

5.1 Introduction

Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time, when adding the incremental impact of Haile's Proposed Project to other past, present, and reasonably foreseeable future actions (RFFAs), regardless of what agency (federal or nonfederal) or person undertakes such actions (40 Code of Federal Regulations [CFR] 1508.7). The cumulative impact assessment provides a broader assessment of potential impacts by considering other activities, new and ongoing projects, and programs in the project area and vicinity. This chapter addresses the cumulative impacts of the Haile Gold Mine and its proposed expansion of mining operations when combined with other past, present, and RFFAs.

The cumulative impact assessment for the Haile Gold Mine was described in Chapter 5, *Cumulative Impacts*, of the 2014 Final Environmental Impact Statement for the Haile Gold Mine Project (2014 FEIS) (USACE 2014). For this Supplemental Environmental Impact Statement (SEIS), 26 additional past, present, and RFFAs have been identified for inclusion in this cumulative impacts analysis. Consistent with the 2014 FEIS, each of the resource areas were screened to determine the potential for cumulative impacts. Resources with the potential for cumulative impacts were carried forward for further analysis.

The key to a cumulative impacts analysis is the identification of past, present, and RFFAs within a clearly defined geographic and temporal scope. The geographic and temporal scope for this cumulative impact assessment is the same as described in Section 5.1, *Introduction*, in the 2014 FEIS, except where clarified or noted below. The identification of past, present, and RFFAs and trends involves some uncertainty, as does the assessment of the magnitude of impacts now and in the future. The cumulative impacts analysis is designed to explore the range of potential cumulative impacts while recognizing that uncertainty.

5.2 Methods

The analysis of cumulative impacts for the Proposed Project and No Action Alternative was performed using the same methods as described in Chapter 5, Section 5.3, *Methods*, of the 2014 FEIS. The criteria used to assess and identify cumulatively affected resources followed the methodology presented in the Council on Environmental Quality (CEQ)'s *Considering Cumulative Effects* (1997). The range of actions considered in the cumulative impacts analysis includes all connected actions described in Chapter 2, Section 2.4, *Proposed Connected Actions*.

5.3 Screening for Cumulative Impacts

Each resource area was evaluated to determine whether project-related impacts on that resource in concert with other past, present, and RFFAs would result in the potential for cumulative impacts. The resource areas determined to have the potential for more than minor cumulative impacts were

carried forward for further consideration and analysis. The rationale for these conclusions is presented in Table 5-1.

Table 5-1. Screening of Cumulative Impacts by Resource Area

Resource Area	Potential to Contribute to Cumulative Impacts in More Than a Minor Way?	Rationale
Geology	Yes	The Proposed Project and No Action Alternative would both contribute to the cumulative extraction of gold ore resources in the Carolina Slate Belt and would contribute to an irreversible cumulative reduction in the regional amount of gold and other mineral resources available in the future.
Water Resources	Yes	The water quality impacts of the Proposed Project and No Action Alternative have the potential to interact with other known past, present and projected future water quality conditions in the upper Little Lynches River. The Proposed Project and No Action Alternative would contribute to a minor loss in the cumulative groundwater availability in the Piedmont ecoregion of South Carolina. Water supplies in the study area are primarily from private and municipal water systems serving the study area, and water sources for these systems would not be affected by the Proposed Project or the No Action Alternative. Consequently, no cumulative impacts are expected.
Soils	No	The Proposed Project would result in localized impacts on soil resources including loss of soils and surface materials during construction. These impacts would be minimized by applicant-proposed avoidance and minimization measures and reclamation that would result in minor cumulative impacts. No other identified actions are anticipated to interact with the Proposed Project producing cumulative impacts other than in a minor way.
Floodplains	No	The Proposed Project would result in negligible changes to the floodplain associated with the unnamed tributary to the Little Lynches River along the southern project boundary. Because the identified RFFAs do not include any substantial reasonably foreseeable changes in floodplain flood elevations, other than general growth and urbanization development, cumulative impacts on flood elevations would be minor.

