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

June 2025

Warrior Met Coal, Inc. Federal Coal Lease by Application

Draft Environmental Impact Statement

DOI-BLM-Eastern States-J000-2024-0007-EIS

Comments must be received by: July 21, 2025

Prepared by:
Bureau of Land Management

In Cooperation with:
Office of Surface Mining Reclamation and Enforcement
Alabama Surface Mining Commission

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Draft Environmental Impact Statement

Warrior Met Coal, Inc. Federal Coal Lease by Application
for
ALES-055797 Mine No. 4
and
ALES-056519 Blue Creek Mine No. 1

Mission Statement

The Bureau of Land Management sustains the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Abstract

The Bureau of Land Management (BLM), in collaboration with the Office of Surface Mining and Reclamation (OSMRE) and the Alabama Surface Mining Commission (ASMC) as cooperating agencies, is preparing an Environmental Impact Statement (EIS) in response to applications from Warrior Met Coal Mining, LLC and Warrior Met Coal BC, LLC to lease approximately 5,700 acres for the Mine No. 4 expansion and 8,350 acres for the Blue Creek Mine No. 1 expansion under the Lease By Application (LBA) process. This EIS evaluates the impacts associated with the leasing decision, which does not authorize mining operations; however, it represents an irretrievable commitment of resources, with a reasonable expectation that mining will occur if the Federal minerals are leased. The EIS analyzes the environmental impacts of both the No Action Alternative (NAA) and the Proposed Action (PA), which includes the extraction of an estimated 53.2 million tons of federal coal and 49.9 million tons of private coal reserves. McGehee Engineering Corp. is identified as the third-party contractor assisting with document preparation.

Cover Photo

Aerial photo of the Blue Creek mining complex. Source: Warrior Met Coal, Inc.

For more Information

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United States Department of the Interior
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Eastern States
5275 Leesburg Pike
Falls Church, VA 22041
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Dear Reader:

We invite you to review and comment on the attached Draft Environmental Impact Statement (DEIS) for the Warrior Met Coal Mines EIS (DOI-BLM-Eastern States-J000-2024-0007). This document analyzes the environmental impacts of a proposal to expand mining operations in Tuscaloosa County, Alabama.

The Bureau of Land Management (BLM) Eastern States, Southeastern States District Office (SSDO) has received two Federal Lease by Applications (LBAs) for this expansion. Warrior Met Coal Mining LLC proposes to expand Mine No. 4 (ALES-055797), while Warrior Met Coal BC, LLC, seeks to expand Blue Creek Mine No. 1 (ALES-056519).

- **Mine No. 4 Expansion (ALES-055797)**: Approximately 5,700 acres of private surface lands with an estimated 16.9 million short tons of recoverable Federal coal.
- **Blue Creek Mine No. 1 Expansion (ALES-056519)**: Approximately 8,350 acres of split-estate (private and state surface) lands with an estimated 36.3 million short tons of recoverable Federal coal.

In total, the proposed lease area for both applications encompasses approximately 14,050 acres. Warrior Met Coal aims to extract metallurgical coal using underground longwall mining techniques.

The issues and analysis provided in the Draft EIS have been developed through consultation and coordination with cooperating agencies, as well as through public scoping. This process has resulted in the development of the Proposed Action and No Action Alternative. Additional alternatives were considered but were eliminated from detailed analysis as impacts associated with these alternatives would be like those described in the PA and NAA: refer to Section 2.6 for a more detailed discussion on these alternatives. The Proposed Action has been identified as the BLM preferred alternative, and the No Action Alternative has been identified as the environmentally preferred alternative.

The BLM encourages public input on the DEIS, particularly regarding the adequacy and accuracy of the proposed action and alternatives, as well as any new information that should be considered. The BLM may select various components from each of the alternatives analyzed in the Draft EIS to best meet the purpose and need for the Project. The BLM considers the identified effects, public comments, and information from consulting parties to make a decision that protects environmental resource values while providing for multiple uses.

Comment Period: We will accept comments for 45 calendar days, following the Environmental Protection Agency's (EPA) publication of its Notice of Availability in the Federal Register.

How to Submit Comments:

- **Online**: Visit the BLM ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/2031600/510

- **Mail**: Bureau of Land Management
  Attn: Warrior Met Coal Mines EIS
  273 Market Street
  Flowood, MS 39232

Comments received, including names and addresses of those who comment, will be considered part of the public record for this project and will be available for public inspection. By including your address, phone number, email address, or other personally identifying information in your comment, you should be aware that your entire comment, including your personally identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

For further information related to public meetings, please refer to the BLM ePlanning website, as all information including dates, location, and time will be updated accordingly.

- ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/2031600/510

Thank you for your time and consideration. If you have any questions or need further information, please contact Brandon Schurch at (601) 715-8503 or via email at bschurch@blm.gov.

Sincerely,

Leah Baker
Acting Eastern States Director

EXECUTIVE SUMMARY

An Environmental Impact Statement (EIS) was initiated by the BLM in response to the applications submitted by Warrior Met Coal, Inc. (Warrior Met) to the BLM requesting to lease the subject properties under the LBA process contained in 43 Code of Federal Regulations (CFR) Subpart 3425. This EIS analyzes the potential environmental, social, and economic effects of the No Action Alternative (NAA) and the Proposed Action (PA), which is to offer by lease the rights to mine federal coal on approximately 5,700 acres to the Warrior Met Coal Mining, LLC – Mine No. 4 expansion, and on approximately 8,350 acres for the Warrior Met Coal BC, LLC – Blue Creek Mine No. 1 expansion. Warrior Met Coal Mining, LLC and Warrior Met Coal BC, LLC are subsidiaries of Warrior Met Coal, Inc (collectively referred to in this draft EIS as Warrior Met).

Warrior Met submitted an LBA in 2009 requesting to lease federally owned coal that will be encountered in the progression of its existing Mine No. 4 operation. The BLM initially began preparing an environmental assessment (EA) to evaluate the LBA for Mine No. 4. Upon further review of the potential effects of the proposed action for the Mine No. 4 expansion and given the proximity to the Blue Creek Mine No. 1 expansion LBA (originally submitted in 2010 and updated in March 2023), the BLM determined in 2024 that an EIS is warranted and that both LBAs would be evaluated under a single EIS.

Proposed Action

The Proposed Action (PA) is for the BLM to offer to Warrior Met, if it is the successful bidder in the competitive leasing process, leases on approximately 5,700 acres of federal coal for Mine No. 4 and 8,350 acres of federal coal for Blue Creek Mine No. 1 under the LBA process contained in 43 CFR Subpart 3425. If the PA is selected, the subject properties are leased, and permitted, and Warrior Met receives approval of separate mining plans, the leases would allow for the proposed extraction of an estimated combined 53.2 million tons of federal coal reserves and an estimated 49.9 million additional tons of private coal reserves by means of underground longwall mining techniques. Access to mining of the proposed lease reserves would occur via Warrior Met's existing leases on non-federal (private) land. The surface of the lands identified for both LBAs are privately owned. Implementation of the PA would result in the BLM holding separate competitive lease sales for each LBA.

The Mine No. 4 lease and Blue Creek Mine No. 1 lease would serve as extensions of the existing mines. Mine No. 4 and Blue Creek Mine No. 1 have existing permits and approvals from both federal and state regulatory agencies. The existing mines are in northern Tuscaloosa County, Alabama. Under the PA, at Mine No. 4 Warrior Met would extract approximately 16.9 million tons of federal coal, and a total of 73.1 million saleable tons of coal over a 21-year mine life, while employing approximately 425 employees annually. At Blue Creek Mine No. 1, Warrior Met would extract approximately 36.3 million saleable tons of federal coal, and a total of 154.2 million saleable tons of coal over a 43-year mine life, while employing approximately 500 employees annually.

No Action Alternative

Under the No Action Alternative (NAA), the proposed LBA tracts for Mine No. 4 and Blue Creek Mine No. 1 would not be offered for competitive leasing and the federal coal resources within the tracts would not be mined. The NAA would not impact the continuation of Warrior Met's existing permitted underground mining operations on private coal reserves that adjoin the subject property, in accordance with the existing ASMC permits and any additional adjacent private leases Warrior Met may acquire in the future. At Mine No. 4, Warrior Met would extract 42.6 million saleable tons of private coal over a 14-year mine life, while employing approximately 425 employees annually. At Blue Creek Mine No. 1, Warrior

Met would extract 81.6 million saleable tons of private coal over a 29—year mine life, while employing approximately 500 employees annually.

Resource Impacts

Air Resources and Climate

Under the NAA and PA, Mine No. 4 and Blue Creek Mine No. 1 are not expected to exceed applicable National Ambient Air Quality Standards (NAAQS) for particulate matter 10 microns or less in diameter (PM_{10}), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$), carbon monoxide (CO), nitrogen oxides (NOx), and sulfur dioxide (SO_2). The air emissions analysis results show that values for both deposition and visibility should not significantly impact any Class I areas. Class I air quality areas are federal lands that receive special air quality and visibility protection. These areas include national parks, national wilderness areas, and national monuments. The closest Class I attainment area is the Sipsey Wilderness (approximately 80km north of the mine). Estimates for the NAA and PA suggest that transportation emissions are not likely to have a significant impact on air resources. Relative to the NAA, the PA (combined Mine No. 4 and Blue Creek Mine No. 1) supports an increase in total greenhouse gas (GHG) emissions of around 80% based on carbon dioxide equivalent (CO_2e). The 80% increase in GHG emissions would occur over the life of the mines, under the PA Blue Creek Mine No. 1 would operate an additional 14 years, and Mine No. 4 would operate an additional 7 years.

To estimate potential impacts from global climate change, the BLM relies on the cumulative information contained in the 2023 *BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends from Coal, Oil, and Gas Exploration and Development on the Federal Mineral Estate* ("2023 BLM Specialist Report") (BLM, 2024). The Report includes a summary of emissions estimates from reasonably foreseeable federal fossil fuel development and production over the next 12 months, as well as longer term assessments of potential federal fossil fuel GHG emissions and the anticipated climate change impacts resulting from the cumulative global GHG burden and is hereby incorporated by reference.[1] In terms of climate resilience, it is unclear how climate change would impact the project itself over the life of the project (both for the infrastructure and human element), but it is reasonable to conclude that higher temperatures could exacerbate working conditions, while increased precipitation volumes and more frequent and violent storm systems could lead to more day-to-day operational challenges.

Geology and Minerals

Potential direct, indirect, and cumulative effects to geology and mineral resources primarily pertain to the recovery and sterilization[2] of private and federal coal, and subsidence from underground mining.

Under the PA, at Mine No. 4 Warrior Met would recover approximately 42% more total saleable coal and would operate for an additional 7 years. The projected subsidence footprint (Section 4.3.3) would increase by 38%, and the number of occupied residential dwellings within the subsidence footprint would increase from 17 to 28 houses. If the PA is selected, at Blue Creek Mine No. 1 Warrior Met would be able to recover approximately 47% more total saleable coal while operating for an additional 14 years. The projected subsidence footprint would increase by 41%, and the number of occupied residential dwellings within the subsidence footprint would increase from 65 to 96 houses. If the PA is selected, Blue Creek Mine No. 1

[1] Section 2.5 "Executive Orders," in the 2023 BLM Specialist Report, is not being incorporated by reference, because the Eos discussed therein were rescinded in accordance with Executive Order 14154, Unleashing American Energy (January 20, 2025).

[2] Sterilization, in the context given through this EIS, refers to the bypassing of coal reserves to an extent that renders the coal unfeasible to recover by current mining methods and technology.

would require an estimated 618 acres of additional coarse refuse disposal area, as compared to 285 acres under the NAA scenario. Mine No. 4 would also have an increase in course refuse material but would not require additional permit area to support the increase. The Subsidence Control Plans (SCPs) for both mines will include fugitive methane monitoring procedures and residential well inventory procedures to minimize and mitigate any potential public health and safety impacts from fugitive methane.

If the NAA is selected, BLM predicts that approximately 30,447,695 tons of coal (private and federal) would likely be sterilized at Mine No. 4, and approximately 72,602,538 tons (private and federal) would be sterilized at Blue Creek Mine No. 1. Access to the coal seam is limited by the depth of cover as well as the coal seam geology. Overburden depths range from 1,300 feet up to 1,900 feet for the Mine No. 4 expansion area and 800 feet up to 1,625 feet for the Blue Creek Mine No. 1 expansion area. Consequently, these depths would likely make new, independent development of these federal mineral reserves cost prohibitive.

Water Resources

Based on the past Mine No. 4 and Blue Creek Mine No. 1 discharge monitoring data, NPDES-compliant outfall discharge does not have a reasonable potential to degrade the quality of the receiving streams relative to applicable state water quality standards. The implementation of erosion control measures and permit monitoring requirements will continue to help prevent adverse direct and indirect impacts to surface water resources, regardless of which alternative is selected. Prior to any additional coarse refuse disposal areas being constructed at Blue Creek Mine No. 1, sediment basins will be located downstream in conjunction with the disturbance areas to control runoff from the disposal site. Warrior Met will not construct any coarse refuse disposal sites in jurisdictional waters of the United States. Under the NAA, Blue Creek Mine No. 1 will need an additional 285 acres to accommodate coarse refuse storage, and under the PA an additional 618 acres would be needed. If Mine No. 4 and Blue Creek Mine No. 1 continue to be compliant with the previously discussed permits, control plans, and Best Management Practices[3] (BMPs), direct and indirect effects to surface water resources are not expected to increase because of a longer mine life, increased coal recovery, or a larger mining footprint.

Impacts to groundwater resources from either alternative would be similar, with the primary differing factor being mine life and subsidence footprints. Direct and indirect effects to groundwater quality are not expected due to the lack of historical groundwater quality issues related to Warrior Met underground mines, and the significant depth from the Pottsville Aquifer to the underground mining developments of Mine No. 4 and Blue Creek Mine No. 1. Indirect effects to domestic water wells (ex: dewatering from subsidence), would be mitigated by Warrior Met, in the event impacts do occur. These indirect effects could potentially occur to a greater number of domestic water wells if the PA is selected because of the larger subsidence footprints associated with the Proposed Development Scenario (PDS) for both mines. If the PA is selected and the PDS is implemented for Mine No. 4 and Blue Creek Mine No. 1, the period these indirect impacts could occur would be extended 7 years and 14 years, respectively. However, if dewatering of wells was to occur, the impacts would be mitigated by Warrior Met as described in Section 4.5, regardless of the alternative selected.

Socioeconomics

If the PA is selected, Mine No. 4 could generate an approximate annual average of $15.4 million in total mineral revenues, including $1.16 million from Alabama state severance taxes and $14.3 million from

[3] Alabama Admin. Code 335-6-6-.02(f) defines "best management practices" or "BMPs" as "schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution off "waters of the state." BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage."

federal royalties and rent payments. About 50% of federal revenues, or $7.3 million annually would be disbursed to Alabama. Over the PA mine life, Alabama could receive an average of $8.3 million in annual mineral revenue. Blue Creek Mine No. 1 is projected to generate approximately $16.2 million annually in total mineral revenues, including $1.2 million from Alabama state severance taxes and $15 million from federal royalties and rent payments. About 50% of federal revenues, or $7.5 million annually would be disbursed to Alabama. Over the PA mine life, Alabama could receive an average of $8.7 million in annual mineral revenue. If the leases are issued, employment at Mine No. 4 (425 employees) would be extended an additional 7 years, and employment at Blue Creek Mine No. 1 (500 employees) would be extended an additional 14 years.

Under the NAA, approximately 72.6 million tons of saleable coal (private and federal) would likely be sterilized at Blue Creek Mine No. 1, and approximately 30.4 million tons of saleable coal (private and federal) would likely be sterilized at Mine No. 4.

Potential adverse effects such as a loss of social cohesion and coal mining heritage identity would ultimately be associated with both the PA and the NAA at the end of the life of mines. It is likely the same impacts would simply occur later in time under the PA, compared to the NAA.

Adverse impacts to private well users' health and safety may occur between actual contamination and detection of contamination. These impacts may be short or long-term depending on when the contamination began and when it was detected. These impacts are more likely to occur in the PA due to a larger subsidence footprint, potentially impacting a greater number of wells.

Though unlikely due to recently established mitigation efforts and monitoring, fugitive methane does have the potential to create imminent harm to the public or to private property when allowed to accumulate to explosive concentrations. The risk of these adverse impacts is uncertain but are likely higher in the PA compared to the NAA due to more occupied residential dwellings occurring in the subsidence footprints in the PA for both Blue Creek Mine No. 1 and Mine No. 4.

Realty and Land Use

Mine No. 4 and Blue Creek Mine No. 1 are predicted to cause subsidence beneath occupied residential dwellings, other associated structures, and utilities. Under the PA, the Mine No. 4 subsidence footprint covers 15,148 acres (as compared to 9,434 acres under the NAA) and the Blue Creek Mine No. 1 subsidence footprint is approximately 29,641 acres (as compared to 17,640 acres under the NAA). The Mine No. 4 PDS subsidence footprint includes 28 occupied residential dwellings (as compared to 17 structures in the NAA), and the Blue Creek Mine No. 1 PDS subsidence footprint includes 96 occupied residential dwellings (compared to 65 in the NAA). Warrior Met will monitor and follow mitigation procedures outlined in the SCP in the event subsidence impacts do occur to dwellings, structures, or utilities. These procedures include, but are not limited to, Warrior Met repairing or offering compensation for material damage that is found to be a result of subsidence. This may consist of Warrior Met offering to purchase the property at market value in pre-subsidence condition or offer to compensate for diminution in value of the property caused by subsidence.

Special Status Species

Adverse impacts to federally listed species and critical habitat from the NAA or PA associated with Mine No. 4 and Blue Creek Mine No. 1 are not anticipated. The lack of expected adverse effects is primarily due to the underground mining technique to be utilized (rather than surface mining), minimal predicted subsidence impacts and minimal impacts from future additional surface use areas. Future surface use areas will receive concurrence from the United States Department of Interior Fish and Wildlife Service (FWS)

prior to any disturbance occurring to ensure adverse impacts to special status species do not occur. Critical habitat designated for the Black warrior waterdog lies within the Mine No. 4 subsidence footprint but will not receive surface runoff from either mining operation. The BLM prepared a Biological Assessment BA and determined that the NAA and PA for Mine No. 4 and Blue Creek Mine No. 1 may affect but are not likely to adversely affect any listed or proposed species or designated critical habitat. FWS has concurred with these determinations.

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Abbreviations and Acronyms

ADEM	Alabama Department of Environmental Management
AHC	State of Alabama Historical Commission
AOD	Angle of Draw
AQRV	Air Quality Related Values
ASLM	Assistant Secretary of the Interior for Land and Minerals Management
ASMC	Alabama Surface Mining Commission
BA	Biological Assessment
BCR	Bird Conservation Region
BLM	Bureau of Land Management
BMP	Best Management Practices
CAA	Clean Air Act
CBM	Coal Bed Methane
CFR	Code of Federal Regulations
DAT	Data Analysis Threshold
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
FCLAA	Federal Coal Leasing Act Amendments of 1976
FLPMA	Federal Land Policy and Management Act of 1976, as amended
FWS	United States Department of Interior Fish and Wildlife Service
GWP	Global Warming Potential
HAP	Hazardous Air Pollutant
HAR	Historical Architectural Resource
HCC	Hard-Coking Coal
IMPROVE	Interagency Monitoring of Protected Visual Environments
LBA	Lease-By-Application
MBTA	Migratory Bird Treaty Act
MEC	McGehee Engineering Corp.
MEI	Maximally Exposed Individual
MERP	Model Emission Rates for Precursors
MLA	Mineral Leasing Act of 1920, as amended
MLE	Most Likely Exposure
MMPA	Mining and Mineral Policy Act of 1970
MSHA	Mine Safety and Health Administration
NAA	No Action Alternative
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act

NHPA	National Historic Preservation Act of 1996
NRHP	National Register of Historic Places
OSMRE	Office of Surface Mining Reclamation and Enforcement
PA	Proposed Action
PAP	Permit Application Package
PDS	Proposed Development Scenario
PEP	Fish and Wildlife Protection and Enhancement Plan
PSD	Prevention of Significant Deterioration
R2P2	Resource Recovery and Protection Plan
RA	Regulatory Authority
RCP	Representative Concentration Pathways
REL	Reference Exposure Level
RfC	Reference Concentration
RMP	Land and Resource Management Plan
SCP	Subsidence Control Plan
SDPS	Surface Deformation Prediction Software
SIP	State Implementation Plan
SMCRA	Surface Mining Control and Reclamation Act of 1977, as amended
SPCC	Spill Prevention Control and Countermeasures
TPY	Tons Per Year
TRC	TRC Environmental Corporation
URF	Unit Risk Factor
USACE	United States Army Corps of Engineers
UST	Underground Storage Tank
VOC	Volatile Organic Compound
Warrior Met	Warrior Met Coal, Inc.

CHAPTER 1. INTRODUCTION

1.1 Introduction

Warrior Met proposes to expand current underground mining operations into federally owned coal reserves in Tuscaloosa County, Alabama. This analysis considers both the proposed Warrior Met Coal Mining, LLC - Mine No. 4 LBA and the Warrior Met Coal BC, LLC - Blue Creek Mine No. 1 LBA. Warrior Met Coal Mining, LLC and Warrior Met Coal BC, LLC are subsidiaries of Warrior Met Coal, Inc.[4] The Bureau of Land Management (BLM) designation for the Mine No. 4 Lease-By-Application (LBA) is ALES-055797 and the Blue Creek Mine No. 1 LBA is ALES-056519. The ALES-055797 and ALES-056519 LBA tracts are previously unleased. This analysis was initiated by the BLM in response to the applications submitted by Warrior Met to the BLM requesting to lease the subject properties under the LBA process contained in 43 CFR Subpart 3425.

This Environmental Impact Statement (EIS) analyzes the potential environmental, social, and economic effects of the Proposed Action (PA) and No Action Alternative (NAA) for the purpose of guiding the BLM decision to be made (Section 1.4). The PA is to offer to lease the rights to mine on approximately 5,700 acres for the Mine No. 4 expansion and 8,350 acres of for the Blue Creek Mine No. 1 expansion. The Mine No. 4 LBA and Blue Creek Mine No. 1 LBA are separate proposed leases but are being considered in a combined analysis due to the geographical proximity and similar nature of the Proposed Development Scenarios (PDS). All facilities needed to support the recovery of the LBA tracts will be permitted with the mining operation. Ventilation fan shafts will be constructed in the future as mining progresses, regardless of which alternative is selected. Only Blue Creek Mine No. 1 will require additional permitted area to service additional coarse refuse disposal areas over the life of the NAA or PA. All other surface facilities needed to service the mining operation and recovery of federal minerals are currently permitted in the existing Alabama Surface Mining Commission (ASMC) permits.

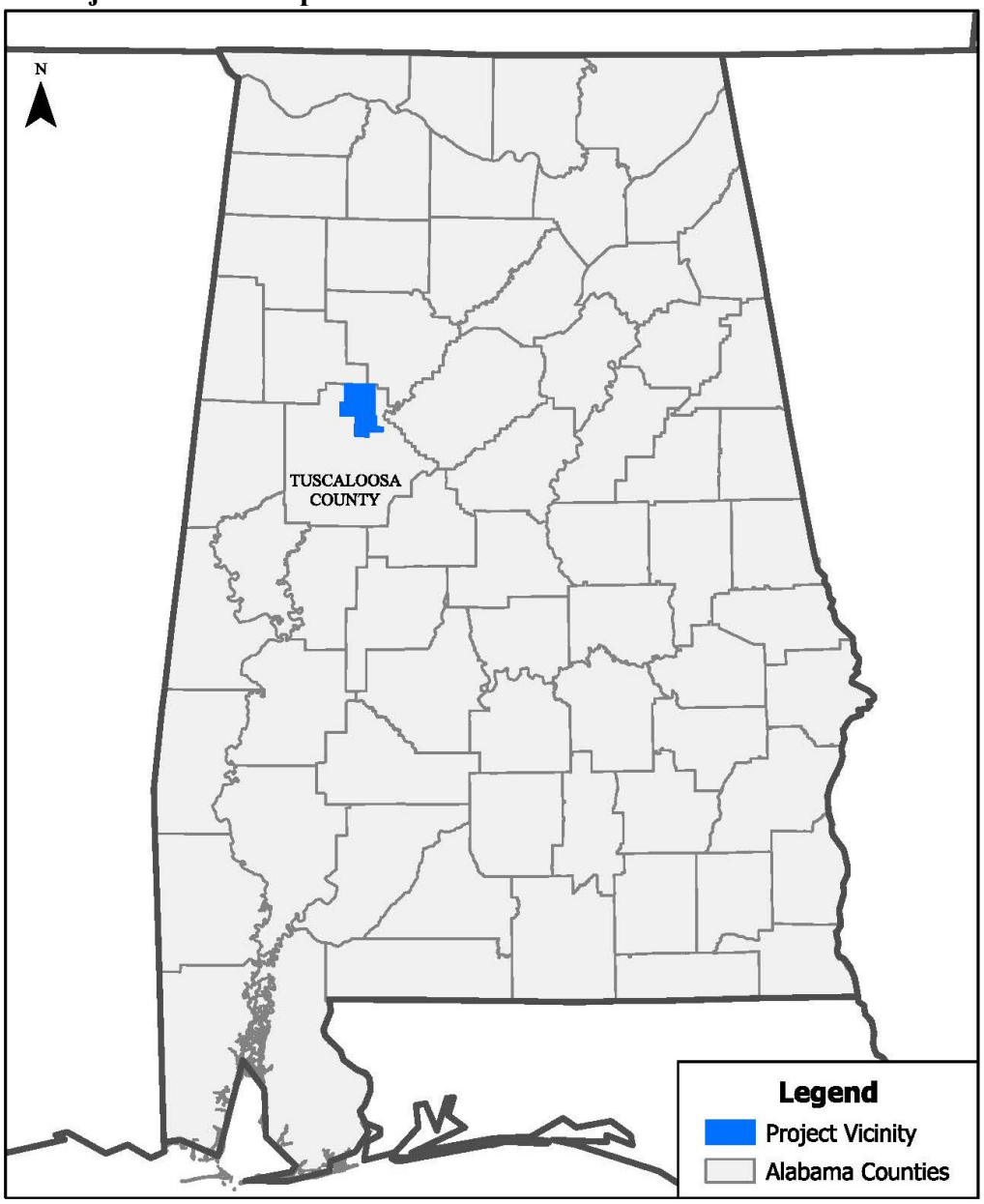
The federal coal referenced in both LBAs would be accessed through existing facilities on privately owned land. The primary method of coal recovery will be underground longwall mining, although coal will also be recovered by the room-and-pillar method as the development sections are established. The lease tracts contain federal coal only and all other minerals adjacent to the lease areas are privately owned. The surface overlying and contiguous to the federal mineral tract are privately owned (that is split-estate lands). The proposed lease tracts are in mostly undeveloped, rural northern Tuscaloosa County as shown in ***Figure 1-1.***

This EIS was prepared to fulfil requirements under the National Environmental Policy Act (NEPA)

[4] Warrior Met Coal, Inc., Warrior Met Coal Mining, LLC, and Warrior Met Coal BC, LLC are collectively referred to as 'Warrior Met' in this EIS.

of 1969, as amended (Pub. L. No. 91-190, 42 USC 4332 *et seq*.).[5] This document will provide analysis to guide the BLM's decision on whether to hold lease sales on the two LBAs.

Figure 1-1. Project location map.



(not to scale)

[5] Executive Order 14154, Unleashing American Energy (Jan. 20, 2025), and a Presidential Memorandum, *Ending Illegal Discrimination and Restoring Merit-Based Opportunity* (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq. Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023). Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. The BLM verifies that it has complied with the requirements of NEPA, including the Department's regulations and procedures implementing NEPA at 43 C.F.R. Part 46 and Part 516 of the Departmental Manual, consistent with the President's January 2025 Order and Memorandum. The BLM has also voluntarily considered the Council on Environmental Quality's rescinded regulations implementing NEPA, previously found at 40 C.F.R. Parts 1500-1508, as guidance to the extent appropriate and consistent with the requirements of NEPA and Executive Order 14154.

1.2 Background

Warrior Met operates three deep-shaft underground mines – Mine No. 4, Mine No. 7 and Blue Creek Mine No. 1 – using continuous miner sections for entry and panel development, then retreat longwall mining technology for primary production. Coal mined by Warrior Met at these three mines is a distinct, metallurgical coal product characterized by high coke strength after reaction, high fluidity, low sulfur content, and is also referred to as hard-coking coal (HCC). HCC produced by Warrior Met meets the specific requirements for making high-quality coke which is an essential fuel for producing high-grade steel. These mining operations are in the Warrior Coal Basin of Alabama, in Tuscaloosa and Jefferson Counties.

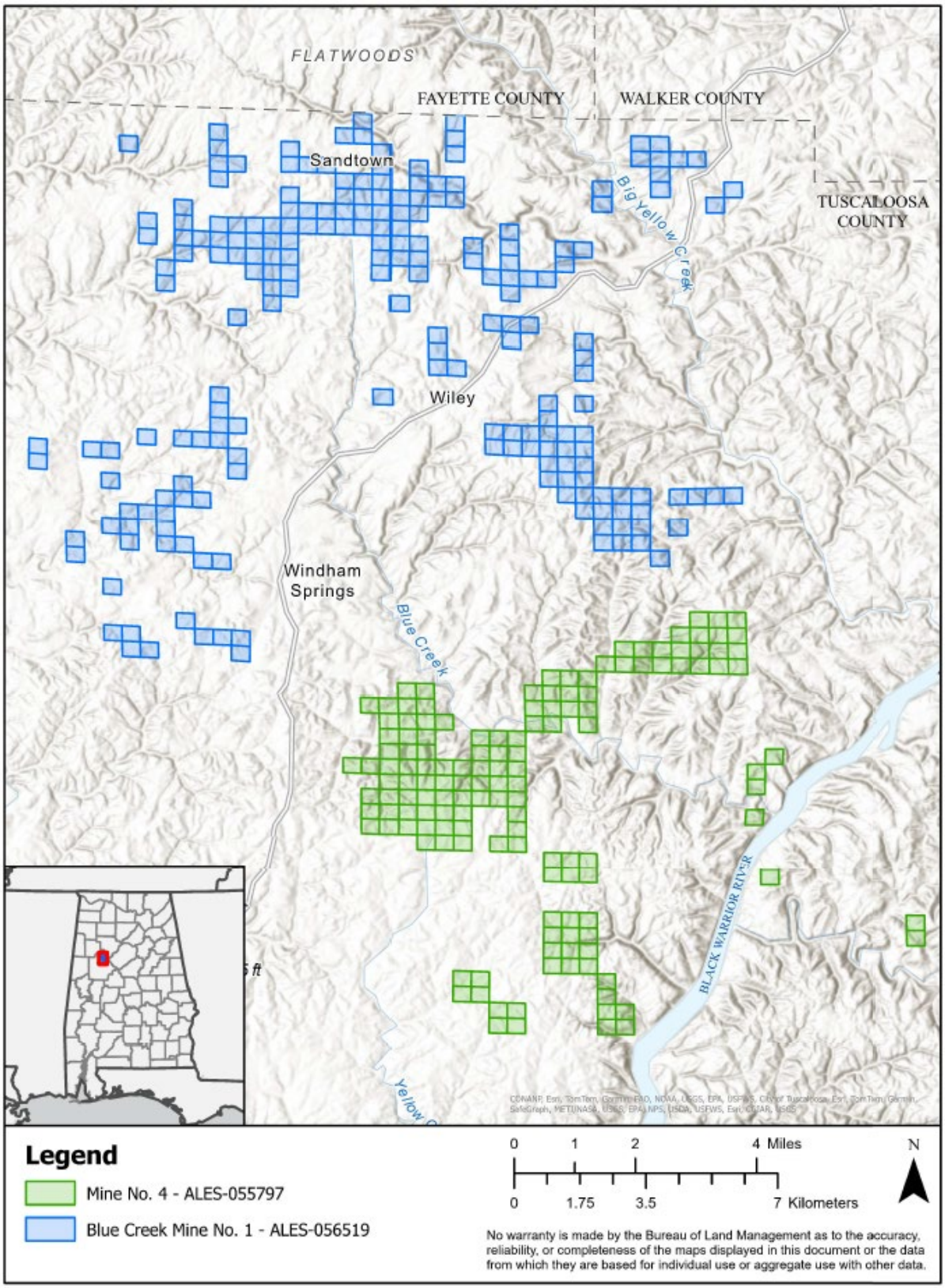
The Mine No. 4 operation is an existing underground mine that mines only private coal, permitted by the ASMC, Permit No. P-3260, located on private and state lands adjacent to the proposed ALES-055797 lease area. Warrior Met submitted an LBA in 2009 requesting to lease federally owned coal that would be encountered in the progression of its existing Mine No. 4 operation.

The Blue Creek Mine No. 1 operation is also an existing underground mine (ASMC Permit No. P-3964) with current permits and approvals from both federal and state regulatory agencies. The ASMC issued the mining permit in 2012, and in-seam development began in 2024. Longwall mining will begin in 2026. Existing surface facilities associated with Blue Creek Mine No. 1 are located on private surface lands. Most of the surrounding surface areas are undeveloped or forestry. Surrounding areas that have mineral development generally consist of gas wells and gas well access roads. The BLM initially began preparing an EA to evaluate the LBA for Mine No. 4. Upon further review of the potential effects of the proposed action for the Mine No. 4 expansion and given the proximity to the Blue Creek Mine No. 1 expansion LBA (originally submitted in 2010 and updated in March 2023), the BLM determined an EIS is warranted and that both LBAs would be evaluated under a single EIS.

Federal coal reserves represented in the lease applications would be recovered by underground longwall and room-and- pillar mining methods. The recovered coal would be accessed through existing permitted facilities on privately owned land.

Mine No. 4 and Blue Creek Mine No. 1 are located close to two large population centers. The city of Tuscaloosa is approximately 20 miles southwest and Birmingham is about 30 miles northeast of Mine No. 4. Tuscaloosa is about 27 miles south and Birmingham is about 36 miles east of Blue Creek Mine No. 1. The location of the Mine No. 4 LBA tract and Blue Creek Mine No. 1 LBA tract and their proximity to one another is as shown in the "LBA Tract Project Area Map" ***Figure 1-2***. The LBA tracts are made up of 40-acre (1,742,400 square foot) parcels, known as "federal forties."

Figure 1-2. LBA federal forties project area map.



1.3 Purpose and Need

The purpose of the project is to support the responsible development of coal resources in the Warrior Basin by responding to two federal coal LBAs submitted by Warrior Met to access a total of approximately 14,050 acres of federal minerals underlying split-estate lands in Tuscaloosa County, Alabama. The approval of both LBAs would enable the recovery of an estimated 53.2 million tons of federal coal.

The need is established by the BLM's responsibility under the Mineral Leasing Act of 1920, as amended (MLA); the Mineral Leasing Act for Acquired Lands of 1947, as amended; and the Federal Coal leasing Amendments Act of 1976, as amended. These laws and their implementing regulations require BLM to respond to federal coal LBAs submitted by Warrior Met (ALES-055797 and ALES-056519) which seek to expand two existing underground mines.

1.4 Decision to Be Made

The BLM deciding official for this action is the Eastern States State Director. Upon completion of this EIS, the BLM will decide whether to offer all or portions of the areas identified in ALES-055797 and/or ALES-056519 during a competitive lease sale for the federal coal reserves. Should the decision be made to offer the federal coal for lease, BLM will also decide whether to attach special stipulations to the coal lease that restricts the rights of the coal lessee beyond the terms and conditions provided by the standard coal lease. The BLM will document its decision in a Record of Decision, as well as any terms, conditions, and/or stipulations associated with its decision.

1.5 Relationship to Statutes, Regulations, or Other Plans

The proposed LBA and associated mining activities would be processed in accordance with all applicable laws, regulations, and orders, as amended, including but not limited to:

- Mineral Leasing Act of 1920 (MLA), as amended by Mineral Leasing Act of 1947, as amended by the Federal Coal Leasing Act Amendments of 1976 (FCLAA).
- The Energy Policy Act of 2005.
- Mining and Mineral Policy Act of 1970 (MMPA).
- Federal Coal Mine Health and Safety Act of 1969.
- Surface Mining Control and Reclamation Act of 1977 (SMCRA).
- Applicable coal leasing regulations found in Title 43 CFR Group 3400.
- Federal Lands Policy and Management Act of 1976 (FLPMA) (BLM's multiple-use mandate).
- National Environmental Policy Act of 1969 (NEPA).
- Clean Air Act of 1970.
- Clean Water Act of 1972.

- Endangered Species Act of 1973 (ESA).
- National Historic Preservation Act of 1966 (NHPA).

The MLA and FCLAA provide the legal foundation and authority for the leasing and development of federal coal resources. BLM is the federal agency designated to offer federal coal resources for leasing and to ensure that maximum economic recovery of the coal resource is achieved (Title 43 CFR Subpart 3480). The MMPA declares that it is the continuing policy of the federal government to foster and encourage the orderly and economic development of domestic mineral resources (30 U.S.C. § 21a).

Awarding a federal coal lease is only one step toward mining federal coal resources. SMCRA established a nationwide system to regulate surface coal mining operations and surface effects of underground coal mining operations. SMCRA, as amended, gives the Office of Surface Mining Reclamation and Enforcement (OSMRE) the responsibility to regulate surface coal mining operations and the surface effects of underground coal mining. Under SMCRA's cooperative federalism system, a state can elect to become the primary regulatory authority (RA) if it establishes its own coal regulatory program that meets the minimum standards set by SMCRA and has the program approved by the Secretary of the Interior.

Under Section 503 of SMCRA, the state of Alabama developed a permanent program, approved by the Secretary of the Interior on May 20, 1982, establishing the ASMC as the RA authorized to regulate surface coal mining operations and the surface effects of underground coal mining on private and state lands within Alabama. In July 1985, pursuant to Section 523(c) of SMCRA, Alabama entered into a cooperative agreement with the Secretary of the Interior authorizing ASMC to primarily regulate surface coal mining operations and the surface effects of underground coal mining on federal lands within the state. The term "Federal lands" as defined in SMCRA means any land, including subsurface mineral interests, owned by the United States.

Pursuant to the cooperative agreement, federal coal lease holders in Alabama must submit a permit application package (PAP) to ASMC and OSMRE for proposed mining and reclamation operations on Federal lands in the state. ASMC reviews the PAP to ensure that it complies with Alabama's approved permanent regulatory program and other statutes. OSMRE and other federal agencies review the PAP to ensure that it contains the necessary information for compliance with the federal coal lease, the MLA, NEPA, and other applicable federal laws and their attendant regulation (30 CFR 740.13).

The PAP contains, among other documents, a Resource Recovery and Protection Plan (R2P2) as part of BLM regulations governing federal coal leases under 43 CFR Subpart 3482. The R2P2 outlines how the operator/lessee will efficiently and responsibly extract coal resources while minimizing environmental impacts and ensuring compliance with federal standards prior to commencement of any coal development or mining operations within the lease. The R2P2 must contain all the requirements pursuant to the MLA for the life of the mine and include the contents given in 43 CFR 3482.1(c).

Mining disturbance on federal coal lands cannot begin until the Assistant Secretary of the Interior for Land and Minerals Management (ASLM) approves the mining plan. OSMRE will prepare a mining plan decision document that includes a recommendation to the ASLM whether to approve, approve with conditions, or disapprove the mining plan.

Before making a recommendation in the mining plan decision document, OSMRE and the State RA, here the ASMC, will obtain input, comments and concurrence from other federal agencies including but not limited to the BLM, the U.S. Fish and Wildlife Service (FWS), and the Environmental Protection Agency (EPA). In addition, OSMRE and other federal agencies will once again review the PAP and R2P2 to ensure that it contains the necessary information for compliance with the coal lease, the MLA, NEPA, and other applicable requirements of other federal laws, regulations, and executive orders.

ASMC enforces the regulations found in the Rules of the Alabama Surface Mining Commission, Chapter 880-X-8H, Underground Mining Permit Applications -- Requirements for Information on Environmental Resources; Chapter 880-X-8I, Underground Mining Permit Applications-- Requirements for Reclamation and Operation Plan; and Chapter 880-X-10D, Performance Standards Underground Mining Activities. In addition, there are certain permits, approvals, regulatory compliance, mitigation measures, and monitoring programs that are required by other state or federal regulations and considered to be part of the PAP. These requirements pertain to compliance with existing state and federal rules and regulations with respect to coal mining and as well as any additional coal lease stipulations that might apply. As a result, before any mining operations being conducted, all necessary mining and regulatory permits will be obtained through the ASMC subject to oversight by OSMRE.

If a lease is awarded in the Federal coal competitive leasing process, the lessee would follow all federal and state rules and regulations promulgated to establish performance standards for protecting soil, water, riparian, and aquatic resources and values; and for restoration and reclamation of areas affected by mining activities. Such rules and regulations include requirements for the protection of surface and groundwater quantity and quality; prevention and control of mine drainage, erosion, and sediment deposition; and protection of streams and hydrologic balance.

1.6 Scoping and Issue Identification

The BLM published the Notice of Intent on April 30, 2024, initiating a 30-day public scoping period. A letter was sent to landowners in the project area on May 31, 2024, to inform them about the project. In addition, the BLM has also sent a request to initiate consultation with the fourteen tribal governments listed in Chapter 5. In total, 54 comments were received, including four from landowners who received the BLM letter. Internal scoping commenced on May 8, 2024. An interdisciplinary team of specialists, from BLM, OSMRE, and ASMC was established to evaluate resource issues. Resources were identified and a determination was made about whether they were present in the project area, present but not affected to a degree that requires detailed analysis; or present with relevant impacts that need to be analyzed in detail. For more information on the determinations made please refer to ***Appendix B***.

Scoping comments are available online at the BLM ePlanning website. Issues included for detailed analysis are identified in ***Table 1-1*** and includes the corresponding section where each issue is discussed in the EIS.

Table 1-1. Issues identified.

Issues Identified During Scoping	Section Where Issue is Addressed
Air Quality and Climate Change	
How would emissions from mining, transportation, and subsequent use of coal impact ambient air quality?	Section 4.2
How would emissions from mining, transportation, and subsequent use of coal impact climate change?	Section 4.2
Geology and Minerals	
How would leasing and mining operations of the federal LBAs impact existing natural gas wells within the area, and would concurrent operations pose safety concerns?	Section 4.3
Would mining or leasing of the federal LBA tracts result in any changed management responsibilities for properly plugging and sealing gas wells within the project area?	Section 4.3
Are there other mineral resources or coal seams in the area that would be rendered no longer recoverable after planned subsidence has occurred?	Section 4.3
Have enough drill hole samples (pre-mining surveys) been conducted to properly quantify the lithology in this area, to identify seismic faults, coal seams and other recoverable minerals present?	Section 4.3
Water Resources	
How would subsidence from removal of the coal affect surface water quantity, drainage pattern, and quality?	Section 4.4
How would runoff from coal processing waste (disposal site or refuse pile) affect surface water quality?	Section 4.4
Is there a potential for surface discharge of mine-pool water?	Section 4.4
How would subsidence from removal of coal affect groundwater quantity and quality?	Section 4.5
Would rock exposed to moisture and oxygen at the surface of the room-and-pillar mine works and similarly exposed in the rubble and fracture zones associated with mined-out longwall panels have the potential to pollute groundwater?	Section 4.5
Would precipitation infiltrating through coal-processing waste contaminate local groundwater?	Section 4.5
Socioeconomics	
How would the actions in the alternatives, including changes to mine life and production, impact economic vitality in the study area?	Section 4.6.1
How would the actions in the alternatives affect government revenues and the provisioning of public services?	Section 4.6.2
How would the LBA approval or denial impact access to products, including federal and non-federal coal within the analysis area?	Section 4.6.3

How would the actions in the alternatives, including impacts to other resources under those alternatives, impact way of life and social cohesion?	Section 4.6.4
How would the actions in the alternatives, including impacts to other resources under those alternatives, impact public health and safety?	Section 4.6.5
Realty and Land Use	
How would leasing and mining operations of the federal LBAs impact private property within the project area?	Section 4.7
How would leasing and mining operation of the federal LBAs impact existing ROWs authorized by either State or County entities?	Section 4.7
Wildlife and Vegetation	
How would leasing and mining of the federal LBA tracts impact non-designated terrestrial and aquatic species?	Section 4.8
How would leasing and mining of the federal LBA tracts impact designated vegetative, terrestrial, and aquatic species?	Section 4.9
How would leasing and mining of the federal LBA tracts impact migratory bird species?	Section 4.10

CHAPTER 2. PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

The following sections describe the PA and PDS, as well as the NAA. For this environmental analysis, references to the PA and NAA will be in respect to both proposed lease areas unless otherwise noted.

2.2 Proposed Action

The PA is for the BLM to offer approximately 5,700 acres of federal coal for Mine No. 4 (ALES-055797) and 8,350 acres of federal coal for Blue Creek Mine No. 1 (ALES-056519) for competitive leasing under the LBA process contained in 43 CFR Subpart 3425. Implementation of the PA would result in the BLM holding separate competitive lease sales for each LBA. The subject properties would be offered for lease with the BLM's standard terms and conditions, special coal lease stipulations identified by the BLM, and any stipulations accepted by the BLM from other federal and non-federal groups for the protection of natural resources consistent with applicable laws, BLM policies, and the Alabama and Mississippi Proposed Resource Management Plan and Final Environmental Impact Statement, May 2008.

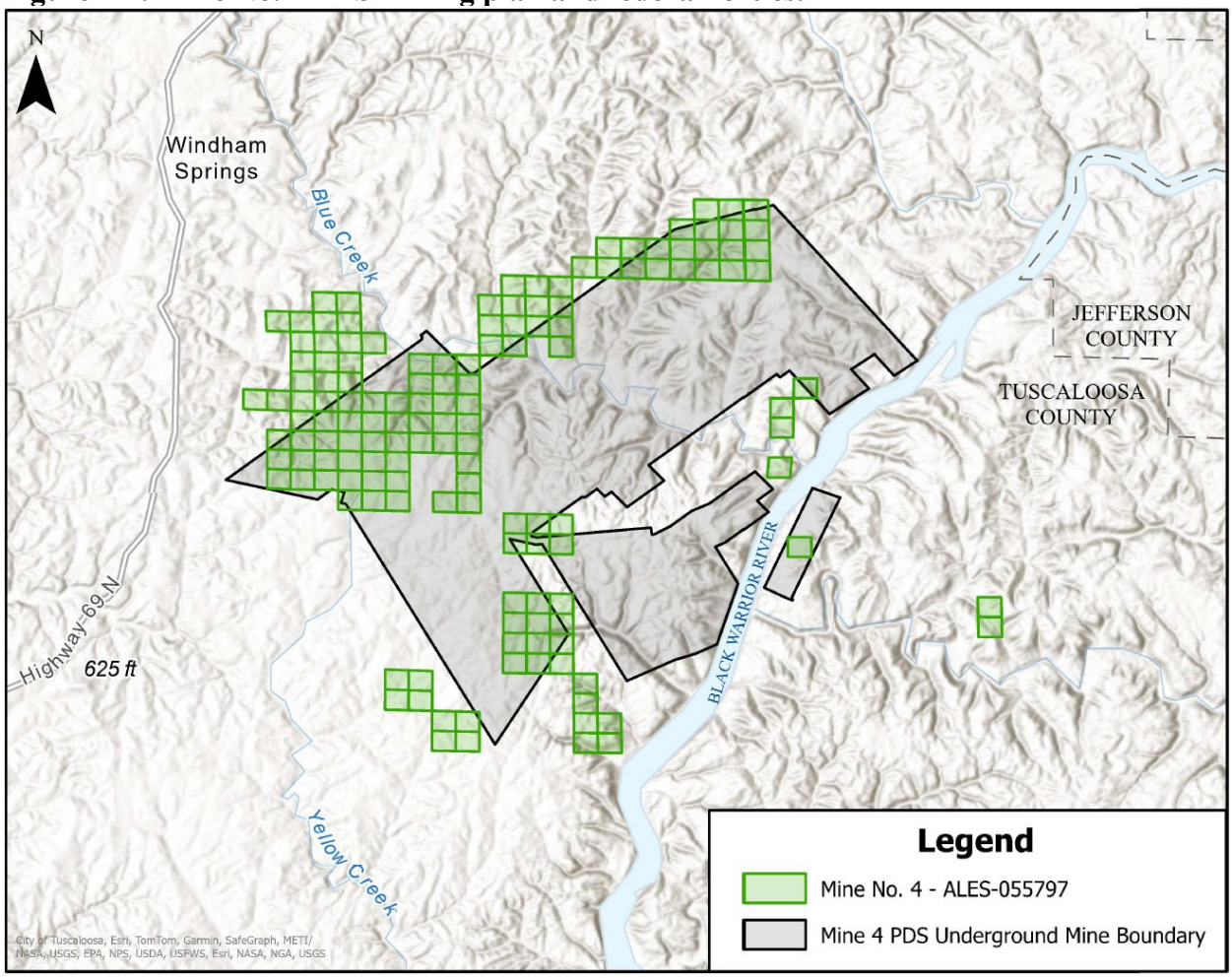
If the PA is selected and Warrior Met is the successful bidder in the competitive leasing process, and the subject properties are leased, permitted, and receive approval of separate mining plans, the leases would allow for the proposed extraction of an estimated combined 53.2 million tons of federal coal reserves and an estimated 49.9 million additional tons of private coal reserves by means of underground longwall mining techniques. Access to mining of the proposed lease reserves would occur via Warrior Met's existing leases on non-federal (private) land. The surface of the lands identified for both LBAs are privately owned. Section 2.2.1 describes the proposed lease for Mine No. 4, and Section 2.2.2 describes the proposed lease for Blue Creek Mine No. 1. Section 2.5 details in the PDS for the mine expansions, should the PA be selected.

2.2.1. Mine No. 4 Lease By Application

Warrior Met proposes to expand the Mine No. 4 operation to an adjacent area in northern Tuscaloosa County. The LBA tract would not support a new mining operation. Rather, it would serve as an extension of Mine No. 4.

Mine No. 4 will continue using the same or similar equipment and mining methods if the proposed federal lease area is mined. Under the PA, Mine No. 4 is expected to extract 16.9 million saleable tons of federal coal, and a total of 73.1 million saleable tons of coal over the life of the mine, while continuing to employ approximately 425 employees annually. Average annual production is estimated at 3.48 million tons, a 411,300-ton annual increase relative to the NAA. The Mine No. 4 LBA tract and Mine No. 4 ASMC permit area are shown in the ASMC Permit Boundary Map provided in ***Appendix A***. The proposed underground mine development associated with the Mine No. 4 LBA tract is shown in ***Figure 2-1***.

Figure 2-1. Mine No. 4 PDS mining plan and federal forties.



(Not to scale)

Most of the coal within the proposed expansion area is not federally owned. Forty-acre parcels of federally owned coal (federal forties) are scattered within the proposed expansion. The legal description of the approximately 5,700-acre ALES-055797 LBA tract, which includes federal forties is shown in ***Table 2-1***. If Warrior Met continues into the expansion area for the private coal but bypasses the Federal coal, the Federal reserves would remain unmined, and, therefore, be sterilized. Coal sterilization is further discussed in Section 4.3.2.

Table 2-1. Mine No. 4 ALES-055797 LBA tract legal description.

Township	Range	Section	Quarter/Quarter {Forties}	Acres
18 South	8 West	17	NE1/4, SE1/4, SW1/4, E1/2NW1/4, SW1/4NW1/4,	599.81
18 South	8 West	18	SE1/4, E1/2SW1/4, SW1/4SW1/4	287.35
18 South	8 West	28	W1/2SW1/4, SE1/4NW1/4	120.06
18 South	8 West	33	SW1/4NW/14	39.80
19 South	8 West	4	SE1/4NW1/4	39.90
19 South	8 West	11	E1/2NW1/4	80.37
19 South	8 West	18	SW1/4, W1/2NW1/4	240.30
18 South	9 West	21	NE1/4SE1/4	39.94
18 South	9 West	22	SW1/4NE1/4, S1/2SE1/4, NW1/4SE1/4, SW1/4, SE1/4NW1/4	358.49
18 South	9 West	24	NE1/4, E1/2SE1/4, NW1/4SE1/4, SW1/4, E1/2NW1/4, SW1/4NW1/4	556.96
18 South	9 West	26	NE1/4, SE1/4, SW1/4, E1/2NW1/4	564.60
18 South	9 West	27	W1/2NE1/4, SE1/4, SW1/4, NW1/4	559.52
18 South	9 West	28	N1/2SE1/4	80.18
18 South	9 West	33	E1/2NE1/4, NE1/4SE1/4	117.24
18 South	9 West	34	NE1/4, SE1/4, N1/2SW1/4, NW1/4	547.18
18 South	9 West	35	N1/2NE1/4, SE1/4NE1/4, E1/2SE1/4, SW1/4SE1/4, W1/2SW1/4, N1/2NW1/4, SW1/4NW1/4	432.47
19 South	9 West	1	NE1/4, E1/2NW1/4	239.82
19 South	9 West	12	NE1/4, SE1/4, E1/2SW1/4, E1/2NW1/4	479.57
19 South	9 West	14	SE1/4, NW1/4	320.96
			TOTAL	**5,704.52**

2.2.2. Blue Creek Mine No. 1 Lease By Application

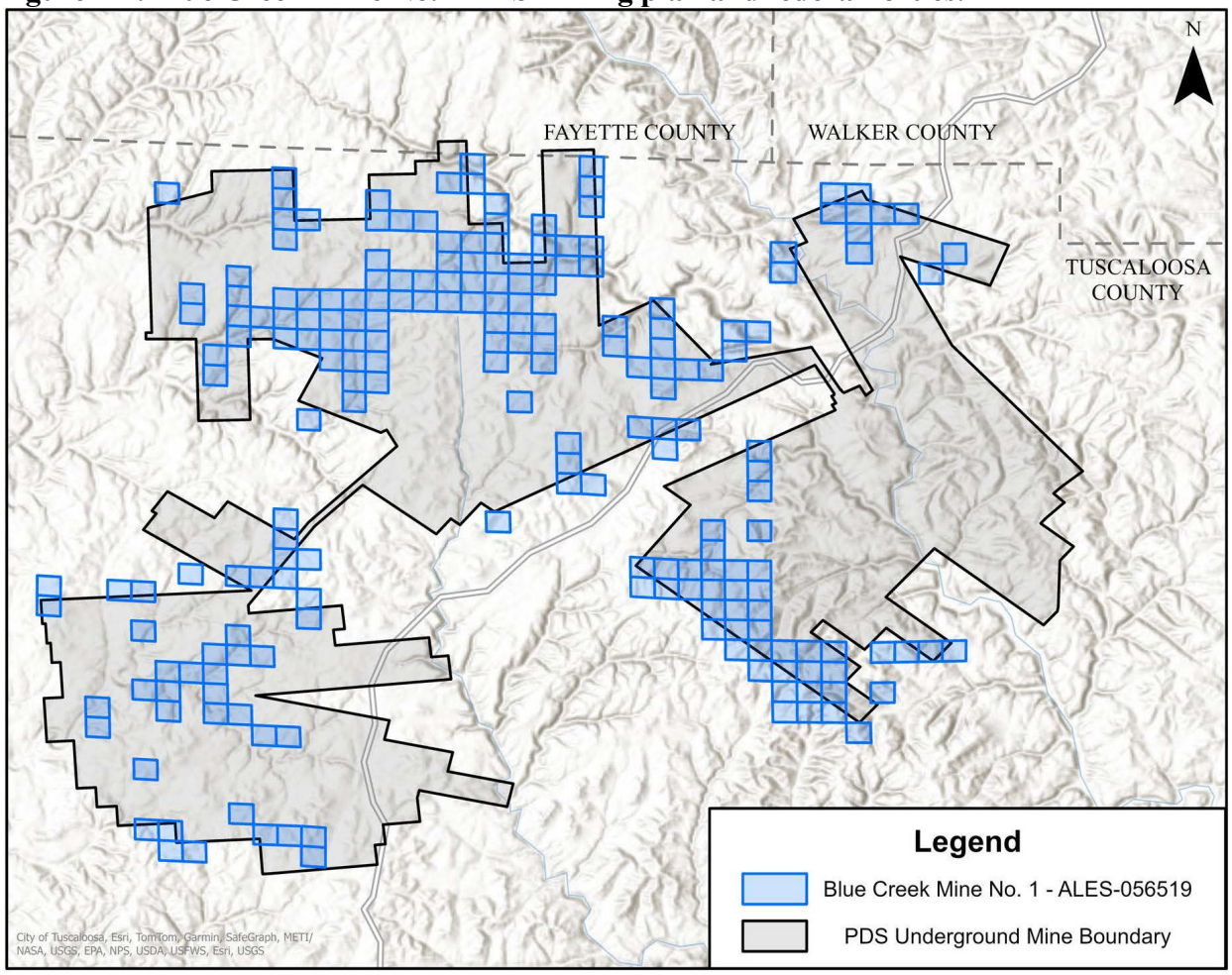
The proposed 8,30-acre Blue Creek Mine No.1 LBA lease tract lies within the future expansion area of the existing underground mining operation, Blue Creek Mine No. 1. The LBA tract would not support a new mining operation. Rather, it would serve as an extension of Blue Creek Mine No. 1.

