

6. MITIGATION AND MONITORING

6.1 Introduction

In the USACE Regulatory Program, the term *mitigation* has two separate and distinct contexts as defined by two separate and distinct laws and regulations. The CEQ regulations implementing NEPA refer to *mitigation*, while the USACE regulations pursuant to the CWA refer to *compensatory mitigation*. Although confusing at times, the terms *mitigation* and *compensatory mitigation* in the context of NEPA and the CWA are not interchangeable. When applying these terms to a DA permit application, they have different requirements, as shown below.

<p>NEPA “Mitigation” as defined in 40 CFR 1508.20:</p> <ul style="list-style-type: none"> (a) Avoiding the impact altogether by not taking a certain action or parts of an action. (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation. (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. (e) Compensating for the impact by replacing or providing substitute resources or environments. 	<p>CWA “Compensatory Mitigation” as defined in the USACE and USEPA regulations:</p> <p>...The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.</p>
---	---

The objective of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the nation’s waters.” To achieve this goal, the CWA prohibits the discharge of dredged or fill material into wetlands, streams, and other Waters of the U.S. unless the USACE issues a DA permit. When a discharge is proposed, all appropriate and practicable steps must first be taken to avoid and minimize impacts on aquatic resources. For unavoidable impacts, compensatory mitigation is required to replace the loss of wetland, stream, and other aquatic resource functions.

NEPA and its implementing regulations require that an EIS identify appropriate mitigation measures for the adverse impacts potentially resulting from a proposed action. Under NEPA, mitigation measures are actions that could be taken to avoid, minimize, rectify, reduce, eliminate, or compensate for adverse effects on the environment (40 CFR 1508.20).

This EIS considers numerous measures to reduce impacts on environmental resources from the proposed Project. This chapter of the EIS has been updated to reflect changes and revisions to mitigation and monitoring measures suggested by commenters on the Draft EIS, and on Haile's Mitigation Plan (previously referred to as the "CMP" in the Draft EIS; Appendix B). Although some of the measures discussed herein are not strictly mitigation measures under the CWA or NEPA, they are identified in this chapter to provide a complete summary for public review of all measures that have been considered in the design and development of the proposed Project, and those that are being considered as additional measures. These measures are identified as avoidance, minimization, and compensatory mitigation under the CWA and as avoidance and minimization measures under NEPA, although many would apply to both regulations. This chapter discusses the compensatory mitigation requirements of the CWA and the mitigation requirements of NEPA under the following topics:

- Avoidance, minimization, and compensatory mitigation under the CWA
 - Avoidance achieved during the DA application review process;
 - Minimization of impacts; and
 - Compensatory mitigation pursuant to *Compensatory Mitigation for Losses of Aquatic Resources, Final Rule* (USACE and USEPA 2008) (referred to herein as the *Mitigation Rule*) and Haile's Mitigation Plan (Appendix B).
- Avoidance and minimization measures under NEPA
 - Avoidance and minimization measures proposed by the Applicant as part of the Project design or as standard procedures during operations;
 - Additional mitigation measures being considered by the USACE to further avoid or minimize impacts;
 - The Applicant's proposed MMP (Haile 2013a, Appendix G); and
 - Monitoring and adaptive management measures being considered by the USACE to ensure that mitigation is being performed and is achieving the expected results or monitoring for adaptive management.

These measures are described in the sections that follow.

6.2 Avoidance and Minimization Measures under NEPA

6.2.1 Avoidance and Minimization Measures

The Applicant's measures to avoid and minimize potential impacts of the proposed Project are summarized by resource area in Table 6-1, based on information provided in various reports and plans submitted by Haile. The USACE views these elements as part of the Applicant's Proposed Project and the Modified Project Alternative for purposes of the environmental impacts analysis presented in Chapter 4. Some of these measures are required under federal, state, and local permits; others are measures that Haile has incorporated into the design and operations of the proposed Project.

Measures from a number of categories in Table 6-1 may be applicable to more than one resource area. For example, certain measures listed under surface water resources may also help to avoid or minimize potential impacts on wetlands and Waters of the U.S.

