

and are found on narrow ridgetops and steep side slopes. These soils are very deep and are formed in gravelly colluvium and underlying residuum. Clarksville and Scholten soils compose about 32% and 15%, respectively of this soil MU (NRCS 2022).

The Coulstone-Bender complex, 15-50% slopes, very stony MU comprises approximately 14% of the two parcels. Coulstone soils compose about 45% of the MU and are on steep side slopes and narrow ridgetops. They are deep soils that have formed in thick regolith from sandstone. Bender soils make up 33% of this MU, are moderately deep, and formed from residuum of sandstones. They are on moderately sloping to narrow ridgetops and strongly sloping to very steep side slopes (NRCS 2022).

3.4.1.2. Sweetwater Mine

The proposed Modification Lands at the Sweetwater Mine include six soil MUs (Table C-2). The Clarksville-Scholten complex, 15-45% slopes, very stony MU is the most abundant, covering 37% of the total area. The Poynor-Clarksville-Scholten complex, 8 to 15% slopes, stony MU is the next most abundant, followed by the Scholten-Bendavis-Poynor complex, 8-15% slopes, stony MU, which comprise approximately 20% and 18% of the total area, respectively (NRCS 2022).

3.4.1.3. Brushy Creek

At the Brushy Creek Mine, the proposed Modification Lands include five soil MUs (Table C-3). The majority of the parcels (74%) are mapped as Clarksville-Scholten complex, 15-45% slopes, very stony. The next most abundant soil type is Alred-Rueter complex, 15-35% slopes, very stony MU which cover approximately 42% of the parcels. Alred soils comprises 50% of the MU and Rueter soils comprise 35%. Rueter soils are found on steep side slopes and narrow ridgetops. They are very deep soils formed in colluvium and residuum of limestone. Poynor-Clarksville-Scholten complex, 8-15% slopes, stony, make up about 24% of the parcels (NRCS 2022).

3.4.2. *Environmental Impacts*

3.4.2.1. *Impacts of Alternative A – No Action Alternative*

Under the No Action Alternative, the BLM would not approve the three lease modifications applied for by Doe Run. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities described in the Proposed Action on these lands that could affect soil resources. Current mining operations would continue on the existing Doe Run-leased lands. The No Action Alternative would have no impact on soil resources in the Project Area.

3.4.2.2. *Impacts of Alternative B – Proposed Action*

Impacts to soils were evaluated for potential erosion hazard and suitability for surface exploration drill site and road construction activities. The six soil property, suitability, and limitation ratings obtained from NRCS and described in Section 3.4.1 were evaluated for each of the soil MUs in the parcels that comprise the Project Area. The ratings for drainage class, erosion hazard, and runoff class pertain to the ability of soils to transport water through the soil and potential to become eroded. The ratings for rutting hazard, mechanical preparation, and road

suitability pertain to the performance of soil for construction (e.g., grading) of the drill site and associated access roads.

Construction of surface exploration drill sites and access roads would require soil disturbance to create a stable, level work zone for drilling operations and a stable access road. The depth of excavation would vary depending on the slope and soil conditions at each site. All work would comply with the USFS standards and guidelines in the 2005 Forest Plan.

Direct permanent impacts to soils would occur from soil compaction, reduced porosity, reduced infiltration and aeration, and changes in sediment structure. Due to moderate permeability and high rock content of most of the soils within the project area, the mapped soils have a moderate resistance to compaction when wet and a high resistance to compaction when dry.

Surface disturbances associated with the Proposed Action would result in soil displacement as the protective ground cover would be removed or displaced during active site work. A typical excavation would expose an approximately 100- by 90-foot area of bare soil. The erosion hazard for soils in forested land is low when slopes are 14% or less and moderate when slopes are greater than 15%. Most of the soils within the Project Area have moderate to steep slopes and a high rock content. These soils have a moderate to severe erosion hazard, medium to high runoff class, and slight to severe rutting hazard potential. Therefore, construction activities within these parcels may require extensive erosion control measures and intensive maintenance of those measures to manage erosion hazards.

Excavated soil materials and the sites of soil excavation would be subject to increased potential erosion hazard from rainfall, stormwater runoff, and wind due to greater exposure of bare soil and subsoil to these forces. Loss of vegetative or other material cover, removal of topsoil, and loss of soil structure from excavation activities also increases the potential for erosion and sediment transport.

Soil properties, such as density (i.e., compaction), soil gas, and water transport, and soil productivity would also be affected by excavation and construction activities. The traversing of heavy equipment over the soils can modify soil properties, making it difficult for vegetation and soil organisms to re-establish after construction activities are completed (National Council for Air and Stream Improvement 2004).

Doe Run would implement the same environmental protection design features used on the existing leased lands to minimize soil erosion (Appendix B). To minimize soil erosion during exploration drilling under the Proposed Action, Doe Run would stabilize the surrounding erodible areas using of hay bales and silt fencing. Filter strips (areas of grass or other permanent vegetation used to reduce sediment, organics, nutrients, pesticides, and other contaminants from runoff and to maintain or improve water quality) would be placed between the drill sites and any adjacent waterways, reducing the likelihood of sedimentation. Furthermore, the rock placed at the drill site and along the access roads would reduce soil erosion. As stipulated in the existing leases, all excavated soil materials would be stockpiled in the order excavated to preserve the topsoil and subsoil separately.

Excavation of the soils would damage the inherent natural structure of the soils. Replacement of the soil materials during the restoration process would not repair the soil structure, as the structure has developed over a long time under climatic and vegetation factors that cannot be reproduced during restoration. It is anticipated that the replaced excavated soil materials

(replaced in the proper order) would have some structure but would not mimic the structure of undisturbed soil. The replaced subsoil materials would likely have disrupted structure that partially resembles massive and large-blocky to small blocky structure depending on soil moisture content and equipment used to grade the subsoil materials. The replaced top-soil materials would likely resemble a granular to sub-angular blocky structure as the result of finer finish-grading equipment used to prepare the soil for seeding. It is anticipated that replacement of the excavated soil materials, in the order of subsoil below topsoil, will possess a soil productivity that would eventually approach a level of productivity resembling the undisturbed natural soils in the surrounding area.

Potential impacts to soils due to the development of the drill pads and access roads would cease once exploration activities are complete at each site. Displaced and eroded soil would settle and become incorporated into the undisturbed forest floor. Surface drill sites are typically reclaimed within three months of the completion and plugging of drill holes, depending on weather conditions. Upon completion of each drill hole, Doe Run would restore each drilling area to the approximate condition it was in prior to drilling. Slopes would be recontoured to match the pre-disturbance state, and reclaimed drill sites would be replanted with winter wheat to control erosion. Drill sites and roads on federal land would be inspected by the USFS prior to final approval of restoration.

In total, project activities under the Proposed Action would affect up to 25 acres of soil (or 1.6%) within the 1,550-acre total Project Area. Impacts to soil and potential erosion would be reduced with the implementation of the mitigation measures described above and adherence to 2005 Forest Plan Standards and Guidelines. Additionally, once vegetative cover is established during and after restoration of the drill sites and access roads, erosion rates would decline over the long term. Therefore, impacts to soil resources would be long-term but minor given the relatively small area of disturbance, adherence to environmental protection design features (Appendix B), existing stipulations (Appendix A), the 2005 Forest Plan, and planned restoration efforts.

3.5. Water Resources

3.5.1. Affected Environment

3.5.1.1. Surface Water

Streams and Wetlands

Aquifers within the Project Area are located within the Ozark system, a geologically complex system of aquifers that has experienced fracturing, faulting, and extensive dissolution of soluble rocks that have modified primary rock properties and the ability to convey and store water. For the carbonate units, fracturing and faulting provided initial pathways for dissolution and karst development, resulting in the connection of groundwater with surface water across large areas (Vandike 1992). Chapman (2002) describes the physiography of the local ecoregion as comprised of hills, entrenched valleys, and steep slopes associated with narrow ridges and valleys.

Perennial streams are often fed by smaller upstream waters or groundwater. Karst topography influences stream substrates. Ephemeral streams would be anticipated within the entrenched and

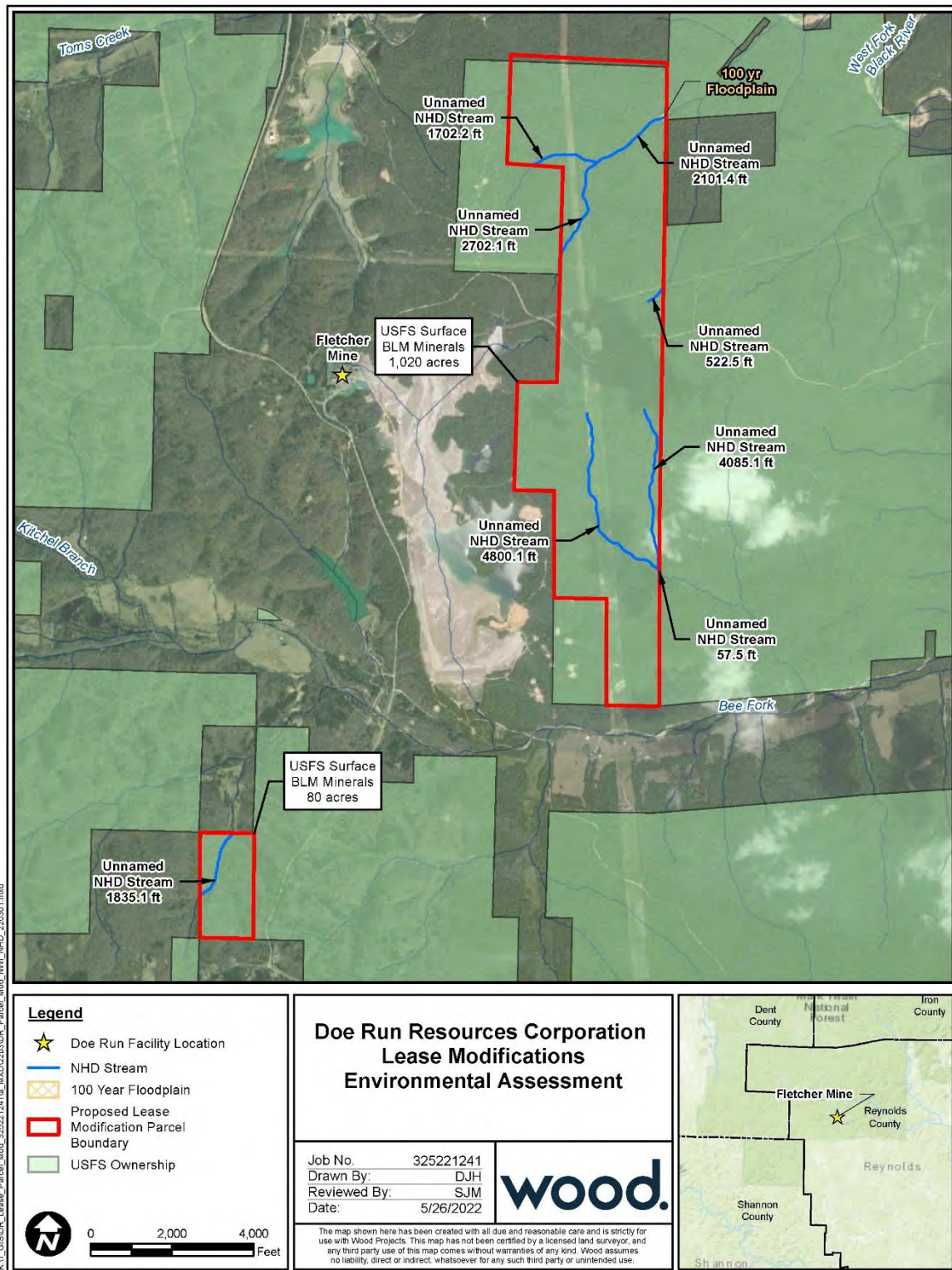
narrow valleys, feeding mapped intermittent and perennial streams. Based on the USGS National Hydrography Dataset (NHD) and USFWS National Wetland Inventory (NWI) mapping, over 22,000 linear feet of 15 intermittent or perennial streams have been mapped within the Project Area. Additionally, one 0.14-acre emergent wetland has been mapped within the bounds of the 40-acre parcel of the proposed lease modification area for Brushy Creek (Table 3-8, Figures 3-1 through 3-3).

Waters of the U.S. are those surface water features subject to U.S. Army Corps of Engineers (USACE) jurisdiction and that require authorization under Section 404 of the CWA (33 U.S. Code 1344) for dredge or fill activities. Additionally, EO 11990 (Protection of Wetlands) requires federal agencies to avoid, to the extent possible, adverse impact to wetlands. In conjunction with Section 404 of the Clean Water Act, a state-issued Section 401 Water Quality Certification may be required for impacts to waters of the U.S. In Missouri, the MoDNR authorizes Section 401 certifications.

Table 3-8. Mapped Streams and Wetlands within the Project Area

| Mine | Area | Number of NHD-Mapped Streams | Linear Feet of Mapped Streams | Acreage and Type of NWI-Mapped Wetlands |
|------------------------|---------------------------------------|------------------------------|-------------------------------|---|
| Fletcher | 1,020 acres USFS surface/BLM minerals | 7 | 15,970.9 | none |
| | 80 acres USFS Surface/BLM Minerals | 1 | 1,835.1 | none |
| Total | | 8 | 17,806.0 | |
| Sweetwater | 160 acres USFS surface/BLM minerals | 1 | 303.1 | none |
| | 80 acres USFS surface BLM minerals | 2 | 1,395.7 | none |
| Total | | 3 | 1,698.8 | |
| Brushy Creek | 10 acres Doe Run surface/BLM minerals | 1 | 87.8 | none |
| | 40 acres Doe Run surface/BLM minerals | 1 | 90.5 | 0.14-acre emergent wetland (PEMB ¹) |
| | 140 acres USFS surface/BLM minerals | 2 | 3,059.7 | none |
| Total | | 4 | 3,238.0 | 0.14 |
| Total all Areas | | 15 | 22,742.8 | 0.14 |

¹ PEMB = palustrine emergent saturated wetland



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Figure 3-1. NHD and NWI Features Mapped within the Fletcher Mine Proposed Lease Modification Area

