health effects, such as compromises to immune and reproductive systems, birth defects, developmental disorders, and/or adverse environmental effects (BLM 2022a). The EPA currently lists 188 compounds as HAPs. National Emission Standards for Hazardous Air Pollutants (NESHAPs), established by the EPA, limit the release of specified HAPs from specific industries (BLM 2022a). NESHAPs for oil and gas development include control of benzene, toluene, ethyl benzene, mixed xylenes, and n-hexane from major sources, and benzene emissions from triethylene glycol dehydration units as area sources (BLM 2022a). The CAA defines a major source for HAPs as being one that emits 10 tons per year of any single HAP or 25 tons per year of any combination of HAPs. Under state regulations (Oklahoma Administrative Code 252:100-7-60), a construction or operating permit may be required for any minor and major source, though some exceptions apply.

The Air Resources Technical Report discusses the relevance of HAPs to oil and gas development and the particular HAPs that are regulated in relation to these activities (BLM 2022a). The EPA's AirToxScreen provides a screening tool for state, local, and tribal air agencies. AirToxScreen's results help the EPA and other agencies identify which pollutants, emission sources, and places they may wish to study further to better understand any possible risks to public health from air toxics. AirToxScreen is the successor to the previous National Air Toxics Assessment, or NATA. In December 2022, EPA released the results of its 2019 AirToxScreen. AirToxScreen calculates concentration and risk estimates from a single year's emissions data using meteorological data for that same year (EPA 2022g). The risk estimates assume a person breathes these emissions each year over a lifetime (or approximately 70 years). AirToxScreen then

provides quantitative estimates of potential cancer risk and five classes of non-cancer hazards (grouped by organ/system: immunological, kidney, liver, neurological, and respiratory) associated with chronic inhalation exposure to real-world toxics for each county and census tract (EPA 2022g). Due to limited health-effects data for some air toxics, the 2019 AirToxScreen assessment includes emissions, ambient concentrations, and exposure estimates for about 129 of the 188 CAA air toxics plus diesel particulate matter (diesel PM). AirToxScreen cannot give precise exposures and risks for a specific individual; therefore, AirToxScreen data are best applied to larger areas. It derives concentration and risk estimates from emissions data from a single year and assumes a person breathes these emissions each year over a lifetime (approximately 70 years). Lastly, AirToxScreen only considers health impacts from breathing air toxics and does not take into account indoor hazards, contacting or ingesting these air toxics, or other ways in which people may be exposed (EPA 2022g). A review of the results of the 2019 AirToxScreen shows that cancer risks, neurological risks, and respiratory risks in Woods County are all lower than national levels, while risks in Pittsburg County are similar to the national levels (EPA 2022g).

The 2019 AirToxScreen map application reveals that the total cancer risk (defined as the probability of contracting cancer over the course of a 70-year lifetime, assuming continuous exposure) from human-caused emissions of HAPs in Oklahoma is approximately 24.9 cases per 1 million people, which is lower than the nationwide level (25.5 cases per 1 million people) (EPA 2022g). The total cancer risk is 367.1 and 75.1 for Pittsburg and Woods Counties, respectively. The contribution of the oil and gas industry to the cancer risk in Pittsburg and Woods Counties is zero and 0.05 in 1 million, respectively. The total cancer risk is within the acceptable range of risk published by the EPA of 100 in 1 million as discussed in 40 C.F.R. § 300.430 (e)(2)(i)(A)(2) and the Residual Risk Report to Congress, EPA- 453/R-99-001 (EPA 1999). AirToxScreen non-cancer hazards (i.e., respiratory and neurological) are expressed as a ratio of an exposure concentration to a reference concentration (RfC) associated with observable adverse health effects (i.e., a hazard quotient). For a given air toxic, exposures at or below the RfC (i.e., hazard quotients are 1 or less) are not likely to be associated with adverse health effects. As exposures increase above the RfC (i.e., hazard quotients are greater than 1), the potential for significant adverse effects also increases (BLM 2022a). The total respiratory hazard quotient in the state of Oklahoma was 0.30, which is lower than that of the nation (0.31). The total neurological hazard quotient in the state of Oklahoma was 0.018, which is lower than that of the nation (0.026) (EPA 2022g).

REASONABLY FORESEEABLE ENVIRONMENTAL TRENDS AND PLANNED ACTIONS

Current estimated emissions across the analysis area (Pittsburg and Woods Counties) and air quality across the analysis area is generally good based on AQI ratings over the last 11 years (see Table 3.11). Current estimated emissions and AQI ratings are reflective of the effects of past and present actions. Over the last 6 years, there have been 108 federal well completions in the OFO (Table 3.12), 40 of which occurred within the state of Oklahoma.

Table 3.12. Past and Present Federal Well Completions in the OFO

Number of Federal Well Completions	2016	2017	2018	2019	2020	2021	Average
Texas (federal wells added annually)	12	2	7	7	11	27	11
Oklahoma (federal wells added annually)	5	4	11	13	7	0	7
Kansas (federal wells added annually)	0	0	0	2	0	0	<1
Total OFO (federal wells added annually)	**17**	**6**	**18**	**22**	**18**	**27**	**18**

The 2019 OFO RMP Final EIS predicts, over the period of 2014 through 2035, the approximate number of federal and trust wells to be drilled in the OFO planning area would range from 775 to 3,054 wells

(BLM and BIA 2019a). This figure is based on information contained in the 2016 OFO RFD (BLM 2016). Based on the range estimates provided above, potential emissions from RFD in the OFO RMP Final EIS (low and high scenario) are listed in Table 3.13.

Table 3.13. Air Emissions from Annual Oil and Gas Well Development Associated with the RFD Scenario

Air Emissions	Lease Sale Emissions (tons per year)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC
One oil-well emission factors*	0.58	0.27	4.53	0.12	2.06	4.46†
One gas-well emission factors	0.67	0.33	5.53	0.11	1.87	0.77
Total annual emissions from reasonably foreseeable federal well development estimated from 2016 OFO RFD/2020 OFO RMP (low scenario – approximately 39 wells per year)	22.62	10.53	176.67	4.68	80.34	173.94
Total annual emissions from reasonably foreseeable federal well development estimated from 2016 OFO RFD/2019 OFO RMP (high scenario – approximately 153 wells per year)	88.74	41.31	693.09	18.36	315.18	682.38

Note: The analysis contained in this table provides percentage contribution rounded to two decimal points.

* The representative well used to calculate emissions is a horizontal oil well. Emissions for vertical wells were not used from this analysis due to current predominance in horizontal technological drilling methods and because presenting horizontal oil wells emissions estimates represents a more conservative summary of emissions compared with emissions from a vertical well, with the exception of SO_2, which could be four to five times greater in a vertical well scenario. However, SO_2 emissions are still estimated to be within the same magnitude and less than 1 ton per year of SO_2 emissions per well. Estimated emissions from a typical horizontal gas well are higher for the criteria pollutants PM_{10} and $PM_{2.5}$ and NO_x. However, estimated emissions from horizontal oil wells are higher for CO, VOC, and HAP emissions. Because the overall magnitude of emissions from oil wells is estimated to be higher in terms of total criteria pollutant emissions, an oil well is evaluated for the purpose of this analysis.

† VOC emissions at the operational phase represent uncontrolled emissions and estimate potential emissions representing the contribution for "one oil well" from the emissions at storage tanks, gathering facilities, etc. However, federally enforceable regulations such as New Source Performance Standards (NSPS) OOOO and OOOOa both require emission reduction of VOC from well completions following hydraulic fracturing or refracturing and storage tanks with emissions greater than 6 tons per year after federally enforceable controls. Therefore, actual emissions from the one well scenario are likely be lower than represented.

It is unknown how many wells would be developed in Pittsburg and Woods Counties specifically. Future well development would contribute emissions to airsheds across Oklahoma including the addition of criteria pollutants emissions. Emissions are anticipated to be at the most acute level during the construction and completion phases of implementation (estimated to be 30–60 days). Localized and short-term effects on air quality for nearby residences from emissions of particulate matter, NO_X, VOCs, and HAPs are expected; however, because well development varies (i.e., permit approval, well pad construction, spudding, and completion), the phases of development may not occur in succession but may be spread out in development over time as a result of the varying development plans and approaches of lessees in the context of overall oil and gas development throughout the analysis area. The parcels may not be developed at all. Therefore, the incremental addition of criteria pollutants and VOCs over a period of 20 years would not be expected to result in any direct exceedances of the NAAQS for any criteria pollutants in the analysis area. Individual well projects would be expected to be under de minimis thresholds for NO_X and VOCs; larger well development projects such as master development plans that do not meet de minimis thresholds would be required to undergo additional coordination with the EPA and Oklahoma Department of Environmental Quality, Air Quality Division (ODEQ AQD) at the site-specific level to ensure that the project would not result in an exceedance of the NAAQS or state air quality standards.

Potential HAP emissions from annual oil and gas federal well development could range from 12.09 tons/year (low scenario) to 47.43 tons/year (high scenario). It is important to note that the well development in the OFO would not occur all at once and the well development and associated emissions would be spread throughout the OFO.

3.6.1.2 *Environmental Effects*

METHODOLOGY AND ASSUMPTIONS

Methodology and assumptions for calculating air pollutant emissions and developing inputs for the calculators are described in the Air Resources Technical Report (BLM 2022a). Emissions calculators were developed by air quality specialists at the BLM National Operations Center in Denver, Colorado, and account for a number of variables, including access and construction requirements, equipment, and other infrastructure needs, as well as expected production volumes. Because these calculators quantify emissions based on averages and several assumptions (e.g., construction methods, all wells would be hydraulically fractured), these estimates provide approximations of emissions of criteria pollutants, VOCs, and HAPs relative to regional and national levels. Additionally, the calculators and assumptions have been modified for use in analyzing a single well to more closely represent oil and gas wells in the state and to address emissions from development and production for one well (BLM 2022a). Emissions estimates per well are included in Table 3.14.

Table 3.14. Percent Increase from Potential Future Development of the Lease Parcels

Future Potential Development	Lease Sale Emissions (tons per year)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC
Current emissions (Pittsburg and Woods Counties, Oklahoma)	17,120	5,777	11,719	370	53,104	41,043
One oil-well emission factors*	0.58	0.27	4.53	0.12	2.06	4.46
One gas-well emission factors*	0.67	0.33	5.53	0.11	1.87	0.77
Total emissions from lease sale (5 wells)	2.9	1.35	22.65	0.6	10.3	22.3
Percent increase	0.02%	0.02%	0.19%	0.16%	0.02%	0.05%

Note: The analysis contained in this table provides percentage contribution rounded to two decimal points.

Note: HAPs from the 2020 NEI are not included for comparison at the county level as a large portion of the inventory includes only facility-level emissions emitted after controls are accounted for and only includes facility level or sources as required to be reported by the Oklahoma Department of Environmental Quality, Air Quality Division. HAP emissions could include 0.31 and 0.06 ton per well/year for an oil well and a gas well, respectively.

* The emission estimates for a one-well (oil well) scenario include construction, operations, maintenance, and reclamation activities. Construction emissions include well pad construction (fugitive dust), heavy equipment combustive emissions, commuting vehicles, and wind erosion. Emissions from operations include well workover operations (exhaust and fugitive dust), well site visits for inspection and repair, recompletion traffic, water and oil tank traffic, venting, compression and well pumps, dehydrators, and compression station fugitives. Maintenance emissions for both oil and gas wells are for road travel, and reclamation emission activities are for interim and final activities and include truck traffic, a dozer, a blade, and track hoe equipment. The representative well used to calculate emissions is a horizontal oil well. Emissions for vertical wells were not used from this analysis due to current predominance in horizontal technological drilling methods and because presenting horizontal oil well emissions estimates represent a more conservative summary of emissions, compared with emissions from a vertical well, with the exception of SO_2, which could be four to five times greater in a vertical well scenario. However, sulfur dioxide emissions are still estimated to be within the same magnitude and less than 1 ton per year of SO_2 emissions per well. Oil wells are used for this analysis because they are the more prevalent well type in the OFO area. However, note that emissions of some compounds (NO_x, SO_2, PM_{10}, and $PM_{2.5}$) tend to be higher for gas well development in the area, but gas wells emit lower amounts of VOCs, CO, and HAPs.

EFFECTS ANALYSIS

Future potential development of the nominated lease parcels would include increased criteria pollutant emissions, including increased particulate matter released from new well pads or roads, exhaust emissions from drilling equipment, compressor engines, vehicles, flares, dehydration and separation facilities, and VOCs during drilling and production activities. As stated above, the most substantial criteria pollutants

and O_3 precursors emitted by oil and gas development and production are VOCs, particulate matter, and NO_2.

Future potential development on the nominated lease parcels is estimated at five horizontal wells (one well per parcel) (see Table 3.1). Depending on the RFD scenario range presented above, the Proposed Action could represent 0.16% of reasonably foreseeable wells built in the OFO planning area for the high development scenario of 3,054 wells, to 0.65% of reasonably foreseeable wells built in the OFO planning area for the low development scenario of 775 wells.

It is unknown how many of the RFD scenario wells would be developed in Pittsburg and Woods Counties. However, it is reasonable to assume that annual well development in Pittsburg and Woods Counties would continue to occur, and that future well development would incrementally contribute to increases in criteria pollutant emissions to airsheds across Oklahoma.

VOCs and NO_2 contribute to the formation of O_3, and because O_3 is not a direct emission, emissions of NO_X and VOCs are used as proxies for estimating O_3 levels. Under the Proposed Action, the additional NO_X and VOC emissions (quantified in Table 3.14) from the well would incrementally add to O_3 levels within the analysis area. Given that five wells are expected to be developed as part of the Proposed Action, it is not expected that the Proposed Action would lead directly to additional NAAQS exceedances of O_3 in Pittsburg and Woods Counties. HAP emissions could include 0.31 and 0.06 ton per well per year for an oil well and a gas well, respectively. The CAA defines a major source for HAPs to be one emitting 10 tons per year of any single HAP or 25 tons per year of any combination of HAPs (BLM 2022a). Emissions presented in this analysis conservatively represent uncontrolled emission rates prior to implementation of applicable federally enforceable controls. Therefore, it is not expected that the Proposed Action would be a major source of HAP emissions.

Under the Proposed Action, particulate matter emissions (PM_{10} and $PM_{2.5}$) would increase by 0.02% and 0.02%, respectively. Construction activities would be one of the primary sources of particulate matter emissions as a result of dust and fine particles generated from on-site equipment use and related groundwork, as well as on- and off-site vehicles (Araújo et al. 2014; Reid et al. 2010). How particulate matter interacts with the environment is dependent on a variety of factors, with the size and chemical composition of the airborne particles being the most important in terms of dispersion (distance from the source) and deposition from the atmosphere. Effects of particulate matter emissions would not be confined to the construction site because $PM_{2.5}$ (fine particles) can travel farther in terms of distance than PM_{10} (dust) and other total suspended particulates (particles of sizes up to 50 micrometers) and therefore can affect residents in the surrounding area (Araújo et al. 2014). According to Araújo et al. (2014), construction site activities may influence the environment in the immediate area or neighborhood through emissions of total suspended particulate. Total suspended particulates are particles that have lower permanence in the atmosphere, thereby depositing near the emission sources (Araújo et al. 2014). The dispersion and concentration of particulate matter emissions depend on the technology and management control methods used by each project and the weather condition variables (i.e., wind speed, wind direction, and humidity/moisture) (Araújo et al. 2014). The nominated lease parcels do not contain any residences. The nearest residence to any of the nominated lease parcels is approximately 0.05 mile south (parcel 0053) (see AIB-17). However, the use of BMPs as described in Section 3.6.1.3 can reduce off-site effects from fugitive dust.

The Proposed Action may also result in localized effects on air quality at nearby residences due to O_3 precursors and HAP emissions. A significant portion of the criteria pollutants, VOCs, and HAP emissions would be from construction and completion from future potential development of the nominated lease parcels; therefore, the Proposed Action would result in short-term increases in these emissions, lasting an average of 30 to 60 days. As stated above, air quality is dependent not only on the quantity of air

pollutants, but also environmental conditions (humidity, wind direction and speed, temperature) that influence concentration and/or dispersion of pollutants.

Levels of HAPs would also temporarily increase during construction and completion activities under the Proposed Action, particularly in the form of diesel particulate matter from the on- and off-road construction equipment. However, concentrations of mobile source emissions of diesel PM are typically reduced by 60% at a distance of approximately 300 feet (Zhu et al. 2002). According to Zhu et al. (2002), the ultrafine particle (diameter <100 nanometers) concentration measured at 300 m downwind from the source of emissions was indistinguishable from the upwind background concentration. The relatively steep drop-off with distance of diesel PM concentrations as well as the short duration of the activity make the effects from exposure to HAP emissions minimal during construction. HAP emissions could include 0.31 and 0.06 ton per well per year for an oil well and a gas well, respectively.

Ongoing operations of the well site would be subject to state and federal permitting (unless emissions are so minimal the site qualifies as de minimis), recordkeeping, monitoring, and reporting requirements, which ensure compliance with air quality emission standards. Compliance with state and federal permitting requirements is designed to ensure that a proposed source would not cause or contribute to a violation of NAAQS standards.

3.6.1.3 *Mitigation Measures and Residual Effects*

The EPA has promulgated air quality regulations for completion of hydraulically fractured gas wells. These rules require air pollution mitigation measures that reduce the emissions of VOCs during gas well completions. Based on its authority under the standard terms and conditions, the BLM requires industry to incorporate and implement BMPs, which are designed to reduce effects on air quality by reducing emissions, surface disturbances, and dust from field production and operations. Typical measures include requirements for watering dirt roads or applying magnesium chloride dust suppressants on dirt roads during periods of high use to reduce fugitive dust emissions of PM_{10} (Intermountain Oil and Gas BMP Project 2013); colocation of wells and production facilities to reduce new surface disturbance; implementation of directional and horizontal drilling and completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores; suggestions that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored; and interim reclamation to revegetate areas not required for production facilities and reduce the amount of fugitive dust.

In addition, the BLM encourages industry to participate in the Natural Gas STAR program, administered by the EPA. The Natural Gas STAR program is a flexible, voluntary partnership that encourages oil and natural gas companies to adopt proven, cost-effective technologies and practices that improve operational efficiency and reduce natural gas emissions (EPA 2022l).

Further, the EPA provides control measures for emission mitigation of various pollutants in the Menu of Control Measures. The Menu of Control Measures provides state, local, and tribal air agencies with information on existing emissions reduction measures, as well as relevant information concerning the efficiency and cost effectiveness of the measures. The Menu of Control Measures includes information on measures for large point sources of emissions, as well as some information on measures for nonpoint sources of emissions. State, local, and tribal agencies will be able to use this information in developing emissions reduction strategies, plans, and programs to assure they attain and maintain the NAAQS (EPA 2022m).

NO_X reductions can include several control measures from oil and gas–related point sources. One such measure is selective catalytic reduction (SCR) for natural gas compressors. This control is the reduction

of NO_X through add-on controls. SCR controls are post-combustion control technologies based on the chemical reduction of NO_X into molecular nitrogen and water vapor. The SCR uses a catalyst to increase the NO_X removal efficiency, which allows the process to occur at lower temperatures. This control applies to compressors used in natural gas production operations, natural gas–fired and process gas–fired heaters with NO_X emissions greater than 10 tons per year. This method generally offers an 90% control efficiency for NO_X (EPA 2022m).

Another NO_X control measure for non-point sources is for process heaters using natural gas or process gas. This control is the use of low-NO_X burner technology to reduce NO_X emissions. Low-NO_X burners reduce the amount of NO_X created from reaction between fuel nitrogen and oxygen by lowering the temperature of one combustion zone and reducing the amount of oxygen available in another. This control is applicable to natural gas–fired and process gas–fired process heaters with uncontrolled NO_X emissions greater than 10 tons per year (EPA 2022m).

VOC control measures from oil and gas–related non-point sources include reducing emissions at storage tanks, use of flares, and a leak detection and repair program to capture fugitive emissions (leaks). The EPA has New Source Performance Standards (NSPS) in place at 40 C.F.R. § 60, Subparts OOOO and OOOOa, to reduce VOCs from well completion operations and storage tanks constructed after August 23, 2011. NSPS OOOOa requires reduction of VOCs from well completion operations and storage tanks and imposes semiannual monitoring requirements for the collection of fugitive emission components at well sites constructed after September 18, 2015. Following the 2020 amendment to OOOO and OOOOa, fugitive emissions monitoring is only required for those wells producing greater than 15 bbl per day. Other emission controls of VOCs include vapor recovery units, enclosed combustors (vapor combustion unit), and open-tipped (candlestick flares). The most desirable control method is a vapor recovery unit since this recovers the natural gas production and sends the gas to the sales line or back to the process for facility use. Finally flaring helps to reduce 98% of VOC emissions at petroleum flares (EPA 2022m). The specified emission control techniques have varying degrees of effectiveness as discussed above. Therefore, the mitigation measures applied to future potential development of the nominated lease parcels would reduce emissions of particulate matter and VOCs but would not completely eliminate these emissions. Emission control techniques would be further evaluated when specific lease development projects are proposed.

3.6.2 Issue 2: Greenhouse Gases and Climate Change

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

Future development of the 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 leased parcels if developed, and from the consumption of any fluid minerals that may be 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 is evaluated through 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 effects of the proposed leasing action on climate change by estimating and analyzing potential GHG emissions from projected oil and gas development on the parcels proposed for leasing using estimates based on past oil and gas development and 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, are included in the *BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends* (2021) (hereinafter referred to as the 2021 Annual GHG Report) (BLM 2022c). 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 2021 Annual GHG Report is incorporated by reference as an integral part of this analysis and is available at https://www.blm.gov/content/ghg/2021/.

3.6.2.1 *Affected Environment*

CLIMATE CHANGE AND GREENHOUSE GASES

Climate change is a global process that is affected by the sum total of GHGs in the Earth's atmosphere. 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 as a result of specific 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. 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. Therefore, potential emissions resulting from the Proposed Action can be compared to state, national, and global GHG emission totals to provide context of their potential contribution to climate change impacts.

Table 3.15 shows the total estimated GHG emissions from fossil fuels at the global, national, and state scales from 2016 through 2020. Emissions are shown in megatonnes (Mt) per year of carbon dioxide equivalent (CO_2e). Chapter 3 of the 2021 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 2021 Annual GHG Report (see Chapters 4, 5, and 6 in BLM 2022c).

Table 3.15. Global and U.S. GHG Emissions, 2016 through 2020

Scale	GHG Emissions (Mt CO_2e/year)				
	2016	2017	2018	2019	2020
Global	36,465.6	36,935.6	37,716.2	37,911.4	35,962.9
United States	5,077.0	5,005.5	5,159.3	5,036.0	4,535.3
State (Oklahoma)	138.7	136.5	141.7	134.0	128.4

Sources: 2021 Annual GHG Report (BLM 2022c), Chapter 6, Table 6-1 (Global and U.S.) and Table 6-3 (State). EPA (2022n).
Mt (megatonne) = 1 million metric tons

The continued increase of anthropogenic GHG emissions over the past 60 years has contributed to global climate change impacts. A discussion of past, current, and projected future climate change impacts is described in Chapters 8 and 9 of the 2021 Annual GHG Report (BLM 2022c). 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. These chapters are incorporated by reference in this analysis.

3.6.2.2 *Environmental Consequences*

PROPOSED ACTION ALTERNATIVE

While the leasing action does not directly result in development that will generate GHG emissions, emissions from potential future development of the leased parcels are reasonably foreseeable and can be estimated for the purposes of this lease sale. There are four general phases of post-lease development 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 occur on-lease and the BLM has program authority over these activities, mid-stream and end-use emissions 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. In order to estimate reasonably foreseeable on-lease emissions at the leasing stage, the BLM uses estimated well numbers 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 mid-stream 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 midstream emissions associated with lease parcels for this analysis will be similar to the national level emissions identified by the Department of Energy's National Energy Technology Laboratory (NETL) (2009, 2019).

The emission estimates calculated for this analysis were generated using the assumptions previously described above using the BLM Lease Sale Emissions Tool. Emissions are presented for each of the four phases of post-lease development 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 20 years for this analysis based on the productive life of a typical oil/gas field.

- Production 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 2021 Annual GHG report (Chapter 4, Tables 4-7 and 4-9 in BLM 2022c).
- 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 C.F.R. § 98). Additional information on emission factors and EUR factors can be found in the 2021 Annual GHG Report (Chapter 4 in BLM 2022c).