Resource Area	Potential to Contribute to Cumulative Impacts in More Than a Minor Way?	Rationale
Wetlands and Other Waters of the United States	Yes	The direct and indirect impacts of the Proposed Project and No Action Alternative would contribute to cumulative impacts on historical losses of primarily palustrine forested wetlands, but also scrub-shrub, emergent, and open water wetlands, and linear feet of streams.
Aquatic Resources	Yes	Incremental impacts of the Proposed Project on aquatic resources may interact with other past and present activities in the expanded Little Lynches River watershed and adversely affect habitat and water quality. Cumulative impacts may occur on species that are geographically limited or sensitive to change.
Terrestrial Resources	No	Impacts of the Proposed Project on terrestrial resources would be localized and temporary. When combined with other RFFAs, project-related impacts generally are not expected to result in cumulative impacts more than in a minor way on terrestrial resources.
Federally Listed Species	No	The Proposed Project and the No Action Alternative would have no effect on federally listed threatened and endangered species or their critical habitat. Based on the identified RFFAs, neither alternative would cumulatively affect federally listed species.
Socioeconomics and Environmental Justice	Yes	Analysis of the four-county socioeconomic study area indicates that the Proposed Project and the No Action Alternative would, when combined with other regional economic activity, cause a cumulatively beneficial economic effect in the study area. The Proposed Project would have negligible adverse impacts on the environmental justice communities surrounding the revised project boundary. It is more likely that the regional economic benefits would benefit environmental justice populations.
Land Use	No	The identified RFFAs do not include any substantial changes in types of land use other than general growth and urbanization development. No projects or activities were found that would interact with the Proposed Project to produce cumulative impacts on land use more than in a minor way.

Resource Area	Potential to Contribute to Cumulative Impacts in More Than a Minor Way?	Rationale
Air Quality and Climate Change	Yes	The combination of the Proposed Project and past, present, and RFFAs could result in an increase in emissions of criteria pollutants, greenhouse gases, and hazardous air pollutants. These increases are unlikely to cause National Ambient Air Quality Standards (NAAQS) to be exceeded, except that if a future project with high nitrogen oxide (NO _x) emissions were to locate near the Haile Gold Mine, there could be potential for cumulative 1-hour nitrogen dioxide (NO ₂) concentrations to exceed the NAAQS in the immediate vicinity of the mine.
Noise and Vibration	No	The impact of the Proposed Project and No Action Alternative on noise and vibration would be localized and minor; no other projects or activities were found that would interact with project-related impacts to produce cumulative impacts on noise and vibration.
Visual Resources	No	No other RFFAs were identified that would interact with the localized visual impacts of the Proposed Project to produce synergistic or additive cumulative effects in the study area.
Transportation	No	The small incremental increase in local traffic and vehicle delays generated by the Proposed Project combined with other past, present and RFFAs is not expected to exceed the level of service requirements for roads and highways in the vicinity of the Haile Gold Mine and proposed mine expansion. As such, adverse cumulative impacts are unlikely to occur.
Recreation	No	Potential impacts of the Proposed Project and No Action Alternative on recreation use would be minor and no reasonably foreseeable projects or activities were found in the study area with the potential to produce synergistic or additive cumulative effects on recreation resources.
Public Health and Safety	No	The impact of the Proposed Project and No Action Alternative on public health and safety would be minor. Because of the adequacy of emergency response in the region and because other RFFAs were not found that would interact with project-related impacts on public health and safety, cumulative impacts on public health and safety are not anticipated.

Resource Area	Potential to Contribute to Cumulative Impacts in More Than a Minor Way?	Rationale
Hazardous Materials and Solid Wastes	No	The hazardous materials used by and the hazardous waste generated by the Proposed Project would be handled in accordance with appropriate regulatory standards and the Applicant's proposed plans. Other RFFAs would be subject to the same regulatory standards and are not expected to interact with the Proposed Project in a way that would result in cumulative impacts related to hazardous materials and solid wastes.
Cultural Resources	No	Project-related impacts on cultural resources would be mitigated through implementation of the Amendment to Memorandum of Understanding (Appendix C of this SEIS) in coordination with the South Carolina Department of Archives and History. The presence of cultural resources on other potential development sites is unknown and cannot be evaluated.

5.4 Geographic and Temporal Scope

A cumulative impacts analysis requires expanding the geographic area of the study beyond that of the Proposed Project and expanding the temporal limits to consider past, present, and future actions that may affect the resources of concern. Similar to the 2014 FEIS, the geographic scope for this cumulative impacts analysis includes a 60-mile radius around the project boundary, including the proposed 947 acres of mine expansion (Figure 5-1). This distance expands upon the individual resource study areas established in Chapter 3, *Affected Environment*, and includes the two regional population centers of Charlotte, North Carolina, and Columbia, South Carolina. The geographic scope allows for analysis of cumulative impacts on groundwater and wetlands, which typically occur on a subregional scale. The study area also allows for analysis of cumulative socioeconomic and air quality impacts at the regional scale.

The temporal scope for the cumulative impacts analysis is a 20-year time frame, consistent with the temporal scope in the 2014 FEIS. The active mining and processing portion of the Proposed Project would last for 16 years. Following completion of mining, reclamation and closure activities would continue for several years. Extending the temporal scope of the cumulative impacts analysis much beyond the active mining and initial reclamation period would involve projecting the existence of new projects and programs more than 20 years into the future. Such projections would be speculative and beyond a reasonable timeframe.