Blue Creek Mine No. 1 is located on private surface and recovers private coal. The mine has permits and approvals from both federal and state regulatory agencies. The existing surface facilities, consisting of approximately 538 acres, are located near Brandon School Road and Alabama State Highway 69 in Tuscaloosa County, Alabama.

Under the PA, Blue Creek Mine No. 1 is expected to extract 36.3 million saleable tons of federal coal, and a total of 154.2 million saleable tons of coal over the life of the mine, while continuing to employ approximately 500 people annually. Average annual production is estimated at 3.59 million tons, a 722,396-ton annual increase relative to the NAA. The Blue Creek Mine No. 1

proposed LBA tract and current Blue Creek Mine No. 1 permit boundary area are depicted in the ASMC Permit Boundary Map provided in ***Appendix A***. The proposed underground mine development associated with the Blue Creek Mine No. 1 proposed LBA tract is shown in ***Figure 2-2***.

Figure 2-2. Blue Creek Mine No. 1 PDS mining plan and federal forties.



(Not to scale)

Most of the coal within the proposed expansion area is not federally owned. Forty-acre parcels of federally owned coal (federal forties) are scattered within the proposed expansion. The legal description of the approximately 8,350-acre ALES-056519 proposed LBA tract, which includes 208 federal forties, is shown below in ***Table 2-2***. If Warrior Met continues into the expansion area for the private coal but bypasses the Federal coal, the Federal reserves would remain unmined, and, therefore, likely be sterilized. Coal sterilization is further discussed in Section 4.3.2.

Table 2-2. Blue Creek Mine No. 1 ALES-056519 LBA tract legal description.

Township	Range	Section	Quarter/Quarter {Forties}	Acres
17 South	8 West	5	N1/2SW1/4	80.16
17 South	8 West	6	S1/2NE1/4, N1/2SE1/4, SE1/4SE1/4	200.40
17 South	8 West	7	NE1/4NE1/4, W1/2NW1/4	119.94
17 South	8 West	8	NE1/4NE1/4, SW1/4NE/14	79.94
17 South	9 West	2	W1/2NW1/4, NW1/4SW1/4	119.26
17 South	9 West	3	W1/2SW1/4, SW1/4SE1/4	119.875
17 South	9 West	4	E1/2NE1/2, SW1/4NE1/4, S1/2SW1/4	199.75
17 South	9 West	5	SW1/4SW1/4, E1/2SE1/4	119.415
17 South	9 West	6	SE1/4NE1/4, E1/2SE1/4	119.565
17 South	9 West	7	NE1/4NE1/4, E1/2SW1/4, SE1/4SE1/4	158.68
17 South	9 West	8	SE1/4NE1/4, S1/2SW1/4, E1/2SE1/4, SW1/4SE1/4	240.63
17 South	9 West	9	NE1/4, SW1/4, SE1/4	481.44
17 South	9 West	10	NE1/4, W1/2NW1/4, SE1/4NW1/4, SW1/4, NW1/4SE1/4	480.67
17 South	9 West	11	W1/2NW1/4, SE1/4SE1/4	119.91
17 South	9 West	13	N1/2NE1/4, SW1/4NE1/4, N1/2SW1/4	199.65
17 South	9 West	14	E1/2NE1/4, E1/2NW1/4, E1/2SE1/4, NW1/4SE1/4	280.08
17 South	9 West	15	W1/2NE1/4, NW1/4, NW1/4SW1/4, NW1/4SE1/4	318.65
17 South	9 West	17	NE1/4, NW1/4, NE1/4SW1/4, SE1/4	521.76
17 South	9 West	18	E1/2NE1/4, NW1/4NE1/4, E1/2NW1/4, W1/2SW1/4	279.04
17 South	9 West	20	NW1/4NE1/4, SW1/4NW1/4	80
17 South	9 West	22	NE1/4NW1/4, E1/2SE1/4	119.885
17 South	9 West	23	S1/2NE1/4, NE1/4SE1/4	120.38
17 South	9 West	24	SW1/4NW1/4, E1/2SE1/4	120.16
17 South	9 West	25	NE1/4NE1/4, E1/2SW1/4, NE1/4SE1/4	159.32
17 South	9 West	26	NW1/4NW1/4	39.995
17 South	9 West	27	NE1/4NE1/4, NW1/4SW1/4	80.28
17 South	9 West	30	E1/2SE1/4	79.12
17 South	9 West	31	E1/2NE1/4, SW1/4NE1/4, SE1/4NW1/4	163.23
17 South	9 West	32	NW1/4NW1/4, W1/2SW1/4	126.185
17 South	9 West	35	NE1/4	163.38
17 South	9 West	36	NE1/4, NW1/4, E1/2SW1/4, SE1/4	560.28
17 South	10 West	1	NW1/4SE1/4	40.075
17 South	10 West	12	SE1/4SE1/4	40.09
17 South	10 West	13	NE1/4NE1/4	39.86
17 South	10 West	35	E1/2SW1/4	80.18
17 South	10 West	36	SE1/4NE1/4, N1/2SW1/4	120.18
18 South	8 West	5	N1/2NE1/4, N1/2NW1/4, NW1/4SW1/4	200.90
18 South	8 West	6	W1/2NE1/4, NW1/4, SW1/4, W1/2SE1/4	486.8025
18 South	8 West	7	NE1/4NE1/4	40.9375
18 South	9 West	1	E1/2NE1/4, NW1/4NE1/4	120.03
18 South	9 West	6	SW1/4NE1/4, E1/2NW1/4, SW1/4NW1/4, W1/2SW1/4	241.66

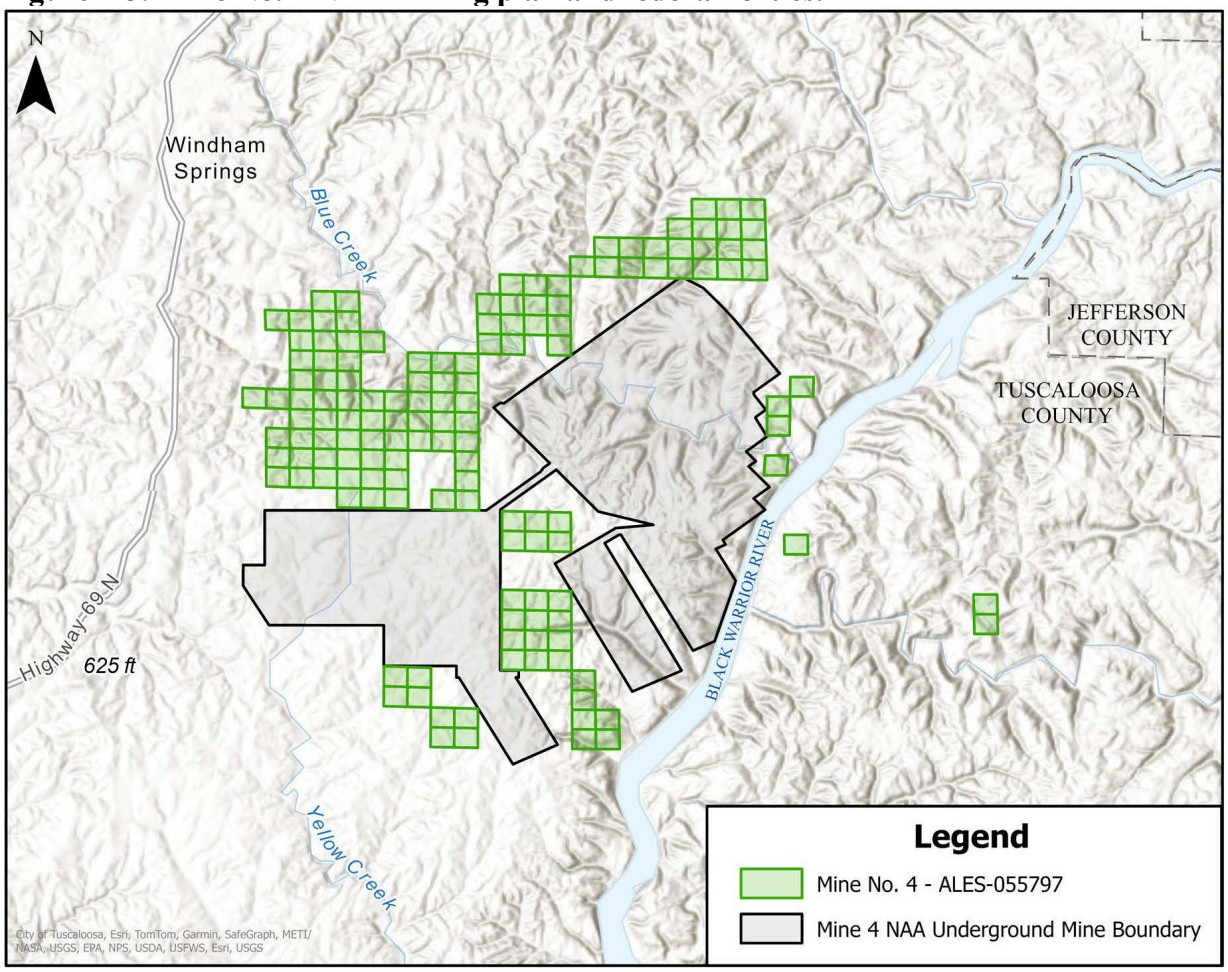
18 South	9 West	7	S1/2NE1/4, N1/2NW1/4	163.10
18 South	9 West	17	W1/2SW1/4	79.88
18 South	9 West	18	SE1/4NW1/4, N1/2SE1/4	122.06
18 South	10 West	1	NE1/4NW1/4, SE1/4SW1/4, N1/2SE1/4, SW1/4SE1/4	199.65
18 South	10 West	11	E1/2NE1/4	79.92
18 South	10 West	12	NW1/4NE1/4, SE1/4SW1/4	79.66
18 South	10 West	13	NE1/4SW1/4, W1/2SE1/4, SE1/4SE1/4	160
			TOTAL	**8,346.015**

2.3 No Action Alternative

Under the No Action Alternative (NAA), the proposed LBA tracts For Mine No. 4 (ALES-055797) and Blue Creek Mine No. 1 (ALES-056519) would not be offered for competitive leasing and the federal coal resources within the tracts would not be mined. Mine No. 4 would extract 42.6 million saleable tons of private coal over the life of the mine, while continuing to employ approximately 425 people annually. Blue Creek Mine No. 1 would extract 81.6 million saleable tons of private coal over the life of the mine, while continuing to employ approximately 500 people annually. If the BLM chooses the NAA, future lease applications could be submitted for the tracts.

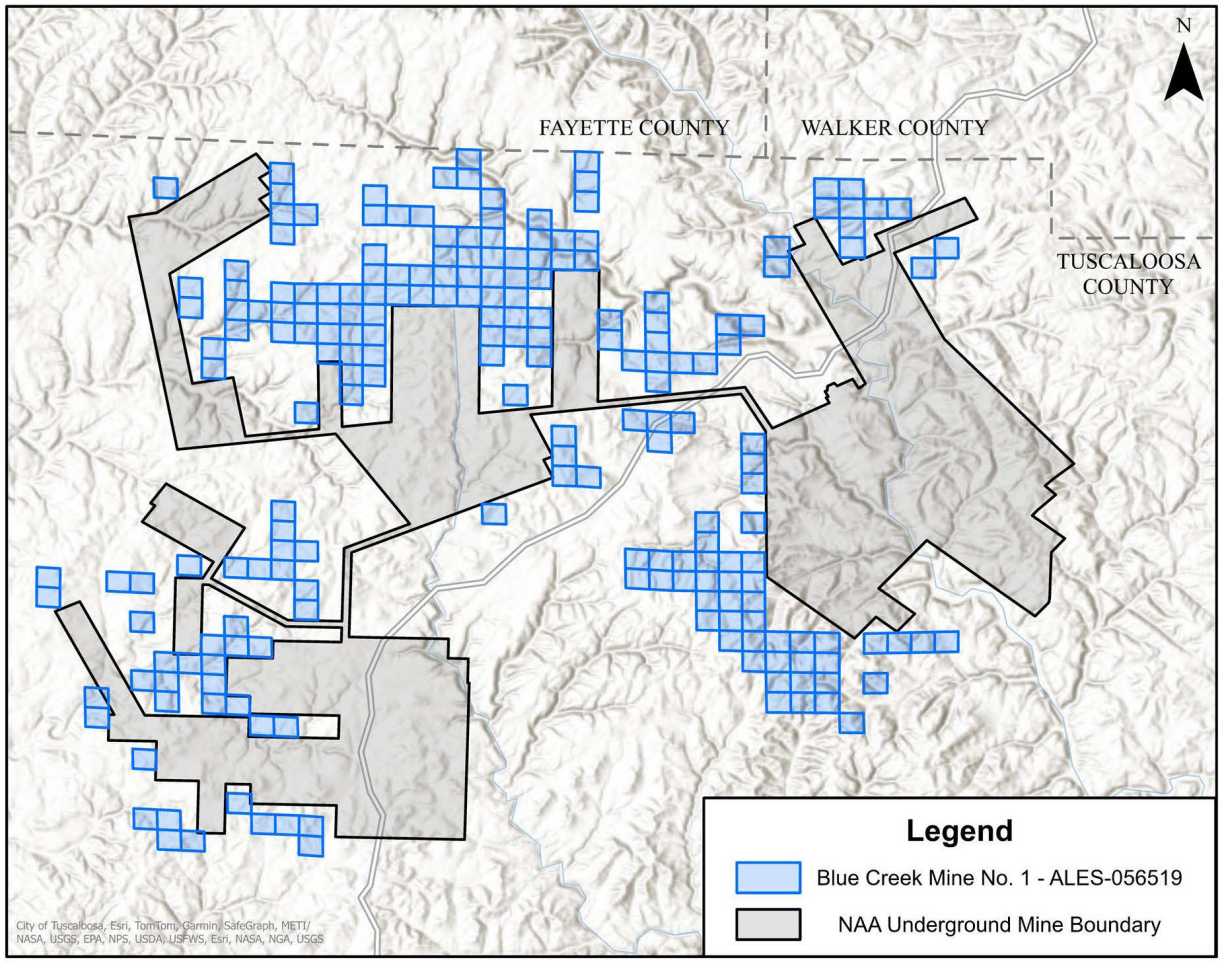
Furthermore, if the NAA is selected, the NAA would still involve the continuation of Warrior Met's existing permitted underground mining operations on private coal reserves that adjoin the subject property. Operations would be conducted in accordance with the existing ASMC permits and any additional adjacent private leases Warrior Met may acquire in the future. In addition, the protection zones (coal barriers) under the NAA are more extensive. As a result, the NAA would bypass and likely sterilize the federally owned coal resources, rendering the unmined coal irretrievably lost and non-recoverable for the foreseeable future. Access to the coal seam is limited by the depth of cover as well as the coal seam geology. Overburden depths range from 1,300 feet up to 1,900 feet for the Mine No. 4 expansion area and 800 feet up to 1,625 feet for the Blue Creek Mine No. 1 expansion area. Consequently, these depths would likely make new, independent development of these federal mineral reserves cost prohibitive. As a result, the federally owned coal resources could be bypassed and sterilized, not allowing future development. The underground mine developments for Mine No. 4 and Blue Creek Mine No. 1 that are proposed to be implemented if the NAA is selected are exhibited in ***Figure 2-3*** and ***Figure 2-4***, respectively.

Figure 2-3. Mine No. 4 NAA mining plan and federal forties.



(Not to scale)

Figure 2-4. Blue Creek Mine No. 1 NAA mining plan and federal forties.



(Not to scale)

2.4 Conformance with Land Use Plan

Development and land use decisions within this area of Alabama are contained in the January 2009 Alabama Record of Decision and Approved Resource Management Plan (RMP). Concerning mineral development, the RMP specifically states that, "Non-USFS [Federal Mineral Ownership] in the Warrior Basin will be available for further coal leasing consideration and limited to underground mining methods. BMPs will be applied as appropriate when processing a Lease by Application (LBA)." (p.11). The proposed LBAs and development of the lease tracts are in accordance with the RMP as generally stated for mineral resource development.

2.5 Proposed Development Scenario

If the PA is selected and the proposed LBA tracts are leased to Warrior Met, the PDS for both Mine No. 4 and Blue Creek Mine No. 1 would include the recovery of federal coal reserves within the Mary Lee/Blue Creek seams. Underground mining operations at Mine No. 4 and Blue Creek Mine No. 1 would follow current practices after the ASMC approves, or approves with conditions,

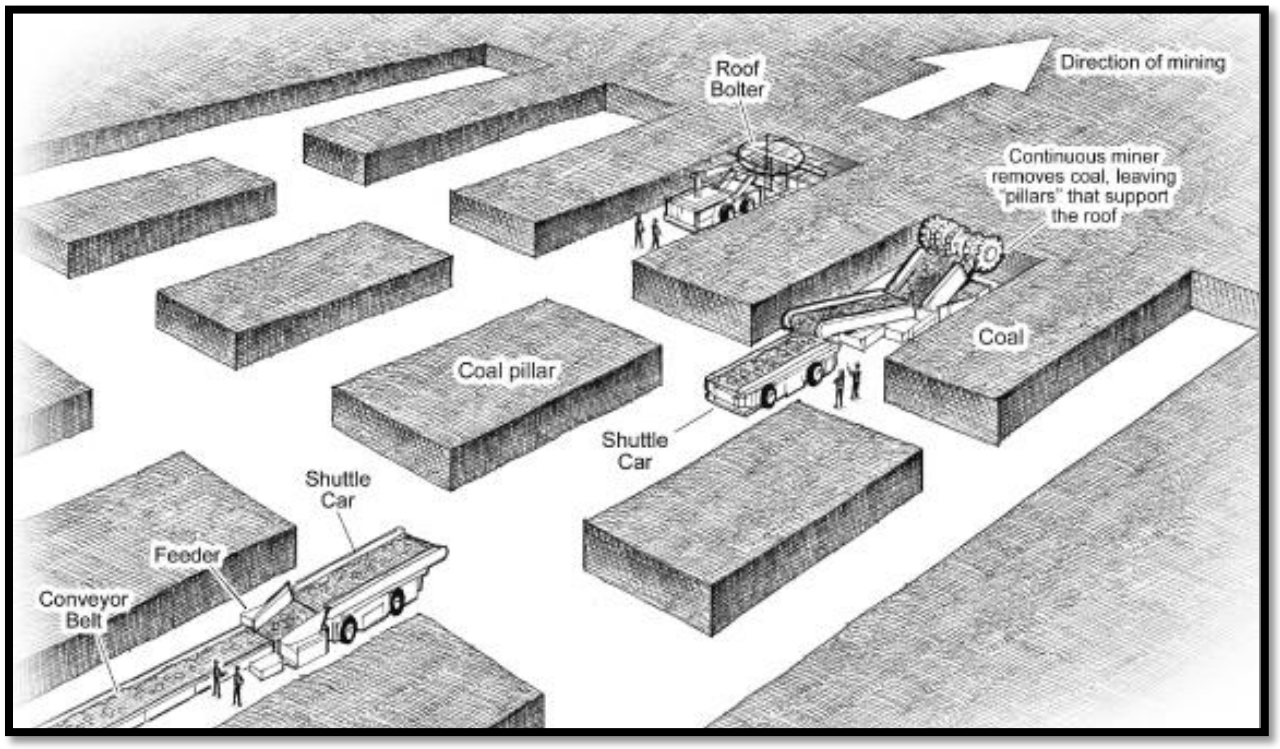
the respective permit revisions and, as a final step, after the ASLM approves the mining plans. Because the PA would be an extension of both Mine No. 4 and Blue Creek Mine No. 1, the necessary surface facilities to support the PDS, such as portals for seam access, stockpile areas, mine support buildings, coal preparation plants, coal refuse facilities, etc., would primarily be facilities currently permitted with the existing mining operations. Blue Creek Mine No. 1 will require additional area not included in the current ASMC permit boundary to be utilized for coarse refuse disposal (see Section 2.5.2 for more detail). Blue Creek Mine No. 1 and Mine No. 4 will require additional ventilation fan shafts to be constructed as mining progresses. For both Blue Creek Mine No. 1 and Mine No. 4, the amount of fan shafts, and associated disturbed area, is expected to be the same, regardless of which alternative is selected.

2.5.1. Underground Longwall Mining

The primary means of coal production for Mine No. 4 and Blue Creek Mine No. 1 is accomplished using longwall mining methods. The development areas are established to access and service the longwall panels and are developed using room-and-pillar mining. Room-and-pillar mining techniques utilize continuous miner units and are employed first to develop the gate roads, the main entries and bleeder systems around the longwall panels. Properly sized coal pillars are left in room-and-pillar areas to support the overlying strata. A continuous miner unit normally consists of a continuous miner machine, shuttle cars, a roof bolter, a belt feeder, and conveyor belts. As coal is extracted from the mining face by the continuous miner machine, it is placed on shuttle cars which then travel back to the belt feeder to be placed onto the conveyor belts for transport out of the mine as illustrated in ***Figure 2-5***. When the cutting length limit is reached for the continuous miner, it is moved to another area for mining. Roof bolters go into the area previously occupied by the miner and provide ceiling support for the area. Room-and-pillar techniques are designed to provide support for equipment, ventilation, and personnel so that underground mining can be done safely.

As part of the development process, entries are excavated in the direction of advance and crosscuts are developed to connect the main entries (mains). The mains provide the primary access artery for the life of the operation. Product haulage, ventilation, transportation, communication, and supplies all enter the mine through the mains. Sections are also called gate roads for the longwall. The gate roads that transport coal to the main entries from the face conveyor are referred to as the headgate while the gate roads on the opposite side are called the tailgate. The continuous miner sections drive the gate roads on all sides of the longwall panel.

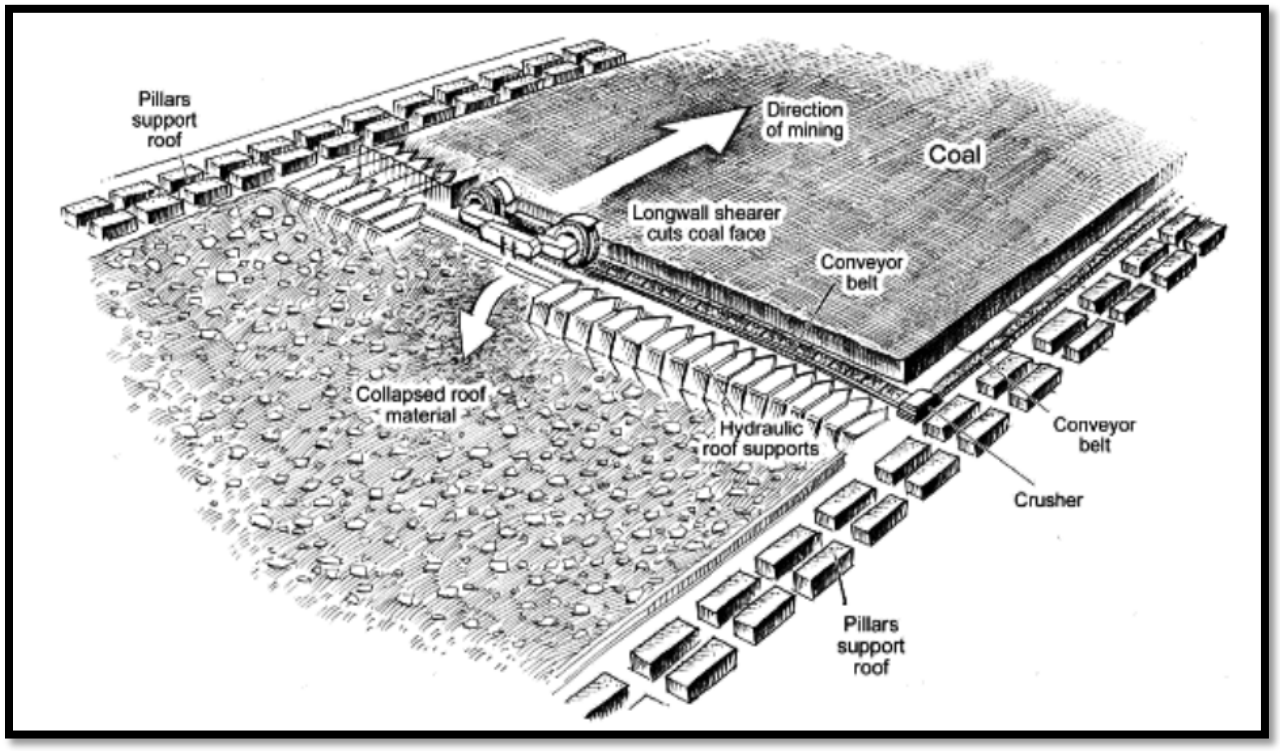
Figure 2-5. Typical room-and-pillar mining layout using continuous miner units (Arch Coal, Inc., 2012).



A longwall system is used to mine the coal in the longwall panels as depicted in ***Figure 2-6***. A longwall system includes a shearer, face conveyor and shields. As the coal is sheared from the face, the face conveyor transports the coal to a crusher which dumps the crushed coal on to a conveyor belt. Additional conveyor belts transport the coal to the surface. Pillars are left in place in the bleeders and full extraction of the coal occurs in the longwall block. The "bleeders" are entries surrounding an area that is currently being mined or an area which has been mined out and needs to remain supported to allow for continued ventilation.

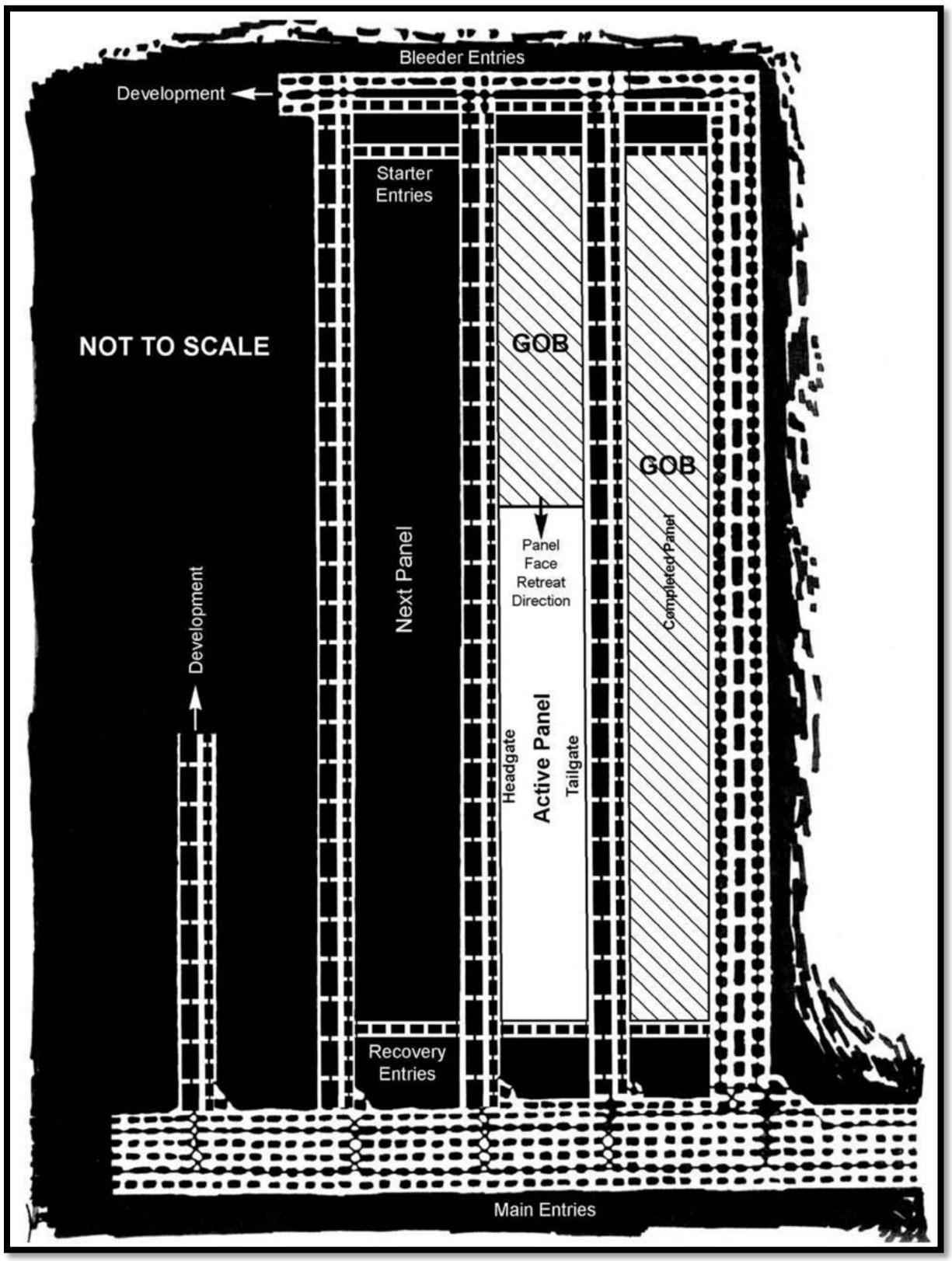
Once the coal is transported to the surface, it then goes to an existing, permitted coal preparation plant, or is temporarily stockpiled at an existing, permitted stockpile area. Any potential surface runoff from either of these areas are monitored under the associated existing point discharge permits. Coal waste would continue to be transported to permitted facilities and in accordance with Alabama Department of Environmental Management (ADEM) requirements. Furthermore, these facilities would continue to be permitted and/or regulated through the ASMC, ADEM, and the Mine Safety and Health Administration (MSHA).

Figure 2-6. Typical longwall mine panel development layout (Arch Coal, Inc., 2012).



Longwall mining provides a controllable excavation method that can be accurately predicted to determine the potential impact to the surface areas as compared to other possible mining methods. Longwall mining systems and technology have evolved over the past century to become a very efficient coal extraction procedure. The longwall mine, as designed, should recover all available coal reserves from areas proposed to be mined. As a result, the coal mining operation plan for the PDS would ensure that the maximum economic recovery of the coal resource was achieved in accordance with 43 CFR Subpart 3480. A conceptual longwall mining plan is provided in ***Figure 2-7*** for reference.

Figure 2-7. Conceptual longwall mining plan.



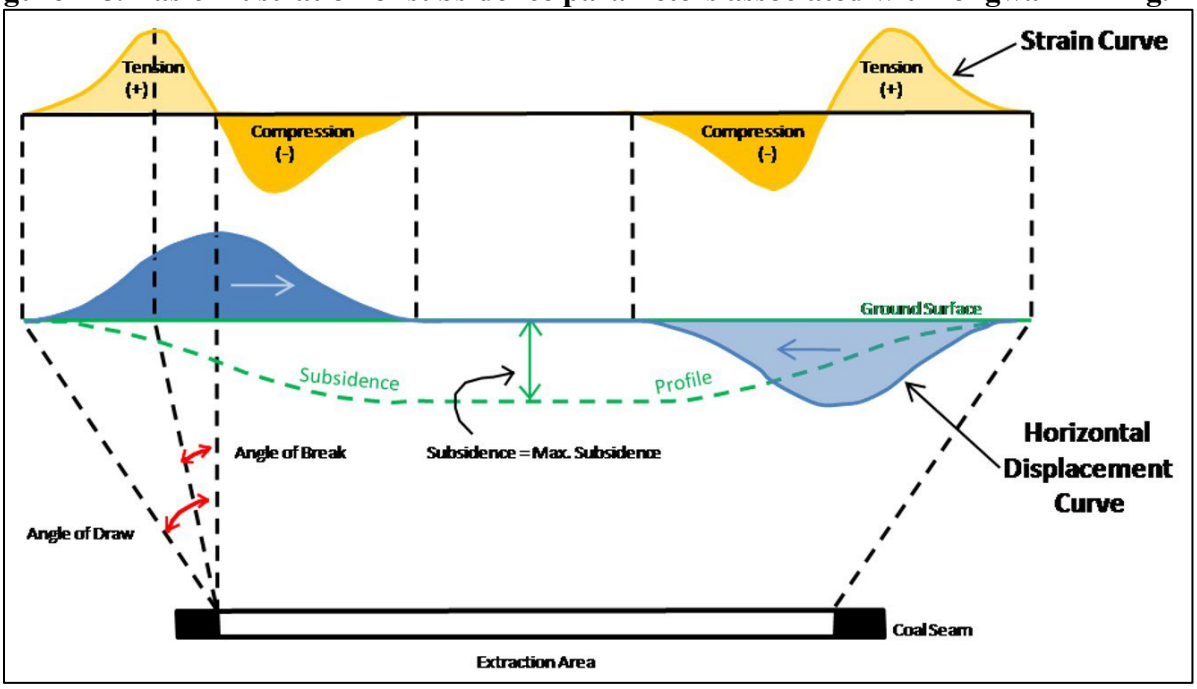
The overall recovery rate (saleable coal vs. run-of-mine) for Mine No. 4 and Blue Creek Mine No. 1 is 48% and 54%, respectively. This means that 48% of the material mined at Mine No. 4 and 54% of the material mined at Blue Creek Mine No.1 is converted into saleable coal. These recovery rates indicate the proportion of saleable coal product derived from the total amount (run-of mine) of material extracted. The quantity of recovered coal will depend on several factors, including but not limited to the mining conditions, coal seam thickness, and pitch. In addition, the mining rates may be impacted by other factors such as market price, mine costs, and availability of alternate, more attractive, coal sources. By issuing the federal coal leases as expansions of existing mining operations and not part of a new mine development (which is capital costs prohibitive), it is more likely the available resources can be recovered to their fullest extent. Development of the proposed LBA tracts would be contingent on BLM approval of the mine plans (the R2P2s) and ASLM approval of the mining plans.

2.5.2. Subsidence Control

Longwall mining at Warrior Met's Mine No. 4 and Blue Creek Mine No. 1 involves development of underground entries using continuous miner units on a grid pattern to isolate large rectangular blocks of coal, which are to be fully recovered. The mining plan for the continuous miner units is designed to provide adequate roof support in the room-and-pillar development areas. Surface subsidence associated with these development areas in Warrior Met's mines tends to be insignificant, if it exists at all. The continuous miner development would be performed well in advance of the longwall mining to limit delays in the longwall miner accessibility and coal production. Longwall mining causes very predictable surface subsidence effects, as well as subsurface movements within the overburden rock between the extracted coal seam and the ground surface. An approved SCP (***Appendix C***) is included in the ASMC permit requirements and would be implemented in accordance with Alabama Administrative Code r. 880-X-8I-.10 Subsidence Control Plan. Updated SCPs would be submitted to the ASMC a minimum of every five years (at the time of the ASMC permit renewals), as the mine plan is revised, or as otherwise required by ASMC.

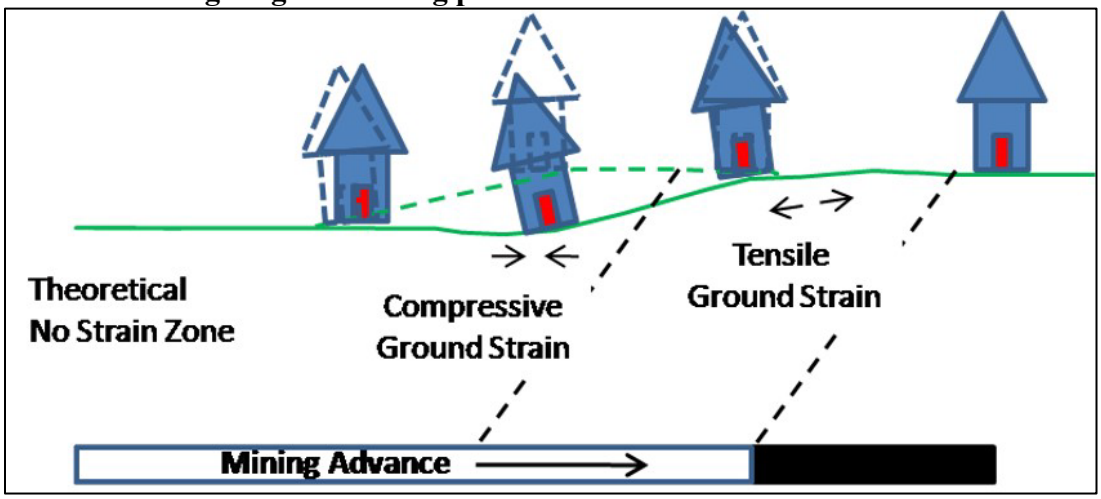
Longwall mining results in what is typically referred to as trough-type subsidence, meaning that the surface deformation can be generally visualized as a bathtub-shaped depression with the maximum subsidence in the middle of the tub. ***Figure 2-8*** illustrates the basic features of trough subsidence from longwall coal mining. The figure shows the relative positions of tensional (pulling apart) and compressional (squeezing together) strain on the edges of the extracted panel. ***Figure 2-8*** also illustrates the concept of "angle of draw" (AOD) (measured vertically from the edge of the panel to the horizontal extent of subsidence at the land surface) and "angle of break" (measured vertically from the edge of the panel to the point of maximum tensional strain).

Figure 2-8. Basic illustration of subsidence parameters associated with longwall mining.



The previous discussion focuses on the shape and characteristics of a final or static subsidence trough. In addition, longwall mining causes dynamic effects on the ground surface. In general, dynamic subsidence differs from final subsidence in that the former is the land movement that occurs as mining progresses toward, beneath, and past any point on the surface. In contrast, static or final subsidence relates to the degree of land movement that occurs at a given point on the surface after mining has passed that point and no further subsidence is expected to occur. The final, static subsidence trough that develops over a mined area will have permanent (pre-mitigation) effects on the surface near the edges of the subsidence trough. Depending on the size and depth of the mine, an additional amount of area within the subsidence trough may be affected by compression. As a result of dynamic subsidence, most of the surface above a panel would have both tensile and compressive strains as mining progresses. ***Figure 2-9*** illustrates the concept of a moving "wave" of subsidence as a longwall panel is developed.

Figure 2-9. Basic illustration of moving "wave" of dynamic subsidence in front of an advancing longwall mining panel.



Subsidence-related surface movements result in deformation of the ground surface that may manifest itself in many forms including vertical and horizontal displacement, strain, slope changes (tilt), curvature, angular distortion, and others. The most common parameter utilized to discuss mine subsidence is vertical displacement. Tensile and compressive ground strain is often used to describe and assess damage to surface structures. The potential damage caused by longwall subsidence is dependent on the object being damaged. Houses and roads tend to be susceptible to parameters such as ground strain and angular distortion (which can cause cracking or buckling), while the critical parameter of concern for power poles may be tilt. Surface drainage features such as streams and rivers are often most affected by vertical displacement of the ground that can lead to changes in stream gradient and result in areas of pooled water where streams cross over the edge of panels. In some cases, subsidence can lead to the reduction of stream water volume at the surface due to cracking or fracturing of the streambed.

The final subsidence deformation observed at the surface starts when roof rock collapses into the mine void and overlying rock settles downward through fracturing and bending. The amount of subsidence depends on many factors—the thickness of the coalbed being mined (mining or extraction height), mining methods (longwall or room-and-pillar), roof control (support) methods, strength and uniformity of the rocks above the coal seam, and overburden thickness (depth of mine).

The zone of collapse immediately above the mine horizon is often referred to as the caved zone, the zone above the caved zone is often called the fractured zone, and the zone above the fractured zone is commonly referred to as the continuous deformation zone or the dilated zone. Each zone is characterized by the type and degree of fracturing that occurs, with zones nearer to the mine horizon being more fractured. The fractured zone is often of particular interest for longwall mining because it defines the interval above the mine from which groundwater is likely to drain to the mine. There is a significant volume of published research regarding the height of the fractured zone and other zones caused by longwall mining. Peng (1992) describes the height of the fractured zone as shown in ***Figure 2-10***, and Newman et al (2017) offers a similar depiction (***Figure 2-11***).

Figure 2-10. Zones of overburden movement according to Peng (1992) where H depicts mining height.

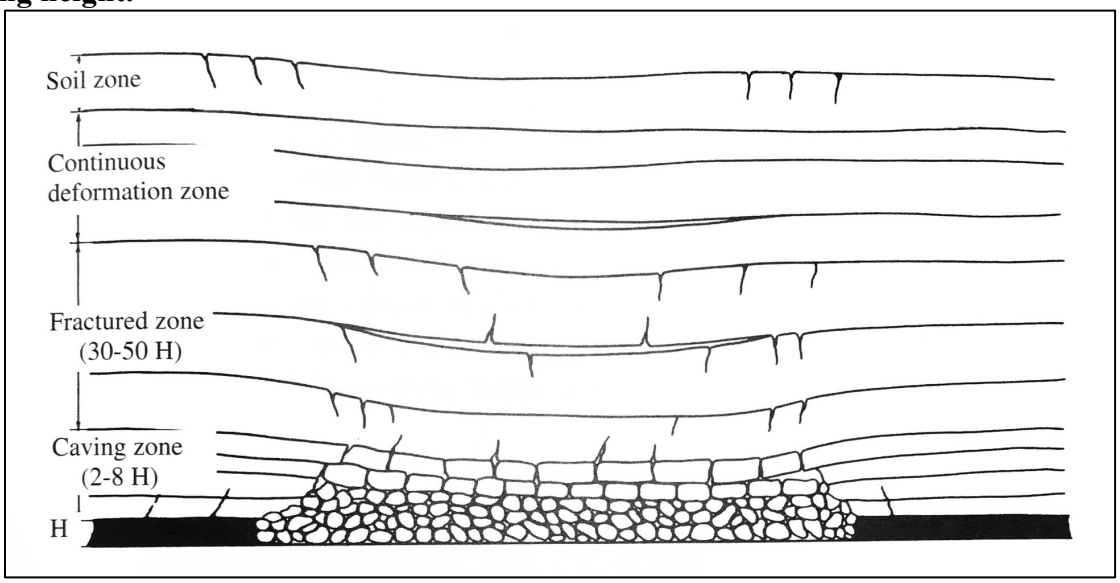
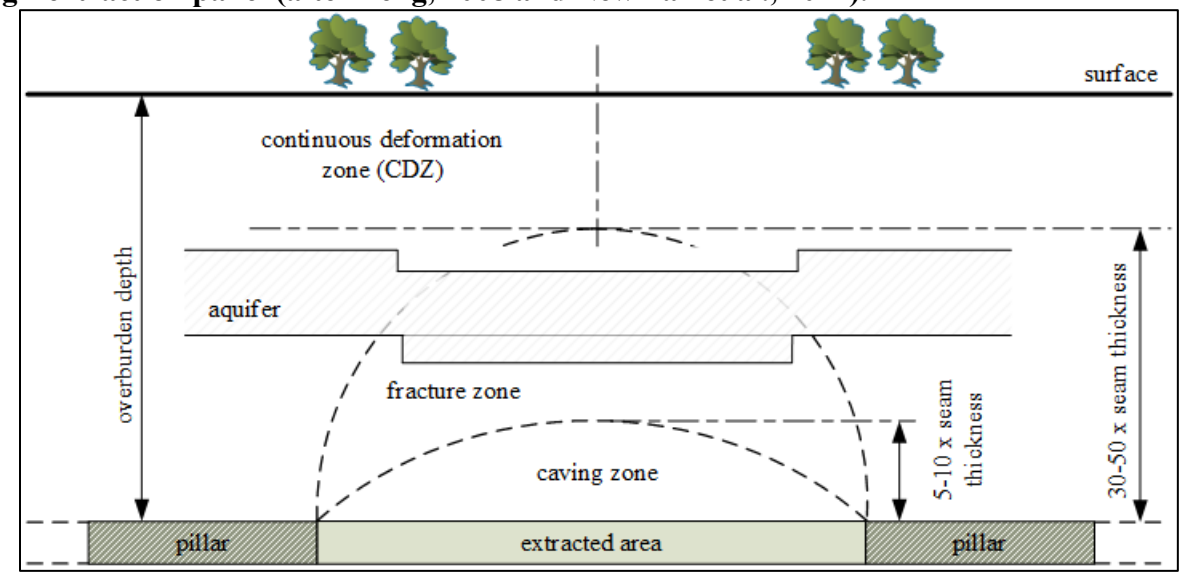


Figure 2-11. Conceptual diagram of the caving, fracture, and deformation zones above a high-extraction panel (after Peng, 2008 and Newman et al., 2017).



Based on the various publications, the height of the fractured zone can be expected to extend to a range of 30 to 60 times the mining height (above the mine roof), with industry experience often indicating that the lower end of the range is most common. The variation in the height of the fracture zone is influenced by the competency of the overburden strata, with the presence of more competent strata (ex: sandstone) generally resulting in fracture heights that trend toward the lower end of the range. Other factors influencing the height of the fracture zone are mining geometry, mining depth, and the rate at which the coal face is being cut back. Caving height will be greater during active mining because the caved in material (gob) compacts over time and becomes stabilized (Peng, 1992).

To clearly and precisely delineate the areas of the surface that will most likely be affected by subsidence, Warrior Met assumes a conservative, 30-degree AOD as measured from the coal extraction zone to the surface. The 30-degree AOD is a conservative estimate of the extent of the surface area that will be affected by subsidence. Because there is no planned subsidence above the room-and-pillar parts of the mine, the 30-degree AOD is calculated from the outer extents of the proposed longwall panels.

The Surface Deformation Prediction Software (SDPS) is a subsidence prediction model that is used to forecast and model the subsidence for Mine No. 4 and Blue Creek Mine No. 1. SDPS has been in use with various state and federal agencies in the United States coal industry over the past 20 years and has yielded prediction models that provide a useful subsidence forecast tool. SDPS was developed at the Virginia Polytechnical Institute and State University (Virginia Tech) for OSMRE. SDPS was used to determine predicted subsidence above longwall panels in the Mine No. 4 LBA area is anticipated to be a maximum of 2.20 feet. The Blue Creek Mine No. 1 LBA area is expected to experience a maximum subsidence of 2.62 feet.

Subsidence predictions contained in the SCPs are limited to the areas within the 30-degree AOD. As required by law and as a part of the SCPs that are provided in ***Appendix C***, Warrior Met will identify all property owners located within the 30-degree AOD for both lease areas to predict which property owners may incur subsidence damage. Warrior Met will send pre-mining notifications to all identified property owners a minimum of six months prior to mining beneath each individual property owner. Warrior Met will follow the requirement to either repair subsidence-induced material damage to non-commercial buildings and occupied residential dwellings and related structures (commercial) to approximate pre-subsidence conditions or compensate the owner for the loss of property value caused by subsidence. Warrior Met will also, in accordance with regulations, provide temporary or permanent replacement water supplies for existing drinking, domestic, and residential water supplies if they are contaminated, diminished, or interrupted by underground coal mining operations. These requirements apply to all such structures with material damage caused by subsidence.

In addition to the requirements given above, Warrior Met has adopted a course of action by which it will repair or offer compensation for material damage which it finds was caused by subsidence and will, at its discretion and with the agreement of the property owner, offer to purchase the property at its pre-subsidence market value or offer to compensate for loss of property value caused by subsidence.

Warrior Met has established a Subsidence Mitigation Program for implementation under the SCPs, which includes:

- Notifying property owners in advance of undermining or mining adjacent to their property.
- Conducting pre-mining reconnaissance of the surface.
- Conducting pre-subsidence and post-subsidence inspections for subsidence impact, and interim inspections as Warrior Met deems necessary.
- Taking necessary and prudent measures, consistent with the mining method employed, to minimize material damage to non-commercial buildings and occupied residential dwellings and related structures to the extent technologically and economically feasible.

- Repairing material damage to surface lands to the extent technologically and economically feasible by restoring the land to a condition capable of maintaining the reasonably foreseeable uses it was capable of supporting prior to subsidence damage.
- Repairing material subsidence damage to non-commercial buildings and occupied residential dwellings and related structures existing at the time of mining or compensating the owners for damage resulting from subsidence.
- Offering, at Warrior Met's discretion, in lieu of repair, to (1) pay to the owners the diminution in value of the property resulting from subsidence or, (2) purchase the property at its current value in its pre-subsidence condition.
- Receiving and logging comments and complaints from potentially affected surface owners and responding promptly.

The aspects and components of Warrior Met's Subsidence Mitigation Program are more thoroughly detailed in Warrior Met's SCPs (***Appendix C***).

Warrior Met or its agents, if property owners allow, will perform water well inventories prior to mining to determine the status of the local groundwater users within the proposed mine area. The surveys will consist of direct interviews of property owners and a recording of the water resource quantity (water depth) and water quality (pH, conductivity, iron, manganese, and sulfate). The inventories are intended to identify local groundwater users within the 30-degree AOD of the future mining extents and to preliminarily determine whether any properties may be at risk of material damage.

ASMC rules and federal regulations, 30 CFR 817.41(j), require mitigation to promptly replace any drinking, domestic, or residential water supply that is contaminated, diminished, or interrupted because of underground mining activities. Replacement includes provision of an equivalent water supply delivery system and payment of operation and maintenance cost.

2.5.3. Outlying Federal Forties

The PDS mining plans for Mine No. 4 and for Blue Creek Mine No. 1 include the current longwall panel configurations for the recovery of federal coal within the LBA areas. These proposed configurations were developed based on known geological limitations, primarily the thickness of the coal seam. The decline in seam thickness at the extents of the PDS mining plans defines the limits of what is currently believed to be a viable longwall operation. For this reason, the PDS mining plans do not account for the recovery of all the federal forties included in the LBAs.

The PDS mining plans were developed based on geologic conditions as they are currently understood; however, the mining plans are subject to change between leasing, permitting, and final mining plan approval. After approval, a mining plan may still be modified in the event these outlying areas are determined to be feasible to mine. While not expected, as the mining operations progress into areas adjacent to the PDS mining plans, more information related to the geological formation in the outlying areas may impact recovery potential and necessitate modifications. Any such mining plan modification would be subject to additional environmental review and approval.