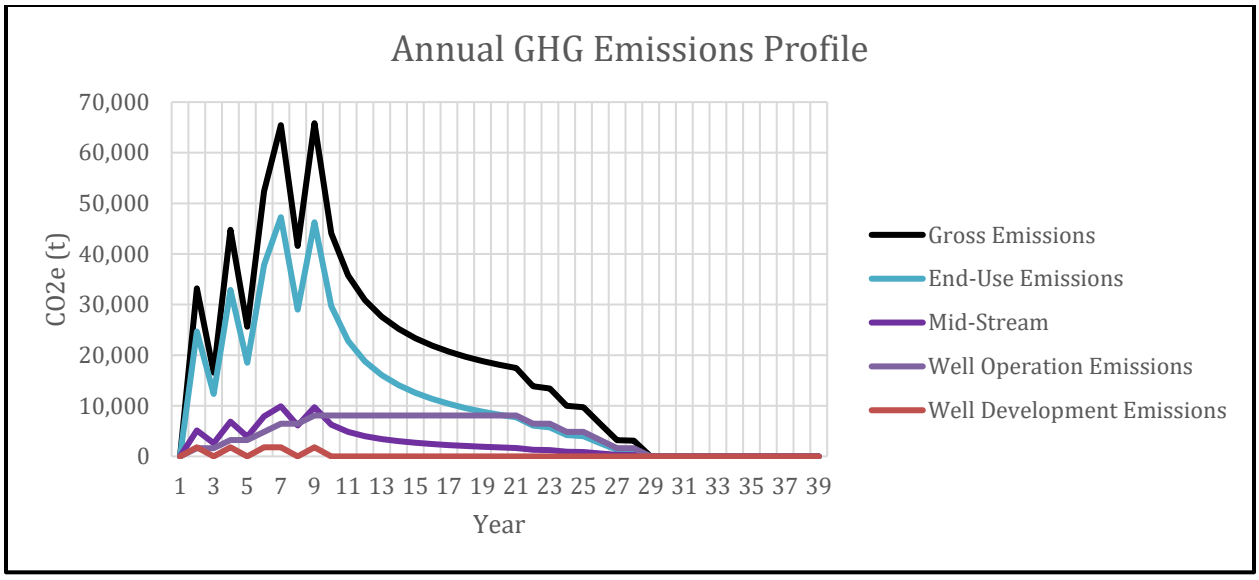
Table 3.16 lists the estimated direct (well development and production operations) and indirect (mid-stream and end-use) GHG emissions in metric tons (tonnes) for the subject leases over the average 20-year production life of the lease.

Table 3.16. Estimated Life-of-Lease Emissions from Well Development, Well Production Operations, Mid-Stream, and End Use

Activity	Life-of-Lease Emissions (tonnes)				
	CO_2	CH_4	N_2O	CO_2e (100-year)	CO_2e (20-year)
Well development	8,837	5.04	0.070	9,006	9,272
Well production operations	111,367	1,685.89	0.260	161,678	250,524
Mid-stream	71,263	749.69	1.054	93,892	133,401
End-use	443,036	12.23	1.954	443,934	444,579
Total	**634,503**	**2,452.86**	**3.338**	**708,510**	**837,775**

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 3.1 shows the estimated GHG emissions profile over the production life of a typical lease including well development, well production operations, mid-stream, end-use, and gross (total of well development, well production, mid-stream activities, and end-use) emissions.



Source: BLM Lease Sale Emissions Tool

Figure 3.1. Estimated annual GHG emissions profile over the life of a lease.

To put the estimated GHG emissions for this lease sale in 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 and to emissions at the state and national level. The EPA GHG equivalency calculator can be used (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator) to express the potential average year GHG emissions on a scale relatable to everyday life (EPA 2022o). For instance, the projected average annual GHG emissions from potential development of the subject lease are equivalent to 5,655 gasoline-fueled passenger vehicles driven for 1 year, or the emissions that could be avoided by operating seven wind turbines as an alternative energy source or offset by the carbon sequestration of 31,239 acres of forest land.

Table 3.17 compares emission estimates over the 30-year life of the lease compared to the 20-year projected federal fossil fuel emissions in the state and nation from existing wells, the development of approved APDs, and emissions related to reasonably foreseeable lease actions.

Table 3.17. Comparison of the Life of Lease Emissions to Other Federal Oil and Gas Emissions

Reference	Mt CO_2e (100-year)	Life of Lease Percentage of Reference
Lease sale emissions (life of lease)	0.709	100.0
Oklahoma reasonably foreseeable short-term federal (oil and gas)*	2.81	25.2
Oklahoma EIA projected long-term federal (oil and gas)†	50.01	1.4
U.S. short-term federal (oil and gas)	4,614.81	0.015
U.S. long-term federal (oil and gas)	13,560.24	0.005

Source: U.S. and federal emissions from BLM Lease Sale Emissions Tool and 2021 Annual GHG Report Tables 5-17 and 5-18 (BLM 2022c).

* Short-term foreseeable is estimated federal emissions from existing producing wells, approved APDs, and one year of leasing.

† Long-term foreseeable are estimated federal emissions to meet EIA projected energy demand.

Compared to emissions from other existing and foreseeable short-term federal oil and gas development, the life of lease emissions for the Proposed Action is between 1.4% and 25.2% of federal fossil fuel

authorization emissions in the state and between 0.005% and 0.015% of federal fossil fuel authorization emission in the nation. In summary, potential GHG emissions from the Proposed Action could result in GHG emissions of 0.709 Mt CO_2e over the life of the lease.

MONETIZED IMPACTS FROM GREENHOUSE GAS EMISSIONS

The "social cost of carbon dioxide (SC-CO_2)," "social cost of nitrous oxide (SC-N_2O)," and "social cost of methane (SC-CH_4)"–together, the "social cost of greenhouse gases" (SC-GHG)–are estimates of the monetized damages associated with incremental increases in GHG emissions in a given year.

Such analysis should not be construed to mean a cost determination is necessary to address potential impacts of GHGs associated with specific alternatives. 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 SC-CO_2, SC-CH_4, and SC-N_2O developed by the Interagency Working Group on the SC-GHG (IWG). Select estimates are published in the Technical Support Document (IWG 2021), and the complete set of annual estimates are available on the Office of Management and Budget's (2021) website.

The SC-GHGs associated with estimated emissions from future potential development of the lease parcels are reported in Table 3.18. These estimates represent the present value (from the perspective of 2023) 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, as described in Section 3.6.1.2. 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. They are rounded to the nearest $1,000. The estimates assume that development will start in 2023 and end-use emissions will be complete in 2051, based on experience with previous lease sales.

Table 3.18. SC-GHGs Associated with Future Potential Development

	Social Cost of GHGs (2023 $)			
	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	$2,399,000	$8,092,000	$11,877,000	$23,699,000
Mid-stream and end-use	$7,154,000	$26,117,000	$39,164,000	$78,800,000
Total	$9,553,000	$34,209,000	$51,041,000	$102,499,000

As detailed in the 2021 Annual GHG Report (BLM 2022c), 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 7.0 of the 2021 Annual GHG Report). This model run suggests that "30-plus years of projected federal emissions would raise average global surface temperatures by approximately 0.0158°C, or 1% of the lower carbon budget temperature target" (BLM 2022c:71). As this is an assessment of what BLM has projected could come from the entire federal fossil fuel program, including the projected emissions from the Proposed Action, over the next 20 years, the reasonably foreseeable lease sale emissions contemplated in this EA are not expected to substantially affect the rate of change in climate effects, bring forth impacts that are not already identified in existing literature, or cause a change in the magnitude of impacts from climate change at the state, national, or global scales.

NO ACTION ALTERNATIVE

Under the No Action Alternative, the BLM would not offer any of the nominated parcels in this 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 associated with new federal oil and gas development for the subject leases would occur under the No Action Alternative in the foreseeable future, the cumulative demand for energy is not expected to differ regardless of BLM decision-making (EIA 2023a). The BLM has no information regarding what energy source could fill the energy demand if development does not occur on the subject leases. Although the change in emissions compared to the Proposed Action could range from a 98.5% decrease if hydro-electricity is substituted to a 110.7% increase if coal is substituted (see Table 10-3 in the 2021 Annual GHG Report [BLM 2022c]). Over the past decade the increasing mix of natural gas has contributed to lower emissions as it has replaced energy produced from coal. In 2022, high prices for natural gas and demand exceeding supply have resulted in some countries reactivating or delaying planned closures of coal-fired power plants (Reuters 2022). In the future, renewable energy is anticipated to become a larger part of the U.S. energy mix and reducing energy-related carbon emissions. It has been estimated that with a 35% integration of wind and solar energy into the western U.S. electric grid, there would be an additional 25% to 45% reduction in carbon emissions (BLM 2022c). Based on this information there is potential for higher emissions over the short-term and reduced emissions over the long-term. The BLM cannot estimate the net effects across all energy markets to understand the mix of energy resources that will meet demand, and therefore cannot provide an estimate of SC-GHG for the No Action Alternative.

ESTIMATED GREENHOUSE GAS EMISSIONS FOR REASONABLY FORESEEABLE ENVIRONMENTAL TRENDS AND PLANNED ACTIONS

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 Chapter 5 of the 2021 Annual GHG Report (BLM 2022c). The 2021 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.

The 2021 Annual GHG Report provides an estimate of short-term and long-term GHG emissions from activities across the BLM's oil and gas program. The short-term methodology presented in the 2021 Annual GHG Report includes a trends analysis of 1) leased federal lands that are held-by-production, 2) approved APDs, and 3) leased lands from competitive lease sales occurring over the next annual reporting cycle (12 months), to provide a 30-year projection of potential emissions from federal oil and gas lease actions over the next 12 months. The long-term methodology uses oil and gas production forecasts from the EIA to estimate GHG emissions out to 2050 that could occur from past, present, and future development of federal fluid oil and gas. For both methodologies, the emissions are calculated using life-cycle-assessment emissions and data 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 2021 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.

Table 3.19 shows the aggregate GHG emissions estimate that would occur from federal leases, existing and foreseeable, between the years 2022 and 2050, using the methodology described above. The 5-year lease averages include all types of oil and gas leases, including leases granted under the MLA as well as

other authorities, that have been issued over the last 5 years. As such the projections made from the 5-year averages represent the potential for all types of future oil and gas development activity, and although not at exact acreages, include emissions that would be associated with the subject lease. However, they may also over-estimate the potential emissions from the 12-month cycle of competitive oil and gas leasing activities if the projected lease sale or development activity does not actually occur or is less than estimated.

Table 3.19. Reasonably Foreseeable Projected Emissions from Federal Lease Development

State (BLM Administrative Unit)	GHG Emissions from Past, Present, and Foreseeable Federal Lease Development (Mt CO_2e per year)
Alabama (Eastern States [ES])	9.34
Alaska	136.9
Arkansas (ES)	9.34
California	51.49
Colorado	243.1
Idaho	0.17
Illinois	0.31
Kansas (New Mexico State Office [NMSO])	3.32
Kentucky (ES)	0.19
Louisiana (ES)	43.29
Michigan (ES)	1.95
Mississippi (ES)	2.89
Montana	58.82
Nebraska (Wyoming State Office)	0.21
Nevada	2.74
New Mexico	1,939.52
New York	0.01
North Dakota (Montana State Office)	379.63
Ohio (ES)	0.37
Oklahoma (NMSO)	20.43
Pennsylvania	0.46
South Dakota (Montana State Office)	2.31
Texas (NMSO)	49.55
Utah	187.84
Virginia	0.15
West Virginia (ES)	0.45
Wyoming	1.487.65
Total	**4,614.81**

Note: Emissions obtained from 2021 2021 Annual GHG Report (BLM 2022c:Figure 5-1)

The most recent short-term energy outlook (STEO) published by the EIA (EIA 2023b) predicts that the world's oil and gas supply and consumption will increase over the next 18 to 24 months. The latest STEO

projections are useful for providing context for the No Action 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. The most recent STEO includes the following projections for the next 2 years:

- U.S. liquid fuels consumption is projected to increase to 20.45 million barrels per day (b/d) in 2023 up from 20.28 million b/d in 2022 and further increase to 20.76 million b/d in 2024.
- U.S. crude oil production is expected to average 11.9 million b/d in 2022 and to rise to 12.4 million b/d in 2023 and 12.63 b/d in 2024.
- U.S. natural gas consumption is expected to average 86.4 billion cubic feet per day (Bcf/d) in 2023, decreasing from 88.5 Bcf/d in 2022.
- U.S. liquid natural gas exports are expected to increase from 10.59 Bcf/d in 2022 to 12.07 Bcf/d in 2023 and 12.73 Bcf/d in 2024.
- U.S. coal production is expected to total 552 million short tons (MMst) in 2023 and 502.6 MMst in 2024 and decrease to 17% of total U.S. electricity generation in 2023 compared to 20% in 2022 driven by ongoing retirement of coal-fired generating plants.
- Generation from renewable sources will make up an increasing share of total U.S. electricity generation, rising from 22% in 2022 to 24% in 2023 and 26% 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) 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 2021). 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 2023a) 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. U.S. natural gas production is projected to increase 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 6 of the 2021 Annual GHG Report (BLM 2022c).

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 in order 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 economywide 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 or 2 degrees Celsius (°C) above preindustrial levels. The IPCC Special Report on Global Warming of 1.5ºC (IPCC 2018) 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. Carbon budgets were originally envisioned as being a convenient tool to simplify communication of a complex issue and to assist policymakers considering options for reducing GHG emissions on a national and global scale. Carbon budgets have not yet been established on a national or subnational scale, 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°C or 2.0°C are not useful for BLM decision making, particularly at the lease sale stage, as it is unclear what portion of the budget applies to emissions occurring in the United States.

However, stakeholders and members of the public have requested that the BLM consider comparing its predicted emissions in the context of global carbon budgets. Table 7-4 in the 2021 Annual GHG Report (BLM 2022c) provides an estimate of the potential emissions associated with BLM's fossil fuel authorizations in relation to IPCC carbon budgets. Total federal fossil fuel authorizations, including coal, natural gas, and oil, represent approximately 1.75% of a suggested global carbon budget of the 400 to 500 gigatonnes of CO_2 needed to limit global warming to 1.5°C.

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 IRA passed in 2022, the EIA 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 IRA. The Department of Energy's Office of Policy developed a preliminary assessment that finds the IRA and Bipartisan Infrastructure Investment and Jobs Act, in combination with past actions, are projected to reduce 2030 economy-wide GHG emissions to 40% below 2005 level, even with continued oil and gas leasing in the near term.

3.6.2.3 *Mitigation Strategies*

GHG emissions contribute to changes in atmospheric radiative forcing resulting in climate change impacts. GHGs act to contain solar energy loss by trapping longer-wave radiation emitted from the Earth's surface and act as a positive radiative forcing component. The buildup of these gases has contributed to the current changing state of the climate equilibrium toward warming. Chapters 8 and 9 of the 2021 Annual GHG Report (BLM 2022c) provide a detailed discussion of climate change science, trends, and impacts. 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) 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) can remove GHGs from the atmosphere or reduce emissions in other areas. Chapter 10 of the 2021 Annual GHG Report provides a more detailed discussion of GHG mitigation strategies (BLM 2022c).

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 NSPS for Crude Oil and Natural Gas Facilities (49 C.F.R. § 60, subpart OOOOa) which imposes emission limits, equipment design standards, and monitoring requirements on oil and gas facilities. 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 2021 Annual GHG Report (BLM 2022c).

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. 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 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 COAs, 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 2021 Annual GHG Report (BLM 2022c).

3.6.3 Issue 3: Water Use and Quantity

How would future potential development of the nominated lease parcels affect surface water and groundwater quantity?

The analysis area for this issue encompasses Woods and Pittsburg Counties, Oklahoma. This analysis area is used because water sources used to support future potential development of the nominated lease parcels would likely be sourced from these counties. Water use for development of the nominated lease parcels is assumed to primarily come from groundwater sources based on previous oil and gas development in the planning area.

Water uses associated with development of the nominated lease parcels would occur during the 30- to 60-day well construction and completion period (such as hydraulic fracturing), the 20-year operation period (e.g., water use associated with dust control), and interim and final reclamation. While most of the water use associated with oil and gas development is expected to occur within a 30- to 60-day well construction and completion period, the effect of this use on groundwater aquifers is expected to last until recharge occurs. Due to uncertainty about water sources and recharge rates, it is assumed that all water use associated with oil and gas development is likely to be a long-term effect. Additionally, the ability for aquifer recharge may be affected by drought conditions associated with climate change.

3.6.3.1 *Affected Environment*

CURRENT TOTAL WATER USE IN THE ANALYSIS AREA

The USGS report, *Estimated Use of Water in the United States in 2015* (Dieter et al. 2018a; herein incorporated by reference), lists total water withdrawals across eight water use categories: aquaculture, domestic, industrial, irrigation, livestock, mining, public water supply, and thermoelectric power. Water

use for 2015 in Woods and Pittsburg Counties is summarized in Table 3.20. As shown in the table, total county water use in 2015 was estimated at 20,501 acre-feet (AF). Water withdrawals are mostly from surface water and the largest water use category in the analysis area is public water supply, comprising 36.3% of total analysis area use. Mining use, which includes oil and gas development, comprises 14.9% of water use. Most of the water used for mining comes from surface water and is fresh.

Table 3.20. Analysis Area Water Use by Category, 2015

Category	Surface Water Withdrawals			Groundwater Withdrawals			Total Water Withdrawals			
	Fresh (AF)	Saline (AF)	Total (AF)	Fresh (AF)	Saline (AF)	Total (AF)	Fresh (AF)	Saline (AF)	Total (AF)	Percent Total Use
Public water supply	6,384.77	0	**6,384.77**	1,052.93	0	**1,052.93**	7,437.70	0	**7,437.70**	**36.3%**
Industrial	537.67	0	**537.67**	11.20	0	**11.20**	548.87	0	**548.87**	**2.7%**
Irrigation	0	0	**0**	5,746.30	0	**5,746.30**	5,746.30	0	**5,746.30**	**28.0%**
Livestock	963.32	0	**963.32**	1,052.93	0	**1,052.93**	2,016.24	0	**2,016.24**	**9.8%**
Aquaculture	0	0	**0**	0.00	0	**0.00**	0	0	**0.00**	**0%**
Mining	2,161.86	0	**2,161.86**	67.21	828.90	**896.11**	2,229.07	828.90	**3,057.97**	**14.9%**
Thermoelectric power	1,534.59	0	**1,534.59**	0.00	0	**0.00**	1,534.59	0	**1,534.59**	**7.5%**
Domestic	0	0	**0**	145.62	0	**145.62**	145.62	0	**145.62**	**0.7%**
Basin Totals	11,582.21	**0**	**11,582.21**	8,064.98	828.90	**8,893.88**	19,658.38	828.90	**2,0487.29**	**100%**

Source: Dieter et al. (2018b).

Notes: All volumes are shown in AF. The mining category row (shaded in table) is the category in which water use associated with the Proposed Action would fall. Note that totals of individual categories may not add up to county totals due to rounding.

CURRENT WATER USE ASSOCIATED WITH OIL AND GAS DEVELOPMENT

As part of oil and gas development, water is used for drilling fluid preparation and make-up water for completion fluids, in well stimulation (of which the most common method is hydraulic fracturing), as rig wash water, as coolant for internal combustion engines, for dust suppression on roads or well pads, and equipment testing. Water use associated with stimulation activities, which comprises the majority of water use during the well development phase, is dependent on many factors, including the type and length of the well, and the type and depth of the geologic formation (EPA 2016). Horizontal wells typically have longer well lengths, and therefore require more water than vertical wells for well completion (EPA 2016).

Estimates of median water use per well for hydraulic fracturing in Oklahoma range from 2.6 million gallons (8 AF) to 3 million gallons (9.21 AF) (EPA 2016). Water use for hydraulic fracturing in Oklahoma increased from 2000 to 2011, driven by volumes required for fracturing horizontal wells across the state (EPA 2016). The average annual hydraulic fracturing water use in 2011 and 2012 was 155.1 million gallons for Woods County and 349.0 million gallons for Pittsburg County (Appendix B of EPA 2016). The available data are insufficient to describe the extent to which reused wastewater is used as a percentage of total injected volume in Oklahoma. However, Oklahoma's Woodford Shale wastewater has been described as low in total dissolved solids; reuse of this wastewater could reduce the demand for fresh water (EPA 2016).

REASONABLY FORESEEABLE ENVIRONMENTAL TRENDS AND PLANNED ACTIONS

The 2019 OFO RMP Final EIS estimates that there could be between 775 and 3,054 new wells within the OFO planning area by 2040 (BLM and BIA 2019a). The RFD covers Kansas, Oklahoma, and Texas; it is unknown how many of these wells would be developed in each of the three states, or in Woods or Pittsburg Counties. With the estimates of median water use per well in Oklahoma ranging from 8.0 AF to 9.21 AF, development of the maximum RFD scenario would require between 24,432 AF and 28,127 AF, or between 1,222 AF and 1,406 AF of water in any given year if all wells were drilled horizontally (BLM and BIA 2019a). Note that this includes both federal and non-federal wells.

The projected annual use associated with the RFD scenario comprises about 5% to 6% of the analysis area's 2015 total water withdrawals (20,501 AF, which already includes past and present water use). Public water supply would remain the largest water use within the analysis area (currently 36.3% of all water use within analysis area).

As noted in Section 3.3.3, predicted effects from climate change for the analysis area include increases in temperatures, more frequent drought, and precipitation decreases, which would stress the region's primary water supply, the Ogallala Aquifer (BLM 2022a).

3.6.3.2 *Environmental Effects*

Drilling and completion of five horizontal wells on the nominated lease parcels is estimated to use 40 to 46.5 AF of groundwater. This calculation is based on a factor of 8.0 to 9.21 AF per horizontal well, which the BLM continues to consider a reasonable current estimate of water use associated with drilling and completion of a single horizontal well within the analysis area (EPA 2016). If more water-intensive stimulation methods (e.g., slickwater fracturing) are implemented or if laterals become longer, water use could increase. Alternatively, water use estimates could be lower if produced water is reused or recycled, or if less water-intensive stimulation methods are used (e.g., nitrogen) in hydraulic fracturing.

Water use associated with drilling and completion of each well is expected to occur within a 30- to 60-day period. If all wells were developed in a single year, groundwater water use associated with future potential development of the leases would result in a 0.20% to 0.23% increase of the analysis area total water use (20,501 AF). Assuming a 20-year development scenario for the Proposed Action (consistent with the RFD time frame), the water use associated with development of the lease parcels would be approximately 2 to 2.3AF for any given year, which represents approximately 0.01% of the analysis area's total annual water use in 2015.

The demand from future potential development of the nominated lease parcels (up to 46.5 AF) is negligible when contrasted with the estimated water demand of the full 2019 OFO RFD (up to 28,127 AF over 20 years or up to 1,406 AF in any given year) and the demands of other sectors (public water supply in particular, which used 7,443 AF in 2015) within the analysis area. Lease operators would be required to obtain water use permits for the withdrawal of water for well drilling, completion operations, and other water-related activities, unless the operator reports that water would be obtained from commercial permitted sources. All water uses would be evaluated at the time of proposed lease development in site-specific environmental review documentation and subject to standard lease terms and conditions and site-specific mitigation.

Produced water associated with development of the lease parcels is estimated at approximately 6,910,000 bbl of water. Produced water would be either recycled, reused, or disposed of in accordance with all applicable federal and state laws and regulations. Disposal of produced water would occur at

regulated and permitted commercial facilities (such as SWD wells). Water sourced from outside of the geological formation that is used in hydraulic fracturing, which remains in the geological formation after hydraulic fracturing is complete, is unlikely to be recovered for other uses (Kondash et al. 2018).

3.6.3.3 *Mitigation Measures and Residual Effects*

The BLM encourages the use of recycled water in hydraulic fracturing techniques but cannot require it. The OCC, which is responsible for permitting oil and gas wells in the state of Oklahoma, also does not require the use of recycled water in hydraulic fracturing. The BLM works with operators during their planning phases to collocate facilities for the management of water including extraction, reuse, treatment, storage, and disposal of water during the life cycle of lease development.

CHAPTER 4. CONSULTATION AND COORDINATION

The following consultation and coordination efforts with tribes, individuals, organizations, and agencies were conducted for the proposed leasing actions.