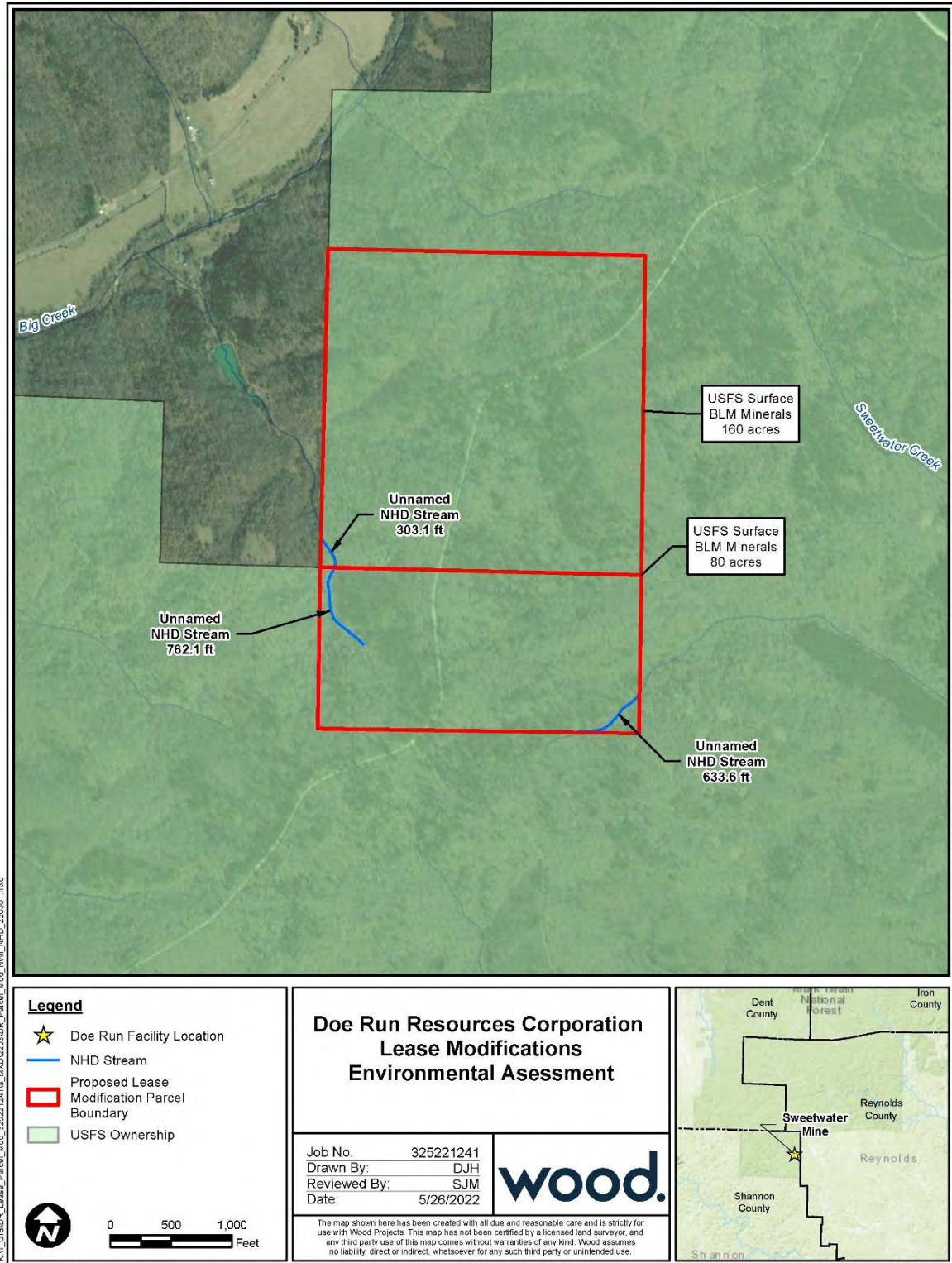
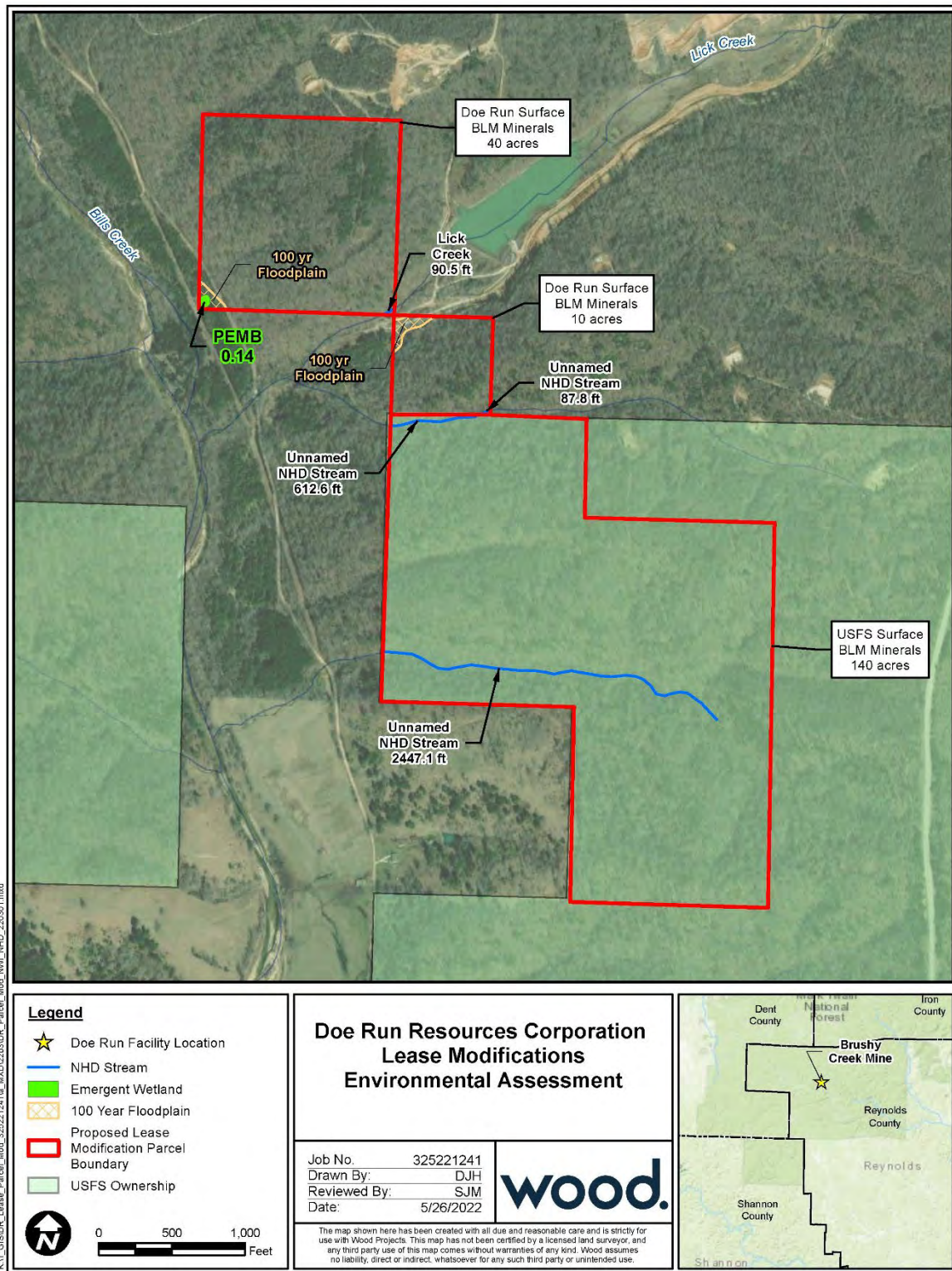


Figure 3-2. NHD and NWI Features Mapped within the Sweetwater Mine Proposed Lease Modification Area



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Figure 3-3. NHD and NWI Features Mapped within the Brushy Creek Mine Proposed Lease Modification Area

Surface Water Use

In compliance with the Missouri Clean Water Law (Revised Statutes of Missouri Chapter 644) and the CWA which regulate water quality in the state, the Fletcher, Sweetwater, and Brushy Creek mines hold current National Pollutant Discharge Elimination System (NPDES) permits authorized by the MoDNR for the discharge of wastewater and stormwater. Permitted facility discharges and surface drainage at each mine may flow to different watersheds due to the hilly terrain of the Project Area.

Surface drainage within the Project Area flows over five separate watersheds as described in Table 3-9. Surface drainage in the northern proposed lease modification land at Fletcher Mine drains to the Middle West Fork Black River watershed; however, surface drainage in the southern lease modification land drains to the Bee Fork watershed. Surface drainage in the eastern portion of the proposed lease modification land at Sweetwater Mine drains to the Headwaters Logan Creek watershed; however, the western portion of the proposed lease modification land drains to the Big Creek watershed. Portions of proposed lease modification areas adjacent to Fletcher and Sweetwater mines are separated by county roads (CRs) as listed in Table 3-9. Figure 3-4 illustrates watersheds in the Project Area. Surface drainage in the proposed lease modification land at Brushy Creek Mine drains to the Upper West Fork Black River watershed (USGS 2022a, USFWS 2022a, EPA 2022d).

Table 3-9. Watersheds within the Project Area

| Mine | Area | Watershed | Hydrologic Unit Code (HUC) |
|--------------|------------------|------------------------------|-----------------------------------|
| Fletcher | North of CR 2236 | Middle West Fork Black River | 110100070103 |
| | South of CR 2236 | Bee Fork | 110100070102 |
| Sweetwater | East of CR P-235 | Headwaters Logan Creek | 110100070401 |
| | West of CR P-235 | Big Creek | 110100080309 |
| Brushy Creek | All | Upper West Fork Black River | 110100070101 |

CR = County Road

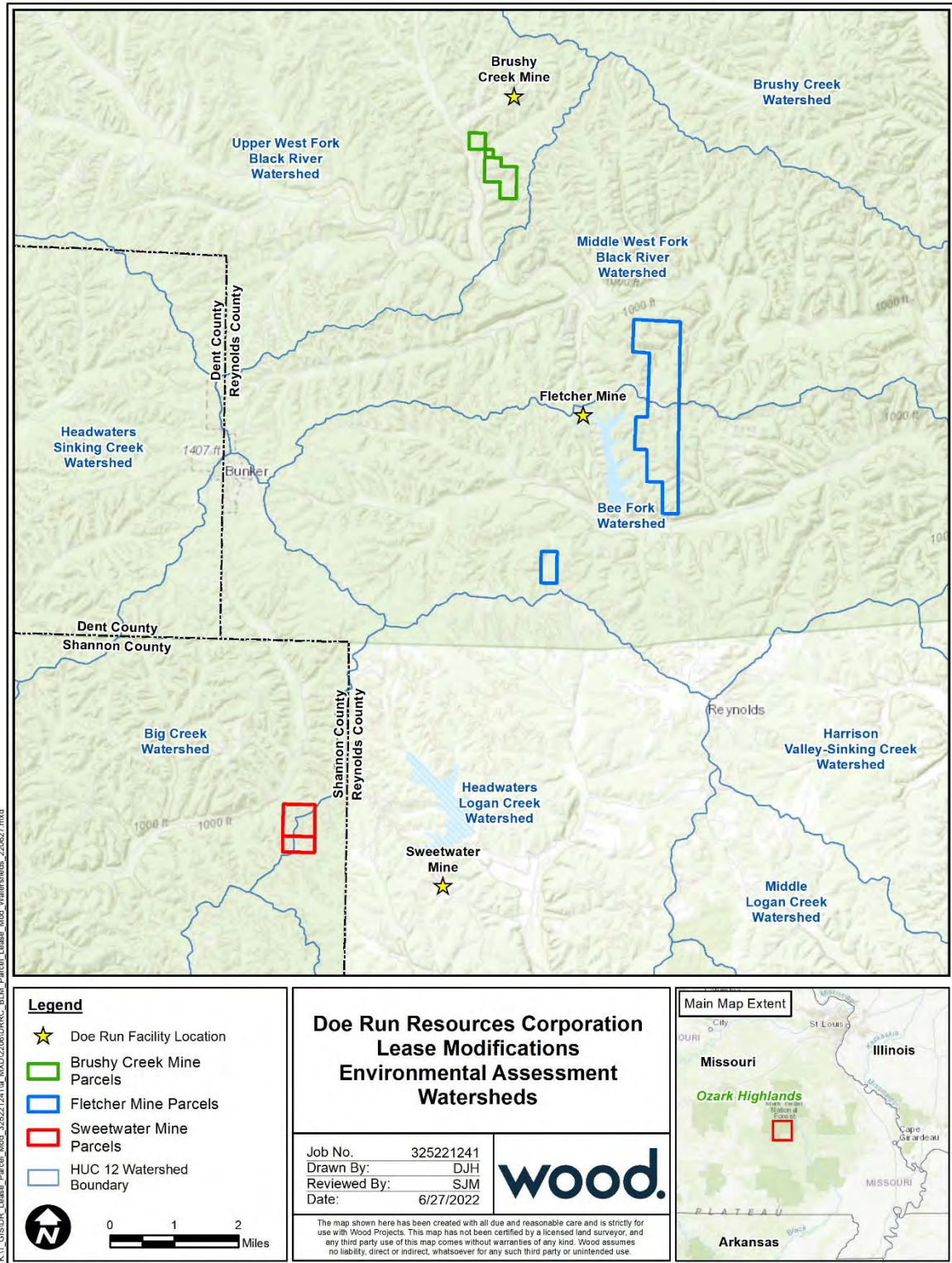


Figure 3-4. Watersheds in the Project Area

Wastewater and stormwater from operations at the Fletcher Mine and Mill (NPDES Permit No. MO-0001856) discharge to three separate tributaries of Bee Fork Creek within the Bee Fork watershed. Wastewater from operations at the Sweetwater Mine and Mill (NPDES Permit No. MO-0001881) discharges to Adair Creek and a tributary to Sweetwater Creek within the Headwaters Logan Creek watershed. Wastewater from operations at the Brushy Creek Mine and Mill (NPDES Permit No. MO-0001848) discharges to Lick Creek and Bills Creek within the Upper West Fork Black River watershed. More details pertaining to existing NPDES permits for each mine are in Tables C-4 through C-6 in Appendix C (MoDNR 2021, 2020, and 2019).

The Fletcher and Sweetwater mines are currently under enforcement with the MoDNR Water Protection Program. Doe Run has conducted remedial actions at these mines, including the installation of a water purification plant, to improve water quality and continues to work with MoDNR on large reclamation projects in the vicinity as part of the 2011 Multi-Media Consent Decree (Case No. 4:10-cv-01895-JCH, Docket No. 116, Filed December 21, 2011). Doe Run does not anticipate changes to existing NPDES permits from the addition of land acres associated with proposed lease modifications. Further, the larger reclamation projects conducted by Doe Run within the region under the Multi-Media Consent Decree have resulted in improved water quality.

In Missouri, a major water user is defined as any surface or groundwater user with a water source and the equipment necessary to withdraw or divert 100,000 gallons (or 70 gallons per minute) or more per day combined from all sources from any stream, river, lake, well, spring, or other water source. Major water users in Missouri are required by law to register their water use on an annual basis (Revised Statutes of Missouri Chapter 256.400). The Sweetwater Mine is a major water user in Missouri; however, the Fletcher and Brushy Creek mines are not (MoDNR 2021, 2020, and 2019). The lease modifications at the Fletcher and Brushy Creek mines are not anticipated to change existing water uses to the magnitude of requiring these mines to register as major water users.

Water Quality

The MoDNR prepares the biannual *Missouri Integrated Water Quality Report* to meet the requirements of Sections 303(d), 305(b), and 314 of the CWA to provide the EPA an update on the condition of surface water quality in the state of Missouri. Section 303(d) requires states to submit a list of waters not meeting water quality standards. Section 305(b) requires states to provide an assessment of surface water quality and summary of monitoring and pollution control activities. Section 314 requires states to conduct a status and trends assessment of publicly owned lakes.

Fletcher Mine and the associated proposed Modification Lands discharge to Bee Fork Creek or its tributaries. Bee Fork Creek was previously listed on the 303(d) list of impaired waters due to elevations of lead; however, Bee Fork Creek has been delisted according to MoDNR's 2020 *Missouri Integrated Water Quality Report and Section 303(d) List* (MoDNR 2020b). Restoration actions including the discontinuation of pumping mine water and tailings waters discharges from Fletcher Mine resulted in improved lead levels in the surface water during 2017 and 2019 monitoring events. Bee Fork Creek is now in attainment for water quality standards.

The Sweetwater Mine and adjacent proposed Modification Lands drain to an impaired reach of Logan Creek, which is on the 303(d) list of impaired waters for lead pollution in its sediment

substrate. The Brushy Creek Mine and adjacent proposed Modification Lands discharge to Lick Creek and Bills Creek, which discharge to West Fork Black River. The West Fork Black River was previously listed on the 303(d) list of impaired waters due to lead and nickel pollution in its sediment substrate; however, West Fork Black River was removed from the 2020 303(d) list. In 2017 and 2019, additional data collected within the sediment of West Fork Black River indicated acceptable nickel and lead levels within sediment. The reason for the sediment recovery is unknown (MoDNR 2020b).

Floodplains

A floodplain is the relatively level land area along a stream or river that is subject to periodic flooding. The area subject to a 1% chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2% chance of flooding in any given year is normally called the 500-year floodplain.

The objective of EO 11988, Floodplain Management is "...to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative." The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (US Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

According to the Federal Emergency Management Agency (FEMA) community panel 2908290175A, effective September 30, 1988, a small area along an unnamed tributary to West Fork Black River in the northeast portion of the Project Area adjacent to the Fletcher Mine are located within a FEMA 100-year floodplain (Figure 3-1). The portion of the Project Area adjacent to the Sweetwater Mine have not been mapped by FEMA. According to community panel 2908290050A, effective September 30, 1988, the southeast corner of the proposed 40-acre tract adjacent to the Brushy Creek Mine is located within the 100-year floodplain of Bills Creek. Within the Brushy Creek Modification Lands, the northwest corner of the 10-acre tract is located within a small area of the FEMA 100-year floodplain of Lick Creek (Figure 3-3).

3.5.1.2. Groundwater

Regional Hydrogeologic Setting

The Ozark aquifer within the Ozark Plateaus aquifer system (also referred to as Ozark System) is the primary groundwater source in the Ozark Plateaus physiographic province of Arkansas, Kansas, Missouri, and Oklahoma (Fenneman 1938; Fenneman and Johnson 1946). The Ozark aquifer lies between the Springfield Plateau and St. Francois aquifers in the Ozark system of aquifers and is the largest and most important aquifer of the region; many public and private supplies depend entirely upon the Ozark aquifer because of the productivity and widespread availability of the aquifer (Vandike 1992).

The Ozark system is primarily located in the Ozark Plateaus physiographic province. The Ozark system of aquifers is divided into five hydrogeologic units (youngest to oldest): Springfield Plateau aquifer, Ozark confining unit, Ozark aquifer, St. Francois confining unit, and St. Francois aquifer (Imes and Emmett 1994). The Ozark system is geologically complex and includes Cambrian- to Mississippian-age strata. The Ozark system aquifers, comprising

carbonate karst and granular-media strata, are bound by confining layers of variable extent and competency. The Ozark system aquifers have experienced fracturing, faulting, and extensive dissolution of soluble rocks that have modified primary rock properties and the ability to convey and store water. For the carbonate units, fracturing and faulting provided initial pathways for dissolution and karst development, resulting in numerous connections of groundwater with surface water across large areas.

Local Hydrogeologic Setting

The Ozark system of aquifers in the vicinity of the lease modification areas generally consists of overburden, the Ozark confining unit (Residuum), the Ozark aquifer (Eminence and Potosi Dolomite), St. Francois confining unit (Derby-Doe Run Dolomite and Davis Formations), the St. Francois aquifer, and the Precambrian basement confining unit. Within the proposed lease modification area, groundwater is known to be present in surficial alluvium along major creek drainages, the Ozark aquifer (Eminence and Potosi Dolomite), and the St. Francois aquifer, and the Precambrian basement confining unit. The depth of the Ozark aquifer ranges from 250 feet in the northern end of the Viburnum Trend to 850 feet in the southern end of the trend. The depth of the St. Francois aquifer ranges from 700 feet in the northern end of the trend and to over 1,400 feet in the southern end of the trend, south of the Sweetwater Mine. Groundwater flow is controlled by lithology and geologic structure and overall regional movement is generally toward the southeast (Nottmeier 2015).