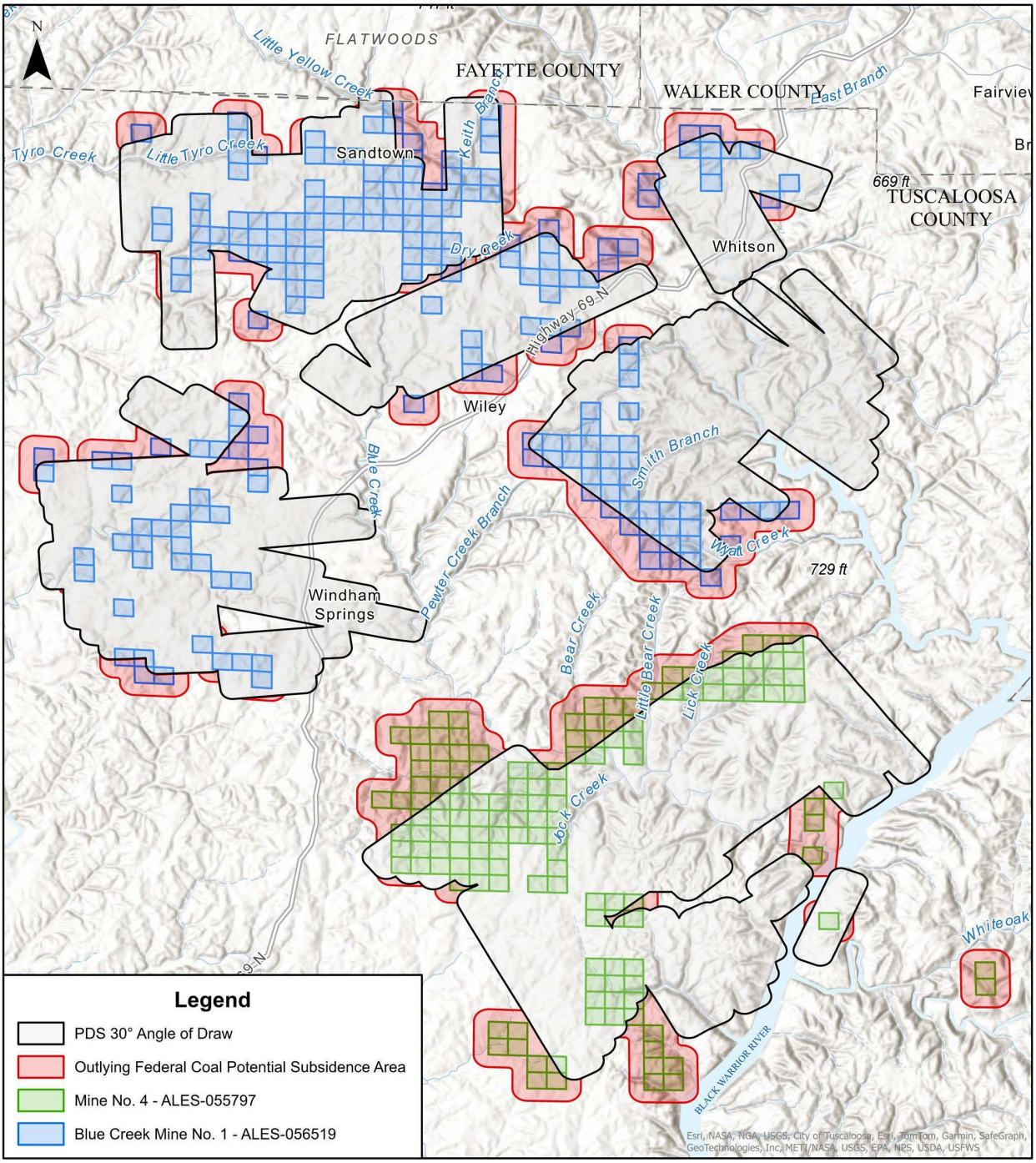
Under the current PDS, approximately 72 of the 143 federal forties of the Mine No. 4 LBA tract and 70 of the 208 federal forties of the Blue Creek Mine No. 1 tract would not be recovered, or only partially recovered. Because these (or portions of these) federal forties are not included in the PDS mining plans, the subsidence predictions calculated for the SCPs described in Section 2.5.2 do not account for areas of potential subsidence should the mining plans later be adjusted to include these parcels. If this analysis were to rely only on the subsidence footprint calculated for the PDS mining plans, excluding these outlying federal forties, additional environmental analyses would be required if these plans are modified in the future (either pre or post mining plan approval).

It is currently unknown how the mine developments would be configured if a portion of, or the entirety of the outlying federal forties were to be mined. To estimate a conservative potential subsidence footprint for this scenario, a 1,000-foot buffer from the outlying federal forties was used and is shown in ***Figure 2-12***.

The outlying buffer area associated with Mine No. 4 is 5,050 acres, for a total potential subsidence footprint of 20,198 acres. The outlying buffer area associated with Blue Creek Mine No. 1 is 6,203 acres, for a total potential subsidence footprint of 35,844 acres.

Previously conducted environmental studies (i.e. habitat assessments, wetland delineations, biological assessment) included these outlying federal forties, and considered any potential adverse impacts to resources in the surrounding area. In the event a portion of, or the entirety of the outlying federal forties were mined, potential impacts to resources would be similar to those described for the PDS in Chapter 4.

Figure 2-12. Outlying federal forties potential subsidence footprint.



(Not to scale)

2.5.4. Mine Ventilation

The Federal Coal Mine Health and Safety Act of 1969, as amended, contains provisions that improve and require monitoring of the ventilation of underground mining. Ventilation systems would be designed to provide a safe and healthy atmospheric working condition for miners. The purpose of ventilation systems is to provide adequate fresh air to the miners in the mine workings and to render toxic, noxious, and explosive gases and dusts harmless either through dilution by fresh air and/or by carrying the harmful gases out of the mine. Ventilation air would maintain more than 19.5% oxygen and less than 0.5% carbon dioxide. At both Mine No. 4 and Blue Creek Mine No. 1, all air shafts for ventilation would be installed and maintained in accordance with the ASMC permits and MSHA standards. Mine No. 4 will require an additional 5 ventilation fan shafts over the course of the mine life, regardless of which alternative is selected. Blue Creek Mine No. 1 will require an additional 12 ventilation fan shafts over the course of the mine life, regardless of which alternative is selected. Pads for fan shafts will be constructed in upland areas and are expected to be 2 acres or less.

Methane is liberated as a direct result of the physical process of coal extraction and can create a potential safety hazard to mine workers. Gas content will vary based on different factors such as coal rank, liberation rates, and depth of cover. Methane concentrations that range between 5% to 15% are explosive, and concentrations can rapidly increase. Therefore, methane concentrations are maintained less than 1% to protect underground workers per MSHA regulations (Title 30 CFR 75.323). Methane emissions can also occur from the collapse of the rock strata over the longwall panel as the panel is removed. This collapsed area is referred to as the gob and the released methane may be called gob gas. If underground methane concentrations ever reach or exceed 1% by volume, all necessary steps and measures will be taken to modify the mine ventilation system to dilute the methane levels back to within acceptable concentrations. In addition, underground equipment is fitted with methane monitors that deenergize the equipment when potentially explosive methane concentrations are reached.

The surface of the PDS has been extensively drilled for coalbed methane (CBM) production from the Mary Lee/Blue Creek seams and other coal seams above and below the horizon to be mined. The methane was sold as natural gas and sent to nearby pipelines outside the PDS area. Removal of methane prior to mining improves the safety of the mine. One gob well (post-mining) will likely be installed for each longwall panel. Gas from the gob wells will be captured and sold to market.

A significant number of CBM wells are located within future mining projections. Warrior Met's procedures as mining approaches a vertical CBM well are specified in the current Ventilation Plan approved by MSHA and are as follows:

- When mining will progress within a one hundred and fifty (150) foot radius of a vertical gas well based upon surface surveys, the well will be surveyed using down-hole tools.
- Based upon the bottom hole survey, if the vertical degas wells are more than thirty-five (35) lateral feet from the mine, no further action is necessary.
- Based upon the bottom hole survey, if the vertical degas wells are less than thirty-five (35) feet from the mine, a cement plug of not less than one hundred (100) feet in length must be placed fifty (50) feet above and fifty (50) feet below the mining horizon.

- When mining will progress within a one hundred and fifty (150) foot radius of a vertical degas well based upon surface surveys, mining operator may forego the bottom-hole survey if a cement plug of not less than one hundred (100) feet in length must be placed fifty (50) feet above and fifty (50) feet below the mining horizon.
- When mining will intercept a vertical degas well and before the active face progresses to within one hundred fifty (150) feet of the well, any steel in the hole through the mining horizon will be removed five (5) feet above to five (5) feet below the coal bed being mined.
- When mining will intercept a vertical degas well and before the active face progresses to within one hundred fifty (150) feet of the well, the degas well will be filled with a cement plug of not less than one hundred (100) feet in length, placed fifty (50) feet above and fifty (50) feet below the mining horizon.
- When the mining horizon is sealed off from the vertical degas well in an approved manner, coalbeds above the mining horizon will continue to produce.
- If mining does not intercept the vertical degas well for whatever reason, a suitable repair can be made to the casing that will isolate the mining horizon from the degas well for production to resume from below the mining horizon.

The procedures followed as mining approaches a horizontal degas hole is as follows:

- Any horizontal degas holes which lie in the direction (*path*) of a continuous mining unit will be taken off line prior to the continuous miner approaching within 300 feet of the anticipated location of the hole, and ***one*** of the following options will be instituted:
    - Any horizontal degas holes that lie in the Blue Creek/Mary Lee mine horizon which may be encountered by a continuous miner must be water infused prior to the mining.
    - The horizontal degas holes will be relieved to the mine atmosphere by opening the shut in valve.

MSHA is responsible for enforcing the Federal Mine Safety and Health Act of 1977 (Mine Act), as amended. As part of that enforcement, MSHA conducts regular inspections (at a minimum of once every quarter) of mine operations to ensure compliance. The Mine Act sets forth mandatory health and safety standards for the protection of life and prevention of injuries in coal or other mines. These rules are in Title 30 CFR parts 1-199. Furthermore, BLM conducts regular inspections and reports any unresolved safety violations to MSHA.

2.5.5. Methane

Coalbeds have the capacity to store large volumes of methane. Methane may also be stored in the rocks above a coalbed. Mining can liberate the gas from its pressurized environment by the excavation of the coal and subsequent fracturing of the overlying strata. As a coalbed is mined, a pressure differential is created that causes methane liberated from the coalbed to flow into the mine. Modern mining techniques such as longwall mining liberate more methane than room-and-pillar mining because this method rapidly exposes large surface areas of coal and pockets that store methane. Methane can also be liberated from the collapse of the rock strata over the longwall panel

as the panel is removed. This collapsed area is referred to as the gob and the released methane may be called gob gas.

Methane has historically been a serious hazard to underground coal miners because, when allowed to accumulate in an enclosed space, liberated methane can cause oxygen-deficient atmospheres, flammable situations, or explosive environments. Methane concentrations are frequently reported as a percentage of their explosive range, with 5% being the lower explosive limit, and 15% the upper explosive limit.

Wells drilled into unmined coalbeds in advance of longwall mining can significantly reduce the hazards of methane in gassy coal regions. During active underground mining, ventilation systems are used to control methane concentrations within the mine workings. Powerful exhaust fans create a low-pressure zone to draw fresh air from main entries past the working face of the mine, which dilutes and removes the hazardous gases.

During the life of a large coal mine, large quantities of gas may be removed through these degasification and ventilation efforts. However, some gas is still retained in the remaining coal or overlying rock strata.

The degasification methods and ventilation systems currently used at Mine No. 4 and Blue Creek Mine No. 1 are detailed in Section 2.5.3.

2.5.5.A. Fugitive Methane

Fugitive methane is the uncontrolled release of methane (a colorless, odorless, tasteless gas) into the atmosphere. Methane tends to migrate through rock pores and fractures either vertically, or to areas of lower pressure. Underground coal mining has the potential to liberate fugitive methane into the atmosphere. Fugitive methane does have the potential to create imminent harm to the public or to private property when allowed to accumulate to explosive concentrations. This is best prevented when methane is not allowed to accumulate to explosive levels in wells or structures (OSMRE, 2001).

Warrior Met will incorporate into the SCPs an effective subsidence and methane monitoring plan, and Warrior Met will report the monitoring results to ASMC. Additionally, these plans should include best practices for identifying abandoned wells that may transmit methane to the surface.

These additional requirements stem from a focused-partial-Federal inspection of the nearby Oak Grove Mine (Permit Number: P-3232), conducted by OSMRE and which took place on November 6, 2024, and was signed and completed on December 4, 2024 (OSMRE, 2024). A focused-partial-Federal inspection typically refers to a targeted inquiry into specific aspects of coal mining operations and compliance with Federal laws and regulations. In this case, the inspection concentrated on the implementation of the currently approved SCP by the ASMC for the Oak Grove Mine, which mines the same coal seam as the PA. The focus of the Federal inspection was on the implementation of the current SCP, with a particular focus on potential fugitive methane.

Following the Federal inspection, OSMRE issued a Ten-Day-Notice to ASMC concerning a potential violation of Section 516(b)(8) of SMCRA, 30 U.S.C. § 1266(b)(8). The Federal

inspection revealed a "failure to include all necessary information concerning subsidence and methane monitoring as part of the planned subsidence plan," in accordance with Alabama Administrative Code 880-X-8I-.10(2)(d) and 880-X-10D-.58. Consequently, OSMRE recommended that the SCP for Oak Grove Mine be revised to address the lack of an effective subsidence and methane monitoring plan, ensure timely reporting of monitoring results to the ASMC, and to update the well survey to include abandoned wells that may transmit methane to the surface after mining (OSMRE, 2024).

In addition, in coordination with OSMRE, the ASMC is requiring all Alabama underground mines to revise their SCPs based on the findings of the Federal inspection. This revision must include an effective subsidence and methane monitoring plan, timely reporting of monitoring results to ASMC, and the incorporation of best practices for identifying abandoned wells that may transmit methane to the surface.

In response to this guidance from ASMC, as previously mentioned, Warrior Met is updating all active SCPs to include additional details regarding the monitoring of methane as applicable to planned subsidence in accordance with Alabama Admin. Code 880-X-8I-.10(2)(d) and 880-X-10D-.58. The formal SCPs are currently being updated, but additional language that will be added to all Warrior Met SCPs will include the following:

- Additional standard language will be added to all 180-day pre-mining notifications provided to property owners requesting any information or knowledge relating to any wells on the property, as well as whether there are any abandoned wells or structures that could potentially still be connected to piping or conduits which could allow gas to collect. This will provide additional opportunity to account for anything which may have not been identified during the research performed for the existing SCP or will allow discovery of new wells which may have been installed since the research performed during the existing SCP.
- A comprehensive well inventory is conducted as part of each SCP action. The SCP plans will now also request concurrence from ADEM and the Alabama Oil and Gas Board for the inventory of wells (active, inactive, and/or plugged and abandoned) identified within each respective SCP boundary to verify all publicly available and permitted wells are properly accounted for and updated. ADEM is responsible for oversight and permitting of residential water wells in Alabama. The Alabama Oil and Gas Board is responsible for the oversight and permitting of gas wells in Alabama. Other wells may be identified during field research of the SCP, and these will also be added to the SCP.

In accordance with Section 880-X-10D-.58(1)(b), which states "*If a permittee employs mining technology that provides for planned subsidence in a predictable and controlled manner, the permittee must take necessary and prudent measures, consistent with the mining method employed, to minimize material damage to the extent technologically and economically feasible to non-commercial buildings and occupied residential dwellings and structures related…"* Warrior Met is currently working to develop a monitoring system that would service any wells identified within a 150 foot radius of any occupied or frequented residence or building, as well as any crawlspaces, underpinning, or other areas associated with these structures where gases could potentially collect. There is currently no known technology that exists on the market designed to provide continuous

monitoring of fugitive methane from point source locations across large areas; therefore, Warrior Met will continue to coordinate with ASMC regarding the incorporation and monitoring of the system as more information becomes available and the development is complete.

Mine No. 4 and Blue Creek Mine No. 1 Methane Monitoring and Well Inventory Requirements

On January 24, 2025, ASMC notified Warrior Met that the SCPs for Mine No. 4 and Blue Creek Mine No. 1 must be revised and submitted to ASMC. These revisions will apply to both mining operations, regardless of whether the PA or the NAA is selected.

The mandatory revisions include the following changes:

Pre-subsidence survey:

- A description of the procedures for effective identification and location of water wells to include:
    - Standard notification letters addressing homeowner to notify Warrior Met of all wells known to exist on the property.
    - Checklist to be used for each homeowner of all means utilized to identify and locate possible wells, i.e. public record searched, physical inspections, discussions with community/neighbors and any other possible actions.
    - Based on pre-subsidence survey, actions to be taken for located wells to include dates.
    - Procedures for monitoring potential methane gas for each located well.
- Report all well actions to the Alabama Oil and Gas Board for updating of historical well files.

Subsidence Control Plan:

- A description of the current processes and/or additional processes in progress for monitoring methane gas potentially released to the surface by mining operations and the reporting of such monitoring results to the ASMC. The Plan should include immediate monitoring consistent 30 CFR 784.20(b)(4) and 817.121(a)(2) and the OSMRE report, "Technical Measures for the Investigation and Mitigation of Fugitive Methane Hazards in Areas of Coal Mining." Specifically, Section 4.5 Active Mines Page 72.
- A description of procedures current or in process to chronicle results of methane sampling to be reported to ASMC quarterly in a format approved by the ASMC that clearly highlights any measurements outside of safe limits and any actions taken.

2.5.6. Waste Products

During the processing of raw coal recovered from the Mine No. 4 lease area and Blue Creek Mine No. 1 lease area, two waste products (coarse refuse and fine refuse) will be produced. Both are similar in composition and differ mainly by size fraction and moisture content. The coarse refuse component would be deposited at coarse refuse disposal areas approved by ASMC and MSHA.

Mine No. 4 will not require more acreage to be permitted for additional coarse refuse disposal areas regardless of whether the NAA or PA is selected. This is due to the adequate amount of available area included in the existing ASMC permit. Blue Creek Mine No. 1 will need to permit additional coarse refuse disposal area to accommodate coarse refuse for whichever alternative is selected. There are currently no design plans for additional coarse refuse areas, and the location and configuration of the future coarse refuse areas is currently unknown. An estimate of additional acreage required to accommodate coarse refuse disposal areas under the NAA and PDS for Blue Creek Mine No. 1 was based on an average dry density of coarse refuse sampled in 2024 at Mine No. 4. The average dry density was then applied to the design volume and footprint for the initial coarse refuse disposal site (included in the existing ASMC permit) to estimate an average tons of coarse refuse material per acre of coarse refuse disposal site. This estimate assumes 80% of waste products will be coarse refuse. There are many design variables not considered that are not available at this time (i.e. location, coarse refuse facility height, footprint, etc.). Based on the above-mentioned estimate procedure, the NAA scenario would require an additional 285 acres of coarse refuse disposal area to store a total of approximately 56,513,966 tons of coarse refuse, and the PDS would require an additional 618 acres of coarse refuse disposal area to store a total of approximately 106,801,148 tons of coarse refuse.

Prior to the additional coarse refuse disposal areas being constructed, the necessary permits and concurrences will be acquired by Warrior Met. The ASMC permit will ensure the proper necessary consultation with FWS, United States Army Corps of Engineers (USACE), and the State of Alabama Historical Commission (AHC).

Regardless of where the coarse refuse disposal areas are located, Warrior Met will comply with Alabama Administrative Code 880-X-10D-.34, which establishes general requirements for coal mine waste disposal. All waste must be placed in approved disposal areas within the ASMC permit boundary to ensure proper containment and environmental protection. The waste must be transported and deposited in a controlled manner to minimize adverse effects on surface and groundwater quality, ensure mass stability, and prevent public hazards and the potential for combustion in the disposal area. Coarse refuse disposal facilities are required to be designed by professional engineers experienced in slope stability, hydrology, and reclamation. The coarse refuse disposal areas are constructed under the supervision of a professional engineer and re-certified quarterly that they are being built and maintained in accordance with the approved plans.

Warrior Met will also comply with Alabama Administrative Code 880-X-10D-.36, which sets additional requirements for coarse refuse piles. Effective drainage control is a critical component of refuse pile management. Runoff from areas above the refuse piles and the surface of the refuse piles is to be diverted into stabilized diversion channels designed to meet the requirements of Section 880-X-10D-.14 to safely handle the runoff from a 100-year, 6-hour precipitation event. Runoff from undisturbed areas will not be capable of commingling with the runoff from the surface

of refuse piles. Underdrains must be constructed in accordance with the standards specified in Alabama Administrative Code 880-X-10D-.33(7). To minimize erosion, slope protection measures must be implemented, and all disturbed areas—including diversion channels that are not otherwise protected—must be revegetated upon completion of construction.

Prior to placement of the refuse material, all organic material and topsoil must be removed, segregated, and either stored or redistributed following the guidelines in Section 880-X-10D-.07 and 880-X-10D-.11. The final coarse refuse disposal area configuration must support the ASMC approved post-mining land use and will be covered with a minimum of four feet (unless an alternative is approved) of the best available non-toxic, non-combustible and non-acid forming material and reclaimed and revegetated in accordance with the approved reclamation plan. Cover material will come from the footprint of the coarse refuse disposal areas and from other areas within the permit designated as borrow area or cover material stockpile areas. The coarse refuse disposal areas would continue to be inspected monthly by ASMC personnel. Sediment ponds are designed and constructed in conjunction with the coarse refuse facilities to control any surface runoff from the disposal site.

Coarse refuse is considered potentially acid-forming or toxic-forming when it has a paste pH less than 4 or a net potential acidity of less than 5 tons per 1,000 tons of $CaCO^3$ equivalent (equates to an acid-base account of less than negative 5). Analysis of current drill hole data does not show acid-forming material in the rock that will be recovered along with the coal and later separated out at the coal processing plant as a waste product. ***Appendix J*** provides a drill hole acid-base account for reference.

If acid-forming coarse refuse material is encountered, a monitoring plan would be implemented to determine if neutralization of the waste product should occur in lifts as the refuse pile is constructed. If monitoring is determined necessary, the coarse refuse material would be sampled monthly at a minimum of two samples per two-foot lift. The samples would be transported to a laboratory to be analyzed for paste pH, total sulfur, and neutralization potential. An acid-base account would then be calculated for each sample. The acid-base accounts would determine the liming requirements for each lift. If necessary, agricultural lime would be spread along the surface of the upper lift and disced into the coarse refuse material. Neutralizing the coarse refuse material as it is being deposited in two-foot lifts should prevent or minimize the possibility of acid mine drainage in the form of groundwater seeps and surface water runoff.

The fine refuse material remaining after coal processing, commonly referred to as slurry, consists of clays and silt with water. Approximately 70-75% of slurry is water. All slurry material would be disposed of in slurry impoundments that are designed by professional engineers and approved by ASMC and MSHA. These impoundments provide retention of the slurry until the solids drop out of the mixture, separating the water from the fine material. The slurry impoundments are required to be re-certified annually to ensure they are maintained according to the design plans and are required by MSHA to be inspected by mine personnel on a weekly basis. As with the coarse refuse disposal areas, sediment ponds are located downstream of all slurry impoundments to control any runoff from the impoundment area.

2.5.7. Product Transportation

Coal produced from the Mine No. 4 LBA tract and Blue Creek Mine No. 1 LBA tract would be transported to the McDuffie Terminal in Mobile, Alabama, and then shipped into the seaborne metallurgical markets (further details provided in Sections 4.2.1.D, 4.2.2 and 4.2.3). Both mines will utilize barge and rail transportation methods. For Blue Creek Mine No. 1 approximately 90 percent of the coal is transported by rail and ten percent by barge. Approximately 76 percent of Mine No. 4 coal will be transported by rail, and the other 24 percent will be transported by barge. The Mine No. 4 rail loadout is located on the east side of the Mine No. 4 facilities and southwest of the intersection of Lock 17 Road and Davis Road. River transport is available approximately four miles to the west of the plant facilities on the Black Warrior River. A rail loadout located approximately eight miles to the northwest of the Blue Creek Mine No. 1 preparation plant will receive saleable coal from Blue Creek Mine No. 1 via overland conveyor. A portion of the saleable coal would also be shipped from a barge loadout facility on the Black Warrior River located approximately ten miles southeast of the Blue Creek Mine No. 1 preparation plant. A conveyor beltline will be used to transport coal from the mine's surface facilities to the barge loadout.

2.5.8. Water Utilization

Mine No. 4 and Blue Creek Mine No. 1 will use freshwater basins to provide water to the mines for various safety and operational needs. Specifically, the water from the freshwater basin services the mines' needs for plant make-up water, dust suppression, firefighting and other various mining operations. Both mines require the freshwater basins to be supplemented on an as-needed basis by a pipeline to a nearby waterway. Mine No. 4 withdraws up to 210 million gallons per year and Blue Creek Mine No. 1 will withdraw up to 920 million gallons per year. These water-withdrawal facilities require permits from the USACE. Mine No. 4 (USACE #SAM-2012-00354-CMS) has a permitted pump station along the Black Warrior River. Blue Creek Mine No. 1 is in the process of acquiring a USACE permit for a pump station.

2.6 Alternatives Considered But Eliminated

The following section describes alternatives that were considered but eliminated from detailed analysis.

2.6.1. Alternative 3: Subsidence Impact Avoidance

An alternative was considered that would remove federal forties from the LBA tracts to avoid or minimize adverse effects to occupied residential dwellings overlying federal coal within the PDS potential subsidence footprint. To evaluate this alternative, federal forties with occupied residential dwellings located on the overlying surface acres were identified. This information was used to determine how many occupied residential dwellings could be avoided, if a federal forty was removed from the corresponding LBA tract.

Based on the results, two federal forties would be removed from the Mine No. 4 LBA tract containing three occupied residential dwellings, and 11 federal forties would be removed from the Blue Creek Mine No. 1 LBA tract containing 19 occupied residential dwellings. This alternative was being considered to avoid or minimize potential impacts to public health and safety and to eliminate possible subsidence damages to the identified occupied residential dwellings overlying the identified federal forties.

Table 2-3 compares the number of occupied residential dwellings within the PDS 30-degree AOD, a conservative estimate of the extent of the surface area that will be affected by subsidence, under each alternative.

Table 2-3. Alternatives comparison of occupied residential dwellings within the potential subsidence footprint.

Mine	Alternative	Occupied Residential Dwellings Overlying PDS Private Coal	Occupied Residential Dwellings Overlying PDS Federal Forties	Occupied Residential Dwellings Overlying Outlying Federal Forties
Blue Creek Mine No.1	NAA	65	0	0
Blue Creek Mine No. 1	PA	77	99	29
Mine No. 4	NAA	17	0	0
Mine No. 4	PA	25	3	12

2.6.1.A. Rationale

This alternative was considered to remove federal forties from the LBA tracts that have occupied residential dwellings located on the surface acres overlying the federal coal. ***Table 2-3*** presents the number of occupied residential dwellings located within the PDS AOD and the Outlying Federal Forties potential subsidence footprint. For Blue Creek Mine No. 1, 125 occupied residential dwellings are within the combined potential subsidence footprint; 19 of which are overlying the federal forties in the PDS, and 29 are overlying the Outlying Federal Forties. For Mine No. 4, 40 occupied residential dwellings are within the combined potential subsidence footprint; three of which are overlying the federal forties in the PDS, and 12 are overlying the Outlying Federal Forties.

As previously mentioned in Section 2.5.6 (Outlying Federal Forties), the PDS for the mines include current longwall panel configurations based on the available information and current understanding of geological conditions. It is important to recognize that mining plans may change during the leasing, permitting, and final approval stages, and modifications can occur even after approval. Any changes to the mining plans may necessitate additional environmental review and approval.

Subsidence related impacts, including fugitive methane, to occupied residential dwellings and wells are analyzed for both the PA and NAA in Section 4.3 (Geology and Minerals), Section 4.6.5

(Public Health and Safety), and Section 4.7 (Realty and Land Use). The direct and indirect effects to occupied residential dwellings are expected to be similar for both the PA and NAA. If adverse effects do occur, they are expected to be minimal and short-term because the mitigation procedures required in the ASMC-approved SCPs provide for the repair or compensation of any property damages. The additional well inventory requirements will minimize any potential for impacts caused by fugitive methane, and the additional methane monitoring requirements will alert the operator and ASMC to any potential for methane accumulation so that immediate action can be taken to protect public health and safety.

This alternative considered the removal of 13 federal forties from the combined LBA tracts for Blue Creek Mine No.1 and Mine No. 4, which would avoid the undermining of 22 occupied residential dwellings. Based on the required mitigation or remediation of any subsidence related impacts to occupied residential dwellings should they occur, Alternative 3 would be expected to have substantially similar effects to the PA and NAA, regardless of the overall number of occupied residential dwellings overlying the underground mining operation.

Extraction of Federal coal cannot proceed unless the ASLM approves a specific mining plan. If BLM decides to offer the LBAs, and additional information relevant to this determination is discovered during development of the R2P2 or the state permitting process, OSMRE could consider to the third alternative when preparing its recommendation to ASLM as to whether to approve, disapprove, or approve with conditions, the proposed mining plans.

The BLM has determined that Alternative 3 would result in substantially similar effects to those already analyzed in the existing alternatives. It is for these reasons, and the fact that the issue could get further consideration if there is new information when OSMRE prepares the mining plan decision document and recommendation for the ASLM, that Alternative 3 was eliminated from detailed analysis for this leasing EIS.

2.6.2. Alternative 4: Mine Specific Alternative

The BLM considered adding an additional alternative for each mine under a separate review; however, this option was ultimately dismissed after careful evaluation. The PA has been designed to comprehensively account for the potential impacts associated with each lease. Therefore, the inclusion of these additional alternatives would not contribute any new insights or information beyond what has already been thoroughly examined in the PA.

2.7 Summary of Effects

Because the PA would allow an expansion of both Mine No. 4 and Blue Creek Mine No. 1, the necessary surface facilities to support the PDS, such as portals for seam access, stockpile areas, mine support buildings, coal preparation plants, coal refuse facilities, etc., would be permitted with the existing mining operations. Surface areas to be added to the permits in the future will include additional fan shafts as mining progresses, and additional coarse refuse disposal area for Blue Creek Mine No. 1 only. The surface infrastructure for fan shafts for both mines will be constructed in accordance with the respective regulatory permits, and the number of fan shafts will not be

dependent on which alternative is selected. The additional coarse refuse disposal area necessary at Blue Creek Mine No. 1 would be larger under the PDS as compared to the NAA. ***Table 2-4*** and ***Table 2-5*** display a summary comparison of the alternatives in relation to each issue.

Table 2-4. Mine No. 4 alternatives comparison summary.

Resource	No Action Alternative	Proposed Action
Mine Life	14 years	21 years
Private Coal Tons	42,610,174	56,156,899
Federal Coal Tons	0	16,900,970
Total Tons	42,610,174	73,057,869
Average Annual Coal Tons	3,043,584	3,478,946
Employees	425	425
Potential Subsidence Footprint	9,434 acres	15,148 acres
Potential Subsidence Footprint (Outlying Federal Forties)	0 acres	5,050 acres
Occupied Residential Dwellings in Potential Subsidence Footprint	17	28
Commercial Building in Potential Subsidence Footprint	0	0
Critical Habitat Length in Potential Subsidence Footprint	9,834 linear feet	2,258 linear feet
Total Direct GHG Emissions (CO_2e 100yr)	8,281,518 Tons	10,788,981 Tons
Total Indirect GHG Emissions (CO_2e 100yr)	103,161,898 Tons	142,996,791 Tons
Additional Coarse Refuse Disposal Area	0	0
Additional Fan Shafts	5	5

Table 2-5. Blue Creek Mine No. 1 alternatives comparison summary.

Resource	No Action Alternative	Proposed Action
Mine Life	29 years	43 years
Private Coal Tons	81,592,509	117,916,571
Federal Coal Tons	0	36,278,476
Total Tons	81,592,509	154,195,047
Average Annual Coal Tons	2,813,535	3,585,931
Employees	500	500
Potential Subsidence Footprint	17,640 acres	29,641 acres
Potential Subsidence Footprint (Outlying Federal Forties)	0 acres	6, 203 acres
Occupied Residential Dwellings in Potential Subsidence Footprint	65	96
Commercial Building in Potential Subsidence Footprint	1	0
Critical Habitat Length in Potential Subsidence Footprint	0	0
Total Direct GHG Emissions (CO_2e 100yr)	18,452,816 Tons	23,237,759 Tons
Total Indirect GHG Emissions (CO_2e 100yr)	244,196,327 Tons	373,000,619 Tons
Additional Coarse Refuse Disposal Area	285 acres	618 acres
Additional Fan Shafts	12	12

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the existing environmental conditions of the areas to be affected by the Proposed Action (PA) and No Action Alternative (NAA) as described in Chapter 2. The chapter addresses reasonably foreseeable environmental trends and any planned actions in the areas. To comply with NEPA, the BLM is required to address specific elements of the environment addresses that are subject to requirements specified in statutes, regulations, Secretary Order(s), and Executive Order(s).

3.2 Air Resources and Climate

Air quality for any region is influenced by the amount of pollutants that are released within the vicinity of the source and up wind of the region which can be highly dependent upon the contaminants chemical and physical properties. Additionally, an area's topography or terrain (mountains and valleys) and weather, such as wind speed and direction, temperature, air pressure (the resulting turbulence), rainfall, and cloud cover can all have a direct influence on how pollutants accumulate, form, or disperse in the local environment. Pollutants generated when coal is transported—exhaust from internal combustion engines in trucks, locomotives, tow boats, and ocean-going vessels—is another important consideration because some pollutants (for example, ozone, secondary $PM_{2.5}$, mercury) can be spread in a way that does not entirely rely on natural air circulation. The affected area for the air quality analysis of the PA and NAA includes Tuscaloosa County, although most air-quality impacts will be limited to the vicinity of the mine itself.

3.2.1. Pollutants and Regulatory Framework

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

The EPA has established National Ambient Air Quality Standards (NAAQS) for criteria pollutants, which include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). Exposure to air pollutant concentrations greater than the NAAQS has been shown to have a detrimental impact on human health and the environment. Consequently, ambient air quality standards must not be violated in areas where the general public has access. All the criteria pollutants are directly emitted from a variety of source types, with the exceptions being ozone, and the secondary formation of condensable particulate matter ($PM_{2.5}$). Ozone is chemically formed in the atmosphere via interactions of oxides of nitrogen (NO_X) and volatile organic compounds (VOCs) in the presence of sunlight and under

certain meteorological conditions (NO_X and VOCs are ozone precursors). Secondary $PM_{2.5}$ forms when certain products of combustion (SO_2 and NO_X) cool sufficiently enough to condense and form a solid or aerosol that can then be measured by traditional monitoring methods. Condensable particulate matter is primarily ammonium sulfate and nitrate which is formed in the atmosphere through the reaction of gaseous emissions containing available ammonia (NH_3).

The CAA established two types of NAAQS:

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

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

The EPA reviews the NAAQS every five years to evaluate the latest science on health effects, risk assessment, and observable data such as hospital admissions and, if the data support it, revise NAAQS. The ADEM Air Pollution Control Program adopts the NAAQS as the state's ambient air quality regulations. ADEM, by means of an approved State Implementation Plan (SIP), can establish state ambient air quality standards for a criteria pollutant that is at least as stringent as, or more so, than the NAAQS. Ambient air quality standards must not be exceeded in areas where the public has access. ***Table 3-1*** lists the federal and state ambient air quality standards applicable to the project area.

Table 3-1. National ambient air quality standards.

Criteria Pollutant	Primary Standards		Secondary Standards		Form
	Level	Averaging Time	Level	Averaging Time	
CO	9 ppm	8 hours	None		Not to be exceeded more than once per year
	35 ppm	1 hour			
Pb	0.15 µg/m^3	Rolling 3-Month Average	Same as Primary		Not to be exceeded
NO_2	53 ppb	1 year	Same as Primary		Annual Mean
	100 ppb	1 hour	None		98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
PM_{10}	150 µg/m^3	24 hours	Same as Primary		Not to be exceeded more than once per year on average over 3 years
$PM_{2.5}$	9.0 µg/m^3	1 year	15.0 µg/m3	1 year	Annual mean, averaged over 3 years
	35 µg/m^3	24 hours	Same as Primary		Not to be exceeded more than once per year on average over 3 years
O_3	0.070 ppm	8 hours	Same as Primary		Annual fourth highest daily maximum 8-hour concentration, average over 3 years
SO_2	75 ppb	1 hour	0.5 ppm	3 hours	Not to be exceeded more than once per year

Source: National – 40 CFR 50, Alabama Admin. Code r. 335-3-1-.03.

Notes: µg/m^3 = micrograms per cubic meter, ppb = parts per billion, ppm = parts per million, $PM_{2.5}$ = particulate matter emissions that are less than of 2.5 microns in diameter; PM10 = particulate matter emissions that are less than 10 microns in diameter.

Sufficient available air monitoring data nearest to the site is in Birmingham, Alabama. While Birmingham air monitoring may be nearest to the mine sites (50 km away), the monitoring data may not be representative of the project area due to the significant difference in population densities and overall development. The background concentration data were derived by calculating the most recent three-year averages. ***Table 3-2*** compares the NAAQS for the criteria pollutants of concern (all in micrograms per cubic meter) to the derived background concentration data.

Table 3-2. NAAQS levels and background concentrations (EPA, 2024a).

Pollutant	CO 8hr	CO 1hr	NO_X Annual	NO_X 1hr	PM_{10} 24hr	$PM_{2.5}$ Annual	$PM_{2.5}$ 24hr	SO_2 1hr
Standard (ug/m^3)	40,000	10,000	100	189	150	9	35	196
Background (ug/m^3)	1.15	2.29	16.17	75.27	49	8.75	18.1	30.39
Background % of Standard	0.00%	0.02%	8.90%	22.75%	38.00%	88.00%	59.43%	6.17%
Near-field Compliance Levels (ug/m^3)	39,998	9,998	91	146	93	1	14	183

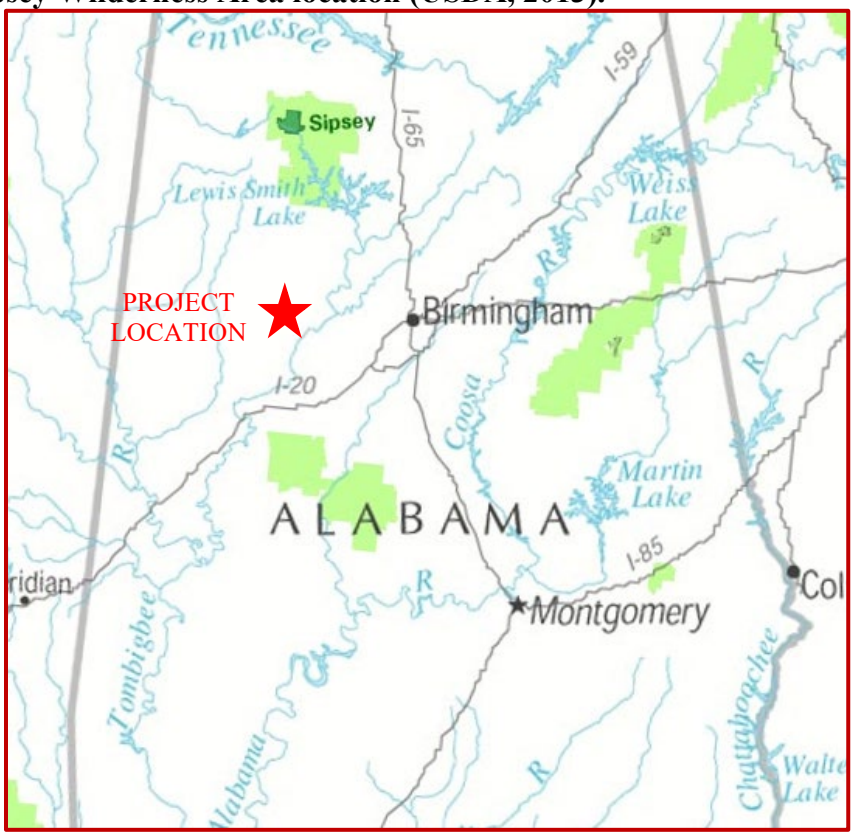
3.2.2. Visibility and Atmospheric Deposition

While there is no one definition of visibility that meets all the criteria of seeing landscape features, several visibility indices have evolved to address the issue. One is the light extinction coefficient; it describes the fraction of light lost or redirected through interactions with gases, suspended particles, and humidity in the atmosphere. Visual range is a measure of visibility that is inversely related to the extinction coefficient. Visual range can be defined as the maximum distance at which one can identify a large black object against the horizon sky. Another important visibility index is the deciviews (dv), a unitless metric which describes changes in uniform atmospheric extinction that can be perceived by a human observer. The deciview index is linear with respect to perceived visual changes over its entire range.

Visibility impairment is manifested in two principal ways: local visibility impairment (e.g., localized plumes) and regional haze. Sources of localized plumes, such as the plume from an industrial facility or a burning field, are often easy to identify. The second type of impairment, regional haze, generally results from pollutant emissions from a multitude of sources located across a broad geographic region. Regional haze is principally responsible for visual impairment in many rural areas across the country. Visual impairment due to regional haze varies by region of the country. For example, visibility levels on the haziest 20% of days in the western portion of the contiguous United States can be about equal to levels on the best 20% of days in the East. Regional differences in visual impairment are due to several factors, including background and current levels of $PM_{2.5}$, $PM_{2.5}$ composition, and the average relative humidity (EPA, 2005a).

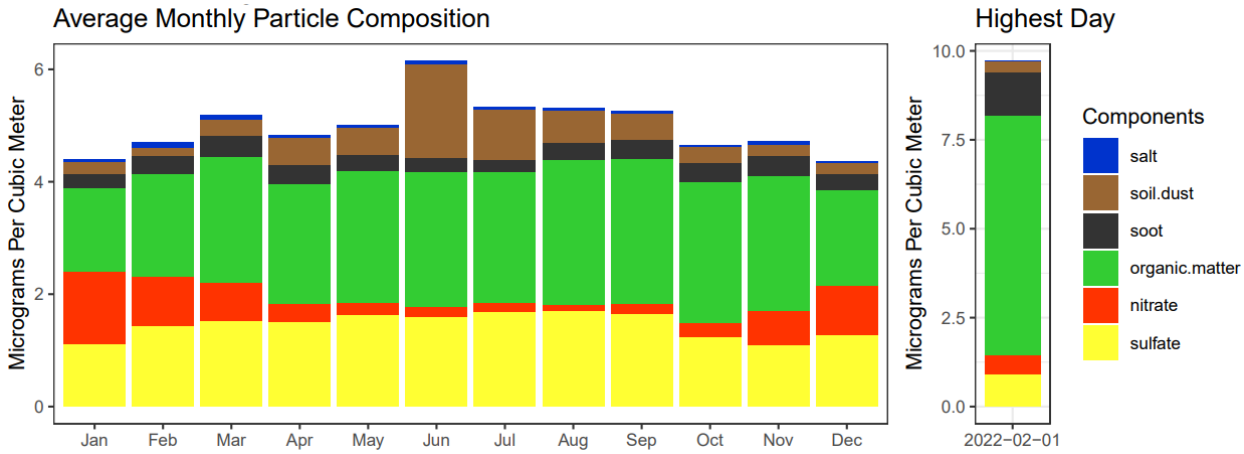
All geographical regions are assigned a priority Class (I, II, or III) which describes how much degradation to the existing air quality is allowed to occur within the area under the Prevention of Significant Deterioration (PSD) permitting rules. Class I areas are areas of special national or regional natural, scenic, recreational, or historic value, and essentially allow very little degradation in air quality, while Class II areas allow for reasonable industrial/economic expansion. There are currently no Class III areas defined in the U.S. The closest Class I area to the project is the Sipsey Wilderness Area, approximately 80 km north of the existing mine sites (***Figure 3-1***).

Figure 3-1. Sipsey Wilderness Area location (USDA, 2013).



The Interagency Monitoring of Protected Visual Environments (IMPROVE) is the EPA long-term air pollution measurement program designed to document and track visibility in protected areas. IMPROVE samples and analyzes the haze particles that impair visibility so their sources can be identified and addressed. ***Figure 3-2*** summarizes the chemical composition of particles collected in 2022 at the Sipsey Wilderness Area monitoring site. The monthly averaged compositions calculated from 2018-2022 data are shown on the left and the compositions for the day with the highest measured concentrations during 2022 are shown on the right (U.C. Davis, 2022).

Figure 3-2. Sipsey Wilderness Area 2022 air particles composition (U.C. Davis, 2022).



Components	Calculation	Natural Sources	Anthropogenic Sources
Salt	$1.8 \cdot Chloride$	Ocean spray, dry lakebeds	Chemical manufacturing, lake consumption
Soil Dust	$2.2 \cdot Al + 2.49 \cdot Si + 1.63 \cdot Ca + 2.42 \cdot Fe + 1.94 \cdot Ti$	Soil resuspension, dust storms long range transport	Construction, agriculture, deforestation, unpaved roads
Soot	*Elemental Carbon*	Wildfires	Motor vehicles, wood burning, smoking
Organic Matter	$1.4 \cdot Organic\ Carbon$	Plants, animals, wildfires	Motor vehicles, cooking oils, household cleaners
Nitrate	$1.29 \cdot Nitrate$	Plants, animals	Fertilizer, stock yards, chemical manufacturing
Sulfate	$4.125 \cdot Sulfur$	Volcanism	Coal-fired power plants, chemical manufacturing

Atmospheric deposition refers to processes in which air pollutants are removed from the atmosphere and deposited into terrestrial and aquatic ecosystems. Air pollutants can be deposited by precipitation (rain and snow) or the gravitational settling of gaseous pollutants on soil, water, and vegetation. Much of the concern about deposition is due to secondary formation of acids and other compounds from emitted nitrogen and sulfur species, such as oxides of nitrogen (NO_X) and SO_2, which can contribute to acidification of lakes, streams, and soils and affect other ecosystem characteristics, including nutrient cycling and biological diversity.

Substances deposited include the following substances:

- Acids, such as sulfuric (H_2SO_4) and nitric (HNO_3), sometimes referred to as acid rain.
- Air toxics, such as pesticides, herbicides, and VOC.
- Heavy metals, such as mercury.
- Nutrients, such as nitrates (NO_3) and ammonium (NH_4).

The accurate measurement of atmospheric deposition is complicated by contributions to deposition by several components including but not limited to rain, snow, cloud water, particle settling, and gaseous pollutants. Deposition varies with precipitation and other meteorological variables (for

example, temperature, humidity, winds, and atmospheric stability), which in turn, vary with elevation and time.

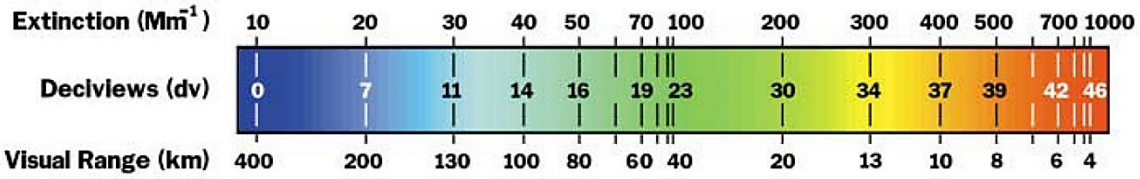
The Data Analysis Thresholds (DAT) defines the additional amount of nitrogen or sulfur deposition within a federal land management area, below which estimated impacts from a proposed new or modified source are considered negligible. In other words, if the predicted nitrogen or sulfur deposition impact from a new or modified source fall below the respective DAT, the impact will be deemed negligible, and no further analysis for that pollutant is necessary. DATs are based on "naturally occurring deposition" that park and wilderness ecosystems may have experienced prior to influences and are scaled to enable assessment of the impacts of individual source of air pollution. The DAT for deposition is 0.005 kg/ha/yr for both nitrogen and sulfur each. The DATs for visibility are 0.5 deciviews (dv), which corresponds to a 5% change in light extinction (0.05 Mm^{-1}) and is said to contribution to a perceptible change in visual quality, and 1.0 dv which is said to cause perceptible visibility impairment (10% change in light extinction). Current background conditions for the Sipsey Wilderness Area are shown below in ***Table 3-3*** (FLAG, 2010). The large and small fraction relative humidity values ($f_L(RH)$, $f_S(RH)$) are the worst case or highest values for any month in the FLAG data, as these would contribute most to the change in background conditions, and the rest of the factors are from the 20% best natural conditions tables in the FLAG report. The relationship between extinction, deciviews, and visual range is given in ***Figure 3-3***.

Table 3-3. Sipsey Wilderness Area MERPs tool backgrounds (FLAG, 2010).

$(NH_4)2SO_4$	NH_4NO_3	Soil	CM	Rayleigh	$f_L(RH)$	$f_S(RH)$
0.23	0.1	0.5	3	11	2.94	4.13

Note: All units are ug/m^3, except Rayleigh (Mm^{-1}), and the relative humidity values (%).

Figure 3-3. Comparison of extinction (Mm-1), deciview (dv), and visual range (km) (Malm, 1999).



3.2.2.A. Hazardous Air Pollutants

The EPA has identified about 188 chemicals and compounds as hazardous air pollutants (HAPs). HAPs are pollutants that pose significant risks to human health and the environment when released into the air. These pollutants can cause a range of health problems, from respiratory and neurological effects to cancer, depending on the level and duration of exposure. Short-term concentrations of HAPs refer to brief, high-level exposures typically over hours or days. To assess the health impacts of such exposures, reference exposure levels (RELs) are used to represent concentration thresholds below which short-term exposure is not expected to cause harmful health effects, even for sensitive populations. If short-term HAP concentrations exceed RELs, acute health effects can occur. Long-term exposures involve lower levels of HAPs over longer durations, such as months to years. To evaluate risks of chronic exposure, the EPA uses reference concentrations (RfCs). RfCs represent the concentration of a pollutant that, over a long-term exposure period, is unlikely to cause harmful health effects. Chronic exposure to HAPs above the RfC levels can lead to serious health issues, including chronic respiratory diseases, developmental disorders, reproductive harm, and an increased risk of cancer (EPA, 2019).

There are no ambient air quality standards for HAPs, instead these compounds are controlled via national emissions standards for hazardous air pollutants (NESHAPs). The NESHAPS are defined for specific industrial source categories and processes that emit high levels of HAPs, such that specifying control parameters or standards for these sources offers significant protection to the public. Currently, EPA has not defined any NESHAPs for coal mining.

3.2.3. Climate

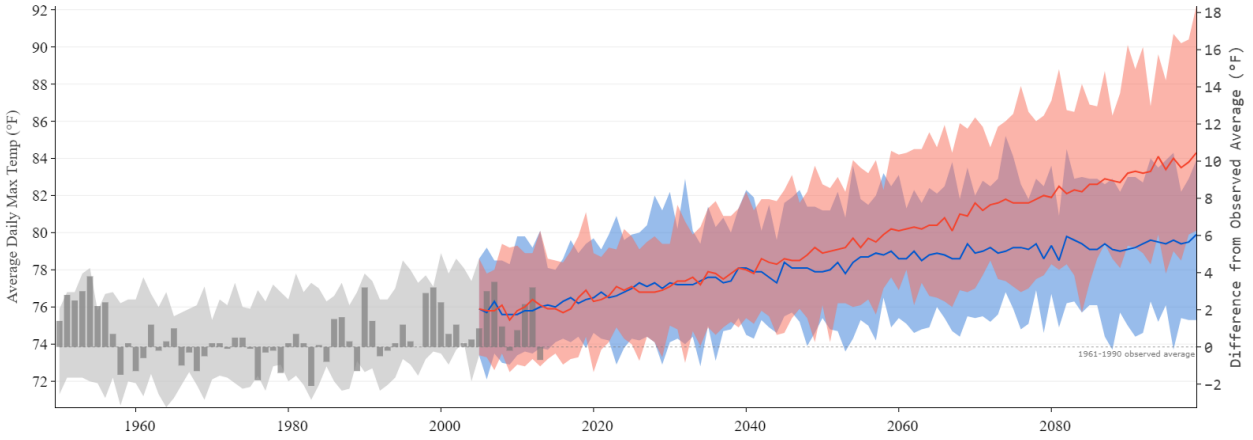
Alabama is situated at subtropical latitudes between the Gulf of America and the southern edge of the vast, flat plains of central North America, stretching from the Arctic Circle to the Gulf. As a result, the state is influenced by a variety of air masses, including warm, moist air from the Gulf and dry continental air, which is cold in winter and warm in summer. The clockwise circulation of air around the semi-permanent high-pressure system in the North Atlantic, known as the Bermuda High, creates a consistent southerly flow of air from the Gulf during the warmer months. This gives Alabama a climate characterized by mild winters, hot summers, and year-round precipitation. The Gulf of America also serves as a key source of moisture and helps moderate coastal temperatures. Alabama's mild climate plays a crucial role in supporting both agricultural production and tourism, important drivers of the state's economy (Runkle and Kunkel, 2022). The project vicinity (Tuscaloosa) as well as the Sipsey Wilderness Area experience primarily north and south wind directions. The city of Tuscaloosa experiences an annual average wind speed of 5.3 miles per hour (mph) and the Sipsey Wilderness Area (Haleyville station) records an annual average wind speed of 5.1 mph (ISU, 2024).

Alabama temperatures have not risen since the beginning of the 20th century, making it one of the few regions globally not to experience significant warming. Temperatures in Alabama were highest during the 1920s and 1930s, followed by a significant cooling of nearly 2°F in the 1960s and 1970s. However, recent years have been notably warm, with the warmest consecutive 5-year period occurring from 2016 to 2020. Under a higher emissions pathway, greater warming in the state is projected to occur during this century. The contiguous United States collectively has

warmed by about 1.8°F since 1900, although it also cooled from the 1930s through the 1960s, but not by nearly as much as the state of Alabama (Runkle and Kunkel, 2022).