4.1 ENDANGERED SPECIES ACT CONSULTATION

BLM OFO biologists have reviewed the proposed leasing and determined it would comply with threatened and endangered species management guidelines outlined in the 2020 Oklahoma, Kansas, and Texas BLM RMP. The BLM also completed a review of current species listings within the vicinity of the nominated lease parcels using the USFWS IPaC system in March 2023 under Consultation Code 2023-0055266 (Pittsburg County) and Consultation Code 2023-0055278 (Woods County); see AIB-8 for species-specific information (USFWS 2023, accessed March 13, 2023). The BLM would initiate Section 7 consultation with the USFWS in compliance with the ESA for species not previously analyzed in the 2020 Oklahoma, Kansas and Texas BLM RMP's Biological Assessment (BLM and BIA 2019b) if during site selection federally listed species are found to have a potential to be present or impacted during lease development, if applicable. No further consultation with the USFWS is required at this stage.

Although not expected to be present, any federally listed fish species found to have a potential to be present or impacted during site selection would require a separate "effects determination" made at a site-specific project level to ensure that water used for drilling operations is properly permitted from existing legal sources (no new water depletions) and is in compliance with the ESA. Any new water depletion would likely require Section 7 consultation under the ESA.

While federal regulations and policies require the BLM to make its public land and resources available on the basis of the principle of multiple uses, 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 Threatened or Endangered by the USFWS. Official species lists, whether obtained via IPaC or local USFWS offices, are valid for 90 days. After 90 days, project proponents should confirm their results on IPaC by requesting an "updated" official species list for their project.

Additionally, the BLM continues to review the available climate science in connection with its statutory responsibilities, including under NEPA, and has found that despite advances in climate science, "global climate models are unable to forecast local or regional effects on resources as a result of specific emissions." Any contribution to global climate processes from the issuance of leases is simply too remote, speculative, and undetectable to trigger ESA Section 7 consultation, given accumulated and persisting GHGs already in the atmosphere, the annual volume of GHG emissions that will occur globally regardless of additional lease issuance, and projected continued climate change. The 2021 Annual GHG Report

(BLM 2022c) concludes that "unlike other common air pollutants, the ecological impacts that are attributable to the GHGs are not the result of localized or even regional emissions but are entirely dependent on the collective behavior and emissions of the world's societies" and notes "the lack of climate analysis tools and techniques that lend themselves to describing the physical climate or earth system responses, such as changes to sea level, average surface temperatures, or regional precipitation rates, that could be attributable to emissions associated with any single [land management] action or decision" (BLM 2022c:18, 65). In addition, according to Federal Register 87:64700, *Threatened Species Status for Emperor Penguin With Section 4(d) Rule* (October 26, 2022), "based on the best scientific data available we [the USFWS] are unable to draw a causal link between the effects of specific GHG emissions and take of the emperor penguin in order to promulgate more specific regulations under [ESA Section] 4(d)."

4.2 TRIBAL CONSULTATION

Tribal consultation for the BLM is guided by a variety of laws, Executive Orders and Memoranda, as well as case law. Laws include the NHPA and subsequent amendments, Public Law (PL) 89-665, 15 October 1966; the Archaeological Resources Protection Act of 1979, PL 96-95, 16 U.S.C. § 470aa-mm, 31 October 1979; the American Indian Religious Freedom Act of 1978, PL 95-341, U.S.C. § 1996 and 1996a, 11 August 1978; NEPA, PL 91-190, 42 U.S.C. § 4321-4347, 1 January 1970; the Native American Graves Protection and Repatriation Act of 1990, PL 101-601, 16 November 1990; and the FLPMA, PL 94-579, 21 October 1976. Executive orders and memoranda include a 1994 Memorandum on Government-to-Government Relations with Native American Tribal Governments (59 Federal Register 85, 4 May 1994), Executive Order 13007 on Accommodation of Sacred Sites (61 Federal Register 104, 29 May 1996), and Executive Order 12898 on Environmental Justice (59 Federal Register 32, 16 February 1994).

The BLM has initiated government-to-government consultation for the proposed lease sale. Tribal consultation is a separate process from public scoping, due to the unique relationship between the U.S. Government and federally recognized Tribes. The primary methods of tribal consultation include letters providing November 2023 lease sale information materials, telephone calls, and/or face-to-face meetings, if requested.

The BLM initiated government-to-government consultation under NEPA on January 25, 2022, and March 14, 2023, with the with the Caddo Nation, Cherokee Nation, Cheyenne and Arapaho Tribes of Oklahoma, Chickasaw Nation, Choctaw Nation, Kialegee Tribal Town, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, Osage Nation, Ponca Tribe of Oklahoma, Quapaw Nation, Southern Ute Indian Tribe, Keetoowah Band of Cherokee, Wichita and Affiliated Tribes, and Wyandotte Nation. The Caddo Nation THPO responded to the NEPA correspondence on February 7, 2023, and stated that they have no additional information to add at this time. The Quapaw Nation THPO responded to the NEPA consultation on February 9, 2023, stating the Nation did not wish to consult further under Section 106. As a result, no Section 106 consultation was sent to the Quapaw Nation. The Cherokee Nation THPO, responded to NEPA correspondence on March 2, 2023, stating the Nation did not foresee the project impacting any known Cherokee Nation cultural resources.

Consultation under NHPA Section 106 was sent to the THPO of each Tribe mentioned above, except the Quapaw Nation, based upon their area of interest and/or area of jurisdiction under Section 106. In their letters to Tribes with interests in Pittsburg County, the BLM explained that one of the nominated lease sale parcels (0047) is located under the Chambers Cemetery in Pittsburg County, Oklahoma, and that, because of this cultural resource conflict, the parcel may be removed as the NEPA process continued. Therefore, the BLM chose to remove the parcel from the NHPA Section 106 process. The Caddo Nation

responded to the Section 106 correspondence on March 22, 2023, and stated they have no additional information to add at this time.

The parcels in Pittsburg County, Oklahoma (parcels 0047 and 0053) are within the confines of the Choctaw Nation Reservation. The Choctaw Nation THPO responded on April 14, 2023, and requested that the survey be completed for the parcels in Pittsburg County, Oklahoma due to the number of known sites near the parcel and the lack of recent cultural resource surveys for the area. The BLM responded via email on April 27, 2023, explaining the two-tier approach the BLM takes for oil and gas lease projects. The BLM further explained this in a phone call and email on May 15, 2023. At that time, the Choctaw Nation THPO expressed concerns about potential effects that various activities and situations around oil drilling, such as emergency mitigation due to spills or earthquakes, could have on sensitive sites. The Choctaw Nation THPO and BLM decided a meeting would be needed to discuss these concerns in detail with the appropriate BLM specialists that could provide information directly related to these concerns. That meeting occurred in July 2023, where the Choctaw Nation THPO expressed continued concerns over potential resource effects, as well as the inability of the BLM to require cultural resource surveys on private lands. No other Native American concerns have been identified; however, this consultation is considered ongoing.

4.3 STATE HISTORIC PRESERVATION OFFICE AND TRIBAL HISTORIC PRESERVATION OFFICE CONSULTATION

The BLM sent NHPA Section 106 consultation letters to the Choctaw Nation and Oklahoma Historical Society State Historic Preservation Office (SHPO), and Oklahoma Archeological Survey (OAS) on March 14, 2023. The Choctaw Nation were jointly consulted along with the SHPO and OAS on the parcel in Pittsburg County, as the county is located within the exterior boundary of the Choctaw Nation. SHPO and OAS were consulted on parcels in both Wood and Pittsburg Counties.

In these letters, the BLM provided information on the proposed lease and a cultural resources literature review. In its correspondence, the BLM explained the records search revealed that one of the nominated lease sale parcels (0047) is located under the Chambers Cemetery in Pittsburg County, Oklahoma. This cultural resource conflict indicated the parcel may be deferred as the NEPA process continued. Therefore, the BLM chose to remove the parcel from the NHPA Section 106 process.

The BLM made a determination of No Historic Properties Affected, as defined in 36 C.F.R. § 800.4(d)(1) for the lease sale. The Oklahoma SHPO responded on April 6, 2023, and concurred with the BLM's determination of effect. In a letter dated April 6, 2023, the OAS stated that it lacks sufficient information to concur with the BLM's recommended finding. The BLM responded to this letter on June 1, 2023. The OAS has not responded to the BLM as of July 12, 2023.

The Choctaw Nation THPO Office responded on April 14, 2023, that it requested a survey be completed for the parcels in Pittsburg County, Oklahoma due to the number of known sites near the parcel and the lack of recent cultural resource surveys for the area. The BLM responded via email on April 27, 2023, explaining the two-tier approach the BLM takes for oil and gas lease projects. The BLM further explained this in a phone call and email on May 15, 2023. At that time, the Choctaw Nation THPO expressed concerns about potential effects that various activities and situations around oil drilling, such as emergency mitigation due to spills or earthquakes, could have on sensitive sites. The Choctaw Nation THPO and BLM decided a meeting would be needed to discuss these concerns in detail with the appropriate BLM specialists that could provide information directly related to these concerns. That meeting occurred in July 2023. This consultation is considered ongoing.

CHAPTER 5. LIST OF PREPARERS

Table 5.1 contains a list of individuals that contributed to preparation or review of this EA.

Table 5.1. List of EA Preparers

Name	Area of Expertise	Organization
Melissa Fisher	Natural Resource Specialist	BLM OFO
Jeremiah Zurenda	Wildlife Biologist	BLM OFO
Erin Knolles	Archeologist	BLM OFO
Patrick Rich	Planning and Environmental Coordinator	BLM OFO
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Phil Gensler	Paleontologist	BLM NMSO
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Eliza Hines	Senior Environmental Planner	SWCA Environmental Consultants
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Georgia Knauss	Lead Paleontologist	SWCA Environmental Consultants
Jenn Clayton	Project Manager and Senior Environmental Planner	SWCA Environmental Consultants
Lili Perreault, PhD	Project Ecologist	SWCA Environmental Consultants
Paige Marchus	NEPA Subject Matter Expert and Senior Natural Resources Director	SWCA Environmental Consultants

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APPENDIX A. MAPS

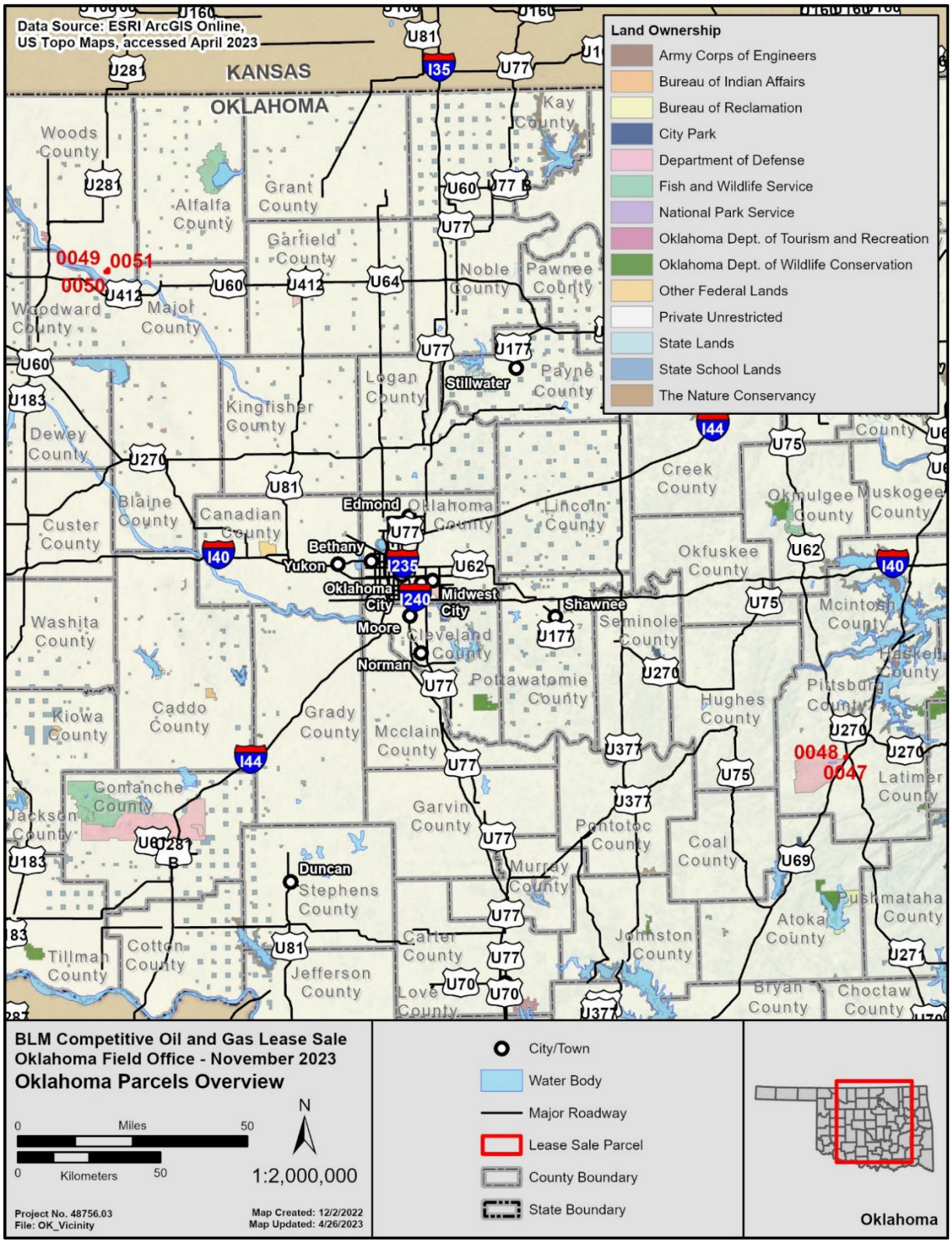

Figure A.1. Overview of the nominated lease parcels analyzed within this EA, within the BLM OFO.

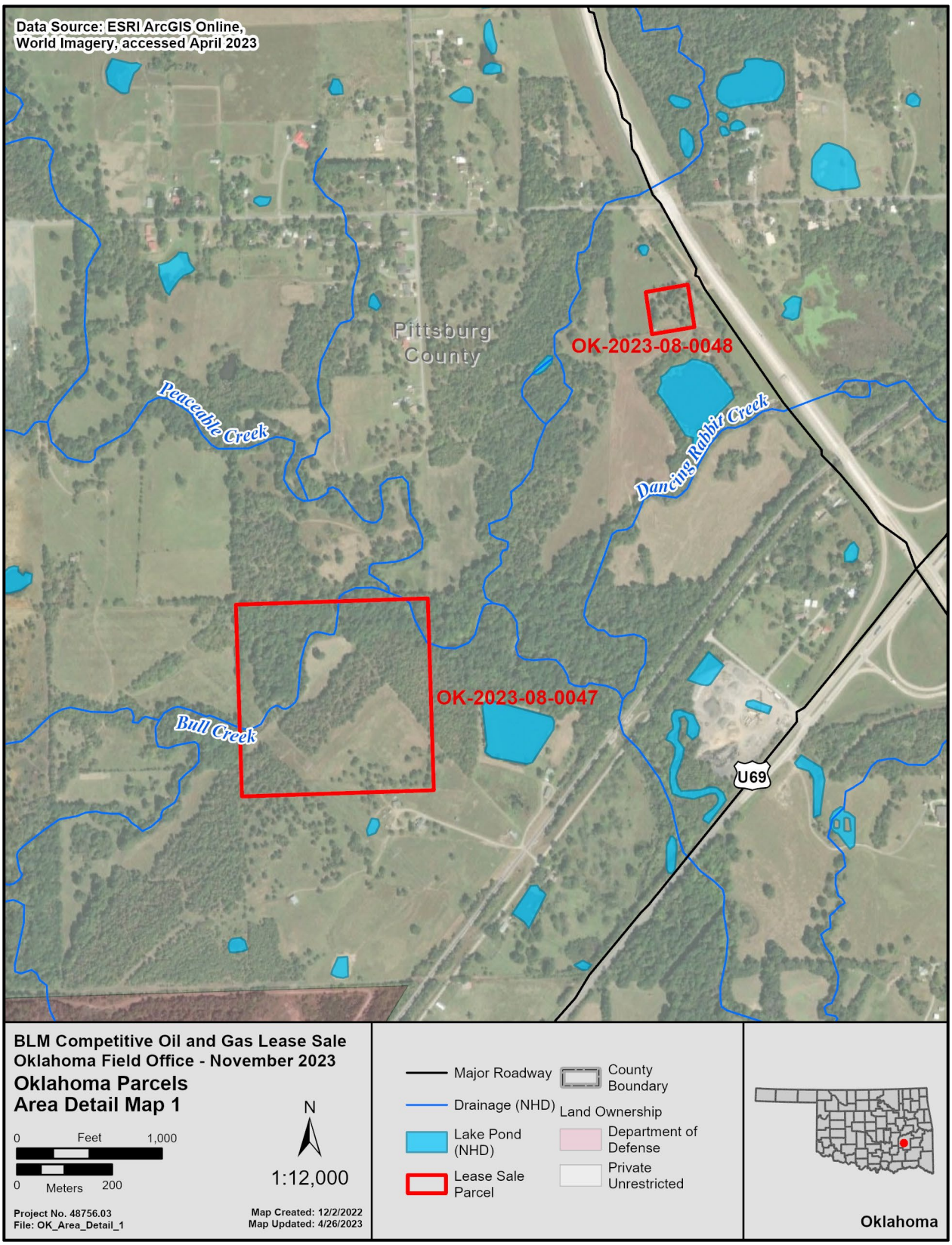

Figure A.2. Detailed map of nominated lease parcels 0053 and 0047 in Pittsburg County, Oklahoma.

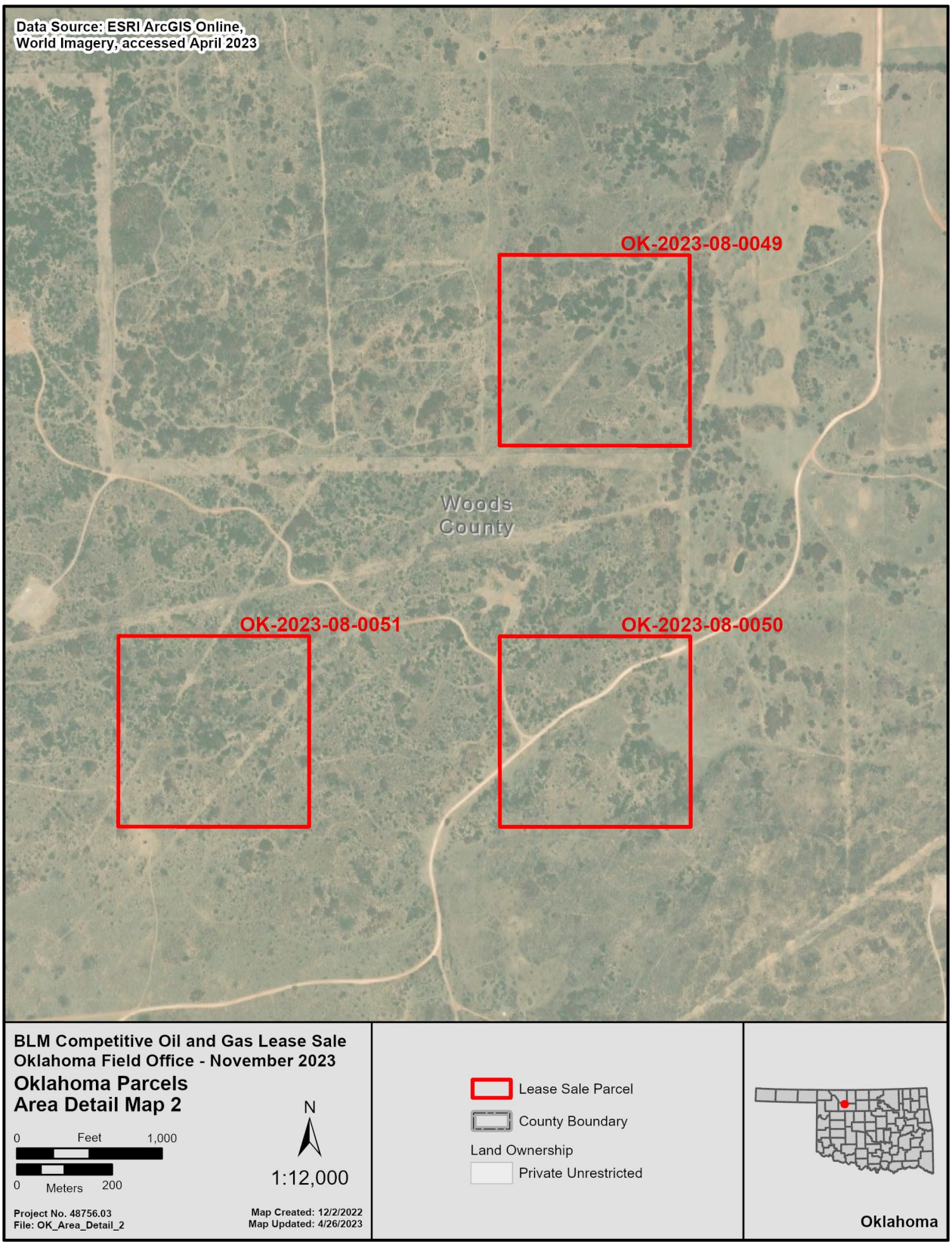

Figure A.3. Detailed map of nominated lease parcels 0049, 6883, and 6884 in Woods County, Oklahoma.

APPENDIX B. OKLAHOMA FIELD OFFICE LEASE NOTICE AND STIPULATION SUMMARY

Table B.1. Lease Notices and Stipulations

Notice or Stipulation	Title and Description*
HQ-TES-1	**THREATENED AND ENDANGERED SPECIES CONSULTATION**
	The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. The BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. The BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. The BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended (16 U.S.C. § 1531 et seq.), including completion of any required procedure for conference or consultation.
HQ-CR-1	**CULTURAL RESOURCES AND TRIBAL CONSULTATION**
	This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations (e.g., SHPO and tribal consultation) under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.
HQ-MLA-1	**LEASE NOTICE- MINERAL LEASING ACT SECTION 2(A)(2)(A)**
	Provisions of the Mineral Leasing Act (MLA) of 1920, as amended by the Federal Coal Leasing Amendments Act of 1976, affect an entity's qualifications to obtain an oil and gas lease. Section 2(a)(2)(A) of the MLA (30 U.S.C. § 201(a)(2)(A)), requires that any entity that holds and has held a federal coal lease for 10 years beginning on or after August 4, 1976, and that is not producing coal in commercial quantities from each such lease cannot qualify for the issuance of any other lease granted under the MLA. 43 C.F.R. § 3472 explains coal lessee compliance with Section 2(a)(2)(A). In accordance with the terms of this oil and gas lease with respect to compliance by the initial lessee with qualifications concerning federal coal lease holdings, all assignees and transferees are hereby notified that this oil and gas lease is subject to cancellation if 1) the initial lessee as assignor or as transferor has falsely certified compliance with Section 2(a)(2)(A) because of a denial or disapproval by a state office of a pending coal action, i.e., arms-length assignment, relinquishment, or logical mining unit; 2) the initial lessee as assignor or as transferor is no longer in compliance with Section 2(a)(2)(A); or 3) the assignee or transferee does not qualify as a bona fide purchaser and, thus, has no rights to bona fide purchaser protection in the event of cancellation of this lease due to noncompliance with Section 2(a)(2)(A). The lease case file, as well as in other BLM records available through the state office issuing this lease, contains information regarding assignor or transferor compliance with Section 2(a)(2)(A).
NM-11-LN	**LEASE NOTICE – CULTURAL RESOURCES**
	All development activities proposed under the authority of this lease are subject to compliance with Section 106 of the NHPA and Executive Order 13007. The lease area may contain historic properties, traditional cultural properties (TCPs), and/or sacred sites currently unknown to the BLM that were not identified in the Resource Management Plan or during the lease parcel review process. Depending on the nature of the lease developments being proposed and the cultural resources potentially affected, compliance with Section 106 of the NHPA and Executive Order 13007 could require intensive cultural resource inventories, Native American consultation, and mitigation measures to avoid adverse effects—the costs for which will be borne by the lessee. The BLM may require modifications to or disapprove proposed activities that are likely to adversely affect TCPs or sacred sites for which no mitigation measures are possible. This could result in extended time frames for processing authorizations for development activities, as well as changes in the ways in which developments are implemented.