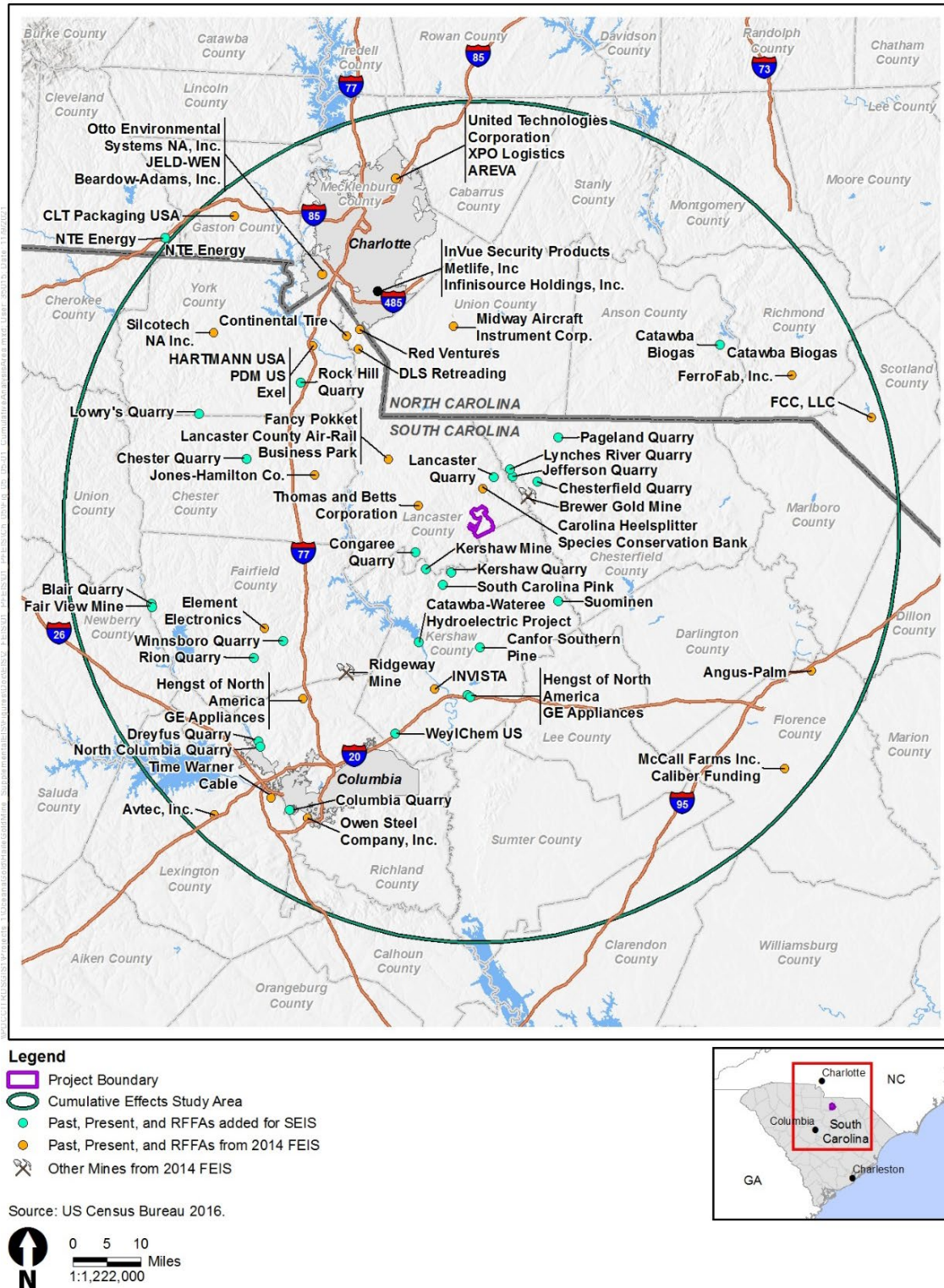


Figure 5-1. Locations of Actions Considered in the Cumulative Impacts Analysis

5.5 Identification of Past, Present, and Reasonably Foreseeable Future Actions

Relevant projects, plans, and programs that could interact with the Proposed Project or No Action Alternative were identified during the environmental analysis for the specific resource areas. To identify RFFAs, a general literature search was conducted, and several sources were reviewed and updated from the 2014 FEIS. The sources reviewed included, but were not limited to the following.