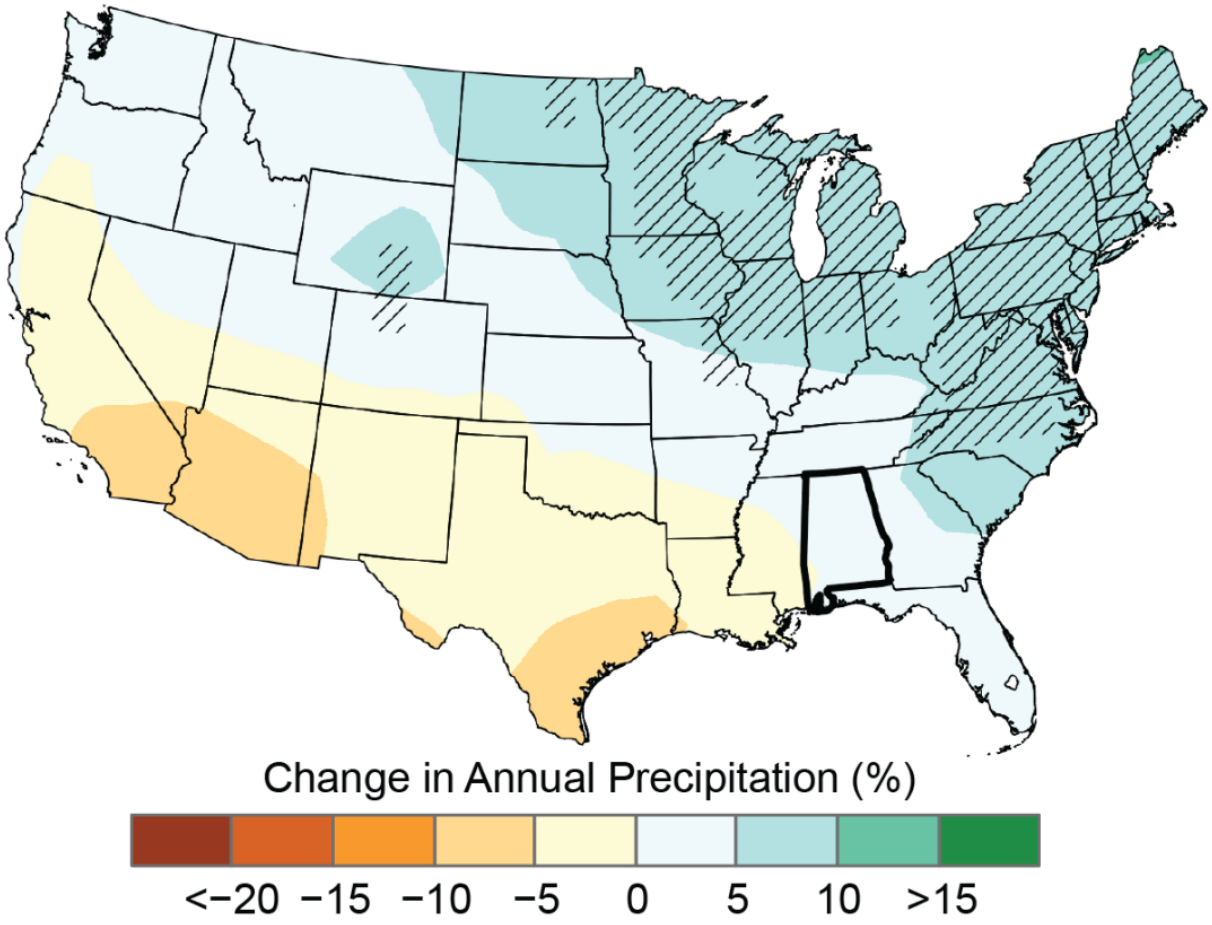
Figure 3-4 displays anticipated changes in temperature for Tuscaloosa County that would result from various global emissions scenarios. The graph shows that the average daily maximum temperatures are likely to trend 6 to 10°F above the historical observed average (1960 to 2005) towards the end of the century (BLM, 2024). Similarly, the data predicts a slight drop in average precipitation days, but does not show the volume of the precipitation, which based on recent events appears to be more frequently extreme when rainfall events do occur.

Figure 3-4. Tuscaloosa County projected average daily maximum temperatures (BLM, 2024b).



Annual precipitation in Alabama varies significantly from year to year. The statewide average is 55.4 inches, with rainfall fairly evenly distributed throughout the year, except for a drier period from August to October. While there has been no long-term trend in precipitation from 1895 to 2020, the 2015–2020 period saw above-average rainfall. Notably, the second-driest year on record (2007) and the second-driest consecutive 3-year period (2006–2008) were followed by the third-wettest year (2009). The driest multi-year periods occurred in the late 1890s and early 1950s, while the wettest were in the late 1940s and late 1970s. The driest 5-year span was from 1895 to 1899, with an average of 48.3 inches per year, and the wettest was from 1971 to 1975, averaging 63.7 inches annually. The combination of variable summer precipitation and soils with poor water retention often leads to short-term droughts. Since 1995, the frequency of extreme precipitation events of 3 inches or more has been near or above average, though no significant long-term trend has been observed. Future shifts in total annual precipitation are uncertain in Alabama. ***Figure 3-5*** displays the projected changes in total annual precipitation for the middle of the 21st century compared to the late 20th century under a higher emissions pathway. However, it is likely that any rise in temperature will accelerate the rate of soil moisture loss during dry periods, potentially increasing the intensity of naturally occurring droughts (Runkle and Kunkel, 2022).

Figure 3-5. Projected change in annual precipitation (Runkle and Kunkel, 2022).



Note: Hatching represents areas where most climate models indicate a statistically significant change. The southeastern United States, including Alabama, is in a transition zone between projected high-latitude increases and subtropical decreases in precipitation, and as such, future precipitation changes are uncertain. Sources: Cooperative Institute for Satellite Earth System Studies (CISESS) and National Environmental Modeling and Analysis Center (NEMAC). Data: Coupled Model Intercomparison Project Phase 5 (CMIP5).

3.2.4. Greenhouse Gases

Greenhouse gases (GHG) are gases in the atmosphere that absorb infrared electromagnetic radiation, contributing to the greenhouse effect. Increasing the concentrations of GHGs in the atmosphere amplifies the greenhouse effect, commonly referred to as global warming, which can drive changes in temperature, precipitation, and other climate variables, (BLM, 2024b).

GHGs including carbon dioxide (CO2), and water vapor are emitted into the atmosphere through natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The primary GHGs that enter the atmosphere due to anthropogenic activities include CO2, methane (CH4), nitrous oxide (N2O), and fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6), with CO2 being the most abundant anthropogenic GHG emitted (BLM, 2024b).

The impacts from GHGs on global warming vary depending on how long the compounds lasts in the atmosphere and its ability to absorb infrared radiation. To measure and compare climate impacts between various GHGs, a factor was developed for each GHG to account for these effects; this factor is known as the Global Warming Potential (GWP). Emissions of GHGs are converted into an equivalent amount of CO_2 (CO_2e) by multiplying the GHG by its GWP. The larger the GWP, the more radiative adsorption of the GHG relative to an equal amount of CO_2 (BLM, 2024b). In this EIS, BLM uses the 100-year GWP time horizon in its GHG emission calculations. The GWP and GHG used in this report are provided in ***Table 3-4***.

Table 3-4. GHG Pollutant vs. CO2 (BLM, 2024)

GHG	CO_2 Equivalent Emissions
CO_2	1
CH_4	29.8
N_2O	273

For the purposes of this analysis, the BLM has evaluated the potential climate change impacts of the proposed action by estimating and analyzing the projected potential GHG emissions from development of the coal tracts.

Further discussion of climate change science and predicted impacts, as well as the reasonably foreseeable and cumulative GHG emissions associated with BLM's fossil fuel actions and methodologies, are included in the 2023 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends (2023 BLM Specialists GHG Report) (BLM, 2024). This report presents the estimated emissions of greenhouse gases attributable to development and consumption of fossil fuels produced on lands and mineral estate managed by the BLM. The Annual GHG Report is incorporated by reference as an integral part of this analysis and is available at https://www.blm.gov/content/ghg/.

3.2.5. Reasonably Foreseeable Actions

There are no other known or reasonably foreseeable actions that would occur in the analysis area at this time.

3.3 Geology and Minerals

Alabama can be divided into four major physiographic regions: Coastal Plain, Piedmont, Valley and Ridge, and Appalachian Plateau (Highland Rim and Cumberland Plateau) (BLM, 2008). The geology of central and northern Alabama is complex, a result of tectonic impacts related to the creation of the Appalachian Mountains. Tuscaloosa County essentially straddles the Coastal Plain and the Cumberland Plateau, resulting in a diverse geography that is forested and hilly in the northeast and low-lying and occasionally swampy in the southwest areas of the county (Siebenthaler, 2007).

The BLM administers 313,819 acres of federal coal ownership in Alabama that underlie lands with various surface owners. Surface owners include the BLM, the Department of Defense, FWS, National Park Service, other federal agencies, and non-federal entities (BLM, 2008). Based on statistics provided by the National Mining Association, Alabama ranked seventeenth in the production of coal for 2022, producing approximately 10,408,000 short tons of coal (NMA 2023).

There are three major coal fields in Alabama: the Coosa Coal Field, Cahaba Coal Field, and Warrior Coal Field. Farthest to the southeast, the Coosa Coal Field covers approximately 134,400 acres in Jefferson, Shelby, and St. Clair Counties in an elongated syncline along the trend of the Appalachian Mountains. Southwest of the Coosa Field and separated by the Cahaba Valley, the Cahaba Field includes approximately 230,400 acres of Bibb, Shelby, St. Clair, and Jefferson Counties. The largest of the three coal fields in Alabama, the Warrior Coal Field, includes approximately 2,324,470 acres in Walker, Fayette, Jefferson, and Tuscaloosa Counties (BLM, 2008).

Within the Warrior Coal Field, the BLM retains 70,610 acres of coal mineral rights, 45,950 acres of which have been identified as having a high potential for development in the PDS. In the Alabama and Mississippi Proposed Resource Management Plan and Final Environmental Impact Statement, BLM anticipated that 9,000 acres of new federal coal leases and 18.8 million tons of federal coal would be produced (an average of 1.9 million tons per year) as part of existing underground mines with no new surface disturbance. This field includes two regions, the Plateau coal region and the Warrior Coal Basin. The Warrior Coal Basin is the most productive and covers 2,240,000 acres in Tuscaloosa, Jefferson, Lamar, Marion, Winston, Fayette, Cullman, Blount, and Walker Counties. There is no BLM administered surface in the Warrior Coal Basin. The thickest and most economically valuable coals within the Warrior Coal Basin are in Tuscaloosa, Walker, Fayette, and Jefferson Counties (BLM, 2008).

The LBA tracts are situated in the Warrior Basin of The Cumberland Plateau Section of the Appalachian Plateau Physiographic Province. The mine extracts the Mary Lee and Blue Creek coal seams of the Mary Lee Coal Group, which are a part of the Pennsylvanian-age Pottsville Group. The Mary Lee and Blue Creek coal seams lie entirely below drainage within the Blue Creek Mine No. 1 and Mine No. 4 mine boundaries. Depths of cover range from about 800 to 1,625 feet at Blue Creek Mine No. 1 and about 1,440 feet to 2,100 feet at Mine No. 4. Strata above the Mary Lee and Blue Creek coal seams are mostly thick layers of shales and sandstones interspersed with alternating sequences of siltstones, shales, claystones, and coals. ***Figure 3-6*** shows the stratigraphic position of the Mary Lee Coal Zone in relation to the Pottsville Section, and ***Figure 3-7*** provides a more detailed representation of the geologic strata that will be encountered during mining operations.

Figure 3-6. Generalized stratigraphic section of the Pottsville Formation in the Warrior Coal Basin showing stratigraphic position of the Mary Lee Coal Zone (Pashin, 2005).

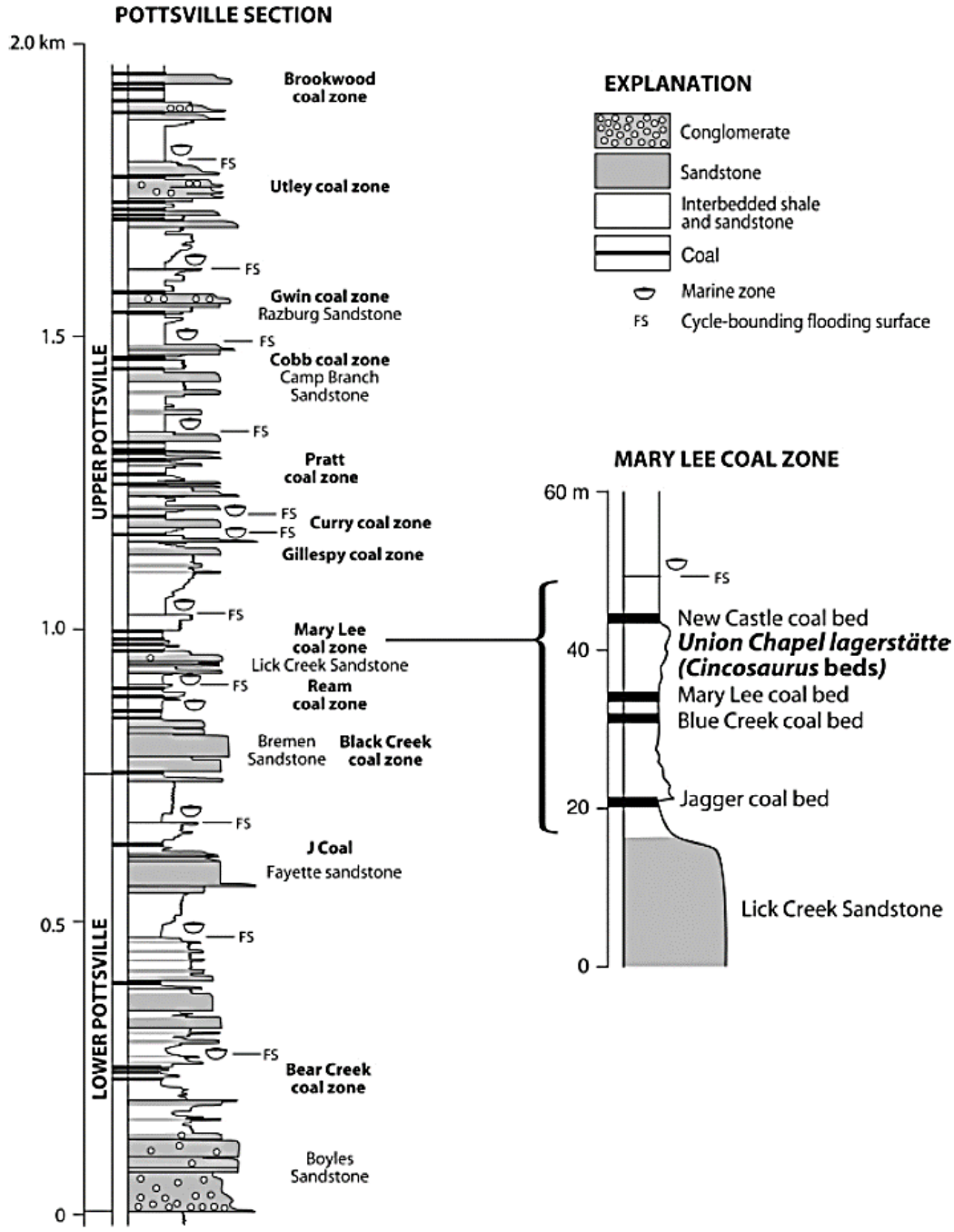
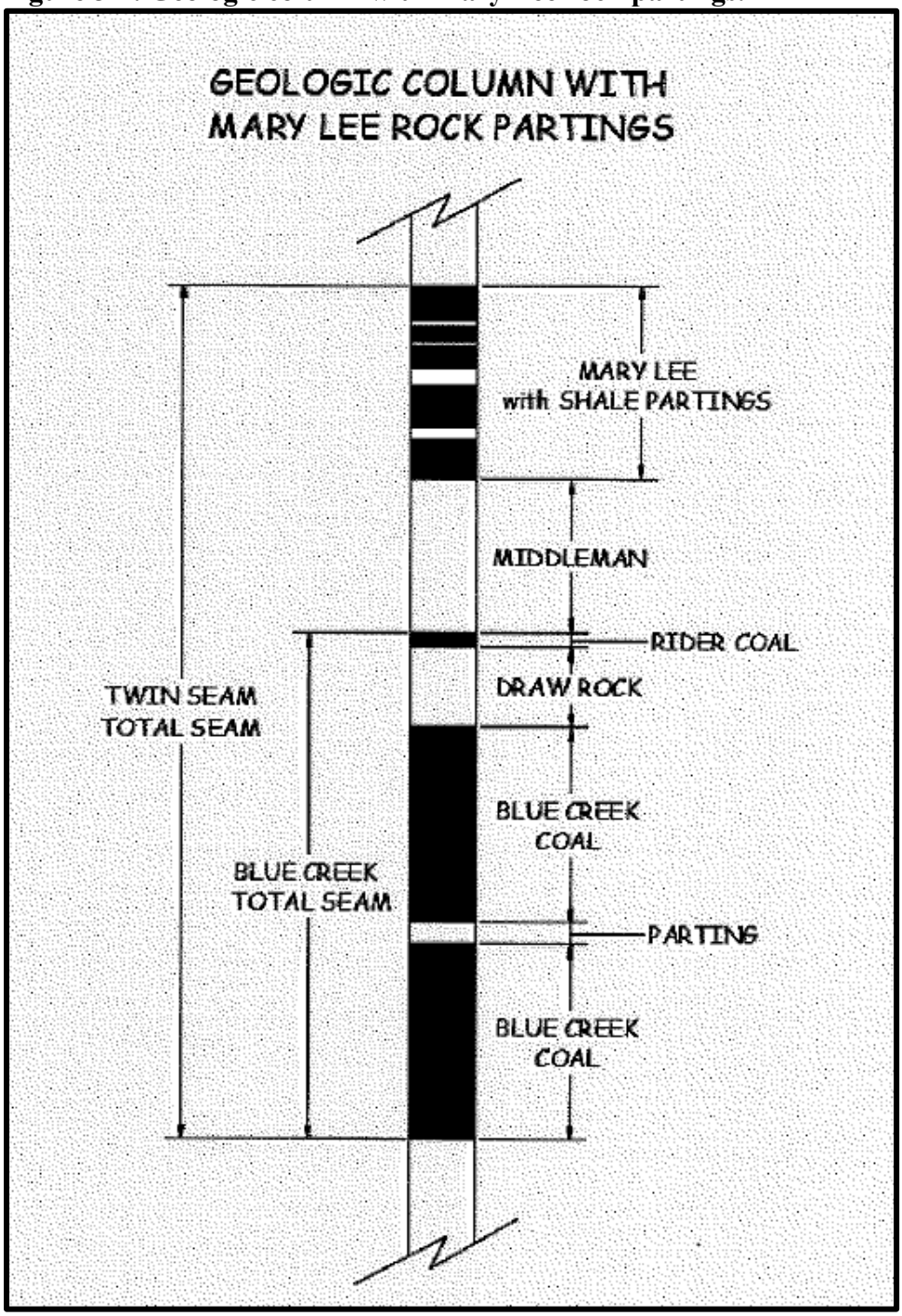


Figure 3-7. Geologic column with Mary Lee rock partings.



Faulting is common across the Black Warrior Coal Basin. These fractures in the earth are typically high-angle, scissor-type normal faults and fault grabens oriented in a southeast to northwest alignment. Vertical displacement generally ranges from only a few feet to as much as 350 feet. Multiple published and in-house studies have been compiled and examined to be compared with the base-of-seam structure data for the Blue Creek seam. One zone of inferred low-angle faulting, nearly perpendicular to the regional fault orientation, has been identified on the property. The estimated dip of the low-angle fault zone is 30 to 35 degrees with a northeast to southwest orientation.

3.3.1. Mine No. 4 Exploration

The geology of the general area of both mining operations has been extensively explored as early as 1916 and as recently as 2023 by numerous entities. Most of this exploration was completed before Warrior Met acquired the coal leases and mining permits. Site geology has been revealed through conventional core hole exploration and air rotary drilling with geophysical logging for CBM wells. Vertical drilling has been the sole method of collecting exploration information since the seam does not outcrop within or near the proposed mine areas. Warrior Met's predecessor mine permittee used geophysical information from CBM wells—information provided by the Geological Survey of Alabama Oil and Gas Board—to determine seam thickness and depth below the land surface. There are 50 CBM wells located in the Mine No. 4 LBA tract as shown in ***Figure 3-8.***

As of 2022, Mine No. 4 totaled 375 drill holes that were used for mapping purposes. Drill hole depths ranged from 1,148 feet to 2,469 feet, averaging 1,888 feet. Drill hole depths to the top of the Mary Lee seam ranged from 1,140 feet to 1,900 feet, averaging 1,590 feet (MM&A, 2023).

The lithologic composition of the roof strata varies throughout the exploration area, consisting primarily of a coarsening-upward sequence of shale or sandy shale, with occasional sandstone channels located within the immediate or main roof of the Mary Lee seam. The Mary Lee seam averages about 1.3-feet thick throughout the mining plan area. The Blue Creek seam, which represents the better metallurgical quality of the two seams, averages about 3.5-feet thick in the mining plan area. The combined thickness of both seams range from about 5 feet to 10 feet, averaging about 6 feet across the mining plan area. Areas where the combined seam thickness is less than the minimum longwall cutting height (5 feet) are rare. When this does occur, portions of the mine roof, floor, or both are expected to be excavated along with the coal (MM&A, 2023).

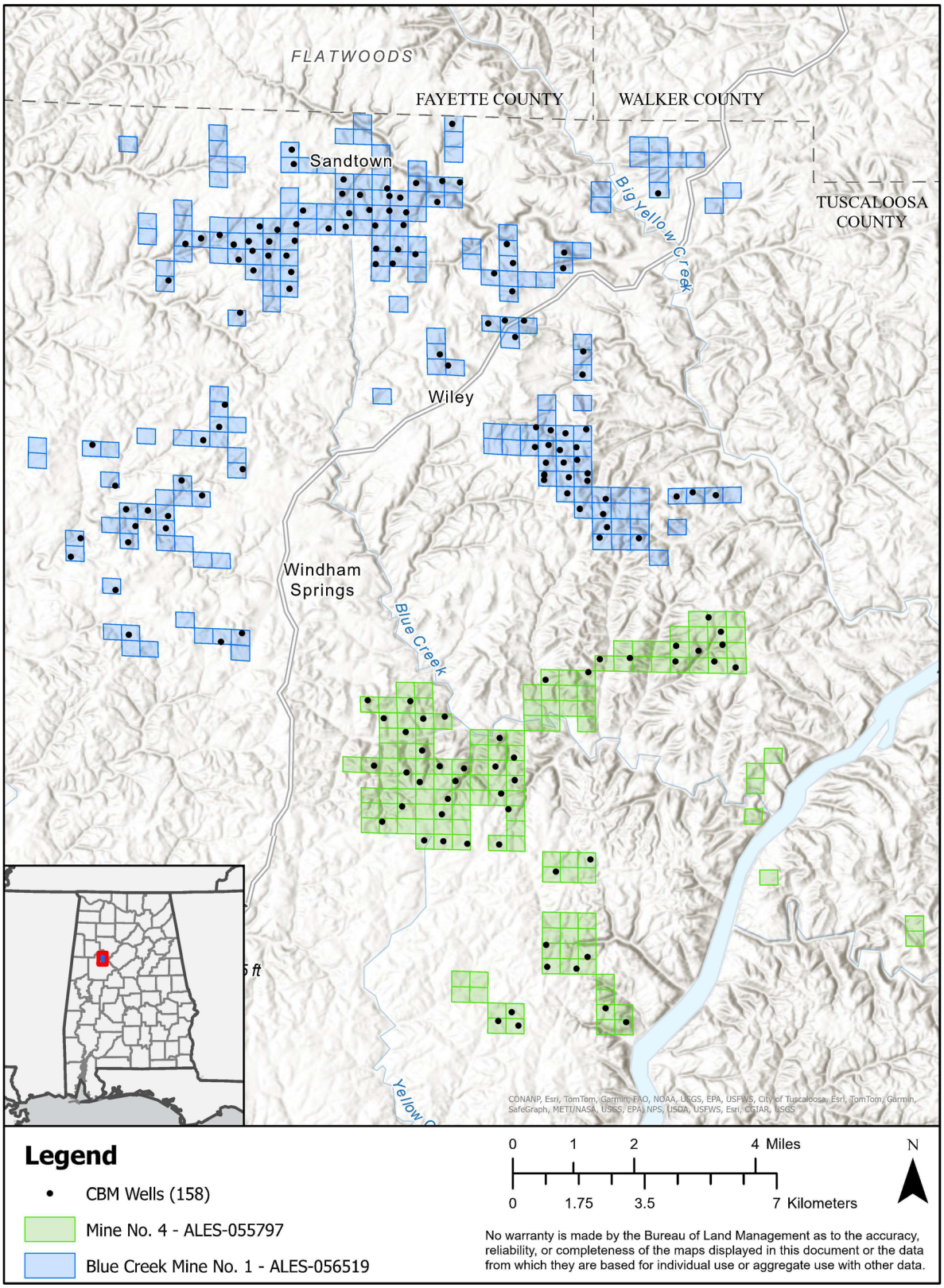
3.3.2. Blue Creek Mine No. 1 Exploration

As of 2023, Blue Creek Mine No. 1 totaled 1,265 drill holes that were used for mapping purposes. Drill hole depths ranged from 835 feet to 2,275 feet, averaging 1,525 feet. Drill hole depths to the top of the Mary Lee seam ranged from 810 feet to 1,615 feet, for an average of 1,255 feet (MM&A, 2024).

The lithologic composition of the roof strata varies throughout the exploration area, consisting primarily of a coarsening-upward sequence of shale or sandy shale, with occasional sandstone channels located within the immediate or main roof of the Mary Lee seam. The Mary Lee seam typically averages 1.75-feet thick on the eastern side of the mining plan area, and 1.25-feet thick on the west side of the mining plan area. The Blue Creek seam, which represents the better metallurgical quality of the two seams, typically averages 4.35-feet thick on the eastern side of the mining plan area and about 2.65-feet thick to the west. The combined thickness of both seams average about 7 feet within the eastern side of the mining plan area and about 5 feet in the western side. Areas where the combined seam thickness is less than the minimum longwall cutting height (5 feet) are rare. When this does occur, portions of the mine roof, floor, or both are expected to be excavated along with the coal (MM&A, 2023).

There are 108 CBM wells located in the Blue Creek Mine No. 1 LBA tract as shown in ***Figure 3-8.***

Figure 3-8. CBM wells.



3.3.3. Reasonably Foreseeable Actions

CBM wells will continue to operate in the area for the reasonably foreseeable future. Mining advancement into areas with active CBM is not a conflicting scenario, as CBM wells in pre-mining areas help degasify the mine, as further discussed in Section 4.3.2.

3.4 Water Resources

3.4.1. Surface Water

Tuscaloosa County is generally comprised of high-quality surface water; however, some streams in the Upper Black Warrior River Basin in Tuscaloosa County are listed on the ADEM 2024 §303(d) list (ADEM, 2024). ADEM reports listed waterbodies—waters that are impaired or threatened—to the EPA. Listed waters include North River (Lake Tuscaloosa), Binion Creek (Lake Tuscaloosa), Daniel Creek, Mill Creek and Carthage Branch. ***Table 3-5*** gives the waters' uses, causes of impairment, and impairment sources. The listings are mostly due to high metal concentrations and pathogens.

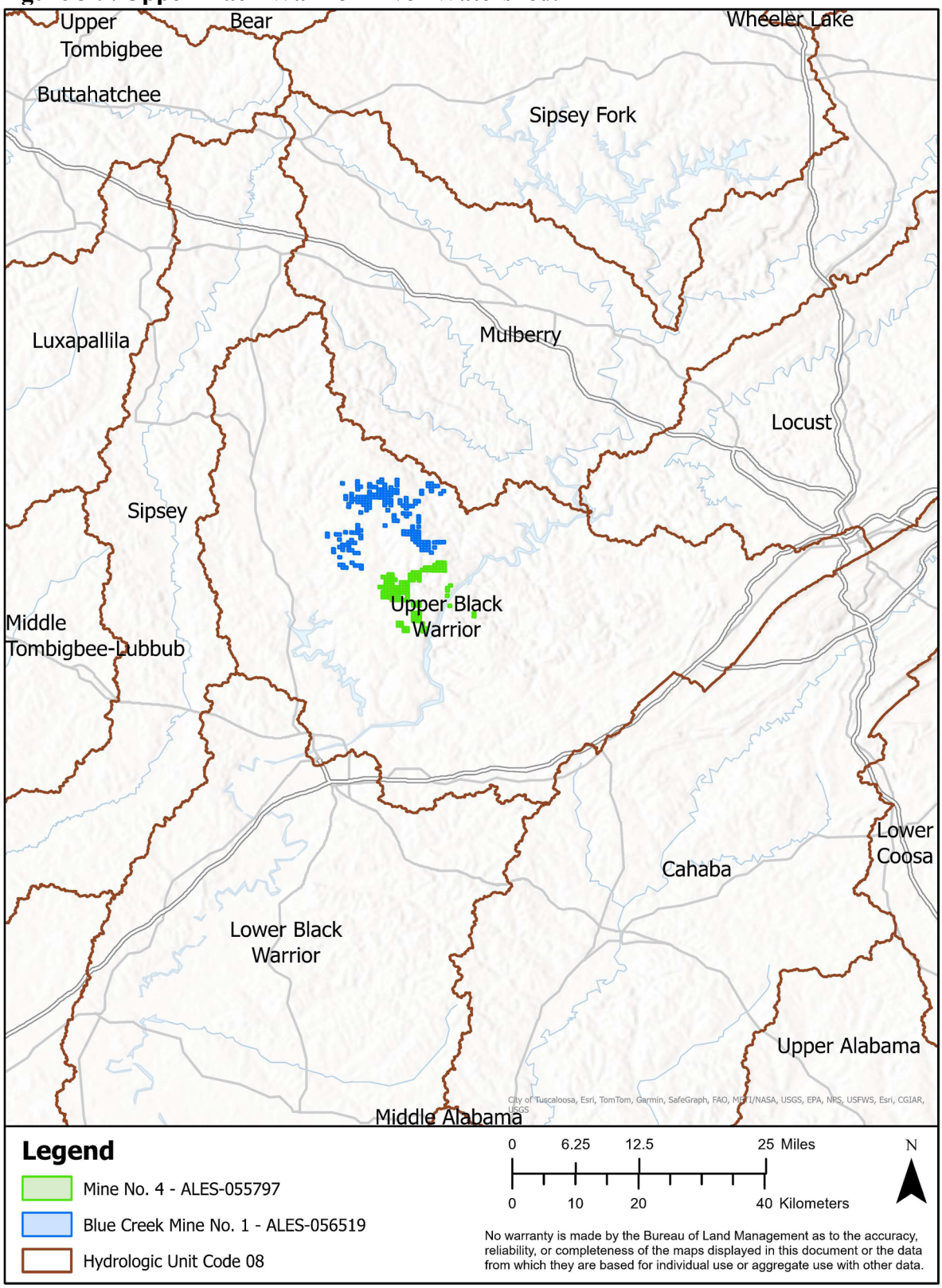
Table 3-5. 2024 Tuscaloosa County Upper Black Warrior River Basin §303(d) list (ADEM, 2024).

Waterbody	Uses	Causes	Sources
Daniel Creek	Fish and Wildlife	Pathogens (E. coli)	Agriculture
		Siltation	Surface mining-abandonment
		Total Dissolved Solids	Surface mining-abandonment
Binion Creek (Lake Tuscaloosa)	Fish and Wildlife	Metals (Mercury)	Atmospheric deposition
		Pathogens (E. coli)	Agriculture, Onsite wastewater systems
North River (Lake Tuscaloosa)	Fish and Wildlife, Public Water Supply Swimming	Metals (Mercury)	Atmospheric deposition
Mill Creek	Fish and Wildlife	Pathogens (E. coli)	Collection system failure, Pasture grazing
Carthage Branch	Fish and Wildlife	Pathogens (E. coli)	Pasture grazing

Mine No. 4 and Blue Creek Mine No. 1 both have an existing ADEM National Pollution Discharge Elimination System (NPDES) permit that includes water quality discharge limitations, conditions, and requirements. Compliance with NPDES permits ensures that mine-water discharge will not degrade the quality of local surface-water resources.

The Mine No. 4 LBA tract and Blue Creek Mine No. 1 LBA tract are situated in the Upper Black Warrior River Watershed, as shown in ***Figure 3-9***, which consists of 1,255.25 square miles and drains twelve sub-watersheds located within Tuscaloosa, Fayette, Jefferson, and Walker Counties. Land uses within the Black Warrior River Basin are estimated to be 74.6% forestland, 16.8% agriculture, 3.4% wetland, 2.1% urban and misc. uses, 1.5% water, 1.4% open/barren, and 0.3% quarry/mining (ADEM, 2003).

Figure 3-9. Upper Black Warrior River Watershed.



3.4.1.A. Mine No. 4

The vicinity of Mine No. 4 is characterized as rugged upland with more than 200 feet of relief adjacent to major streams. The surface facilities east of the Black Warrior River are dissected by streams that flow to the west and eventually to the Black Warrior River. Two major drainage basins—Davis Creek and its tributaries and Pegues Creek and its tributaries—are east of the Black Warrior River. The surface facilities west of the Black Warrior River are dissected by Blue Creek and its tributaries which flow to the east and eventually to the Black Warrior River.

The Mine No. 4 ASMC permit area is in the Black Warrior River Basin and is drained by Bluff Creek, Horn Creek, Black Branch, unnamed tributary to Davis Creek, unnamed tributary to Daniel Creek, unnamed tributary to Pegues Creek, Oswalt Creek, Beaver Pond Creek, Davis Creek and the Black Warrior River. The basin contains larger streams that maintain flow in the dry season, but many headwater tributaries are dry during the summer months due to low recharge from groundwater aquifers. The upper Black Warrior River and its major tributaries--Locust Fork, Mulberry Fork, Sipsey Fork, and North River—comprise the dominant drainage features in the district. Streams have steep-sided valleys, many of which are gorge-like (GSA, 2018). Most streams in the area are higher gradient streams characterized by riffle-run geomorphology. The LBA tract is entirely in the Upper Black Warrior Watershed, hydrologic unit code (HUC) 03160112 and in sub-watersheds 0202, 0301, 0303, 0306 and 0501.

Surface runoff from the Mine No. 4 LBA tract ultimately drains into the Black Warrior River. The LBA tract is west of the Black Warrior River, except for 80 acres of federally owned coal east of the river. Moore Creek, Bear Creek, Jock Creek, Little Bear Creek, Lick Creek, Blue Creek, Panther, Branch, Allgood Branch, Whiteoak Creek, Davis Creek, and unnamed tributaries to these streams flow through the LBA tract. Many open water bodies are present within the LBA tract.

Mine No. 4 has existing ASMC and NPDES permits that require surface water monitoring of sediment basin outfalls and receiving streams. Surface water draining from areas of the mine site that are being disturbed by mining activity is routed through one of twenty-three existing sediment-control structures prior to discharging into state waters. All drainage from surface facilities passes through sediment-control structures where water may be treated before discharging into receiving streams. These sediment basins are regularly monitored in accordance with the NPDES permit. That permit sets limits on the maximum and average pollutant concentrations for water discharged from sediment basins both during the active mining operation and for a time post mining. Existing sediment basin locations are shown in the NPDES Monitoring Map ***(Appendix F***). Mine No. 4 must comply with the hydrologic monitoring plan in the current ASMC-approved mine permit.

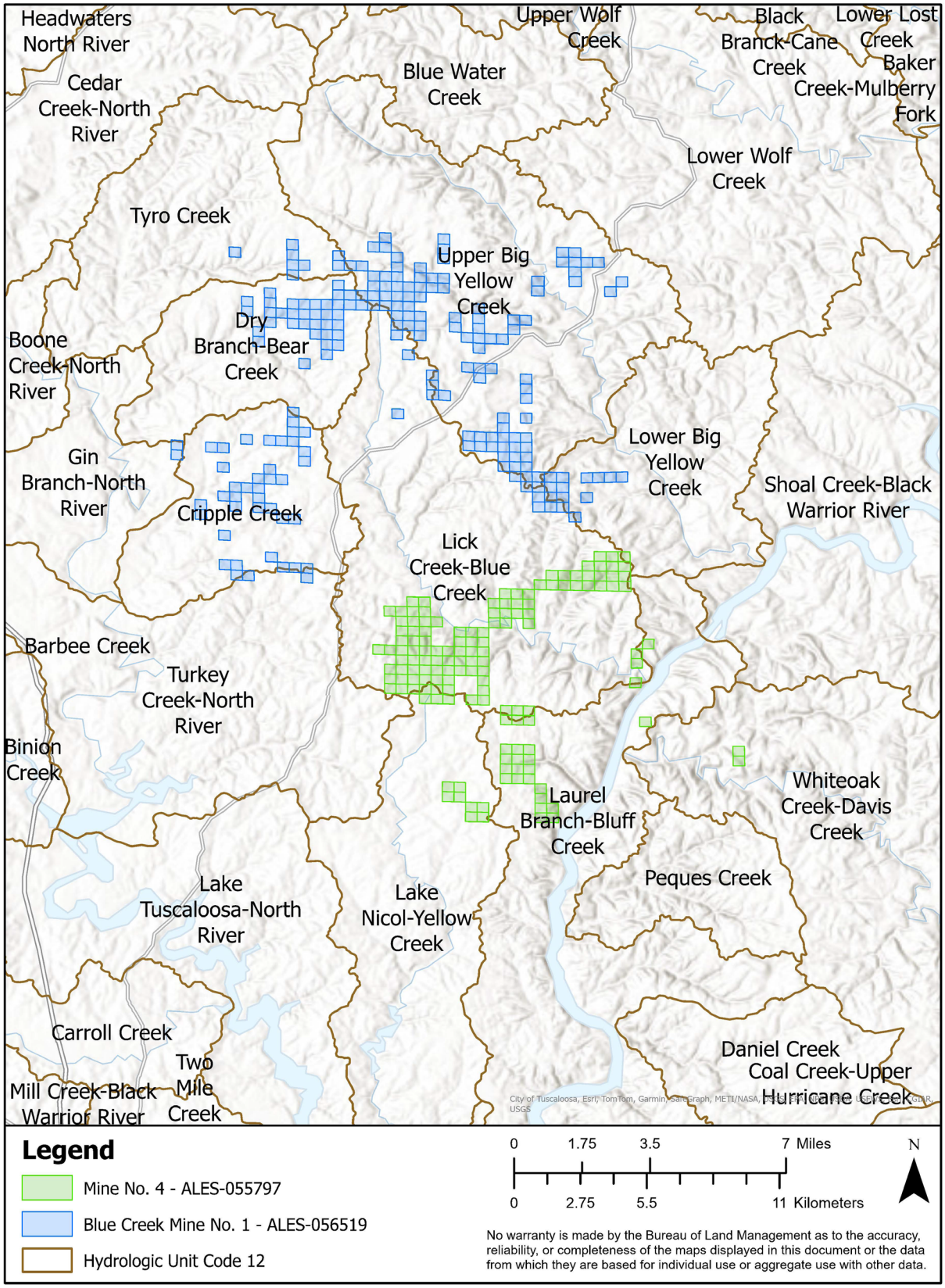
No exceedances in water quality standards for the NPDES permit were recorded during this sampling timeframe (1985-present), except for one sample from a sediment basin that recorded a level of total suspended solids (TSS) that exceeded the permit limit. The August 2023 sample reflected a TSS reading of 36.5 mg/L (monthly average) compared to the permit limit of 35 mg/L. The sediment basin had unexpected inflows from upstream cleaning and maintenance processes, leading to a brief period of elevated TSS concentrations. The inflow source that caused the elevated TSS was corrected, and the sediment basin was cleaned out to improve its retention volume. Water samples from September and October of 2023 indicated that the mitigation actions were effective, and the TSS levels returned to typical ranges well within permit requirements.

3.4.1.B. Blue Creek Mine No. 1

The Blue Creek Mine No. 1 ASMC permit area is in the Black Warrior River Basin and is drained by Big Yellow Creek and Little Yellow Creek. The basin has larger streams that maintain flow in the dry season, but many headwater tributaries are dry during the summer months due to low recharge from groundwater aquifers. The upper Black Warrior River and its major tributaries, Locust Fork, Mulberry Fork, Sipsey Fork, and North River are the dominant drainage features in the district. The region's streams have steep-sided valleys, many of which are gorge-like (GSA, 2018). The project area is in the Upper Black Warrior Watershed, hydrologic unit code (HUC) 03160112 and in sub-watersheds 0201, 0202, 0301, 0404, 0406, 0407, 0408, and 0411 (***Figure 3-10***).

Surface runoff from the project area ultimately drains into the Black Warrior River. Big Yellow Creek, Cripple Creek, Dry Creek, Finley Branch, Fourmile Creek, Keith Branch, Little Bear Creek, Little Tyro Creek, Little Yellow Creek, South Branch, Wyatt Creek, and unnamed tributaries to these streams flow through the LBA tract. Numerous ponds are present within the LBA tract.

Figure 3-10. Subwatersheds: HUC 12.



Compliance with NPDES permit requirements at Blue Creek Mine No. 1 protect water resources, aquatic ecosystems, and public health and safety. Before mining, baseline data were collected to detect changes in water quality over time, allowing for early intervention if the need arises. A comparison of baseline data to subsequent monitoring data is presented in ***Table 4-33***. The existing NPDES permit established specific limits on the amount of pollutants that can be discharged based on the type of pollutant and the receiving water's characteristics.

Surface water draining from areas of the mine site that are being disturbed by mining activity is routed through one of the seven existing sediment-control structures (basins 010, 020, 060, 061, 062, 086 and 087) prior to discharging into state waters. Every sediment basin is monitored in accordance with the NPDES permit. Existing sediment basin locations are shown in the Hydrologic Monitoring Stations Map given in ***Appendix F***. Blue Creek Mine No. 1 has had no exceedances in NPDES water-quality standards.

Much of the surface land in the region around Mine No. 4 and Blue Creek Mine No. 1 is owned by land management groups that harvest timber. Therefore, timber cutting events near the mines over life of the mines are expected. The size and frequency of the probable timber harvests are unknown.

3.4.2. Groundwater

The Blue Creek Mine No. 1 and Mine No. 4 mine sites are in the Pottsville Formation in the Cumberland Plateau physiographic region. The Pottsville Formation is a large aquifer occurring in both the Cumberland Plateau and Alabama Valley and Ridge physiographic region. The thickness of the formation varies from 20 feet in western regions to over 9,000 feet in eastern regions. The Pottsville Formation is a hydro-geologically complex aquifer having many faults and folds. Groundwater movement is generally limited to fracture zones, joints, and bedding planes with sharp permeability contrasts within the aquifer. The Pottsville aquifer is mostly recharged from seasonal rainfall along exposures from southern DeKalb and northern Cherokee Counties, southwest to central Shelby and northern Bibb Counties, and west to Tuscaloosa, Fayette, and Marion Counties. Groundwater may be encountered at depths of less than 250 feet, and the potential for obtaining water at greater depths decreases in the Pottsville Formation. The target coal seams (Mary Lee and Blue Creek) are below drainage within the mine developments (that is, water-filled underground mine works will not discharge anywhere at the land surface). Depths of cover range from about 800 to 1,625 feet at Blue Creek Mine No. 1, and about 1,140 to 2,100 feet at Mine No. 4. Wells in Tuscaloosa and Franklin counties have the lowest pumping rates in the region, generally less than 10 gallons per minute (Dejarnette & Crownover, 1987). The Pottsville Formation has an overall porosity of about 10 percent (Hunter and Moser, 1990).

The region has a poorly hydrologically connected fracture system of the alternating sequences of sandstone and shales of the Pottsville Formation. This system forms isolated perched water tables with little areal extent. Groundwater in the Pottsville aquifer also occurs under confined conditions due to the sharp contrast in permeability within the aquifer. Large supplies of groundwater generally are not available from the Pottsville Formation, and no municipal wells tap the Pottsville Formation within the mining area (Dejarnette and Crownover, 1987).

In general, shallow groundwater flows from areas of higher elevation toward surrounding stream valleys where it may appear as seeps or springs. Recharge for a shallow groundwater system is often from direct rainfall. Seeps and springs were not observed during field studies for those operations covered by this EIS. Small scale local folding influences the movement of groundwater within the Blue Creek Mine No. 1 and Mine No. 4 ASMC permit boundaries and adjacent areas. Most of the groundwater movement in the vicinity of the mining operations is believed to be in the direction of dip that is primarily to the southwest. However, under confining aquifer conditions, groundwater flow is in response to the change in hydraulic head. The groundwater will flow from areas of higher head to lower head. The ASMC permits for Blue Creek Mine No. 1 and Mine No. 4 do not require continual groundwater monitoring to be conducted across the footprint of the mine development. The existing underground mine works are well below the Pottsville aquifer (Dejarnette & Crownover, 1987). For Blue Creek Mine No. 1 that distance is at least 400 feet and for Mine No. 4 the distance is at least 740 feet.

3.4.2.A. Mine No. 4 Water Well Inventory

A water well inventory was conducted by McGehee Engineering Corp. (MEC) in October 2017 and February 2018. Door-to-door interviews targeted occupied residential dwellings within one half mile of the mining development to identify domestic wells. Well inventories note characteristics of the well including depth, location, quality and quantity of groundwater to establish pre-mining and post-mining conditions of those wells. The inventory revealed seven active wells and thirteen non-active wells within the half-mile radius of the mine. Of the seven active wells, three were being used as a primary source of water, and the others were being used as a secondary source for other purposes such as gardening and livestock. There were no known seeps, springs, or underground discharges located within the ASMC permit area. The Well Inventory Log is provided in ***Appendix G***. In accordance with ASMC regulations, water well inventories will continue to be conducted in advance of mining within the 30-degree AOD to determine the status of local groundwater users within the proposed mining area.

3.4.2.B. Blue Creek Mine No. 1 Water Well Inventory

A water well inventory was conducted by MEC in February of 2012. Door to door interviews were performed on occupied residential dwellings within one half mile of the initial ASMC permit boundary to determine if domestic wells were present. The inventory revealed six active wells and ten non-active wells within the half-mile radius of the mine. Of the six active wells, five were being used as a primary source of water and the other was being used as a secondary source for outdoor purposes. There were no other known seeps, springs, or underground discharges located within the ASMC permit area. During the drilling of the exploration holes at this mine, no stratigraphic horizons were observed to consistently produce water in usable quantities. The Well Inventory Log is provided in ***Appendix G***. In accordance with ASMC regulations, water well inventories will continue to be conducted in advance of mining within the 30-degree AOD to determine the status of local groundwater users within the proposed mining area.

3.5 Socioeconomics

The socioeconomic study area includes Tuscaloosa, Fayette, Walker, and Jefferson Counties.

3.5.1. Economic Vitality

As of 2023, coal mining was present in all the counties of the socioeconomic study area except Fayette County. Coal production was highest in Jefferson County (8,230,000 tons), followed by Tuscaloosa County (3,041,000 tons), and Walker County (763,000 tons) (EIA, 2024). Although coal mining is not present in Fayette County, it is possible residents in that bordering county commute to work in the coal mines.

Within northern Tuscaloosa County, Mine No. 4 and Blue Creek Mine No. 1 are active and are planning to mine private coal reserves adjacent to the LBA tracts regardless of federal action. However, Blue Creek Mine No. 1 is in the development phase and not at full production. Blue Creek Mine No. 1 is expected to reach full production regardless of federal action.

Mine No. 4 reported production of roughly 2.5 million tons in 2023 and employed an average of 362 workers. Production at Mine No. 4 fluctuated over the last decade averaging around 2 million tons annually from 2013-2023. Employment over the same period fluctuated similarly with an annual average of 383 employees but trending downward. Productivity, measured as tons of coal produced per employee per year, has more than doubled from 2013-2023 allowing for higher levels of production with fewer employees (MSHA, 2024).

Mining (including all mining) in the socioeconomic study area represents a small share (0.6%) of total employment. Nonservice-related industries, which includes mining, employ 12% of the socioeconomic study area workforce. Service-related industries employ a significant share of workers in the socioeconomic study area at 72% of total employment (***Table 3-6***, U.S. Department of Commerce and the Bureau of Economic Analysis). Jefferson County and Tuscaloosa County have urban population centers which tend to have more service-related jobs relative to nonservice-related jobs compared to counties with lower population densities. About 10% of employment in Jefferson County is in nonservice-related sectors compared to 18% to 30% in the other counties. The share of employment in mining is highest in Walker County at 1.3% and lowest in Jefferson County at 0.4%, despite Jefferson County having the highest level of coal production in the socioeconomic study area in 2023 (U.S. Department of Commerce and the Bureau of Economic Analysis).

Table 3-6. Total employment by industry for the socioeconomic study area in 2023.

	Fayette County, AL	Jefferson County, AL	Walker County, AL	Tuscaloosa County, AL	Combined Counties	Alabama
Non-services related	30.9%	10.6%	18.4%	19.2%	12.8%	18.0%
Natural Resources and Mining	9.6%	0.6%	3.5%	1.5%	0.9%	2.3%
Mining (including fossil fuels)	0.8%	0.4%	1.3%	0.9%	0.6%	0.3%
Services related	38.2%	76.5%	68.3%	61.3%	72.8%	67.8%
Trade, Transportation, and Utilities	14.2%	19.2%	20.0%	15.8%	18.5%	18.2%
Professional and Business Services	5.1%	15.7%	7.7%	11.5%	14.5%	13.6%
Education and Health Services	0.0%	13.5%	14.6%	8.2%	12.4%	10.6%

Notes:

- The sums of the subcategories do not add to the totals for the categories because some sectors were omitted from the table.
- These values are different from the values in Table 3-3 because they are calculated from total employment and not only wage and salary employment.
- Data from U.S. Department of Commerce and the Bureau of Economic Analysis

When comparing the socioeconomic study area employment data from 2001 to 2022 in Table 3-7, there is a general decline in employment for nonservice-related industries except for manufacturing in Walker and Tuscaloosa counties and forestry, fishing, and agriculture jobs in Jefferson County. The gains in nonservice-related employment in Walker and Tuscaloosa counties are minor compared to the total nonservice-related employment loss of 12,600 jobs in the socioeconomic study area (U.S. Department of Commerce and the Bureau of Economic Analysis).

In the socioeconomic study area from 2001-2022, employment in mining fell by roughly 1,500 jobs, 1,265 of which were lost from Tuscaloosa County alone. The loss of coal mining jobs is a national trend related to reduced production of coal (EIA, 2019). In 2018 the U.S. produced over 700 million short tons of coal, while only producing 577 million short tons in 2023 (EIA, 2024). Demand for coal used in electricity generation is expected to decline globally through 2026 due to several factors including growth in renewable energy generation and natural gas production. The socioeconomic study area produces exclusively bituminous coal, which is the usual classification for metallurgic coal. National bituminous coal production has fallen alongside total coal production. However, demand for metallurgic coal is expected to remain steady over the near term (IEA, 2023). Coal production trends in Alabama are consistent with national trends.

During the same period of employment decline in nonservice-related sectors in the socioeconomic study area, there was a marked increase in service-related employment. From 2001 to 2022, the socioeconomic study area lost roughly 12,600 nonservice-related jobs and gained 87,000 service-related jobs (***Table 3-7***). These increases in service-related employment have been greatest in Tuscaloosa and Jefferson Counties, which have urban population centers. Mining typically takes

place in rural areas where residents may not have access to the increasing number of jobs in service-related industries. As nonservice-related jobs like those in mining decline, workers are more likely to seek employment in service-related industries, which pay less on average (***Table 3-8***).

Table 3-7. Change in jobs by industry from 2001 to 2022 for the socioeconomic study area.

	Fayette County, AL	Jefferson County, AL	Walker County, AL	Tuscaloosa County, AL	Combined Counties	Alabama
Total change in jobs	-1,304	44,528	1,030	37,671	81,925	493,878
Non-services related	-1,090	-13,946	125	2,306	-12,605	-44,169
Farm	-52	-226	-196	-190	-664	-14,842
Forestry, fishing, and ag. services	-115	93	-124	-19	-165	na
Mining (including fossil fuels)	-46	-175	-52	-1,265	-1,538	-683
Construction	-116	-3,229	-232	-509	-4,086	6,693
Manufacturing	-761	-10,409	729	4,289	-6,152	-50,952
Services related	103	55,671	706	30,710	87,190	677,083
Government	-115	2,803	-274	4,655	7,069	21,367
Residual	-202	0	473	0	271	-160,403

Notes:

- Values are "na" when there is insufficient data to estimate the value.
- Data from U.S. Department of Commerce and the Bureau of Economic Analysis

Table 3-8. Wages by sector for the socioeconomic study area in 2023.

Employment and Wages in 2023, Aggregated Region	Wage and Salary Employment	% of Total Wage and Salary Employment	Avg. Annual Wages (2023 $s)	Alabama Avg. Annual Wages (2023 $s)
Total	482,838		$65,824	$59,795
Non-Services Related	73,548	15.2%	$80,207	$70,074
Natural Resources and Mining	3,735	0.8%	$106,094	$70,306
Mining (incl. fossil fuels)	3,222	0.7%	$114,541	$100,671
Services Related	321,763	66.6%	$62,130	$55,592
Trade, Transportation, and Utilities	95,761	19.8%	$57,318	$52,530
Professional and Business Services	60,640	12.6%	$74,178	$71,487
Education and Health Services	67,730	14.0%	$66,458	$57,324

Notes:

- The sums of the subcategories do not add to the totals for the categories because some sectors were omitted from the table.
- Wage and Salary employment does not represent the total number of jobs as it does not include self-employed workers, most agricultural workers on small farms, all members of the Armed Forces, elected officials in most states, most employees of railroads, some domestic workers, most student workers at schools, and employees of certain small nonprofit organizations.

- Data from U.S. Department of Commerce and the Bureau of Economic Analysis

Nonservice-related jobs tend to pay higher wages compared to service-related jobs—on average $106,000 annually compared to $62,000 annually. Mining jobs offer even higher pay relative to other sectors, averaging $114,000 annually for the socioeconomic study area (***Table 3-8***, U.S. Department of Commerce and the Bureau of Economic Analysis). Employment in mining offers an opportunity for individuals to earn high wages without a post-secondary education. These opportunities are important for people living in rural areas where adults are less likely to have a bachelor's degree or higher degree when compared to urban and suburban areas (National Center for Education Statistics, 2023). While the socioeconomic study area covers four counties, the LBA areas are contained in rural northern Tuscaloosa County where service-related jobs may be less available.

Outside the direct employment of coal mines, the operation of the mines and the movement of produced coal generates economic activity in other sectors and areas of the State. For additional project context, most of the coal produced in the analysis area is shipped to the port of Mobile, Alabama, and exported, supporting employment in transportation and shipping. In 2018, Mobile ranked fourth nationally in shipping U.S. coal exports, and Mobile was first in handling coal imports. The McDuffie Coal Terminal in Mobile generates about half of the total annual revenue earned by the Alabama State Port Authority. In addition, there were 777 full-time jobs averaging a salary of $93,000 supported by coal operations in 2018 at the Port of Mobile and the transportation of met coal to the port (Deravi and Buchanan, 2019).

3.5.2. Provisioning of Public Services

Underground coal mining in Alabama results in government revenue streams that support public services. Federal and state revenues are generated through the following mechanisms:

- Federal:
    - Bid from the competitive lease sale.
    - Mineral lease rent paid annually to federal government not less than $3 per acre (43 CFR 3473.3-1).
    - Federal royalties 8% of the gross value of coal obtained by subsurface mining (43 CFR 3473.3-2(a)(2)).
- State:
    - Alabama coal severance tax of $0.135 per ton of coal produced (Alabama Code: Section 40-13-2).
    - Alabama $0.20 per ton levy on coal severed (Alabama Code: Section 40-13-31).