Notice or Stipulation	Title and Description*
NM-14-LN	**LEASE NOTICE – PALEONTOLOGICAL RESOURCES**
	All development in this lease will be subject to compliance with the National Environmental Policy Act (NEPA) and Federal Land Policy and Management Act (FLPMA). The lessee shall immediately notify the BLM Authorized Officer (AO) of any paleontological resources discovered as a result of approved surface-disturbing operations. The lessee shall suspend all activities in the vicinity of such discovery until notified to proceed by the AO and shall protect the discovery from damage or looting. The AO will evaluate, or will have evaluated, such discoveries after being notified and determine after consulting with the operator and the BLM Regional Paleontologist, the appropriate measures to mitigate adverse effect on significant paleontological resources. Upon approval of the AO, the operator will be allowed to continue construction through the site or will be given the choice of either following the AO's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or following the AO's instructions for mitigating impacts on the fossil resource prior to continuing construction through the project area. The lessee is responsible for any cost associated for mitigating paleontology resources discovered as a result of their activities. In addition, surface occupancy or use may be subject to special operating constraints.
OFO-1-CSU	**CONTROLLED SURFACE USE – SENSITIVE SOILS**
	The lease or portions of the lease contain sensitive soils. Soils susceptible to erosion at excessive rates (per Natural Resources Conservation Service Highly Erodible Land (HEL) definition and Skidmore Wind Erodibility Groups 1 or 2) and/or biological soil crusts (BSC) (per U.S. Department of Interior BLM Technical Reference 1730-2 2001; *Biological Soil Crusts: Ecology and Management*), which are found to be sensitive to surface disturbance, shall be avoided. Parcels exhibiting sensitive soils characteristics shall undergo a site-specific survey by a BLM-approved specialist to identify necessary special design, construction, implementation, mitigation, and/or reclamation measures. Surface-disturbing activities may require relocation beyond standard lease terms and conditions (i.e., 656 feet). The mandated relocation, beyond standard lease terms and conditions, shall be communicated to the lessee/operator through conditions of approval at the Application for Permit to Drill stage to avoid adverse impacts on sensitive soils on or near the lease parcel. If avoidance of sensitive soils is unattainable under standard lease terms and conditions, the operator/lessee shall be required to submit an operation plan to the BLM Authorized Officer. The operation plan shall require, but is not limited to, special design, construction, and implementation measures describing how impacts on sensitive soils would be prevented or minimized, and how disturbed sited would be successfully reclaimed, in accordance with federal and state reclamation mandates.
OFO-2-CSU	**AMERICAN BURYING BEETLE**
	This lease may contain suitable habitat for American Burying Beetle (ABB), a federally listed species. The lessee is required to adhere to the current protocol for ABB as determined by USFWS, and may be subject to constraints including but not limited to: • A clearance survey conducted by a qualified biologist may be required in all ABB suitable habitat. • If the survey is positive and reveals that beetles are present, no construction or ground-disturbing activities will be allowed during the active season while the ABB remains above ground unless the lessee is issued a take permit by the USFWS. • If the clearance survey is negative, surface disturbance and construction will be allowed during the active season. A new survey may be required for any new projects proposed in the next active season when the beetles emerge above ground.

Notice or Stipulation	Title and Description*
OFO-4-CSU	**SPECIAL STATUS BAT SPECIES**
	The lease or portions of the lease is known to contain Special Status Bat Species (SSBS) habitat. Parcels potentially containing SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat shall undergo a site-specific survey by a BLM-approved specialist/biologist to identify necessary special design, construction, implementation, and/or mitigation measures. Based on survey results, planned surface disturbing activities the BLM specialist/biologist has assessed to be sufficiently threatening to SSBS roosts or hibernacula within USFWS confirmed habitat during the site-specific survey shall require relocation of surface disturbing activities to a geographic position that meets current regulatory and BLM/USFWS policy requirements. The mandated relocation, beyond standard lease terms and conditions (i.e., 200 meters/ 656 feet), shall be communicated to the lessee/operator through a Condition of Approval (COA) at the Application for Permit to Drill (APD) stage. If the BLM's site-specific survey results reveal the existence of SSBS maternity roosts or hibernacula within USFWS confirmed habitat and appropriate surface disturbing activity relocation is unattainable, additional protective/mitigation measures shall be required of the lessee and/or operator, to include, but not limited to, the following: • Development and implementation of a BLM-approved mitigation/protection plan for activities known to cause adverse impacts on SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat. This plan shall require, but is not limited to, special design, construction, and implementation measures describing how adverse impacts on known SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat would be prevented or mitigated. • Disturbance area minimization, utilization of previously existing disturbed areas, roads, well-pads, and corridors, and implementation of mitigation measures such as operational twinning.
OFO-1-NSO	**FLOODPLAINS**
	All or portions of the lands lie in or are adjacent to a major watercourse and are subject to periodic flooding. No surface occupancy or use is allowed within areas of a Federal Emergency Management Agency (FEMA) or similarly identified floodplain. Directional drilling from outside the floodplain into federal minerals beneath the floodplain is allowed, provided that it does not adversely affect the natural hydrology and geomorphology. **Exception**: An exception allowing surface occupancy beyond floodway encroachment lines (the lines marking the limits of floodways on federal, state, and local floodplain maps), or the Regulatory Flood Fringe (the area on either side of the floodway) may be allowed below the base flood elevation (BFE) if the lessee can demonstrate that the proposed action has sufficient mitigation, floodproofing, and engineering design features to prevent adverse impacts on the chemical, physical, and biological functions of the relevant floodplain, floodway, and adjacent body of water contributing to flooding, as defined by the official FEMA Flood Boundary Floodway Map (FBFM) and the FEMA Flood Hazard Boundary Map (FHBM), and a variance is permitted by the State's coordinating agency.
OFO-4-NSO	**NO SURFACE OCCUPANCY – RIPARIAN-WETLAND AREAS AND WATERBODIES**
	All or portions of the lands under this lease contain wetland-riparian areas and/or waterbodies. Riparian-wetland areas and/or waterbodies include but are not limited to perennial, ephemeral, or intermittent streams; springs, seeps, lakes, ponds, reservoirs, and playas. No surface occupancy is allowed within these areas and within an area that begins and extends up to 415 feet landward from the outside edge of the riparian-wetland area or waterbody, as determined by the BLM biologist prior to any surface-disturbing activities. **Modification:** A modification may be granted if it is determined that a portion of the area does not qualify as a riparian-wetland area or waterbody, or if scientific research indicates that a lesser or more restrictive buffer is appropriate for managing these riparian-wetland/waterbody areas.
OFO-4-LN	**LEASE NOTICE – MIGRATORY BIRDS AND BIRDS OF CONSERVATION CONCERN**
	The lease or portions of the lease fall within the Central Flyway for Migratory Birds. As defined in the requirements for the BLM site survey, which will be conducted at the Application for Permit to Drill stage, the BLM may require the project proponent to follow additional conditions of approval. These would be imposed to mitigate impacts on migratory birds under the Migratory Bird Treaty Act and USFWS Birds of Conservation Concern. If surface-disturbing activities occur during the migratory birds' nesting season (which varies by species and could be any time between December 15 to July 30), surveys for ground- and tree-nesting birds may be required to be conducted by an entity approved by the BLM Authorized Officer. If active nests are identified, surface-disturbing activities may be delayed until the nesting activities are complete. The project proponent must consult with the BLM to determine whether a survey is required, the extent of the survey, and the timing of the nesting season.

Notice or Stipulation	Title and Description*
OFO-5-LN	**LEASE NOTICE – FEDERAL MINERALS**
	Other federal minerals, including but not limited to, asphalt, salt and coal, may exist on this lease or portions of the lease. If other federal minerals are present, then the oil and gas lessee and operators are required to coordinate development with the other federal minerals lessee, and vice versa. Operations authorized by this lease may be altered or modified by the authorized officer in order to conserve and protect the other mineral resources and provide for simultaneous operations. Some areas may not be drillable due to multiple mineral resources present.
OFO-8-LN	**LEASE NOTICE – CULTURAL RESOURCES AND TRIBAL CONSULTATION**
	This lease may be found to contain historical properties or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders. The BLM would not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations, for example, to consult with the SHPO and Tribes, under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties or may disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized, or mitigated.

*Stipulation descriptions are summarized for brevity. The full text of all stipulations, including all modifications, waiver, and exceptions, can be found in the March 2020 Oklahoma, Kansas, and Texas BLM Approved RMP, with Record of Decision (BLM 2020).

APPENDIX C. LEASING PREFERENCE RATINGS FOR NOMINATED LEASE PARCELS

In accordance with Instruction Memorandum 2023-007, *Evaluating Competitive Oil and Gas Lease Sale Parcels for Future Lease Sales*, the BLM has evaluated the nominated lease parcels against five criteria to determine each parcel's leasing preference. Two of the nominated lease sale parcels are rated as low based on their proximity to existing development, recreational and other resource concerns (e.g., habitat and cultural resources), and oil and gas potential. The BLM is deferring two parcels from further consideration for leasing (parcels 0047 and 0053) due to cultural resource concerns which cannot be mitigated through stipulations and COAs. With the exception of parcels 0047 and 0053, the BLM is moving all other parcels forward for leasing, furthering the intent of Section 50265 of the Inflation Reduction Act (IRA), 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 lesser of 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.

Leasing Preference Rating based on the Following Criteria								
Parcel Information		**Preference Criteria**					**Preference for Leasing:**	
Office	**Parcel**	**1 Proximity to Existing Development***	**2 Habitat****	**3 Cultural Resources†**	**4 Recreation/ Other Resources‡**	**5 High Potential§**	**High**	**Low**
OFO	0053	Low	Low	Low	Low	Low		X
OFO	0047	Low	Low	Low	Low	Low		X
OFO	0049	High	Low	High	High	Low	X	
OFO	6883	High	Low	High	High	Low	X	
OFO	6884	High	Low	High	High	Low	X	

*Determinations in this column are made by reviewing aerial imagery for signs of existing oil and gas development within 5 miles of the parcel boundaries.

** Low determinations within this column were due to the presence of potentially suitable habitat for ESA listed species. Protections for ESA suitable habitat would be provided through stipulations and COAs attached to the parcels (see Table 2.1). See Appendix B for full descriptions of stipulations. Due to the protections offered through stipulations and COAs, the BLM proposes moving these parcels forward for leasing, assuming other preference criteria ratings do not disqualify any parcels from further consideration.

†Low determinations in this column were made if a cultural site exists within the parcel. Parcel 0047 is located under the Chambers Cemetery in Pittsburg County, Oklahoma. In addition, the Choctaw Nation THPO expressed concerns over potential cultural resource effects on parcels 0047 and 0053, as well as concerns over the inability of the BLM to require cultural resource surveys on private lands. Therefore, the BLM is deferring these two parcels from further consideration for leasing due to cultural resource conflicts that cannot be mitigated through stipulations and COAs.

‡Low determinations within this column were due to known surface water occurrences (parcel 0053) and environmental justice resources of concern (parcel 0047). Stipulations OFO-1-NSO and OFO-4-NSO would be applied to parcel 0053 and would prohibit surface disturbance within floodplains, riparian-wetland areas, and waterbodies (up to 415 feet landward from the edge of wetland or waterbody, as determined by the BLM biologist prior to any surface-disturbing activities) (see Appendix B). Due to the protections offered through stipulations and COAs, the BLM proposes moving this parcel forward for leasing. Parcel 0047 is located under the Chambers Cemetery in Pittsburg County, Oklahoma, which the BLM considers a resource of concern for environmental justice communities. Based on this resource concern, the BLM is deferring the parcel from the lease sale.

§Determinations in this column are made using the RFD scenario and considers site-specific changes that may have occurred since the RMP was signed.

APPENDIX D. 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,[4] and perforating the casing in target zones. If a well is going to be drilled directionally,[5] horizontally,[6] or vertically[7] 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

[4] According to BLM regulations from 43 C.F.R. § 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.

[5] 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).

[6] 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).

[7] 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 reestablishing 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 C.1 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[8] 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.

[8] 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 (HF) 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 (within Mancos shale geologic formations, for example), 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 are usually needed to perform hydraulic fracturing. 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 make-up of fracturing fluid varies from one geologic basin or formation to another. Because the make-up 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 most 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.

In Oklahoma, there are no state regulations regarding the handling and disposal of NORM wastes produced during the exploration and production of oil and gas. However, testing is required prior to disposal of pipes, tanks, and pipe deposits per BLM's APD requirements.

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 declines 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 D.1 includes some of the common wastes (hazardous and nonhazardous) that are produced during oil and gas development.

Table D.1. 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	

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APPENDIX E. ENVIRONMENTAL JUSTICE MAPS AND DATA

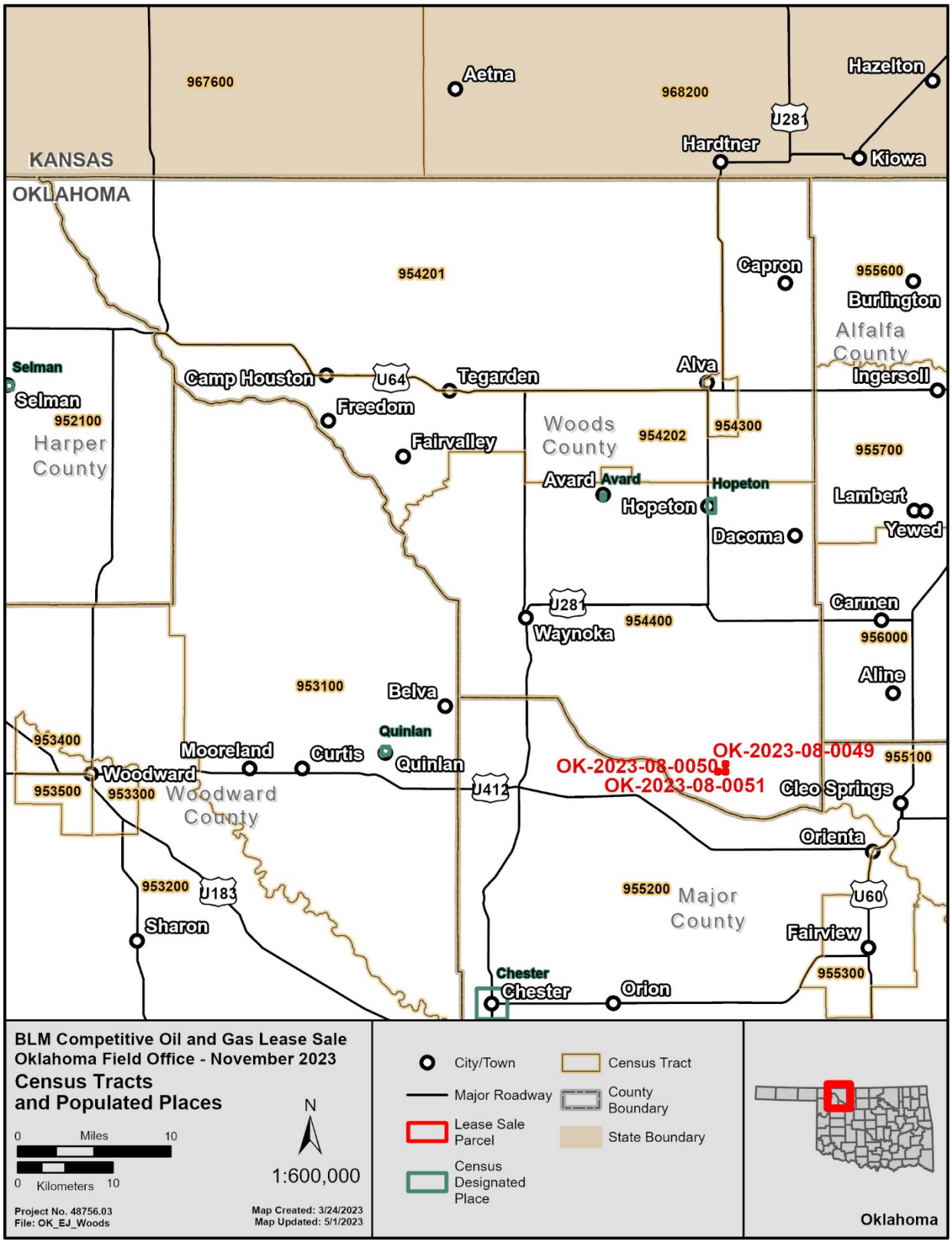

Figure E.1. Environmental justice analysis area and census tracts in Woods County, Oklahoma.

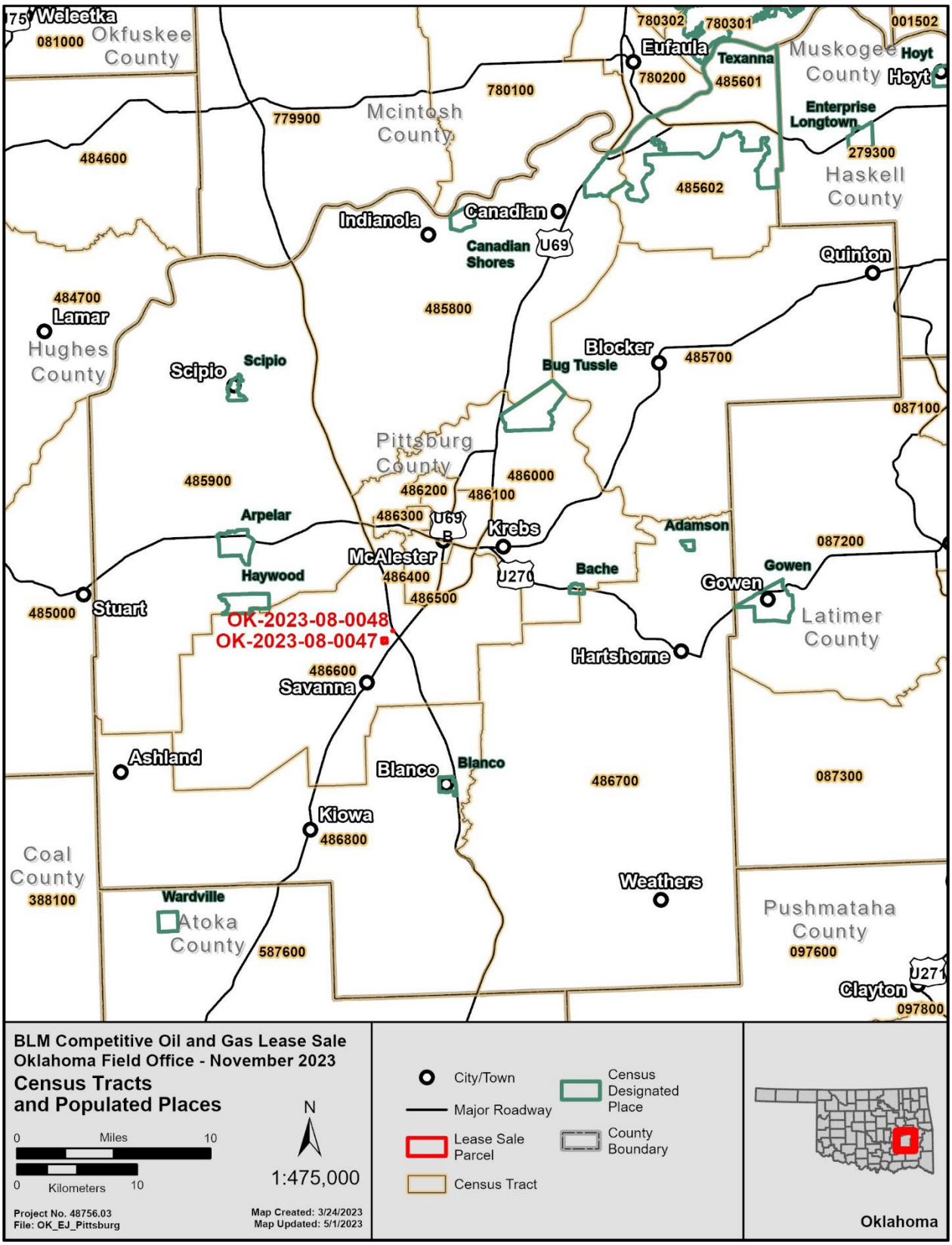

Figure E.2. Environmental justice analysis area and census tracts in Pittsburg County, Oklahoma.

Table E.1. Low-Income and Minority Populations Applicable to the Area of Analysis

Analysis Unit	Total Population	Minority Populations*									Low-Income Populations†	
		Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino (of any race)	White Alone‡	Total Minority Population§	Individuals	Families
United States¶	326,725,481	12.6%	0.8%	5.7%	0.2%	5.6%	7.0%	18.4%	59.4%	40.6%	29.2%	23.0%
Oklahoma (110% meaningfully greater threshold)#	3,948,136	7.2% (7.9%)	7.7% (8.5%)	2.2% (2.4%)	0.2% (0.22%)	3.0% (3.3%)	10.0% (11.0%)	11.2% (12.3%)	64.2%	35.8% (39.4%)	35.7%	28.5%
Counties												
Woods County, Oklahoma	8,731	3.4%	3.0%	0.3%	0.0%	0.9%	4.1%	7.3%	82.8%	17.2%	35.4%	20.0%
Pittsburg County, Oklahoma	43,836	2.5%	5.9%	0.5%	0.16%	0.7%	19.1%	5.6%	68.0%	32.0%	39.3%	32.7%
Census Tracts												
Woods County												
Census Tract 9542.01, Woods County	2,614	1.6%	1.8%	0.6%	0.0%	0.0%	5.4%	3.0%	87.7%	12.3%	27.6%	18.9%
Census Tract 9542.02, Woods County	1,713	7.6%	1.4%	0.1%	0.0%	0.4%	3.4%	3.6%	85.2%	14.8%	31.6%	10.2%
Census Tract 9543, Woods County	2,854	4.4%	1.9%	0.2%	0.0%	2.3%	3.1%	13.7%	77.5%	22.5%	46.2%	28.2%
Census Tract 9544, Woods County	1,550	0.0%	8.8%	0.0%	0.0%	0.5%	4.4%	6.8%	81.4%	18.6%	36.2%	21.8%
Pittsburg County												
Census Tract 4856.01, Pittsburg County, Oklahoma	1,038	0.0%	7.9%	0.0%	0.0%	0.0%	11.1%	1.5%	79.5%	20.5%	40.3%	33.4%
Census Tract 4856.02, Pittsburg County, Oklahoma	1,914	0.0%	3.0%	0.1%	0.0%	0.0%	10.6%	2.8%	83.5%	16.5%	33.3%	24.3%

Analysis Unit	Total Population	Minority Populations*									Low-Income Populations†	
		Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino (of any race)	White Alone‡	Total Minority Population§	Individuals	Families
Census Tract 4857, Pittsburg County, Oklahoma	1,887	1.0%	4.9%	0.0%	0.21%	0.3%	26.3%	8.0%	61.1%	38.9%	37.8%	29.1%
Census Tract 4858, Pittsburg County, Oklahoma	4,546	2.6%	2.9%	0.6%	0.5%	0.7%	17.1%	8.2%	69.5%	30.5%	39.0%	32.3%
Census Tract 4859, Pittsburg County, Oklahoma	2,217	0.0%	9.2%	0.5%	0.0%	0.0%	15.8%	1.7%	73.8%	26.2%	30.2%	25.3%
Census Tract 4860, Pittsburg County, Oklahoma	4,558	1.0%	3.6%	0.0%	0.0%	0.0%	19.2%	4.0%	73.3%	26.7%	31.6%	30.6%
Census Tract 4861, Pittsburg County, Oklahoma	4,662	2.8%	6.3%	0.8%	0.0%	0.3%	21.9%	10.8%	60.6%	39.4%	51.3%	40.5%
Census Tract 4862, Pittsburg County, Oklahoma	3,357	4.4%	8.2%	0.3%	0.0%	2.9%	14.8%	6.8%	66.9%	33.1%	51.8%	46.2%
Census Tract 4863, Pittsburg County, Oklahoma	1,305	27.0%	8.2%	0.9%	0.0%	5.3%	17.5%	9.1%	38.1%	61.9%	45.8%	57.1%
Census Tract 4864, Pittsburg County, Oklahoma	2,497	1.8%	8.9%	0.4%	1.5%	2.4%	19.3%	7.2%	62.8%	37.2%	68.4%	57.0%
Census Tract 4865, Pittsburg County, Oklahoma	6,257	2.3%	5.6%	0.9%	0.0%	0.3%	11.7%	3.7%	77.4%	22.6%	31.2%	27.2%
Census Tract 4866, Pittsburg County, Oklahoma	3,072	0.6%	5.3%	0.5%	0.1%	0.6%	20.2%	3.3%	70.7%	29.3%	25.9%	25.4%
Census Tract 4867, Pittsburg County, Oklahoma	4,676	0.9%	6.1%	0.4%	0.0%	0.2%	30.8%	4.9%	60.3%	39.7%	36.9%	31.5%