Groundwater occurrence, storage, and movement are associated with and controlled by the porosity and continuity of water bearing units, as well as structural gradients and faults. Groundwater in the Viburnum Trend exists primarily under confined conditions within the bedrock units, under unconfined conditions within the alluvial deposits below the major surface drainages of the area, and under previously disturbed areas of adjacent former and current mines site facilities and tailings ponds (Kleeschulte 2001). Below the surficial alluvial deposits and above the major aquifers consists of the low permeability Ozark confining unit (Residuum). Recharge to the major aquifer units takes place at the outcrops of the bedrock aquifers, mostly by infiltration of precipitation and runoff into underlying rock zones connected by fractures, faults, or vertically interconnected pores.

Groundwater Use

Groundwater from the Ozark system has historically been an important part of the water resource base, with numerous domestic and municipal water consumers utilizing the Ozark aquifer as primary water supply (Kleeschulte 2001). Local groundwater use in the region is primarily by numerous private domestic wells and community water systems, including Centerville Public Water Supply (PWS), Ellington PWS, and Reynolds County Public Water and Sanitation District 1 in Reynolds County and Birch Tree PWS, Eminence PWS, and Winona PWS in Shannon County.

At mine sites currently leased or operated by Doe Run, groundwater is pumped out of project areas prior to the start of mining operations and managed throughout the operations through a series of sumps and piping underground. Collected groundwater pumped for operations is managed through tailing impoundments, mine ponds, and ultimately treated through one of the five water treatment plants along the Viburnum Trend and discharged under state NPDES permits. Doe Run's underground mining operations occur in the St. Francois aquifer, which is

confined by the Davis Shale and is between the locally unconfined Ozark aquifer above and St. Francois aquifer below. The upper Ozark aquifer is not affected by mine pumping due to the overlying Davis Shale aquitard.

Ongoing exploration drilling programs in areas currently leased by Doe Run that drill and core through the area's hydrogeologic system consist of two parts or phases. The primary phase utilizes rotary drilling to set protective casing (sleeves) in the overburden of the Eminence and Potosi Dolomitic Ozark aquifer. Difficult drilling conditions due to faults, fractures, and porous cavernous sections require the use of drilling muds and setting of protective sleeves, with the bottom of the sleeve set into the upper St. Francois confining unit (Derby-Doe Run Dolomite and Davis Formations). The thickness of this overburden and shallower aquifer is commonly 250 feet thick in the northern end of the Viburnum Trend and conversely, this section is up to 850 feet thick in the southern end of the trend. The second phase involves diamond drilling, which cores the remaining Derby Doe-Run and Davis formation, and the objective mining target Bonneterre, LaMotte, and Precambrian formations, which make up the St. Francois aquifer and the Precambrian basement confining unit. Total depths for these sections range from 1,300 feet for the standard drill hole and up to 3,200 feet for Precambrian drilling. The depth from the surface to the bottom of the Bonneterre varies from around 700 feet in the north end of the Viburnum Trend to over 1,400 feet at the far south end of the trend, south of the Sweetwater Mine (Doe Run 2016).

3.5.2. Environmental Impacts

3.5.2.1. Impacts of Alternative A – No Action Alternative

Under the No Action Alternative, the BLM would not approve the three lease modifications. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities included in the Proposed Action in the Project Area that could affect surface and groundwater resources. Under the No Action Alternative, current mining operations would continue on the existing Doe Run-leased lands and any ongoing impacts to water resources would continue. The No Action Alternative would have no impact on water resources in the Project Area.

3.5.2.2. Impacts of Alternative B – Proposed Action

Water quality, surface water, and groundwater data, maps, and permits available online from the state of Missouri were reviewed to assess potential impacts of the Proposed Action.

Surface Water Impacts

Doe Run would avoid developing access roads across surface water features in each of the proposed lease modification areas to the extent practicable. If a feature cannot be avoided, it would be crossed by the new access road in a perpendicular fashion (the shortest possible route) or existing crossings would be utilized. Should impacts to surface waters occur, the area would be restored to pre-existing conditions after construction activities are completed. Short-term, indirect effects to surface water have the potential to occur due to erosion and sedimentation caused by the creation of drill sites and access roads as described in Section 2.2. Doe Run would implement proper environmental protection design features described in Section 2.2.3 to minimize sedimentation into nearby water resources.

Development and operation of the exploration drill sites would be conducted in accordance with the 2005 Forest Plan and current lease stipulations (Appendix A), which require protections for surface waters and watersheds. Drill site placement would be in accordance with the designated buffer zones associated with perennial streams, springs, or wetlands. Excess water and drill cutting would be collected in a sump on the drill site, which would be reclaimed following completion of drilling by allowing the pit to dry and then backfilling with excavated soil. These protections also include the prohibition of drilling mud to flow into intermittent or live stream courses or sinkholes. Therefore, the Proposed Action would have minor direct and indirect effects to surface water quality within the Project Area with implementation of these avoidance and minimization measures.

Actions associated with the underground mining would be done in compliance with the current Operating Plan on file with the BLM. At this time, Doe Run does not anticipate any changes to their operations. No changes in the existing wastewater treatment process or existing NPDES discharge volumes and locations are anticipated as a result of implementation of the Proposed Action. As the mill capacity at each mine will remain the same, the overall production at each of the mines, and therefore the surface water use, will be unchanged. Therefore, no changes to the existing designated surface water uses are anticipated.

Groundwater Impacts

Upon completion of drilling under the Proposed Action using the same process as described in Section 3.5.1.2, drill pad sumps would be reclaimed, and drill sites would be restored to meet USFS standards. Environmental protection design features described in Section 2.2.3 would be implemented to protect surface and groundwater. In accordance with the pollution prevention measures outlined in the current Exploration Plan, Doe Run would plug each surface exploration drill hole with approved materials as specified by MoDNR to ensure that water from the Ozark and St. Francois aquifers do not intermingle. This includes the removal of the drill casing and placement of down-hole wood and cement plugs in the test bores per the Missouri Code of State Regulations (10 CSR 20-7.010). These grouting programs prevent leakage and hydraulic connection between the aquifer systems and prevents down-hole contamination.

No significant degradation of groundwater quality is anticipated to result from implementation of the Proposed Action. No water quality effects in the upper Ozark aquifer (Eminence and Potosi Dolomite) would be anticipated during mining operations as the thick, low permeability St. Francois confining unit (Derby-Doe Run Dolomite and Davis Formations) limit vertical water transmission between bedrock units, preventing potentially contaminated water from reaching the aquifer. Following completion of mining in a specific area, the mined-out area would be allowed to flood. The hydrostatic pressure created during the reintroduction of groundwater to the mined-out area increases the stability to the pillar spans.

Oxidation effects associated with contact between the groundwater and overburden would result in changes in groundwater quality and chemistry including increases in levels of total dissolved solids and metals. These effects would normalize over time and would be buffered by dilution by continued inflows and contact mixing with undisturbed groundwater sources. These increased total dissolved solids concentrations would be limited to the overburden unit. Any localized reduction in piezometric surfaces (the imaginary surface to which groundwater rises under hydrostatic pressure in wells or springs) and/or changes in water quality and chemistry should not adversely affect water users.

Based on area monitoring well records provided by MoDNR, groundwater level measurements have stayed fairly consistent over the years (MoDNR 2022a). In addition, available USGS groundwater data for the Viburnum Trend Well 6 (HUC 11010007), located approximately one mile north of Fletcher Mine, and data from the Lesterville Well (HUC 11010007), located approximately 14 miles east of Fletcher Mine, were reviewed. The data from these wells indicates relatively stable groundwater levels at each well with regular seasonal fluctuations (USGS 2022b). Studies conducted by the USGS of groundwater levels pre- and post- mining activity have shown that no large cones of depression are apparent in the potentiometric surface of the Ozark aquifer in the Viburnum Trend as a consequence of mining activity (Kleeschulte 2001). Therefore, the continued underground mining operations in the Project Area would not affect groundwater quantity.

3.6. Wildlife and Aquatic Resources

3.6.1. Affected Environment

3.6.1.1. Terrestrial Wildlife Resources

The Project Area falls within the Level IV Ecoregion 39h Current River Hills of the Level III Ecoregion 39 Ozark Highlands (Chapman et al. 2002). In the Current River Hills, stream valleys contain numerous large, high-quality springs and water quality is generally better than elsewhere in Missouri (Chapman et al. 2002). Caves and losing streams (streams that lose water as they flow downstream) are common. Streams in this area drain southeast into the Mississippi River.

The majority of the Project Area consists of forested habitat for wildlife species, predominately in upland hardwood and scattered shortleaf pine with scattered drainages (Table 3-10). This type of vegetation is typical of the oak-hickory, oak-pine upland forest that comprises much of the greater region. Occurrence and distribution of individual species depends on the existing vegetative cover, structure, age, and spatial distribution described in Section 3.7.1.

The Missouri Fish & Wildlife Database lists 380 species (28 amphibians, 44 reptiles, 155 birds, 8 crayfish, 49 mammals, 91 fish, 4 insects, 1 mollusk) likely to occur in Reynolds and Shannon counties (MDC 2022b). Some of these species may not occur within the proposed Project Area because habitat is absent or limited.

Birds in the forested areas of the Project Area typically include ovenbird, eastern wild turkey, wood thrush, ruffed grouse, bobwhite quail, indigo bunting, orchard oriole, eastern bluebird, woodpeckers, and various species of warblers. Mammals typically found in the forested habitat may include eastern gray squirrel, white-tailed deer, eastern cottontail rabbit, black bears, coyotes, mountain lions, raccoons, possums, armadillos, mice, shrews, and moles. Amphibian and reptile species that may be found in forested habitat include ring-necked snake, rat snake, five-lined skink, copperhead snake, spring peeper, and upland chorus frog.

Table 3-10. Landcover Habitat by Lease Modification Land

| Landcover | Area (acres) | Percent |
|-----------------------|--------------|---------|
| Sweetwater | | |
| Deciduous Forest | 157 | 66% |
| Mixed Forest | 40 | 17% |
| Evergreen Forest | 18 | 7% |
| Shrub/Scrub | 13 | 5% |
| Developed, Open Space | 11 | 5% |
| Total | 238 | |
| Fletcher | | |
| Deciduous Forest | 821 | 76% |
| Shrub/Scrub | 102 | 10% |
| Mixed Forest | 84 | 8% |
| Developed, Open Space | 28 | 3% |
| Grassland Herbaceous | 22 | 2% |
| Evergreen Forest | 16 | 1% |
| Total | 1074 | |
| Brushy Creek | | |
| Deciduous Forest | 178 | 93% |
| Mixed Forest | 7 | 4% |
| Shrub/Scrub | 7 | 4% |
| Total | 192 | |

Source: MSDIS 2011

3.6.1.2. Aquatic Resources

Riparian ecosystems are important wildlife habitats that occur in the transitional zone between aquatic and upland areas. These ecosystems include the vegetation adjacent to surface waters such as streams, rivers, or seeps. Wetland areas are areas with soils that can be permanently or intermittently flooded, and include such areas as freshwater marshes, fens, seeps, wet meadows, and shallow ponds and lakes. Some of the wildlife attracted to these riparian and wetland habitats are beaver, otters, muskrat, mink, raccoon, bald eagle, osprey, northern harrier, ducks, geese, coots, rails, herons, kingfishers, snipe, sandpipers, plovers, killdeer, swallows, common yellowthroat, painted turtle, garter snake, newts, salamanders, toads, and several species of frogs.

Aquatic habitat within the Project Area generally includes smaller headwater streams. As discussed in Section 3.5.1.1, there are over 22,000 linear feet of intermittent and perennial streams within the proposed lease modification areas (Table 3-8). These streams are home to a variety of crayfish, freshwater clams, benthic invertebrates, and smaller fish species including darters, sculpins, minnows, and shiners. There is one emergent wetland within the Brushy Creek portion of the Project Area (Figure 3-3).

3.6.1.3. Special Status Species

The ESA requires federal agencies, in consultation with the USFWS and/or the National Oceanic and Atmospheric Administration Fisheries Service (the Services), to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. Listed species include those categorized as threatened or endangered by the Services.

Endangered species are those determined to be in danger of extinction through all or a significant portion of their range. Threatened species are those likely to become endangered within the foreseeable future. Section 7 of the ESA requires federal agencies to consult with the Services when proposed actions may affect endangered or threatened species or designated critical habitat. Critical habitat is habitat needed to support recovery of listed species and includes specific areas within the geographical area occupied by the species at the time of listing that contain physical or biological features essential to conservation of the species. These areas may require special management considerations or protection. Specific areas outside of the occupied area may also be determined by the Services to be essential for conservation. As with final listing of endangered or threatened status, once critical habitat has received final designation, the habitat receives full protection under the ESA (NOAA 2022).

The State of Missouri provides protection for species considered threatened, endangered, or deemed in need of management within the state other than those already federally listed under the ESA. A review of the Missouri Department of Conservation (MDC) Natural Heritage Review and the USFWS Information for Planning and Consultation (IPaC) online system for protected species potentially present within the Project Area was conducted in March 2022 (MDC 2022b; USFWS 2022b). The BLM obtained the official list of threatened and endangered species prepared by USFWS in consideration of the Section 7 Consultation being conducted between these agencies (D. Donkersloot, BLM, personal communication, February 16, 2022). A list of these species is included in Table 3-11.

In addition to the federal and state-listed species, the USFS Forest Service Manual directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern. Designation of Regional Forester Sensitive Species (RFSS) helps maintain species viability and avoid trends toward federal listing under the ESA. Eastern Region Sensitive Species considered in this EA are those included in the RFSS list dated January 2021. Within MTNF, the RFSS list includes 60 animal species (four mammals, three birds, two reptiles, four amphibians, 18 fish, eight insects, nine crustaceans, 10 bivalves, and two snails/gastropods). However, based on a review of the USFS occurrence records for these species, there are no known occurrences of RFSS-listed animals within the Project Area. Risk evaluations were completed for each species considered for listing and are on file in the Forest Service Regional Office. Those evaluations are incorporated by reference in this analysis.

Many of the sensitive species within the MTNF occur in specialized habitats such as fens, seeps, sinkholes, glades, and caves. These specialized habitats are managed in accordance with standards and guidelines in the 2005 Forest Plan to maintain the viability of species using these habitats and to avoid trends towards federal listing. While potential habitat exists in the project area for several sensitive species, no RFSS-listed wildlife species have been documented within the Project Area and potential habitat within the Project Area for these species is not considered essential for their viability or recovery.

Table 3-11. Federal and State-Listed Protected Animal Species and Critical Habitat in the Project Area

| Common Name | Scientific Name | Federal Status | State Status |
|---------------------------|---|----------------|--------------|
| Mammals | | | |
| Gray bat | <i>Myotis grisescens</i> | Endangered | Endangered |
| Indiana bat | <i>Myotis sodalis</i> | Endangered | Endangered |
| Northern long-eared bat | <i>Myotis septentrionalis</i> | Threatened | Endangered |
| Insects | | | |
| Hines's emerald dragonfly | <i>Somatochlora hineana</i> | Endangered | Endangered |
| Monarch butterfly | <i>Danaus plexippus</i> | Candidate | N/A |
| Amphibians | | | |
| Ozark hellbender | <i>Cryptobranchus alleganiensis bishopi</i> | Endangered | Endangered |
| Critical Habitats | | | |
| Indiana bat | <i>Myotis sodalis</i> | Final | |

Sources: USFWS IPaC Report (USFWS 2022b), MDC Natural Heritage Review (MDC 2022b).

Gray Bat (*Myotis grisescens*)

Gray bats inhabit caves year-round, with most of the known population (almost 95%) inhabiting only nine caves, descriptive of their large hibernaculum densities. A few of the known, large hibernacula caves exist within Missouri. During the winter, gray bats hibernate in cold caves or mines, while during the summer, a different and possibly distant cave or mine is used for maternity colonies where warmer temperatures are necessary for rearing young. The gray bat is known to forage at great distances from their maternity colonies (EKU 2012, USFWS 2007a, 2019a). The gray bat has been documented within approximately 765 feet of the proposed lease modification area at the Fletcher Mine (K. Nicholas, USFS, personal communication/GIS files, 3/24/2022).

Indiana Bat (*Myotis sodalis*)

The Indiana bat is found throughout much of the eastern half of the U.S., ranging from the western edge of the Ozark region in Oklahoma, north to southern Wisconsin, east to Vermont, and as far south as northern Florida. (USFWS 2007b). Missouri is home to largest population of Indiana bats (195,000+) and has the second largest number of hibernacula (92) (USFWS 2019b).

During winter, Indiana bats are restricted to suitable underground hibernacula. The vast majority of these sites are caves located in karst areas of the east-central U.S.; however, Indiana bats also hibernate in other cave-like locations, including abandoned mines. Suitable hibernacula in the central and southern U.S. often provide a wide range of vertical structure. These hibernacula tend to have large volumes and often have large rooms and vertical or extensive passages, often below the lowest entrance. Cave volume and complexity help buffer the cave environment against rapid and extreme changes in outside temperature, and vertical relief helps provide a range of temperatures and roost sites. Most Indiana bats hibernate in caves or mines with relatively stable temperatures where the ambient temperature remains below 10°C (50.0°F) but infrequently drops below freezing.

In summer, most reproductive females occupy roost sites under the exfoliating bark of dead trees that retain large, thick slabs of peeling bark. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically within canopy gaps in a forest, in a fence line, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas (USFWS 2007b).