- Kershaw Economic Development Office
- South Carolina Department of Commerce
- North Carolina Department of Commerce
- U.S. Fish and Wildlife Service, South Carolina Field Office
- Haile Gold Mine Scoping Report
- Kershaw News Era
- The Lancaster News
- South Carolina Statewide Transportation Improvement Program
- USACE Permit Records

Table 5-2 lists the potential plans, programs, and projects obtained from the above sources. Appendix O, *Haile Gold Mine SEIS Cumulative Impacts*, contains more detailed descriptions of the projects that were identified. Figure 5-1 illustrates the locations of the past, present, and RFFAs in relation to the mine expansion. A review of these actions indicates that cumulative impacts would result primarily from changes to urban and industrial development, general regional economic drivers, regional mining activity, agriculture and forestry, energy projects, and transportation and roadways.

Table 5-2. Past, Present, and Reasonably Foreseeable Future Actions in the Study Area for Cumulative Impacts^a

Project	Key Potential Cumulative Impacts
South Carolina	
Ridgeway Mine	Regional mining activity
Interstate 73	Regional transportation project
PDM US	Urban and industrial development, general regional economic drivers
DLS Retreading	General regional economic drivers, urban and industrial development, transportation and roadways
Red Ventures	General regional economic drivers, urban and industrial development, transportation and roadways
Thomas & Betts Corporation	General regional economic drivers, urban and industrial development, transportation and roadways
Avtec, Inc.	General regional economic drivers, urban and industrial development, transportation and roadways

Project	Key Potential Cumulative Impacts
Owen Steel Company, Inc.	General regional economic drivers, urban and industrial development, transportation and roadways
Constantia Hueck Foils, LLC	General regional economic drivers, urban and industrial development, transportation and roadways
2AM Group	General regional economic drivers, urban and industrial development, transportation and roadways
AQT Solar	General regional economic drivers, urban and industrial development, transportation and roadways
Angus-Palm	General regional economic drivers, urban and industrial development, transportation and roadways
Caliber Funding	General regional economic drivers, urban and industrial development, transportation and roadways
Exel	General regional economic drivers, urban and industrial development, transportation and roadways
HARTMANN USA, Inc. Expansion	General regional economic drivers, urban and industrial development, transportation and roadways
Haddon House Food Products, Inc.	General regional economic drivers, urban and industrial development, transportation and roadways
Lancaster County Air-Rail Business Park	General regional economic drivers, urban and industrial development, transportation and roadways
Element Electronics	General regional economic drivers, urban and industrial development, transportation and roadways
Time Warner Cable	General regional economic drivers, urban and industrial development, transportation and roadways
Hengst of North America	Urban and industrial development, general regional economic drivers
WeylChem US	General regional economic drivers, urban and industrial development, transportation and roadways
Chester Quarry	Regional mining activity
Chesterfield Quarry	Regional mining activity
Jefferson Quarry	Regional mining activity
Lynches River Quarry	Regional mining activity
Pageland Quarry	Regional mining activity
Blair Quarry	Regional mining activity
Fair View Mine	Regional mining activity
Rion Quarry	Regional mining activity
Winnsboro Quarry	Regional mining activity
Kershaw Mine	Regional mining activity
Kershaw Quarry	Regional mining activity
South Carolina Pink	Regional mining activity
Congaree Quarry	Regional mining activity
Columbia Quarry	Regional mining activity
Dreyfus Quarry	Regional mining activity
North Columbia Quarry	Regional mining activity

Project	Key Potential Cumulative Impacts
Lowry's Quarry	Regional mining activity
Rock Hill Quarry	Regional mining activity
Jones-Hamilton Co.	Urban and industrial development, general regional economic drivers
Canfor Southern Pine	Agriculture and forestry
INVISTA	Urban and industrial development, general regional economic drivers
Suominen	Urban and industrial development, general regional economic drivers
Fancy Pokket Corporation	General regional economic drivers, urban and industrial development, transportation and roadways
Continental Tire the Americas	Urban and industrial development, general regional economic drivers
Silcotech North America, Inc.	Urban and industrial development, general regional economic drivers
Carolina Heelsplitter Conservation Bank	Agriculture and forestry
Catawba-Wateree Hydroelectric Project	Energy, urban and industrial development, general regional economic drivers
Brewer Mine	Regional mining activity
McCall Farms, Inc.	Urban and industrial development, general regional economic drivers
GE Appliances	Urban and industrial development, general regional economic drivers
North Carolina	
XPO Logistics	General regional economic drivers, urban and industrial development, transportation and roadways
InVue Security Products, Inc.	General regional economic drivers, urban and industrial development, transportation and roadways
Otto Environmental Systems North America, Inc.	General regional economic drivers, urban and industrial development, transportation and roadways
Infinisource Holdings, Inc.	General regional economic drivers, urban and industrial development, transportation and roadways
FerroFab, Inc.	General regional economic drivers, urban and industrial development, transportation and roadways
CLT Packaging USA	General regional economic drivers, urban and industrial development, transportation and roadways
Midway Aircraft Instrument Corporation	General regional economic drivers, urban and industrial development, transportation and roadways
AREVA	General regional economic drivers, urban and industrial development, transportation and roadways
JELD-WEN	General regional economic drivers, urban and industrial development, transportation and roadways
Beardow-Adams, Inc.	General regional economic drivers, urban and industrial development, transportation and roadways
Owens Corning	General regional economic drivers, urban and industrial development, transportation and roadways