Of the federal mineral revenues collected, 50% are distributed to the state from which the minerals were extracted (30 USC 191: Disposition of moneys received). The $0.135 per ton Alabama severance tax is earmarked for different funds including the State Docks Bulk Handling Facility Trust Fund and The Alabama Mining Academy. Tax payments are also distributed to a mixture of county general funds, associations and foundation, and the ASMC (Sections 40-13-5 and 40-13-6, Code of Alabama). The $0.20 per ton of coal levy by Alabama is disbursed to the counties where the coal was mined or where it was loaded for transportation or both (Section 40-13-32, Code of

Alabama). In 2023 the revenue from the state coal severance taxes totaled $3.6 million representing 0.02% of the revenues collected by the state (Alabama Department of Revenue, 2023).

3.5.3. Access to Products

Coal reserves in the project area are comprised of federal and non-federal coal. Areas of federal coal and nonfederal coal are interspersed (***Figure 2-1*** and ***Figure 2-2***). If a mine does not have a valid lease for either a federal or non-federal coal tract in the route of their mining expansion, the non-leased mineral must be bypassed. Bypassed coal generally cannot be economically recovered later, rendering this resource irretrievably lost.

3.5.4. Way of Life and Social Cohesion

Coal mining in the socioeconomic study area stretches back to the 1800s, with large-scale mining operations beginning around 1870 (Snow, 2024). The presence of coal mining as an industry, specifically for those employed in the coal mining industry, creates a coal heritage cultural identity (Carley and Konisky, 2017; Lewin, 2019). However, relatively few people are currently employed in mining (ranging from 0.4% of total employment in Jefferson County to 1.3% in Walker County) in the socioeconomic study area. Furthermore, mining continues to decrease as a source of employment (U.S. Department of Commerce and the Bureau of Economic Analysis, 2023; ***Table 3-6***).

In areas near the mines in Fayette and Walker counties, relatively low population densities when compared to the State of Alabama average contribute to a rural character (***Table 3-9;*** U.S. Department of Commerce and The Census Bureau, 2023). Most of the mine workforce currently live in rural locations nearby the mine. Fayette and Walker counties saw decreasing populations over the past decade (***Table 3-9***). The population density in other areas, such as Tuscaloosa and Jefferson counties, provide a much more suburban or urban character based on their relatively higher population densities when compared to the State of Alabama. In these counties, populations increased over the past decade. A smaller portion of the mine workforce commutes to mines from more populous localities.

Counties in the Appalachian region with active coal production generally have lost population (Kratzer, 2015). However, this is not the case for Tuscaloosa County where the LBA tracts are located (***Table 3-9***; U.S. Department of Commerce and The Census Bureau, 2023). This contrary trend may be due to the large urban centers in Tuscaloosa County. Subsurface coal for potential lease is located very near the boundaries of Fayette and Walker Counties, both of which experienced population loss from 2000 to 2022 that may be partially influenced by coal mining activity (***Table 3-9***; U.S. Department of Commerce and The Census Bureau, 2023). There may be an unknown amount of spillover effect on population change and density from coal mining activity in nearby Fayette and Walker Counties.

Table 3-9. Population, density, and change.

	Tuscaloosa	Fayette	Jefferson	Walker	Combined	Alabama
Population						
Population, 2000	165,414	18,512	662,033	70,602	916,561	4,452,173
Population, 2022	236,780	16,118	665,409	64,339	982,646	5,074,296
Change						
Population change from 2000 to 2022	+43.1%	-12.9%	+0.5%	-8.9%	+7.2%	+14.0%
Size						
Square miles	1,320.8	627.7	1,111.5	791.0	3,851.0	50,633.2
Density						
People per square mile (2022)	179.3	25.7	598.7	81.3	255.2	100.2

U.S. Department of Commerce and The Census Bureau, 2023

3.5.5. Public Health and Safety

Activities associated with coal mining, including the development of facilities, extraction of coal, transportation of coal, and burning of coal, create public health and safety hazards for populations in the areas where these activities occur (Cortes-Ramirez et al., 2018; Wagner, 2017). Populations in areas where coal mining occurs generally suffer poorer health outcomes (Cortes-Ramirez et al., 2018; Wagner, 2017).

All counties in the socioeconomic study area had higher asthma prevalence compared to national rates, and about 77% of census tracts in the socioeconomic study had higher asthma prevalence rates compared to national rates (Centers for Disease Control, 2024). All but one county (Tuscaloosa County) had higher coronary heart disease prevalence compared to national rates, and about 66% of census tracts in the socioeconomic study had coronary heart disease prevalence compared to national rates (Centers for Disease Control, 2024). All counties in the socioeconomic study area had lower life expectancy than national life expectancy, and about 82% of census tracts in the socioeconomic study area had lower life expectancy when compared to national life expectancy (Centers for Disease Control, 2020).

Table 3-10. Prevalence of public health issues for counties in the socioeconomic study area.

Public health issue	National	Fayette County	Jefferson County	Tuscaloosa County	Walker County
Asthma[1]	9.9%	11.1%	10.5%	10.8%	11.0%
Coronary heart disease[2]	6.8%	10.6%	7.4%	6.5%	10.1%
Life expectancy[3]	78.3 years	73.4 years	74.2 years	75.0 years	71.4 years

[1]Crude prevalence of the number of adults who have asthma (Centers for Disease Control, 2024)
[2]Cruden prevalence of the number of adults who have coronary heart disease (Centers for Disease Control, 2024)
[3]Estimates of life expectancy at birth (Centers for Disease Control, 2020)

Table 3-11. Number of census tracts exceeding national public health prevalence across the socioeconomic study area.

Public health issue	Census tracts[1] exceeding national public health prevalence
Asthma[2]	76.9% (210 out of 273)
Coronary heart disease[3]	65.9% (180 out of 273)
Life expectancy[4]	82.4% (183 out of 222)

[1]Census tracts are small units of geography. Census tract boundaries for statistical areas are determined by the U.S. Census Bureau once every ten years.
[2]Crude prevalence of the number of adults who have asthma (Centers for Disease Control, 2024)
[3]Cruden prevalence of the number of adults who have coronary heart disease (Centers for Disease Control, 2024)
[4]Estimates of life expectancy at birth (Centers for Disease Control, 2020). Census Tract numbers do not match those for asthma and coronary heart disease due to different data years and missing data

In addition to public health issues generally shared by an entire population mentioned above, some residents expressed concerns about property damage, injury, and death related to fugitive methane. As detailed in Section 2.5.4, fugitive methane does have the potential to create safety hazards if allowed to accumulate to explosive concentrations in confined spaces (OSMRE 2001). Fugitive methane is discussed in more detail in Section 4.3.

Public health and safety issues related to air quality are analyzed in detail in Section 4.2.

3.6 Realty And Land Use

No known BLM-administered surface tracts are in the project area. There are 127 landowners in the combined federal lease area. Structures identified within the predicted subsidence footprint are used primarily for residential purposes. These structures are constructed by various methods such as: brick, block-frame, or pre-site manufactured. Some are a combination of construction methods. Residences may have support structures such as garages, carports, out buildings, barns sheds, etc. The Mine No. 4 NAA potential subsidence footprint includes 17 occupied residential dwellings,

and the PA potential subsidence footprint includes 28 occupied residential dwellings. The Blue Creek Mine No. 1 NAA potential subsidence footprint includes 65 residential dwellings, and the PA potential subsidence footprint includes 96 residential dwellings. In addition, there are 29 occupied residential dwellings associated with the PA for Blue Creek Mine No. 1 and 12 occupied residential dwellings associated with the PA for Mine No. 4 identified in the Outlying Federal Forties AOD.

There is one business located within the 30-degree AOD of the Mine No. 4 NAA, a grocery store/gas station known as Fields Grocery and Gas. There are no cell towers, municipal facilities, or government facilities located within the 30-degree AOD of any alternative addressed in this EIS. There is one cemetery, Whitson Place Cemetery, located within the 30-degree AOD of Blue Creek Mine No. 1 for both the PA and NAA.

Multiple public roads are within the 30-degree AOD of the Blue Creek Mine No. 1 alternatives. These roads are Alabama Highway 69, Bagwell Road, Blue Creek Road/Goodwater Road, Bonner Loop, Bonner Road, Bozeman Lane, Brandon School Road, Chestnut Ridge Rd, Davis Ranch Road, Doc Norris Road, Evanstown Road, Monroe Dunn Road/County Road 53, N Hagler Rd, Northside Road, Old Cheatam Road, Old Jasper Road, Oregonia Road/Waldrop Road, Ples Willcutt Road, Ross Jones Road, Roy Montgomery Road, Samson Clements Loop Road, Sandtown Lane, Sherman Bolton Road, Tolly Jones Loop/Earnest Road, Upton Road, Utley Loop Road, Willcutt Road, Williams Camp Road and Wint Dunn Road. All roads in the 30-degree AOD are owned and maintained by either Tuscaloosa County or Fayette County. All roads listed above are asphalt surfaced or dirt and gravel surfaced.

There are 158 CBM wells within the mine area along with low pressure gas pipelines, low voltage electrical power lines, and supporting water lines. There are two high pressure gas lines located within the proposed mining area. Main water lines and distribution lines are located adjacent to Alabama Highway 69 and county roads within the mine area. Most of these infrastructure distribution features follow public and private access roads.

A portion of the surface land use is residential. The remainder of the surface overlying the mining plan area is predominantly privately owned forest/woodlands, with small parcels of pastureland (hay), grassed clearings, farm ponds, rural residential development, and some previously surface mined areas. The forest/woodlands include tracts that are owned by large corporations and forestry companies, and these tracts are presumably managed for timber production to some extent.

3.7 Wildlife

Tuscaloosa County is home to a variety of game species, including whitetail deer (*Odocoileus virginianus*), eastern wild turkey (*Meleagris gallopavo silvestris*), mourning dove, northern bobwhite quail, squirrel, and several species of waterfowl. In 2000, Alabama's whitetail deer population was estimated at 1.75 million, a significant increase from just 2,000 in the early 1900s, thanks to management efforts in the 1950s and 1960s. An estimated 7,434 whitetail deer were harvested during the 2023-2024 hunting season in Tuscaloosa County (Responsive Management, 2024). The Alabama Wildlife and Freshwater Fisheries Division currently estimates the eastern wild turkey population at 350,000, with the species favoring hardwood and mixed pine-hardwood forests that include open areas in both uplands and bottomlands. Mourning doves are widespread

across the state, found on farms, in towns, woodlots, agricultural fields, and grasslands. Quail are less common, typically inhabiting weedy fields and open pinelands with native grasses, forbs, and scattered brush thickets. Gray squirrels (*Sciurus carolinensis*) and fox squirrels are found statewide, with gray squirrels thriving in hardwood and mixed forests as well as urban areas, while the less common fox squirrel prefers mature deciduous and pine-oak woodlands, along with forest edges and riparian zones (BLM, 2008).

Following the completion of the biological assessment (BA), MEC compiled a list of terrestrial animal species found or expected to be found on or near the project area (***Appendix K***).

3.8 Special Status Species

BLM special status species are: (1) species listed or proposed for listing under the ESA, and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as Bureau sensitive by the State Director(s) (BLM, 2008). All federal candidate species, proposed species, and delisted species (for five years following delisting) will be conserved as Bureau sensitive species.

Section 7(a)(2) of the ESA directs federal agencies to consult with the FWS when their activities "may affect" a listed species or designated critical habitat.

A list of federally listed and proposed species and designated/proposed critical habitat in the action area was obtained from the FWS Information Planning and Consultation (IPaC) website on February 18, 2025 (FWS 2025). The official species list included 16 listed, or proposed listed, threatened and endangered species (9 aquatic and 7 terrestrial) that have the potential to occur within the boundary of the proposed project area and/or may be affected by the proposed project (see ***Table 3-12***). The list is diverse, including one amphibian, six clams, two flowering plants, one insect, four mammals (bats), and two reptiles.

BLM prepared a BA (***Appendix D***), which details (1) the potential for these species to occur within the proposed action area, (2) the potential exposure of each species with the potential to occur to stressors (direct and indirect effects that negatively affect a species) associated with the PA and the NAA; (3) the potential response of each species from such exposure, and (4) an effect determination for each species and designated critical habitat.

Table 3-12. Federally listed and proposed species and their potential to occur within the proposed action area.

Common Name	Scientific Name	Status	Critical Habitat	Potential to Occur	Rationale
AMPHIBIANS					
Black Warrior waterdog	*Necturus alabamensis*	Endangered	YES	YES	Potential habitat is present within the action area
CLAMS					
Alabama moccasinshell	*Medionidus acutissimus*	Threatened	No	No	Outside known distributional range of species
dark pigtoe	*Pleurobema furvum*	Endangered	No	YES	Potential habitat is present within the action area
inflated heelsplitter	*Potamilus inflatus*	Threatened	No	YES	Potential habitat is present within the action area
orangenacre mucket	*Hamiota perovalis*	Threatened	No	YES	Potential habitat is present within the action area
ovate clubshell	*Pleurobema perovatum*	Endangered	No	No	Outside known distributional range of species
triangular kidneyshell	*Ptychobranchus greenii*	Endangered	No	No	Outside known distributional range of species
FLOWERING PLANTS					
Mohr's Barbara's button	*Marshallia mohrii*	Threatened	No	YES	Potential habitat is present within the action area
white fringeless orchid	*Platanthera integrilabia*	Threatened	No	YES	Potential habitat is present within the action area
INSECTS					
monarch butterfly	*Danaus plexippus*	Proposed Threatened	No	YES	Unknown whether potential habitat is present within the action area
MAMMALS					
gray bat	*Myotis grisescens*	Endangered	No	No	Potential winter hibernacula or summer roost habitat is not present within the action area
Indiana bat	*Myotis sodalis*	Endangered	No	YES	Potential summer roost habitat is present within the action area
northern long-eared bat	*Myotis septentrionalis*	Endangered	No	YES	Potential summer roost habitat is present within

					the action area
Common Name	**Scientific Name**	**Status**	**Critical Habitat**	**Potential to Occur**	**Rationale**
tricolored bat	*Perimyotis subflavus*	Proposed Endangered	No	YES	Potential summer roost habitat is present within the action area
REPTILES					
alligator snapping turtle	*Macrochelys temminckii*	Proposed Threatened	No	YES	Potential habitat is present within the action area
flattened musk turtle	*Sternotherus depressus*	Threatened	No	YES	Potential habitat is present within the action area

3.8.1. Critical Habitat

Critical habitat refers to a designated geographic area that contains features essential to the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery. Critical habitat is defined by describing physical and biological features essential for life processes and successful reproduction of the species.

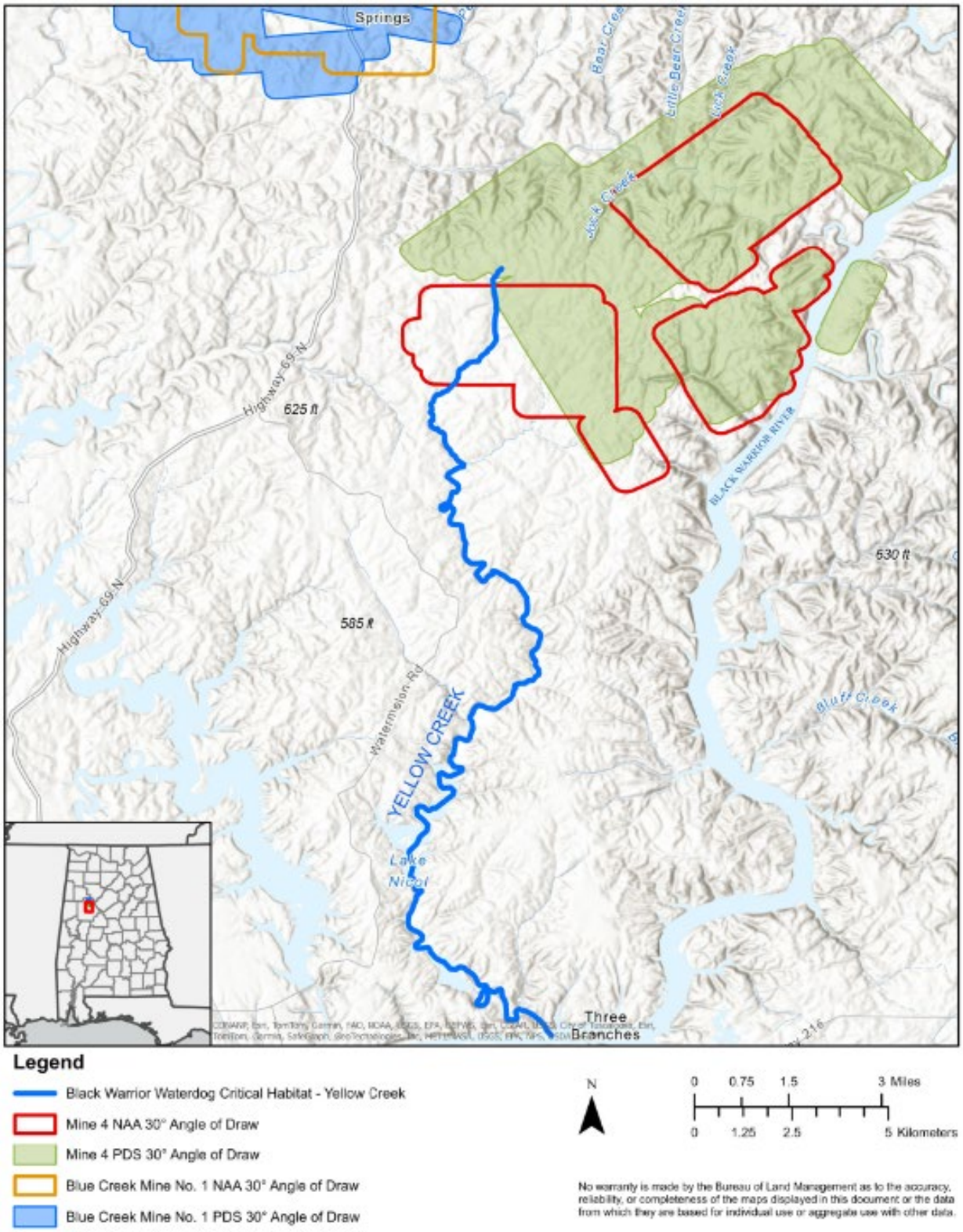
In 2018, Yellow Creek was designated as Critical Habitat Unit 1 for the Black Warrior waterdog (*Necturus alabamensis*) and consists of the headwaters of Yellow Creek to Holt Lake and includes 30 river km (19 mi) of stream and river habitat. The area was designated because it contained abundant rock crevices and rock slabs, leaf litter, and instream flow with moderate velocity and continuous daily discharge that allows for a longitudinal connectivity regime inclusive of both surface runoff and groundwater sources exclusive of flushing flows caused by stormwater runoff (FWS 2018b).

For both the Proposed Action and the NAA, a portion of Yellow Creek is within the proposed expansion area of Mine No. 4 (***Figure 3-11***). Under the Proposed Action, if the ALES-056519 federal forties are leased, permitted, and approved, the portion of Yellow Creek within the action area begins at the headwater and continues for about 9,834 linear feet (1.86 miles). Under the NAA, because the configuration of the underground mine development would need to be adjusted to bypass the federal forties, the portion of Yellow Creek within the action area begins at the headwater and continues for about 2,258 linear feet (0.43 miles).

In 2013 and 2014, eDNA samples indicated Black Warrior waterdogs may still be present in Yellow Creek, although no waterdogs were captured at the time (Godwin 2013; Godwin 2015; Godwin 2016). Similarly, in 2016 a Black Warrior waterdog was captured in Yellow Creek, validating the results of the eDNA survey in that stream (FWS 2024a).

A field assessment of Yellow Creek was conducted on the portions of Yellow Creek within the action area of the Proposed Action and the NAA in August 2024. The stream reach was observed to be slow moving, heavily sedimented, and lacking in rock structure. The species here is presumed to be present but not abundant (FWS 2018a).

Figure 3-11. Yellow Creek critical habitat and predicted subsidence footprints.



3.9 Migratory Birds

Federal agencies have a responsibility to protect migratory birds and their habitats as well as to undertake actions that will further implement the Migratory Bird Treaty Act of 1918 (MBTA) prohibits the take of protected migratory bird species without prior authorization by FWS (16 U.S.C. 703-712). The list of migratory bird species protected by the law is primarily based on bird families and species included in the four international treaties implemented by the MBTA.

A migratory bird species is included on the list if it meets one or more of the following criteria: (1) it occurs in the U.S. or U.S. territories as the result of natural biological or ecological processes and is currently, or was previously listed as, a species or part of a family protected by one of the four international treaties or their amendments; (2) revised taxonomy results in it being newly split from a species that was previously on the list, and the new species occurs in the United States or U.S. territories as the result of natural biological or ecological processes; or (3) new evidence exists for its natural occurrence in the United States or U.S. territories resulting from natural distributional changes and the species occurs in a protected family.

The BLM focuses on species identified by FWS as Birds of Conservation Concern (FWS 2021). The Mine No. 4 LBA tract and Blue Creek Mine No. 1 LBA tract lie on the boundary of two Bird Conservation Regions (BCRs), BCR 27 (Southeastern Coastal Plain) and BCR 28 (Appalachian Mountains). ***Appendix E*** provides a description of each species included in BCR 27 and 28.

Bald and golden eagles are also protected under the MBTA and the Bald and Golden Eagle Protection Act. These species are also included in ***Appendix E***.

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

The environmental consequences section forms the scientific and analytical basis for the comparison of the Proposed Action (PA) and No Action Alternative (NAA) outlined in Chapter 2 and assesses and analyzes the reasonably foreseeable effects to the existing environment, as described in Chapter 3, and determines the significance of those effects.

Effects or impacts means changes to the human environment from the PA or NAA that are reasonably foreseeable. These changes include direct effects caused by the PA or NAA that occur at the same time and place and indirect effects that are later in time or farther removed geographically from actions arising from the PA or NAA.[6] Other effects may be cumulative; those would be environmental consequences resulting from the federal action (PA or NAA) added to the effects of other past, present, and reasonably foreseeable actions. Cumulative effects can result from actions with individually minor but collectively significant effects taking place over a period of time. Effects, whether direct of cumulative, may be ecological (natural resources and the components, structures, and functioning of ecosystems), aesthetic, historic, cultural (including tribal resources), economic, social, or health related. Effects also bear upon climate-change issues including the contribution of the PA and its alternatives to climate change, and, conversely, the reasonably foreseeable effects of climate change on the PA and its alternatives. Effects may include those resulting from actions that may be both beneficial and adverse, even if on balance the agency believes that the effect would be beneficial.

4.2 Air Resources and Climate

The affected area for the air resources analysis of the direct effects for each alternative includes Tuscaloosa County; although, most of direct air quality impacts would be limited to the immediate vicinity of the mine itself. All the metallurgical coal produced by Warrior Met is slated for export to major steel producing countries in South America, Europe, and Asia, and thus most of the indirect effects associated with coal transport and all of the effects associated with coke production and blast furnace combustion occur at numerous locations outside of the U.S., with the sole exception being the potential climate impacts which are global in scope and would occur regardless of where the greenhouse gas emissions originate.

4.2.1. Analysis Methodologies

While a leasing action itself does not directly result in authorized development that would generate emissions, such emissions from the future extraction of minerals from the leased federal forties is reasonably foreseeable (based on the existing and potential changes to mine operations and

[6] As of April 11, 2025, the CEQ regulations were rescinded, and the BLM has decided to voluntarily follow the 2020 CEQ regulations as guidance. This draft EIS was largely complete prior to that date and does not reflect this change ; however, the treatment of effects in the final EIS may change from this document that was drafted.

equipment and the estimated coal reserves provided by the leases), and thus can be estimated for the purposes of analysis. To facilitate the analysis, comprehensive emissions inventory estimates were prepared for each alternative to describe both the direct and indirect emissions associated with the mining, transport, and end use of the coal. The inventories include estimates of annual criteria and HAPs and the greenhouse gases emitted over the life of the mine based on an estimated annual average production rate.

Apart from fugitive particulate matter and coal mine methane (CMM), all the directly emitted pollutants from Warrior Met's operations are from fuel combustion sources, such as mobile mining equipment, haul trucks, and stationary sources such as emergency generators, air compressors, water pumps, and exhaust fans. Fugitive particulate matter is expected to originate from haul roads, coal storage piles, prep plant operations, and load out. CMM may be directly emitted by the ventilation system required by the MSHA to reduce the combustion/explosion potential of the mine's underground atmosphere. Warrior Met does not presently anticipate the need for drilling wells to extract methane ahead of the advancing underground mine face. Given the extensive amount of historical coal mine methane production (oil and gas operations) in the area, the mine permittee believes that fan shafts will be adequate to manage methane in the active underground works. One gob well (post-mining) will likely be installed for each longwall panel. Gas from gob wells will be captured and sold to market. Indirect sources of emissions for the leases include coal transportation by rail, barge, and ocean vessels, and the end use of the coal for coke and steel production.

4.2.1.A. Air Quality

To estimate the potential impacts to air resources from the alternative's operational activities, the BLM employed two screening methodologies to provide analysis of the direct emissions at both the local and regional scales.

Locally, or within the near-field, the BLM employed the screening model component of the U.S. EPA's regulatory near-field model, AERMOD (AERSCREEN). AERSCREEN was chosen for the near field analysis to represent the worst-case possible impacts from the emissions being generated from the proposed on-site activities. The model uses a meteorological module called MAKEMET to generate a set of poor dispersion characteristic wind fields designed to provide results that would be more conservative than the full blown AERMOD model employing full meteorology.

The BLM used the emissions inventory data developed for the EIS to formulate emissions scenarios to evaluate the range of activities that would occur over the life of the mines. Emissions activities were grouped into pseudo sources to facilitate the single source limitations of the model and to provide for the worst-case potential impacts to any nearby sensitive receptors. The exact locations for the sources at the mines are not known, particularly for the Blue Creek Mine No. 1 expansion, as this facility is still under construction at multiple locations. Due to this limitation, the analysis is focused on providing compliance level setbacks for sources and activities.

In general, the model scenarios are focused on source groups and functional activities that can be lumped together. The BLM employed three model configurations to estimate impacts from fugitive dust and heavy equipment operations (volume sources), miscellaneous engines (point), and the

mine vents (point). The coal prep plants, stockpile management, loadouts, and most of the heavy equipment operations (excluding haul trucks) were assumed to occur for each volume source (two configurations, one for dust and the other for diesel exhaust) at three locations. Miscellaneous engines were modeled based on the largest emitters as a fraction of the total emissions from these sources. The mine vents were modeled as ambient temperature point sources where a fraction of the heavy equipment and on-road mobile source emissions would exhaust from. It is unknown what actual fraction of the mobile sources would operate in this manner. For the purposes of analysis, the BLM is assuming that 10% of the on-road mobile sources would operate underground while almost 80% of the off-road source's emissions would come from the three surface locations—prep plant, barge, and rail loadouts. The other fractions of the mobile sources would operate throughout the Warrior Met complex (that is, between the various mines and along haul roads). These assumptions are based on the BLM's overall knowledge and understanding of underground longwall mining operations and what information is available about the layout and design of the Warrior Met complex in general. Note that the mining method itself, longwall and conveyors to move extracted coal, uses line power to operate such that there are no direct emissions associated with this activity.

Finally, absent credible evidence to the contrary, the BLM is assuming that coal mining and transport operations occur for 24 hours per day, seven days a week, for 51 weeks per year. The miscellaneous engines ran for the times presented in the emissions inventory.

4.2.1.B. Hazardous Air Pollutants

For a screening level analysis, the BLM is simply assuming that all the HAP emissions are formaldehyde. Formaldehyde was chosen because of its prominence in the inventory, accounting for approximately 52% of all HAPs emitted within the direct portion of the emissions inventory (primarily by off-road heavy equipment and the miscellaneous engines). Formaldehyde was also used as a proxy due to its lower-level thresholds for acute and chronic exposure risks compared to other combustion related HAPs. The lower risk thresholds mean that using formaldehyde as a proxy for all HAPs is significantly conservative for a screening assessment.

Short-term (1-hour) concentrations will be compared to acute reference exposure levels RELs. RELs are defined as concentrations at or below which no adverse health effects are expected. The REL for formaldehyde is 55 ug/m^3. Long-term exposure to HAPs resulting from the PA activities will be compared to reference concentrations for chronic inhalation (RfCs). An RfC is defined by EPA as the daily inhalation concentration at which no long-term adverse health effects are expected. RfCs exist for both non-carcinogenic and carcinogenic effects on human health. RfCs for suspected carcinogens (formaldehyde) are expressed as unit risk factors (URF), where the annual modeled concentration is multiplied by EPA's URFs that are based on 70-year exposure assessments (lifetime). The product will then be multiplied by an adjustment factor, which represents the ratio of projected exposure time to 70 years. The adjustment factors represent two scenarios: a most likely exposure (MLE) scenario and one reflective of the maximally exposed individual (MEI). The MLE duration will be assumed to be 10 years, which corresponds to the mean duration that an area family remains at a residence in Tuscaloosa County, Alabama (based on 2022 census data, table S2502). This duration corresponds to an adjustment factor of 10/70 or 0.143. The duration of exposure for the MEI is assumed to be life of the mines for each alternative.

In both cases the BLM is assuming individuals are exposed for the duration of the adjustment period (i.e., the BLM is not adjusting for time spent away from home or indoors).

4.2.1.C. Regional Air Quality and Related Values

For the regional assessment, the BLM employed an internally developed tool based on the U.S. EPA's modeled emission rates for precursors (MERPs) (EPA, 2024b). The MERPs were developed to aid new source review (NSR) applicants with a tier I (screening) approach for evaluating impacts on ambient air quality from the formation of secondary fine particulate matter ($PM_{2.5}$) and ozone (O_3). The EPA developed the MERPs by performing photochemical model runs with an array of hypothetical sources in over 113 locations across the continental U.S. to relate VOC and NO_X emissions to O_3 concentrations (eight-hour basis) and SO_2 and NO_X emissions to secondary $PM_{2.5}$ concentrations (daily and annual basis).

EPA modeled each hypothetical source at three emission rates: 500, 1000, and 3000 tons per year (tpy) at two release heights of 10 and 90 meters. Based on the precursor emission rates and the modeled maximum concentrations, MERPs were calculated to represent the precursor emission rates (in tpy) that would result in concentrations equal to the prevention of significant deterioration significant impact levels (PSD SILs).

The BLM's implementation of the MERPs looks at these same parameters, but also includes an air quality related values (AQRV) component that can estimate the effects of deposition and visibility impacts based on the downwind concentrations of nitrogen oxides (NO_X) and sulfur dioxide (SO_2). The BLM's model uses published Class I area data for background pollutant species, and visibility parameters to provide the final estimates of impacts from user provided emissions data. In anticipation of using the tool to support NEPA, the BLM also vetted the model for its scientific validity through EPA's OAQPS office, which is responsible for producing most of the air quality modeling methodologies and guidance published by EPA. For a more detailed perspective on the BLMs MERPs tool, please see the "Bureau of Land Management Interim Guidance for Use of EPA Model Emission Rates for Precursors (MERPs) for Screening Air Quality Related Values" technical document, available on the BLM E-Planning website. To fully account for the project's AQRV impacts the BLM had to modify a spreadsheet version of the MERPs tool to add in the maximum 24-hour downwind concentrations of particulate matter from the AERSCREEN model prior to providing for the final AQRV calculations in accordance with the FLM FLAG 2010 procedures. The MERPs only provide for the transformation and secondary formation of the reactive primary pollutants (NO_X and SO_2) to downwind particulate concentrations. However, the non-reactive species of primary pollutants must also be considered for a proper AQRV visibility impact analysis, and thus the modification was a necessary step. Because AERSCREEN only has applicability out to 50km, the BLM used the 50km values as a proxy for the anticipated values at the distance from the closest mine to any Class I area which is conservative and in line with EPA's recommended practices for extending a near-field model's range.

Class I areas of potential regional concern were identified as those areas that are relatively close to the mine based solely on the emissions source characteristics and overall anticipated pollutant levels developed for the EIS. The major pollutants of concern for AQRV impacts are the particulate matter species and, to a lesser extent, the nitrogen oxides. The BLM reviewed the emissions

inventory data and concluded that only one nearby Class I area warranted further AQRV analysis, and that was the Sipsey Wilderness Area, which is about 80 km north of the PA area. To determine the appropriate MEPRs hypothetical source to choose as our project pseudo source, the BLM looked at the concentration versus-distance plots of two nearby MERPs candidates, Autauga County, Alabama, and Smith County, Mississippi. For the 500-tpy emissions level (that is, the immediate levels that exceed the potential emissions levels of the PA activities) at the lower elevation release height, the Smith, source produced slightly higher SO_2 concentrations and slightly lower NO_X concentrations at the 80-km distance. In consideration of the prevailing north and south wind directions in the project area, the Autauga source was chosen to be the pseudo source of this analysis as it has a better relative proximity with the prevailing winds and higher NO_X concentrations, which are more relevant to the mine's operations in relation to SO_2. We also note that the Smith source is also in a predominantly north and south wind flow. The Smith source is due west of the Class I area at a similar distance as the Autauga source, and for this reason, as well as the less conservative nature of the NO_X concentrations, it was not considered to be reasonably representative.

4.2.1.D. Downstream Indirect Emissions

All coal that will be produced by Warrior Met is slated for overseas markets to be used in steel production. The emissions inventory data provides estimates of the indirect emissions from both transport and end-use consumption. The transport estimates consider shipments to Europe, South America, and Asia, where Warrior Met's customers would consume various fractions of all the exported coal annually. No estimates of transport emissions beyond the port of destination are provided since the actual overland transport methods beyond the port are unknown. All of the coal is transported to export terminals in Mobile, Alabama, which is located about 285 travel miles south of the mines. Rail and barge transport emissions from the mines to the export terminal would be intermittent, and the maximum per trip emissions from rail transport would be less than the barge transport. To estimate the impacts of coal transport on air quality, the BLM is again using a different configuration of the AERSCREEN volume source to estimate the impacts. Here the total emissions were divided along the travel pathlength miles and then again by a hypothetical volume source spacing of 50 feet.

The end use analysis for coking and blast furnace emissions for air quality is limited to the quantification of emissions only, since oversees facility configurations, population centers, and regulatory requirements are unknown. Coking and blast furnace operations are based on generic emissions factors developed by EPA from domestic facilities and may not be entirely representative of emissions from facilities in other counties with differing environmental laws and or control requirements (or lack thereof). Coking is a process by which raw coal is heated to very high temperatures in the absence of oxygen. Instead of combustion, this process liberates impurities in the coal to produce coke, which is almost pure carbon. Coke is an essential component in the steel making process. In the blast furnace, coke is combusted along with iron ore and other minerals to produce pig iron. A separate operation reduces the carbon content of the iron to about 1% to make steel.

4.2.1.E. Climate Change

For the purposes of NEPA analyses, the BLM uses the decision scope emissions (that is, reasonably foreseeable GHG emissions of the alternatives) as a proxy for assessing climate impacts. Published climate impact predictions associated with various global emissions scenarios can be compared to the decision scope emissions levels to provide a basis for considering the magnitude, or range of impacts, that could follow from the alternatives. More specifically, the proxy approach was adopted because of the lack of climate analysis tools and techniques that would allow associating emissions from any single action or decision with broad-scale effects such as changes to sea level, average surface temperatures, and regional precipitation rates; habitat transformations; and loss of species or altered migration patterns. Simply put, such tools and or analysis techniques do not yet exist.

Comparing proxy emissions at various scales relative to a quantity of emissions known to have a definitive climate impact (that is., climate-modeled emissions) allows the BLM to provide a clearly understandable sense of the intensity of an action relative to the magnitude of the issue. One of the drawbacks of this method is the difficulty in downscaling the published climate impacts (predicted or observed) relative to the federal action emissions which are typically several orders of magnitude smaller than the emissions levels associated with the published impacts.

To estimate the potential impacts from global climate change, the BLM is relying on the cumulative information contained in the 2023 BLM *Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends from Coal, Oil, and Gas Exploration and Development on the Federal Mineral Estate* (BLM, 2024). The report includes a summary of emissions estimates from reasonably foreseeable federal fossil fuel development and production over the next 12 months, as well as longer term assessments of potential federal fossil fuel GHG emissions and the anticipated climate change impacts resulting from the cumulative global GHG burden. The report examines carbon emissions from authorized development of the onshore federal mineral estate in the context of the nation's carbon economy and the relationship between energy generation and climate issues by providing life cycle estimates of fossil fuel GHG emissions from that development. The report provides estimates of both direct and indirect emissions from development and consumption of onshore federal fossil fuel minerals, including those fuels that are combusted by end users. The report incorporates current climate science and discussions of scientific values relevant to the context within which the BLM authorizes development of the onshore federal mineral estate. Chapters 2 through 5 provide background information relevant to the existing affected environment concerning GHG emissions and climate change science. Chapters 6 and 7 describe the methodologies and data utilized by the BLM for projecting federal fossil fuel mineral emissions and the results of the projection calculations for various scopes. The remainder of the 2024 BLM document (Chapters 8 through 10) provides comparative context and analysis for the estimated emissions, discloses the potential impacts of projected climate change relative to projected emissions, and presents mitigation strategies that could be used by BLM to contribute towards lowering GHG emissions. The 2023 BLM Specialist Report is hereby incorporated by reference

to describe the overall impacts that could be anticipated from implementation of the alternatives in this EIS.[7]

4.2.2. Environmental Impacts No Action Alternative

Under the NAA, the LBAs for the Mine No.4 and Blue Creek Mine No. 1 expansions would not be approved and the federal coal reserves would likely be bypassed for all time. Both mines would continue forward with plans to extract as much of the non-federal reserves they currently have access to or plan to gain access to via any future mining permit modifications. Operations would continue as presently implemented or as planned.

4.2.2.A. Mine No. 4

Under the NAA, Mine No. 4 would mine and export approximately 3.04 million tons of coal annually for the next 14 years for a total of 42.61 million tons. The following tables outline the estimated emissions for the NAA for Mine No. 4.

Table 4-1. No action criteria--hazardous pollutant emissions (tons per year).

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	Total HAPs
Total Direct Emissions	41.07	62.86	75.60	9.82	0.11	3.32	1.34
Total Indirect Emissions	366.63	3,161.68	76.12	72.44	160.66	184.27	18.02

Table 4-2. No action criteria—greenhouse gas emissions (tons per year).

Source	CO_2	CH_4	N_2O	CO_2e 100yr
Total Direct Emissions	119,199	15,839	1.22	591,537
Total Indirect Emissions	7,289,232	917	134	7,368,707

[7] Section 2.5 “Executive Orders,” in the Report, is not being incorporated by reference, because the EOs discussed therein were rescinded in accordance with Executive Order 14154, *Unleashing American Energy* (January 20, 2025)

Table 4-3. No action criteria—hazardous pollutant model results.

Source	CO 8hr	CO 1hr	NO_X 1yr	NO_X 1hr	PM_{10} 24hr	$PM_{2.5}$ 1yr	$PM_{2.5}$ 24hr	SO_2 1hr	HAPs 1yr	HAPs 1hr
Prep Plant Fugitives and Exhaust										
Max 1-hr	195.94	357.03	43.25	709.50	381.38	13.92	75.35	2.09	4.00	39.98
Comp. Dist.	50	50	50	525	250	675	325	50	NA	NA
Load Out Barge Fugitives and Exhaust										
Max 1-hr	7.28	31.83	1.61	63.26	27.25	1.09	2.31	0.19	0.36	3.56
Comp. Dist.	50	50	50	50	50	50	50	50	NA	NA
Load Out Rail Fugitives and Exhaust										
Max 1-hr	65.52	100.81	14.46	200.33	86.30	3.45	20.79	0.59	1.13	11.29
Comp. Dist.	50	50	50	100	50	225	75	50	NA	NA
Stationary Engines										
Max 1-hr	570.73	513.66	12.68	126.76	5.04	0.82	4.95	1.44	0.20	2.02
Comp. Dist.	50	50	50	50	50	50	50	50	NA	NA
Mine Exhaust Vents										
Max 1-hr	75.75	84.17	23.23	232.28	4.27	0.69	4.14	0.29	0.56	5.56
Comp. Dist.	50	50	50	125	50	50	50	50	NA	NA

[1] Max 1-hr is the maximum 1st high concentration (ug/m^3) at the initial setback receptor located at a distance of 50 meters.

[2] Comp. Dist. is the estimated setback distance from the source (meters) where air quality would meet the NAAQS. This is the recommended distance from which sources should be located away from any ambient air boundary.

The results show that the coal prep plant operations would require the largest setback, approximately 675 meters. The location of the existing coal prep plants within the Mine No. 4 complex provides more than enough distance to ambient air to provide for compliance with the NAAQS. The remaining sources and operations require minimal setbacks that should be easily achievable as longwall mining progresses.

The maximum 1-hr HAP concentration value (assumed formaldehyde) from the Mine No. 4 scenarios was 39.98 ug/m^3, which is well below the short-term REL and thus no adverse impacts are expected. The annual modeled concentration of all the HAPs was 4.0 ug/m^3 and is compared directly to the non-carcinogenic RfC for formaldehyde (9.8 ug/m^3), which is again well below the threshold level.

The results for both the MLE and MEI at 50 meters is 7.4E-05 and 1.0E-04, respectively (that is, cancer risk probabilities of 7.4 in a hundred thousand and 1 in ten thousand). These values are higher than a 1-in-a-million threshold often used for project level analyses. However, the simplifying assumptions used in the screening assessment—all HAPs assumed to be formaldehyde

along with worst case meteorology and a situation in which an individual would have to be exposed at this distance (50m) for the life of the project—re conservative enough to suggest that actual risks to individuals would be well below the project level thresholds.

The tables below provide the relative impacts from the MERPs tool and the individual direct particulate matter species. The relative contributions are shown to provide some context for the severity of the impacts in relation to the types of emissions (primary versus secondary) and using the maximum 50km AERSCREEN model outputs as a proxy for the values at the Class I area approximately 80km north of the mine. Note that the total combined impact from the individual contributions does not equal the sum of the parts due to the way the evaluation of change equations works. The results show that values for both deposition and visibility are below the DATs and should not significantly impact the Sipsey Wilderness Class I area.

Table 4-4. Regional deposition AQRV results.

Deposition	Flux	Units	DAT	Screen Result	DAT Exceedance	% DAT Exceedance
Nitrogen	0.0006	kg/ha/yr	0.005	Pass	NA	NA
Sulfur	0.0000	kg/ha/yr	0.005	Pass	NA	NA

Table 4-5. Regional visibility AQRV results.

Visibility	Flux (Δb_{ext})	Units	DAT	Screen Result	DAT Exceedance	% DAT Exceedance
MERPs	0.0015	Mm^{-1}	0.05	Pass	NA	NA
Direct PM_{10}	0.0290	Mm^{-1}	0.05	Pass	NA	NA
Direct $PM_{2.5}$	0.0094	Mm^{-1}	0.05	Pass	NA	NA
Total	0.0346	Mm^{-1}	0.05	Pass	NA	NA

Table 4-6. Mine No. 4 indirect criteria emissions estimates for - exported coal (tpy).

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	Total HAPs
Truck Transport	0.33	0.41	0.01	0.01	0.00	0.03	0.01
Barge Transport	50.62	68.84	3.04	2.79	13.16	2.73	0.00
Rail Transport	42.52	192.45	4.86	4.71	0.15	7.75	0.00
Ocean Transport	241.53	2898.41	41.00	37.72	88.00	115.61	0.00
Coking	31.96	1.98	27.22	27.22	59.35	58.18	18.02
Totals	367	3162	76	72	161	184	18

All mined and processed coal from Mine No. 4 will be transported to an export terminal in Mobile, Alabama, which is about 285 travel miles south of the mine. The data show that trucks are not used much for transporting coal. Rail and barge transport emissions would be intermittent, where

annual shipments from the NAA are estimated to require approximately 232 and 46 trips, respectively. The maximum per trip emissions for rail transport is less than barge transport. To estimate the impacts of coal transport on air quality, the BLM is again using a different configuration of the AERSCREEN volume source to estimate the impacts of the highest emitted pollutant (0.014 g/sec of NOx). Here the total emissions were divided along the travel pathlength miles and then again by a hypothetical volume source spacing of 50 feet. The maximum one-hour concentration at an initial 50-foot setback was 75.31 ug/m^3. Scaling this value by the other pollutant emissions rates and adding in the background concentrations shows that only the annual $PM_{2.5}$ values would be slightly above the NAAQS (9.14 ug/m^3) at this distance. Background concentration of this pollutant is estimated to be roughly 88% of the NAAQS. The model results for the rail emissions show that compliance can be met at a setback of approximately 150 feet. This analysis is very conservative and shows that transport emissions are not likely to have a significant impact on air resources.

Table 4-7. Mine No. 4 life-of-project GHG emissions (tonnes[8]).

Source	Emissions Type	CO_2	CH_4	N_2O	Duration (years)
Mine No. 4	Direct	108,135	14,369	1	14
Mine No. 4	Indirect	6,612,682	832	121	14
Total Life-of-Project	All	94,091,436	212,818	1,714	NA

As previously stated, the BLM is incorporating by reference the 2023 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends (BLM, 2024) to enhance this analysis and provide additional context that is too voluminous to condense here. Section 8.4 of the report provides, a map-based data viewer tool built to support the U.S. Climate Resilience Toolkit that shows anticipated global warming changes for the project area that would result from various global emissions scenarios.

Data from the viewer tool shows that the average daily maximum temperatures are likely to trend 6 to 10°F above the historical observed average (1960 to 2005) towards the end of the century. Similarly, the data predicts a slight drop in average precipitation days but does not show the volume of the precipitation which, based on recent events, appears to be more frequently extreme when rainfall events do occur.

In terms of climate resilience, it is unclear how climate change would impact the project itself over the life of the project (both for the infrastructure and human element), but it is reasonable to conclude that higher temperatures could exacerbate working conditions while increased precipitation volumes and more frequent and violent storm systems could lead to more day-to-day operational challenges.

The emissions scenarios used in the data viewer are aligned with the representative concentration pathways (RCPs), specifically scenarios 4.5 and 8.5 (see reference BLM, 2024b section 8.1 for more details). The aggregate emissions in gigatons carbon dioxide equivalent ($GtCO_2e$) from each of these pathways is about 3,729 and 9,228 respectively. The cumulative emissions from the NAA

[8] Tonnes = 1,000 kilograms or 2,240 pounds

estimates (0.1 $GtCO_2e$) would represent just 0.0027% and 0.0011% of the reference RCP scenarios, respectively, based on the remaining aggregate values of the RCPs starting in 2018. Considering the global emissions produced since then, the actual percentages of project emissions relative to the RCPs would be slightly higher.

Another way to consider the emissions is via global carbon budgets. The budgets are described in detail within section 9.1 of the 2023 BLM Specialist Report. The budgets seek to estimate the remaining emissions available to humanity that would represent a 50% chance of attaining a relative warming target by the end of the century. The primary targets are for 1.5° and 2.0°C of average global surface warming, and the corresponding emissions budgets associated with these targets are 275 and 1,150 Gt of CO_2, respectively. Comparing the NAA emissions to the global carbon budget shows the project could consume approximately 0.034% of the 1.5-degree target, and 0.008% of the 2.0-degree target. The targets themselves would be more aligned with the lower emissions scenario in the climate viewer tool referenced above. The major issue concerning the budgets is not individual contributions but rather how much time is remaining to exhaust the budget given current global GHG emissions rates. As explained in the 2023 Specialist Report the 1.5-degree budget will be exhausted in roughly 5 years at current global emissions levels, while the 2.0-degree target will be exhausted in approximately 21 years. Subtracting out all federal emissions (oil, gas, and coal for the entire onshore federal mineral estate) over the estimated time remaining would only contribute months at best to the exhaustion timeline. Of course, this calculation would change if the world started dramatically reducing GHG emissions over the short term.

The BLM provided simple climate modeling scenarios (see BLM, 2024 section 9.3) that considered removing the projected GHG emissions from the federal mineral estate at the rates provided by the report out to year 2050. The purpose was to ascertain the change in the climate metrics provided by the model absent federal emissions. On average, the emissions projections provide for approximately 24 Gt of CO_2 from 2024 to 2050, or roughly 238 times as much CO_2 as the NAA levels on a lifetime basis. The model results showed the paired maximum difference in temperature outcomes for the most sensitive emissions scenarios resulted in just 0.009°C of attributable change, while the absolute peak differences in warming between the scenarios (does not pair for any given year) showed the most sensitive scenario resulted in 0.012°C of attributable change.

4.2.2.B. Blue Creek Mine No. 1

Under the NAA, Blue Creek Mine No. 1 would mine and export approximately 2.81 million tons on coal annually for the next 29 years for a total of 81.6 million tons. The following tables outline the estimated emissions for the NAA for Blue Creek Mine No. 1.

Table 4-8. No action criteria--hazardous pollutant emissions (tons per year).

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	Total HAPs
Total Direct Emissions	33.39	51.09	13.73	3.30	0.09	2.72	1.09
Total Indirect Emissions	315.99	2,922.41	69.32	66.02	142.80	170.33	16.66

Table 4-9. No action criteria—greenhouse gas emissions (tons per year).

Source	CO_2	CH_4	N_2O	CO_2e 100yr
Total Direct Emissions	115,062	13,368	1.20	513,761
Total Indirect Emissions	6,734,763	848	124	6,809,371

Table 4-10. No action criteria— hazardous pollutant model results.

Source	CO 8hr	CO 1hr	NO_X 1yr	NO_X 1hr	PM_{10} 24hr	$PM_{2.5}$ 1yr	$PM_{2.5}$ 24hr	SO_2 1hr	HAPs 1yr	HAPs 1hr
Prep Plant Fugitive and Exhaust										
Max 1-hr	195.94	217.61	43.25	432.45	406.27	12.55	75.35	1.26	2.43	24.31
Comp. Dist.	50	50	50	275	275	625	325	50	NA	NA
Load Out Barge Fugitive and Exhaust										
Max 1-hr	7.28	8.08	1.61	16.07	11.19	0.38	2.31	0.05	0.09	0.90
Comp. Dist.	50	50	50	50	50	50	50	50	NA	NA
Load Out Rail Fugitive and Exhaust										
Max 1-hr	65.52	72.76	14.46	144.60	100.71	3.46	20.79	0.42	0.81	8.13
Comp. Dist.	50	50	50	50	50	225	75	50	NA	NA
Stationary Engines										
Max 1-hr	537.90	484.11	11.96	119.59	4.74	0.75	4.52	1.44	0.2	2.02
Comp. Dist.	50	50	50	50	50	50	50	50	NA	NA
Mine Exhaust Vents										
Max 1-hr	26.86	29.84	13.72	137.15	2.51	0.41	2.43	0.15	0.3	3.02
Comp. Dist.	50	50	50	50	50	50	50	50	NA	NA

[1] Max 1-hr is the maximum 1st high concentration (ug/m^3) at the initial setback receptor located at 50 meters.

[2] Comp. Dist. is the estimated setback distance from the source (meters) where air quality would meet the NAAQS. This is the recommended distance from which sources should be located away from any ambient air boundary.

The results show that the coal prep plant operations would require the largest setback, at approximately 675 meters. The location of the existing coal prep plants within the Mine No. 4 complex provides more than enough distance to ambient air to provide for compliance with the NAAQS. The remaining sources and operations require minimal setbacks that should be easily achievable as longwall mining progresses.

The maximum 1-hr HAP concentration value (assumed formaldehyde) from the Blue Creek No. 1 scenarios was 24.31 ug/m^3, which is well below the short-term REL and thus no adverse impacts are expected. The annual modeled concentration of all the HAPs was 2.43 ug/m^3 and is compared directly to the non-carcinogenic RfC for formaldehyde (9.8 ug/m^3), which is again well below the threshold level.

The results for both the MLE and MEI at 50 meters is 4.5E-05 and 1.3E-04, respectively (that is, cancer risk probabilities of 4.5 in a hundred thousand and 1.3 in ten thousand). These values are higher than a 1-in-a-million threshold often used for project level analyses. However, the simplifying assumptions used in the screening assessment—all HAPs assumed to be formaldehyde along with worst case meteorology and a situation in which an individual would have to be exposed at this distance (50m) for the life of the project—are conservative enough to suggest that actual risks to individuals would be well below the project level thresholds.

The tables below provide the relative impacts from the MERPs tool and the individual direct particulate matter species. The relative contributions are shown to provide some context for the severity of the impacts in relation to the types of emissions (primary versus secondary) and using the maximum 50km AERSCREEN model outputs as a proxy for the values at the Class I area approximately 80km north of the mine. Note that the total combined impact from the individual contributions does not equal the sum of the parts due to the way the evaluation of change equations works. The results show that values for both deposition and visibility are below the DATs and should not significantly impact the Sipsey Wilderness Class I area.

Table 4-11. Regional deposition AQRV results.

Deposition	Flux	Units	DAT	Screen Result	DAT Exceedance	% DAT Exceedance
Nitrogen	0.0005	kg/ha/yr	0.005	Pass	NA	NA
Sulfur	0.0000	kg/ha/yr	0.005	Pass	NA	NA

Table 4-12. Regional visibility AQRV results.

Visibility	Flux (Δb_{ext})	Units	DAT	Screen Result	DAT Exceedance	% DAT Exceedance
MERPs	0.0012	Mm^{-1}	0.05	Pass	NA	NA
Direct PM_{10}	0.0298	Mm^{-1}	0.05	Pass	NA	NA
Direct $PM_{2.5}$	0.0089	Mm^{-1}	0.05	Pass	NA	NA
Total	0.0352	Mm^{-1}	0.05	Pass	NA	NA

Table 4-13. Blue Creek No. 1 indirect criteria emissions estimates--exported coal (tpy).

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	Total HAPs
Barge Transport	20.82	28.31	1.25	1.15	5.41	1.12	0.00
Rail Transport	39.50	178.76	4.51	4.38	0.14	7.20	0.00
Ocean Transport	226.13	2713.51	38.39	35.32	82.39	108.23	0.00
Coking	29.54	1.83	25.17	25.17	54.86	53.78	16.66
Totals	316	2922	69	66	143	170	17

All mined and processed coal from Blue Creek No. 1 will be transported to an export terminal in Mobile, Alabama, which is located approximately 285 travel miles south of the mine. The data shows little use of trucks for transporting coal. Rail and barge transport emissions would be intermittent with annual shipments from the NAA estimated to require about 242 and 18 trips, respectively. The maximum per-trip emissions for rail transport are less than barge transport. To estimate the impacts of coal transport on air quality, the BLM is again using a different configuration of the AERSCREEN volume source to estimate the impacts of the highest emitted pollutant (0.014 g/sec of NOx). Total emissions were divided along the travel pathlength miles and then again by a hypothetical volume source spacing of 50 feet. The maximum one-hour concentration at an initial 50-foot setback was 75.31 ug/m^3. Scaling this value by the other pollutant emissions rates and adding in the background concentrations shows that only the annual $PM_{2.5}$ values would be slightly above the NAAQS (9.14 ug/m^3) at this distance. Background concentration for this pollutant is estimated to be roughly 88% of the NAAQS. The model results for the rail emissions show that compliance can be met at a setback of about 150 feet. This analysis is very conservative and shows that transport emissions are not likely to have a significant impact on air resources.