Table 6-1 Summary of Avoidance and Minimization Measures

Resource Area	Avoidance and Minimization Measures
Geology and soils	<p>Implement Storm Water Pollution and Prevention Plans (SWPPPs) as required by Haile's National Pollutant Discharge Elimination System (NPDES) permit, including management of sediment and erosion control.</p> <p>Implement a Spill Prevention Control and Countermeasures (SPCC) Plan for petroleum products.</p> <p>Implement spill prevention and control measures for process and reagent tanks and pipelines.</p> <p>Use methods of managing sediment and erosion control during construction pursuant to the <i>South Carolina Stormwater Management Handbook</i> (South Carolina Department of Health and Environmental Control [SCDHEC] 2005).</p> <p>Design facility slopes to minimize erosion, as feasible.</p> <p>Store and re-use growth media for use during reclamation, minimizing disturbance of additional soils.</p> <p>Implement an overburden management plan, including segregating and placing rock based on the content of potentially-acid generating (PAG) materials.</p> <p>Perform concurrent and final reclamation to minimize soil loss and erosion.</p>
Groundwater hydrology and water quality	<p>Implement a groundwater monitoring and reporting program during operations and post-mining per the SCDHEC Mine Operating permit.</p> <p>Comply with requirements of the NPDES permit, including groundwater monitoring.</p> <p>Amend Yellow Class overburden material used as pit backfill with lime to minimize acid rock drainage during operations.</p> <p>Use composite liner (low-permeability soil liner and high-density polyethylene [HDPE] liner) at the tailings storage facility (TSF) and Johnny's PAG.</p> <p>Provide drainage for groundwater from under Johnny's PAG and the TSF.</p> <p>Install HDPE cover on the TSF and Johnny's PAG during closure to minimize impacts on water quality.</p> <p>Install a double HDPE liner at the TSF Underdrain Collection Pond, 465 Collection Pond, 469 Collection Pond, and 19 Pond; and install a single HDPE liner at the Process Event Pond.</p> <p>Implement a leak collection and recovery system at all double HDPE-lined ponds.</p> <p>Conduct post-mining reclamation and closure monitoring for purposes of ensuring continued compliance with permit requirements.</p> <p>Seal abandoned wells.</p>
Surface water hydrology and water quality	<p>Construct a Process Event Pond designed to contain a spill that exceeds a facility's containment capacity or a failure of the TSF slurry pipeline.</p> <p>Implement an overburden characterization and management plan, including; segregating and placing rock based on the content of PAG materials.</p> <p>Provide double-walled pipelines, or a single-walled pipeline within an HDPE channel, for the TSF slurry pipeline to prevent and contain a spill;</p> <p>Install pressure-sensing alarms for the tailings and reclaim water pipeline systems and certain contact water lines.</p> <p>Install automatic shut-off on the contact water pipeline system.</p> <p>Treat runoff and seepage from Johnny's PAG and other contact waters during operations in an NPDES-permitted water treatment plant prior to release.</p> <p>Treat drain-down from Johnny's PAG and the TSF during closure in an NPDES-permitted treatment system prior to release.</p> <p>Primarily use a water-resistant ammonium nitrate emulsion blasting agent to minimize impacts on nearby waterbodies and groundwater.</p> <p>Expedite Ledbetter Pit Lake refilling to minimize impacts on water quality.</p>

Table 6-1 Summary of Avoidance and Minimization Measures (Continued)