Project	Key Potential Cumulative Impacts
NTE Energy	Energy, general regional economic drivers, urban and industrial development, transportation and roadways
MetLife, Inc.	General regional economic drivers, urban and industrial development, transportation and roadways
FCC, LLC	Urban and industrial development, general regional economic drivers
Catawba-Wateree Hydroelectric Project	Energy, urban and industrial development, general regional economic drivers
Catawba Biogas	Energy, general regional economic drivers, urban and industrial development, transportation and roadways
GrowGreen Power, Inc.	Agriculture and forestry, energy
United Technologies Corporation	Urban and industrial development, general regional economic drivers

Sources: *Biomass Magazine* 2011, 2018; Business Facilities 2013; Business Wire 2018; CCED 2019; *Charlotte Business Journal* 2011, 2012a, 2012b, 2013; Conservation Fund 2010; Duke Energy 2020; Home in Henderson 2013; *Lancaster Business Journal* 2013; *Lancaster News* 2019; Laurinburg Exchange 2017; MetLife 2017; NCDC 2011, 2012, 2013a, 2013b; North Carolina's Southeast Regional Economic Development Partnership 2012; Pancontinental Resources Corporation 2020; Red Ventures 2013; Reuters 2011; Rubber and Plastics News 2016, 2019; SCDC 2011, 2012a, 2012b, 2013a, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g, 2013h, 2013i, 2014a, 2014b, 2015a, 2015b, 2018, 2019a, 2019b; SCDHEC 2020; SCDOT 2007; South Carolina I-77 Alliance 2020; Trade & Industry Development 2010; Winston-Salem Journal 2018; XPO Logistics 2013

^a Past, present, and reasonably foreseeable regional mining activities in this table include gold mines and granite quarries. There are also numerous sand/clay borrow pits in the cumulative impacts analysis area that are not included in this table.

Relevant sources were also reviewed in November 2021 to confirm whether there were any significant changes to past, present, and RFFAs in the geographic scope of the cumulative impacts analysis. Since publication of the Draft SEIS, one previously identified project (Continental Tire the Americas) has announced another round of expansion and investment in South Carolina. One additional proposed granite quarry was identified along with several additional urban and industrial development projects that will be general economic drivers for the region. More details on these additional projects are presented in Appendix O, *Haile Gold Mine SEIS Cumulative Impacts*. Newly identified additional projects are anticipated to contribute to the cumulative impacts as assessed below but are not anticipated to change any of the conclusions of this cumulative impacts assessment.

5.6 Assessment of Cumulative Impacts

The Proposed Project and No Action Alternative, in combination with the past, present, and RFFAs identified in Table 5-2 could result in cumulative impacts as discussed below. Each resource area with the potential to result in more than minor cumulative impacts (Table 5-1) was further considered with regard to the past, present and RFFAs identified in Table 5-2. These resources are geology, water resources, wetlands and other waters of the United States, aquatic resources, socioeconomics and environmental justice, and air quality and climate change.

5.6.1 Urban and Industrial Development

Industrial manufacturers are the business ventures most commonly under consideration and listed as possible RFFAs in South Carolina in the study area for cumulative impacts. In addition, several industries are entering the market or expanding established markets in automobile production; chemical, silicone, electronics, or other product manufacturing; agricultural products production; or communication, internet, and technology providers. New and expanding industry activity is also expected in the study area for cumulative impacts in North Carolina in the same sectors. Available information for these companies is provided in Appendix O, *Haile Gold Mine SEIS Cumulative Impacts*.

5.6.2 General Regional Economic Drivers

The economies of both South Carolina and North Carolina are transitioning from labor-intensive industries to knowledge-based and service-related industries. This represents the region's long-term shift from labor-intensive product production to a more capital-intensive production that requires fewer and more highly skilled workers. South Carolina's labor market has improved dramatically over the past several years. South Carolina is expecting to see large increases in transportation and warehousing, and health care and social assistance in the coming years, along with a modest increase in manufacturing employment. Jobs in mining, agriculture and forestry are projected to decline slightly (South Carolina Department of Employment and Workforce 2018). In North Carolina, the fastest growing job sectors are health care and social assistance and the professional, scientific, and technical services industries (NCDC 2018).