Table 4-14. Blue Creek No. 1 life-of-project GHG emissions (tonnes).

Source	Emissions Type	CO_2	CH_4	N_2O	Duration (years)
Blue Creek No. 1	Direct	104,383	12,127	1	29
Blue Creek No. 1	Indirect	6,109,676	769	112	29
Total Life-of-Project	All	180,207,713	373,995	3,281	NA

As previously stated, the BLM is incorporating by reference the 2023 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends (BLM, 2024) to enhance this analysis and provide additional context that is too voluminous to condense here. Section 8.4 of the report provides, a map-based data viewer tool built to support the U.S. Climate Resilience Toolkit that shows anticipated global warming changes for the project area that would result from various global emissions scenarios.

Data from the viewer tool show that average daily maximum temperatures are likely to trend 6° to 10°F above the historical observed average (1960 to 2005) towards the end of the century. Similarly, the data predicts a slight drop in average precipitation days but does not show the

volume of the precipitation which, based on recent events, appears to be more frequently extreme when rainfall events do occur.

In terms of climate resilience, it is unclear how climate change would impact the project itself over the life of the project (both for the infrastructure and human element). It is reasonable to conclude that higher temperatures could worsen working conditions while increased precipitation volumes and more frequent and violent storm systems could lead to more day-to-day operational challenges.

The emissions scenarios used in the data viewer are aligned with the RCPs, specifically scenarios 4.5 and 8.5 (see 2023 BLM Report section 8.1 for more details). The aggregate emissions from each of these pathways is approximately 3,729 and 9,228 $GtCO_2e$ respectively. The cumulative emissions from the NAA estimates (0.1 $GtCO_2e$) would represent just 0.0052% and 0.0021% of the reference RCP scenarios, respectively, based on the remaining aggregate values of the RCPs starting in 2018. Considering the global emissions consumed since then, the actual percentages of project emissions relative to the RCPs would be slightly higher.

Another way to consider the emissions is by global carbon budgets. The budgets are described in detail within section 9.1 of the 2023 BLM Specialist Report. The budgets seek to estimate the remaining emissions available to humanity that would represent a 50% chance of attaining a relative warming target by the end of the century. The primary targets are for 1.5° and 2.0°C of average global surface warming, and the corresponding emissions budgets associated with these targets are 275 and 1,150 Gt of CO_2, respectively. Comparing the NAA emissions to the global carbon budget shows the project could consume approximately 0.066% of the 1.5-degree target, and 0.016% of the 2.0-degree target. The targets themselves would be more aligned with the lower emissions scenario in the climate viewer tool referenced above. The major issue concerning the budgets is not individual contributions but rather how much time is remaining to exhaust the budget given current global GHG emissions rates. As explained in the 2023 Specialist Report the 1.5-degree budget will be exhausted in roughly 5 years at current global emissions levels, while the 2.0-degree target will be exhausted in approximately 21 years. Subtracting out all federal emissions (oil, gas, and coal for the entire onshore federal mineral estate) over the estimated time remaining would only contribute months at best to the exhaustion timeline. Of course, this calculation would change if the world started dramatically reducing GHG emissions over the short term.

The BLM provided simple climate modeling scenarios (see 2023 BLM Specialist Report section 9.3) that considered removing the projected GHG emissions from the federal mineral estate at the rates provided by the report out to year 2050. The purpose was to determine the change in the climate metrics provided by the model if there were to be no federal emissions. On average, the emissions projections provide for approximately 24 Gt of CO_2 from 2024 to 2050, or roughly 125 times as much CO_2 as the NAA on a lifetime basis. The model results showed the paired maximum difference in temperature outcomes for the most sensitive emissions scenarios resulted in just 0.009 °C of attributable change, while the absolute peak differences in warming between the scenarios (does not pair for any given year) showed the most sensitive scenario resulted in 0.012 °C of attributable change.

4.2.3. Environmental Impacts Proposed Action Alternative

Under the PA, one or both mine LBAs would be authorized allowing for the potential lease and extraction of federal coal resources. In each case, the federal authorization would allow for additional private reserves to be extracted as well since the mining plan would be more efficient in its overall design (that is, by not having to work around the federal resource).

4.2.3.A. Mine No. 4

Under the PA, Mine No. 4 would recover and export about 3.48 million tons of coal per year for the next 21 years for a total of 73.06 million tons. The federal reserves would constitute 16.9 million tons or 23% of the total mined at a rate of approximately 0.8 million tons per year. The LBA would allow Warrior Met to access an additional 13.55 million tons of private coal (18.5% of the total) mined at a rate of about 0.65 million tons per year. In total, the Mine No. 4 expansion LBA would provide Warrior Met with an additional 30.45 million tons of coal (or 71% more coal relative to the NAA). The following tables outline the total estimated emissions for the PA alternative for Mine No. 4.

Table 4-15. Proposed action criteria--hazardous pollutant emissions (tons per year.)

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	Total HAPs
Total Direct Emissions	46.93	71.82	116.77	15.55	0.12	3.81	1.53
Total Indirect Emissions	410.17	3,502.40	85.46	81.38	180.36	206.19	20.60

Table 4-16. Proposed action criteria— greenhouse gas emissions (tons per year).

Source	CO_2	CH_4	N_2O	CO_2e 100yr
Total Direct Emissions	122,319	17,236	1.24	636,304
Total Indirect Emissions	8,331,953	1,049	153	8,420,563

On average, the PA for Mine No. 4 would anticipate an 11% increase in the annual rates of emissions across all pollutant types and sources. In terms of emissions, the federal coal lease would account for approximately 41.6% of the totals shown (23.1% federal coal and 18.5% additional private).

Table 4-17. Proposed action criteria—hazardous pollutant model results.

Source	CO 8hr	CO 1hr	NO_X 1yr	NO_X 1hr	PM_{10} 24hr	$PM_{2.5}$ 1yr	$PM_{2.5}$ 24hr	SO_2 1hr	HAPs 1yr	HAPs 1hr
Prep Plant Fugitives and Exhaust										
Max 1-hr	195.94	302.85	43.25	601.74	427.36	14.39	75.35	1.81	3.38	33.79
Comp. Dist.	50	50	50	425	275	675	325	50	NA	NA
Load Out Barge Fugitives and Exhaust										
Max 1-hr	7.28	28.21	1.61	56.05	32.04	1.17	2.31	0.17	0.31	3.15
Comp. Dist.	50	50	50	50	50	50	50	50	NA	NA
Load Out Rail Fugitives and Exhaust										
Max 1-hr	65.52	89.33	14.46	177.50	101.47	3.69	20.79	0.53	1.00	9.97
Comp. Dist.	50	50	50	75	50	225	75	50	NA	NA
Stationary Engines										
Max 1-hr	539.85	485.86	12.05	120.50	4.79	0.78	4.65	1.46	0.22	2.15
Comp. Dist.	50	50	50	50	50	50	50	50	NA	NA
Mine Exhaust Vents										
Max 1-hr	37.78	41.98	19.29	192.89	3.53	0.57	3.42	0.23	0.42	4.24
Comp. Dist.	50	50	50	100	50	50	50	50	NA	NA

[1] Max 1-hr is the maximum 1st high concentration (ug/m^3) at the initial setback receptor located at a distance of 50 meters.

[2] Comp. Dist. is the estimated setback distance from the source (meters) where air quality would meet the NAAQS. This is the recommended distance from which sources should be located away from any ambient air boundary.

The results show that the coal prep plant operations would require the largest setback, at approximately 675 meters. The location of the existing coal prep plants within the Mine No. 4 complex provides more than enough distance to ambient air to provide for compliance with the NAAQS. The remaining sources and operations require minimal setbacks that should be easily achievable as mining progresses.

The maximum 1-hr HAP concentration value (assumed formaldehyde) from the Mine No. 4 scenarios was 33.79 ug/m^3, a value well below the short-term REL and thus no adverse impacts are expected. The annual modeled concentration of all the HAPs was 3.38 ug/m^3 and is compared directly to the non-carcinogenic RfC for formaldehyde (9.8 ug/m^3), which is again well below the threshold level.

The results for both the MLE and MEI at 50 meters are 6.3E-05 and 1.3E-04, respectively (that is, cancer risk probabilities of 6.3 in a hundred thousand and 1.3 in ten thousand). These values are higher than a 1-in-a-million threshold often used for project level analyses. However, the simplifying assumptions used in the screening assessment—all HAPs assumed to be formaldehyde

along with worst case meteorology and a situation in which an individual would have to be exposed at this distance (50m) for the life of the project—are conservative enough to suggest that actual risks to individuals would be well below the project level thresholds.

The tables below provide the relative impacts from the MERPs tool and the individual direct particulate matter species. The relative contributions are shown to provide some context for the severity of the impacts in relation to the types of emissions (primary vs. secondary) and using the maximum 50km AERSCREEN model outputs as a proxy for the values at the Class I area approximately 80km north of the mine. Note that the total combined impact from the individual contributions does not equal the sum of the parts due to the way the evaluation of change equations works. The results show that values for both deposition and visibility are below the DATs and should not significantly impact the Sipsey Wilderness Class I area.

Table 4-18. Regional deposition AQRV results.

Deposition	Flux	Units	DAT	Screen Result	DAT Exceedance	% DAT Exceedance
Nitrogen	0.0006	kg/ha/yr	0.005	Pass	NA	NA
Sulfur	0.0000	kg/ha/yr	0.005	Pass	NA	NA

Table 4-19. Regional visibility AQRV results.

Visibility	Flux (Δb_{ext})	Units	DAT	Screen Result	DAT Exceedance	% DAT Exceedance
MERPs	0.0017	Mm^{-1}	0.05	Pass	NA	NA
Direct PM_{10}	0.0326	Mm^{-1}	0.05	Pass	NA	NA
Direct $PM_{2.5}$	0.0095	Mm^{-1}	0.05	Pass	NA	NA
Total	0.0379	Mm^{-1}	0.05	Pass	NA	NA

Table 4-20. Mine No. 4 indirect criteria emissions estimates—exported Coal (tpy).

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	Total HAPs
Truck Transport	0.37	0.46	0.01	0.01	0.00	0.04	0.01
Barge Transport	58.32	79.32	3.50	3.22	15.16	3.15	0.00
Rail Transport	48.57	219.82	5.55	5.38	0.17	8.86	0.00
Ocean Transport	266.75	3201.00	45.29	41.66	97.19	127.68	0.00
Coking	36.53	2.26	31.12	31.12	67.84	66.50	20.60
Totals	410	3502	85	81	180	206	21

All the mined and processed coal from Mine No. 4 will be transported to an export terminal in Mobile, Alabama which is located about 285 travel miles south of the mine. The data show that

there is little use of trucks for transporting coal. Rail and barge transport emissions would be intermittent with annual shipments from the NAA estimated to require about 265 and 53 trips, respectively. The maximum per trip emissions for rail transport is less than barge transport. To estimate the impacts of coal transport on air quality, the BLM is again using a different configuration of the AERSCREEN volume source to estimate the impacts of the highest emitted pollutant (0.014 g/sec of NOx). Total emissions were divided along the travel path length miles and then again by a hypothetical volume source spacing of 50 feet. The maximum one-hour concentration at an initial 50-foot setback was 75.31 ug/m^3. Scaling this value by the other pollutant emissions rates and adding in the background concentrations shows that only the annual $PM_{2.5}$ values would be slightly above the NAAQS (9.14 ug/m^3) at this distance. Note, the background concentration value for this pollutant is estimated to be roughly 88% of the NAAQS. The model results for the rail emissions show that compliance can be met at a setback of approximately 150 feet. This analysis is very conservative and shows that transport emissions are not likely to have a significant impact on air resources.

Table 4-21. Mine No. 4 life-of-project GHG emissions (tons).

Source	Emissions Type	CO_2	CH_4	N_2O	Duration (years)
Mine No. 4	Direct	110,966	15,637	1	14
Mine No. 4	Indirect	7,558,623	951	139	14
Total Life-of-Project	All	161,061,374	348,347	2,936	NA

As previously stated, the BLM is incorporating by reference the 2023 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends (BLM, 2024) to enhance this analysis and provide additional context that is too voluminous to condense here. Section 8.4 of the report provides, a map-based data viewer tool built to support the U.S. Climate Resilience Toolkit that shows anticipated global warming changes for the project area that would result from various global emissions scenarios.

Data from the viewer tool shows that the average daily maximum temperatures are likely to trend 6° to 10°F above the historical observed average (1960 to 2005) towards the end of the century. Similarly, the data predict a slight drop in average precipitation days but does not show the volume of the precipitation which, based on recent events, appears to be more frequently extreme when rainfall events do occur.

In terms of climate resilience, it is unclear how climate change would impact the project itself over the life of the project (both for the infrastructure and human element), but it's reasonable to conclude that higher temperatures could worsen working conditions. Increased precipitation volumes and more frequent and violent storm systems could lead to more day-to-day operational challenges.

The emissions scenarios used in the data viewer are aligned with the RCPs, specifically scenarios 4.5 and 8.5 (see 2023 BLM Specialist Report section 8.1 for more details). The aggregate emissions from each of these pathways is approximately 3,729 and 9,228 $GtCO_2e$ respectively. The cumulative emissions from the NAA estimates (0.1 $GtCO_2e$) would represent just 0.0046% and 0.0019% of the reference RCP scenarios, respectively, based on the remaining aggregate

values of the RCPs starting in 2018. Considering the global emissions consumed since then, the actual percentages of project emissions relative to the RCPs would be slightly higher.

Another way to consider the emissions is by global carbon budgets. The budgets are described in detail within section 9.1 of the 2023 Specialist Report. The budgets seek to estimate the remaining emissions available to humanity that would represent a 50% chance of attaining a relative warming target by the end of the century. The primary targets are for 1.5° and 2.0°C of average global surface warming, and the corresponding emissions budgets associated with these targets are 275 and 1,150 Gt of CO_2, respectively. Comparing the NAA emissions to the global carbon budget shows the project could consume approximately 0.059% of the 1.5-degree target, and 0.014% of the 2.0-degree target. The targets themselves would be more aligned with the lower emissions scenario in the climate viewer tool referenced above. The major issue concerning the budgets is not individual contributions but rather how much time is remaining to achieve net zero emissions given current global GHG emissions rates. As explained in the 2023 Specialist Report, the 1.5-degree budget will be exhausted in roughly 5 years at current global emissions levels, while the 2.0-degree target will be exhausted in approximately 21 years. Subtracting out all federal emissions (oil, gas, and coal for the entire onshore federal mineral estate) over the estimated time remaining would only contribute months at best to the exhaustion timeline. Of course, this calculus would change if the world started dramatically reducing GHG emissions over the short term.

Additionally, the BLM provided simple climate modeling scenarios (see 2023 BLM Specialist Report section 9.3) that considered removing the projected GHG emissions from the federal mineral estate at the rates provided by the report out to year 2050. The purpose was to ascertain the change in the climate metrics provided by the model absent federal emissions. On average the emissions projections provide for about 24 Gt of CO_2 from 2024 to 2050, or roughly 139 times as much CO_2 as the PA on a lifetime basis. The model results showed the paired maximum difference in temperature outcomes for the most sensitive emissions scenarios resulted in just 0.009°C of attributable change, while the absolute peak differences in warming between the scenarios (does not pair for any given year) showed the most sensitive scenario resulted in 0.012°C of attributable change.

4.2.3.B. Blue Creek Mine No. 1

Under the PA, Blue Creek Mine No. 1 would recover and export approximately 3.59 million tons of coal per year for the next 43 years for a total of 154.2 million tons. The federal reserves would constitute 36.3 million tons or 23.5% of the total mined at a rate of approximately 0.84 million tons per year. The LBA would allow Warrior Met to access additional private coal in an amount roughly equal to the federal leases. In total, the Blue Creek Mine No. 1 expansion LBA would provide Warrior met with an additional 72.6 million tons of coal (or 89% more coal relative to the NAA). The following tables outline the estimated emissions for the PA alternative for Blue Creek Mine No. 1.

Table 4-22. Proposed action criteria—hazardous pollutant emissions (tons per year).

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	Total HAPs
Total Direct Emissions	48.36	74.04	37.42	7.23	0.12	3.92	1.58
Total Indirect Emissions	381.27	3,467.02	84.71	80.78	174.22	206.83	21.23

Table 4-23. Proposed action criteria— greenhouse gas emissions (tons per year).

Source	CO_2	CH_4	N_2O	CO_2e 100yr
Total Direct Emissions	123,081	13,993	1.25	540,413
Total Indirect Emissions	8,583,633	1,080	157	8,674,433

On average, the PA for Blue Creek Mine No. 1 would anticipate a 22% increase in the annual rates of emissions across all pollutant types and sources. For the emissions presented, the federal coal lease would account for approximately 47% of the totals shown (23.5% federal coal and 23.5% additional private).

Table 4-24. Proposed action criteria—hazardous pollutant model results.

Source	CO 8hr	CO 1hr	NO_X 1yr	NO_X 1hr	PM_{10} 24hr	$PM_{2.5}$ 1yr	$PM_{2.5}$ 24hr	SO_2 1hr	HAPs 1yr	HAPs 1hr
Prep Plant Fugitive and Exhaust										
Max 1-hr	195.94	315.48	43.25	626.94	506.04	16.32	75.35	1.83	3.52	35.20
Comp. Dist.	50	50	50	450	325	750	325	50	NA	NA
Load Out Barge Fugitive and Exhaust										
Max 1-hr	7.28	11.72	1.61	23.29	14.39	0.51	2.31	0.07	0.13	1.31
Comp. Dist.	50	50	50	50	50	50	50	50	NA	NA
Load Out Rail Fugitive and Exhaust										
Max 1-hr	65.52	105.49	14.46	209.63	129.51	4.61	20.79	0.61	1.18	11.77
Comp. Dist.	50	50	50	100	75	275	75	50	NA	NA
Stationary Engines										
Max 1-hr	540.28	486.25	12.06	120.60	4.80	0.78	4.67	1.46	0.22	2.15
Comp. Dist.	50	50	50	50	50	50	50	50	NA	NA
Mine Exhaust Vents										
Max 1-hr	38.94	43.26	19.88	198.84	3.63	0.59	3.53	0.23	0.44	4.38
Comp. Dist.	50	50	50	100	50	50	50	50	NA	NA

[1] Max 1-hr is the maximum 1st high concentration (ug/m^3) at the initial setback receptor located at a distance of 50 meters.

[2] Comp. Dist. is the estimated setback distance from the source (meters) where air quality would meet the NAAQS. This is the recommended distance from which sources should be located away from any ambient air boundary.

The results show that the coal prep plant operations would require the largest setback, at approximately 750 meters. It is unclear exactly where the coal prep plant will be located within the Blue Creek complex, so no assertion for compliance with the NAAQS is provided. The remaining sources and operations require minimal setbacks that should be easily achievable as new longwall mining progresses.

The maximum 1-hr HAP concentration value (assumed formaldehyde) from the Blue Creek No. 1 scenarios was 35.2 ug/m^3. This value is well below the short-term REL, and thus no adverse impacts are expected. The annual modeled concentration of all the HAPs was 3.52 ug/m^3 and is compared directly to the non-carcinogenic RfC for formaldehyde (9.8 ug/m^3), which is again well below the threshold level.

The results for both the MLE and MEI at 50 meters are 6.5E-05 and 1.3E-04, respectively (that is, cancer risk probabilities of 6.3 in a hundred thousand and 1.3 in ten thousand). These values are higher than a 1-in-a-million threshold often used for project level analyses. However, the simplifying assumptions used in the screening assessment—all HAPs assumed to be formaldehyde

along with worst case meteorology and a situation in which an individual would have to be exposed at this distance (50m) for the life of the project—are conservative enough to suggest that actual risks to individuals would be well below the project level thresholds.

The tables below provide the relative impacts from the MERPs tool and the individual direct particulate matter species. The relative contributions are shown to provide some context for the severity of the impacts in relation to the types of emissions (primary vs. secondary) and using the maximum 50km AERSCREEN model outputs as a proxy for the values at the Class I area approximately 80km north of the mine. Note that the total combined impact from the individual contributions does not equal the sum of the parts due to the way the evaluation of change equations works. The results show that values for both deposition and visibility are below the DATs and should not significantly impact the Sipsey Wilderness Class I area.

Table 4-25. Regional deposition AQRV results.

Deposition	Flux	Units	DAT	Screen Result	DAT Exceedance	% DAT Exceedance
Nitrogen	0.0007	kg/ha/yr	0.005	Pass	NA	NA
Sulfur	0.0000	kg/ha/yr	0.005	Pass	NA	NA

Table 4-26. Regional visibility AQRV results.

Visibility	Flux (Δb_{ext})	Units	DAT	Screen Result	DAT Exceedance	% DAT Exceedance
MERPs	0.0017	Mm^{-1}	0.05	Pass	NA	NA
Direct PM_{10}	0.0374	Mm^{-1}	0.05	Pass	NA	NA
Direct $PM_{2.5}$	0.0095	Mm^{-1}	0.05	Pass	NA	NA
Total	0.0426	Mm^{-1}	0.05	Pass	NA	NA

Table 4-27. Blue Creek No. 1 indirect criteria emissions estimates—exported Coal (tpy).

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	Total HAPs
Barge Transport	26.60	36.18	1.60	1.47	6.92	1.44	0.00
Rail Transport	50.27	227.51	5.74	5.57	0.18	9.17	0.00
Ocean Transport	266.75	3201.00	45.29	41.66	97.19	127.68	0.00
Coking	37.65	2.33	32.08	32.08	69.93	68.54	21.23
Totals	381	3467	85	81	174	207	21

All the mined and processed coal from Blue Creek No. 1 will be transported to an export terminal in Mobile, Alabama, which is located about 285 travel miles south of the mine. The data show that few trucks transport coal Rail and barge transport emissions would be intermittent. There would be about 308 rail and 23 barge trips annually under the NAA. The maximum per trip emissions for rail transport is less than barge transport. To estimate the impacts of coal transport

on air quality, the BLM is again using a different configuration of the AERSCREEN volume source to estimate the impacts of the highest emitted pollutant (0.014 g/sec of NOx). Total emissions were divided along the travel path length miles and then again by a hypothetical volume source spacing of 50 feet. The maximum one-hour concentration at an initial 50-foot setback was 75.31 ug/m^3. Scaling this value by the other pollutant emissions rates and adding in the background concentrations shows that only the annual $PM_{2.5}$ values would be slightly above the NAAQS (9.14 ug/m^3) at this distance. Note, the background concentration value for this pollutant is estimated to be roughly 88% of the NAAQS. The model results for the rail emissions show that compliance can be met at a setback of about 150 feet. This analysis is very conservative and shows that transport emissions are not likely to have a significant impact on air resources.

Table 4-28. Blue Creek No. 1 life-of-project GHG emissions (tonnes).

Source	Emissions Type	CO_2	CH_4	N_2O	Duration (years)
Blue Creek No. 1	Direct	111,658	12,694	1	43
Blue Creek No. 1	Indirect	7,786,943	980	143	43
Total Life-of-Project	All	339,639,812	587,995	6,190	NA

As previously stated, the BLM is incorporating by reference the 2023 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends (BLM, 2024) to enhance this analysis and provide additional context that is too voluminous to condense here. Section 8.4 of the report provides, a map-based data viewer tool built to support the U.S. Climate Resilience Toolkit that shows anticipated global warming changes for the project area that would result from various global emissions scenarios.

Data from the viewer tool shows that the average daily maximum temperatures are likely to trend 6° to 10°F above the historical observed average (1960 to 2005) towards the end of the century. Similarly, the data predicts a slight drop in average precipitation days, but does not show the volume of the precipitation, which based on recent events appears to be more frequently extreme when rainfall events do occur.

In terms of climate resilience, it is unclear how climate change would impact the project itself over the life of the project (both for the infrastructure and human element). It is reasonable to conclude that higher temperatures could worsen working conditions, while increased precipitation volumes and more frequent and violent storm systems could lead to more day-to-day operational challenges.

The emissions scenarios used in the data viewer are aligned with the RCPs, specifically scenarios 4.5 and 8.5 (see 2023 BLM Specialist Report section 8.1 for more details). The aggregate emissions from each of these pathways is approximately 3,729 and 9,228 $GtCO_2e$, respectively. The cumulative emissions from the NAA estimates (0.1 $GtCO_2e$) would represent just 0.0096% and 0.0039% of the reference RCP scenarios, respectively, based on the remaining aggregate values of the RCPs starting in 2018. Considering the global emissions consumed since then, the actual percentages of project emissions relative to the RCPs would be slightly higher.

Another way to consider the emissions is by global carbon budgets. The budgets are described in detail within section 9.1 of the 2023 Specialist Report. The budgets seek to estimate the remaining

emissions available to humanity that would represent a 50% chance of attaining a relative warming target by the end of the century. The primary targets are for 1.5° and 2.0°C of average global surface warming, and the corresponding emissions budgets associated with these targets are 275 and 1,150 Gt of CO_2, respectively. Comparing the NAA emissions to the global carbon budget shows the project could consume approximately 0.124% of the 1.5-degree target, and 0.030% of the 2.0-degree target. The targets themselves would be more aligned with the lower emissions scenario in the climate viewer tool referenced above. The major issue concerning the budgets is not individual contributions but rather how much time is remaining to achieve net zero emissions given current global GHG emissions rates. As explained in the 2023 Specialist Report, the 1.5-degree budget will be exhausted in roughly 5 years at current global emissions levels, while the 2.0-degree target will be exhausted in approximately 21 years. Subtracting out all federal emissions (oil, gas, and coal for the entire onshore federal mineral estate) over the estimated time remaining would only contribute months at best to the exhaustion timeline. Of course, this calculation would change if the world started dramatically reducing GHG emissions over the short term.

The BLM provided simple climate modeling scenarios (see 2023 BLM Specialist Report section 9.3) that considered removing the projected GHG emissions from the federal mineral estate at the rates provided by the report out to year 2050. The purpose was to ascertain the change in the climate metrics provided by the model without considering federal emissions. On average, emissions projections provide for approximately 24 Gt of CO_2 from 2024 to 2050, or roughly 67 times as much CO_2 as the PA on a lifetime basis. The model results showed the paired maximum difference in temperature outcomes for the most sensitive emissions scenarios resulted in just 0.009°C of attributable change. Absolute peak differences in warming between the scenarios (does not pair for any given year) showed the most sensitive scenario resulted in 0.012 °C of attributable change.

4.2.4. Summary

In general, the combination of the PAs should not cause undue degradation to air quality in the project area. The mines are sufficiently far apart that near field mixing of pollutants should be minimal in terms of contributing to actual impacts to ambient air quality or human health effects. If summed at face value, the modeled AQRV impacts to visibility would seem to exceed the DAT: however, recall that those values are for a 50km distance or the limits of the near-field models validity range. Given that the Sipsey Wilderness Class I area is some 80km from the project area, it is unlikely that any DAT would be exceeded. The proponent should judiciously apply state-approved fugitive-dust controls and consider using this EIS analysis when citing locations for equipment and activities that can generate significant emissions.

Relative to the NAA, mining operations conducted under the PA would increase total GHG emissions by around 80% on a CO_2e basis. Within the context of the 2023 BLM Specialist Report, emission levels between the alternatives are not significant in terms of quantifiable. The EIS explains that it lacks the data and tools to estimate specific, climate-related effects from the project alternatives. There are no established thresholds, qualitative or quantitative, for the NEPA analysis to assess the GHG emissions of an action in terms of the action's effect on climate, incrementally or otherwise. No scientific data in the record would allow the BLM, in the absence of an agency

carbon budget or similar standard, to evaluate the significance of the GHG emissions from this proposed action or the other alternatives analyzed.

4.3 Geology and Minerals

4.3.1. Analysis Methodologies

The evaluation of the potential impacts to geology and minerals associated with the NAA and PA is completed by characterizing the current setting of the area, identifying the types of impacts that will or could occur, and determining the potential significance that these effects may impose. The evaluation includes data collection, data analysis, results interpretation, and conclusions. Each component of the analysis was completed using empirical knowledge and industry standard practices. Assessment results identify potential issues of significant risk associated with surface topography, marketable coal, and CBM hazards.

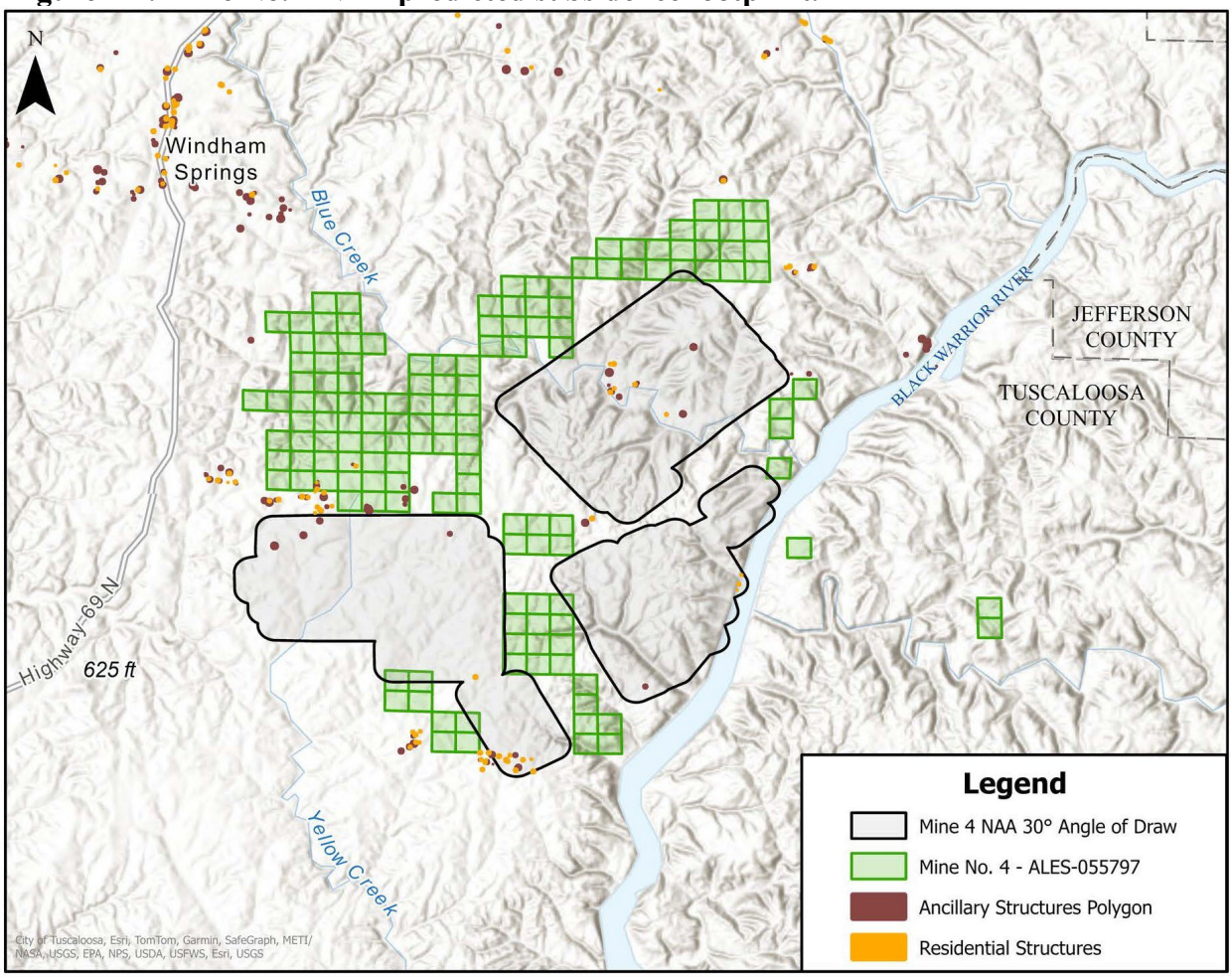
The analysis primarily relies on the subsidence prediction models generated using the SDPS and the SCPs. The SDPS is a subsidence prediction model that models the subsidence for Mine No. 4 and Blue Creek Mine No. 1 using available drill hole data. SDPS, in use with various state and federal agencies in the United States coal industry over the past 20 years, has been a useful subsidence forecast tool. SDPS was developed at the Virginia Polytechnical Institute and State University (Virginia Tech) for OSMRE. The predicted subsidence models for Mine No. 4 and Blue Creek Mine No. 1 were evaluated to consider the potential impacts from planned subsidence associated with the NAA and PA.

4.3.2. Environmental Impacts No Action Alternative

4.3.2.A. Mine No. 4

If the NAA is selected, the Mine No. 4 LBA tract would not be offered for competitive leasing. Consequently, federal coal reserves within the tract would not be mined. The existing mining operation would continue to recover private coal reserves. Subsidence will occur systematically above the longwall panels of the NAA mining plan in a predictable and consistent manner. The variables that affect the extent of subsidence are outlined in Section 2.5.2. The Mine No. 4 NAA predicted subsidence footprint consists of 9,434 acres and is shown in ***Figure 4-1***.

Figure 4-1. Mine No. 4 NAA predicted subsidence footprint.



(Not to Scale)

Occupied Dwellings and Commercial Facilities

The surface area that is expected to experience subsidence includes 17 occupied residential dwellings as well as other related structures, drinking water supplies, and other surface features. There are no commercial facilities within the 30-degree AOD. Warrior Met's planned subsidence of these areas may, in some cases, result in material damage to dwellings and structures, or contaminate, diminish, or interrupt drinking, domestic or residential water supplies. In accordance with the SCP, which is described in detail in Section 2.5.2, Warrior met will either repair subsidence-related damages or compensate property owners. Warrior Met will also provide temporary or permanent replacement water supplies and offer to permanently seal impacted residential wells.

Transportation Infrastructure

The predicted subsidence footprint also includes public roadways and related facilities but is without major transportation structures, such as long-span bridges or culverts, or tunnels. Potential subsidence damage to public roadways and related facilities is anticipated to be limited to cracking, and slight opening or closure of joints and cracks in pavements. Measures to repair damage to public roadways will be based on recommendations made by the appropriate governmental entity. No major

transportation structures, such as long-span bridges or culverts, or tunnels, exist within the area that will be affected by subsidence. If mine subsidence damage occurs to public roadways or related facilities, qualified personnel will perform repairs at Warrior Met's expense.

Public Utilities

Gas pipelines and gas-handling facilities, water mains, electrical transmission lines and associated substations exist within the anticipated subsidence footprint. Subsidence from the proposed mine could cause material damage. Warrior Met will notify owners of utilities and pipelines of Warrior Met's intent to mine under the pipelines, utility lines and related structures, and public roads that cross proposed longwall panels approximately six (6) months in advance of mining. Warrior Met will offer to assist pipeline owners to determine whether such lines can withstand the planned subsidence. It may be necessary to have gas pressure reduced in pipelines, suspend gas service, or unearth any high-pressure gas pipelines overlying the subsidence footprint during the predominant period of subsidence. Warrior Met will also offer the owners of pipelines and other utilities access to available information concerning protective measures (if any) that that have been used to maintain the integrity of infrastructure as mining process beneath Warrior Met will also periodically inform the utility and pipeline owners of the status of the mine so that the owners can better manage the potential for subsidence impacts to their facilities. Experience has shown very little subsidence impact to pipelines, utility lines, and related structures. Nevertheless, Warrior Met recognizes that owners of energy-supply infrastructure may have expertise in protecting their assets from subsidence damage. More details concerning the monitoring, protection, and mitigation of possible subsidence-induced damages to gas lines and other structures are provided in the approved SCPs.

Coal Sterilization

Under the NAA, the mine life would continue for 14 years, which is 7 years shorter than the PA. The Mine No. 4 LBA tract, which includes 16,900,970 saleable tons of federal coal, would likely be sterilized due to geological limitations, with the most significant being the coal seam thickness. For a longwall mining operation, a minimum seam thickness of 24 inches is required. The decline in seam thickness at the extents of the proposed mining plan associated with the PA has essentially defined the limits of a viable longwall operation.

The federal mineral associated with the proposed LBA is somewhat dispersed, likely complicating the feasibility of future mining of the federal reserve. The NAA mine projection includes the mine progressing into adjacent private coal reserves situated between the segments of federal coal. Should the NAA be selected and Warrior Met later complete Mine No. 4, the viability of establishing a future economically efficient mining operation would likely be severely compromised. This would be due to the prior extraction of contiguous coal reserves, which would leave behind isolated, less substantial coal pockets. The subsequent mining of these scattered reserves would likely necessitate significant engineering efforts to overcome access constraints, aimed at recovering only a limited amount of coal. As a result, such an operation would likely not be economically feasible given its present-day, and likely future, cost.

Under the NAA, approximately 13,546,725 tons of interspersed non-federal coal would also likely be sterilized. This is due to accessibility to areas of private coal that are mostly surrounded by scattered sections of federal coal. These pockets of private coal are accessible with the PDS miing plan, but if the surrounding federal coal reserves are sterilized, segments of private coal would

likely be irretrievable as well. A total of 30,447,695 tons of saleable coal (private and federal) would likely be sterilized if the NAA is selected.

Coalbed Methane Wells

A significant number of CBM wells are located within the NAA future mining projections. As mining operations approach a vertical CBM well, Warrior Met will operate in accordance with its MSHA-approved Ventilation Plan, as described in Section 2.5.3. The MSHA approval letter is provided in ***Appendix H***. Under the NAA, existing CBM wells would not pose safety concerns as a result of the mining progression.

Fugitive Methane

As discussed in Section 2.5.5.A, underground coal mining has the potential to liberate fugitive methane. Fugitive methane at the surface does have potential to create imminent harm to the public or to private property when allowed to accumulate to explosive concentrations. This is best prevented when methane is not allowed to accumulate to explosive levels in wells or structures (OSMRE, 2001).

These procedures are detailed in Section 2.5.5.A, and under the NAA, Warrior Met would be required to identify and locate all possible wells on properties overlying the subsidence footprint, and to conduct and report methane monitoring throughout the period of subsidence. The additional well inventory requirements will minimize any potential for impacts caused by fugitive methane, and the additional methane monitoring requirements during this period will alert the operator and ASMC to any potential for methane accumulation so that immediate action can be taken to protect public health and safety.

Warrior Met is currently working to develop a monitoring system that would service any wells identified within a 150—foot radius of any occupied or frequented residence or building, as well as any crawlspaces, underpinning, or other areas associated with these structures where gases could potentially collect. There is currently no known technology that exists on the market designed to provide continuous monitoring of fugitive methane from point source locations across large areas, but Warrior Met will continue to coordinate with ASMC regarding the incorporation and monitoring of the system as more information becomes available and the development is complete.

Direct and Indirect Effects

Direct effects of the NAA include the continuation of the Mine No. 4 operations to recover approximately 42,610,174 tons of private coal over the course of 14 years. If the lease is not issued and the NAA mining plan proceeds, the federal coal reserves within the LBA tract would be bypassed, sterilizing approximately 16,900,970 saleable tons of federal coal, and the mine life would be 7 years less than the PDS mine life. Annually, Mine No. 4 would recover approximately 3,043,584 saleable tons, which is 435,362 tons less than the PDS.

Indirect effects from the NAA may include subsidence related impacts to surface facilities. These surface facilities include 17 occupied residential dwellings, as well as ancillary structures and drinking and domestic water supplies. If subsidence-induced adverse effects to surface structures and water supplies do occur, effects are expected to be minimal and short-term because the mitigation procedures required in the ASMC-approved SCP would provide for the repair or

compensation of any property damages. The mandatory revisions required by ASMC would provide for the thorough inventory and monitoring of wells, which is expected to prevent any accumulation of explosive concentrations of fugitive methane.

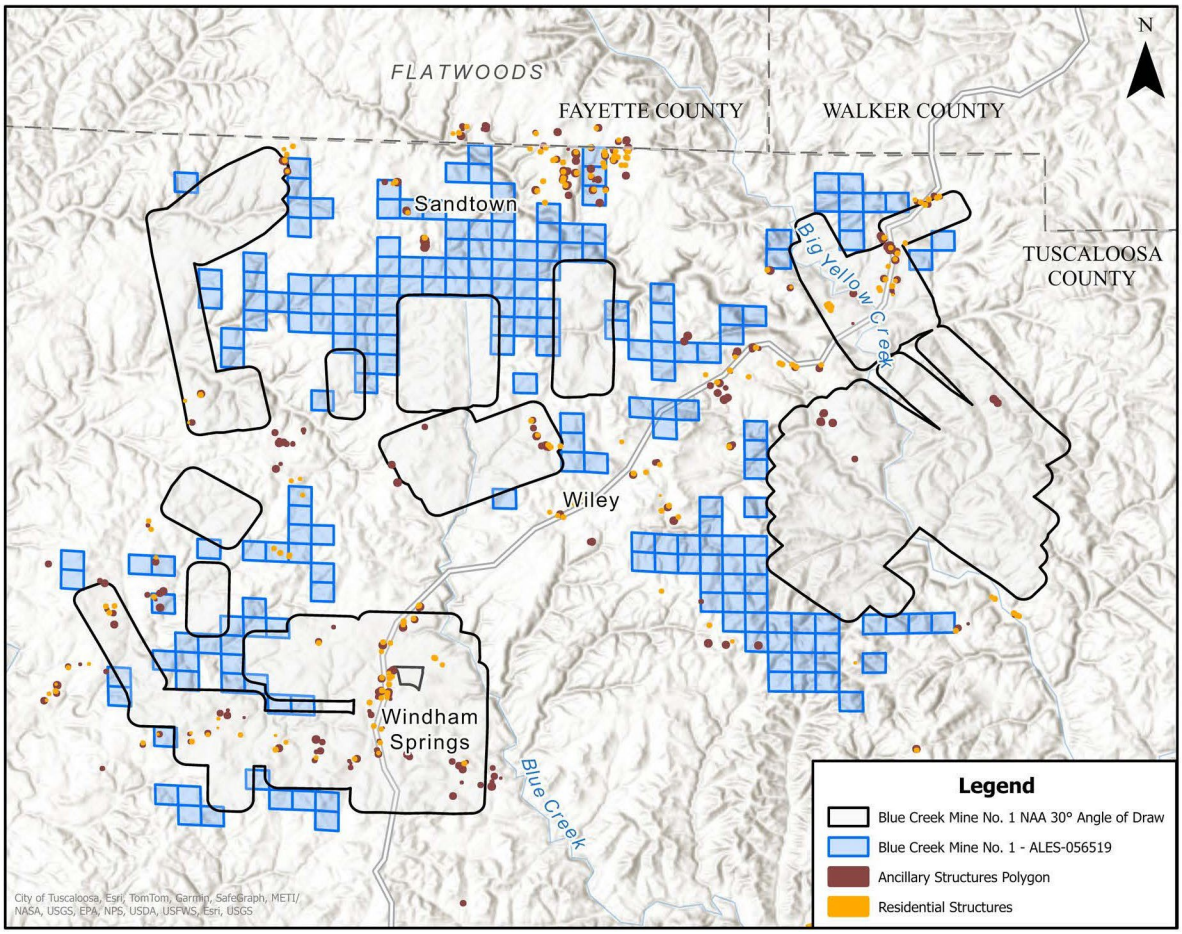
Cumulative Effects

If the NAA is selected and the Mine No. 4 federal coal lease is not issued, it is assumed that the Blue Creek Mine No. 1 federal coal lease would also not be issued. Therefore, the impacts associated with the Blue Creek Mine No. 1 NAA as discussed in Section 4.3.2.B would be represented as cumulative effects to the Mine No. 4 NAA scenario. Effects from the Blue Creek Mine No. 1 NAA scenario, such as mine life, coal production, federal and private coal sterilization, and subsidence related impacts are best quantified in ***Table 4-29,*** and these effects would be additive, meaning the combined (Mine No. 4 and Blue Creek Mine No. 1) NAA scenario effects associated with geology and mineral resources would be equal to the sum of their individual effects.

4.3.2.B. Blue Creek Mine No. 1

If the NAA is selected, the Blue Creek Mine No. 1 LBA tract would not be offered for competitive leasing, and subsequently, the federal coal reserves within the tract would not be mined. The existing mining operation would continue to mine private coal reserves. Subsidence will occur systematically above the longwall sections of the NAA mining plan in a predictable and consistent manner. The variables that affect the extent of subsidence are outlined in Section 2.5.2. The Blue Creek Mine No.1 NAA predicted subsidence footprint consists of 17,640 acres and is presented in ***Figure 4-2***.

Figure 4-2. Blue Creek Mine No. 1 NAA predicted subsidence footprint.



(Not to Scale)

Occupied Dwellings and Commercial Facilities

The surface area that is expected to experience subsidence includes 73 occupied residential dwellings as well as other related structures, drinking water supplies, and other surface features. There is one commercial facility, known as Fields Grocery and Gas, that is located within the Blue Creek Mine No. 1 NAA 30-degree AOD. Warrior Met's planned subsidence of these areas may, in some cases, result in material damage to dwellings and structures, or contaminate, diminish, or interrupt drinking, domestic or residential water supplies. In accordance with the SCP, which is described in detail in Section 2.5.2, Warrior met will either repair subsidence-related damages or compensate property owners. Warrior Met will also provide temporary or permanent replacement water supplies and offer to permanently seal impacted residential wells.

Transportation Infrastructure

The predicted subsidence footprint also includes public roadways and related facilities but is without major transportation structures, such as long-span bridges or culverts, or tunnels. Potential subsidence damage to public roadways and related facilities is anticipated to be limited to cracking, and slight opening or closure of joints and cracks in pavements. Measures to repair damage to public

roadways will be based on recommendations made by the appropriate governmental entity. No major transportation structures, such as long-span bridges or culverts, or tunnels, exist within the area that will be affected by subsidence. If mine subsidence damage occurs to public roadways or related facilities, qualified personnel will perform repairs at Warrior Met's expense.

Public Utilities

Gas pipelines and gas-handling facilities, water mains, electrical transmission lines and associated substations exist within the predicted subsidence footprint. Subsidence from the proposed mine could cause material damage. Warrior Met will notify owners of utilities and pipelines of Warrior Met's intent to mine under the pipelines, utility lines and related structures, and public roads that cross proposed longwall panels approximately six (6) months in advance of mining. Warrior Met will offer to assist pipeline owners to determine whether such lines can withstand the planned subsidence. It may be necessary to have gas pressure reduced in pipelines, suspend gas service, or unearth any high-pressure gas pipelines overlying the subsidence footprint during the predominant period of subsidence. Warrior Met will also offer the owners of pipelines and other utilities access to available information concerning protective measures (if any) that that have been used to maintain the integrity of infrastructure as mining process beneath Warrior Met will also periodically inform the utility and pipeline owners of the status of the mine so that the owners can better manage the potential for subsidence impacts to their facilities. Experience has shown very little subsidence impact to pipelines, utility lines, and related structures. Nevertheless, Warrior Met recognizes that owners of energy-supply infrastructure may have expertise in protecting their assets from subsidence damage. More details concerning the monitoring, protection, and mitigation of possible subsidence-induced damages to gas lines and other structures are provided in the approved SCPs.

Coal Sterilization

Under the NAA, the mine life would continue for 29 years, which is 14 years shorter than the PA. The Mine No. 4 LBA tract, which includes 36,278,476 saleable tons of federal coal, would be likely sterilized due to geological limitations, with the most significant being the coal seam thickness. For a longwall mining operation, a minimum seam thickness of 24 inches is required. The decline in seam thickness at the extents of the proposed mining plan associated with the PA has essentially defined the limits of a viable longwall operation.

The federal mineral associated with the proposed LBA is somewhat dispersed, likely complicating the feasibility of future mining of the federal reserve. The NAA mine projection includes the mine progressing into adjacent private coal reserves situated between the segments of federal coal. Should the NAA be selected and Warrior Met later complete Blue Creek Mine No. 1, the viability of establishing a future economically efficient mining operation would likely be severely compromised. This would be due to the prior extraction of contiguous coal reserves, which would leave behind isolated, less substantial coal pockets. The subsequent mining of these scattered reserves would necessitate significant engineering efforts to overcome access constraints, aimed at recovering only a limited amount of coal. As a result, such an operation would likely not be economically feasible given its present-day, and likely future, cost.

Under the NAA, approximately 36,324,062 tons of interspersed non-federal coal would also likely be sterilized. This is due to accessibility to areas of private coal that are mostly surrounded by scattered sections of federal coal. These pockets of private coal are accessible with the PDS mining plan, but if the surrounding federal coal reserves are sterilized, segments of private coal will likely

be irretrievable as well. A total of 72,602,538 tons of saleable coal (private and federal) would be sterilized if the NAA is selected.

Coalbed Methane Wells

A significant number of CBM wells are located within the NAA future mining projections. As mining operations approach a vertical CBM well, Warrior Met will operate in accordance with its MSHA-approved Ventilation Plan, as described in Section 2.5.3. The MSHA approval letter is provided in ***Appendix H***. Under the NAA, existing CBM wells would not pose safety concerns as a result of the mining progression.

Fugitive Methane

As discussed in Section 2.5.5.A, underground coal mining has the potential to liberate fugitive methane. Fugitive methane at the surface does have potential to create imminent harm to the public or to private property when allowed to accumulate to explosive concentrations. This is best prevented when methane is not allowed to accumulate to explosive levels in wells or structures (OSMRE, 2001). Blue Creek Mine No. 1 will adhere to the procedures and monitoring requirements detailed in Section 2.5.5.A.

Direct and Indirect Effects

Direct effects of the NAA include the continuation of the Blue Creek Mine No. 1 operations to recover approximately 81,592,509 tons of private coal over the course of 29 years. If the lease is not issued and the NAA mining plan proceeds, the federal coal reserves within the LBA tract would be bypassed, sterilizing approximately 36,278,476 saleable tons of federal coal, and the mine life would be 14 years less than the PDS mine life. Annually, Blue Creek Mine No. 1 would recover approximately 2,813,535 saleable tons, which is 772,397 tons less than the PDS.

Indirect effects from the NAA may include subsidence related impacts to surface facilities. These surface facilities include 73 occupied residential dwellings, as well as ancillary structures, one commercial facility, and drinking and domestic water supplies. If subsidence-induced adverse effects to surface structures and water supplies do occur, effects are expected to be minimal and short-term because the mitigation procedures required in the ASMC-approved SCP would provide for the repair or compensation of any property damages. The mandatory revisions required by ASMC would provide for the thorough inventory and monitoring of wells, which is expected to prevent any accumulation of explosive concentrations of fugitive methane.

Cumulative Effects

If the NAA is selected and the Blue Creek Mine No. 1 federal coal lease is not issued, it is assumed that the Mine No. 4 federal coal lease would also not be issued. Therefore, the impacts associated with the Mine No. 4 NAA as discussed in Section 4.3.2.A would be represented as cumulative effects to the Blue Creek Mine No. 1 NAA scenario. Effects from the Mine No. 4 NAA scenario, such as mine life, coal production, federal and private coal sterilization, and subsidence related impacts are best quantified in ***Table 4-29***, and these effects would be additive, meaning the combined (Mine No. 4 and Blue Creek Mine No. 1) NAA scenario effects associated with geology and mineral resources would be equal to the sum of their individual effects.

4.3.3. Environmental Impacts Proposed Action

4.3.3.A. Mine No. 4

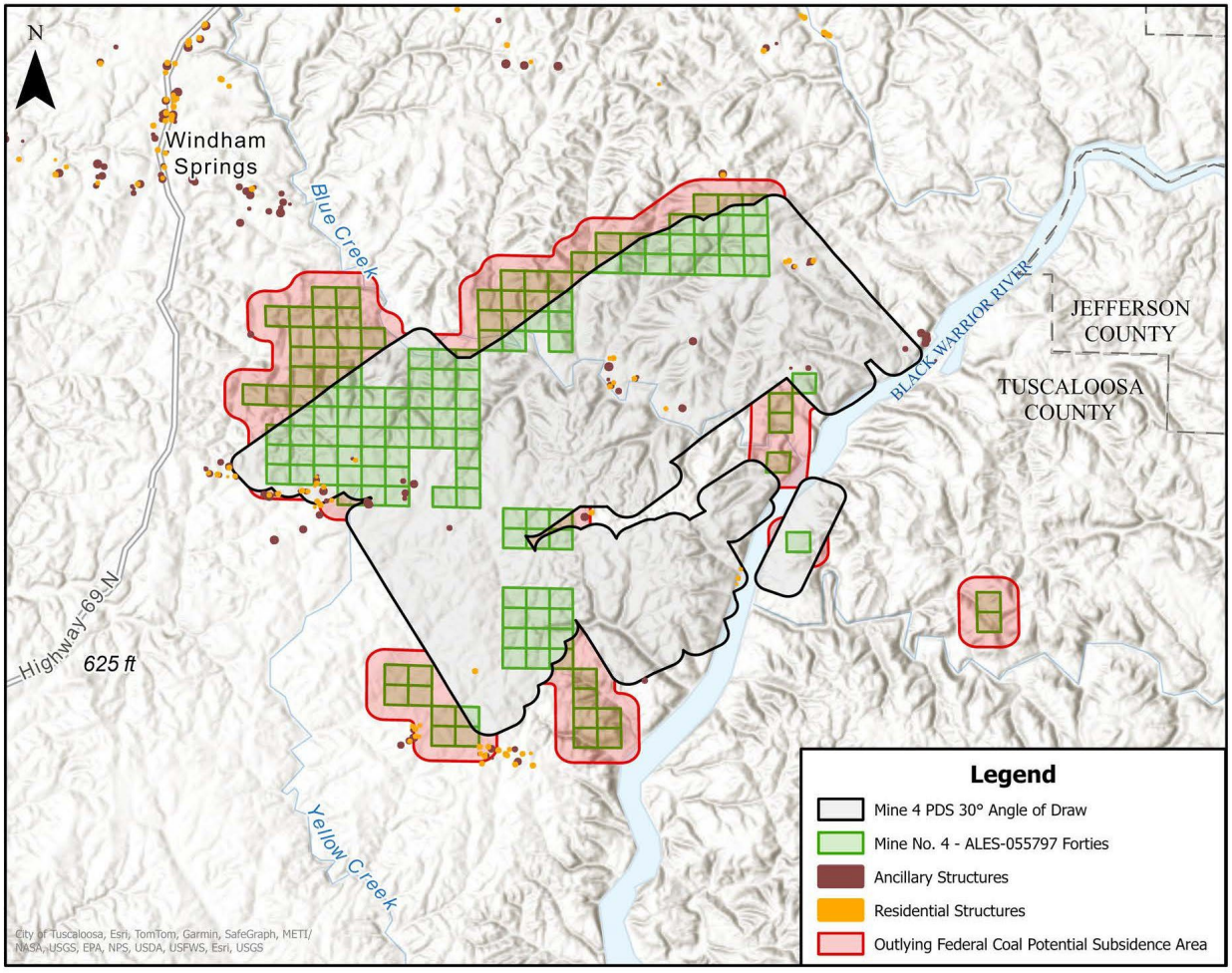
The PDS under the PA will allow for the existing Mine No. 4 development to be expanded into the proposed LBA tract and the federal coal reserves would be recovered to the greatest extent feasible. Because the underground development would be an extension of the existing operations, recovering the coal in the LBA tract from Mine No. 4 would be the most economically efficient method and would provide the best opportunity to maximize resource recovery of federal and private coal. Specifically, Mine No. 4 annual saleable coal production would experience a 14.3% increase.