Final critical habitat for the Indiana bat has been listed within the Project Area (USFWS 2022b, D. Donkersloot, BLM, personal communication, February 16, 2022). Indiana bat has been documented in the vicinity but outside of the Project Area (K. Nicholas, USFS, personal communication/GIS files, 3/24/2022).

Northern Long-Eared Bat (*Myotis septentrionalis*)

The northern long-eared bat is found in much of the eastern and north central U.S. The northern long-eared bat spends winter hibernating in caves and mines, using areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. During the summer, northern long-eared bats roost singly or in colonies underneath bark in the cavities or crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. Northern long-eared bats migrate between winter hibernacula and summer habitat, with a maximum migrating distance of 168 miles (USFWS 2014; USFWS 2015b). Northern long-eared bats have been documented near the Brushy Creek Mine but outside of the Project Area (K. Nicholas, USFS, personal communication/GIS files, 3/24/2022).

Hine's Emerald Dragonfly (*Somatochlora hineana*)

General habitat for the Hine's emerald dragonfly consists of calcareous waters from seeps, springs, fens, and slow-flowing streams that are small and shallow within vegetative communities ranging from emergent to woody. Soils with organic surface horizons or organic soils that lie on a substrate of calcareous bedrock are important habitat areas for this species. Areas for breeding and larval stages included fens, seeps, marshes, sedge meadow dolomite prairies, and associated woody fringe. Herbaceous/open areas and corridors are important for Hine's emerald dragonfly aerial feeding (adult), movement, and dispersal. Ponded or slow-flowing streams with aquatic macroinvertebrates serve as a prey base for the larval stage. Crayfish burrows provide refugia for larva.

Designation of critical habitat considers space, resources, and other biological and physical attributes of the environment to successfully carry out the organism's life cycle events. These include elements such as space for individual and population growth, shelter and cover, nutritional sources, and undisturbed and protected habitats. A primary trait of critical habitat for the Hine's emerald dragonfly is suitability for egg deposition and larva development with considerations for adult aerial and larval aquatic feeding and refugia (USFWS 2010a, 2010b). Final critical habitat for the Hine's emerald dragonfly has been designated but there is none located within the Project Area (USFWS 2022b).

Monarch Butterfly (*Danaus plexippus*)

Eastern monarch butterfly populations decreased by 88% from 1996 to 2020 due to habitat destruction, fragmentation, and pesticide use (USFWS 2019c). In December 2020, the USFWS completed a status assessment that informed their decision to list monarch butterfly as a candidate species, meaning that USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Candidate species designation does not authorize federal protections. Official USFWS listing of the monarch butterfly is anticipated to occur in 2024.

Adult monarchs use a variety of flowering plants during both migration and breeding periods. Some of these include *Coreopsis*, *Viburnum*, *Phlox* spp., Goldenrods (*Solidago* spp.) asters, (*Symphyotrichum* spp.), sunflowers (*Helianthus* spp.), sages (*Salvia* spp.), and milkweeds (*Asclepias* spp.) (USFWS 2019c).

Ozark Hellbender (*Cryptobranchus alleganiensis bishopi*)

The Ozark hellbender is a large aquatic salamander found in perennial streams. This long-lived species was once widespread across multiple states within the U.S. and prefers to inhabit fast, flowing, well-oxygenated streams that consist of loose gravel and flat rocks for hunting and spawning. Multiple sources of stressors have depleted the eastern Ozark hellbender population including water quality degradation, habitat destruction, disease, and direct removal by humans (USFWS 2018, USFWS 2019d, USFWS 2019e, USFWS 2019f).

After petition was received to list the species in the ESA, the USFWS evaluated the species' range-wide status and decided not to list the species across its broadest range as multiple populations persist and are healthy. However, all five populations of the Ozark hellbender in Missouri (Missouri DPS) are considered unhealthy and are predicted to continually decline over the next 25 years. Therefore, these distinct Missouri populations have been deemed to be in danger of extinction and were officially listed as endangered on March 9, 2021 (USFWS 2018, USFWS 2019d, USFWS 2019e, USFWS 2019f).

3.6.2. Environmental Impacts

3.6.2.1. Impacts of Alternative A – No Action Alternative

Under the No Action Alternative, the BLM would not approve the three lease modifications. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities described in the Proposed Action on these lands that could affect wildlife and aquatic resources. Current mining operations would continue on the existing Doe Run-leased lands. Selection of the No Action Alternative would have no impact on wildlife and aquatic resources in the Project Area.

3.6.2.2. Impacts of Alternative B – Proposed Action

Under the Proposed Action, a maximum of 25 acres of surface disturbance would occur on the Modified Lands due to development of surface drill pads and temporary access roads. While the exact location of the exploration surface drill sites is unknown at this time, each site would require approval from the BLM and the USFS prior to any disturbance.

Short-term, minor impacts to terrestrial wildlife populations would result from increased noise and habitat disruption during surface exploration drilling activities. Increased noise and habitat disruption would result in species displacement, stress, injury, or potential mortality of wildlife unable to leave the immediate area of impact. Disruption of any habitat type could cause alterations in breeding, feeding, nesting, and rearing activities of species that actively use those habitats. However, most of the wildlife likely to occur within the proposed Project Area and vicinity are mobile and able to relocate during short-term construction and drilling activities. Once exploration drilling activities cease and vegetation is restored, most wildlife would likely recolonize the area. Given the limited extent of the affected area, measurable impacts are not anticipated.

Direct impacts to aquatic habitat would be avoided or minimized during exploration activities to the extent practicable. If an access road is planned that would cross a stream feature, it would either cross in a perpendicular fashion (the shortest route possible) or utilize an existing crossing. If unavoidable, stream crossings would be approved by USFS prior to the installation or activity. Temporary culverts or low water crossings would be installed where needed, or where culverts or crossings already exist, they may be improved. Impacts include the temporary fill due to the placement of the culvert or low water crossing and increased sedimentation during construction of the stream crossing. Should impacts to surface waters occur, the area would be restored to pre-existing conditions. Environmental protection design features described in Section 2.2.3 would be implemented to protect aquatic habitat in the Project Area.

No impacts to terrestrial or aquatic wildlife or their habitat are anticipated to result from underground mine operations in the Project Area as all actions would be conducted in accordance with the 2005 Forest Plan and current lease stipulations.

Special Status Species

Potential Indiana bat and northern long-eared bat summer roosting habitat associated with the Proposed Action would be affected by the removal of potentially suitable summer roost trees in association with the development of the drill pads and/or access roads. Tree clearing activities would be limited to the period between November 1 and March 31 to avoid potential direct impacts to bats during reproductive periods in accordance with the conservation measures included in the existing lease stipulations. Although fens, which support Hine's emerald dragonfly, are present within the vicinity of the Project Area, these sensitive areas do not occur within the Project Area and would not be affected.

Doe Run would comply with the existing lease stipulations, BLM terms and conditions, Programmatic Biological Opinion for the 2005 Forest Plan (USFWS 2005), 2016 Programmatic Biological Opinion on the Final 4(d) Rule for the Northern Long Eared Bat (USFWS 2016), and the 2015 Biological Opinion on Ongoing Activities on the MTNF (USFWS 2015a). Doe Run would also comply with the USFWS Bat Tree Removal Decision Tree (USFWS undated) as well as the USFWS General Project Design Guidelines for the species identified. The BLM would consult USFWS on a site-specific basis for planned surface exploration sites and associated access roads at the lease modification areas.

Based on the adherence to these plans and the use of avoidance and minimization measures, effects determinations were made for each of the listed species as listed in Table 3-12. These determinations assume Doe Run would adhere to the existing lease stipulations and plans listed

above and would only clear trees during the winter from November 1 to March 31. Concurrence with these effects determinations was received from the USFWS via email on May 11, 2022 (Appendix D).

Table 3-12. Effects Determinations for Listed Species in the Project Area

| Species | Scientific Name | Listing Status | Effects Determination |
|------------------------------|---|----------------|---|
| Gray bat | <i>Myotis grisescens</i> | Endangered | No effect |
| Hines's emerald dragonfly | <i>Somatochlora hineana</i> | Endangered | May affect but not likely to adversely affect |
| Indiana bat | <i>Myotis sodalis</i> | Endangered | May affect but not likely to adversely affect |
| Monarch butterfly | <i>Danaus plexippus</i> | Candidate | No effect |
| Northern long eared bat | <i>Myotis septentrionalis</i> | Threatened | No effect |
| Ozark hellbender | <i>Cryptobranchus alleganiensis bishopi</i> | Endangered | No effect |
| Indiana bat critical habitat | <i>Myotis sodalis</i> | Final | May affect but not likely to adversely affect |

Since none of the RFSS-listed wildlife species have been documented within the Project Area, the Proposed Action would not affect these species.

3.7. Vegetation

3.7.1. Affected Environment

The Project Area falls within the Current River Hills Level IV Ecoregion of the Ozark Highlands Level III Ecoregion. The Ozark Highlands endured intensive timber cutting in the early 20th century, but oak forests are still the dominant vegetative community with mixed stands of oak and shortleaf pine also common in the southeastern part of the region, including in Reynolds and Shannon counties. Karst features, including caves, springs, and spring-fed streams, are found throughout the region. Soils in the Ozark Highlands Ecoregion are mostly derived from cherty carbonate rocks, with chert stone comprising from 20% to 60% of the soil mass. The Current River Hills is characterized by deeply incised stream and river valleys with abundant springs with high water quality. This ecoregion is defined by a higher number of endemic (native) species than surrounding ecoregions (Chapman et al. 2002; Krusekopf 1962).

The two parcels comprising the 1,120-acre Fletcher Modification Lands are primarily forested upland, although small forested and herbaceous riparian stream valleys and cleared upland transmission corridors are also present to a lesser extent. The 240-acre Sweetwater and 190-acre Brushy Creek Modification Lands are characterized entirely by upland forest. Deciduous forest occupies most of the parcels; however, stands of pine and mixed forest are scattered throughout.

Upland deciduous and mixed forests in the Current River Hills ecoregion are typically dominated in cover by woody species like black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), and white oak (*Quercus alba*). Shortleaf pine (*Pinus echinata*) is found alongside the

aforementioned oaks in the canopy of mixed forested stands and is found in near monoculture in coniferous forested stands. The most common subcanopy woody shrubs found in forested uplands include flowering dogwood (*Cornus florida*), winged elm (*Ulmus alata*), red mulberry (*Morus rubra*), and redbud (*Cercis canadensis*) (Brookshire et. al 1997). Within the 80-acre parcel of the Fletcher lease modification, two stands of upland oak-hickory forest have been characterized as old-growth (B. Merkel, USFS, personal communication, April 2022) (Figure 3- 5). A forest stand is determined as old growth based on the age of large trees, diameter at breast height of large trees, past disturbance (e.g., fire), basal area, stand density, number of standing snags, fallen logs per acre, and minimal evidence of past human disturbance.

Disturbed herbaceous and scrub-shrub vegetation found along periodically cleared transmission line rights-of-way can be found in the largest parcel of the 1,120-acre Fletcher proposed lease modification land. Commonly encountered species observed along upland right-of-way clearings include scrub woody regrowth of oaks, hickories (*Carya* spp.), sassafras (*Sassafras albidum*), brambles (*Rubus* spp.), winged sumac (*Rhus coppalina*), black tupelo (*Nyssa sylvatica*), and American hazelnut (*Corylus americana*). Common herbaceous species include broomsedge (*Andropogon virginicus*), little bluestem (*Andropogon scoparium*), tall fescue (*Schedonorus arundinaceous*), southeastern wildrye (*Elymus glabriflorus*), sericea (*Lespedeza cuneata*) and various goldenrod species (*Solidago* spp.).

According to USFS records, small herbaceous wetlands are uncommon and are typically found marginally to small streams or in swales, and more rarely, in small fens (B. Davidson, personal communication, March 2022). Recorded fens are not present in the Project Area; however, they are present within the existing lease lands at Fletcher Mine. Commonly encountered wetland species include bulrushes (*Scirpus* spp.), deertongue grass (*Dichantheium clandestinum*), river oats (*Chasmanthium latifolium*), beaked panicgrass (*Coleataenia anceps*), redtop (*Agrostis gigantea*), beggartick species (*Bidens* spp.), and various sedges (*Carex* spp.). In upland and wetland riparian zones along small streams, woody species like vernal witchhazel (*Hamamelis vernalis*), ninebark (*Physocarpus opulifolius*), and Ward's willow (*Salix caroliniana*) are typical (Wood Environmental 2021).

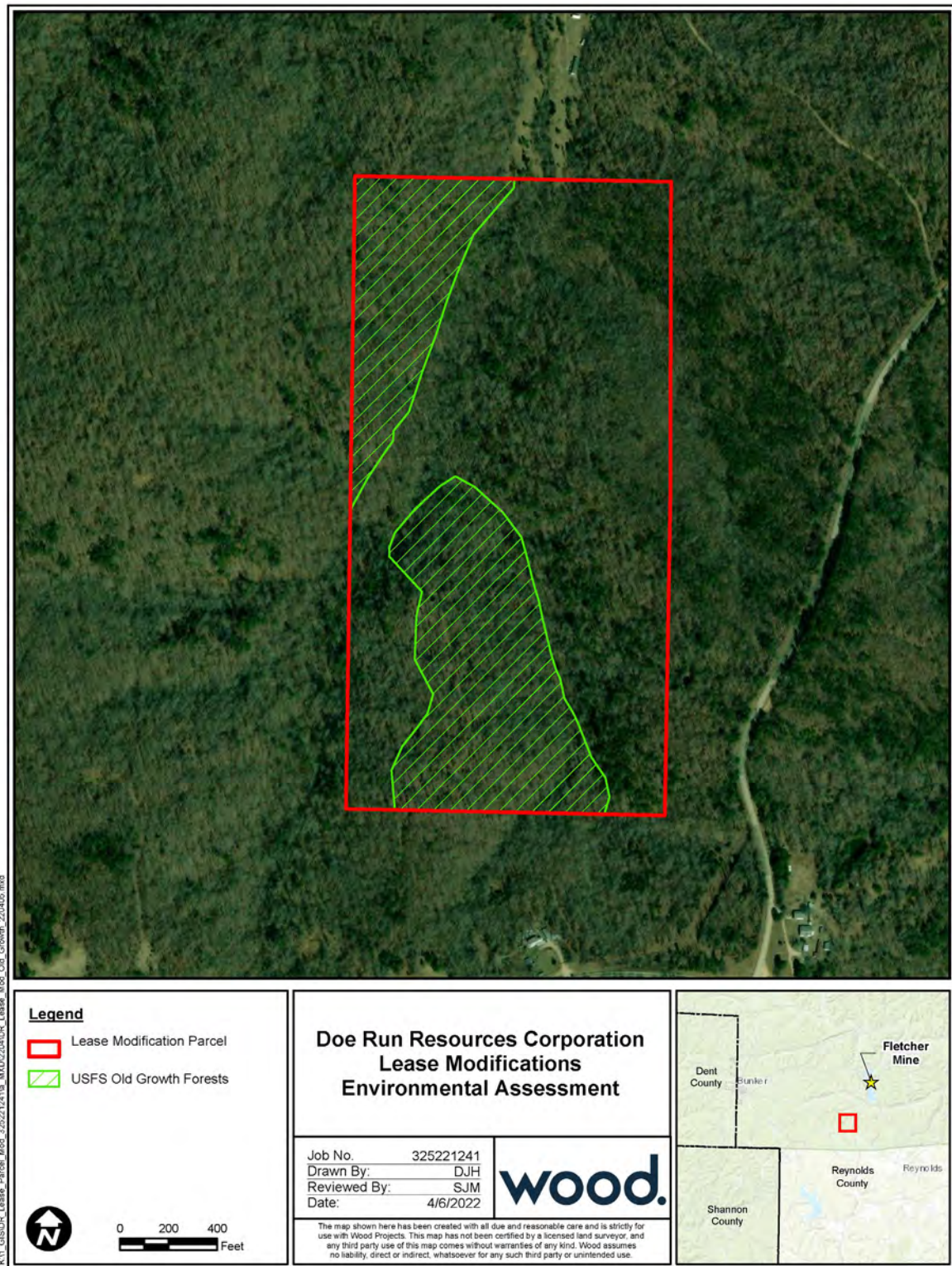


Figure 3-5. Old Growth Stands within the 80-Acre Fletcher Mine Proposed Lease Modification Area

3.7.1.1. Special Status Species

A review of the USFWS, USFS, and MDC sensitive plant species potentially occurring within Reynolds and Shannon counties includes two federally listed species [Mead’s milkweed (*Asclepias meadii*) and Virginia sneezeweed (*Helenium virginicum*)], 89 state listed plant species, and 70 MTNF RFSS vascular plant species. The federal and state-listed species potentially occurring within the Project Area are listed in Table 3-13. In addition, 2 RFSS and 15 state listed non-vascular bryophyte species are considered as potentially occurring within the Project Area. According to USFS records (B. Davidson, USFS, personal communication, March 2022), 17 federal, state, or RFSS listed species have historically been located within the vicinity of the Project Area, including vascular plants: dioecious sedge (*Carex sterilis*), rigid sedge (*Carex tetanica*), hairyfruited sedge (*Carex tichocarpa*), graceful sedge (*Carex gracillima*), heartleaved plantain (*Plantago cordata*), satin brome (*Bromus nottawayanus*), marsh blue violet (*Viola cucullata*), yellow widelip orchid (*Liparis loeselii*), largeleaf phlox (*Phlox amplifolia*), spotted phlox (*Phlox maculata* ssp. *pyramidalis*), California bulrush (*Schoenoplectus californicus*), Riddell’s goldenrod (*Solidago riddellii*), Sullivan’s coolwort (*Sullivantia sullivantii*), and zigzag bladderwort (*Utricularia subulata*), and bryophytes: yellow starry fen moss (*Campylium stellatum* var. *stellatum*), marsh magnificent moss (*Plagiomnium ellipticum*), and *Aneura pinguis*. No known records of federal, state, or RFSS sensitive species exist within the Project Area. With the exception of largeleaf phlox, there is no suitable habitat for historically recorded sensitive species within the Project Area.