5.6.3 Regional Mining Activity

The study area for cumulative impacts is located in the Carolina Slate Belt of northern South Carolina, where gold and other minerals were mined intermittently beginning in 1827. The most noteworthy gold-producing mines in the area included the Haile Gold Mine, Ridgeway Mine, and Brewer Mine. Between 1951 and 2009, mining for other products occurred near the historical Haile mine pits. Exploration for gold, and open-pit mining for gold has occurred in the region off and on to the present day. The Brewer Gold Mine stopped operations in 1995 and was placed on the U.S. Environmental Protection Agency Superfund program's National Priorities List in 2005. This began an ongoing process of cleanup activities and wastewater treatment (USEPA 2020). Other historic mine sites in the area, such as Henry's Knob in York County have also been added to the Superfund National Priorities List. In 2019, gold exploration activities resumed at the previously abandoned Brewer Mine site (Appendix O, *Haile Gold Mine SEIS Cumulative Impacts*). The presence of mineral deposits that have been mined in the past indicates the potential for future mining in the region. More specifically, re-opening closed mines based on a more favorable price of gold would indicate potential for future mining. However, mining activity at existing mines would be limited by land conditions, resource availability, and environmental constraints.

5.6.4 Agriculture and Forestry

South Carolina contains 12.9 million acres of forestland, which is roughly two-thirds of the total area of South Carolina (SCFC 2019). The first record of the timber industry dates to 1670, which coincides with the establishment of Charleston as the colony's first permanent settlement. Poor forestry management practices historically led to a decline in South Carolina's timber industry.

Beginning in the 1930s; however, reforestation, timber management, and sustained yield improved the region's timber stock. South Carolina's forests now contain 26.6 billion cubic feet of wood, more than at any time in the past century (SCFC 2019). The state's forests, both hardwood and softwood, are growing more wood than is being harvested. South Carolina announced \$104 million in forestry capital projects in fiscal year 2018–2019 supporting 47,047 forest industry jobs. The trend of increased timber growth, production, and export throughout the state is expected to continue (SCFC 2019).

5.6.5 Energy

South Carolina ranks 51st in energy production in the United States, producing approximately 699 trillion Btu (EIA 2019a). South Carolina has four nuclear power plants with supply just over half of the state's electricity. Other renewable energy resources such as hydropower, biomass, and solar energy account for about 6 percent of South Carolina's electricity generation. Nuclear power is expected to remain a primary source of electricity for the state and the renewable energy sector is anticipated to grow in the coming years (EIA 2019a). North Carolina ranks 53rd in energy production (EIA 2019b). About one-third of North Carolina's electricity is produced by nuclear power plants. Renewable energy sources produce about 5 percent of the state's electricity and the section is rapidly growing.

5.6.6 Transportation and Roadways

Historically, much of Lancaster County lacked a major roadway system. The region's economic need for industrial development by way of product export gave rise to development of the current regional roadway system. Presently, major highways include U.S. Route 521 (US 521), Highway 9, and U.S. Route (US 601), which connect the north, central, and southern portions of Lancaster County to all major points in the region. The South Carolina Statewide Transportation Improvement Program (STIP) covers all federally funded improvements that are expected to occur within a 6-year period (currently through 2027). The STIP is updated every 3 years and is revised on a continual basis to reflect the latest program and project information (SCDOT 2021).

5.6.7 COVID-19 Pandemic

The COVID-19 pandemic adds uncertainty to estimates of RFFAs and cumulative impacts. The cumulative impacts described in the following sections are conservative as they do not take into account the effects of the COVID-19 pandemic. Some RFFAs contributing to cumulative impacts may be postponed or canceled due to the severe economic impact that the pandemic is causing in South Carolina and nationwide.

5.6.8 Geology

The Proposed Project would result in an increase in the historical extraction of gold ore resources in the Carolina Slate Belt in combination with past mining activity and reasonably foreseeable future mining activities. The Proposed Project would contribute to an irreversible cumulative reduction in the regional amount of gold and other mineral resources, although quantifying cumulative impacts that may result from the expansion would be speculative. The detailed project description for the Proposed Project (Appendix A) estimates that approximately 3.8 million ounces of gold can be produced from the mine (Haile Gold Mine, Inc. 2021). Cumulative impacts from the No Action

Alternative of this SEIS (including the baseline of permitted actions for the Haile Gold Mine project that have occurred since the 2014 FEIS as described in Chapter 2, *Proposed Action and Alternatives*) would be the same or substantially similar to the impacts described for the prior proposed project in the 2014 FEIS.