Analysis Unit	Total Population	Minority Populations*									Low-Income Populations†	
		Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino (of any race)	White Alone‡	Total Minority Population§	Individuals	Families
Census Tract 4868, Pittsburg County, Oklahoma	1,850	1.5%	7.7%	0.0%	0.0%	0.0%	29.4%	2.6%	60.6%	39.4%	41.6%	33.4%
Places												
Woods County												
Alva city, Oklahoma	5,056	4.0%	1.4%	0.5%	0.0%	0.9%	4.1%	9.4%	81.6%	18.4%	39.9%	23.5%
Avard CDP, Oklahoma	39	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
Capron town, Oklahoma	0	-	-	-	-	-	-	-	-	-	0.0%	0.0%
Dacoma town, Oklahoma	113	0.0%	27.4%	0.0%	0.0%	0.0%	1.8%	4.4%	66.4%	33.6%	21.6%	23.3%
Freedom town, Oklahoma	223	0.4%	1.8%	0.4%	0.0%	0.9%	1.3%	1.8%	95.1%	4.9%	29.3%	25.5%
Hopeton CDP, Oklahoma	39	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	87.2%	100.0%
Waynoka city, Oklahoma	781	0.0%	6.5%	0.0%	0.0%	1.0%	7.4%	12.2%	76.3%	23.7%	42.3%	25.3%
Pittsburg County												
Adamson CDP, Oklahoma	29	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
Alderson town, Oklahoma	193	3.6%	1.6%	0.0%	0.0%	0.0%	34.2%	6.7%	58.0%	42.0%	33.2%	13.2%
Arpelar CDP, Oklahoma	258	0.0%	5.4%	1.6%	0.0%	0.0%	22.5%	3.5%	70.5%	29.5%	44.2%	40.0%
Ashland town, Oklahoma	40	0.0%	32.5%	0.0%	0.0%	0.0%	7.5%	7.5%	60.0%	40.0%	30.0%	11.1%
Bache CDP, Oklahoma	85	0.0%	0.0%	0.0%	0.0%	0.0%	8.2%	4.7%	87.1%	12.9%	47.1%	57.1%

Analysis Unit	Total Population	Minority Populations*									Low-Income Populations†	
		Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino (of any race)	White Alone‡	Total Minority Population§	Individuals	Families
Blanco CDP, Oklahoma	70	0.0%	2.9%	0.0%	0.0%	0.0%	54.3%	0.0%	42.9%	57.1%	65.7%	60.0%
Bug Tussle CDP, Oklahoma	87	0.0%	37.9%	0.0%	0.0%	0.0%	3.4%	0.0%	58.6%	41.4%	0.0%	0.0%
Canadian town, Oklahoma	189	0.0%	3.7%	0.0%	0.0%	0.0%	11.1%	0.0%	85.2%	14.8%	51.9%	30.0%
Canadian Shores CDP, Oklahoma	283	6.7%	0.0%	1.8%	0.0%	0.0%	24.4%	4.6%	67.1%	32.9%	48.4%	46.5%
Carlton Landing town, Oklahoma	32	0.0%	0.0%	6.3%	0.0%	0.0%	6.3%	0.0%	87.5%	12.5%	9.4%	0.0%
Crowder town, Oklahoma	391	0.0%	0.0%	0.5%	0.0%	0.0%	8.7%	4.1%	87.5%	12.5%	35.0%	46.1%
Haileyville city, Oklahoma	691	0.0%	5.2%	0.0%	0.0%	0.0%	44.3%	5.1%	49.8%	50.2%	49.2%	41.3%
Hartshorne city, Oklahoma	1,711	1.8%	7.8%	0.0%	0.1%	0.0%	29.4%	3.3%	58.9%	41.1%	49.8%	42.2%
Haywood CDP, Oklahoma	210	0.0%	1.4%	0.0%	0.0%	0.0%	21.9%	2.4%	74.3%	25.7%	33.8%	31.1%
Indianola town, Oklahoma	129	0.0%	0.8%	0.8%	0.0%	0.0%	19.4%	0.0%	79.1%	20.9%	52.7%	48.5%
Kiowa town, Oklahoma	659	0.0%	6.1%	0.0%	0.0%	0.0%	32.0%	2.7%	60.8%	39.2%	53.4%	43.5%
Krebs city, Oklahoma	2,094	1.7%	2.4%	0.0%	0.0%	0.0%	24.7%	6.1%	67.2%	32.8%	44.2%	46.9%
Longtown CDP, Oklahoma	3,013	0.0%	4.6%	0.0%	0.0%	0.0%	10.8%	2.9%	82.3%	17.7%	33.7%	27.0%
McAlester city, Oklahoma	18,225	4.5%	6.7%	0.7%	0.20%	1.4%	16.0%	7.2%	66.7%	33.3%	44.3%	35.9%
Pittsburg town, Oklahoma	185	0.0%	2.7%	0.0%	0.0%	0.0%	49.2%	4.9%	46.5%	53.5%	45.4%	40.4%

Analysis Unit	Total Population	Minority Populations*									Low-Income Populations†	
		Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino (of any race)	White Alone‡	Total Minority Population§	Individuals	Families
Quinton town, Oklahoma	829	1.7%	2.9%	0.0%	0.0%	0.6%	25.5%	6.4%	66.5%	33.5%	59.8%	52.3%
Savanna town, Oklahoma	557	0.0%	2.0%	0.5%	0.0%	0.0%	29.4%	4.5%	66.1%	33.9%	31.6%	29.5%
Scipio CDP, Oklahoma	20	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	15.0%	0.0%

Note: Gray shaded cells indicate where EJ populations are present (i.e., the percentage of population meets or exceeds the criterion for identifying EJ populations).

* Source: ACS 2021 5-year estimates Table DP05.

† Defined as individuals or families with income below 200 percent of federal poverty level. Source: ACS 2021 5-year estimates Tables S1701 (Individuals) and S1702 (Families).

‡ White-alone (non-Hispanic) population does not constitute a minority EJ population and is provided for reference only.

§ Defined as the total population minus the white alone (non-Hispanic) population.

¶ National data are provided for context only and do not represent a reference area used in identifying EJ populations.

The state of Oklahoma is used as the reference area for determining whether minority or low-income EJ populations exist within the county, census tract, or census-mapped place.

APPENDIX F. COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND BLM'S RESPONSE

The BLM evaluated all comments received and parsed them into substantive or non-substantive comments according to the guidance in the BLM's NEPA Handbook (H-1790-1; page 66). Example substantive comments contained in Table F.1 are representative of topics raised, and single responses are provided for similarly stated topics

Table F.1. Substantive Comment Topics and Responses

Comment Number	Topic	Comment Text	Response
1	Big Game	Program deficiencies with direct impacts for this lease sale that need to be addressed in the rulemaking include but are not limited to :• Reckless leasing of public lands that carves up important wildlife habitat. These lease sales could further degrade critical wildlife habitats in New Mexico and Oklahoma, at least 593 acres are in parcels with low level lease preference for habitat conflict. Recommendation: The BLM should not offer leases on lands determined to be important habitat value for wildlife or fish species. As noted above, IM 2023-007 begins to address this issue by detailing criteria the BLM offices will use to evaluate nominated parcels, which the BLM should apply to the parcels in this lease sale. DOI should go further by embedding these criteria in its rulemaking and establishing a robust framework that employs these leasing availability screens before scoping to determine which lands are eligible and available for nomination via EOIs. DOI should establish a robust framework that uses leasing availability screens that include wildlife and fish habitat (based on the most current and accurate data layers available from the relevant State BLM Office(s) and the appropriate state fish and wildlife agencies, as well as input received via Tribal consultation and public participation) to determine which lands are eligible and available for nomination. The BLM should establish in regulation that any lands where impacts to fish and wildlife could not be avoided or mitigated if development activities were to occur would not be available for nomination.	The BLM responds to Expressions of Interest (EOIs) to lease federal oil and gas resources through a competitive leasing process. In accordance with BLM IM 2023-007, the BLM has evaluated the parcels against the lease parcel preference criteria. After screening, IM 2023-007 states that "The BLM will generally conduct environmental analysis for lease parcels with a high preference value first for potential inclusion in a lease sale; however, if there are no high preference parcels available, the officer may select one or more low preference parcels that present the least conflicts based on the criteria listed in the IM, including parcels deferred from previous sales, to analyze for potential inclusion in the sale. " The proposed action is the sale of all leases. A no action alternative was considered that would not approve sale of any leases. Based on the analysis in the EA, the decision-maker has the option of approving the sale of all, some, or none of the leases. The BLM decision-maker therefore has the option of deferring leasing on these parcels.

Comment Number	Topic	Comment Text	Response
2	BLM Must Prepare an EIS	The BLM Must Prepare an EIS to Address the Cumulative Impacts of All the Lease Sales under Consideration for 2023. This proposed lease sale is part of a national DOI decision to proceed with oil and gas leasing across multiple states, and offshore, as part of implementing the Inflation Reduction Act...As such, each of the proposed lease sales in different states must be analyzed under NEPA as part of a larger national initiative. That means preparing an environmental impact statement (EIS) to address both the indirect GHG emissions and the cumulative impacts of all those lease sales. Cumulative impacts include not only those related to climate and GHGs, but also wildlife habitat, water pollution, impacts to recreation and other uses of these lands and waters, the combined costs to taxpayers from issuing new leases before the Interior Department addresses long-overdue reforms, socioeconomic impacts, public health impacts, and environmental justice impacts, among others. NEPA's cumulative impacts requirement directs BLM to evaluate impacts "result[ing] from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." 40 C.F.R. § 1508.1(g)(3); see 46 C.F.R. §§ 46.30 (definition of reasonably foreseeable future actions), 46.115. BLM's cumulative effects analysis "must give a realistic evaluation of the total impacts and cannot isolate a proposed project, viewing it in a vacuum."... Analyzing those impacts will require an EIS. NEPA requires an agency to prepare an EIS for any major federal action that may significantly affect the quality of the human environment. 42 U.S.C. § 4332(2)(C). An agency can rely on an environmental assessment (EA) only if it makes an affirmative finding that environmental impacts will not be significant (a FONSI). If there are "substantial questions" whether leasing may have a significant effect on the environment, an EIS is required. Anderson v. Evans, 371 F.3d 475, 488 (9th Cir. 2004); Ctr. for Biological Diversity v. BLM, 937 F. Supp. 2d 1140, 1154 (N.D. Cal. 2013). Here, the Interior Department has announced potential onshore leasing covering nearly 764 square miles (489,000 acres) across New Mexico, Oklahoma, Wyoming, Montana, North Dakota, Utah, Nevada, and other states, as well as holding large offshore lease sales. It would be arbitrary and capricious to conclude that leasing on that scale will not be significant.	To the extent the comment purports to interpret legal authorities that speak for themselves, the BLM considers the comment non-substantive. The BLM analyzes potential cumulative impacts to a total of 27 relevant issues in Sections 3.5 and 3.6 of the EA (including but not limited to climate and greenhouse gases, wildlife and habitat, water quality, and recreation). Additionally, the BLM incorporates by reference the 2022 BLM Water Support Document for Oil and Gas Development in New Mexico, the 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas, and the 2021 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends. NEPA allows agencies to prepare an EA "on any action at any time in order to assist agency planning and decision-making" (43 C.F.R. § 1501.3; see also 43 C.F.R. § 1508.9 [defining "environmental assessment"]). An agency need not prepare an EIS if it determines the action will not have significant effect on the human environment or where such effects may be mitigated by adoption of appropriate measures. The level of environmental analysis conducted by the BLM for the May 2023 Lease Sale is consistent with the purpose and requirements of NEPA.

Comment Number	Topic	Comment Text	Response
3	Climate Change	The BLM should implement a climate screen. It is beyond doubt that oil and gas lease sales result in greenhouse gas (GHG) emissions from fossil fuel production that contribute to climate change impacts. While climate change from GHG emissions is clearly causing global disruption, it is also undisputed that climate change is causing detrimental impacts to the public lands that the BLM manages. To adhere to its mandates under FLPMA to ensure multiple use and sustained yield and to prevent permanent impairment and unnecessary and undue degradation of the lands it manages, the BLM has an obligation to address climate disruption from oil and gas development adversely impacting public land resources. We therefore urge the BLM to exercise its broad discretion over the leasing program pursuant to the MLA, authority over public lands management pursuant to FLPMA, and review requirements pursuant to NEPA to consider several options for a climate screen. Such a screen would determine whether to defer parcels or mitigate the resulting GHG emissions and attendant climate impacts that result from the BLM's oil and gas leasing decisions.	Because the commenter is suggesting agency-wide policy changes which are outside the scope of this NEPA analysis, the BLM considers the comment non-substantive.
4	Climate Change	Climate impacts screen A climate screen could be grounded, first, in a qualitative analysis of (a) the present severity and intensity of climate change impacts occurring to the BLM resource area under consideration and (b) projected impacts to that resource over the next 10 years (primary lease term), rooted in the best available science and information to assess whether impacts are causing unnecessary or undue degradation or inhibiting achievement and maintenance of sustained yield of renewable resources. To establish the proper baseline and projections for the region and the resource area impacted, the BLM would need to reference sources such as the National Climate Assessment29 and high-quality regional and local scientific research and studies on the resource, including species threats, wildlife migration and habitat, air and water quality and quantity, public health impacts, viewsheds, and other conservation values. Second, the screen could involve a quantitative assessment of consistency of the projected GHG emissions from the lease sale (the aggregated emissions from all related lease sales for that period) with climate imperatives, which could take several forms: the global 1.5°C target; the goal to achieve net zero emissions by 2050; or the United States' commitment to reduce net greenhouse gas emissions by 50% from 2005 levels by 2030. Alternatively, the quantitative component could be the climate test discussed below. Based on a reasoned evaluation of both the qualitative and quantitative factors indicating climate impacts to the resource, the BLM would determine whether to defer lease parcels or otherwise mitigate the GHG emissions, just as it would under a reasoned evaluation of conflict with, for example, a wildlife corridor or cultural resource values.	The BLM has evaluated the potential effects of the proposed leasing action on climate change by estimating and analyzing potential GHG emissions from projected oil and gas development on the parcels proposed for leasing using estimates based on past oil and gas development and available information from existing development within the state. Emission estimates over the 20-year life of the lease are compared to the 20-year projected federal fossil fuel emissions in the state and nation from existing wells, the development of approved APDs, and emissions related to reasonably foreseeable lease actions. 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, are included in the 2021 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends. To the extent the commenter is suggesting agency-wide policy changes which are outside the scope of this NEPA analysis, the BLM considers the comment non-substantive.

Comment Number	Topic	Comment Text	Response
5	Climate Change	The BLM Must Properly Analyze and Address the Reasonably Foreseeable Greenhouse Gas Emissions and Related Climate Impacts Stemming from this Lease Sale. The Draft EAs' discussion of GHG emissions and climate impacts resulting from this lease sale requires additional analysis to take the proper "hard look at environmental consequences" that NEPA demands. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989). On January 9, 2023, the Council on Environmental Quality (CEQ) released updated guidance on how agencies should consider and analyze GHG emissions and climate change in NEPA reviews.36 The CEQ climate guidance is effective immediately and directs agencies to "use this guidance to inform the NEPA review for all new proposed actions."37 The guidance reiterates the BLM's obligation under NEPA to properly consider GHG emissions and climate change. Application of this climate guidance to this lease sale will inform the BLM's analysis of the impacts related to climate disruption and consideration of alternatives. Properly analyzing GHG emissions and climate impacts requires a stepwise process. First, the BLM must quantify the reasonably foreseeable GHG emissions – both direct and indirect – of the lease sale, including each alternative.38 Second, the BLM must "[d]isclose and provide context for the GHG emissions and climate impacts associated with the lease sale and alternatives."39 This includes "monetizing climate damages" using the social cost of greenhouse gas estimates, "placing emissions in the context of relevant climate action goals and commitments, and providing common equivalents . . . to help decision makers and the public understand proposed actions' potential GHG emissions and climate change effects."40 As part of its analysis, the BLM must also consider the effects of climate change on the lease sale. This requires evaluating how climate disruption will affect the resources, ecosystem, communities, and oil and gas infrastructure, making it more vulnerable to adverse impacts. 41 Finally, the BLM must analyze reasonable alternatives, "including those that would reduce GHG emissions relative to baseline conditions, and identify available mitigation measures to avoid, minimize, or compensate for climate effects."42	BLM recognizes the national and global impact potential of greenhouse gas (GHG) emissions and the likewise broad scope of climate change impacts related to them and has therefore prepared annual BLM Specialist Reports on Annual Greenhouse Gas Emissions and Climate Trends. These reports account for current and projected future agency wide GHG emissions related to fossil fuel actions on Public Land, national and global GHG emission trends, and potential climate impacts related to these emissions. The report is specifically referenced in and incorporated into each State Office lease sale NEPA analysis and provides the information necessary to properly assess agency wide, nationwide, and global reasonably foreseeable cumulative impacts of each State Office lease sale. The BLM also completed a social cost of greenhouse gases analysis as part of the review process for the proposed lease sales. In Section 3.6.2 of the EA, the BLM analyzes greenhouse gas impacts associated with the Proposed Action. The BLM quantifies direct, indirect, and cumulative emissions from the combustion of oil and gas and discusses the significance of these emissions. The BLM takes a hard look at the environmental impacts of leasing, including quantifying and forecasting aggregate GHG emissions from oil and gas development and addressing the environmental effects of downstream oil and gas use including the effects on climate change. The BLM has disclosed the GHG emissions from the Proposed Action and provided context for those emissions compared to existing federal onshore GHG emissions in the state and nationally. The EAs incorporate by reference information from the 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas and the 2021 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends. The BLM's analysis comports with the best available science and thus with the overarching goals set forth in EO-14008.

Comment Number	Topic	Comment Text	Response
6	Climate Change	The Draft EAs and Draft FONSIs Fail to Determine Whether GHG Emissions and Climate Impacts Are Significant, in Violation of NEPA Climate change is precisely the type of thorny problem that the cumulative impacts analysis is meant to address.46 The "incremental" addition of GHG emissions that will result from a particular lease sale cannot be dismissed as insignificant merely because it constitutes a small percentage increase compared to state, regional, or national emissions. See 40 C.F.R. § 1508.1. This flips on its head the entire point of NEPA's cumulative impacts analysis. "Cumulative effects . . . result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions . . . [and] can result from individually minor but collectively significant actions taking place over a period of time." GHG emissions that cause climate change are just such an "individually minor but collectively significant" problem. No source of GHG emissions by itself constitutes a sufficient cause of overall climate change. But those sources collectively are necessary causes of climate change. An incremental increase in GHG emissions, such as from this lease sale, must be considered in the context of the proper environmental baseline of cumulative GHG emissions and climate change impacts. The BLM must place emissions and climate damages "in the context of relevant climate action goals and commitments, . . . summarizing and citing to available scientific literature to help explain real world effects."47	In Section 3.6.2 of the EAs, the BLM analyzes greenhouse gas impacts associated with the Proposed Action. The BLM quantifies direct, indirect, and cumulative emissions from the combustion of oil and gas and discusses the significance of these emissions. The BLM takes a hard look at the environmental impacts of leasing, including quantifying and forecasting aggregate GHG emissions from oil and gas development and addressing the environmental effects of downstream oil and gas use including the effects on climate change. The EAs incorporate by reference information from the 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas as well as the 2021 BLM Specialist Report on Annual GHG Emissions and Climate Trends.
7	Climate Change	The BLM's NEPA analysis fails to address whether the lease sale is consistent with U.S. climate commitments and fails to address its full costs and benefits. The BLM must consider and address whether the proposed leasing is consistent with U.S. climate commitments and national policy. The United States has committed to the climate change target of holding the long-term global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels" under the Paris Agreement.57 The Paris Agreement established the 1.5°C climate target based on evidence that 2°C of warming would lead to catastrophic climate harms.58 Scientific research estimated the global carbon budget for maintaining a likely chance of meeting the Paris climate targets, providing clear benchmarks for United States and global climate action.59	The BLM analyzes potential impacts, including cumulative impacts, from climate change and GHG in detail in the EAs (see Sections 3.6.1 and 3.6.2). The EAs incorporate by reference information from the 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas. The emissions used in this analysis are estimated using the 2022 BLM Lease Sale Emissions Tool and evaluated with the EPA GHG equivalency calculator. The BLM also includes a monetized social cost of carbon analysis for the estimated emissions associated with future potential development. Estimating the economic benefits (change in social welfare) associated with oil and gas leasing is not feasible, nor is it required for NEPA. The BLM analyzes the impacts associated with the alternatives using the best available information, which is typically not monetized estimates of benefits or costs. Various laws, including the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, require the BLM to make mineral resources, such as oil and gas, available for development. See EA Sections 1.2 and 1.4 for information regarding the BLM's requirements under MLA, FLPMA, and other statues and regulations.

Comment Number	Topic	Comment Text	Response
		In 2021, the United States committed to reduce the nation's greenhouse gas emissions 50–52% by 2030.60 President Biden also has recognized the need for action, stating that the "United States and the world face a profound climate crisis. We have a narrow moment to pursue action . . . in order to avoid the most catastrophic impacts of that crisis." Exec. Order No. 14008, Tackling the Climate Crisis at Home and Abroad, 86 Fed. Reg. 7,619, 7,619 (Jan. 27, 2021). Similarly, the Interior Department has acknowledged the need to address climate change when making management decisions on federal lands. Interior Secretarial Order 3289, Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources (Sept. 14, 2009), stated that "the realities of climate change require us to change how we manage the land, water, fish and wildlife, and cultural heritage and Tribal lands and resources we oversee"; and acknowledged that the Department of the Interior is "responsible for helping protect the nation from the impacts of climate change." And in 2021, the Secretary recognized that the "Nation faces a profound climate crisis," ordering the Interior Department to "prioritize[ ] action on climate change." Interior Secretarial Order 3399, Department-Wide Approach to the Climate Crisis and Restoring Transparency and Integrity to the Decision-Making Process (April 16, 2021). fundamental disconnect exists, however, between the federal government's commitment to address climate change, how public lands are managed for energy production, and how the Draft EAs address emissions estimated to stem from this lease sale. The BLM cannot ignore national climate policy in making decisions over the proposed lease sale or in the NEPA analysis for any such sale. The CEQ climate guidance directs agencies "to discuss whether and to what extent the proposal's reasonably foreseeable GHG emissions are consistent with GHG reduction goals, such as those reflected in the U.S. nationally determined contribution under the Paris Agreement."63 The BLM should conduct this consistency evaluation with U.S. climate commitments and targets.	Chapter 2 of the 2021 BLM Specialist Report on Annual GHG Emissions and Climate Trends discusses the relationship between BLM's coal, oil, and gas leasing programs with other laws and policies and+I38+I37+I38+I37

Comment Number	Topic	Comment Text	Response
8	Climate Change	The BLM's NEPA analysis fails to address whether the lease sale is consistent with U.S. climate commitments and fails to address its full costs and benefits. Relatedly, the BLM's NEPA analysis must address the social and economic costs resulting from development of any leases it offers and explain what benefits warrant incurring those costs, which the Draft EAs fail to consider. The CEQ climate guidance instructs agencies to use social cost of greenhouse gases (SC-GHG) estimates, which can "assist in assessing the significance of climate impacts."64 The BLM should focus on SC-GHG estimates consistent with the best available science, employing low discount rates that properly consider the considerable harm to future generations.65 Offering leases that could impose billions of dollars in social and environmental harms without addressing what (if any) countervailing benefits might warrant such a decision would be arbitrary, capricious, and inconsistent with FLPMA mandates. Here, it would be arbitrary and capricious, and inconsistent with NEPA, to quantify the costs of selling so many leases but disregard the other side of the cost-benefit scale...The Draft EAs' silence on the relative costs and benefits from leasing is particularly glaring because of its large size and huge social and environmental costs.	The BLM analyzes potential impacts, including cumulative impacts, from climate change and GHG in detail in the EAs (see Sections 3.6.1 and 3.6.2). The EAs incorporate by reference information from the 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas. The emissions used in this analysis are estimated using the 2022 BLM Lease Sale Emissions Tool and evaluated with the EPA GHG equivalency calculator. The BLM also includes a monetized social cost of carbon analysis for the estimated emissions associated with future potential development. Estimating the economic benefits (change in social welfare) associated with oil and gas leasing is not feasible, nor is it required for NEPA. The BLM analyzes the impacts associated with the alternatives using the best available information, which is typically not monetized estimates of benefits or costs. Various laws, including the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, require the BLM to make mineral resources, such as oil and gas, available for development. See EA Sections 1.2 and 1.4 for information regarding the BLM's requirements under MLA, FLPMA, and other statues and regulations. Chapter 2 of the 2021 BLM Specialist Report on Annual GHG Emissions and Climate Trends discusses the relationship between BLM's coal, oil, and gas leasing programs with other laws and policies and+I38+I37+I38+I37

Comment Number	Topic	Comment Text	Response
9	Climate Change	The Draft EAs Fails to Adequately Discuss Mitigation Measures to Address the Impacts of GHG Emissions The BLM did not identify or evaluate any mitigation measures in the Draft EAs or discuss requiring mitigation in the Draft FONSIs in order to address GHG emissions. The Specialist Report does list several mitigation measures. 82 The report even explains that "comparative analysis is . . . useful for informing policy and planning decisions and to identify options for maximizing the effectiveness of mitigation and emissions reduction strategies."83 But the BLM fails to include in the Draft EAs, let alone evaluate, or require in the Draft FONSIs any of these measures for mitigating GHG emissions and resulting climate impacts associated with the lease sale. This failure violates the BLM's obligations under NEPA. [...] The Draft EAs wrongly assert that the "majority of GHG emissions resulting from federal fossil fuel authorizations occur outside of the BLM's authority and control."87 This misunderstands its authority and obligation over adverse environmental effects resulting from development of the mineral resource. Agencies should analyze reasonable alternatives that would mitigate both direct and indirect GHG emissions impacts.	EA Section 3.6.2.3 discusses mitigation strategies designed to reduce GHGs and incorporates by reference information from the 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas as well as the 2021 BLM Specialist Report on Annual GHG Emissions and Climate Trends. Analysis and approval of future development may include application of BMPs within BLM's authority, as COAs, to reduce or mitigate GHG emissions. Additional measures proposed at the project development stage also 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 2021 Annual GHG Report. See EA Sections 1.2 and 1.4 for information regarding the BLM's requirements under MLA, FLPMA, and other statues and regulations. Based on the analysis in the EA, the decisionmaker has the option of approving the sale of all, some, or none of the leases. The BLM decision maker therefore has the option of deferring leasing on these parcels, and consequently, a deferral alternative is not necessary. Moreover, "[a]lternatives that do not accomplish the purpose of an action are not reasonable and need not be studied in detail by the agency." *Citizens' Comm. to Save Our Canyons v. U.S. Forest Serv.*, 297 F.3d 1012, 1031 (Tenth Cir. 2002) "NEPA does not require agencies to analyze the environmental consequences of alternatives it has in good faith rejected as too remote, speculative, or impractical or ineffective."