Table 3-13. Federal and State-Listed Protected Plant Species and Critical Habitats in the Project Area

| Common Name | Scientific Name | Federal Status | State Status |
|--------------------------|----------------------------|----------------|------------------|
| Flowering Plants | | | |
| Mead’s milkweed | <i>Asclepias meadii</i> | Threatened | Endangered |
| Virginia sneezeweed | <i>Helenium virginicum</i> | Threatened | Endangered |
| Large-leaved phlox | <i>Phlox amplifolia</i> | - | Vulnerable (S3?) |
| Critical Habitats | | | |
| None | | | |

Sources: USFWS IPaC Report (USFWS 2022b), MDC Natural Heritage Review (MDC 2022b)

Mead’s Milkweed (*Asclepias meadii*)

Mead’s milkweed is thought to have once occurred throughout the historical tallgrass prairie region of the Midwest, but a legacy of habitat loss and fragmentation has reduced its native range to scattered areas of Missouri, Kansas, Iowa, and Illinois (Kartesz 2015, NatureServe 2022). The species is now considered federally threatened and state endangered. Physiography and soils associated with observation records of Mead’s milkweed in Iron County and eastern Reynolds County are described as igneous glade habitat in Missouri’s Ozark Physiographic Region with soils that are acidic and nutrient poor (NRCS 2016, USFWS 2003). In populations in Shannon and western Reynolds counties not underlain by igneous geology, the plant can be found in mesic to dry upland tallgrass prairie or chert-lime glade/barren habitat characterized by vegetation adapted for fire and drought. Generally, the plant is restricted to sites that are open and have never been plowed and are only lightly grazed (USFWS 2003).

Virginia Sneezeweed (*Helenium virginianum*)

Virginia sneezeweed's current range is disjunct between a small geographic area of the Shenandoah Valley in Virginia, and the south-central Ozark Highlands of Missouri (NatureServe 2022). The species is considered federally threatened and state endangered in Missouri (MDC 2021). While this species closely associates with, and appears restricted to, sinkhole ponds in the two counties where it has been recorded in Virginia, Virginia sneezeweed can be found in a diversity of habitat types in the six counties where it has been found in Missouri. In addition to sinkhole ponds, wet meadows, and wetland ditches, the species has also been observed in pastures, rural airports, hayfields, and otherwise open and disturbed areas that are at least temporarily moist (Yatskievych 2006, NatureServe 2022).

Large-leaved Phlox (*Phlox amplifolia*)

The current range for large-leaved phlox includes scattered areas of the Southeast and lower Midwest, with more concentrated distributions along the southern Ridge and Valley and in the Western Highland Rim in Tennessee (Kartesz 2015). The species is currently state ranked as vulnerable (S3?) in Missouri (MDC 2021). Range-wide, large-leaved phlox is found in forests and streambanks with rocky or sandy soil and can sometimes be found at higher elevations. In Missouri, the species is found along roadsides and on mesic forested slopes, sometimes streamside (Yatskievych 2013, NatureServe 2022). Threats to the species in Missouri are primarily from roadside construction and mowing, herbivory, and invasive species encroachment.

3.7.1.2. Forestry Resources

Existing in a rural area, each parcel of the Project Area has the availability and capacity for timber and woodland product harvest. The Project Area contains approximately 1,420 acres of forested land. Within the MTNF, red oak species, white oak, and shortleaf pine between five inches and 20 inches or more are typically the targeted species and size classes for logging (B. Merkel, USFS, personal communication, April 2022). As most forested areas within the Project Area are upland habitat characterized by mature stands of oak-hickory, mixed, and shortleaf pine stands, marketable timber is presumed to be widely present.

3.7.2. Environmental Impacts

3.7.2.1. Impacts of Alternative A – No Action Alternative

Under the No Action Alternative, the BLM would not approve the three lease modifications. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities described in the Proposed Action on these lands that could affect vegetation, including forestry resources. Current mining operations would continue on existing Doe Run-leased lands. Selection of the No Action Alternative would have no impact on vegetation or forestry resources in the Project Area.

3.7.2.2. Impacts of Alternative B – Proposed Action

Impacts to upland vegetation, including forestry resources, would primarily be caused by clearing activities associated with the development of exploratory drill pads and access roads. Up to 25 acres of upland vegetation clearing would be required for access road construction and drill

pad development. In the case of forestry resources, the clearing of marketable timber species including red oak species, white oak, and shortleaf pine, is expected to some extent. While targeted species within the marketable size range may be cleared during project activities, their potential for recovery and sale should not be affected. In cases where marketable species not yet of saleable size are cleared during project activities, minor impacts to future potentially marketable timber are possible. Impacts to existing vegetation communities from drill pad and access road development are expected to be minor, localized, and temporary to short-term. These areas would be restored and revegetated following use in accordance with the existing lease stipulations, the 2005 Forest Plan, and the USFS Road Use Permit, where applicable.

Indirect impacts to vegetation from project activities would be minor and result from ground-disturbing project activities (e.g., access road and drill pad development, movement of heavy machinery) that cause soil displacement (thus creating dust generation and erosion) and compaction would result in the degradation of soil conditions that support native plant communities. Soil exposed during ground disturbance is susceptible to becoming colonized with invasive plants, and the introduction of outside, uncleaned equipment during construction may exacerbate in-situ invasive plant loads that could at least initially outcompete native vegetation, including young timber species. Mitigation of indirect impacts to existing vegetation would be completed during site restoration once drilling is completed. With the implementation of the restoration measures described in Section 2.2.3, impacts caused by invasive species would be limited and would not significantly impact local vegetation in the long-term. To minimize impacts to forestry resources, Doe Run would contact the District Ranger prior to any surface disturbance to ensure that it does not conflict with any ongoing and planned activities within the MTNF.

Special Species Status

There are no records of federal, state, or RFSS-listed plant species within the Project Area, and no impacts to sensitive species are expected from project activities. As outlined in the 2005 Forest Plan and current lease stipulations, riparian and wetland vegetation communities would be buffered and thus excluded from project impacts. Therefore, 16 of the 17 species historically recorded in the vicinity of the Project Area would not be impacted by project activities.

Potential habitat for the large-leaved phlox is found within the Project Area and includes mesic upland forested slopes and along roadsides (Yatskievych 2013). The closest historical recorded location of large-leaved phlox is approximately 5 miles west of the Brushy Creek lease modification land. While large-leaved phlox is not expected to occur within the Project Area, potential direct impacts from exploratory drilling and access road clearing are possible on forested slopes and especially along existing roadsides and forested edges should unknown populations of large-leaved phlox occur in the Project Area. The introduction of invasive species into natural plant communities adjacent to the limits of disturbance could potentially have an indirect impact on unknown existing populations.

There are no known records of the federally listed Mead's milkweed and Virginia sneezeweed within the Project Area, however potential habitat for both species may be present within limited portions of the Project Area characterized by herbaceous vegetation. In areas of Shannon and Reynolds counties underlain by sedimentary geology, Mead's milkweed is found in high quality natural glades, barrens, and tallgrass prairies. Marginal potential habitat for this species may be located in portions of the cleared transmission right-of-way that runs through the large parcel of

the Fletcher Mine Modification Lands. Virginia sneezeweed has less restricted habitat constraints than Mead's milkweed and can be found in a variety of herbaceous habitats, including disturbed and intact vegetation communities, wetlands, and uplands that meet seasonal moisture requirements. Although Virginia sneezeweed has never been recorded in Reynolds County, this species could potentially be found within low swales of the cleared right-of-way transmission corridor that crosses the Fletcher Mine Modification Lands or perhaps along mowed ditches of existing roadsides that cross the Project Area. While neither species is expected to be present in the Project Area, potential direct and indirect effects to the species associated with construction activities are possible should unknown populations of either species occur in the Project Area. Because of the relative rarity of both species, direct and indirect effects could be significant for the local viability of any existing population. However, across their total ranges, populations of both Mead's milkweed and Virginia sneezeweed are concentrated within the project region. Mead's milkweed is considered mostly stable in the Eastern Ozarks and populations of Virginia sneezeweed have recently been discovered in Missouri (Yatskievych 2006, NatureServe 2022). In light of this, any project activities that would impact either species would be minor and would not likely negatively affect their conservation status regionally or range-wide.

3.8. Cultural Resources

3.8.1. Affected Environment

As used in this analysis, the term "heritage resources" includes the tangible or physical remains that provide evidence of human activity at a particular geographic locale (36 CFR 800.16(l) and Forest Service Manual 2361). In this sense, heritage resources include principally prehistoric and historic archaeological sites and objects, historic sites, and architectural sites. Under the terms and conditions of the NHPA (as amended through 1992), and the accompanying regulations in 36 CFR 800 [specifically 36 CFR 800.4(d)], the BLM and USFS must consider the effect of its actions on two classes of heritage resources: (1) those heritage resources which meet the National Register of Historic Places (NRHP) significance criteria as found in 36 CFR 60 (termed "historic properties" or "eligible sites") and in Forest Service Manual 2363.21(b); and (2) those heritage resources which have not yet been evaluated against the NRHP criteria (termed "unevaluated" or "potentially eligible" sites). The NHPA sets forth the process federal agencies must take and the consultation process required to assess the effects of their actions on cultural resources.

The area of potential effect is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR 800.16(d)). In other words, the area of potential effect is the area where potential impacts to historic resources would be most likely to occur.

For this project, the area of potential effect is limited to the area affected by the project within the boundaries of the proposed Modification Lands. A review of the SHPO online database and data provided by a USFS archaeologist indicates that the entire proposed Modification Lands adjacent to Sweetwater Mine and portions of the proposed Modification Lands adjacent to Fletcher and Brushy Creek mines have been previously surveyed for cultural resources. Several archaeological sites have been recorded in previously surveyed areas. Within proposed Modification Lands at Sweetwater, one archaeological site, a historic railroad tram berm, was located and was previously recommended as eligible for the NRHP. Within proposed

Modification Lands at Brushy Creek, one archaeological site, a historic homestead, was previously recorded but was not recommended as eligible for the NRHP. There are no previously recorded sites located within the Fletcher lease Modification Lands.

3.8.2. Environmental Impacts

3.8.2.1. Impacts of Alternative A – No Action Alternative

Under the No Action Alternative, the BLM would not approve the three lease modifications. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities described in the Proposed Action on these lands that could affect cultural resources. Current mining operations would continue on existing Doe Run-leased lands. Selection of the No Action Alternative would have no impact on cultural resources in the Project Area.

3.8.2.2. Impacts of Alternative B – Proposed Action

Only a portion of the Project Area has been surveyed for heritage resources; however, locations of any permitted ground-disturbing activities (including exploratory drilling and access road construction) in areas not previously surveyed for heritage resources would be surveyed once specific locations become known. Such surveys and associated regulatory consultations with the USFS, SHPO, and Tribes would be completed as required under the terms and conditions of the NHPA and the 2019 Programmatic Agreement among MTNF, the Advisory Council on Historic Preservation, Federally recognized Tribal Partners, and the Missouri SHPO prior to initiation of any ground-disturbing activities. Thus, implementation of the Proposed Action would not result in direct or indirect effects on heritage resource sites as any actions within the new lease areas would also be required to adhere to current lease stipulations pertaining to the protection of heritage sites, including site-specific surveys and consultation with USFS, SHPO, and Tribes as described above.

3.9. Human Health and Safety

3.9.1. Affected Environment

Workplace health and safety regulations are designed to prevent personal injuries and illnesses from occurring in the workplace. These laws may comprise both federal and state statutes. The Mine Safety and Health Act of 1977 (30 CFR parts 1-199) is the primary statute protecting the health and safety of workers at mine operations. This act sets forth mandatory health and safety standards for the protection of life and prevention of injuries in mines and is enforced by the Mine Safety and Health Administration.

3.9.1.1. Noise

Noise is unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or diminishes the quality of the environment. Community response to noise is dependent on the intensity and duration of the sound source, proximity of noise-sensitive receptors, and the time of day the noise occurs. For instance, higher sensitivity to noise would be expected during quieter nighttime periods at noise-sensitive receptors such as residences. Other noise-sensitive receptors

include developed sites where frequent human use occurs, such as hospitals, churches, and schools.

Sound is measured in logarithmic units called decibels (dB). Given that the human ear cannot perceive all pitches or frequencies of sound, noise measurements are typically weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel (dBA), which filters out sound in frequencies above and below human hearing. A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. The noise level associated with a 10 dBA change is perceived as being twice as loud; whereas the noise level associated with a 20 dBA change is perceived as four times as loud and would therefore represent a “dramatic change” in loudness.

To account for sound fluctuations, environmental noise is commonly described in terms of the equivalent sound level. The equivalent sound level is the constant noise level that conveys the same noise energy as the actual varying instantaneous sounds over a given period. Fluctuating levels of continuous, background, and/or intermittent noise heard over a specific period are averaged as if they had been a steady sound. The day-night sound level (Ldn), expressed in dBA, is the 24-hour average noise level with a 10-dBA correction penalty for the hours between 10 p.m. and 7 a.m. to account for increased community sensitivity to noises that occur at night. Typical background Ldn for rural areas are anticipated to range between 35 and 50 dB, whereas Ldn for higher-density residential and urban areas range from 43 to 72 dB (EPA 1974).

There are no federal, state, or locally established quantitative noise level regulations that specify environmental noise limits for the Project Area or surrounding area. However, EPA noise guidelines recommend that outdoor noise levels do not exceed Ldn of 55 dBA; this sound level is sufficient to protect the public from the effect of environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are “intentionally conservative to protect the most sensitive portion of the American population” with “an additional margin of safety” (EPA 1974).

The Project Area is primarily located on public lands in a rural and remote area of southern Missouri removed from major development. Existing sources of noise in this area are traffic on roads in the vicinity of the Project Area and current operations at the Bushy Creek, Fletcher, and Sweetwater mines. There are no sensitive noise receptors located within the Project Area, such as hospitals, churches, and schools. The nearest residence is at least 0.1 miles away from the boundary of any of the Modified Lands and the Town of Bunker is the closest town to the mine sites and is located more than 3 miles from existing mining operations at Bushy Creek, Fletcher, and Sweetwater.

3.9.1.2. Solid and Hazardous Waste

Drilling fluids or products used during exploratory drilling operations would be stored within the Project Area. Water is commonly used to lubricate the drill bit and support the hole during drilling. Bentonite mud composed of finely ground particles of clay may also be added to lubricate the drill bit. Occasionally, a biodegradable “soap” or frothing agent (such as Drilfoam) may also be added during drilling to lubricate the drill bit and keep it cool until the water table is reached. Drilfoam contains the hazardous ingredients isopropyl alcohol (12%) and ethanol (4%)

and has “low order of toxicity” for ingestion. Currently, neither the EPA nor the MoDNR regulates the use of drilling fluids.

Potentially hazardous materials used for project activities would include diesel fuel, gasoline, lubricating grease, and hydraulic fluid. Diesel fuel and gasoline for the operation of mechanical equipment would be brought onsite in mobile fueling tanks. Any hazardous materials such as lubricating grease or hydraulic fluid would be stored on drill rigs or on drill maintenance trucks. Containers of hazardous substances would be labeled and handled in accordance with applicable federal, state, and local requirements.

3.9.2. Environmental Impacts

3.9.2.1. Impacts of Alternative A – No Action Alternative

Under the No Action Alternative, the BLM would not approve the three lease modifications. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities described in the Proposed Action in the Project Area that could affect human health and safety. Current mining operations would continue on existing Doe Run-leased lands. Selection of the No Action Alternative would have no impact on human health and safety in the Project Area.

3.9.2.2. Impacts of Alternative B – Proposed Action

Noise

Construction associated with the implementation of the Proposed Action would temporarily increase ambient noise levels during the construction of the access roads and drill pads. Development of a single drill site would take approximately 20 hours, with work primarily occurring on weekdays during daytime hours. During the construction phase, noise would be generated by a variety of construction equipment including dozers (D6 or similar), excavators (CAT36 or similar), and tandem dump trucks for transport of rock. Typical noise levels from the use of construction equipment are expected to be 85 dBA or less at a distance of 50 feet from the construction site (FHWA 2016).

Operational noise would be associated with drilling activities that would occur for approximately 150 hours at each drill rig site. Operational noise would also be associated with vehicle trips and would last until exploration activities are complete. At each drill site, a two-person crew would complete core drilling within approximately 130 hours. Restoration of each drill site would be completed within three months of drill hole plugging. During the operation and restoration phases, noise would be generated by a variety of equipment including truck-mounted Longyear LF 70 drill rigs or similar, flatbed trucks, flatbed trucks with mounted containers for water haul, and quarter-ton pickup trucks. Typical noise levels from this construction equipment are expected to be 84 dBA or less at a distance of 50 feet from the construction site (FHWA 2016).