5.6.9 Water Resources

The Little Lynches River and tributaries have historically experienced water quality degradation. The Little Lynches River at US 601 is 303(d) listed for impairment of recreational use because of excessive levels of fecal coliform bacteria (Altman 2012). This segment has previously been listed as impaired for aquatic life use due to exceedances of the copper criteria, but the impairment listing was removed in 2008 when the copper criteria were attained. In 2004, Haile Gold Mine Creek was listed as impaired for aquatic life use because of low pH levels. It was removed from the state's 303(d) list of impaired waters in 2004, because, based on an assessment performed by Water Management Consultants (2003), the state deemed that the low pH was caused by natural conditions. Camp Branch Creek and Champion Creek are not currently 303(d) listed and are assessed as supporting designated beneficial uses (SCDHEC 2016, 2018). Water quality trends indicate generally improving water quality conditions.

New data and analysis developed since the 2014 FEIS allowed for water resource modeling to be updated in this SEIS analysis. Impacts on stream flows are anticipated to be less than previously modeled and the quality of discharged water is anticipated to be better than previously modeled. Within the Little Lynches River watershed, the Proposed Project has the potential to contribute incrementally to cumulative water quality degradation; however, the potential for cumulative impacts is likely lower than concluded in the 2014 FEIS. Cumulative impacts are anticipated to be minor or undetectable for most parameters.

Private and municipal water supplies within the cumulative effects study area access water from wells, springs, ponds, and streams. The updated analysis indicates that potential impacts on water supplies that depend on groundwater are similar to those previously modeled, but would occur within a smaller area immediately adjacent to the mine and would not extend outside of the Project Area. Therefore, cumulative impacts on groundwater supplies are not expected. Potential impacts on stream flows are also less than previously modeled and cumulative impacts on downstream water users are also not expected to occur from development of the Proposed Project. The Town of Kershaw's sewage treatment plan has the capacity to accommodate sanitary waste from the Proposed Project. The identified RFFAs also do not include any substantial changes in types of land use other than the general growth and urbanization development. Therefore, cumulative impacts from the Proposed Project are anticipated to be minor. Cumulative impacts from the No Action Alternative of this SEIS (including the baseline of permitted actions for the Haile Gold Mine project that have occurred since the 2014 FEIS as described in Chapter 2, *Proposed Action and Alternatives*) would be the same or substantially similar to the impacts described for the prior proposed project in the 2014 FEIS.

5.6.10 Wetlands and Other Waters of the United States

Trends for wetlands are similar to those reported in the 2014 FEIS. Nationally, forested wetlands are declining and are experiencing the largest change in area of any wetland type (Dahl 2011). The Proposed Project would result in losses of wetlands and open water from dredge and fill activities, as well as alterations to forested wetlands inside and outside the project boundary. Combined with

the past, present, and RFFAs, the Proposed Project would result in a minor incremental cumulative effect on forested wetlands nationally and in the Piedmont ecoregion of South Carolina. Cumulative impacts from the No Action Alternative for this SEIS (including the baseline of permitted actions for the Haile Gold Mine project that have occurred since the 2014 FEIS as described in Chapter 2, *Proposed Action and Alternatives*) would be the same or substantially similar to the impacts described for the prior proposed project in the 2014 FEIS.

5.6.11 Aquatic Resources

The species potentially affected by the Proposed Project would be primarily the same species that were analyzed in the 2014 FEIS. However, no native freshwater mussels have been found in the study area; therefore, no cumulative impacts on freshwater mussels are anticipated. Species that could experience more than minor cumulative impacts are typically less common, geographically limited, or sensitive aquatic and aquatic-dependent species. Included in this category are certain fishes and amphibians. Additionally, several fish species were found in the study area that are rated as a high conservation priority by the South Carolina Department of Natural Resources. Combined, the sensitive species most likely to be affected by the Proposed Project include the Sandhills chub, American Eel, amphibians, and reptiles.

The Proposed Project is most likely to cause incremental effects on aquatic species in three habitats: Haile Gold Mine Creek, Camp Branch Creek, and Unnamed Tributary. The Proposed Project is anticipated to decrease flow rates in these three habitats. However, the habitat impacts are not expected to result in more than minor incremental impacts on sandhills chub in comparison with the impacts identified in the 2014 FEIS. The American Eel is not found in Haile Gold Mine Creek, Camp Branch Creek, and Unnamed Tributary, and potential impacts downstream where the species has been identified in the past (Little Lynches River below the confluences with these streams) are not anticipated. Amphibians and reptiles would experience habitat loss and fragmentation in the identified habitats. These species may be permanently affected by the habitat changes as a result of the mine expansion.