Comment Number	Topic	Comment Text	Response
10	Climate Change	The Draft EAs Fails to Adequately Discuss Mitigation Measures to Address the Impacts of GHG Emissions The BLM could mitigate projected GHG emissions and resulting climate impacts that would result from lease issuance by deferring actual lease issuance or including a new stipulation or lease term condition as part of a mitigated FONSI. The lease would not issue – or if issued, the stipulation or lease term could provide that no oil and gas exploration, development, or production may occur – unless and until: (a) DOI implements a programmatic climate conservation plan and projected GHG emissions from leasing were determined compatible with U.S. climate commitments; or (b) such GHG emissions could be adequately avoided, sequestered, or offset to avoid unnecessary or undue degradation and achieve and maintain sustained yield.	EA Section 3.6.2.3 discusses mitigation strategies designed to reduce GHGs and incorporates by reference information from the 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas as well as the 2021 BLM Specialist Report on Annual GHG Emissions and Climate Trends. Analysis and approval of future development may include application of BMPs within BLM's authority, as COAs, to reduce or mitigate GHG emissions. Additional measures proposed at the project development stage also 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 2021 Annual GHG Report. The BLM responds to Expressions of Interest (EOIs) to lease federal oil and gas resources through a competitive leasing process. In accordance with BLM IM 2023-007, the BLM has evaluated the parcels against the lease parcel preference criteria. After screening, IM 2023-007 states that The BLM will generally conduct environmental analysis for lease parcels with a high preference value first for potential inclusion in a lease sale; however, if there are no high preference parcels available, the officer may select one or more low preference parcels that present the least conflicts based on the criteria listed in the IM, including parcels deferred from previous sales, to analyze for potential inclusion in the sale.
11	Defer Parcel from Lease Sale	III. The BLM should exercise its authority to defer additional parcels in this lease sale using the criteria in IM 2023-007. We appreciate the BLM implementing a policy of using leasing criteria detailed in IM 2023-007 to consider parcel deferrals. The BLM should employ these criteria for these lease sales. The IM directs deferral of parcels that receive a "low" value leasing preference. Only if there are "no high preference parcels available for the sale" is the office guided to select "one or more low preference parcels that present the least conflicts based on the criteria." The presence of a single high value leasing preference parcel urges deferral of all parcels with a low value leasing preference designation. While the IM preferences leasing parcels with "[p]roximity to existing oil and gas development," these areas risk further concentrating and expanding development, exacerbating ongoing and historical degradation to the affected area and the public health of nearby communities. As discussed in Section VIII below, we urge the BLM to prioritize community health and environmental justice, values the Administration has committed to upholding. As such, so long as there is one high leasing preference parcel available for the sale, the BLM should defer all remining parcels with any low leasing preference designation.	In accordance with BLM IM 2023-007, the BLM has evaluated the parcels against the lease parcel preference criteria. After screening, IM 2023-007 states that "The BLM will generally conduct environmental analysis for lease parcels with a high preference value first for potential inclusion in a lease sale; however, if there are no high preference parcels available, the officer may select one or more low preference parcels that present the least conflicts based on the criteria listed in the IM, including parcels deferred from previous sales, to analyze for potential inclusion in the sale." The proposed action is the sale of all leases. A no action alternative was considered that would not approve sale of any leases. Based on the analysis in the EA, the decision-maker has the option of approving the sale of all, some, or none of the leases. The BLM decision-maker therefore has the option of deferring leasing on these parcels.

Comment Number	Topic	Comment Text	Response
12	Defer Parcel from Lease Sale	For the Oklahoma Field Office, the BLM assigned 1 parcel a low leasing preference based on proximity to existing development, assigned a low leasing preference for all 4 remaining parcels based on habitat conflicts, and 1 parcel for recreation/other resources conflicts – meaning all 4 remaining parcels received a low value leasing preference14 and should be deferred.	In accordance with BLM IM 2023-007, the BLM has evaluated the parcels against the lease parcel preference criteria. After screening, IM 2023-007 states that "The BLM will generally conduct environmental analysis for lease parcels with a high preference value first for potential inclusion in a lease sale; however, if there are no high preference parcels available, the officer may select one or more low preference parcels that present the least conflicts based on the criteria listed in the IM, including parcels deferred from previous sales, to analyze for potential inclusion in the sale." The proposed action is the sale of all leases. A no action alternative was considered that would not approve sale of any leases. Based on the analysis in the EA, the decision-maker has the option of approving the sale of all, some, or none of the leases. The BLM decision-maker therefore has the option of deferring leasing on these parcels.
13	Development Potential	Program deficiencies with direct impacts for this lease sale that need to be addressed in the rulemaking include but are not limited to: • Leasing that fosters speculation by oil and gas companies and other individuals. Speculative leasing has long hindered the federal oil and gas program, not only as a result of oil and gas speculators formerly being able to purchase leases noncompetitively, but also because the BLM has opened up 90 percent of western public lands to oil and gas leasing. Speculation on lands with little drilling potential wastes the BLM's time and resources and locks up public land that should be devoted to uses in the greater public interest. For this New Mexico and Oklahoma Lease Sale, 6 parcels covering about 240 acres of lands with low development potential11 have been nominated, which, if sold, would perpetuate this long-standing and redressable problem. Current leasing procedures also insufficiently screen out unqualified applicants or so-called bad actors, who have a history of abandoning and orphaning wells, missing payments, and other poor practices.	The BLM responds to Expressions of Interest (EOIs) to lease federal oil and gas resources through a competitive leasing process. In accordance with BLM IM 2023-007, the BLM has evaluated the parcels against the lease parcel preference criteria. After screening, IM 2023-007 states that The BLM will generally conduct environmental analysis for lease parcels with a high preference value first for potential inclusion in a lease sale; however, if there are no high preference parcels available, the officer may select one or more low preference parcels that present the least conflicts based on the criteria listed in the IM, including parcels deferred from previous sales, to analyze for potential inclusion in the sale. The proposed action is the sale of all leases. A no action alternative was considered that would not approve sale of any leases. Based on the analysis in the EA, the decision-maker has the option of approving the sale of all, some, or none of the leases. The BLM decision-maker therefore has the option of deferring leasing on these parcels.

Comment Number	Topic	Comment Text	Response
		Recommendation: In looking to avoid allowing public lands to become held up in nonproducing oil and gas leases that prevent management of other resource values and provide little benefit to taxpayers, the BLM should not offer leases on lands determined to have low or no development potential for oil or gas. Recently released IM 2023-007 begins to address this problematic issue by detailing criteria the BLM offices will use to evaluate nominated parcels, which the BLM should apply to the parcels in this lease sale. DOI should go further by embedding these criteria in its rulemaking and establishing a robust framework that employs these leasing availability screens before scoping to determine which lands are eligible and available for nomination via EOIs. The BLM should establish in regulation that any lands with low or no development potential, lands that are covered by a reasonably foreseeable development (RFD) scenario that does not assess and specifically identify development potential, and lands that are covered by an outdated RFD scenario should not be available for nomination. Recommendation: The BLM has broad authority to limit participation in the leasing process to "responsible qualified" bidders and cannot issue leases to companies that are violating "reclamation requirements and other standards . . . for any prior lease." 30 U.S.C. § 226(b)(1)(A), (g). But the BLM has historically failed to adequately scrutinize the compliance records or development intentions and resource capabilities of participants in the oil and gas leasing process, which allows speculators and bad actors to freely obtain new leases. The BLM should prevent actors with a history of violating the terms of federal oil and gas leases from purchasing or otherwise acquiring new leases. It should eliminate the ability to nominate parcels anonymously and establish criteria for identifying "responsible qualified bidders." These criteria could be used to limit or prevent participation in the leasing process by companies/individuals: § With a history of failing to make timely rental payments; § That operate a significant number of inactive wells; § That are violating federal or state reclamation requirements on other leases; § Whose operations are violating federal or state air or water quality standards; and § That lack the technical or economic resources to responsibly develop oil and gas resources. The BLM should also regularly update and make publicly available the list of "Entities in Noncompliance with Reclamation Requirements of Section 17(g) of MLA."12	

Comment Number	Topic	Comment Text	Response
		Recommendation: Recommendation: The IRA's elimination of noncompetitive leasing was an important step towards addressing the widespread issue of speculation in the federal onshore oil and gas program. In its rulemaking, the Department of the Interior must affirm the end of noncompetitive leasing and direct the BLM to no longer accept offers on public land parcels that are submitted for oil and gas leasing outside of competitive auction. Because a final rule is not yet in place, Interior must immediately issue interim guidance prohibiting noncompetitive oil and gas leasing and instructing BLM Field Offices not to issue leases noncompetitively.	
14	Environmental Justice	The BLM fails to thoroughly analyze the impacts of this lease sale on environmental justice. The BLM must take a hard look at environmental justice – not just in relation to health, but also in its own right. As defined by the U.S. Environmental Protection Agency, "environmental justice" means "the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, in the development, implementation, and enforcement of environmental laws, regulations, and policies."122 Executive Order (EO) 12898 requires each Federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."123 As the court stated in Standing Rock v. U.S. Army Corps of Engineers, "NEPA creates, through the Administrative Procedure Act, a right of action deriving from Executive Order 12898."124 Even more recently, President Biden's January 27, 2021, "Executive Order on Tackling the Climate Crisis at Home and Abroad" explicitly recognizes the inexorable links among climate, health, and environmental justice (which includes social and economic justice), and the corresponding need to address all of them in concert, with a whole-of-government approach.125 Environmental Justice is a "relevant factor" for which federal agencies must take a hard look under NEPA, made reviewable under the APA's arbitrary and capricious standard.126 As various executive orders and related agency guidance documents state,127 and as courts have affirmed specifically, regarding the NEPA process, the BLM must take environmental justice seriously.	The BLM analyzes potential impacts to environmental justice communities in in AIB-18 in the OFO EA. The analysis presented in AIB-18 complies with the requirements set forth in CEQ guidance, Executive Order 12898, and BLM policy (as contained in BLM's Land Use Planning Handbook and BLM's IM 2022-059) determining whether proposed actions would have disproportionately high and adverse environmental impacts to minority, low-income, and American Indian populations of concern. The AIB analysis contains sufficient information to meet the BLM's public disclosure and informed decision-making requirements and provides sufficient evidence to reach a Finding of No Significant Impact (FONSI).

Comment Number	Topic	Comment Text	Response
		According to EPA Guidance on environmental justice in the NEPA process, an environmental justice analysis must also include "the cultural values that the community and/or Indian Tribe may place on a natural resource at risk."128 The Guidance also states that it is "essential" for the "NEPA analyst to consider the cumulative impacts from the perspective of these specific resources or ecosystems which are vital to the communities of interest."129 Failure to adequately analyze impacts to overburdened communities from additional fossil fuel leasing within the planning area would be arbitrary and capricious, a failure to "articulate a rational connection between the facts found and the choices made."130 The BLM must also adhere to the "process" requirements of environmental justice – fair treatment and meaningful involvement. If the BLM ignores or excludes the very people and communities who are most affected by its land allocation decisions, the BLM is not only denying them fair treatment and meaningful involvement in decision-making – and, in the case of indigenous peoples and Tribes, abrogating the right to self-determination and free prior and informed consent131 – but also depriving itself, and the general public, of invaluable knowledge and expertise that would enable better-informed and more transparent decision-making. "Better decisions" are indeed a fundamental goal of NEPA, and they require extensive, meaningful public involvement throughout an agency's decision-making process – not just "input" on pre-determined agendas.132 Indeed, environmental justice is not merely a box to be checked.	

Comment Number	Topic	Comment Text	Response
15	Federal Leasing Policies	Program deficiencies with direct impacts for this lease sale that need to be addressed in the rulemaking include but are not limited to: • Irresponsible leasing of public lands that adversely impacts the public, including degrading clean air, clean water, and the climate, and communities' access to outdoor recreation. Leasing leads to degradation of air and water quality, release of greenhouse gases that disrupt the climate, and limitations on opportunities to enhance recreation, including discouraging investments in recreation assets. Recommendation: Under the MLA, Interior may choose to lease "where eligible lands are available." 30 U.S.C. § 226(b)(1)(A). The BLM retains discretion to determine what lands qualify as eligible and available. E.g., W. Energy All. V. Biden, No. 21-cv-13-SWS, at *18 (D. Wyo. Sept. 9, 2022) ("'Eligible' and 'available' are not defined by Congress in the MLA, which necessarily delegates the matter to the agency." (citation omitted)). The MLA does not define or discuss a nomination process for leasing those lands, and, likewise, the IRA leaves to Interior the discretion to determine a process (if any) for soliciting EOIs.7 As such, the agency may determine the process for nominating lands to be leased, including by EOIs, which Interior itself created in its regulations. See 43 C.F.R. § 3120.3-1. Given the Interior Department's considerable authority and discretion over if and when to hold oil and gas lease sales, the agency should establish in regulation – and in additional guidance in the interim – that EOIs may be submitted and accepted only if there is an announced lease sale and only for lands eligible and available for leasing based on various screens, including conservation and climate priorities, community impacts, multiple use, and taxpayer fairness. The BLM should also establish a new lease nomination process in line with the "formal" nomination process set forth in 43 C.F.R. § Part 3120 (Competitive Leases), where the BLM would similarly develop a selection of lands that may be nominated for leasing in a particular sale based on various screens.	The commenter is suggesting agency-wide policy changes which are outside the scope of this NEPA analysis.
16	Federal Leasing Policies	To move forward with more leasing without an updated regulatory framework that a formal rule will provide would continue an antiquated and flawed system that for decades has short-changed our public lands, wildlife, and the public, while perpetuating harm to the health of communities and the environment. We urge the Interior Department to move expeditiously to publish its proposed rule reforming the leasing and permitting programs before holding another oil and gas lease sale. This would take a critical step toward disallowing these and other structural issues in the leasing program to continue unabated.	The commenter is suggesting agency-wide policy changes which are outside the scope of this NEPA analysis.

Comment Number	Topic	Comment Text	Response
17	FLPMA	The BLM does not adequately analyze the socioeconomic impacts of this lease sale. The need to adequately consider the environmental costs and benefits (if any) of its leasing decisions is also part of the BLM's obligation under FLPMA's multiple-use mandate. FLPMA requires striking a balance between conflicting uses, such as oil and gas development and climate (and numerous other uses). As the Supreme Court has noted, "multiple use" describes the enormously complicated task of striking a balance among the many competing uses to which land can be put, "including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and [uses serving] natural scenic, scientific and historical values." Norton v. SUWA, 542 U.S. 55, 58 (2004) (quoting 43 U.S.C. § 1702(c)). The BLM cannot strike that balance without even considering what it is balancing.	Various laws, including the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, require the BLM to make mineral resources, such as oil and gas, available for development on public domain. See EA Sections 1.2 and 1.4 for information regarding the BLM's requirements under MLA, FLPMA, and other statues and regulations. Estimating the economic benefits associated with oil and gas leasing is not required for NEPA. The BLM analyzes the impacts associated with the alternatives using the best available information, which is typically not monetized estimates of benefits or costs.
18	GHG Emissions	Climate test methodology One method that the BLM could use to implement a climate screen is the climate test developed by scientists and attorneys at the Natural Resources Defense Council (NRDC).30 Their approach offers a novel and scalable tool to evaluate the significance of GHG emissions from new fossil fuel development and achieves something that the BLM's simpler, static comparison of project emissions to total U.S. or global levels cannot: objectively determining a project's significance in terms of its contribution to driving warming over time, in the context of the entire energy system with consideration to the project's relative role therein, and all relative to the constraints necessary for limiting warming to 1.5°C. The result is a quantitative measure of a project's consistency with climate goals, where the numerical value of the climate test's decision metric communicates an increasing degree of climate impact significance. Although originally designed to solve for the more elusive problem of evaluating individual projects for their respective climate impact significance, NRDC notes that the climate test methodology can just as easily be applied to aggregated emissions to test, for example, all or multiple of a period's lease sales as a collective "project" for consistency with pathways to limited warming. Again, based on the outcome of individual-scale or aggregate lease area's climate test screening, the BLM would either defer parcels to minimize GHG emissions or otherwise mitigate the emissions...	The BLM responds to Expressions of Interest (EOIs) to lease federal oil and gas resources through a competitive leasing process. In accordance with BLM IM 2023-007, the BLM has evaluated the parcels against the lease parcel preference criteria. After screening, IM 2023-007 states that The BLM will generally conduct environmental analysis for lease parcels with a high preference value first for potential inclusion in a lease sale; however, if there are no high preference parcels available, the officer may select one or more low preference parcels that present the least conflicts based on the criteria listed in the IM, including parcels deferred from previous sales, to analyze for potential inclusion in the sale. Various laws, including the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, require the BLM to make mineral resources, such as oil and gas, available for development. See EA Sections 1.2 and 1.4 for information regarding the BLM's requirements under MLA, FLPMA, and other statues and regulations. The BLM analyzes potential impacts from climate change and GHG in detail in the EAs (see Sections 3.6.1 and 3.6.2). The proposed action is the sale of all leases. A no action alternative was considered that would not approve sale of any leases. Based on the analysis, the decisionmaker has the option of approving the sale of all, some, or none of the leases.

Comment Number	Topic	Comment Text	Response
19	GHG Emissions	The Draft EAs and Draft FONSIs Fail to Determine Whether GHG Emissions and Climate Impacts Are Significant, in Violation of NEPA A finding of no significant impact also appears arbitrary in light of the Specialist Report's conclusion that "[s]taying within the 1.5°C carbon budget implies that CO2 emissions need to start declining this decade to maintain reasonable progress to reach net zero by about 2050."54 Rather than fulfill its legal obligations under NEPA and grapple with the imminent threat posed by locking in future GHG emissions through leasing, the BLM asserts that "there is no scientific data in the record, including scientific data submitted during the comment period for these lease sales, that would allow the BLM, in the absence of an agency carbon budget or similar standard, to evaluate the significance of the greenhouse gas emissions from this proposed lease sale."55 But the BLM does have the responsibility to make a non-arbitrary significance determination. Otherwise, no matter the size of the project or the amount of GHG emissions, the BLM will always find them to be insignificant, which is contrary to the best available climate science and the BLM's mandate "to prevent unnecessary or undue degradation of the lands" under FLPMA. See 43 U.S.C. § 1732(b).	The BLM has prepared multiple EIS's covering the lands BLM is considering making available for competitive auction. The BLM has analyzed the GHG emissions from the Proposed Action and provided context for those emissions compared to existing federal onshore GHG emissions in the state and nationally. The BLM has included an evaluation of the climate change impacts that could result from the proposed action and incorporated by the reference the 2021 BLM Specialists Report on Annual Greenhouse Gas Emissions and Climate Trends which provides a more detailed assessment of cumulative emissions, climate change impacts, and reputable climate science sources. If and when a proposed action for development is submitted, the BLM can determine appropriate mitigation measures to reduce/offset GHG emissions that are not already required by law or proposed by the operator. Climate impacts are one of many factors that are considered in the NEPA analysis to evaluate the significance of a proposed action and the BLM's exercise of its discretion in deciding leasing actions.
20	GHG Emissions	The Draft EAs and Draft FONSIs Fail to Determine Whether GHG Emissions and Climate Impacts Are Significant, in Violation of NEPA The BLM also states that it can wait to determine appropriate mitigation measures until the APD stage.56 But the further down the line the BLM waits to address GHG emissions, the smaller the emissions become. Thus, the agency ends up in a place where it continues to slice an oil and gas project until any amount of emissions appears de minimis. This is contrary to its obligations under NEPA and FLPMA and direction in the CEQ climate guidance.	The BLM analysis presented in the EA and the 2021 Specialists Report is the agency's determination of a "hard look" at GHG emissions related to agency fossil fuel approvals. Comparing all potential emissions from fossil fuel approvals within BLM jurisdiction to emissions totals at state, national and global levels represents a comprehensive "hard look" focused on the subject matter set before BLM decision makers. Given the highly complex and thus-far unclear relationship between GHG emissions from a specific location and climate effects at that or any other location, smaller scale comparisons cannot be made. The BLM also included comparisons of projected emissions to familiar GHG emission sources (passenger vehicles), alternative energy sources (a wind turbine), and acres of forest sequestration. These standard comparisons provided by EPA illustrate the level of impact expected from GHG emissions related to the lease sale. At this time, BLM has not developed a standard or emissions budget that it can apply uniformly to make a determination of significance based on climate change or GHG emissions. Until such time as the BLM develops further tools to analyze the relative emissions impact of its activities nationwide, the BLM can disclose GHG emissions and climate impacts, and provide context and analysis for those emissions and impacts; the agency cannot determine significance for a proposed action based on GHG emissions or climate impacts alone.