Potential indirect noise impacts may occur from an increase in traffic related to the addition of workforce vehicles and equipment transport to local roadways. Roadway traffic noise typically does not seriously impact residents living more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (FHWA 2011). Due to the attenuating effects of noise with distance, a doubling of traffic volume in the same location as existing traffic noise would result in an approximately 3 dBA increase in noise level, which would not normally

be a perceptible noise increase (FHWA 2011). Therefore, the increase in current noise levels is estimated to be less than 3 dBA and as such, traffic noise is not anticipated to increase perceptibly as the nearest residence is at least 0.1 mile away from the boundary of any of the Modification Lands. There would be no noise impacts to any sensitive receptors due to their distance from the Project Area.

Solid and Hazardous Waste

Any oil, hazardous material, or chemicals spilled during operations would be cleaned up immediately. Spills of a reportable quantity would be reported as required by federal and state regulations. After cleanup, any contaminated material would be removed from the site and disposed of at an approved off-site disposal facility.

Trash and other debris would be collected daily and hauled off-site and disposed of in an authorized landfill. No trash would be buried or burned onsite. Self-contained, portable toilets would be transported to and used onsite for human waste. These portable toilets would be serviced by a licensed contractor and materials would be emptied at an approved facility.

As release of hazardous or solid wastes is not expected to occur or would be cleaned up immediately according to federal and state regulations, activities associated with surface exploration drilling would not result in impacts to the environment. Preparation and development of drill sites would generate minimal amounts of solid and hazardous waste, such as land clearing debris and non-hazardous used oil and lubricants. Wastewater and excess drill cuttings generated at drill sites would be managed in accordance with the Exploration Plan. Excess cuttings would be collected onsite and reclaimed, and wastewater would be stored in an on-site sump. Additionally, as there would be no substantive change to ongoing mine operations associated with the addition of proposed Modification Lands, health and safety conditions would be similar to those described above and the potential for impacts resulting from a substance release would be low.

Health hazards associated with the generation of wastes including solid wastes, hazardous wastes, liquid wastes, discharges, and air emissions would be managed in accordance with federal, state, and location requirements. Safety and emergency response plans for the drill rig sites would be developed to ensure the health and safety of workers and to limit potential impacts to the environment. As a result, potential human health and safety impacts are expected to be short-term and minor.

3.10. Socioeconomics and Environmental Justice

3.10.1. Affected Environment

The proposed lease expansion areas adjacent to the Fletcher and Brushy Creek mines are in Reynolds County and the proposed lease expansion area for the Sweetwater Mine is in Shannon County.

The study area for socioeconomic resources was determined to be Reynolds, Shannon, and Dent counties. Dent County was included in the study area as it contains the largest regional city (Salem), which provides an employment base and a hub for mine service companies.

3.10.1.1. Population and Demography

By population, Reynolds, Shannon, and Dent counties are the 12th, 15th, and 44th smallest, respectively, of the 115 counties in Missouri. By area, Reynolds, Shannon, and Dent counties are the 12th, 2nd, and 20th largest in Missouri, respectively. Table 3-14 provides population statistics for Reynolds, Shannon, and Dent counties (USCB 2020c). As shown in Table 3-14, populations in all three counties have decreased since 2010 with Shannon County having the largest decrease (16.7%).

Reynolds, Shannon, and Dent counties are not ethnically diverse, with approximately 95% of the population identified as Caucasian. The other races that are represented by more than 1% in each county are Hispanic/Latino, Native American, and Black (Reynolds County only).

Table 3-14. Population Statistics for Reynolds, Shannon, and Dent Counties

| County/Town* | 2010 Population | 2020 Population | Percent Change 2010-2020 |
|--------------|-----------------|-----------------|--------------------------|
| Reynolds | 6,696 | 6,096 | -9.0 |
| Bunker | 445 | 449 | 0.88 |
| Centerville | 188 | 187 | -0.19 |
| Ellington | 887 | 878 | -1.03 |
| Shannon | 8,441 | 7,031 | -16.7 |
| Birch Tree | 655 | 653 | -0.35 |
| Montier | 94 | 94 | -0.37 |
| Summersville | 476 | 474 | -0.51 |
| Winona | 1,295 | 1,290 | -0.3 |
| Eminence | 607 | 606 | 0.09 |
| Dent | 15,657 | 14,421 | -7.9 |
| Salem | 4,927 | 4,925 | -0.04 |

Source: USCB 2022c

* Only includes incorporated towns

3.10.1.2. Economy and Employment

Doe Run's taxes and other expenditures in 2020 are provided in Table 3-15 (Doe Run 2020). As indicated below, Doe Run's largest expenditure is related to compensation of its employees, followed by environmental and capital spending. Expenditures to local, county, state, and federal governments account for over \$13 million per year.

Table 3-15. Financial Expenditures from 2018-2020

| Expenditure | 2018 | 2019 | 2020 |
|----------------|--------------------------|---------------|---------------|
| Property Taxes | \$1,962,000 ¹ | \$6,799,000 | \$6,869,000 |
| Compensation | \$121,362,000 | \$120,632,000 | \$115,154,000 |

| Expenditure | 2018 | 2019 | 2020 |
|-----------------------------------|--------------|--------------|--------------|
| Community Investment ² | \$176,000 | \$164,000 | \$173,000 |
| Environmental ³ | \$50,904,000 | \$42,656,000 | \$36,779,000 |
| Research and Development | \$2,533,000 | \$3,564,000 | \$4,494,000 |
| Royalties to Government | \$9,303,000 | \$7,430,000 | \$6,819,000 |
| Capital Spending | \$46,908,000 | \$34,107,000 | \$14,783,000 |

Source: Doe Run 2020.

¹ Lower property tax spending in 2018 is due to an appeal of taxes from 2011 through 2017.

² Community investment includes donations, scholarships, and tuition reimbursement.

³ Decrease in environmental spending is due to the completion of several remediation projects at historic properties.

Mining wages and salaries are among the highest for jobs in these counties. The Doe Run average annual salary is approximately \$49,000 (Zippia 2022), which is above the average income for each county but below the average for the state of Missouri, as shown in Table 3-16. The poverty rate for each county is higher than the state poverty rate of 12.1%.

Table 3-16. Economic and Employment Statistics

| Economic Factor | Reynolds County | Shannon County | Dent County | Missouri |
|---|------------------------|-----------------------|--------------------|-----------------|
| % of Population (16 year or older) in Labor Force | 51.9% | 47.1% | 55.3% | 62.6% |
| Total Employment | 1,397 | 1,239 | 3,515 | 2,547,310 |
| Median Income | \$39,552 | \$36,229 | \$42,714 | \$56,179 |
| Poverty Rate | 19.4% | 21.8% | 15.1% | 12.1% |

Source: USCB 2022c

In 2020, Doe Run employed 1,145 workers throughout the company, with 675 employees associated with the Southeast Missouri Mining and Milling Division (Doe Run 2020). The number of employees decreased by 52 between 2018 and 2020, with a company-wide decrease of 100 employees during that timeframe.

As indicated in Table 3-16, the percentage of the population in the labor force and the median income in the three counties are lower than overall Missouri numbers (USCB 2020c). In addition, the poverty rate in Reynolds, Shannon, and Dent counties is higher than the state poverty rate.

3.10.1.3. Housing

Table 3-17 provides housing information for Reynolds, Shannon, and Dent counties and for the state of Missouri (USCB 2020c).

Table 3-17. Housing Data

| Housing Factor | Reynolds County | Shannon County | Dent County | Missouri |
|---|------------------------|-----------------------|--------------------|-----------------|
| Housing Units | 4,030 | 4,174 | 7,333 | 2,819,383 |
| Owner Occupancy Rate | 82% | 74.9% | 71.5% | 67.1 |
| Median Value of Owner-Occupied Units | \$96,000 | \$119,900 | \$104,900 | \$163,600 |
| Median Owner Monthly Cost with Mortgage | \$891 | \$973 | \$1,017 | \$1,287 |
| Median Gross Rent | \$612 | \$623 | \$583 | \$843 |
| Households | 2,580 | 3,063 | 6,355 | 2,440,212 |
| Person per Household | 2.35 | 2.64 | 2.41 | 2.44 |

Source: USCB 2022c

As both Reynolds and Shannon counties have relatively small populations, housing statistics for these counties are similar. One notable difference, as indicated in Table 3-17, is the median home value in each county. Shannon County has a median home value that is over \$20,000 greater than Reynolds County. However, housing and rent values in Reynolds, Shannon, and Dent counties are significantly lower than housing and rent values overall in the state of Missouri.

Community Facilities and Services

Free public education is provided in each county at schools located in the largest communities within each county. Table 3-18 provides enrollment numbers by education level for each county and for the state of Missouri overall (County Office 2022).

Table 3-18. Education Statistics for Reynolds, Shannon and Dent Counties and Missouri

| Education Level | Reynolds County | Shannon County | Dent County | Missouri |
|--|------------------------|-----------------------|--------------------|-------------------|
| Nursery & Preschool Enrollment | 52 (100.0%) | 37 (78.7%) | 224 (87.2%) | 54,969 (58.4%) |
| Kindergarten Enrollment | 77 (96.3%) | 164 (97.6%) | 174 (93.0%) | 65,419 (86.6%) |
| Elementary School Enrollment (Grades 1-4) | 293 (99.3%) | 456 (96.8%) | 775 (85.9%) | 265,753 (86.7%) |
| Elementary School Enrollment (Grades 5-8) | 315 (96.3%) | 355 (96.2%) | 638 (92.6%) | 271,485 (86.8%) |
| Less than 9th Grade Education | 285 (6.2%) | 376 (6.5%) | 829 (7.6%) | 134,369 (3.3%) |
| High School Enrollment (Grades 9-12) | 269 (84.9%) | 377 (85.5%) | 762 (96.0%) | 272,577 (87.9%) |
| 9-12th Grade (No Diploma) | 706 (15.3%) | 737 (12.7%) | 1,268 (11.6%) | 296,160 (7.2%) |
| High School Graduate (Including Equivalency) | 1,908 (41.3%) | 2,468 (42.5%) | 4,431 (40.4%) | 1,266,430 (30.7%) |

Source: County Office 2022.

3.10.1.4. Environmental Justice

On February 11, 1994, President Clinton signed EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. EO 12898 mandates certain federal executive agencies to consider environmental justice as part of the NEPA process. Environmental justice has been defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income (EPA 2018) and ensures that minority and low-income populations do not bear disproportionately high and adverse human health or environmental effects from federal programs, policies, and activities.

Guidance for addressing environmental justice is provided by CEQ's Environmental Justice Guidance under the National Environmental Policy Act (CEQ 1997). The CEQ defines minority as any race and ethnicity, as classified by the U.S. Census Bureau (USCB), that is: Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; some other race (not mentioned above); two or more races; or a race whose ethnicity is Hispanic or Latino (CEQ 1997).

Identification of minority populations requires analysis of individual race and ethnicity classifications as well as comparisons of all minority populations in the region. Minority populations exist if either of the following conditions is met:

- The minority population of the impacted area exceeds 50% of the total population.
- The ratio of minority population is meaningfully greater (i.e., greater than or equal to 20%) than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997).

Low-income populations are those with incomes that are less than the nationwide poverty level, which is determined annually by the USCB and varies by family size and number of related children under 18 years of age. The 2021 USCB poverty threshold for an individual is an annual income of \$14,097; for a family of four, the poverty threshold is an annual household income of \$28,406 (USCB 2021). A low-income population exists if either of the following two conditions is met:

- The low-income population exceeds 50% of the total population.
- The ratio of low-income population significantly exceeds (i.e., greater than or equal to 20%) the appropriate geographic area of analysis.

Total minority populations (i.e., all non-white and Hispanic or Latino racial groups combined) comprise approximately 8% of the population of Dent, Reynolds, and Shannon counties (Table 3-19). This number is less than the total minority population of the State of Missouri at approximately 24%. Additionally, the census block groups (CBGs) within the three counties have minority populations similar to those within the geographic reference (State of Missouri), ranging from 5% to 13%. Therefore, the total minority populations of the three counties and all CBGs are below or consistent with the minority percentages of the reference geography, and do not meet the criterion for consideration as minority populations.

Table 3-19. Racial Characteristics of Area Counties

| Racial Characteristics | Dent County | Reynolds County | Shannon County | Missouri |
|--|--------------------|------------------------|-----------------------|-----------------|
| Not Hispanic or Latino | 98.1% | 98.4% | 98.0% | 95.1% |
| White alone | 91.6% | 93.0% | 91.8% | 75.8% |
| Black or African American | 0.4% | 0.5% | 0.0% | 11.3% |
| American Indian and Alaska Native | 0.4% | 0.4% | 0.5% | 0.4% |
| Asian | 0.4% | 0.3% | 0.2% | 2.1% |
| Native Hawaiian and Other Pacific Islander | 0.0% | 0.0% | 0.0% | 0.2% |
| Some Other Race alone | 0.3% | 0.0% | 0.0% | 0.4% |
| Two or More Races | 5.0% | 4.1% | 5.4% | 5.0% |
| Hispanic or Latino | 1.9% | 1.6% | 2.0% | 4.9% |

Source: USCB 2022b

The percentage of the population living below the nationwide poverty level is approximately 13% in the state of Missouri (USCB 2020a). Approximately 18% of Dent and Reynolds counties are below the nationwide poverty level, while in Shannon County, this number is 26% (USCB 2020a). As illustrated in Figure 3-6, four CBGs within the three counties have a population that exceeds 50% of the total population or significantly exceeds the population living below the poverty level of any of the reference geographies. These four CBGs, Block Group 2, Census Tract 9603 and Block Group 2, Census Tract 9604 in Dent County and Block Group 2, Census Tract 4701 and Block Group 1, Census Tract 4702 in Shannon County, have populations ranging from 33.4 to 54.9% living below the nationwide poverty level, which exceeds the overall poverty level for the state of Missouri population (USCB 2020a). Therefore, these four CBGs meet the criterion for consideration as low-income population groups subject to environmental justice considerations.

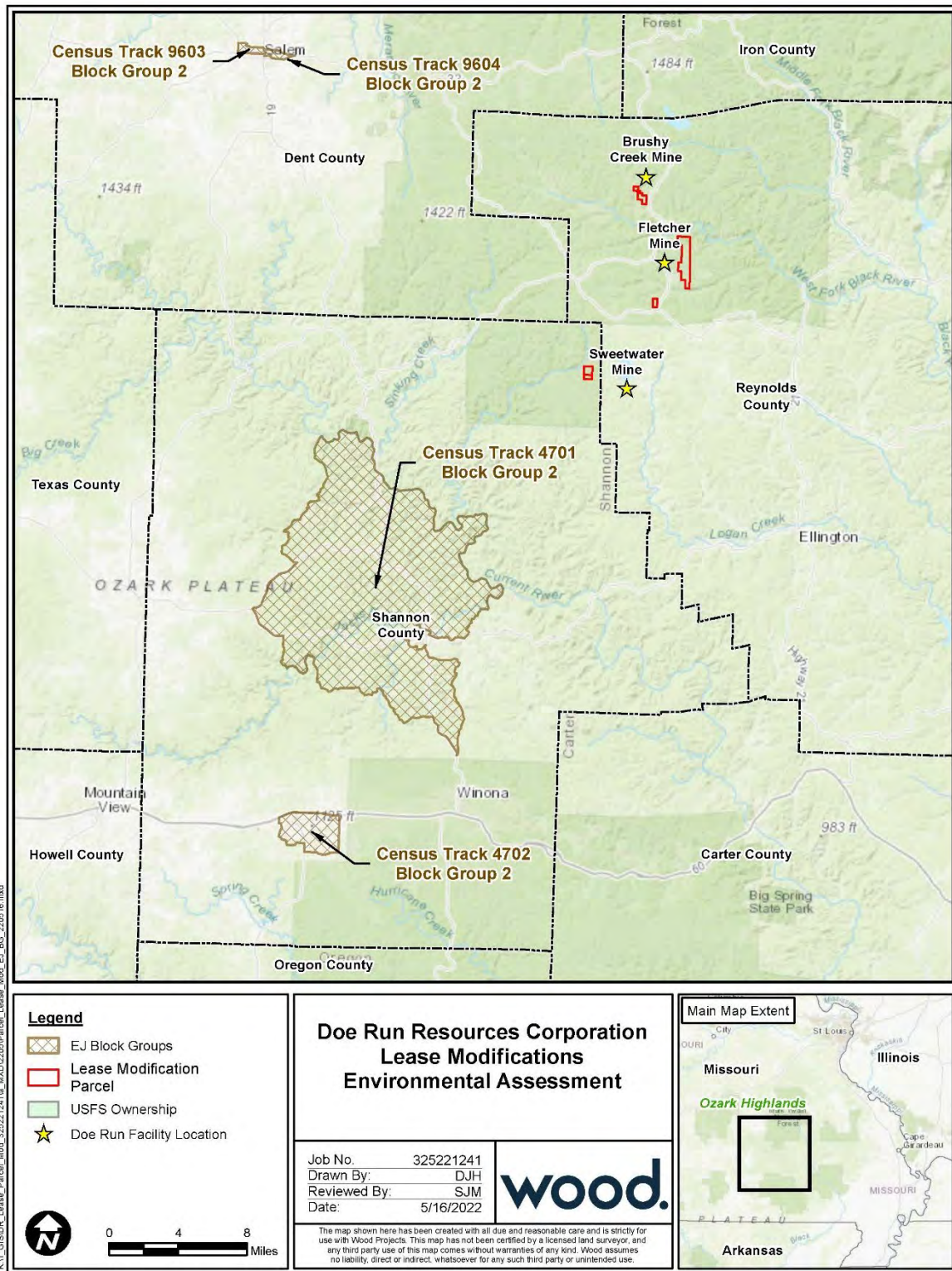


Figure 3-6. Environmental Justice Communities within Reynolds, Shannon, and Dent Counties

3.10.2. Environmental Impacts

3.10.2.1. Impacts of Alternative A – No Action Alternative

This section evaluates the following issues related to social and economic values: 1) effects associated with potential changes in the long-term local population, employment, or earnings associated with construction or operation of the proposed project; 2) potential project-related demands for housing and public services or infrastructure that would exceed current capacities of these systems; 3) potential project-related effects on public sector fiscal conditions regarding demand for services compared to revenue generated; and 4) potential effects of the No Action Alternative relative to local workforce and employment conditions.