The Sandhills chub has a current National Status of N3N4 (N3-Vulnerable, N4-Apparently Secure), and the South Carolina state status is S2, or imperiled (NatureServe 2020). Considering direct impacts of the Proposed Project together with the potential impacts of RFFAs in the broader geographic area, cumulative impacts on Sandhills chub are likely to be minor. The incremental impact of the Proposed Project would be long term, but the impacts would be ameliorated over time as the habitat of the affected streams gradually improves following closure of the mine and reclamation. Based on the existing distribution of American Eel in the study area, the species population, and activities associated with the RFFAs, cumulative impacts on American Eel also would be minor.

Since the mid-1980s, herpetologists have been concerned about apparent global declines in amphibian populations (Kolbert 2014). Recent research has implicated several factors in population declines, including habitat destruction and alteration, climate change, chemical contaminants, diseases, parasites, invasive species, and commercial overexploitation. In a review of the literature regarding the declines of individual southeastern species, Dodd (1997) found that habitat alteration and loss were the most commonly implicated factors. Given the Proposed Project's direct and indirect impacts on wetlands and streams, and the dependence of amphibian species on these habitats for important parts of their life cycles, cumulative impacts on amphibian populations could be more than minor.

Cumulative impacts from the No Action Alternative (including the baseline of permitted actions for the Haile Gold Mine project that have occurred since the 2014 FEIS as described in Chapter 2, *Proposed Action and Alternatives*) would be the same or substantially similar to the impacts described for the prior proposed project in the 2014 FEIS.

5.6.12 Socioeconomics and Environmental Justice

The analysis presented in Chapter 4, Section 4.9, *Socioeconomics and Environmental Justice*, is inherently a cumulative analysis that includes a four-county study area encompassing Lancaster, Kershaw, Richland, and York Counties. Regional economic impacts of the Proposed Project would include direct benefits as a result of the extended life of the mine and additional economic benefits in the local economy, based on linkages among industries and households. Although no specific data on RFFAs are available to reliably predict future economic conditions, it is likely that the addition of the projects identified in Table 5-2 (and discussed further in Appendix O, *Haile Gold Mine SEIS Cumulative Impacts*) would contribute to an increase in jobs and associated economic benefits to the region. Cumulative impacts on socioeconomics and environmental justice from the No Action Alternative (including the baseline of permitted actions for the Haile Gold Mine project that have occurred since the 2014 FEIS as described in Chapter 2, *Proposed Action and Alternatives*) would be the same or substantially similar to the impacts described for the prior proposed project in the 2014 FEIS.

5.6.13 Air Quality and Climate Change

Chapter 3, Section 3.11, *Air Quality and Climate Change*, indicates that the air quality in the region is generally good and that the Haile Gold Mine is located in an attainment area (an area that meets all National Ambient Air Quality Standards). Ambient pollutant concentrations have generally decreased compared to the 2014 FEIS. However, the combination of the Proposed Project and past, present, and RFFAs could result in increases in emissions of criteria pollutants, greenhouse gases, and hazardous air pollutants. The air quality analysis (Chapter 4, Section 4.11, *Air Quality and Climate Change*) indicates that emissions associated with the Proposed Project would be less than SCDHEC major source thresholds. Air quality modeling of pollutants (Chapter 4, Section 4.11, *Air Quality and Climate Change*) indicates that concentrations associated with the Proposed Project would be well below the NAAQS except that estimated 1-hour NO₂ concentrations could slightly exceed the NAAQS at one location on the fence line adjacent to Highway 601 and the West Potentially Acid-Generating (PAG) storage area. One-hour NO₂ concentrations would not exceed the NAAQS in areas beyond the site fence line. These results suggest that cumulative impacts in areas accessible to the public would not exceed the NAAQS. Assessing future air quality in the study area for cumulative impacts is speculative because no specific air quality emissions data on RFFAs are available to reliably predict future conditions. No RFFAs are known to have NO_x emissions sufficient to cause a substantial increase in NO₂ concentrations near the Haile Gold Mine, but if a future project with sufficiently high NO_x emissions were to locate near the mine, there could be a potential for 1-hour NO₂ concentrations to exceed the NAAQS in the immediate vicinity of the mine.

Greenhouse gases emitted by the Proposed Project and other past, present, and RFFAs would contribute incrementally to current and future changes in the global climate. Additionally, removal of vegetation and disturbance of soils, particularly wetland soils, would decrease the carbon storage capacity of these natural resources and contribute to a corresponding increase in atmospheric carbon dioxide that further contributes to climate change.

Cumulative impacts associated with the No Action Alternative (including the baseline of permitted actions for the Haile Gold Mine project that have occurred since the 2014 FEIS as described in Chapter 2, *Proposed Action and Alternatives*) would be the same or substantially similar to the impacts described for the prior project in the 2014 FEIS.

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