If the LBA tract is leased to Warrior Met, the life of Mine No. 4 would be extended for an additional 7 years and produce 435,362 more tons annually. Mapping of future mining conditions is based on data compiled from a variety of past and present exploration programs and projections. Assumptions presented here can be made with a reasonable degree of certainty.

Subsurface resources in the LBA tract include coal and its contained methane. Coal seams above and below the Mary Lee and Blue Creek seams are not consistent and lack the necessary thickness and quality for economic recovery. Therefore, no impacts to potential coal recovery (other than the seams being mined) are anticipated from subsidence. Subsidence will occur systematically above the longwall sections in a predictable and consistent manner which provides a means of managing where the subsidence will occur. The variables and conditions related to subsidence are outlined in Section 2.5.3.

Warrior Met is not aware of subsidence-induced landslides, soil erosion, impacts to surface water channels, or soil cracking from historical mining in the area. This includes the mines' observations as well as public complaints and observations. Although impacts to surface waters are not likely, Warrior Met will employ mitigation measures to restore any impacted water resources (Section 4.4.2.A). Noticeable, persistent soil cracking is not expected. Fractures in soil tend to "self heal" as soil particles wash or slough into openings. Subsidence associated with the PA is expected to be similar in nature to that of past mining in the area. Specifically, Warrior Met anticipates a maximum subsidence of 2.20 feet at Mine No. 4, but subsidence in most areas is expected to be less than 2 feet. Areas most susceptible to subsidence are those closest to the extents of the 30-degree AOD for each longwall panel. This is due to the relative positions of tensional and compressional strain on the edges of the extracted panel, as discussed in Section 2.5.3. This expectation is consistent with Warrior Met's past mining experiences in the area. The predicted subsidence footprint associated with the Mine No. 4 PDS consists of 15,148 acres and is presented in ***Figure 4-3***.

Figure 4-3. Mine No. 4 PDS predicted subsidence footprint.



(Not to Scale)

The surface area expected to experience subsidence, as shown in the figure above, has 28 occupied residential dwellings, ancillary structures, drinking water supplies and other surface features. Subsidence in these areas may cause material damage to structures or could contaminate, diminish, or interrupt drinking, domestic, or residential water supplies. The expected subsidence footprint also includes public roadways and related facilities, but is without major transportation structures, such as long-span bridges or culverts, or tunnels. There are no commercial facilities within the 30-degree AOD.

The outlying federal forties potential subsidence area (as shown in ***Figure 4-3***) accounts for the estimated potential subsidence should the PDS mining plan be adjusted to include the federal forties that are not entirely within the PDS predicted subsidence footprint. The PDS mining plan does not account for the recovery of the entirety of every federal forty due to the geologic limitations reflected in Warrior Met's current drill hole data. If the mining plan is modified in the future, and the outlying federal forties were to be mined, potential impacts to resources within the subsidence footprint would be similar to impacts identified elsewhere in this document. Warrior Met will adhere to ASMC regulations and the SCP as well as adopting the same course of action described in Section 4.3.2.A. These procedures will be applied to all surface features within the Mine No. 4 PDS predicted subsidence footprint.

Many CBM wells are within the Mine No. 4 PDS future mining projections. Warrior Met's procedures to be followed as mining approaches a vertical CBM well are specified in the current ventilation plan as described in Section 2.5.3. Under the PA, existing CBM wells would not pose safety concerns as mining progresses.

As discussed in Section 2.5.5.A, underground coal mining has the potential to liberate fugitive methane. Fugitive methane at the surface does have potential to create imminent harm to the public or to private property when allowed to accumulate to explosive concentrations. This is best prevented when methane is not allowed to accumulate to explosive levels in wells or structures (OSMRE, 2001). Mine No. 4 will adhere to the procedures and monitoring requirements detailed in Section 2.5.5.A.

Direct and Indirect Effects

Direct effects of the PA include the recovery of approximately 16.9 million saleable tons of federal coal and 56.2 million tons of saleable private coal over the course of 21 years. In comparison to the NAA scenario, the mine life would be extended 7 years, and an additional 30.4 million total saleable tons of coal would be recovered. The lease would result in an annual recovery of 3.48 million saleable tons per year, an annual increase of 435,362 tons compared to the NAA scenario.

Indirect effects from the PA may include subsidence related impacts to surface facilities. These surface facilities include 28 occupied residential dwellings plus ancillary structures and drinking and domestic water supplies. If subsidence-induced adverse effects to surface structures and water supplies do occur, effects are expected to be minimal and short-term because the mitigation procedures required in the ASMC-approved SCP would provide for the repair or compensation of any property damages. The revisions required by ASMC would provide for the thorough inventory and monitoring of wells, which is expected to prevent any accumulation of explosive concentrations of fugitive methane.

Cumulative Effects

If the PA is selected and the Mine No. 4 federal coal lease is issued, it is assumed that the Blue Creek Mine No. 1 LBA would also be leased. Therefore, the impacts associated with the Blue Creek Mine No. 1 PDS as discussed in Section 4.3.3.B would be represented as cumulative effects to the Mine No. 4 PA. Effects from the Blue Creek Mine No. 1 PA, such as mine life, coal production, federal and private coal sterilization, and subsidence related impacts are best quantified in ***Table 4-29***, and these effects would be additive, meaning the combined (Mine No. 4 and Blue Creek Mine No. 1) PA effects associated with geology and mineral resources would be equal to the sum of their individual effects.

4.3.3.B. Blue Creek Mine No. 1

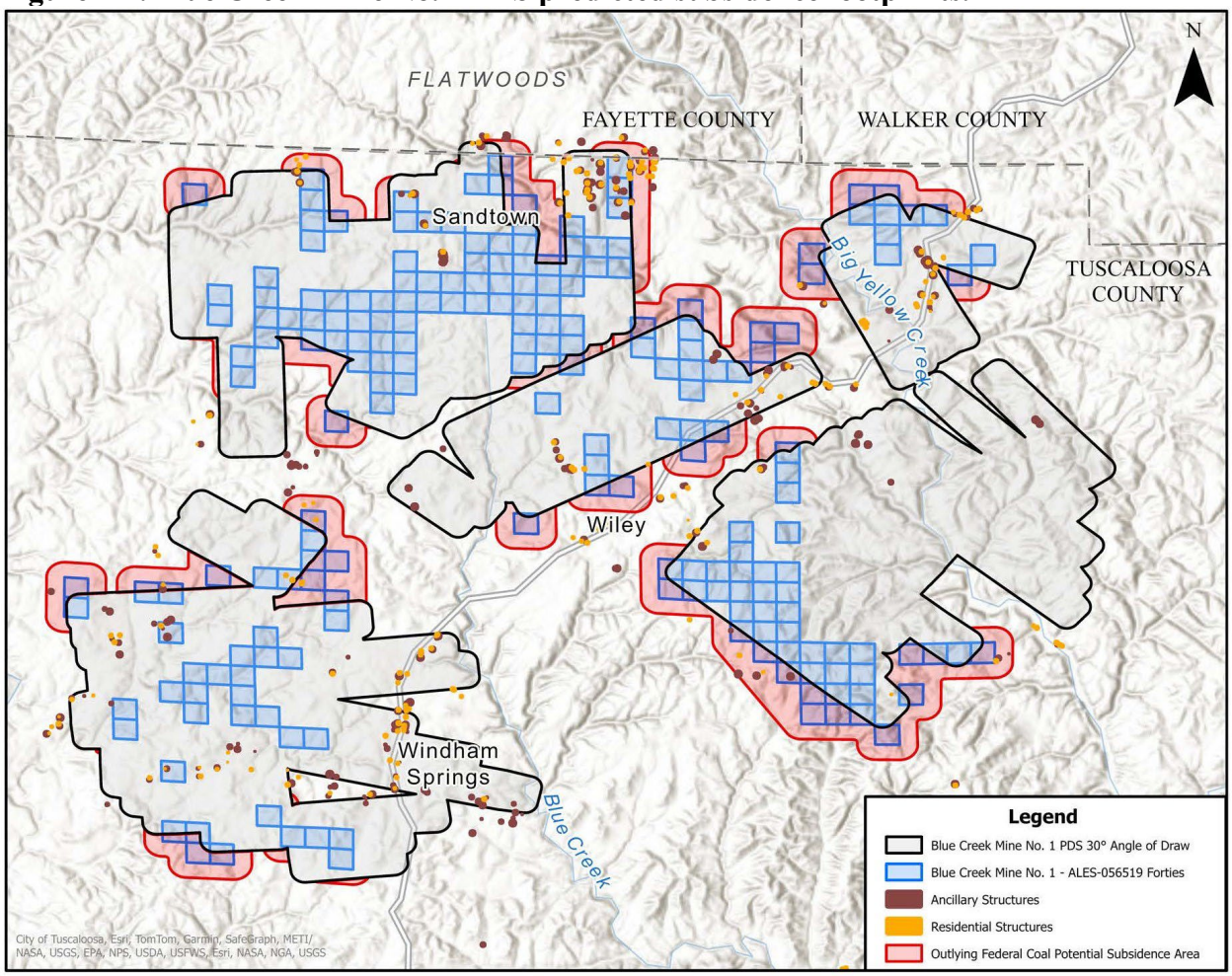
Should Warrior Met be the successful lease bidder, the PDS under the PA would extend the existing Blue Creek Mine No. 1 development into the proposed LBA tract, and federal coal reserves would be recovered to the greatest extent feasible as would private coal Specifically, Blue Creek Mine No. 1 would realize a 27.5% increase in annual saleable coal production. Blue Creek Mine No. 1 would operate for an additional 14 years, producing 772,397 more tons annually.

Under the PA, Blue Creek Mine No. 1 will require an estimated 618 acres of additional coarse refuse disposal. The additional area will likely be constructed in area not currently within the boundary of the existing ASMC permit. Presently there are no design plans for the additional coarse refuse area, and the location of that area is unknown. Warrior Met will have to have a permit revision approved by the ASMC before the permittee can construct the facility. ASMC's permit revision process will ensure the proper necessary consultation with FWS, USACE, and the AHC. Further details concerning the additional coarse refuse disposal areas are given in Section 2.5.2.

Coal beds above and below the Mary Lee and Blue Creek seams may not be uniformly present, and they lack the necessary thickness and quality for economic recovery. Therefore, subsidence would not affect the potential of those thinner coal beds of the Pottsville Formation to be recovered one day. Subsidence will occur systematically above the longwall sections in a predictable and consistent manner which provides a means of managing where the subsidence will occur. The parameters and conditions related to subsidence are outlined in Section 2.5.3.

Impacts from subsidence at Blue Creek Mine No. 1 are expected to be similar to those at Mine No. 4 as described in Section 4.3.3.A. The SDPS model predicts a maximum of 2.62 feet of subsidence at Blue Creek Mine No. 1. The predicted PDS subsidence footprint at Blue Creek Mine No. 1 is 29,641 acres (***Fig. 4-4)***.

Figure 4-4. Blue Creek Mine No. 1 PDS predicted subsidence footprints.



(Not to Scale)

The subsided surface area, as shown in the figure above, would include 96 occupied residential dwellings as well as other ancillary structures, drinking water supplies, and other surface features. Subsidence in these areas may cause material damage to structures or could contaminate, diminish, or interrupt drinking, domestic or residential water supplies. The expected subsidence footprint also includes public roadways and related facilities but is without major transportation structures such as long-span bridges, culverts, or tunnels. There are no commercial facilities within the 30-degree AOD.

The outlying federal forties potential subsidence footprint (as shown in ***Figure 4-4***) accounts for the estimated potential subsidence should the PDS mining plan be adjusted to include the federal forties that are not entirely within the potential subsidence footprint derived from the PDS mining plan. The PDS mining plan does not account for the recovery of the entirety of every federal forty due to the geologic limitations reflected in Warrior Met's current drill hole data. If the mining plan was to be modified in the future, and the outlying federal forties were to be mined, potential impacts to resources within the subsidence footprint would be similar to impacts identified elsewhere in this document. Warrior Met will adhere to ASMC regulations and the state-approved SCP and take the same course of action as described in Section 4.3.2.B. These procedures will be applied to all surface features within the Blue Creek Mine No. 1 PDS subsidence footprint.

Many CBM wells are located within the Blue Creek Mine No. 1 future mining projections. Warrior Met's procedures to be followed as mining approaches a vertical CBM well are specified in the current ventilation plan as described in Section 2.5.3. Under the PA, existing CBM wells would not pose safety concerns because of the underground mining progression.

As discussed in Section 2.5.5.A, underground coal mining has the potential to liberate fugitive methane. Fugitive methane at the surface does have potential to create imminent harm to the public or to private property when allowed to accumulate to explosive concentrations. This is best prevented when methane is not allowed to accumulate to explosive levels in wells or structures (OSMRE, 2001). Blue Creek Mine No. 1 will adhere to the procedures and monitoring requirements detailed in Section 2.5.5.A.

Direct and Indirect Effects

Direct effects of the PA include the recovery of approximately 36.3 million saleable tons of federal coal and 117.9 million tons of saleable private coal over the course of 43 years. In comparison to the NAA scenario, the mine life would be extended 14 years, and an additional 72.6 million total saleable tons of coal would be recovered. The lease would result in an annual recovery of 3.59 million saleable tons per year, an annual increase of 772,396 tons compared to the NAA scenario.

Indirect effects from the PA may include subsidence related impacts to surface facilities. These surface facilities include 104 occupied residential dwellings plus ancillary structures and drinking and domestic water supplies. If subsidence-induced adverse effects to surface structures and water supplies do occur, effects are expected to be minimal and short-term because the mitigation procedures required in the ASMC-approved SCP would provide for the repair or compensation of any property damages. Indirect effects from the PA may also include the development of an additional 618 acres for coarse refuse disposal, an increase of 333 acres under the NAA (see Section 2.5.2). The revisions required by ASMC would provide for the thorough inventory and monitoring of wells, which is expected to prevent any accumulation of explosive concentrations of fugitive methane.

Cumulative Effects

If the PA is selected and the Blue Creek Mine No. 1 federal coal lease is issued, it is assumed that the Mine No. 4 LBA would also be leased. Therefore, the impacts associated with the Mine No. 4 PDS as discussed in Section 4.3.3.A would be represented as cumulative effects to the Blue Creek Mine No. 1 PA. Effects from the Mine No. 4 PA, such as mine life, coal production, federal and private coal sterilization, and subsidence related impacts are best quantified in ***Table 4-29***, and these effects would be additive, meaning the combined (Mine No. 4 and Blue Creek Mine No. 1) PA effects associated with geology and mineral resources would be equal to the sum of their individual effects.

4.3.4. Summary

In summary, the potential direct, indirect, and cumulative effects of the NAA and PA in regard to geology and mineral resources primarily pertain to the recovery and sterilization of private and federal coal and potential subsidence-related impacts to surface facilities.

If the PA is selected, Mine No. 4 would be able to recover about 42% more saleable coal while operating for an additional 7 years. The projected subsidence footprint would increase by 38%, and the number of occupied residential dwellings within the subsidence footprint would increase from 17 to 28 houses.

Under the PA, Blue Creek Mine No. 1 would be able to recover approximately 47% more saleable coal while operating for an additional 14 years. The projected subsidence footprint would increase by 41%, and the number of occupied residential dwellings within the subsidence footprint would increase from 73 to 104 houses. The NAA predicted subsidence footprint includes one commercial facility while the PDS subsidence footprint has none. Effects associated with geology and minerals resources are quantified in ***Table 4-29***.

Table 4-29. Geology and minerals resources summary.

	No Action		Proposed Action	
	Mine No. 4 NAA	**Blue Creek Mine No. 1 NAA**	**Mine No. 4 PDS**	**Blue Creek Mine No. 1 PDS**
Mine Life	14	29	21	43
Federal Coal Tons	0	0	16,900,970	36,278,476
Private Coal Tons	42,610,174	81,592,509	56,156,899	117,916,571
Total Coal Tons	42,610,174	81,592,509	73,057,869	154,195,047
Coal Tons per Year	3,043,584	2,813,535	3,478,946	3,585,931
Sterilized Federal Coal Tons	16,900,970	36,278,476	0	0
Sterilized Private Coal Tons	13,546,725	36,324,062	0	0
Total Sterilized Coal Tons	30,447,695	72,602,538	0	0
Subsidence Footprint Area	9,434 acres	17,640 acres	15,148 acres	29,641 acres
Occupied Residential Dwellings in AOD	20	73	31	104
Commercial Facilities in AOD	0	1	0	0
Additional Coarse Refuse Disposal Area	0	285 acres	0	618 acres

Note: All volumes are saleable tons.

4.4 Surface Water Resources

An evaluation of surface-water resources addresses how the NAA and PA may affect streams and watersheds described in Section 3.4.1. The analysis considers the change, or lack thereof, in permit requirements, historical surface water data trends, mine life, and the subsidence footprints associated with each alternative.

4.4.1. Trend Analysis Methodologies

NPDES and ASMC permits require water-quality monitoring at Mine No. 4 and Blue Creek Mine No. 1 to protect water resources, aquatic ecosystems, and public health and safety. Stream sampling is conducted quarterly at multiple locations for both mines to ensure water quality in the receiving streams outside of the permit areas and monitor the long-term effects of mining. The surface water analysis used the following l stream monitoring data: flow, pH, iron (Fe), manganese (Mn), total suspended solids (TSS), and conductivity. The flow rate, in cubic feet per second (cfs), is a measure of how much water was moving through a particular point in the stream at the sampling location., Flow rate is directly affected by surface runoff and groundwater influence. The other parameters and how they affect water quality are as follows.

The concentration of hydrogen ions in water, a measure of acidity, is given by the pH which is the negative logarithm of the hydrogen ion concentration (mol/L) in an aqueous solution. The pH scale mostly ranges from 0 to 14, with a pH of 7 being neutral. As the concentration of hydrogen ions in a solution increases, acidity increases, and the pH lowers below 7. When the pH is above 7, the solution is basic. The pH affects most chemical and biological processes in water and is a key environmental factor influencing species distribution in aquatic ecosystems. Different species thrive within different pH ranges, with the optimal range for most aquatic organisms is from pH 6.5 to pH 8. The EPA water quality criteria for pH in freshwater suggest a range of 6.5 to 9. Water with a fluctuating pH or a pH that remains outside of the EPA range physiologically stresses many species and can result in decreased reproduction, decreased growth, disease or death (EPA, 2025b).

Iron (Fe) is a naturally occurring metal that has the potential to affect water quality by causing discoloration, taste, pH change, and adversely affecting aquatic wildlife if the concentration is too high (EPA, 2025c). The water quality standard limit on iron is 0.3 mg/L for domestic drinking water and is 1.0 mg/L for freshwater aquatic life (EPA, 1986).

Manganese (Mn) is a naturally occurring element that can be found in air, soil, and water. Lower concentrations of manganese can have health benefits, while higher concentrations can be toxic (EPA, 2025d). The water quality standard limit on manganese is 0.05 mg/L for domestic drinking water and 0.1 mg/L for marine waters (EPA, 1986).

Total suspended solids (TSS) represent the amount of particulate matter that exceeds 2 microns floating in water. High TSS concentrations are often attributed to erosion, pollution, and algae, and can result in low dissolved oxygen levels and increased water temperature. The water quality standard limit for TSS is 500 mg/L for domestic drinking water (EPA, 2025d).

Conductivity measures water's ability to transmit an electrical current. It increases with salinity because dissolved salts and other inorganic chemicals enhance electrical conductivity. In contrast, organic compounds such as oil are poor conductors and exhibit low conductivity in water. Temperature also influences conductivity. Warmer water leads to higher conductivity (EPA, 2025a).

Stream monitoring data for both Mine No. 4 and Blue Creek Mine No.1was analyzed to determine the potential impacts from future mining. The Seasonal-Kendall trend test (using the R package 'NADA2' program) was applied to both sets of historical data to determine whether or how measured water characteristics have changed over the period of record and if an increasing or decreasing trend is statistically significant.

In addition to the Seasonal Kendall trend test, a two-sample comparison of baseline data versus subsequent mining operations data was analyzed using the Wilcoxon rank-sum test for non-censored values and the Peto-Peto test for censored values. Censored values are data less than the laboratory reporting limit; the material may be present in the sample, but the lab cannot confidently same how much may be there. Two-sample Comparison tests could only be run on Blue Creek Mine No. 1 data because baseline data are not available for Mine No. 4. When Mine No. 4 opened, there was no requirement to do baseline sampling. Statistical tests give a measure of how confident one can be in rejecting the null hypothesis—that which is assumed to be true. For the trend test, the null hypothesis is the data that show no trend over time; for the two-sample comparison—baseline versus operations—the null hypothesis is no difference between the two data sets.

Some stream sampling stations at Mine No. 4 and Blue Creek Mine No. 1 had a high number of no-flow events. In these instances, few measured values are available for analysis which makes it especially difficult to reject the null hypothesis of no trend. The Seasonal-Kendall trend test requires at least four values per season (a season being a calendar quarter), and where that requirement is not met, those statistically deficient seasons are omitted and not included in the overall test. A p-value of less than 0.05 indicates a statistically significant trend, in which case the null hypothesis is rejected. A p-value greater than 0.05 indicates that deviation from the null hypothesis is not statistically significant. ***Table 4-30*** provides an overview of the Mine No. 4 (P-3260) and Blue Creek Mine No. 1 (P-3964) historical sampling events.

Table 4-30. Stream sampling data sets.

Permit	Station	Earliest Sampling Date	Latest Sampling Date	Number of Sampling Events
P-3260	4-6S	8/10/1994	6/11/2024	114
	4-5S	8/10/1994	5/26/2023	104
	4-4S	8/10/1994	6/11/2024	103
	4-2S	8/10/1994	6/11/2024	109
	4-2G	12/31/1983	3/2/2013	90
	4-1G	12/31/1983	3/2/2013	90
P-3964	UTBYC-SW	9/28/2012	4/4/2024	21
	LYC-SW2	1/24/2011	4/4/2024	28
	LYC-SW1	1/24/2011	4/4/2024	28
	BYC-SW2	1/24/2011	12/1/2011	6
	BYC-SW1	1/24/2011	12/1/2011	7

4.4.2. Environmental Impacts No Action Alternative

4.4.2.A. Mine No. 4

Mine No. 4 will continue to recover private coal for another 14 years if the NAA is selected. All existing surface activity associated with the existing mine is subject to stringent regulatory controls (including requirements for siltation structures, sediment ponds, monitoring, etc.) to limit soil erosion in the Daniel Creek, Whiteoak Creek – Davis Creek, Peques Creek, Laurel Branch – Bluff Creek, and Lick Creek – Blue Creek sub-watersheds. Warrior Met has been required to obtain necessary permits from the ASMC and ADEM with concurrence from the USACE, AHC, FWS, and other related regulatory entities. Erosion mitigation measures (for example, waterbars and silt fences) have been required in accordance with the existing permits and pollution-control plans. The water quality monitoring and reporting in the permit area will continue regularly per the requirements of the existing NPDES permit[9].

The NPDES permit requires Warrior Met to design and implement a spill prevention control and countermeasures (SPCC) plan[10] for all stored chemicals, fuels, and stored pollutants that have the potential to discharge to a water of the State. The existing SPCC plan meets the minimum engineering requirements as defined in 40 CFR Part 112 and provides for secondary containment adequate to control any potential spills. Warrior Met also implemented a pollution abatement/prevention plan per the NPDES permit. The pollution abatement prevention plan ensures reduction of pollutants to a level that the discharge will not contribute to or cause a violation of applicable state water quality standards.

[9] The Mine No. 4 ADEM NPDES permit that was issued on August 01, 2019 is available at https://lf.adem.alabama.gov/WebLink/DocView.aspx?id=31521902&dbid=0

[10] The Mine No. 4 SPCC Plan is attached in the Draft NPDES permit (pp.180-187) available at: https://lf.adem.alabama.gov/WebLink/DocView.aspx?id=31507555&dbid=0

Surface water runoff at the existing Mine No. 4 facilities is managed by sediment control structures. All runoff drains to the basins naturally. Once reclamation is complete, surface water runoff should continue to flow to those sediment basins that ASMC has approved as permanent structures. Sediment basins are designed to retain all settleable solids, skim and retain all floating solids, and provide adequate detention volume and time to minimize the contribution of suspended solids into the receiving streams. Timely re-contouring and revegetation of disturbed areas will continue to minimize contamination to the surface water systems. Therefore, water quality (ground and surface) is not anticipated to receive direct or indirect impacts from operations at Mine No. 4.

An exceedance in water quality standards in accordance with the NPDES permit has not occurred except for one monitoring sample collected from a sediment basin in August 2023. The sample had a TSS reading of 36.5 mg/L (monthly average) which exceeded the permit limit of 35 mg/L. The sediment basin had unexpected inflows from upstream cleaning and maintenance processes. The inflow source that caused the brief period of elevated TSS was corrected, and the sediment basin was treated and underwent a significant clean out process to improve retention volume. Samples gathered in September and October of the same year indicated that the mitigation actions were effective, and the TSS levels returned to typical ranges well within permit requirements.

Under the NAA, the Mine No. 4 predicted subsidence footprint is about 9,434 acres. Underground mining operations have the potential to increase surface ponding in streams and cause subsidence-induced dewatering of surface water resources (Newman *et al*, 2017). Planned subsidence from Mine No. 4 underground operations has occurred on nearby surface areas, including those crossed by streams, without adverse effects to the surface, such as slope changes causing ponding or dewatering. Neither ADEM nor ASMC has received public complaints in respect to surface water impacts from Mine No. 4 operations. No adverse effects on surface drainage or hydrologic systems are anticipated due to planned subsidence. Mining is anticipated to cause a maximum of 2.20 feet of subsidence from Mine No. 4, while most of the surface land will be subject to less subsidence. The land surface is relatively steep, greatly reducing the potential for surface waters to be impacted by subsidence. If subsidence were to cause impacts to surface water resources, Warrior Met would implement mitigation measures in accordance with the applicable ASMC regulations.

Historical stream monitoring data were reviewed, and a statistical analysis was conducted for the purpose of determining if any statistically significant trends have occurred since monitoring began. A summary of results from the statistical analysis previously discussed in Section 4.4.1 is given in ***Table 4-31***.

Table 4-31. Mine No. 4 stream monitoring trends (Seasonal-Kendall test).

Station	Value	Flow (CFS)	pH	Fe (mg/L)	Mn (mg/L)	TSS (mg/L)	Conductivity (µS/cm)
4-6S	p-value	0.0038 ↑	< 0.0002 ↑	< 0.0002 ↓	< 0.0002 ↓	0.163	< 0.0002 ↑
	slope	0.1544	0.03677	-0.01224	-0.01289	4.545e-08	34.69
4-5S	p-value	< 0.0002 ↑	0.4768	0.8476	< 0.0002 ↑	0.6548	< 0.0002 ↑
	slope	0.03287	-0.0047	0.001345	0.02589	2.562e-08	36.09
4-4S	p-value	< 0.0002 ↑	0.0596	0.0004 ↓	< 0.0002 ↓	0.4218	0.0734
	slope	0.1738	0.009746	-0.02069	-0.02732	-4.105e-08	23.6
4-2S	p-value	< 0.0002 ↑	0.0008 ↑	< 0.0002 ↓	< 0.0002 ↓	0.8562	< 0.0002 ↑
	slope	0.1585	0.02828	-0.01464	-0.01421	-3.73e-08	35.24
4-1G*	p-value	NA	1	0.3148	0.44752	1	0.759
	slope	NA	0.08838	0.04488	0.1162	0.1747	-506.9
4-2G*	p-value	0.0378 ↓	0.8268	0.9164	0.7204	0.6654	0.1016
	slope	-3.618e-08	0.044	-7.839e-08	-4.716e-08	-0.4707	-13.8

Note: A p-value of less than 0.05 indicates a statistically significant trend. That is, the null hypothesis can be rejected at a 95-percent level of confidence.

* Represents monitoring stations without sufficient data to evaluate all 4 seasonal trends. One or more seasons were dropped due to too few observations.

Surface water quality and quantity in the area are subject to many other factors such as timber harvesting, weather patterns, and unrelated construction activities. Forestry activities can impact surface waters through inputs of sediment, nutrients, and chemicals, and by alterations to stream flow. Weather patterns can significantly impact surface water quality and quantity by influencing factors such as precipitation intensity, temperature, and wind, which can contribute to sediment runoff, nutrient loading, algal blooms, and the dilution or concentration of pollutants. More intense weather events like heavy rains, droughts, floods, and storms are often most impactful to surface water quality trends (EPA, 2005b).

Mine No. 4 will continue to comply with the procedures provided in Section 4.4.2.C in the handling of coal and refuse waste products, and that compliance should continue to protect surface water quality. The existing ASMC permit area will accommodate future coarse refuse disposal needs.

The exact extent of effects historically on the surface-water quality of local streams and watersheds from Mine No. 4 operations is unknown, and potential direct and indirect effects from the Mine No. 4 NAA are not measurable. Based on the Mine No. 4 discharge monitoring data, NPDES-compliant outfall discharge does not have a reasonable potential to degrade the quality of the receiving streams (listed in Section 3.4.1.A) relative to applicable state water quality standards. The trend analysis does not provide a consistent conclusion, and the variability is anticipated to continue. The implementation of erosion-control measures and monitoring requirements will apply to future fan shaft installments and will continue to help prevent adverse direct and indirect impacts to surface-water resources. Any impacts to surface-water resources from mining would contribute

to the overall cumulative effects on local watersheds from harvesting practices, changing weather patterns, and any unrelated construction activities, if they were to occur.

4.4.2.B. Blue Creek Mine No. 1

Blue Creek Mine No. 1 will continue to recover private coal for another 29 years if the NAA is selected. All existing surface activity associated with the existing mine is subject to stringent regulatory controls (including requirements for siltation structures, sediment ponds, monitoring, etc.) to limit soil erosion in the Shoal Creek – Black Warrior River, Lower Big Yellow Creek, Upper Big Yellow Creek, Tyro Creek, and Cedar Creek – North River sub-watersheds. Warrior Met has been required to obtain necessary permits from the ASMC, ADEM, and the USACE, with concurrence from the AHC, FWS, and other related regulatory agencies. Erosion mitigation measures (for example, waterbars and silt fences) have been required to be employed in accordance with the existing permits and pollution-control plans. The water quality in the permit area will continue to be monitored, tested, and reported regularly per the requirements of the existing NPDES permit[11].

The NPDES permit requires Warrior Met to design and implement a SPCC plan[12] for all stored chemicals, fuels, and stored pollutants that have the potential to discharge to a water of the state. The existing SPCC plan meets the minimum engineering requirements as defined in 40 CFR Part 112 and provides for secondary containment adequate to control any potential spills. Warrior Met also implemented a pollution abatement/prevention plan, per the NPDES permit. The pollution abatement/prevention plan ensures reduction of pollutants to a level that the discharge will not contribute to or cause a violation of applicable state water-quality standards.

Surface water runoff at the existing Blue Creek Mine No. 1 facilities is managed by sediment control structures. All runoff drains to the basins naturally. Once reclamation is complete, surface water runoff should continue to flow to those sediment basins that ASMC has approved as permanent structures. Sediment basins are designed to retain all settleable solids, skim and retain all floating solids, and provide adequate detention volume and time to minimize the contribution of suspended solids and dissolved solids into the receiving streams. Timely re-contouring and revegetation of disturbed areas will continue to minimize contamination to the surface water systems.

An estimated 285 acres of additional coarse refuse disposal area will be needed if the NAA is selected. The specific design plans and locations of future coarse refuse disposal areas is unknown at this time; however, all coarse refuse disposal areas will be situated in upland areas with sediment ponds designed and constructed in conjunction with the coarse refuse facilities to control any surface runoff from the disposal site. Blue Creek Mine No. 1 will continue to comply with the procedures provided in Section 4.4.2.C in the handling of coal and refuse waste products to continue to protect surface-water quality. Water quality is not anticipated to experience direct or

[11] The Blue Creek Mine No. 1 ADEM NPDES permit that was issued on July 10, 2023 is available at: https://lf.adem.alabama.gov/WebLink/DocView.aspx?id=105136966&dbid=0

[12] The Blue Creek Mine No. 1 SPCC Plan is attached in the Draft NPDES permit (pp.239-246) available at: https://lf.adem.alabama.gov/WebLink/DocView.aspx?id=105136264&dbid=0

indirect impacts from the operation of mining facilities when handling material from the Blue Creek Mine No. 1 operation.

Under the NAA, the Blue Creek Mine No. 1 predicted subsidence footprint consists of about 17,640 acres. Underground mining has the potential to impact surface-water resources. Past underground mining operations in the region have occurred for many years (i.e. Mine No. 4). As discussed with Mine No. 4 in Section 4.4.2.A, subsidence is not expected to impact surface-water resources from Blue Creek Mine No. 1 operations. Blue Creek Mine No. 1 predicts a maximum subsidence of 2.62 feet, while most of the surface land will be subject to less subsidence. Most of the land surface is relatively steep, greatly reducing the potential for surface waters to be impacted by subsidence. If subsidence were to affect surface-water resources, Warrior Met would implement mitigation measures in accordance with the SCP and ASMC regulations. Neither ADEM nor ASMC has received public complaints in respect to surface water impacts from Blue Creek Mine No. 1 operations.

Historical stream-monitoring data were reviewed, and a statistical analysis was conducted for the purpose of determining if any statistically significant trends have occurred since monitoring began. A summary of results from the statistical analysis previously discussed in Section 4.4.1 is given in ***Table 4-32***.

Table 4-32. Blue Creek Mine No. 1 stream monitoring trends (Seasonal Kendall test).

Station	Value	Flow (CFS)	pH	Fe (mg/L)	Mn (mg/L)	TSS (mg/L)	Conductivity (µS/cm)
UTBYC-SW1*	p-value	1	0.2762	1	0.017 ↑	1	0.1128
	slope	-0.002234	-0.05765	-0.001044	0.1435	2.184e-08	2.767
LYC-SW2	p-value	0.0562	0.0756	0.0368 ↑	0.1766	0.3518	0.0076 ↓
	slope	0.9877	-0.04414	0.007966	-0.001259	-1.289e-08	-5.01
LYC-SW1	p-value	1	0.013 ↓	0.0866	0.7388	0.1128	0.3442
	slope	0.00501	-0.07187	0.007904	3.961e-08	-1.955e-08	-2.915

Note: A p-value of less than 0.05 indicates a statistically significant trend.

* Represents monitoring stations without sufficient data to evaluate all 4 seasonal trends. One or more seasons were dropped due to too few observations.

A statistical comparison of baseline data versus subsequent monitoring data was conducted using the Wilcoxon rank-sum test for non-censored values and the Peto-Peto test for censored values to determine if a statistically significant difference exists between the two groups for monitoring stations LYC-SW1 and LYC-SW2. A summary of results (***Table 4-33***) shows that an overall increase in iron and a decrease in conductivity has occurred since monitoring began.

Table 4-33. Baseline data vs. operations data trend (p-values)

Station	Flow (CFS)	pH	Fe (mg/L)	Mn (mg/L)	TSS (mg/L)	Conductivity (µS/cm)
LYC-SW1	0.8916	0.1234	0.03544 ⬆	0.717	0.3695	0.6951
LYC-SW2	0.3652	0.494	0.3696	0.106	0.4896	0.02334 ⬇

Note: A p-value of less than 0.05 represents a statistically significant trend as determined by the Wilcoxon Rank-Sum Test or Peto-Peto Test. The trend direction (increasing or decreasing) is indicated by arrows.

Surface-water quality and quantity in the area are subject to many other factors such as timber harvesting, weather patterns, and unrelated construction activities. Forestry activities can impact surface waters through inputs of sediment, nutrients, and chemicals, and by alterations to stream flow. Weather patterns can significantly impact surface-water quality and quantity by influencing factors such as precipitation intensity, temperature, and wind, which can contribute to sediment runoff, nutrient loading, algal blooms, and the dilution or concentration of pollutants. More intense weather events like heavy rains, droughts, floods and storms are often most impactful to surface water quality trends (EPA, 2005b).

The exact extent of effects to the surface-water quality of local streams and watersheds from Blue Creek Mine No. 1 operations is unknown, and potential direct and indirect effects from the Blue Creek Mine No. 1 NAA are not measurable. Based on the Blue Creek Mine No. 1 discharge monitoring data, NPDES-compliant outfall discharge does not have a reasonable potential to degrade the quality of the receiving streams (listed in Section 3.4.1.B) relative to applicable state water-quality standards. An exceedance in the NPDES permit water-quality standards has not occurred. The trend analysis does not provide a consistent conclusion, and the variability is anticipated to continue. Implementation of erosion control measures and permit monitoring requirements will continue to help prevent adverse direct and indirect impacts to surface-water resources. Any mining related impacts to surface-water resources would contribute to the overall cumulative effects to the local watersheds in addition to nearby timber harvesting practices, changing weather patterns, and any unrelated construction activities, if they were to occur.

4.4.2.C. Coal and Waste Products

Necessary preventive or remedial measures will continue to be utilized in the handling of coal stockpiles and the immediate pit area. Coal stockpiles are situated on pads made of compacted clay or shale of acceptable permeability of desired thickness to carry the weight of loading and transportation equipment. Coal stockpiles are constructed on a mild slope in a manner to provide adequate drainage and minimize contamination of water. Excess drainage is diverted from coal stockpile areas. When coal stockpiles are no longer needed, they will be reclaimed by removing the coal that makes up the pads, covering the pad area with four feet of the best available non-toxic, non-combustible material and establishing permanent vegetation in accordance with the approved reclamation plans.

Both fine and coarse refuse is produced when. raw recovered coal is run through the processing plant. Coarse refuse is deposited in coarse refuse disposal areas approved by ASMC and MSHA. These structures are designed and re-certified quarterly by a professional engineer. Coarse refuse

disposal areas are above ground, mound-type features situated on higher ground than the surrounding area. At these disposal areas, coarse refuse is spread in two-foot-thick lifts (maximum) with dozers and compacted to 90% of maximum dry density using rubber-tire or track-mounted equipment. As the refuse pile is built up, it is shaped to have a slope no greater than a 3 horizontal to 1 vertical pitch. Terraces are constructed along the slopes to break up the slope lengths to minimize erosion and to control drainage. Down drains are constructed to route surface runoff from the top of the disposal area to the terraces. Coarse refuse disposal areas are constructed in stages, often with a terrace corresponding to each increment. The final graded site may be covered with lime as a precaution to balance out any potential acid-forming material. Once the lime is applied and disked into the surface, the entire disposal area is covered with a minimum of four feet (unless an alternative is approved) of the best available non-toxic, non-acid forming, non-combustible material and then vegetated to stabilize the disposal area and prevent erosion. Coarse refuse disposal areas are permanent structures and are inspected monthly by ASMC. Sediment basins are constructed in conjunction with coarse refuse facilities to control runoff from the disposal site. Warrior Met will adhere to the regulations included in Alabama Administrative Code 880-X-10D-.34, 880-X-10D-.36, and the requirements of 30 CFR 77.214-215 in the construction, maintenance, and monitoring of coarse refuse disposal areas.

Current drill hole data do not reflect acid-forming material in the rock that will be recovered and processed (See ***Appendix J***). Coarse refuse is considered potentially acid- or toxic- forming when it has a pH of 4 or less or has a net potential acidity of less than 5 tons per 1,000 tons of calcium carbonate equivalent (equates to an acid-base account of less than negative 5). If acid-forming coarse refuse material is encountered, a monitoring plan would be implemented to determine if neutralization of the waste product should occur in lifts as the refuse pile is constructed. If monitoring is determined necessary, the coarse refuse material would be sampled monthly at a minimum of two samples per two-foot lift. The samples would be transported to a laboratory to be analyzed for paste pH, total sulfur, and neutralization potential. The lab would calculate the acid-base account for each sample. The acid-base accounts would determine the liming requirements for each lift. If necessary, agricultural lime would be broadcast or spread along the surface of the upper lift and disced into the coarse refuse material. Neutralizing the coarse refuse material as it is brought up in two-foot lifts should prevent or minimize the possibility of acid mine drainage in the form of groundwater seeps and surface water runoff.

The fine refuse material remaining after coal processing, commonly referred to as slurry, consists of clays, and silt with water. Approximately 70-75% of slurry is water. All slurry material is disposed of in slurry impoundments that are designed by professional engineers and approved by ASMC and MSHA. The slurry impoundments are required to be re-certified annually to ensure they are maintained according to the design plans and are required by MSHA to be inspected by mine personnel on a weekly basis. As with the coarse refuse disposal areas, sediment ponds are located downstream of all slurry impoundments to control any runoff from the coal processing waste.

4.4.3. Environmental Impacts Proposed Action Alternative

4.4.3.A. Mine No. 4

Leasing the Mine No. 4 LBA tract would allow for an additional 7 years of mine life and an additional 30 million tons of saleable coal to be produced (as compared to the NAA). The relationship between the Mine No. 4 surface operations and surface-water resources would be the same as the NAA as previously described in Section 4.4.2.A but for an additional 7 years. While the mine life would be increased under the PDS, surface runoff from the permit area would likely not adversely affect local streams and watersheds.

The subsidence footprint would increase by 38% under the PDS compared to the NAA. The larger subsidence footprint contains more surface-water features, but no subsidence induced impacts to local streams and watersheds are anticipated (see Section 4.4.2.A).

Trend analyses for the existing data set do not reveal a consistent change in water characteristics. Similar variability may well persist as surface-water monitoring continues under the PA. Remediation will occur if any thresholds are detected.

Potential cumulative impacts of the PA upon surface-water resources are unknown due to immeasurable contribution of impacts from timber management, unrelated construction activities, and changing weather patterns. Direct and indirect impacts to surface- water resources are not anticipated.

4.4.3.B. Blue Creek Mine No. 1

Leasing the Blue Creek Mine No. 1 LBA tract would add 14 years of mine life and an additional 72.6 million tons of saleable coal to be produced (as compared to the NAA). The relationship between the Blue Creek Mine No. 1 surface operations and surface-water resources would be similar to the NAA as previously described in Section 4.4.2.B but extended for an additional 14 years. The primary difference in surface use operations would be the additional 618 acres (333 acres more than the NAA) of coarse refuse disposal area needed to accommodate the PDS. The exact locations and design specifications of future coarse refuse disposal areas are currently unknown. Warrior Met will construct and maintain disposal areas for coal waste following procedures and regulations previously discussed in Section 4.4.2.C. Runoff from the increased volume of coal waste is not likely to materially affect local streams and watersheds.

Under the PDS, the subsidence footprint would increase by 41%, as compared to the NAA. While the larger subsidence footprint does contain more surface-water features, potential subsidence induced impacts to local streams and watersheds are not anticipated (see Section 4.4.2.B).

Trend analyses of the existing water-monitoring data do not point to a consistent conclusion regarding mining effects on local water resources. Among the various water characteristics, some are trending toward improvement, others point toward degradation, while others show no statistically significant trend over the period of record. Similar variability is anticipated to continue

under the PA. Surface water monitoring will continue, and remediation will occur if any thresholds are detected.

Potential cumulative impacts of the PA upon surface water resources unknown due to immeasurable contribution of impacts from timber management, unrelated construction activities, and changing weather patterns. Direct and indirect impacts to surface- water resources are not anticipated.

4.4.4. Summary

The primary differences between the PDS and NAA for both mines are the durations of operations, amounts of coal recovered, and areas where subsidence will occur. Blue Creek Mine No. 1 would require an additional 618 acres of coarse refuse disposal area (333 more than the NAA) if the PDS is selected. Mine No. 4 and Blue Creek Mine No. 1 will continue to adhere to the existing ASMC and ADEM permit requirements, various control plans, and BMPs as needed, regardless of which alternative is selected. Direct and indirect effects to surface- water resources are not expected to increase as a result of a longer mine life, increased coal recovery, or a larger mining footprint. If impacts were to occur from operations at either mine, cumulative effects under the PA could be more environmentally significant than cumulative effects under the NAA. especially when considering both leases being issued. Potential cumulative effects, however, are largely unknown due to immeasurable potential impacts from timber management, unrelated construction activities, and changing weather patterns.

4.5 Groundwater Resources

4.5.1. Environmental Impacts No Action Alternative

4.5.1.A. Mine No. 4

If the NAA is selected, the Mine No. 4 LBA tract would not be offered for competitive leasing, and so federal coal reserves within the tract would not be mined. The existing mining operation would continue to recover private coal reserves for an estimated 14 years. Historically, a minor amount of groundwater has been encountered above and below the Blue Creek Coal seam in the mining area. Groundwater within the mining area appears to be contained in a poorly connected fracture system of sandstone in the Pottsville Formation. Isolated perched water tables with little areal extent are common to this system. Nevertheless, some local residents are using groundwater (MEC 2017-2018 inventory). The well inventory logs, as discussed in Section 3.4.3.A, are provided in ***Appendix G***. The NPDES permit does not authorize any discharge to groundwater. Should a threat of groundwater contamination occur, Warrior Met may be required to initiate groundwater monitoring for the identified issue to properly assess the degree of the problem. The ADEM may then require Warrior Met to undertake mitigation measures to abate any groundwater supply or quality issues.

Experiences in other mines in the region suggest little or no potential for significant water inflow through faults and fracture zones coupled with longwall mining-induced fractures does exist, especially where there is potential for interaction with surface water features. The current mining plan layout avoids most potentially problematic areas identified in previous studies.

Warrior Met reports that Mine No. 4 has encountered minimal hydrologic concerns ASMC has no record of public complaints concerning groundwater resource impacts from Mine No. 4 operations. Notably, the operation completed development under the Black Warrior River to access the northern reserve. Future mining operations such as mining under streams and aquifers and through hydraulically fractured CBM well are projected to occur in areas that exhibit similar hydrogeological conditions as past mining. s. Areas most likely to have hydrologic issues are those near existing faults or those overlain by large water features (MM&A, 2023).

Some groundwater is expected to be pumped out of underground mine works, mostly from the headgates or tailgates. Mine No. 4 development on the west side of the Black Warrior River has not encountered much groundwater. No groundwater has been pumped out of the mine since mining began on the west side of the river. Typical practice at Warrior Met mines is to install a deep well in conjunction with each exhaust fan to ensure the ventilation path does not become flooded. These wells remain in place after a mined-out portion of the underground works is sealed off to prevent potential water accumulation and pressure against the seals that separate these areas from the active mine areas and ventilation streams. The existing NPDES permit sets effluent limits for pumped mine water and for discharge from sediment basins that receive mine water.

Once mining is complete, Mine No. 4 is expected to fill with water to a certain extent. At mine depths of over 1,000 feet, water is not expected to rise to the elevation of wells in the region these wells are less than 400-feet deep) or discharge at the ground surface. The mine will be sealed, creating a largely oxygen-free condition that will greatly minimize the potential for developing an underground pool of acidic water.

Subsidence could impact groundwater resources and existing water wells could be damaged. Warrior Met or its agents, if property owners allow, will perform a well inventory prior to mining to determine the status of local groundwater users within the proposed mine area. These surveys will consist of direct interviews with property owners and measurements of water level and water quality as characterized by pH, conductivity, iron, manganese, and sulfate. Well inventories are intended to identify local groundwater users within the 30-degree AOD of the future mining extents and to preliminarily determine whether groundwater supply for any properties might be at risk of material damage.

ASMC rules and federal regulations, such as 30 CFR 817.41(j), require mitigation to promptly replace any drinking, domestic, or residential water supply that is contaminated, diminished, or interrupted because of underground mining activities. Replacement includes providing an equivalent water supply delivery system and payment of operation and maintenance cost. While there have been a few homeowners served by private wells near previous Warrior Met mining operations that have claimed well-water loss in the past, Warrior Met responded to those claims by arranging for service from a water authority. Mitigation practices will not change as Warrior Met continues mining in the future. Any loss of individual well-water supply is expected to be a minimal short-term impact.

Potential direct and indirect impacts to groundwater resources could occur under the NAA, but significant impacts are not likely considering the lack of public complaints or reported significant groundwater issues in the past. Impacts to groundwater quality are not expected; however, subsidence might dewater private water wells. There are no anticipated cumulative effects from Mine No. 4 under the NAA.

4.5.1.B. Blue Creek Mine No. 1

If the NAA is selected, the Blue Creek Mine No. 1 LBA tract would not be offered for competitive leasing, and subsequently, the federal coal reserves within the tract would not be mined. The existing mining operation would continue to recover private coal reserves for 29 years. Historically, other nearby mines (Mine No. 4 and No. 7) have encountered minor amounts of groundwater above and below the Blue Creek Coal seam. Groundwater within the mining area appears to be contained in a poorly connected fracture system of sandstone in the Pottsville Formation. Isolated perched water tables with little areal extent are common to this system. Nevertheless, some local residents are using groundwater (MEC 2012 inventory). The well inventory logs, as discussed in Section 3.4.3.B, are in ***Appendix G***. The NPDES permit does not authorize any discharge to groundwater. Should a threat of groundwater contamination occur, Warrior Met may be required to initiate groundwater monitoring for the identified issue to properly assess the degree of the problem. The ADEM may then require Warrior Met to mitigate any water quantity or quality issues.

Experiences in other mines in the region suggest that there could be significant water inflow to underground mine works through faults and fracture zones, especially where longwall mining-induced fractures extend up to stream beds or pond bottoms. The current mining plan layout avoids most potentially problematic areas identified in previous studies.

Warrior Met reports that the closest neighboring mine, Mine No. 4, has had minimal hydrologic concerns. The ASMC has no record of past public complaints concerning groundwater resource impacts from Mine No. 4 operations. Blue Creek Mine No. 1 mining operations occur in areas that have similar hydrogeological conditions as at Mine No. 4. where operations have undermined streams and aquifers and have mined through hydraulically fractured CBM wells. Areas that are anticipated to experience the most hydrologic issues are areas near existing faults and those overlain by large water bodies (MM&A, 2024).

Some groundwater is expected to be pumped out of the future mine development, most likely from the headgates or tailgates. As with Mine No. 4, Warrior Met predicts largely dry conditions during active operations at Blue Creek Mine No. 1. Warrior Met has not needed to pump any water from the mine since development began at Blue Creek Mine No. 1. Typical practice at Warrior Met mines is to install a deep well in conjunction with each exhaust fan to ensure the ventilation path does not become flooded. These wells remain in place after a mined-out portion of the underground works is sealed off to prevent potential water accumulation and resulting pressure against the seals that separate these areas from the active mine areas and ventilation streams. The existing NPDES permit specifies effluent limits for pumped mine water and for discharges from the sediment basins that receive that pumped water.

Once mining is complete, Blue Creek Mine No. 1 is expected to fill with water to a certain extent. At mine depths of over 800 feet, water is not anticipated to rise to the elevation of wells in the region (< 400' from surface) or discharge to the ground surface. After mining is complete, the mine will be sealed, creating a largely anoxic condition that will greatly minimize the potential for producing an acid mine pool.

Subsidence could impact groundwater resources and existing water wells could be damaged. Warrior Met or its agents, if property owners allow, will perform a well inventory prior to mining to determine the status of local groundwater users within the proposed mine area. These surveys will consist of direct interviews with property owners and measurements of water level and water quality as characterized by pH, conductivity, iron, manganese, and sulfate. Well inventories are intended to identify local groundwater users within the 30-degree AOD of the future mining extents and to preliminarily determine whether groundwater supply for any properties might be at risk of material damage.

ASMC rules and federal regulations, such as 30 CFR 817.41(j), require mitigation to promptly replace any drinking, domestic, or residential water supply that is contaminated, diminished, or interrupted because of underground mining activities. The mine permittee may provide an equivalent water delivery system and pay the cost for its operation and maintenance. Few homeowners with private wells near other Warrior Met mining operations have claimed well-water loss in the past. Warrior Met responded to these claims by arranging for service from a water authority. Mitigation practices will not change as Warrior Met continues mining in the future. Any loss of individual well-water supply is expected to be a minimal, short-term impact.

Potential direct and indirect impacts to groundwater resources could occur under the NAA, but significant impacts are not likely considering the lack of public complaints about groundwater issues in the past. Impacts to groundwater quality are not expected; however, subsidence might dewater private water wells. There are no anticipated cumulative effects associated with the NAA at Blue Creek Mine No. 1.

4.5.2. Environmental Impacts Proposed Action Alternative

4.5.2.A. Mine No. 4

If Warrior Met is the successful bidder in the competitive leasing process, mining operations would be extended 7 years. Warrior Met would continue to operate within the standards and regulations of the existing ASMC and NPDES permits. Potential impacts to groundwater resources would be like those described for the NAA in Section 4.5.1.A. Under the PDS, it is likely that more domestic water wells would be within the subsidence footprint (an area 41% larger than that under the NAA). Subsidence could possibly dewater these wells. If mining activities were to cause the dewatering, Warrior Met would mitigate the loss by replacing the water supply. Any loss of individual well-water supply is expected to be minimal and short term. There are no anticipated cumulative effects because of the Mine No. 4 PA.