Under the No Action Alternative, the BLM would not approve the three lease modifications. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities described in the Proposed Action on these lands. This would affect the overall life of ongoing mining operations and thus could negatively impact socioeconomic resources in the study area.

If the overall life of ongoing mining operations were not extended, direct mining jobs at each of the facilities would be lost, potentially as would associated support jobs in the local and regional area. It is likely that up to 300 of the 675 Southeast Missouri Mining and Milling Division employees would lose their jobs at Fletcher, Sweetwater, and Brushy Creek mines once mining was completed at these locations. In addition, both the Reynolds and Shannon counties and the State of Missouri would realize a loss of revenue from taxes related to goods and services associated with the mines. Cessation of operations at the mines would result in the loss of a significant portion of the \$6.9 million in property tax, \$6.8 million in government royalty, and community investment currently brought in by mining operations. Loss of tax dollars in the area could result in reduced funding for schools and social resources.

3.10.2.2. Impacts of Alternative B – Proposed Action

Under the Proposed Action, it is assumed that the life of mining operations would be extended beyond current life of mine estimates. Under this alternative, it is likely that current staffing levels for ongoing operations would be maintained throughout the extended life of mining operations. This would continue to have a beneficial impact on socioeconomic resources for the subject towns, counties, and state through tax revenue generated by goods and services directly related to the mine and support services.

Under the Proposed Action, actions associated with the lease modifications could result in adverse impacts to nearby residents in the environmental justice communities identified in Section 3.10.1.4, due to increased traffic, noise, and air emissions during exploration and potential mining operations. However, due to the rural nature of the three counties and short-term nature of the proposed surface activities, it is unlikely that substantial long-term impacts on human health would occur. Therefore, the Proposed Action would not result in a disproportionate impact to the environmental justice community identified within the study area, as these impacts, even at insignificant levels, would similarly affect environmental justice and non-environmental justice communities.

3.11. Transportation

3.11.1. Affected Environment

The transportation network includes physical road characteristics and existing traffic characteristics (e.g., average daily volume) of existing roadways in the vicinity of the proposed Project Area, including access roads. The Project Area is located on private and public lands in a rural and remote area with existing private, state, county, and USFS roads

Data provided in this section is derived from existing information available from the Missouri Department of Transportation (MoDOT), USFS, and other sources. Major highways within the transportation network surrounding the proposed Project Area include MO-72, MO-21 (to the south), and MO-32 (to the north), and MO-49 (to the east). These roads are all two-lane secondary rural highways.

3.11.1.1. Fletcher Mine

Public road access is available to the Fletcher Mine Modification Lands via MO-72 (to the south); State Route TT (east of the southern proposed modification parcel); CR 854 (between the two proposed parcels); and CRs 888 and 2456 that pass through the northern parcel. All of these roads are two-lane secondary rural roads or highways. MO-72 has average annual daily traffic (AADT) of 1,933 vehicles, and State Route TT has AADT of approximately 549 vehicles (MoDOT 2022). USFS roads in proximity to the Fletcher Mine proposed lease modification area include USFS Routes 2236 and 2675. USFS roads can be paved, loose surface, or unimproved dirt roads. AADT is not available for the county and USFS roads.

3.11.1.2. Sweetwater Mine

Public road access is available to the Sweetwater Mine Modification Lands from CR P-235, which passes through both Sweetwater Mine proposed lease modification parcels. CR P-235 can be accessed from MO-72 via USFS Route 2220 and State Route P. All of these roads are two-lane secondary rural roads or highways. MO-72 has an AADT of 1,914 vehicles AADT, and State Route P has an AADT of 356 (MoDOT 2022). AADT is not available for the county and USFS roads.

3.11.1.3. Brushy Creek Mine

Public road access is available to the Brushy Creek Mine Modification Lands from State Route KK (to the east) and CR 908 (to the west). These roads are two-lane secondary rural highways. State Route KK has an AADT of 792 (MoDOT 2022). AADT is not available for County Road 908.

3.11.2. Environmental Impacts

3.11.2.1. Impacts of the Alternative A – No Action Alternative

Under the No Action Alternative, the BLM would not approve the three lease modifications. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities described in the Proposed Action on these lands that could affect transportation resources. Current mining operations would continue on existing Doe Run-leased lands.

Selection of the No Action Alternative would have no impact on transportation resources in the Project Area.

3.11.2.2. Impacts of Alternative B – Proposed Action

Under Alternative B, the BLM would approve the lease modifications and Doe Run would conduct surface exploration and underground mining activities in the Project Area. Surface activities under the Proposed Action would include continued use of existing access roads and construction of new, relatively short and narrow temporary access roads (average 422 feet long by 15 feet wide) to exploration drill sites. While existing access roads would be used to support surface exploration efforts to the extent possible, the Proposed Action would result in disturbance to no more than 25 acres of surface lands for all activities; disturbance for construction of new temporary access roads would be less than 25 acres. Temporary access road length would be dependent on the distance between planned drill sites and existing roads.

Traffic generated by surface exploratory drilling operations would be composed of a mix of personal vehicles used by workers and trucks associated with exploration drilling equipment.

During the exploration phase, survey and drilling crews would use private, state, county, and USFS roads to access drill sites on the proposed Project Area. While increased traffic during construction of potential new access roads and drill pads may cause temporary delays or closures on the road networks in proximity to the surface exploration sites, impacts would be short-term overall and intermittent in nature, and would likely only affect rural roads in a remote area. The traffic volume from workforce vehicles, construction vehicles, and drilling equipment driving to and from the proposed Project Area would be similar to that for surface exploration and drilling activities that occur on current lease parcels, which are in close proximity. The expected small increase in traffic would generally be spread over the course of the day, would assimilate into existing traffic patterns, and would have a minor impact on local roads and existing traffic conditions.

Upon completion of each drill hole, Doe Run would restore the access road to the approximate condition it was in prior to the drilling effort. Any rock placed along the road would be removed, slopes would be recontoured to match the pre-disturbance state, and the area would be replanted with winter wheat to control erosion. Therefore, impacts to the transportation network in proximity to the proposed Project Area would be temporary and minor. There would be no impact to regional transportation networks.

Surface drill site development and restoration activities, including the development of access roads, are governed by the 2005 Forest Plan and the existing leases. Doe Run would request approval from the USFS prior to the use of existing USFS roads by way of a Special Use Permit. The specific locations of temporary access roads would require approval by the BLM and USFS prior to any disturbance. Stipulations from the existing leases designed to ensure environmental protection are included in Appendix A. Additional design features are described in the Operating Plan for each mine on file with the BLM.

Continued operation of the Fletcher, Sweetwater, and Brushy Creek mines within the Project Area would occur in a similar manner as the current mines assuming that mineral resources are identified during exploration drilling. All mining would be performed underground and there would be no construction associated with the Project Area that would affect traffic in the area. As described in Section 3.10.2.2, it is likely that current staffing levels for ongoing operations

would be maintained throughout the extended life of mining operations, therefore no additional vehicle traffic from operations would occur. Operation of the mines would be done in compliance with the current Operating Plan on file with the BLM. Therefore, there would be no impacts to transportation resources from proposed underground mining activities.

3.12. Recreation

3.12.1. Affected Environment

Recreation facilities include open areas, boat ramps, community centers, swimming pools, and other places designed for public use. For the purposes of this analysis, the study area for recreation is limited to recreation facilities within a 1-mile radius of the proposed Project Area as, in general, potential noise, traffic, and air emissions are unlikely to have impacts outside of this range.

The Project Area is located within the Salem Potosi unit of the MTNF. The MTNF is comprised of nine separate geographic units that span 29 counties in central and southern Missouri and total more than 3 million acres, of which approximately 1.5 million are public land owned and managed by the USFS. The rest of the land within the boundary of the MTNF is owned by other federal and state agencies or private landowners (USFS 2022c). Popular recreation activities within the MTNF include relaxing, hunting, viewing wildlife or natural features, hiking or walking, and picnicking (USFS 2005b). Based on the 2005 Forest Plan, the most heavily used facilities were picnic grounds, forest roads, developed campgrounds, non-motorized trails, and swimming areas. There are three recreation facilities and two dispersed recreation areas within 1 mile of the proposed Project Area (Table 3-20). There are no recreation facilities located within the Project Area.

Table 3-20. Recreation Facilities within 1 Mile of the Project Area

| Name | Area/Length | Activities |
|--|-----------------|--|
| Mark Twain National Forest | 1,500,000 acres | Dispersed recreation, including visiting beaches & dunes, bicycling, camping, fishing, hiking, horse riding, hunting, nature viewing, off-highway vehicle riding, picnicking, rocks & minerals, scenic driving, and water activities |
| Blair Creek Section of the Ozark Trail | 8 miles | Mountain biking, day hiking, backpacking, horse riding, and viewing scenery |
| Karkaghne Section of the Ozark Trail | 25 miles | Mountain biking, dispersed camping, day hiking, backpacking, horse riding, and viewing scenery |
| Salem Ranger District | 175,000 acres | Small game hunting, including fish (except trout*), frogs, clams, turtles, crayfish, birds (except turkey, doves*, snipe*, woodcock*, rails*, waterfowl*), and mammals (except deer) |

| Name | Area/Length | Activities |
|--|-------------|----------------------------------|
| Sutton Bluff ATV, UTV, and Motorcycle Trail System | 45 miles | off-highway vehicle trail riding |

*Additional permits needed

Source: USFS 2022a, USFS 2022b, USFS 2022d, USFS 2022e, and MDC 2022a

Recreational use of the public lands within and in the vicinity (one mile) of the Project Area consists primarily of day hiking, off-highway vehicle trail riding, viewing scenery, and dispersed recreation activities, which include camping, horse riding, hunting, and picnicking (Table 3-20). No wildlife management areas or other designated wilderness areas are located within the vicinity of the Project Area. Opportunities for small game hunting are available throughout the entire 175,00 acres of the Salem Ranger District.

Two portions of the Ozark Trail are located within the vicinity of the Project Area: the Blair Creek and Karkaghne sections. The Ozark Trail is maintained and expanded by the Ozark Trail Association. The Ozark Trail Association leads the Ozark Trail Council, which was formed from a cooperative effort of seven government agencies, one private landowner, and several environmental groups. These groups include USFS, Ozark National Scenic Riverways, USACE, MDC, MoDNR, Pioneer Forest, and the Sierra Club. The Ozark Trail Council oversaw the construction of approximately 170 miles of trail, and the Ozark Trail system contained more than 200 miles by 1991. As of 2022, there are over 390 miles of trail within the Ozark Trail system (The Ozark Trail Association 2022a, 2022b).

3.12.2. Environmental Impacts

3.12.2.1. Impacts of Alternative A – No Action Alternative

Under the No Action Alternative, the BLM would not approve the three proposed lease modifications. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities described in the Proposed Action on these lands that could affect recreation resources. Current mining operations would continue on the existing Doe Run-leased lands and traffic, noise, and air emissions would continue at current levels. Selection of the No Action Alternative would have no impact on recreation surrounding the Project Area.

3.12.2.2. Impacts of Alternative B – Proposed Action

During the exploration phase, survey and drilling crews would likely use available access roads that are also used to access recreation resources within 1 mile of the Project Area. Increased traffic during construction of access roads and drill pads would be associated with increases in noise and dust levels and could cause temporary delays or closures on some access roads. Since the majority of the Sutton Bluff trail riders use motorized equipment, the noise associated with any exploration activity is not likely to be disruptive to this recreational experience as it might be for hikers or mountain bikers. Noise and dust emissions from the operation of drills used during surface exploration could displace users on both the Blair Creek and Karkaghne sections of the Ozark Trail, as well as other portions of the trail on adjacent lands.

Safety fencing would be installed around the perimeter of each drill site and signage would be placed at the entrance of each road to prevent public access while it is in use. Development of drill

exploration sites would limit public access, slightly decreasing access to the area for recreation and possibly displacing recreational users. However, there are no trails or established recreation facilities within the Project Area, therefore the number of dispersed recreational users is anticipated to be small. Restoration of drill sites would occur within three months following use and plugging of the drill hole. Therefore, drill pad development and surface exploration activities would be short-term in nature, therefore, impacts of the Proposed Action to recreation would be minor.

Operation of the Fletcher, Sweetwater, and Brushy Creek mines within the Project Area would be performed underground and no new surface ventilation structures or other surface structures would be constructed in the Project Area. Operation of the mines would comply with the current Operating Plan on file with the BLM. Therefore, there would be no impacts to recreationists due to the continued mining operations.

3.13. Visual Resources

3.13.1. Affected Environment

This section provides a review and classification of the visual attributes of existing scenery in the Project Area. The classification criteria used in this analysis are adapted from a scenery management system developed by the USFS (USFS 1995).

The Project Area is located in Reynolds and Shannon counties in southeastern Missouri in a rural area that contains incised stream and river valleys. The Project Area is characterized by forests dominated by oak and shortleaf pine with karst features, including caves, springs, and spring-fed streams throughout the area (see Section 3.7.1). The composition and patterns of vegetation are the prominent natural features of the landscape within the Project Area. Land cover within the Project Area consists of upland deciduous and mixed forests. The existing land use in the vicinity consists of transportation corridors, timber, USFS managed lands, recreation, transmission lines, and ongoing mining exploration and reclamation activities by Doe Run.

The USFS utilizes the Recreation Opportunity Spectrum planning tool to classify and monitor existing and desired recreation settings. The Proposed Action is in the 1.1 Management Area, which is classified as ‘Roaded Natural’ in the Recreation Opportunity Spectrum (USFS 2005a). Roaded Natural settings fall in the middle of the Recreation Opportunity Spectrum (between the Semi-Primitive Non-Motorized and Roaded Modified classifications) (Lee, et al. 2011). Roaded Natural settings are located within a half mile of a state, county, or maintenance Level 3 Forest System road and usually provide higher levels of development such as campgrounds, picnic areas and river access points (USFS 2005b).

3.13.1.1. Visual Impact Sensitivity

In a visual impact assessment, sensitive receptors generally include any scenic vistas, scenic highways, residential viewers, public recreational facilities, farmsteads, residences, churches, cemeteries, schools, and parks located in the project’s viewshed. Sensitivity levels described by the USFS Visual Quality Objective are a measure of the number and types of users and their level of concern for scenic quality. The Project Area intersects both sensitivity levels 1 (highest) and 2 (average) trails and roads in the foreground as shown in Table 3-21 (USFS 2022g).

Sensitivity Level 1 consists of primary travel routes with major concern and Sensitivity Level 2 consists of primary travel routes with less concern.

Table 3-21. Scenic Classes of Project Area Foregrounds

| Lease Modification Area | Sensitivity Level | Scenic Attractiveness | Scenic Class |
|--------------------------------|--|------------------------------|---------------------|
| Brushy Creek Mine | One Level 2 Road | Typical | 2 |
| Sweetwater Mine | One Level 1 Trail; One Level 2 Road | Typical | 1 |
| Fletcher Mine | One Level 1 Trail; One Level 1 Road; Two Level 2 Roads | Distinctive to Typical | 1 |

Within the foreground, sensitive receptors include Sensitivity Level 1 roads and trails, Sensitivity Level 2 roads, cemeteries, residences, and churches. Additional sensitive receptors in the middleground include sensitivity Level 2 waterways, towns, and recreation sites.

3.13.1.2. Visual Landscape Character

The visual landscape character of an area is formed by physical, biological, and man-made features that combine to influence both landscape identifiability and uniqueness. Visual and aesthetic impacts associated with an action may result from the introduction of a feature that is not consistent with the existing viewshed. Consequently, the visual character of an existing site is an important factor in evaluating potential visual impacts. For the purposes of this visual assessment, the Project Area is categorized into three categories of landscape visibility: the foreground (less than 0.5 mile), middleground (0.5 – 4 miles), and background (greater than 4 miles). In the foreground, details of objects are easily distinguished. In the middleground, objects may be distinguishable, but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details, and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast.

3.13.1.3. Scenic Attractiveness

The scenic value of a particular landscape is evaluated based on several factors that include scenic attractiveness, scenic integrity, and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. Scenic attractiveness is ranked according to the following three categories: distinctive (Class A), typical (Class B), or indistinctive (Class C). Distinctive (Class A) is defined as areas where features of landform, vegetative patterns, waterforms, or other features show unusual or outstanding visual quality (USFS 1995). Common or typical (Class B) is defined as areas where features contain variety but tend to be common throughout the area.