Comment Number	Topic	Comment Text	Response
21	GHG Emissions	The Draft EAs and Draft FONSIs Fail to Determine Whether GHG Emissions and Climate Impacts Are Significant, in Violation of NEPA The BLM should start from the scientifically sound and accepted premise that the addition of GHG emissions resulting from this (and related) lease sales must be addressed. These climate change impacts are adversely impacting the specific resource areas at issue, which the BLM must thoroughly analyze in its NEPA analysis. The BLM has the legal authority to take measures to address and mitigate those emissions. We again suggest several ways the BLM can do so: (1) through a climate screen (with various options for what the screen might consist of) discussed in Section V; and (2) through a conservation and climate alternative and mitigation measures discussed in Section IX.	The BLM analysis presented in the EA and the 2021 Specialists Report is the agency's determination of a "hard look" at GHG emissions related to agency fossil fuel approvals. Comparing all potential emissions from fossil fuel approvals within BLM jurisdiction to emissions totals at state, national and global levels represents a comprehensive "hard look" focused on the subject matter set before BLM decision makers. Given the highly complex and thus-far unclear relationship between GHG emissions from a specific location and climate effects at that or any other location, smaller scale comparisons cannot be made. The BLM also included comparisons of projected emissions to familiar GHG emission sources (passenger vehicles), alternative energy sources (a wind turbine), and acres of forest sequestration. These standard comparisons provided by EPA illustrate the level of impact expected from GHG emissions related to the lease sale. At this time, BLM has not developed a standard or emissions budget that it can apply uniformly to make a determination of significance based on climate change or GHG emissions. Until such time as the BLM develops further tools to analyze the relative emissions impact of its activities nationwide, the BLM can disclose GHG emissions and climate impacts, and provide context and analysis for those emissions and impacts; the agency cannot determine significance for a proposed action based on GHG emissions or climate impacts alone.
22	GHG Emissions	The Draft EAs Fails to Adequately Discuss Mitigation Measures to Address the Impacts of GHG Emissions Climate mitigation measures are also required to satisfy the BLM's obligation to prevent unnecessary or undue degradation under FLPMA. See, e.g., Rocky Mountain Oil & Gas Ass'n v. Watt, 696 F.2d 734, 739 (10th Cir. 1982) ("In general, the BLM is to prevent unnecessary or undue degradation of the public lands."). In other contexts, the BLM has defined its obligation to avoid unnecessary and undue degradation as requiring mitigation for adverse impacts. E.g., 43 C.F.R. §§ 3809.5, 3809.420(a)(4) (stating that, in the hard rock mining context, UUD means conditions, activities or practices that are not "reasonably incident" to the mining operation or that fail to comply with other laws or standards of performance, which include "mitigation measures specified by BLM to protect public lands"). The Interior Board of Land Appeals (IBLA) and courts have likewise recognized that BLM has authority to incorporate mitigation measures into project authorizations to observe its FLPMA obligations...Just as the BLM can deny a project outright to protect the environmental uses of public lands, it can also condition a project's approval on the commitment to mitigation measures that lessen environmental impacts....	The BLM has prepared multiple EIS's covering the lands BLM is considering making available for competitive auction. The BLM has disclosed the GHG emissions from the Proposed Action and provided context for those emissions compared to existing federal onshore GHG emissions in the state and nationally. The BLM has included an evaluation of the climate change impacts that could result from the proposed action and incorporated by the reference the 2021 BLM Specialists Report on Annual Greenhouse Gas Emissions and Climate Trends which provides a more detailed assessment of cumulative emissions, climate change impacts, and reputable climate science sources. If and when a proposed action for development is submitted, the BLM can determine appropriate mitigation measures to reduce/offset GHG emissions that are not already required by law or proposed by the operator. Climate impacts are one of many factors that are considered in the NEPA analysis to evaluate the significance of a proposed action and the BLM's exercise of its discretion in deciding leasing actions.
23	Inflation Reduction Act	The BLM should immediately issue additional guidance, including on other important reforms, to steer all leasing decisions before a final rule is in place.	To the extent the commenter is suggesting agency-wide policy changes which are outside the scope of this NEPA analysis, the BLM considers the comment non-substantive.

Comment Number	Topic	Comment Text	Response
		We appreciate that the BLM issued guidance addressing not only the leasing reforms included in the IRA, but also additional updates to onshore leasing and permitting policies. However, there are many other reforms that the agency has yet to address and that DOI should prioritize in its fossil fuel leasing and permitting rulemaking. In the interim, we ask that the BLM issue additional guidance on the following to steer all leasing decisions and processes for any lease sales held before regulations are in place: • Renewables development. The IRA did not enact a leasing mandate but rather made at least some oil and gas leasing a requirement for issuing wind or solar development ROWs.1 While DOI has stated that it is proceeding with new lease sales "to comply with congressional direction on oil and gas leasing through the [IRA]," it has not established how the proposed oil and gas lease sales align with plans to issue ROWs for wind and solar development. IM 2023-006 does detail how the BLM will determine the acreage it must offer for oil and gas leasing in order to issue wind or solar ROWs pursuant to the IRA and defines the period for calculating the acreage requirement as the "year before the wind or solar energy right-of-way is issued." However, if DOI is going to conduct lease sales to comply with the IRA's tethering provisions, it should do so as part of a clearly articulated and concerted national strategy rather than holding lease sales piecemeal, state office by state office. Any leases offered as part of this lease sale or related lease sales in the one-year period should indeed be part of a plan to issue wind or solar permits. We urge the BLM to offer for lease the minimum amount of acreage necessary under the IRA to enable it to issue renewables ROWs. • Bonding. The BLM should issue guidance eliminating or minimizing the use of blanket bonds and require that bonds be based on the full costs of plugging, abandonment, and reclamation. The Mineral Leasing Act (MLA) requires adequate bonding. 30 U.S.C. § 226(g). In the environmental review for this lease sale, please disclose how many idle and orphan wells are currently present within the designated lease parcels and at a cumulative level in nearby areas; explain how additional leasing in areas with idle and orphan wells will protect the interests of the BLM, the state, and citizens in the area; and consider alternatives and mitigation measures, such as lease stipulations, that require plugging old wells before drilling new wells within a lease parcel. • Responsible bidders. The BLM should issue guidance to prevent actors with a history of violating the terms of federal oil and gas leases from purchasing or otherwise acquiring new leases. We appreciate that in IM 2023-008 the BLM states that it will no longer accept anonymous EOI submissions. Additionally, we urge the BLM to establish criteria for identifying "responsible qualified bidders."	BLM issued updated oil and gas leasing guidance on November 21, 2022, including seven IMs, which will enable consistent implementation of the IRA's changes to agency's oil and gas programs. See Section 1.4.2 of the EA.

Comment Number	Topic	Comment Text	Response
24	Inflation Reduction Act	Before holding the proposed lease sales, the DOI should release a proposed rule to revise fossil fuel leasing and permitting regulations and implement leasing reform provisions in the Inflation Reduction Act to ensure the rulemaking moves forward expeditiously . Even with agency guidance regarding implementation of the IRA's leasing provisions in place, new regulations for the federal onshore oil and gas program remain paramount for ensuring durable, holistic reform. We call on the Interior Department to issue its proposed rule to reform fossil fuel leasing and permitting regulations and implement the IRA's leasing-related provisions modernizing the MLA before holding the BLM New Mexico – Oklahoma 2023 Fourth Quarter Oil and Gas Lease Sale. Releasing a proposed rule before holding new lease sales is critical to ensuring that the rulemaking moves forward expeditiously.[...] Reforming the onshore leasing system will address some of the notable flaws recognized by independent and non-partisan entities fundamental to ensuring the federal leasing program works for everyone, not just the oil and gas industry.3 Thus, we urge Interior to implement needed reforms before leasing more of our shared public lands. Fortunately, the Department has the authority to address several programmatic deficiencies through rulemaking. The rulemaking should address the IRA's increases to the federal onshore royalty rate, rental rates, and minimum lease bid, establishment of a $5/acre EOI fee, elimination of noncompetitive leasing, and the requirement of a methane royalty on federal leases, including from vented and flared gas. Regulation must also reform the currently inadequate bonding regime, left out of the IRA but for which Interior has ample authority to address, as well as many other programmatic reforms.	The commenter is suggesting agency-wide policy changes which are outside the scope of this NEPA analysis.
25	Inflation Reduction Act	Avoided emissions screen The IRA arbitrarily tethers issuance of wind and solar development ROWs to oil and gas leasing. Given the Interior Department's aforementioned considerable authority and discretion over if and when to hold oil and gas lease sales, it should establish in regulation – and in guidance in the interim – that, over the next ten years during the term of the IRA's tethering provisions, oil and gas lease sales are to be held only when there are wind or solar development ROWs needing to be issued. Additionally, projected GHG emissions from any onshore oil and gas lease sales and, more specifically, any oil and gas leases issued, must not be greater than the projected emissions that would be avoided by planned onshore wind and solar development projects whose ROWs would be issued contingent upon the oil and gas lease sale. This screen should be in addition to one of the climate screens discussed above...	The commenter is suggesting agency-wide policy changes which are outside the scope of this NEPA analysis.

Comment Number	Topic	Comment Text	Response
26	Methane	The BLM does not properly analyze methane emissions that would result from this lease sale. Methane is a potent climate pollutant that has contributed about half a degree Celsius to observed global warming.133...The BLM must, in its baseline, properly account for current methane levels and the related climate and resource impacts associated with this and the related lease sales. The Draft EAs fail to take the requisite hard look at the impacts of methane emissions that will result from development of and production on these leases, including the economic, public health, and public welfare impacts of venting and flaring.138 Venting and flaring of gas account for tremendous economic waste and adverse health impacts... Venting and flaring on Tribal and federal public lands also has significant health impacts on frontline and fence line communities.142 These groups live near flaring wells at much higher rates than other communities across the country. Proximity to oil and gas infrastructure creates disproportionate adverse health risks and impacts on Indigenous communities in particular.143 The BLM is presently undertaking a rulemaking on methane waste. As such, BLM should not issue additional oil and gas leases until the agency addresses waste on Tribal and federal public lands. At the least, the BLM must properly account for and estimate methane emissions that occur during oil and gas production and transport. This can easily be done using a reasonable leak rate assumption (such as 2.3%) and projected production estimates.146 The BLM must further discuss and provide for adequate mitigation of methane emissions resulting from this lease sale.	To the extent the commenter is suggesting agency-wide policy changes which are outside the scope of this NEPA analysis, the BLM considers the comment non-substantive. EA Section 3.6.2 analyzes greenhouse gas emissions, including methane, and climate change impacts associated with the Proposed Action. The BLM quantifies direct, indirect, and cumulative emissions from the combustion of oil and gas and discusses the significance of these emissions. EA Section 3.6.2.3 discusses mitigation strategies designed to reduce methane and GHGs. Analysis and approval of future development may include application of BMPs within BLM's authority, as COAs or lease stipulations, to reduce or mitigate GHG emissions. Additional measures proposed at the project development stage also 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 2021 Annual GHG Report. EA Section 3.5 (AIB-16 Human Health and Safety) emphasizes that 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. Additionally, 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. EA Section 3.5 (AIB-19 Environmental Justice) discusses additional adverse impacts that may be identified by local communities as specific development locations and types are proposed. The BLM would continue to work with potentially affected communities of concern to identify and address additional EJ issues as they arise. Furthermore, BLM OFO uses stipulations and COAs to minimize impacts to nearby populations, including communities of concern, during construction and operations, to the extent practicable.

Comment Number	Topic	Comment Text	Response
27	Mitigation	The Draft EAs Fails to Adequately Discuss Mitigation Measures to Address the Impacts of GHG Emissions The Draft EAs do not adequately identify or evaluate mitigation measures to address GHG emissions associated with oil and gas development for the lease sale. As discussed in this comment and as the BLM acknowledges in the Draft FONSIs, GHG emissions impacts could be significant.81 As such, NEPA requires the BLM to include a discussion of possible mitigation measures in the Draft EAs. 40 C.F.R. § 1508.9... If the BLM is to rely on an EA instead of an EIS to evaluate an action with likely significant environmental effects, it must impose mitigation of those impacts in a mitigated FONSI. See, e.g., Environmental Prot. Info. Ctr. v. United States Forest Serv., 451 F.3d 1005, 1011–12 (9th Cir. 2006); Nat'l Audubon Soc'y v. Hoffman, 132 F.3d 7, 11, 17 (2d Cir. 1997). NEPA requires the BLM to consider ways to avoid, minimize, and mitigate impacts in accord with the mitigation hierarchy. 40 C.F.R. §§ 1508.8, 1502.14, 1502.16, 1508.20. Specifically, agencies must "include appropriate mitigation measures not already included in the proposed action or alternatives." Id. §§ 1502.14(f), 1502.16(h). The BLM must, in order, seek to avoid impacts, minimize impacts, and, only if those approaches are insufficient to fully mitigate the impacts, appropriately and sufficiently offset any remaining impacts.	An explanation of the BLM's decision space based on the alternatives analyzed in detail is provided in EA Sections 1.3 and 2.1. As informed by the issues-based analysis in the EA, the BLM Authorized Officer retains the discretion to lease all of the nominated lease parcels, none of the nominated lease parcels, or some configuration of leasing and deferring nominated lease parcels. Site-specific avoidance, minimization, and/or mitigation measures would be determined at the time of proposed lease development and attached as COAs to the APD.
28	Native American/Tribal Consultation	The BLM should provide robust public participation and Tribal consultation as part of the lease sale process. Public participation and Tribal consultation are critical to an informed NEPA process. DOI has rightfully committed to providing robust and "enhance[d] opportunities for Tribal and environmental justice community engagement in the NEPA and decision-making process." Secretarial Order 3399, at *3 (Apr. 16, 2021). We strongly urge BLM to abide by these commitments.[...] To honor its commitment to enhanced public participation and Tribal consultation, BLM should consider providing, in addition to this scoping comment period, one or more listening sessions before issuing any draft NEPA document. These sessions could be timed and located to allow fence-line, frontline, and other affected communities the opportunity to participate. Then, BLM should give the public at least 60 days to review and comment on any draft NEPA document. Doing so would help ensure that the public has an adequate "opportunity to comment upon . . . and participate in, the preparation and execution of" this lease sale, as required by FLPMA and NEPA. 43 U.S.C. § 1738(e); 42 U.S.C. § 4332(C).	The BLM provided a 30-day comment scoping period from February 17 to March 20, 2023 (although no scoping period is required for an EA, per the BLM NEPA handbook.) The BLM also provided a 30-day public comment period from May 16 to June 15, 2023. The public will also have the opportunity to provide comments again during the protest period. Additionally, the BLM OFO initiated government-to-government consultation under NEPA on January 25, 2022, and March 14, 2023, and Tribal Historic Preservation Office (THPO) consultation under NHPA Section 106 on March 16, 2023, and March 17, 2023, with the Caddo Nation, Cherokee Nation, Cheyenne and Arapaho Tribes of Oklahoma, Chickasaw Nation, Choctaw Nation, Kialegee Tribal Town, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, Osage Nation, Ponca Tribe of Oklahoma, Southern Ute Indian Tribe, Keetoowah Band of Cherokee, Wichita & Affiliated Tribes, and Wyandotte Nation Tribal consultation is ongoing, and the BLM OFO will remain available to engage with tribes and Pueblos and respond to any consultation requests.

Comment Number	Topic	Comment Text	Response
29	Native American/Tribal Consultation	The BLM should provide robust public participation and Tribal consultation as part of the lease sale process. The Department must also fully consult and engage Tribal nations, both those recognized by the United States as sovereign nations as well as those not recognized. Tribes must be able to protect and preserve their own lands and resources. The United States must recognize the right of Indigenous Peoples to give or withhold "free, prior and informed consent" to projects and policies affecting their lands and people, as stated in the United Nations Declaration on the Rights of Indigenous Peoples, which the United States has supported for more than a decade. The incorporation of these bottom-up principles in this federal process is an important and needed step as we address the history of public lands in the United States.	The BLM provided a 30-day comment scoping period from February 17 to March 20, 2023 (although no scoping period is required for an EA, per the BLM NEPA handbook.) The BLM also provided a 30-day public comment period from May 16 to June 15, 2023. The public will also have the opportunity to provide comments again during the protest period. Additionally, the BLM OFO initiated government-to-government consultation under NEPA on January 25, 2022, and March 14, 2023, and Tribal Historic Preservation Office (THPO) consultation under NHPA Section 106 on March 16, 2023, and March 17, 2023, with the Caddo Nation, Cherokee Nation, Cheyenne and Arapaho Tribes of Oklahoma, Chickasaw Nation, Choctaw Nation, Kialegee Tribal Town, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, Osage Nation, Ponca Tribe of Oklahoma, Southern Ute Indian Tribe, Keetoowah Band of Cherokee, Wichita & Affiliated Tribes, and Wyandotte Nation Tribal consultation is ongoing, and the BLM OFO will remain available to engage with tribes and Pueblos and respond to any consultation requests.
30	Orphaned and Abandoned Wells	Program deficiencies with direct impacts for this lease sale that need to be addressed in the rulemaking include but are not limited to: • Mounting cleanup and remediation costs of orphan wells. According to the Government Accountability Office (GAO), the BLM holds an average of $2,122 per well in bonding (as of 2018), while average reclamation costs on federal lands range from around $20,000 to $145,000 per well. As of 2022, there were 31,186 and 457 producible federal wells in New Mexico and Oklahoma respectively, which means the bonding shortfall – the amount of the oil and gas industry's reclamation costs that could fall to taxpayers – may range from approximately $550 million to just under $4 billion. Offering additional leases without adequate bonding will only increase the burden on the public and leave numerous orphaned wells to degrade our public lands. Recommendation: The existing regulatory framework for inactive and orphaned wells is completely inadequate, as it lets industry shift millions in clean-up costs to taxpayers and fails to protect public lands, waters, and nearby communities from the impacts of aging and abandoned infrastructure. GAO and Interior's Inspector General have both repeatedly advised the BLM to strengthen its oversight of inactive and orphaned wells, including by increasing bond amounts to reflect the actual costs of reclamation.10 The BLM should issue additional guidance in the interim as it works to amend its oil and gas regulations to eliminate or minimize the use of blanket bonds and require that bonds be based on the full costs of plugging, abandonment, and reclamation. The agency should issue new policies that increase oversight of inactive wells and limit the ability of operators to indefinitely delay final reclamation.	The commenter is suggesting agency-wide policy changes which are outside the scope of this NEPA analysis.

Comment Number	Topic	Comment Text	Response
31	Public Health and Safety	A Stanford University study released in April 2018 documents seismic threats in the Permian Basin resulting from injection wells.19 In addition, a Durham University Study released in February 2018 noted that, "The risk of human-made earthquakes due to fracking is greatly reduced if high-pressure fluid injection used to crack underground rocks is 895m away from faults in the Earth's crust."20 Hydraulic fracking in the Permian basin was not remotely close to current levels 15 years ago. Not only does this underscore the issue of BLM not adequately responding to comments, it also indicates BLM is not using the best available science. Essentially, NEPA "ensures that the agency, in reaching its decision, will have available and will carefully consider detailed information concerning significant environmental impacts." Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989)...	To the extent the comment purports to interpret legal authorities that speak for themselves, or suggests agency-wide policy changes which are outside the scope of this NEPA analysis, the BLM considers the comment non-substantive. The EA analyzes potential human health impacts in AIB-16, including the cumulative health and safety effects of reasonable foreseeable environmental trends and planned actions. Human health and safety effects to environmental justice communities, including minority, low income, and Tribal populations are further analyzed in AIB-18. As discussed in AIB-18, additional environmental justice analysis would be conducted at the time of proposed lease development. Additionally, OK, KS & TX state governments have all studied and addressed the issue of induced seismicity correlated to high-volume high-pressure waste water injection wells through the legislative and/or regulatory process, as oil & gas well operations are largely managed by the states. Additionally, the BLM appropriately addresses the potential for induced seismicity in the NEPA analysis at the APD stage, because the BLM then knows, specifically, where the well would be drilled and how.
32	Public Health and Safety	The BLM has failed to take the necessary "hard look" at potential environmental impacts. The BLM has not taken the required "hard look" at potential environmental impacts, as required by NEPA. Under NEPA, BLM must evaluate the "reasonably foreseeable" site-specific impacts of oil and gas leasing prior to making an "irretrievable commitment of resources." New Mexico ex rel. Richardson, 565 F.3d at 718; see also Sierra Club v. Hodel, 848 F.2d 1068, 1093 (10th Cir. 1988) (agencies are to perform hard look NEPA analysis "before committing themselves irretrievably to a given course of action so that the action can be shaped to account for environmental values"); Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., 435 U.S. 519, 553 (1978) (stating NEPA "places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action"). Courts have held that BLM makes such a commitment when it issues an oil and gas lease without reserving the right to later prohibit all development. New Mexico ex rel. Richardson, 565 F.3d at 718; Pennaco Energy, Inc. v. United States Dep't of the Interior, 377 F.3d 1147, 1160 (10th Cir. 2004).	To the extent the comment purports to interpret legal authorities that speak for themselves, or suggests agency-wide policy changes which are outside the scope of this NEPA analysis, the BLM considers the comment non-substantive. To the extent the comment is focused on impacts to LPC, management of LPC habitat is outside the scope of this NEPA analysis and is not relevant to the November 2023 OFO EA.

Comment Number	Topic	Comment Text	Response
		Here, the BLM is in fact proposing to make an "irretrievable commitment of resources" by offering leases without reserving the right to prevent future development; the site-specific impacts are "reasonably foreseeable" and should be analyzed in the Draft CFO EA, rather than waiting until a leaseholder submits an application for permit to drill (APD). Unfortunately, the Draft CFO EA takes exactly the wrong approach and contains essentially no discussion of impacts to lesser prairie-chicken (LEPC).26 The Draft CFO EA expressly denotes that the LEPC remains a threatened species.27 However, the EA fails to discuss exactly what impacts may occur on the leases to be sold. Instead, the EA merely states that impacts would be mitigated through lease stipulations.28 The Draft CFO EA contains no forecast of the impacts to LEPC populations from the specific leases being considered for sale. This approach violates NEPA, and BLM must take the site-specific impacts of leasing into account at this stage. [...] Here, the BLM can develop a reasonable forecast of how these leases will impact LEPCs, just as it has done for their greenhouse gas impacts. For example, the agency can look to nearby existing development to assess where and how much drilling may occur on the proposed leases. Failing to use this type of readily available information to forecast development would violate NEPA... Moreover, the BLM cannot rely for these sales on the plan-level NEPA analysis conducted for the 1988 Plans. Tiering is only appropriate when a subsequent NEPA document incorporates by reference earlier general matters into a subsequent narrower statement; but it does not allow a subsequent analysis to ignore the specific environmental issues that are presented in the later analysis. 40 C.F.R. § 1508.28. The1988 Plan EIS does not address the site-specific impacts associated with issuing these particular lease parcels. On the contrary, by requiring a prioritization analysis the 1988 Plans contemplate that such an analysis will occur at the leasing stage...	
33	Public Health and Safety	The BLM does not thoroughly analyze the impacts of this lease sale on public health. The Biden Administration has committed to "promot[ing] and protect[ing] public health and the environment" and "advanc[ing] environmental justice."108 The BLM must acknowledge foreseeable direct, indirect, and cumulative human health impacts resulting from fossil fuel development should these lease sales proceed. Protecting public health is fundamental to the underlying purpose of NEPA, which was enacted in part to "stimulate the health and welfare of man," and mandates that agencies consider the degree to which their proposed actions affect public health or safety. 42 U.S.C § 4321; 40 C.F.R § 1508.27(b)(2). NEPA requires federal agencies "to use all practicable means, consistent with other essential considerations of national policy" to	To the extent the comment purports to interpret legal authorities that speak for themselves, or suggests agency-wide policy changes which are outside the scope of this NEPA analysis, the BLM considers the comment non-substantive. The EA analyzes potential human health impacts in AIB-16, including the cumulative health and safety effects of reasonably foreseeable environmental trends and planned actions. Human health and safety effects to environmental justice communities are further analyzed in AIB-18.