4.5.2.B. Blue Creek Mine No. 1

If Warrior Met is the successful bidder in the competitive leasing process, coal recovery would continue for an additional 14 years beyond the time when mining would otherwise have ended. Warrior Met would continue to operate within the standards and regulations of the existing ASMC and NPDES permits. Potential impacts to groundwater resources would be like those described for the NAA in Section 4.5.1.B. More domestic water wells would likely be within the subsidence footprint under the PA because the subsidence footprint would be 41% larger than it would be under the NAA. More wells would be at risk of water loss from subsidence. If mining activities were to cause dewatering, Warrior Met would mitigate that loss by replacing the water supply. Any loss of individual well-water supply is expected to be minimal and short term. There are no anticipated cumulative effects because of Blue Creek Mine No. 1 PA.

4.5.3. Summary

Both the PA and NAA would have similar effects on groundwater resources. These effects would be directly related to differences in the duration of mining operations and size of the subsided area between the two federal decision alternatives. Direct and indirect effects to groundwater quality are not expected because there have been few, if any, groundwater quality issues tied to past and current mining activity—activity that would continue regardless of any federal leasing decision. Furthermore, underground workings of Mine No. 4 and Blue Creek Mine No. 1. are well below the Pottsville Aquifer which is the water source for local private wells. Mine No. 4 and Blue Creek Mine No. 1. Mining would not occur within the Pottsville Aquifer, but the aquifer could be fractured when underlying rocks collapse into the mine workings. Residential wells could lose water. Warrior Met, as required by ASMC, would replace the lost water source in a timely manner. Mining effects on groundwater could include a greater number of domestic water wells if the PA is selected because the subsidence footprints for both mines would expand as operations extend into leased federal coal. If the PA is selected and the PDS is implemented for Mine No. 4 and Blue Creek Mine No. 1, the period these groundwater impacts could occur would be extended 7 years and 14 years, respectively. Neither the NAA nor PA would have a cumulative effect on groundwater resources because the potential groundwater effects of mining—loss of water in wells—is limited to the subsidence footprint of each mine.

4.6 Socioeconomics

4.6.1. Economic Vitality

Appendix I gives the methodology and assumptions used to estimate economic impacts. This section summarizes the results from the analysis.

4.6.1.A. Environmental Impacts No Action Alternative

Under the NAA, the LBA tracts would not be leased, and mining operations progress to extract leased and accessible non-federal coal adjacent to the LBA tracts. Average annual production rates and employment for each mine are available in ***Table 4-34*** and ***Table 4-35***. Production rates differ between the alternatives due to a less efficient mine layout under the NAA. Mine No. 4 is expected to produce an average of 435,000 fewer tons annually when compared to the PA. Blue Creek Mine No. 1, is expected to produce an average of 772,000 fewer tons annually when compared to the PA. However, coal production rates at both mines are estimated to be higher than their respective baseline productions.

4.6.1.A.A. Mine No. 4

Average annual coal production and employment at Mine No. 4 from 2013 to 2023 is used as the baseline conditions to compare the economic effects of the PA (***Table 4-34***). Under the NAA, Mine No. 4 is expected to produce approximately 3 million tons of coal annually and employ 425 workers. This is an increase compared to baseline annual production of approximately 2 million tons with 383 workers. Under the NAA, Mine No. 4 is expected to increase average annual direct output by $231 million compared to baseline conditions. Direct mine employment is projected to increase by 42 compared baseline conditions, same as under the PA. The growth in direct output and employment could increase average annual total economic output of the socioeconomic study area by $347 million and total annual employment by an average of 442 jobs. The economic activity associated with the NAA could continue through the remaining life of the mine barring substantial changes to the market for metallurgical coal. Without federal coal, Mine No. 4 would have sufficient reserves for another 14 years.

The direct, primary impacts of federal leasing decisions are geographically concentrated in Tuscaloosa County; secondary effects extend out to other areas through equipment supply and maintenance services and the coal transportation sector of the wider state, region, and international economy. Once mine reserves are exhausted or production is otherwise halted, the annual economic activity supported by production will cease.

Table 4-34. Annual average economic activity within the socioeconomic study area supported by production at Mine No. 4 relative to baseline for the NAA.

No Action Alternative			
Effect	**Average Annual Employment (Number of jobs)**	**Average Annual Labor Income**	**Average Annual Output**
Direct	42	$5,357,375	$231,331,265
Secondary	400	$31,073,488	$116,466,905
Total	442	$36,430,863	$347,798,170

4.6.1.A.B. Blue Creek Mine No. 1

Blue Creek Mine No. 1 is a relatively new mine that is ramping up to full production. Regardless of federal action, the achievement of full production at Blue Creek Mine No. 1 would represent a large increase in economic activity for the study area compared to baseline conditions. Under the NAA, Blue Creek Mine No. 1 is estimated to produce 2.8 million tons of coal on average annually. This level of production is estimated to generate an average annual direct output of $623 million and employ an average of 500 workers at the mine annually, representing new economic activity when compared to baseline conditions. Production under the NAA could support an average of $941 million in total economic output and 1,654 total jobs in the socioeconomic study area annually through the life of the mine. Under the NAA, coal reserves are expected to sustain production for 29 years, assuming no major changes in market conditions occur.

The impacts are heavily concentrated as direct output in coal mining in Tuscaloosa County, with secondary effects in several mining related areas, transportation, and other sectors. Once mine reserves are exhausted and production is halted, the annual economic activity supported by production will cease.

Table 4-35. Annual average economic activity within the socioeconomic study area supported by production at Blue Creek Mine No. 1 relative to baseline for the NAA.

No Action Alternative			
Effect	**Average Annual Employment (Number of jobs)**	**Average Annual Labor Income**	**Average Annual Output**
Direct	500	$63,778,274	$623,676,303
Secondary	1154	$86,097,614	$318,317,451
Total	1654	$149,875,888	$941,993,754

4.6.1.B. Environmental Impacts Proposed Action Alternative

The PA would allow for the development of federal coal resources within the LBA tracts for both mines. Federal minerals are interspersed with nonfederal minerals, some of which would be inaccessible without the federal mineral leases. The analysis here describes the changes in baseline economic activity and employment for the socioeconomic study area associated with the development both federal and nonfederal coal in the LBA areas.

4.6.1.B.A. Mine No. 4

Average annual production and employment at Mine No. 4 from 2013 to 2023 is used as the baseline conditions to compare the economic effects of the PA (***Table 4-36***). Under the PA, Mine No. 4 is expected to produce approximately 3.4 million tons of coal each year and employ 425 workers compared to baseline annual production of approximately 2 million tons with 383 workers. Under the PA, Mine No. 4 is expected to increase average annual direct output by $327 million compared to baseline conditions. Direct mine employment is projected increase by 42 jobs

compared baseline conditions, same as under the NAA. The growth in direct output and employment could increase average annual total economic output of the socioeconomic study area by $492 million and total employment by an average of 605 jobs. The addition of the federal coal lease is expected to extend the mine life at the increased production level for another 21 years, 7 more years than the NAA. The economic activity associated with the PA could continue through the remaining life of the mine barring substantial changed to the market for metallurgical coal.

Table 4-36. Annual average economic activity within the socioeconomic study area supported by production at Mine No. 4 relative to baseline for the PA.

Proposed Action Alternative			
Effect	**Average Annual Employment (Number of jobs)**	**Average Annual Labor Income**	**Average Annual Output**
Direct	42	$5,357,375	$327,837,960
Secondary	563	$43,931,498	$164,858,863
Total	605	$49,288,873	$492,696,823

4.6.1.B.B. Blue Creek Mine No. 1

Blue Creek Mine No. 1 is a new mine that is ramping up to full production. Regardless of federal action, achievement of full production at Blue Creek Mine No. 1 represents a large increase in economic activity for the study area compared to baseline conditions. Under the PA, Blue Creek Mine No. 1 is expected to produce 3.5 million tons of coal a year with 500 workers on the payroll compared to no baseline production or employment. Under the PA, Blue Creek Mine No.1 is estimated to generate average annual direct output of $794 million from producing federal and nonfederal coal and employ an average of 500 workers at the mine annually. Production under the PA could support an average of $1.19 billion in total output and 1,944 total jobs annually through the life of the mine for the socioeconomic study area. The addition of federal mineral leases is expected to extend the mine life 14 more years than the NAA.

Table 4-37. Annual average economic activity within the socioeconomic study area supported by production at Blue Creek Mine No. 1 relative to baseline for the PA.

Proposed Action Alternative			
Effect	**Average Annual Employment (Number of jobs)**	**Average Annual Labor Income**	**Average Annual Output**
Direct	500	$63,778,274	$794,893,325
Secondary	1444	$108,909,609	$404,171,878
Total	1944	$172,687,883	$1,199,065,203

4.6.2. Provisioning of Public Services

4.6.2.A. Environmental Impacts No Action Alternative

The NAA may affect public services through short-term interruptions of service due to subsidence damage (Section 4.3).

Section 4.3 states that planned subsidence may cause material damage to electrical transmission lines, water mains, and roadways, and that subsidence may damage or contaminate residential wells. Warrior Met will pay for repairs and connect residences to water utilities if damages occur. Public services like residential water, electricity, and roadways may be diminished or unavailable for the time between damage and repair. Impacts are expected to be adverse and short-term in nature.

Under the NAA, no federal minerals would be leased and therefore no federal or state mineral revenues would be collected. ***Table 4-38*** estimates state mineral revenues to be collected on the non-federal coal mined in the socioeconomic study area.

Mine No. 4 may generate average annual state mineral revenues of $1 million for the remainder of the mine life, an estimated 14 more years. This level of state mineral revenues represents a slight increase from baseline but much less than the PA which has the addition revenues associated with federal minerals.

Blue Creek Mine No. 1 may generate average annual state mineral revenues of $942,534 for the remainder of mine life, an estimated 29 years. Since Blue Creek Mine No. 1 was not operating during the time used to describe baseline conditions, all the revenues collected from Blue Creek Mine No. 1 would be considered new revenues compared to baseline conditions.

Table 4-38. Estimated average annual state mineral revenues under the NAA.

Mine	Average Annual State Mineral Revenues	Average Annual Federal Mineral Revenue
Blue Creek Mine No. 1	$942,534	$0
Mine No. 4	$1,019,601	$0

4.6.2.B. Environmental Impacts Proposed Action Alternative

The PA is expected to affect both the provisioning of public services through short-term interruptions of service due to subsidence damage (Section 4.3) and government revenues associated with mining coal.

Section 4.3 states that planned subsidence may cause material damage to electrical transmission lines, water mains, and roadways, and that subsidence may damage or contaminate residential wells. Warrior Met will pay for repairs and connect residences to water utilities if damages occur.

Public services like residential water, electricity, and roadways may be diminished or unavailable for the time between damage and repair. Impacts are expected to be adverse and short term in nature.

Impacts to government revenue and the services it funds are driven through changes to revenues associated with coal extraction. These revenue streams are described in Section 3.5.2.

Under the PA, federal mineral leases would generate revenue from the competitive lease sale, annual rents, and royalties on extracted coal. Fifty percent of federal mineral revenues are distributed to the state where the coal is mined. Alabama state severance taxes and levies are also applied to extracted federal coal. Compared to the NAA, federal coal leases will increase the amount of non-federal coal to be extracted. Consequently, the state will benefit from more tax revenue from that private coal.

The mineral lease itself can be altered such that the rents and royalties described in Section 3.5.2 are different. The analysis assumes a standard 20-year mineral lease.

Due to the complexities of disbursements, this analysis does not estimate the exact disbursements to federal, state, and county governments. Rather, the analysis provides estimates of the funds to be collected by the state and federal governments. This is not an exhaustive list of the revenues associated with the PA. Government revenues from associated payroll taxes, income taxes, or sales tax are not analyzed.

Under the PA, **Mine No. 4** could generate about $15.4 million a year in total mineral revenues. Of the total, roughly $1.16 million is from Alabama state severance taxes and roughly $14.29 million from federal royalties and rent payments. About 50% of federal mineral revenues would be disbursed to Alabama at an average rate of $7.3 million annually. Through the remaining life of mine (an estimated 21 years), Alabama could, on average, receive $8.3 million in mineral revenue each year. The addition of federal minerals to the annual production would represent a relatively large increase in mineral revenues collected from Mine No. 4. From an estimated annual average of $670,000 under baseline conditions to $8.3 million under the PA.

Since **Blue Creek Mine No. 1** was not operating during the time used to describe baseline conditions, all the revenues collected from Blue Creek Mine No. 1 would be considered new revenues. Under the PA, Blue Creek Mine No. 1 could generate about $16.2 million a year in total mineral revenues. Of the total, roughly $1.2 million is from Alabama severance taxes and roughly $15 million from federal royalties and rent payments. Approximately 50% of federal mineral revenues would be disbursed to Alabama at an average annual rate of $7.5 million. Through the remaining life of mine (43 years), Alabama could, on average, receive $8.7 million in mineral annually.

Table 4-39. Estimated average annual state and federal mineral revenues under the PA.

Mine	Average Annual State Mineral Revenues	Average Annual Federal Mineral Revenue	Total Revenue Received by Alabama[1]
Blue Creek Mine No. 1	$1,201,287	$14,986,532	$8,694,553
Mine No. 4	$1,165,447	$14,289,303	$8,310,098

[1]Total revenues received by AL are average annual state mineral revenues plus 50% of average annual federal mineral revenues. Of the federal mineral revenues collected, 50% are distributed to the state the minerals were extracted from (30 USC 191: Disposition of moneys received)

4.6.3. Access to Products

4.6.3.A. Environmental Impacts No Action Alternative

Regardless of federal action, both mines will recover private coal reserves adjacent to the LBA tracts. Under the NAA, mining plans would bypass federal coal and interspersed non-federal coal (see Section 4.3.2). Due to geologic conditions and engineering limits, bypassed coal becomes irretrievable and is essentially sterilized. ***Table 4-40*** shows the tonnage of retrievable coal under each alternative that would be sterilized by ownership over the life of the mines.

For **Mine No. 4** under the NAA, about 30 million tons of coal would be sterilized (about 16 million tons of federal coal and 13 million tons of non-federal coal).

For **Blue Creek Mine No. 1**, the NAA would result in the sterilization of about 72 million tons of coal with about half federal and half private.

Sterilized coal would not be recoverable in the future. Owners or lessees of the sterilized nonfederal coal would be unable recover that coal and enjoy the benefits in the future. Similarly, the public loses the option to lease sterilized federal coal later.

Table 4-40. Coal expected to be sterilized under NAA and PA for Blue Creek Mine No. 1 and Mine No. 4 by ownership.

Mine	Sterilized Federal Coal	Sterilized Nonfederal Coal	Total Sterilized Coal
Blue Creek Mine No. 1	36,278,476	36,324,062	72,602,538
Mine No. 4	16,900,970	13,546,725	30,447,695

4.6.3.B. Environmental Impacts Proposed Action Alternative

Leasing the proposed LBA tracts would allow for the recovery of federal coal and interspersed non-federal coal reserves adjacent to current underground mining operations. For **Mine No. 4**, the PA, compared to the NAA, would have an additional 30 million tons of coal extracted over the life of the mine. About 16 million tons of the increased production would be federal coal and 13 million tons would be non-federal coal.

For **Blue Creek Mine No. 1**, the PA would allow for an additional 72 million tons of coal to be extracted over the life of the mine comprised of about equal parts federal coal and non-federal coal, compared to the NAA.

4.6.4. Way of Life and Social Cohesion

Impacts to way of life and social cohesion are similar for both Mine No. 4 and Blue Creek Mine No. 1. To reduce redundancy, they are discussed together in the section below.

4.6.4.A. Environmental Impacts No Action Alternative

A decision to not lease the coal may cause short-term, minor adverse impacts to social cohesion because populations across the study area with strong coal mining heritage identities may see that decision as an attack on their moral worth (Lewin, 2019). This conflict would likely be most prevalent between individuals and communities with strong coal mining heritage identities and those who value environmental regulations.

Under the NAA, population trends would likely continue through the life of the mine (Section 3.5.4). Once coal production stops at the end of the life of the mine, additional population growth may occur in Tuscaloosa County (Kratzer, 2015). However, due to the rapidly increasing population and associated density already present in this county (U.S. Department of Commerce and The Census Bureau, 2023), selection of the NAA is unlikely to have any noticeable impact on the urban character of the county. This is likely also to be the case with Jefferson County's more suburban character. Assuming some spillover effects from coal mining due to the proximate nature of Fayette and Walker Counties to the mine locations, populations may also increase in these counties once coal mining ceases (Kratzer, 2015). However, due to the expected declines in population though the life of the mine in Fayette and Walker Counties (U.S. Department of Commerce and The Census Bureau, 2023), the population gain and associated densities from the cessation of coal mining at Blue Creek Mine No. 1 and Mine No. 4 is unlikely to change the rural character of these counties. However, it should be noted that there is substantial uncertainty regarding these effects due to the complexity of population change (Chi and Ventura, 2011) and the inability to anticipate effects decades into the future.

Coal mining heritage identity, including the sense of purpose, passion, respect in the community, and feelings of responsibility for those associated with the industry (Wagner, 2017), is likely to continue to diminish as jobs in the mining industry (including all four counties in the study area)

are also likely to continue to decrease across the study area (U.S. Department of Commerce and The Census Bureau, 2023). At the end of the life of the mine, the acute loss of mining jobs in the study area is likely to have an adverse impact on people and communities with coal mining heritage identities. There is uncertainty about the magnitude of this impact due to complex market demands, technological advances that may occur and the historic volatility of the coal market (Carley et al., 2017; Houser et al., 2017).

In summary, impacts to coal mining heritage identity is the primary avenue by which way of life and social cohesion values would be affected. Social cohesion initially may be affected to a minor degree, while a loss of coal mining heritage identity after the mines close may also represent an adverse effect. The complex nature of social systems and the inability to accurately project conditions decades into the future produce uncertainty about how different mining scenarios might affect way of life and social cohesion.

4.6.4.B. Environmental Impacts Proposed Action Alternative

A decision to lease the coal under the PA may cause short-term, minor sense of loss in those populations across the study area who value restricting coal mining for environmental protection reasons (Lewin, 2019). Social cohesion could be strained between individuals and communities with strong coal mining heritage identities and those who value environmental regulations.

Under the PA, population trends would likely continue through the life of the mine (Section 3.5.4). Once coal production stops and mining jobs are gone, population growth may still occur in Tuscaloosa County (Kratzer, 2015). Tuscaloosa County has a rapidly increasing population and associated density (U.S. Department of Commerce and The Census Bureau, 2023), Mining is unlikely to have any noticeable effect on the urban character of the county. This is also likely to be the case with Jefferson County's more suburban character. Even assuming some spillover effects from coal mining, neighboring counties of Fayette and Walker, may also have population increases once coal mining ceases (Kratzer, 2015). However, due to the expected declines in population though the life of the mine in Fayette and Walker Counties (U.S. Department of Commerce and The Census Bureau, 2023), the population gain, and associated density increase from the cessation of coal mining at Blue Creek Mine No. 1 and Miner No. 4 is unlikely to change the rural character of these counties. The primary difference compared to the NAA is that these potential changes would occur later in the PA due to the life of the mines. However, it should be noted that there is substantial uncertainty regarding these effects due to the complexity of population change (Chi and Ventura, 2011) and the inability to anticipate effects decades into the future.

Coal mining heritage identity, including the sense of purpose, passion, respect in the community, and feelings of responsibility for those associated with the industry (Wagner, 2017), is likely to continue to diminish as jobs in the mining industry (including all four counties in the study area) are also likely to continue to decrease across the study area (U.S. Department of Commerce and The Census Bureau, 2023). At the end of the life of the mine, the acute loss of mining jobs in the study area is likely to have an adverse impact on people and communities with coal mining heritage identities. There is uncertainty about the magnitude of this impact due to complex market demands, technological advances that may occur and the historic volatility of the coal market (Carley et al.,

2017; Houser et al., 2017). Compared to the NAA, these effects would be delayed due to the longer mine lives.

In summary, impacts to coal mining heritage identity is the primary avenue by which way of life and social cohesion values would be affected. Social cohesion initially may be affected to a minor degree, while a loss of coal mining heritage identity after the mines close may also represent an adverse effect. The complex nature of social systems and the inability to accurately project conditions decades into the future produce uncertainty about how different mining scenarios might affect way of life and social cohesion. Compared to the NAA, the result is not what types of impacts would occur, but when they would occur. It is likely the same impacts would occur later, compared to the NAA.

4.6.5. Public Health and Safety

Public health and safety may be impacted by mine subsidence and degradation of air and water quality. An analysis for each of these issues is in the respective sections of this EIS. Impacts are similar for both Mine No. 4 and Blue Creek Mine No. 1. To reduce redundancy, they are discussed together in the section below.

4.6.5.A. Environmental Impacts No Action Alternative

The probability of exceeding NAAQS in the PA is low (Section 4.2.2.A). Because of this, public health and safety impacts from air quality issues are unlikely to occur from the PA.

Some contamination of residential wells may occur (Section 4.5.1), but Warrior Met will mitigate any potential public health and safety impact by paying for repairs or connecting residences to water utilities if damage or contamination occurs. While not likely, adverse impacts to the health of those who use groundwater may occur between the time contamination occurs and when that contamination is detected. These impacts may be short or long-term. Because the subsidence footprint is smaller in the NAA and contains fewer occupied residential dwellings, potential public health and safety impacts from well contamination are lower in the NAA (Section 4.3.2.A).

As discussed in Section 2.5.5.A., under the SCP, the mandated well inventory and methane monitoring requirements would minimize and mitigate any risks to public health and safety from fugitive methane. Methane monitoring and reporting during the critical early period of subsidence will alert both the operator and ASMC to any potential for the accumulation of methane to explosive concentrations and allow for immediate action to be taken. Overall, the NAA would not likely result in impacts to public health and safety.

4.6.5.B. Environmental Impacts Proposed Action Alternative

The probability of exceeding NAAQS in the PA is low (Section 4.2.2.B). Consequently, public health and safety impacts from air quality issues are unlikely to occur from the PA.

Some contamination of residential wells may occur (Section 4.5.2), but Warrior Met would mitigate any potential public health and safety impact by paying for repairs or connecting residences to water utilities if damage or contamination occurs. Adverse impacts to the health and safety of those who use groundwater from private wells may occur between the time the groundwater is contaminated and when that contamination is detected. These impacts may be short or long-term. Because the subsidence footprint is larger in the PA and contains more occupied residential dwellings, potential public health and safety impacts from well contamination are higher in the PA (Section 4.3.3.B).

As discussed in Section 4.3.3, under the SCP, the mandated well inventory and methane monitoring requirements would minimize and mitigate any risks to public health and safety from fugitive methane. Methane monitoring and reporting during the critical period of subsidence post-mine passage will alert both the operator and ASMC to any potential for the accumulation of methane to explosive concentrations and allow for immediate action to be taken. Overall, the PA would not likely result in impacts to public health and safety.

4.7 Realty And Land Use

4.7.1. Environmental Impacts No Action Alternative

4.7.1.A. Mine No. 4

Under the NAA, the Mine No. 4 subsidence footprint covers 9,434 acres. Within that area, there are 17 occupied residential dwellings as well as other related structures, drinking water supplies and various surface features. Warrior Met will follow procedures outlined in the SCP and previously described in Section 2.5.2 in the event subsidence damages dwellings, structures, or utilities. Direct and indirect effects from fugitive methane gas to public or private property are not anticipated, but any adverse effects are expected to be short-term and effectively mitigated under the approved SCP, as described in Section 2.5.5.A.

There is one commercial facility, Fields Grocery and Gas, located within the NAA predicted subsidence footprint. Fields Grocery and Gas has three active underground storage tanks (USTs). Warrior Met would coordinate with the property owner to implement procedures to avoid potential subsidence impacts to the active USTs onsite. These procedures would likely include the temporary or permanent closure of the USTs and would be consistent with the ADEM regulations[13] that govern UST closures.

Six months prior to mining under the Fields Grocery and Gas facility, Warrior Met would coordinate with the property owner to conduct a site assessment to test for any previous UST leaks or contamination. The closure of the USTs would involve emptying and cleaning the tanks and

[13] ADEM Admin. Code 335-6-15-.33 through .37 details requirements for closure notifications, required closure practices, and which UST systems must undertake a closure site assessment. Code 335-6-15-.26 details the requirements for conducting UST closure site assessments.

piping, removing or filling them with inert materials, and capping or removing all associated lines and connections. Warrior Met would also establish a survey monument to monitor the subsidence at the site until subsidence is complete.

There are no direct effects anticipated from the Mine No. 4 NAA. Indirect effects from the NAA may include subsidence related impacts to surface facilities. These surface facilities include 17 occupied residential dwellings, as well as ancillary structures and drinking and domestic water supplies. If they were to occur, subsidence induced effects to surface structures and water supplies would not likely be adverse considering the rarity of similar issues historically in the area. Effects are expected to be short-term due to the mitigation procedures in the SCP (Section 2.5.2). Known potential cumulative effects to realty and land use resources consists of potential impacts from the continuation of mining at Blue Creek Mine No. 1. These effects would be additive, meaning the combined effects from both mines would be equal to the sum of their individual effects.

4.7.1.B. Blue Creek Mine No. 1

Under the NAA, the Blue Creek Mine No. 1 subsidence footprint covers 17,640 acres. Within that area, there are 65 occupied residential dwellings as well as other related structures, drinking water supplies and other surface features. Warrior Met will follow procedures outlined in the SCP and previously described in Section 2.5.2 in the event subsidence impacts do occur to dwellings, structures, or utilities. Direct and indirect effects from fugitive methane gas to public or private property are not anticipated, but any adverse effects are expected to be short-term and effectively mitigated under the approved SCP, as described in Section 2.5.5.A.

There are no direct effects anticipated from the Blue Creek Mine No. 1 NAA. Indirect effects from the NAA may include subsidence impacts to surface facilities. These surface facilities include 65 occupied residential dwellings, as well as ancillary structures and drinking and domestic water supplies. If they were to occur, subsidence induced effects to surface structures and water supplies would not likely be adverse considering the rarity of similar issues historically in the area. Effects would be short-term due to the previously mentioned mitigation procedures (Section 2.5.2). Known potential cumulative effects to realty and land use resources consists of potential impacts from the continuation of mining at Mine No. 4. These effects would be additive, meaning the combined effects from both mines would be equal to the sum of their individual effects.

4.7.2. Environmental Impacts Proposed Action Alternative

4.7.2.A. Mine No. 4

Under the PA, and if the PDS is implemented, Mine No. 4 will operate for an additional 7 years and add 15,148 acres of subsidence footprint. Within that area, there are 28 occupied residential dwellings as well as other related structures, drinking water supplies and other surface features. There are no commercial buildings within the PDS subsidence footprint. Warrior Met will follow procedures outlined in the SCP and previously described in Section 2.5.2 in the event subsidence impacts do occur to dwellings, structures, or utilities. Direct and indirect effects from fugitive

methane gas to public or private property are not anticipated, but any adverse effects are expected to be short-term and effectively mitigated under the approved SCP, as described in Section 2.5.5.A.

An additional 5,050 acres have been identified in the outlying federal forties AOD for Mine No. 4, which includes 12 occupied residential dwellings that have the potential to be impacted by subsidence. The PDS currently defines the boundaries of what is considered a viable longwall operation and does not include the entirety of the proposed federal coal lease. At this time, it is not anticipated that the additional acreage will be impacted by subsidence. However, as the PA is being considered regarding the leasing of federal coal, there is potential for subsidence to occur in this area if operations were to progress in the future as a result of leasing the federal coal under the PA.

There are no direct effects anticipated from the Mine No. 4 PA. Indirect effects from the PA may include subsidence related impacts to surface facilities. These surface facilities include 28 occupied residential dwellings within the PDS AOD and 12 occupied residential dwellings in the outlying federal forties AOD, as well as ancillary structures and drinking and domestic water supplies. If they were to occur, subsidence induced effects to surface structures and water supplies would not likely be adverse considering the rarity of similar issues historically in the area. Effects would be short-term due to the previously mentioned mitigation procedures (Section 2.5.2). Known potential cumulative effects to realty and land use resources consists of potential impacts from the continuation of mining at Blue Creek Mine No. 1. These effects would be additive, meaning the combined effects from both mines would be equal to the sum of their individual effects.

4.7.2.B. Blue Creek Mine No. 1

Under the PA, and if the PDS is implemented, Blue Creek Mine No. 1 will operate for an additional 14 years, and the subsidence footprint covers 29,641 total acres. Within that area, there are 96 occupied residential dwellings as well as other related structures, drinking water supplies and other surface features. There are no commercial buildings within the PDS subsidence footprint. Warrior Met will follow procedures outlined in the SCP and previously described in Section 2.5.2 in the event subsidence impacts do occur to dwellings, structures, or utilities. Direct and indirect effects from fugitive methane gas to public or private property are not anticipated, but any adverse effects are expected to be short-term and effectively mitigated under the approved SCP, as described in Section 2.5.5.A.

An additional 6,203 acres have been identified in the outlying federal forties AOD for Blue Creek Mine No.1, which includes 29 occupied residential dwellings that have the potential to be impacted by subsidence. The PDS currently defines the boundaries of what is considered a viable longwall operation, at this time, it is not anticipated that the additional acreage will be impacted by subsidence. However, as the PA is being considered regarding the leasing of federal coal, there is potential for subsidence to occur in this area if operations were to progress in the future as a result of leasing the federal coal under the PA.

There are no direct effects anticipated from the Blue Creek Mine No. 1 PA. Indirect effects from the PA may include subsidence related impacts to surface facilities. These surface facilities include 96 occupied residential dwellings within the PDS AOD and 29 occupied residential dwellings in the outlying federal forties AOD, as well as ancillary structures and drinking and domestic water

supplies. If they were to occur, subsidence induced effects to surface structures and water supplies would not likely be adverse considering the rarity of similar issues historically in the area. Effects would be short-term due to the previously mentioned mitigation procedures (Section 2.5.2). Known potential cumulative effects to realty and land use resources consists of potential impacts from the continuation of mining at Mine No. 4. These effects would be additive, meaning the combined effects from both mines would be equal to the sum of their individual effects.

4.8 Wildlife

4.8.1. Environmental Impacts No Action Alternative

Potential stressors (direct and indirect effects that negatively affect a species) associated with underground mining operations that may result from the NAA include (1) ground disturbance activities; (2) subsidence-induced surface water alteration; (3) groundwater alteration; and (4) water quality degradation (pollution/siltation).

4.8.1.A. Mine No. 4

The necessary surface facilities to support the expansion of Mine No. 4 would primarily be existing, permitted facilities, with the exception of the five fan shafts which would require separate ASMC approval and FWS concurrence prior to any surface disturbance.

Planned subsidence would occur gradually over time. Most of the surface land within the action area is relatively steep in gradient, greatly reducing the potential for surface waters to be impacted by subsidence. Planned subsidence from Mine No. 4 has occurred on nearby surface areas, including those crossed by streams, without adverse impacts to surface water resources, such as slope changes, ponding, or dewatering. Neither ADEM nor ASMC has received public complaints in respect to surface water impacts from the existing Mine No. 4 or Blue Creek Mine No. 1 operations. If subsidence was to impact surface water resources, in accordance with each mine operation's Subsidence Mitigation Program, Warrior Met would be required to implement mitigation measures to return the surface water resource back to its original topography and function.

The ASMC permit for Mine No. 4 does not require continual groundwater monitoring to be conducted, and the NPDES permit does not authorize discharge to groundwater. Some groundwater is expected to be pumped out of the future mine development, most likely at the headgates or tailgates. Mine No. 4 has experienced minimal hydrologic concerns or material issues, and ASMC has no record of past public complaints concerning groundwater resource impacts from Mine No. 4 operations. Should impacts to groundwater occur, Warrior Met may be required to initiate groundwater monitoring and undertake mitigation measures to abate any such discharge and/or contamination.

The NAA has the potential to directly or indirectly affect surface water quality. However, based on analyses of the historical discharge monitoring data for both mines, NPDES-compliant outfall

discharge does not have a reasonable potential to degrade the quality of the receiving streams relative to applicable state water quality standards. Discharges from sediment ponds in the Mine No. 4 permit area will continue to be monitored, tested, and reported regularly per the requirements of the existing NPDES permits. The implementation of erosion control measures and permit monitoring requirements will continue to help prevent adverse direct and indirect impacts of surface runoff to surface water resources. The mines will continue to follow coal refuse and waste product handling procedures to protect surface water quality. Timely re-contouring and revegetation of disturbed areas will continue to minimize contamination to the surface water systems.

If Mine No. 4 continues to be compliant with the previously discussed permits, control plans, and Protection and Enhancement Plans (PEP), direct and indirect effects to wildlife resources from ground disturbance or subsidence-induced surface water alteration are not expected under the NAA. Direct and indirect effects to wildlife resources from groundwater and surface water resources and water quality could occur, but significant impacts are not likely.

If impacts from Mine No. 4 were to occur under the NAA, potential cumulative effects would include potential impacts from the continuation of mining at Blue Creek Mine No. 1. These effects would be additive, meaning the combined effects from both mines would be equal to the sum of their individual effects.

4.8.1.B. Blue Creek Mine No. 1

Under the NAA, potential impacts to wildlife resources at Blue Creek Mine No. 1 are expected to be similar to those discussed for Mine No. 4.

If Blue Creek Mine No. 1 continues to be compliant with the previously discussed permits, control plans, and PEPs, direct and indirect effects to wildlife resources from ground disturbance or subsidence-induced surface water alteration are not expected under the NAA. Direct and indirect effects to wildlife resources from groundwater and surface water resources and water quality could occur, but significant impacts are not likely.

If impacts from Blue Creek Mine No. 1 were to occur under the NAA, potential cumulative effects would include potential impacts from the continuation of mining at Mine No. 4. These effects would be additive, meaning the combined effects from both mines would be equal to the sum of their individual effects.

4.8.2. Environmental Impacts Proposed Action Alternative

Potential stressors (direct and indirect effects that negatively affect a species) associated with underground mining operations that may result from the NAA include (1) ground disturbance activities; (2) subsidence-induced surface water alteration; (3) groundwater alteration; and (4) water quality degradation (pollution/siltation).

4.8.2.A. Mine No. 4

Under the PA, the Mine No. 4 subsidence footprint would increase approximately 38%, and mining would continue for an additional 7 years.

The necessary surface facilities to support the expansion of Mine No. 4 would primarily be existing, permitted facilities, with the exception of the five fan shafts which would require separate ASMC approval and FWS concurrence prior to any surface disturbance.

Planned subsidence would occur gradually over time. Most of the surface land within the action area is relatively steep in gradient, greatly reducing the potential for surface waters to be impacted by subsidence. Planned subsidence from Mine No. 4 has occurred on nearby surface areas, including those crossed by streams, without adverse impacts to surface water resources, such as slope changes, ponding, or dewatering. Neither ADEM nor ASMC has received public complaints in respect to surface water impacts from the existing Mine No. 4 or Blue Creek Mine No. 1 operations. If subsidence was to impact surface water resources, in accordance with each mine operation's Subsidence Mitigation Program, Warrior Met would be required to implement mitigation measures to return the surface water resource back to its original topography and function.

The ASMC permit for Mine No. 4 does not require continual groundwater monitoring to be conducted, and the NPDES permit does not authorize discharge to groundwater. Some groundwater is expected to be pumped out of the future mine development, most likely at the headgates or tailgates. Mine No. 4 has experienced minimal hydrologic concerns or material issues, and ASMC has no record of past public complaints concerning groundwater resource impacts from Mine No. 4 operations. Should impacts to groundwater occur, Warrior Met may be required to initiate groundwater monitoring and undertake mitigation measures to abate any such discharge and/or contamination.

The PA has the potential to directly or indirectly affect surface water quality. However, based on analyses of the historical discharge monitoring data for both mines, NPDES-compliant outfall discharge does not have a reasonable potential to degrade the quality of the receiving streams relative to applicable state water quality standards. Water quality in the Mine No. 4 permit area will continue to be monitored, tested, and reported regularly per the requirements of the existing NPDES permits. The implementation of erosion control measures and permit monitoring requirements will continue to help prevent adverse direct and indirect impacts of surface runoff to surface water resources. The mines will continue to follow coal refuse and waste product handling procedures to protect surface water quality. Timely re-contouring and revegetation of disturbed areas will continue to minimize contamination to the surface water systems.

If Mine No. 4 continues to be compliant with the previously discussed permits, control plans, and PEPs, direct and indirect effects to wildlife resources from ground disturbance or subsidence-induced surface water alteration are not expected under the PA. Direct and indirect effects to wildlife resources from groundwater and surface water resources and water quality could occur, direct and indirect effects to surface water resources are not expected to increase significantly from the implementation of the PA versus the NAA. Additive effects from the PA could potentially be more significant than the NAA in the case of an unforeseen event or impact to surface water resources.

If impacts from Mine No. 4 were to occur under the PA, potential cumulative effects would include potential impacts from the continuation of mining at Blue Creek Mine No. 1. These effects would be additive, meaning the combined effects from both mines would be equal to the sum of their individual effects.

4.8.2.B. Blue Creek Mine No. 1

Under the PA, the Blue Creek Mine No. 1 subsidence footprint would increase approximately 41%, and mining would continue for an additional 14 years.

Under the PA, potential impacts to wildlife resources at Blue Creek Mine No. 1 are expected to be similar to those discussed for Mine No. 4.

If Blue Creek Mine No. 1 continues to be compliant with the previously discussed permits, control plans, and PEPs, direct and indirect effects to wildlife resources from ground disturbance or subsidence-induced surface water alteration are not expected under the PA. Direct and indirect effects to wildlife resources from groundwater and surface water resources and water quality could occur, direct and indirect effects to surface water and groundwater resources are not expected to increase significantly from the implementation of the PA versus the NAA. Additive effects from the PA could potentially be more significant than the NAA in the case of an unforeseen event or impact to surface water resources.

If impacts from Blue Creek Mine No. 1 were to occur under the PA, potential cumulative effects would include potential impacts from the continuation of mining at Mine No. 4. These effects would be additive, meaning the combined effects from both mines would be equal to the sum of their individual effects.

4.9 Special Status Species

4.9.1. Environmental Impacts No Action Alternative

The BLM prepared a BA and submitted its effects determinations to FWS for informal consultation and concurrence under section 7 of the ESA. The BLM received concurrence from FWS on its effects determinations on April 29, 2025 (see Section 5.2).

4.9.1.A. Mine No. 4

At Mine No. 4, the NAA would have no effect on the threatened Alabama moccasinshell mussel, the endangered ovate clubshell mussel, or the endangered triangular kidneyshell mussel because these species do not occur in the Mine No. 4 action area, or the Upper Black Warrior watershed. The NAA would also have no effect on the endangered gray bat because this species does not occur within the action area.

Under the NAA, because exposure to potential stressors such as ground disturbance and subsidence-induced surface water alteration is unlikely, the direct and indirect effects of these stressors on the endangered Black Warrior waterdog, the endangered dark pigtoe mussel, the threatened inflated heelsplitter mussel, the threatened orangenacre mucket mussel, the threatened flattened musk turtle, the endangered Indiana bat, the endangered northern long-eared bat, the threatened Mohr's Barbara's button, and the threatened white fringeless orchid, are expected to be discountable.

Under the NAA, species may be exposed to potential stressors such as alteration of surface and groundwater quality. However, because protections are in place at Mine No. 4, including sediment control measures, effluent limitations, and 100-foot riparian buffer zones, the direct and indirect effects of these stressors on the endangered Black Warrior waterdog, the endangered dark pigtoe mussel, the threatened inflated heelsplitter mussel, the threatened orangenacre mucket mussel, the threatened flattened musk turtle, the proposed threatened alligator snapping turtle , the endangered Indiana bat, the endangered northern long-eared bat, the proposed endangered tricolored bat, the proposed threatened monarch butterfly, the threatened Mohr's Barbara's button, and the threatened white fringeless orchid, are expected to be insignificant.

As discussed in Section 3.8.1, because the configuration of the underground mine development would need to be adjusted to bypass the federal forties, the portion of Yellow Creek within the action area begins at the headwater and continues for approximately 9,834 linear feet (1.86 mi) (***Figure 3-10***). The direct and indirect effects of these stressors on designated critical habitat for the Black Warrior waterdog (Yellow Creek) are also expected to be discountable or insignificant and are not expected to increase significantly from the implementation of the NAA versus the PA. Additive effects from the NAA could potentially be more significant than the PA in the case of an unforeseen event or impact to designated critical habitat.

4.9.1.B. Blue Creek Mine No. 1

Under the NAA, potential impacts to special status species at Blue Creek Mine No. 1 are expected to be the same as those discussed for Mine No. 4.

The NAA at Blue Creek Mine No. 1 would eventually (5+ years) require an additional 285 acres for coarse refuse storage. There are currently no design plans for this area, and the location is unknown. Similar to the fan shafts, prior to construction or surface disturbance, this area would require approval by ASMC, and concurrence from FWS. For these reasons, exposure to ground disturbing activities at Blue Creek Mine No. 1 is still expected to be unlikely, and the direct and indirect effects of such exposure to listed and proposed species would be insignificant.

There is no designated critical habitat within the Blue Creek No. 1 action area.

4.9.2. Environmental Impacts Proposed Action Alternative

4.9.2.A. Mine No. 4

Under the PA, the Mine No. 4 subsidence footprint would increase approximately 38%, and mining would continue for an additional 7 years.

At Mine No. 4, the PA would have no effect on the threatened Alabama moccasinshell mussel, the endangered ovate clubshell mussel, or the endangered triangular kidneyshell mussel because these species do not occur in the Mine No. 4 action area, or the Upper Black Warrior watershed. The NAA would also have no effect on the endangered gray bat because this species does not occur within the action area.

Under the PA, because exposure to potential stressors such as ground disturbance and subsidence-induced surface water alteration is unlikely, the direct and indirect effects of these stressors on the endangered Black Warrior waterdog, the endangered dark pigtoe mussel, the threatened inflated heelsplitter mussel, the threatened orangenacre mucket mussel, the threatened flattened musk turtle, the endangered Indiana bat, the endangered northern long-eared bat, the proposed endangered tricolored bat, the threatened Mohr's Barbara's button, and the threatened white fringeless orchid, are expected to be discountable.

Under the PA, species may be exposed to potential stressors such as alteration of surface and groundwater quality. However, because protections are in place at Mine No. 4, including sediment control measures, effluent limitations, and 100-foot riparian buffer zones, the direct and indirect effects of these stressors on the endangered Black Warrior waterdog, the endangered dark pigtoe mussel, the threatened inflated heelsplitter mussel, the threatened orangenacre mucket mussel, the threatened flattened musk turtle, the proposed threatened alligator snapping turtle, the endangered Indiana bat, the endangered northern long-eared bat, the proposed threatened tricolored bat, the proposed threatened monarch butterfly, the threatened Mohr's Barbara's button, and the threatened white fringeless orchid, are expected to be insignificant.

Under the PA, the portion of Yellow Creek within the action area begins at the headwater and continues for approximately 2,258 linear feet (0.43 mi) (***Figure 3-10***). The direct and indirect effects of these stressors on designated critical habitat for the Black Warrior waterdog (Yellow Creek) are also expected to be discountable or insignificant.

4.9.2.B. Blue Creek Mine No. 1

Under the PA, the Blue Creek Mine No. 1 subsidence footprint would increase approximately 41%, and mining would continue for an additional 14 years.

Under the PA, potential impacts to special status species at Blue Creek Mine No. 1 are expected to be the same as those discussed for Mine No. 4.

The PA at Blue Creek Mine No. 1 would eventually (5 or more years) require an additional 618 acres for coarse refuse storage. There are currently no design plans for this area, and the location

is unknown. Similar to the fan shafts, prior to construction or surface disturbance, this area would require approval by ASMC, and concurrence from FWS. For these reasons, exposure to ground disturbing activities at Blue Creek Mine No. 1 is still expected to be unlikely, and the direct and indirect effects of such exposure to listed and proposed species would be insignificant.

There is no designated critical habitat within the Blue Creek No. 1 action area.

The BLM received concurrence from FWS on its effects determination on April 29, 2025 (see Section 5.2).

4.10 Migratory Birds

4.10.1. Environmental Impacts No Action Alternative

Under the NAA, no adverse effects to surface drainage or hydrologic systems are anticipated due to planned subsidence, and no water quality impacts or sedimentation is expected from runoff from mine surface facilities. Therefore, potential habitat and nearby food sources for migratory birds and bald eagles are not expected to be impacted under the NAA.

4.10.2. Environmental Impacts Proposed Action Alternative

Under the PA, no adverse effects to surface drainage or hydrologic systems are anticipated due to planned subsidence, and no water quality impacts or sedimentation is expected from runoff from mining surface facilities. Therefore, potential habitat and nearby food sources for migratory birds and bald eagles are not expected to be impacted under the PA.

CHAPTER 5. CONSULTATION AND COORDINATION

In compliance with Section 106 of the NHPA, BLM sent a request to initiate consultation with fourteen (14) tribes that are listed below. Consultation with FWS, and the AHC has also been completed. The objective of this coordination with other agencies is to solicit input concerning the PA, the alternatives, and the mitigation measures necessary for any potential direct, indirect, and/or cumulative impacts.

The BLM contacted the following tribal governments during the EIS process:

- Cherokee Nation
- United Keetoowah Band of Cherokee Indians in Oklahoma
- The Chickasaw Nation
- The Choctaw Nation of Oklahoma
- Jena Band of Choctaw Indians
- Mississippi Band of Choctaw Indians
- Alabama-Coushatta Tribe of Texas
- Coushatta Tribe of Louisiana
- Kialegee Tribal Town
- The Muscogee (Creek) Nation
- Poarch Band of Creek Indians
- Thlopthlocco Tribal Town
- The Seminole Nation of Oklahoma
- Seminole Tribe of Florida

5.1 AHC Consultation

5.1.1. Blue Creek Mine No. 1

A Cultural Resources Phase I investigation was performed by TRC Environmental Corporation (TRC) on the Blue Creek Mine No. 1 LBA area. In the study it states that a total of 211 survey areas, each measuring approximately 40 acres, were investigated for cultural resources. The field methods to complete this investigation were designed to provide thorough coverage throughout the project area. These included both pedestrian survey and systematic subsurface testing. In addition, this investigation included an architectural evaluation of all historic standing structures older than 50 years in age located within or adjacent to the proposed project areas. As a result of the investigation, 20,863 shovel tests were completed, and this investigation resulted in the identification of 26 cultural resources.

The study also notes that of the 26 identified resources, eight of those resources were newly recorded archaeological sites, eight were non-site cultural loci, nine were historic standing structures, and one was a newly recorded cemetery. The new archeological sites, historic structures, and non-site cultural resources loci do not possess those qualities of significance and integrity as defined by the National Register of Historic Places (NRHP) Criteria for Evaluation (36 CFR 60.4 [a–d]). The NRHP eligibility of the cemetery has not been assessed; however, provided the cemetery is avoided, the PDS will have no effect on the resource. As a result, TRC recommended that no further investigations of the proposed Blue Creek Mine No. 1 Federal Coal Lease (ALES-056519) project be conducted. TRC further recommended that the proposed project be allowed to proceed with a finding of No Effect on historic properties for the examined portions of the project area.

In response to the submittal of the Blue Creek Mine No. I - Federal Coal Lease LBA ALES-056519 Phase 1 Cultural Resource Study, the AHC, on October 18, 2024, concurred that the project activities will have no effect on cultural resources eligible for or listed on the NRHP on October 18th, 2024.

5.1.2. Mine No. 4

In February of 2015 a Cultural Resources Phase I investigation was performed by the University of Alabama for the BLM Coal Lease (ALES-055797). As stated in the cultural resource study, during the cultural resource survey, eight new archaeological sites, seven historic architectural resources (HARs), and two isolated finds were identified and documented within the boundaries of the area of potential effect. Six previously recorded archaeological sites were also revisited. Sites 1Tu360, 1Tu363, 1Tu374, 1Tu488, 1Tu489, 1Tu929, and 1Tu111- 1Tu117, were not recommended as potentially meeting the eligibility criteria for listing in the NRHP due to the general paucity of cultural material and the extent of disturbance. Site 1Tull18 was recommended as potentially eligible for listing to the NRHP based on Criterion D in that it was considered likely to yield important information in the area's prehistory. This determination was based on moderately dense cultural deposits, relatively good soil integrity, and the potential for data relative to the Late Woodland period. Although Late Woodland sites are present in the region, further testing may contribute additional data into prehistoric lifeways including subsistence, lithic

resource procurement, and settlement patterns. HAR 3, a well-preserved transverse passage, log barn, met the eligibility criteria for listing in the NRHP based on Criteria A and C in the areas of agriculture and architecture. HAR 3 represents a specific period and type of agriculture typical of the early twentieth century and retains its architectural form that is now rare in this portion of the state. Based on these findings, it was determined that the proposed mining activity associated with the proposed lease area may have an adverse effect on Site 1Tu1118 and HAR 3.

In response to the Phase 1 Cultural Resource Study, the AHC found that site 1Tu1118 was potentially eligible for the NRHP and should be avoided. In addition to the site 1Tu1118, Historical Architectural Resource (HAR) 3 was also eligible for the NRHP and project activities would have an adverse effect on this resource. An additional Phase 1 Site Delineation and Evaluation on site 1Tu1118 was then performed by MRS Consultants, LLC in January of 2018. In summary the Phase 1 Cultural Resource Study states that the Phase I shovel testing program and site delineation at 1Tu1118 yielded unremarkable findings. As a result of these investigations, 98 Shovel Tests and No Digs were excavated or attempted at Site 1Tu1118. Of these, 19 shovel tests are positive for cultural materials, 55 are negative, and 24 locations are considered No Digs due to slope and/or disturbances. In general, shovel tests revealed less than 17 cm of medium grayish brown sandy clay loam underlain by yellowish brown sandy clay to a maximum of 25 cm in depth overlying reddish yellow sterile clay subsoil. Artifacts recovered from the 19 positive tests include an overwhelming majority of lithic flake artifacts with one grog tempered Baytown Plain ceramic sherd. No other diagnostic artifacts were recovered. Based on the distribution of positive shovel tests, the site dimensions are estimated to be 30 m by 40 m. Due to the paucity of artifacts, deflated topsoil revealed during the field investigation, and disturbed nature, Site 1Tu1118 is recommended as ineligible for nomination to the NRHP. The site lacks research potential and further investigations would unlikely yield pertinent information regarding the cultural history of the area or region. As such, MRS Consultants, LLC recommended clearance of Site 1Tu1118. Based on these findings, MRS recommended that the BLM and the AHC clear this undertaking as no significant historic properties will be affected.

Following the completion of the Phase 1 Cultural Resource Study that found the site 1Tu1118 to be no effect to the historic properties, MEC, responding to AHC concerns, passed MRS Consultants' 2018 Phase I report on to the state agency. MEC's response letter also addressed AHC's concerns about disturbance to HAR3. This site, according to the cultural resource survey, is a dilapidated log passage barn that is overgrown with vegetation. The proposed activity consists of an underground mining operation. There are no proposed surface disturbances for the area where HAR 3 is located.

The letter also states that the proposed project is an underground mining operation and the disturbance in this area will be limited to the underground mining operation. Limited subsidence will be associated with the project area. However, subsidence for this project is calculated to range from 0 inches to less than 28 inches and will occur over a larger portion of the area, over a gradual time frame, which does not have any projected noticeable impact for the immediate area associated with the HAR3 site or site 1Tu1118.

Following the additional information submittal in response to AHC's initial inquiries, AHC concurred on October 8, 2024, that the project activities will have no effect on cultural resources eligible for or listed on the NRHP. Therefore, they concur with the determination of No Effect to Historic Properties.

5.2 FWS Consultation

On April 24, 2025, the BLM Southeastern States District Office submitted the IPaC Official Species List and the BA to the FWS Alabama Ecological Services Field Office for informal consultation and concurrence under section 7 of the ESA.

The BLM determined that the NAA and the PA at Mine No. 4 and Blue Creek No. 1 would have no effect on the threatened Alabama moccasinshell mussel (*Medionidus acutissimus*), the endangered ovate clubshell mussel (*Pleurobema perovatum*), the endangered triangular kidneyshell mussel (*Ptychobranchus greenii*), or the endangered gray bat (*Myotis grisescens*). The ESA gives federal action agencies the authority to make a no effect determination without additional concurrence from FWS.

The BLM determined that the NAA and the PA at Mine No. 4 and Blue Creek No. 1 may affect, but is not likely to adversely affect the endangered Black Warrior waterdog (*Necturus alabamensis*), the endangered dark pigtoe mussel (*Pleurobema furvum*), the threatened inflated heelsplitter mussel (*Potamilus inflatus*), the threatened orangenacre mucket mussel (*Hamiota perovalis*), the threatened flattened musk turtle (*Sternotherus depressus*), the endangered Indiana bat (*Myotis sodalis*), the endangered northern long-eared bat (*Myotis septentrionalis*), the threatened Mohr's Barbara's button (*Marshallia mohrii*), or the threatened white fringeless orchid (*Platanthera integrilabia*).

The BLM determined that the NAA and the PA at Mine No. 4 and Blue Creek No. 1 are not likely to jeopardize the continued existence of the proposed threatened alligator snapping turtle (*Macrochelys temminckii*), the proposed threatened monarch butterfly (*Danaus plexippus*), or the proposed endangered tricolored bat (*Perimyotis subflavus*).

The BLM determined that the NAA and the PA at Mine No. 4 and Blue Creek No. 1 may affect but are not likely to adversely affect designated Critical Habitat for the Black Warrior waterdog (Yellow Creek).

In a response letter, dated April 29, 2025, FWS concurred with BLM's "may affect, but not likely to adversely affect" determinations for both the listed and proposed species, and the designated Critical Habitat.

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Appendix A – ASMC Permit Boundary Map

Appendix B – Scoping Checklist

Appendix C – Subsidence Control Plans

Appendix D – Biological Assessment

Appendix E – Migratory Birds Analysis

Appendix F – NPDES Monitoring Maps

Appendix G – Well Inventory Logs

Appendix H – MSHA Ventilation Plan Approval Letters

Appendix I – Economic Vitality Methods and Analysis

Appendix J – Drill Hole Acid Base Account

Appendix K – Terrestrial Animal Species Expected in the Project Area