Based on the Visual Quality Objective variety class data obtained from the USFS for MTNF (USFS 2022f), the scenic attractiveness of the Project Area ranges from distinctive to typical. For the portion of the Project Area surrounding the Sweetwater Mine, the scenic attractiveness at all view distances is typical, while the portion of the Project Area near Brushy Creek lease modification ranges from typical in the foreground and most of the middleground to distinctive

to the southeast in the middleground and background (Table 3-22). The scenic attractiveness for the portion of the Project Area near the Fletcher Mine ranges from distinctive in the foreground and middleground to typical in the middleground and background. Disturbed vegetation can be found along the cleared transmission line right-of-way in the largest parcel of the 1,120-acre Fletcher Mine lease modification land; this contributes to the slightly altered visual landscape. MO-72 runs from west to east in the foreground of the Fletcher Mine lease modification land.

Scenic classes are used as a measure of the value of scenery in a national forest and measure the relative importance, or value, of discrete landscape areas and are derived based on attractiveness and landscape visibility (USFS 1995). The scenic class with the highest public value, Scenic Class 1, consists of distinctive attractiveness within the foreground (USFS 1995). The scenic class with the lowest public value, Scenic Class 7, consists of indistinctive attractiveness in the background (USFS 1995). Based on the scenic attractiveness and landscape visibility of the Project Area, Scenic Classes 1 to 2 were determined to characterize the area. The Fletcher and Sweetwater mine proposed lease modification areas both have a Scenic Class of 1, while the Brushy Creek Mine proposed lease modification area has a Scenic Class of 2 (Table 3-21).

3.13.1.4. Scenic Integrity

Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character and the degree of direct human-caused deviation in the landscape. Scenic integrity can be measured through a continuum of levels consisting of Very High, High, Moderate, Low, Very Low, and Unacceptably Low (USFS 1995). The subjective perceptions of a landscape's aesthetic quality and sense of place are dependent on where and how it is viewed. For the Project Area, the existing scenic integrity is considered moderate (Table 3-22) as there are noticeable deviations in the landscape, but the slightly altered portions are still visually subordinate.

Table 3-22. Visual Assessment Ratings for Existing Landscape in the Project Area

| | Brushy Creek Mine | Sweetwater Mine | Fletcher Mine |
|------------------------------|------------------------------|-------------------------|------------------------------|
| View Distance | Scenic Attractiveness | Scenic Integrity | Scenic Attractiveness |
| Foreground (<0.5 miles) | Typical | Moderate | Distinctive to Typical |
| Middleground (0.5 – 4 miles) | Typical to Distinctive | Moderate | Distinctive to Typical |
| Background (4-10 miles) | Typical to Distinctive | Moderate | Distinctive to Typical |

3.13.2. Environmental Impacts

3.13.2.1. Impacts of Alternative A – No Action Alternative

The potential impacts to the visual environment from a given action are assessed by evaluating the potential for changes in the scenic value class ratings based on landscape scenic attractiveness, integrity, and visibility. Sensitivity of viewing points available to the public, their

viewing distances, and visibility of a proposed action are also considered during the analysis. These measures help identify changes that would occur to visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The extent and magnitude of visual changes that could result from the proposed alternatives were evaluated based on the process and criteria outlined in the scenery management system as described in Section 3.13.1.

Under the No Action Alternative, the BLM would not approve the three proposed lease modifications. As such, Doe Run would not conduct any additional surface exploration, underground mining, or other activities described in the Proposed Action on these lands that could affect visual resources. Current mining operations would continue on existing Doe Run-leased lands. There would be no impacts to visual resources in the Project Area under the No Action Alternative.

3.13.2.2. Impacts of Alternative B – Proposed Action

The Proposed Action would disturb up to 25 acres of surface land for the development of exploration drill sites and access roads. Prior to any disturbance, approval of specific locations for surface exploration holes and temporary access roads in the Project Area would be required by the BLM and USFS. Surface drill sites would typically be reclaimed within three months following drill hole plugging, depending on weather conditions. During restoration, Doe Run would restore affected areas to approximate pre-drilling conditions. Slopes would be recontoured to match the pre-disturbance state, and the area would be replanted with winter wheat to control erosion. The Proposed Action would result in short-term visual impacts and minor long-term visual impacts in the immediate vicinity of the foreground. The short-term visual impacts associated with development of each surface drill pad include the 20-hour construction period, construction of access roads, and approximately 130 hours of surface drilling activities. The equipment and material used for each drill pad and drilling activities include dozers, excavators, trucks, and approximately 150 tons of rock. Short-term visual impacts would be limited to the immediate vicinity of the foreground as the presence of construction equipment and materials and vegetation clearing would create visual discord from existing conditions, especially for trail or roadway users in the immediate vicinity. However, construction and drilling activities would last approximately one week at each drill site and therefore, short-term visual impacts at each drill site would be minor.

Following the completion of drilling activities, the disturbed areas would be reclaimed within three months including seeding, contouring, and restored as described in Section 2.2.3. The reclaimed areas would be visually discordant with the existing conditions and landscape in the immediate vicinity of the foreground as the disturbance area would contain heavily compacted rock and be cleared of vegetation. Depending on topography and viewing angles, disturbed areas would likely not be visible from motorists or trail users in the middleground or background. Therefore, long-term visual impacts would be limited to the immediate foreground, and there would be no long-term visual impacts beyond the foreground.

The area with the greatest potential for visual impact is the proposed leased modification area for Fletcher Mine. This area possesses distinctive (Class A) scenic attractiveness based on the Visual Quality Objective variety class shapefiles for MTNF (USFS 2022f). Visual impacts would occur in the immediate foreground but would be temporary.

3.14. *Cumulative Impacts*

This section discusses cumulative adverse impacts to the region's environment that could result from the Proposed Action. The CEQ regulations (40 CFR §§ 1500-1508) implementing the procedural provisions of the NEPA of 1969, as amended (42 US Code § 321 et seq.) define cumulative impact as: "...the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7). Baseline conditions reflect the impacts of past and present actions and therefore these actions are considered part of the baseline and are not addressed separately in the cumulative effects analysis.

3.14.1. *Geographic Area of Analysis*

The appropriate geographic area over which past, present, and future actions could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated. Because potential impacts associated with the proposed Project are localized and do not exert a notable geographic extent, a 1-mile radius of the Project Area was considered appropriate for consideration in this analysis. This geographic area encompasses the entire Project Area that would include any surface disturbance as well as the underground mining.

3.14.2. *Identification of "Other Actions"*

Past, present, and reasonably foreseeable future actions identified within the geographic areas of analysis that have the potential to exert a notable effect (historical, continuing, or future) on environmental resources are listed below. These actions were initially identified as having the potential to, in aggregate and in conjunction with the impacts of the proposed action, result in larger, and potentially significant adverse impacts to the resources of concern. Importantly, actions listed as having a timing that is "past" or "present" inherently have resulted in environmental impacts that are integrated into the base condition for each of the resources analyzed in Chapter 3. However, these actions are included in this discussion to provide for a more complete description of their characteristics, and to consider the continuing effects of these actions in the reasonably foreseeable future timeframe.

Actions that are not reasonably foreseeable are those that are based on mere speculation or conjecture, or those that have only been discussed on a conceptual basis. These can include projects that have not been approved by the proper authorities or have not yet submitted license/permit applications.

For this Draft EA, since the current leases would be up for renewal in 2025, the cumulative effects analysis considered those future actions that would occur before that time. Any actions occurring after that would be evaluated in 2025 during the lease renewal process.

3.14.2.1. Doe Run Actions

Existing land use in the vicinity of the Project Area consists primarily of ongoing mining exploration and reclamation activities by Doe Run, as authorized under the most recent Operating Plan and approved amendments. These activities are limited to the areas within the current leases and are anticipated to continue in the foreseeable future as outlined in the approved plan.

Doe Run may develop surface exploration drill sites on the proposed Modification Lands that would be additional to those proposed for the 25 acres analyzed in this Draft EA. These activities will be evaluated in 2025 during the lease renewal process.

As mentioned in Section 3.5.1.1, the Fletcher and Sweetwater mines are currently under enforcement with the MoDNR Water Protection Program. Doe Run has conducted remedial actions at these mines to improve water quality and continues to work with MoDNR on large reclamation projects in the vicinity. As a result, these other actions conducted by Doe Run within the region will continue to improve the surface water quality in the region.

3.14.2.2. Surface Land Exchange

Future actions in the analysis area include surface land exchanges between the USFS and Doe Run of multiple properties up to approximately 2,000 acres within the next five years. These properties would include areas both within and outside of the proposed Modification Lands covered in this EA. One surface land exchange would include a 20-acre parcel that would be used to expand the tailings impoundments for the Fletcher Mine. While specific plans and dimensions of the impoundment are not available, it is assumed for the purposes of this Draft EA that all 20 acres would be disturbed. The expanded tailings impoundment would be subject to the existing terms and conditions and permitting requirements of the current mine operation lease. This action is currently still under design however, it is anticipated that the land exchange would be completed by 2027.

3.14.2.3. USFS Resource Management

Additional actions within the vicinity of the project include continued timber harvest and habitat restoration activities planned and conducted by the USFS. These activities are anticipated to continue through the timeframe of the leases and would be conducted in compliance with the 2005 Forest Plan.

3.14.3. Analysis of Cumulative Impacts

To address cumulative impacts from the Proposed Action, the existing environment was considered in conjunction with the environmental impacts presented in Chapter 3. The combined impacts of the incremental actions are defined by the CEQ as “cumulative impact” in 40 CFR 1508.7 and may result from other individually minor but collectively significant actions taking place over a period of time.

The cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of a project when added to other past, present, and reasonably foreseeable future actions. This cumulative impact analysis is limited to those resource issues potentially adversely affected by project activities. As has been described in prior subsections of this EA, environmental resources with the potential to be directly or indirectly affected by project activities is generally low. Accordingly, such resources as water, wildlife and aquatic, vegetation, cultural, safety, socioeconomics, environmental justice, transportation, recreation, and visual are not included in this analysis as these resources are either not adversely affected, or the effects are considered to be temporary or negligible. Additionally, the reclamation activities performed by Doe Run in coordination with MoDNR will result in an overall improvement to surface water quality.

The analyses summarized in preceding sections showed that the Proposed Action would result in only minor adverse impacts to undisturbed or sensitive resources including geology, soils, and threatened and endangered species. The other identified actions are anticipated to be conducted in accordance with the existing lease stipulations, 2005 Forest Plan, and any applicable state and federal permits. For the future actions, including any additional surface exploration drill sites on the Modification Lands or the expansion of the tailings impoundment at the Fletcher Mine, impacts from those actions would be analyzed in separate environmental reviews and would be subject to the requirements of the mine operation leases. As a result they are not expected to result in adverse impacts. Therefore, impacts from the proposed action in combination with the other actions described above would not result in incrementally greater cumulative effects to these resources.

While impacts to air quality and climate change from the Proposed Action were determined to be minor, they have the potential to be impacted by the continued operations of each mine and are therefore discussed here.

3.14.3.1. Air Quality and Climate Change

Missouri

Doe Run operates six copper, lead, and zinc mines in the Viburnum Trend that partially or completely underlie 33,623 surface acres of federal surface lands in the MTNF (GAO 2020). These six mines are Fletcher / West Fork, Sweetwater, Brushy Creek, Buick, Casteel (Mine #35), Mine #29, and Sweetwater (EPA 2010) and are located in Iron, Reynolds, and Shannon counties, Missouri. Cumulative air emissions were estimated for the Fletcher, Sweetwater, Brushy Creek, and Buick mines and are provided in Table 3-23.

Table 3-23. Cumulative State Direct Air Pollutant and GHG Emissions from Underground Mining

| Operation | CO tons | NO _x tons | PM ₁₀ tons [†] | PM _{2.5} tons [†] | SO ₂ tons | VOC tons [†] | Total HAP tons [†] | CO ₂ e tons [‡] |
|--------------------|------------|-------------------------|---------------------------------------|--|-------------------------|--------------------------|--------------------------------|--|
| Underground Mining | -- | -- | 46.63 | 6.99 | -- | 1.68 | 1.47 | 15,562 |

[†] From 2017 National Emissions Inventory (EPA 2021)

[‡] From 2020 Sustainability Report (Doe Run 2021) & 2020 Lead Production (Market Data 2021)

Indirect emissions are generated from the transport and smelting (refining) of minerals recovered from the mines. Since there are no primary lead smelters in the U.S. as of December 31, 2013, any emissions from smelting activities will not occur within the U.S. (EPA 2010). Instead, lead ore is transported via truck to Cape Girardeau, Missouri and loaded onto barges for transport to New Orleans, Louisiana, then transferred to an ocean cargo carrier for transport to primary lead smelters in Europe and Asia (Missouri Business 2015). Indirect emissions associated with transport of minerals for processing from all six mines are estimated in Table 3-24.

Table 3-24. Cumulative State Indirect Air Pollutant and GHG Emissions from Ore Transportation

| Source | CO tons | NO _x tons | PM ₁₀ tons | PM _{2.5} tons | SO ₂ tons | VOC tons | Total HAP tons | CO ₂ e tons |
|---------------------|------------|-------------------------|--------------------------|---------------------------|-------------------------|-------------|-------------------|---------------------------|
| Ore Truck Emissions | 7.93 | 19.94 | 0.74 | 0.73 | 0.01 | 1.32 | 0.26 | 1,246 |
| Ore River Emissions | 24.55 | 142.66 | 2.38 | 2.30 | 0.09 | 2.85 | 0.37 | 9,706 |

| Source | CO tons | NO _x tons | PM ₁₀ tons | PM _{2.5} tons | SO ₂ tons | VOC tons | Total HAP tons | CO ₂ e tons |
|---------------------|--------------|-------------------------|--------------------------|---------------------------|-------------------------|--------------|-------------------|---------------------------|
| Ore Ocean Emissions | 60.08 | 721.03 | 10.20 | 9.38 | 21.89 | 28.76 | 3.34 | 36,386 |
| Total | 92.56 | 883.63 | 13.32 | 12.41 | 21.99 | 32.92 | 3.97 | 47,337 |

The air pollutant and GHG emissions associated with transporting the minerals overseas would primarily occur outside of the U.S. in international waters. These emissions were included in this analysis, as they are solely generated due to the mining activities associated with these leases.

Regional

Since the BLM Eastern States Office has not received any other applications for lead, zinc, and copper leases and there are no other known lead, zinc, and copper mines operating on or underlying federal lands within the Eastern States region, no additional sources can be included other than the emissions from this project in a cumulative impact analysis (BLM 2022).

National

Nationally, one additional zinc and 16 additional copper mines extract federal minerals. These mines are open pit and underground mines located on 14,550 acres of federal lands in Arizona, Montana, New Mexico, Nevada, and Utah (GAO 2020). The Proposed Action would increase the number of leased acres for copper, lead, and zinc mining within the U.S. by 3%, although underground lead mining operations are associated with minimal surface disturbance compared to copper and zinc mining. National total cumulative air pollutant and GHG direct emissions from all copper, lead, and zinc mining operations are provided in Table 3-25.

Table 3-25. Cumulative Direct National Air Pollutant and GHG Emissions

| State | Mines | Acres | CO tons | NO _x tons | PM ₁₀ tons | PM _{2.5} tons | SO ₂ tons | VOC tons | CO ₂ e tons |
|-------------------------|-----------|---------------|--------------|-------------------------|--------------------------|---------------------------|-------------------------|-------------|---------------------------|
| Arizona [†] | 9 | 4,224 | 1,179 | 906 | 719 | 107 | 16 | 65 | 137,527 |
| Montana [‡] | 1 | 1,500 | 8 | 2 | 945 | 120 | -- | -- | 18,059 [‡] |
| New Mexico [□] | 4 | 535 | 38 | 10 | 271 | 30 | 1 | -- | 5,187 |
| Nevada [†] | 1 | 6,867 | 1,916 | 1,473 | 1,169 | 174 | 26 | 105 | 223,580 |
| Utah [†] | 2 | 1,424 | 397 | 306 | 243 | 36 | 5 | 22 | 46,363 |
| Missouri [*] | 6 | 33,623 | -- | -- | 47 | 7 | -- | 2 | 15,562 |
| Total | 23 | 48,173 | 3,538 | 2,697 | 3,394 | 475 | 48 | 194 | 446,278 |

[†] Estimated from Rosemont Copper Project Final Environmental Impact Statement (USFS 2013)

[‡] From 2017 National Emissions Inventory for mining in Jefferson County, MT (EPA 2021)

[□] Estimated from Copper Flat Copper Mine Final Environmental Impact Statement (BLM 2019)

^{*} From Table 3-23

Since annual copper, lead, and zinc production is not expected to increase due solely to the Proposed Action, the only increase in actual emissions would be due to air pollutant and GHG emissions from exploration activities associated with the Proposed Action (Table 3-1). The estimated temporary increase in PM₁₀ and PM_{2.5} direct emissions from exploration activities would represent 0.07% of the national cumulative direct emissions from all copper, lead, and zinc mining operations on federal lands managed by BLM. This represents a minor increase in nationwide mining air pollutant and GHG emissions from the Proposed Action.