Comment Number	Topic	Comment Text	Response
		"assure for all Americans safe, healthful, productive and aesthetically and culturally pleasing surroundings." 42 U.S.C 4331(b). "Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative." 40 C.F.R § 1508.8. To protect public health and promote informed agency decision-making, transparency, and public participation, NEPA imposes "action-forcing procedures … requir[ing] that agencies take a hard look at environmental consequences." Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989). Such consequences include all "reasonably foreseeable" direct, indirect, and cumulative effects, including health effects. An effect is "reasonably foreseeable" if it is "sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision." Sierra Club v. Marsh, 976 F.2d 763, 767 (1st Cir. 1992). An agency's hard look "must be taken objectively and in good faith, not as an exercise in form over substance, and not as a subterfuge designed to rationalize a decision already made." Forest Guardians v. U.S. Fish & Wildlife Serv., 611 F.3d 692, 712 (10th Cir. 2010). NEPA and its implementing regulations require the BLM to do more than list generalized categories of risks: the agency must analyze and take a hard look at those risks and their effects. See 40 C.F.R. § 1508.1. The intent of NEPA is for agencies to study the impact of their actions on the environment before the action is taken... Oil and gas development poses myriad public health impacts. An extensive and ever-growing body of peer-reviewed research has shown what people living near oil and gas operations already know firsthand – that proximity to drilling and fracking operations and other oil and gas facilities is linked to adverse health risks and impacts. Some of these risks and impacts are discussed in further detail throughout this section, but in general, they include but are not limited to: • Reproductive harms – including birth defects, low birth weight, preterm births, and miscarriages; • Respiratory health effects – including asthma, lung disease, breathing difficulty, and, most recently, increased vulnerability to COVID-19; • Eye, skin, and throat irritation and rashes; • Cardiovascular effects – including higher blood pressure and other indicators of, or precursors to, heart disease; • Possible disruption of the endocrine system (a system of glands producing hormones that regulate a variety of functions in the body, including metabolism, growth and development, reproduction, sleep, and mood); • Cancer (lung cancer and other types of cancer);	

Comment Number	Topic	Comment Text	Response
		• Motor vehicle injuries and fatalities, and other health and safety risks associated with increased vehicle traffic (and the air pollutants it emits) from oil and gas development; • Injuries and fatalities from explosions, fires, spills, and leaks; and • Trauma and psychological stress.109[...] The BLM must take a hard look not only at direct health impacts and proximity-related health impacts of oil and gas development, but also at cumulative health risks and impacts. See 40 C.F.R. § 1508.1(g)(3). Cumulative health risks and impacts can arise not only from multiple pollutant exposures, and cumulative pollution exposures over time, but also from compounding structural, social, and economic factors, many of which are rooted in systemic inequities and injustices. To adequately analyze human health impacts, the BLM should incorporate findings from regionally relevant health impact assessments (HIAs).117 An HIA is an internationally used preventative health tool that anticipates the human health impacts of new or existing development projects, programs, or policies. The overall goal of this type of assessment is to identify and minimize negative health effects of a particular action, such as oil and gas development and production.	

Comment Number	Topic	Comment Text	Response
34	Reasonable Range of Alternatives	The BLM must require full-cost bonding. To prevent oil and gas companies from saddling American taxpayers with their reclamation costs, the BLM must require full-cost bonding as a condition of lease acquisition. Under the MLA, the BLM is required to adopt standards that "ensure the complete and timely reclamation of the lease tract, and the restoration of any lands or surface waters adversely affected by lease operations. . . ." 30 U.S.C. § 226(g) (emphasis added). BLM must also ensure that lease operators provide "adequate" bonding, i.e., bonding that will ensure "complete and timely reclamation." Yet, as documented by GAO and others, BLM routinely requires bonds that are far short of what is needed to "completely and timely" reclaim and restore drilling sites. According to GAO, BLM has collected just over $2,100 in bonding per well. This is because BLM typically defaults to minimum bond amounts, which have not increased in decades and are well-below what is needed to "completely" reclaim and restore drilling sites. For this reason, GAO has concluded that BLM's bonds "do not reflect full reclamation costs for the wells they cover" and "are not sufficient to prevent orphaned wells . . . ."22 [...] Accordingly, the BLM must require bonds that reflect the full and complete costs of reclamation and restoration. To ensure this happens, the BLM should incorporate a new term into all leases now under consideration that requires a detailed assessment of potential reclamation and restoration costs in advance of surface disturbing activities and bonds that are equal to or in excess of those costs...	To the extent the comment suggests agency-wide policy changes which are outside the scope of this NEPA analysis, the BLM considers the comment non-substantive.

Comment Number	Topic	Comment Text	Response
35	Reasonable Range of Alternatives	The BLM must consider a range of reasonable alternatives, including a conservation and climate alternative. The BLM fails to consider a range of reasonable alternatives in the Draft EAs. The range of alternatives is the heart of a NEPA document because "[w]ithout substantive, comparative environmental impact information regarding other possible courses of action, the ability of [a NEPA analysis] to inform agency deliberation and facilitate public involvement would be greatly degraded." New Mexico ex el. Richardson, 565 F.3d at 683, 708. NEPA analysis must cover a range of reasonable alternatives so that an agency can make an informed choice from the spectrum of reasonable options. An environmental review offering a choice between leasing every parcel nominated, and leasing nothing at all, fails to present a range of reasonable alternatives. The BLM should consider at least one conservation and climate alternative. The CEQ climate guidance directs agencies to "evaluate reasonable alternatives that may have lower GHG emissions, which could include technically and economically feasible clean energy alternatives to proposed fossil fuel-related projects."76... NEPA analysis must compare "relevant GHG emissions, GHG emission reductions, and carbon sequestration potential across reasonable alternatives, assessing trade-offs with other environmental values, and evaluating the risks from or resilience to climate change inherent in a proposed action and its design."78 Because of the "urgency of the climate crisis," the BLM "should use the information provided through the NEPA process to help inform decisions that align with climate change commitments and goals." Therefore, for this lease sale, the BLM should consider a protective alternative in line with U.S. climate commitments.	EA Section 3.6.2 analyzes greenhouse gas emissions and climate change impacts associated with the Proposed Action. Analysis and approval of future development may include application of BMPs within BLM's authority, as COAs or lease stipulations, to reduce or mitigate GHG emissions. Additional measures proposed at the project development stage also 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 2021 Annual GHG Report (BLM 2022c). The BLM has analyzed a range of alternatives for proceeding with lease sales taking into account a number of factors, including resource conflicts and development potential, as part of exercising its discretion in leasing decisions. The alternatives considered adequately weigh the courses of actions that BLM could take based on potential resource conflicts and whether making certain lands available would meet the purpose and need of the EA. BLM has considered a reasonable range of alternatives and disclosed the impacts based on GHG emissions and SC GHG over the range of the Proposed Action which is what BLM has proposed as its decision, and the No Action which are less than the Proposed Action. Climate impacts are one of many factors that are considered in the NEPA analysis to evaluate the significance of a proposed action and the BLM's exercise of its discretion in deciding on leasing actions.

Comment Number	Topic	Comment Text	Response
36	Reasonable Range of Alternatives	The BLM must consider a range of reasonable alternatives, including a conservation and climate alternative. We strongly urge this conservation and climate alternative to entail substantial deferrals based on the conservation and climate leasing screens discussed in this comment letter. This reasonable alternative would defer parcels based on a climate screen and the criteria in IM 2023-007. A conservation and climate alternative should rely on option value, which considers the value of avoiding leasing or delaying leasing or development.79 Leasing lands for oil and gas development gives preference to oil and gas development at the expense of other uses while handcuffing the BLM's ability to make other management decisions down the road. The presence of oil and gas leases or development can limit the BLM's willingness to manage for other resources in the future. Option value would allow realizing the economic benefits that could arise from delaying leasing or exploration and development based on improvements in technology, additional benefits that could come from managing these lands for other uses, and additional information on the impacts of climate change and ways to avoid or mitigate impacts on the environment. The BLM has the ability and obligation to undertake an analysis of the benefits of delaying leasing or permitting, which can be both qualitative and quantitative, considering both economic and environmental needs. Failing to account for the informational value of waiting puts the American people at economic and financial disadvantages. The consideration of option value before offering leases would result in greater consideration of climate risks and reduced costs.80	EA Section 3.6.2 analyzes greenhouse gas emissions and climate change impacts associated with the Proposed Action. Analysis and approval of future development may include application of BMPs within BLM's authority, as COAs or lease stipulations, to reduce or mitigate GHG emissions. Additional measures proposed at the project development stage also 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 2021 Annual GHG Report (BLM 2022c). The BLM has analyzed a range of alternatives for proceeding with lease sales taking into account a number of factors, including resource conflicts and development potential, as part of exercising its discretion in leasing decisions. The alternatives considered adequately weigh the courses of actions that BLM could take based on potential resource conflicts and whether making certain lands available would meet the purpose and need of the EA. BLM has considered a reasonable range of alternatives and disclosed the impacts based on GHG emissions and SC GHG over the range of the Proposed Action which is what BLM has proposed as its decision, and the No Action which are less than the Proposed Action. Climate impacts are one of many factors that are considered in the NEPA analysis to evaluate the significance of a proposed action and the BLM's exercise of its discretion in deciding on leasing actions.

Comment Number	Topic	Comment Text	Response
37	Social Cost of Carbon	The BLM's NEPA analysis fails to address whether the lease sale is consistent with U.S. climate commitments and fails to address its full costs and benefits. The Draft EAs contain several inconsistencies in its social cost analysis that we urge the BLM to address. First, Table 3.18 of the Draft OFO EA, and Table 3.26 of the Draft CFO EA states that the SC-GHGs presented are in 2020$, but the text right above them states that the estimates represent the present value from the perspective of 2021.66 Second, because the BLM assumes that the average lifespan of a well is 20 years, that is the timeline the BLM uses for the lifecycle emission calculations even though the BLM's own annual GHG emissions profile for total end-use emissions from the fossil fuels coming from a well continue to occur for at least 10 more years and an ongoing small amount come from the well-site for around 19 more years (so a total profile of 39 years). By only including the 20 years that the well is actively producing in the lifecycle emissions and subsequent social cost analysis, the BLM is arbitrarily leaving out about 25% of lifecycle emissions and subsequent costs that stem from the actions under discussion. For this lease sale, the BLM used SC-GHG estimates to project that foreseeable development would cause upwards of billions of dollars in social and environmental harms. But the BLM never explained why it chose to incur such enormous societal costs, or how its cost analysis informed the agency's decision making. The Draft EAs do not discuss whether there might be any benefits from the lease sale that warrant incurring those enormous costs.	The BLM analyzes potential impacts, including cumulative impacts, from climate change and GHG in detail in the EAs (see Sections 3.6.1 and 3.6.2). The EAs incorporate by reference information from the recently published 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas. The emissions used in this analysis are estimated using the 2022 BLM Lease Sale Emissions Tool and evaluated with the EPA GHG equivalency calculator. The BLM also includes a monetized social cost of carbon analysis for the estimated emissions associated with future potential development. Until such time as the BLM develops further tools to analyze the relative impact of its activities nationwide, the BLM can disclose the SC-GHG, and provide context and analysis for those costs; the agency cannot determine significance for a proposed action based on SC-GHG amounts alone. Estimating the economic benefits (change in social welfare) associated with oil and gas leasing is not feasible, nor is it required for NEPA. The BLM analyzes the impacts associated with the alternatives using the best available information, which is typically not monetized estimates of benefits or costs. For comparison, a well in New Mexico that produces for 20 years instead of 30 will result in total lifecycle emissions that are approximately 10% less CO_2e (100-yr GWP) and 13% less CO_2e (20-yr GWP). Section 3.6.1 of the OFO and CFO EAs has been revised to correct the inconsistencies mentioned by the commenter. The SC-GHGs are presented in 2023$ and the EA Tables and text have been revised to reflect this change. The statement regarding the SC-GHG estimates and associated well development and operation emissions timeframe has been revised and corrected to reflect a longer duration (the estimates assume well development will start in 2023 and end-use emissions complete in 2051). Various laws, including the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, require the BLM to make mineral resources, such as oil and gas, available for development. See EA Sections 1.2 and 1.4 for information regarding the BLM's requirements under MLA, FLPMA, and other statues and regulations. Chapter 2 of the 2021 BLM Specialist Report on Annual GHG Emissions and Climate Trends discusses the relationship between BLM's coal, oil, and gas leasing programs with other laws and policies and+I38+I37+I38+I37

Comment Number	Topic	Comment Text	Response
38	Social Cost of Carbon	The BLM's NEPA analysis fails to address whether the lease sale is consistent with U.S. climate commitments and fails to address its full costs and benefits. Assessing significance is not solely a fact-based judgment that a research tool, such as the SC-GHG, can accomplish. Determining whether impacts are significant is a determination that requires reasoned judgment. While SC-GHG is a particularly helpful tool for determining significance, the BLM may also need to look at additional qualitative factors in some cases. In this respect, assessing the significance of climate impacts from a lease sale is no different from any other type of impact that the BLM regularly evaluates for significance. It is certainly not, as the FONSI claims, an impossible task. On the contrary, given the breadth and depth of scientific information available to the BLM and the robustness of the SC-GHG tool, NEPA requires the BLM to make just such a significance determination. Agencies' or other government entities' significance determinations provide a useful starting point for identifying a monetary value triggering significance. The Federal Energy Regulatory Commission (FERC) frequently conducts cost-benefit analyses... The BLM can and should examine its own past NEPA documents to determine whether it has found certain monetary benefits or costs to be significant. Using the limited FERC examples,70 however, indicates that annual gross climate damages of roughly $8 to $20 million are significant, along with considering any unmonetized, qualitative climate damages in its determination. Comparing these amounts to the SC-GHG for this lease sale under both the Proposed Action and Alternative 3 suggests that the BLM should consider the climate impacts to be significant. Moreover, the BLM should show the social cost calculations using the Environmental Protection Agency's recently released SC-GHG estimates.71 These estimates represent the most up-to-date, best available information. Using these calculations assuming 64% of the calculated estimate to approximate the BLM's inexplicably low calculations would demonstrate that SC-GHG estimates for this lease sale could exceed $7.5 billion under a 2% discount rate in a high CO2e scenario, exceed $8 billion using a 1.5% discount rate, and exceed $12 billion using a 1.5% discount rate under a high CO2e scenario.	The BLM analyzes potential impacts, including cumulative impacts, from climate change and GHG in detail in the EAs (see Sections 3.6.1 and 3.6.2). The EAs incorporate by reference information from the recently published 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas. The emissions used in this analysis are estimated using the 2022 BLM Lease Sale Emissions Tool and evaluated with the EPA GHG equivalency calculator. The BLM also includes a monetized social cost of carbon analysis for the estimated emissions associated with future potential development. Until such time as the BLM develops further tools to analyze the relative impact of its activities nationwide, the BLM can disclose the SC-GHG, and provide context and analysis for those costs; the agency cannot determine significance for a proposed action based on SC-GHG amounts alone. Estimating the economic benefits (change in social welfare) associated with oil and gas leasing is not feasible, nor is it required for NEPA. The BLM analyzes the impacts associated with the alternatives using the best available information, which is typically not monetized estimates of benefits or costs. Various laws, including the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, require the BLM to make mineral resources, such as oil and gas, available for development. See EA Sections 1.2 and 1.4 for information regarding the BLM's requirements under MLA, FLPMA, and other statues and regulations. Chapter 2 of the 2021 BLM Specialist Report on Annual GHG Emissions and Climate Trends discusses the relationship between BLM's coal, oil, and gas leasing programs with other laws and policies and+I38+I37+I38+I37

Comment Number	Topic	Comment Text	Response
39	Social Cost of Carbon	The BLM's NEPA analysis fails to address whether the lease sale is consistent with U.S. climate commitments and fails to address its full costs and benefits. Again, a specific monetary threshold should not be the exclusive metric for determining significance. Rather, it illustrates that the task of determining the significance of GHG emissions for this lease sale is within BLM's capabilities. Deeming lifecycle climate impacts of billions of dollars as having uncertain significance is an arbitrary and capricious determination, especially with no basis for comparison to project benefits. Because the BLM has issued Draft FONSIs, it is indeed attributing insignificance to this lease sale's SC-GHG, despite protestations in the document that it cannot determine whether climate impacts are significant or not. The BLM is misleadingly trivializing emissions by comparing them to larger totals, such as global or domestic emissions, and thus fails to properly contextualize the emissions. We urge the BLM to correct this analysis.	The BLM analyzes potential impacts, including cumulative impacts, from climate change and GHG in detail in the EAs (see Sections 3.6.1 and 3.6.2). The EAs incorporate by reference information from the recently published 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas. The emissions used in this analysis are estimated using the 2022 BLM Lease Sale Emissions Tool and evaluated with the EPA GHG equivalency calculator. The BLM also includes a monetized social cost of carbon analysis for the estimated emissions associated with future potential development. Until such time as the BLM develops further tools to analyze the relative impact of its activities nationwide, the BLM can disclose the SC-GHG, and provide context and analysis for those costs; the agency cannot determine significance for a proposed action based on SC-GHG amounts alone. Estimating the economic benefits (change in social welfare) associated with oil and gas leasing is not feasible, nor is it required for NEPA. The BLM analyzes the impacts associated with the alternatives using the best available information, which is typically not monetized estimates of benefits or costs. Various laws, including the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, require the BLM to make mineral resources, such as oil and gas, available for development. See EA Sections 1.2 and 1.4 for information regarding the BLM's requirements under MLA, FLPMA, and other statues and regulations. Chapter 2 of the 2021 BLM Specialist Report on Annual GHG Emissions and Climate Trends discusses the relationship between BLM's coal, oil, and gas leasing programs with other laws and policies and+I38+I37+I38+I37

Comment Number	Topic	Comment Text	Response
40	Social Cost of Carbon	The Draft EAs Lacks Adequate Analysis of the Climate Effects of GHG Emissions. The Draft EAs fail to adequately address the full projected environmental effects of GHG emissions resulting from this lease sale and the cumulative emissions impacts. The Draft EAs lack adequate analysis of climate impacts by making little attempt to discuss and qualify on-the-ground, regional environmental effects of climate change. Providing SC-GHG metrics helps encapsulate impacts but does not relieve BLM of the obligation to adequately contextualize SC-GHG estimates and to discuss, qualitatively, actual climate impacts on the environment and people. As the D.C. Circuit has explained, merely listing the quantity of emissions is insufficient if the agency "does not reveal the meaning of those impacts in terms of human health or other environmental values," since "it is not releases of [pollution] that Congress wanted disclosed" but rather "the effects, or environmental significance, of those releases."72 Although the Supreme Court reversed this decision on largely unrelated grounds, it agreed that the disclosure of impacts is the "key requirement of NEPA," and held that agencies must "consider and disclose the actual environmental effects" of a proposed project in a way that "brings those effects to bear on [the agency's] decisions." 73	The BLM analyzes potential impacts, including cumulative impacts, from climate change and GHG in detail in the EAs (see Sections 3.6.1 and 3.6.2). The EAs incorporate by reference information from the recently published 2021 BLM Air Resources Technical Report for Oil and Gas Development in New Mexico, Oklahoma, Texas and Kansas. The emissions used in this analysis are estimated using the 2022 BLM Lease Sale Emissions Tool and evaluated with the EPA GHG equivalency calculator. The BLM also includes a monetized social cost of carbon analysis for the estimated emissions associated with future potential development. Until such time as the BLM develops further tools to analyze the relative impact of its activities nationwide, the BLM can disclose the SC-GHG, and provide context and analysis for those costs; the agency cannot determine significance for a proposed action based on SC-GHG amounts alone. Estimating the economic benefits (change in social welfare) associated with oil and gas leasing is not feasible, nor is it required for NEPA. The BLM analyzes the impacts associated with the alternatives using the best available information, which is typically not monetized estimates of benefits or costs. Various laws, including the MLA and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, require the BLM to make mineral resources, such as oil and gas, available for development. See EA Sections 1.2 and 1.4 for information regarding the BLM's requirements under MLA, FLPMA, and other statues and regulations. Chapter 2 of the 2021 BLM Specialist Report on Annual GHG Emissions and Climate Trends discusses the relationship between BLM's coal, oil, and gas leasing programs with other laws and policies and+I38+I37+I38+I37

Comment Number	Topic	Comment Text	Response
41	Social Cost of Carbon	The BLM does not adequately analyze the socioeconomic impacts of this lease sale. The BLM must properly analyze the socioeconomic impacts of this lease sale, which it fails to do. The best available SC-GHG estimates provide an appropriate measure of the anticipated costs of the BLM's leasing decisions.99 While NEPA does not require a straight cost-benefit analysis,100 the BLM may include the analysis to assist the agency and the public in weighing the choice among different alternatives and "as an aid in evaluating the environmental consequences." 101 Generating an estimate of estimated economic benefits from each lease sale is feasible. For example, previous lease sale EAs have forecast the bonus and rental payments resulting from that proposed sale.102 It is also realistic to forecast potential oil and gas production (and thus royalties and other economic benefits) from the proposed leases. The BLM has prepared reasonably foreseeable development estimates in Colorado and other states,103 that can be used for a forecast of future production. Moreover, the BLM's estimate of GHG impacts further illustrates that the agency can make such projections. While recognizing uncertainties, the agency used "estimated well numbers based on State data for past lease development combined with per-well drilling, development, and operating emissions data from representative wells in the area. For purposes of estimating production and end-use emissions, reasonably foreseeable wells are assumed to produce oil and gas in similar amounts as existing nearby wells."104 A similar methodology could be used to estimate production royalty and related economic benefits from the leases.	The analysis discloses potential socioeconomic impacts in AIB-24 of the PDO EA. Estimating the economic benefits (change in social welfare) associated with oil and gas leasing is not feasible, nor is it required for NEPA. The BLM analyzes the impacts associated with the alternatives using the best available information, which is typically not monetized estimates of benefits or costs. The BLM is exercising its discretion to estimate SC GHG to provide additional context for decision making. The BLM provided a wide range of potential impact contexts in the 2021 Specialists Report, which was incorporated by reference into each EA. The Specialists Report presents the life-cycle representation of the federal onshore mineral estate GHG emissions relative to various local, state, national and global emissions and impact contexts.
42	Water Quality	BLM Must Take a Hard Look at Impacts to Groundwater from Well Construction Practices and Hydraulic Fracturing. The Draft EA violates NEPA because it contains no analysis of the reasonably foreseeable impacts to groundwater from drilling on these particular lease sale parcels. The Draft EA contains three pages of generic boilerplate about potential water impacts from oil and gas development,91 and a conclusory statement that BLM "would require full compliance with local, state, and federal directives and stipulations that relate to surface and groundwater protection and the BLM would deny any APD who proposed drilling and/or completion process was deemed to not be protective of usable water zones."92 These statements could be made about any oil and gas lease anywhere in New Mexico, Oklahoma, or nearby states—they tell the agency and the public nothing at all about the development of these leases.	The BLM identified, discussed, and analyzed the potential impacts to groundwater quality and quantity in AIB-1 and Section 3.6.3 in the Nov 2023 Lease Sale EA. Cumulative effects on groundwater resources are also analyzed and discussed in these sections. Additionally, the BLM further analyzes risk of spills, casing failures, and groundwater contamination in the 2022 New Mexico Water Support Document. At the leasing stage, there are no site-specific details about number of wells/well pads, well depth, miles of roads, or other surface disturbances that would be used to prepare more detailed water use estimates. Accordingly, the issue of water use would be further examined at the site-specific level when these details are known.

Comment Number	Topic	Comment Text	Response
		NEPA requires BLM to assess all the potential environmental impacts from oil and gas leases before it offers those leases to operators. That responsibility includes taking a “hard look” at how ensuing development could impact groundwater. WildEarth Guardians v. U.S. Bureau of Land Mgmt., 457 F. Supp. 3d 880, 886–89 (D. Mont. May 1, 2020).[...] Oil and gas drilling involves boring wells to depths thousands of feet below the surface, often through or just above groundwater aquifers. Without proper well construction and vertical separation between aquifers and fractured formations, oil and gas development can contaminate underground sources of water.94 However, federal rules and regulations do not provide specific direction for BLM and operators to protect all usable water. Even rules that purport to do so, like Onshore Order No. 2’s requirement to “protect and/or isolate all usable water zones,” are inconsistently applied and often disregarded in practice.95 In light of these risks to a resource, BLM must evaluate potential groundwater impairment. As a threshold matter, BLM must provide a detailed account of all regional groundwater resources that could be impacted, including usable aquifers that may not currently be used as a drinking water supply. The accounting must include, at minimum, all aquifers with up to 10,000 parts per million total dissolved solids, and it cannot substitute existing drinking water wells or any other incomplete proxy for a full description of all usable or potentially usable groundwater in the region. Second, BLM must use that accounting to assess how new oil and gas wells might impact these resources. That evaluation must assess the sufficiency of protective measures that will be employed, including wellbore casing and cementing and vertical separation between aquifers and the oil and gas formations likely to be hydraulically fractured. In assessing these protections, BLM cannot presume that state and federal regulations will protect groundwater, because of the shortcomings and industry noncompliance described above. BLM may not defer this analysis of groundwater impacts to the APD stage. WildEarth Guardians, 457 F. Supp. 3d at 888. Failure to conduct this analysis would violate NEPA. Id.	As stated in EA section 1.4.2, purchasers of oil and gas leases 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. This includes, but is not limited to, BLM and state regulations regarding hydraulic fracturing, including casing specifications, monitoring and recording, and management of recovered fluids. The BLM is also required to comply with all applicable federal, state, and local laws and regulations, as well as Department of Interior policies when leasing mineral estate and responding to EOIs. The BLM does not judge the adequacy of applicable laws and regulations.