Resource Area	Avoidance and Minimization Measures
<p>Surface water hydrology and water quality (Continued)</p>	<p>Implement sediment and erosion control measures to mitigate sediment and sediment-associated pollutant loading from disturbed areas.</p> <p>Eliminate toxicity or delay outflow from Ledbetter Pit Lake to Haile Gold Mine Creek if water quality monitoring of pit lake waters exceed surface water standards or fail toxicity tests.</p> <p>Actively treat pit lakes during refilling to minimize impacts on water quality.</p> <p>Perform concurrent and final reclamation to minimize impacts on water quality.</p> <p>Implement spill prevention and control measures for petroleum products, reagents, processes, and pipelines.</p> <p>Implement a surface water monitoring and reporting program during operations and post-mining.</p> <p>Comply with requirements of the NPDES permit, including discharges to surface waters.</p> <p>Implement a SWPPP as required by the industrial stormwater NPDES permit.</p> <p>Implement dust control measures for roads and construction areas.</p> <p>Design the TSF to contain the probable maximum precipitation event (approximately 48 inches) with 48 inches of freeboard.</p> <p>Comply with the requirements of Dam Safety permit.</p> <p>Comply with the requirements of Surface Water Withdrawal permit during refilling of Ledbetter Pit Lake, as applicable.</p> <p>Monitor the structural integrity of TSF embankment.</p> <p>Route stormwater not falling on the PAG around Johnny's PAG.</p> <p>Design culverts to maintain existing surface drainage patterns and prevent erosion.</p> <p>Route depressurization water through the dust control holding tanks, which will assist in acclimating water to ambient temperature and increasing dissolved oxygen levels prior to release to streams.</p> <p>Implement 50-foot vegetative buffers around otherwise not directly affected Waters of the U.S.</p>
<p>Water supply and floodplains</p>	<p>Construct mine facilities outside of the 100-year floodplain.</p> <p>Implement a program to investigate complaints from water users about potential impacts on wells, ponds, and springs due to mine operations, and provide remedial response as appropriate.</p> <p>Recycle/re-use process water to minimize water consumption.</p>
<p>Wetlands and other waters of the United States; Aquatic resources</p>	<p>Design and locate mine facilities to reduce impacts on Waters of the U.S.</p> <p>Concentrate and confine impacts to previously disturbed areas, where feasible.</p> <p>Avoid mine roads crossing Waters of the U.S. Where crossing is necessary, minimize impacts by crossing at the narrowest portion or by siting over existing road crossings.</p> <p>Include Haile Gold Mine Creek detention and diversion structure within the footprint of the haul road crossing.</p> <p>Include North Fork of Haile Gold Mine Creek diversion structure within the footprint of the road crossing.</p> <p>Implement 50-foot vegetative buffers around otherwise not directly affected Waters of the U.S.</p>

Table 6-1 Summary of Avoidance and Minimization Measures (Continued)

Resource Area	Avoidance and Minimization Measures
<p>Terrestrial resources; Federally listed species</p>	<p>Follow Migratory Bird Treaty Act terms described in 16 U.S. Code 703(a).</p> <p>Design substations and distribution and transmission lines to follow the guidelines in the Rural Utilities Service substation design and transmission line design handbooks (RUS 2001, 2009).</p> <p>Design and construct transmission lines to follow the guidelines in <i>Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006</i> (APLIC 2006).</p> <p>Implement an Avian Protection Plan at the mine site for transmission lines, including designing power lines and poles to minimize potential bird mortalities due to electrocution.</p> <p>Develop procedures for managing nests of protected species on utility structures (if nests are built).</p> <p>Install an 8-foot fence around all HDPE double-lined ponds and the TSF facility to exclude wildlife from the TSF pond.</p> <p>Implement an avian mortality reporting system for the TSF and contact water ponds. Regularly inspect and maintain all fencing around HDPE double-lined ponds and the TSF perimeter.</p> <p>Use skirting to enclose open spaces as necessary beneath raised structures as practical.</p> <p>Limit the concentration of weak acid dissociable cyanide in the TSF Reclaim Pond to a maximum of 50 parts per million.</p> <p>Avoid features possibly attractive to wildlife in HDPE double-lined ponds, as possible.</p> <p>Maintain slopes around water ponds to restrict access, where necessary, and to provide a means of escape for trapped animals.</p> <p>Clear vegetation surrounding the perimeter of HDPE-lined ponds, and minimize infrastructure around open-solution ponds and the TSF where practicable.</p> <p>Use certified as noxious-weed-free seed mixes to promote diverse wildlife in areas undergoing final reclamation.</p> <p>During final grading of facilities during reclamation, leave occasional large boulders that are uncovered during sloping on the surface to provide microhabitats for wildlife and vegetation.</p> <p>Ensure that workers do not intentionally feed, harass, or approach wildlife.</p> <p>Follow posted speed limits for traffic in the Project area to reduce incidents with wildlife.</p>
<p>Socioeconomics and environmental justice</p>	<p>None proposed.</p>
<p>Land use</p>	<p>Return disturbed areas to a stable condition that can support a productive post-mining land use.</p>
<p>Transportation</p>	<p>Construct two overpasses across US Highway 601 (US 601) (to TSF and Champion Pit) to reduce traffic using state roads.</p> <p>Restrict mining-related traffic to roads constructed in the Project area to minimize impacts on local infrastructure.</p> <p>Construct turning lanes for Project entrance to reduce traffic using state roads.</p>
<p>Cultural resources</p>	<p>Implement Memorandum of Agreement and Cultural Resources Monitoring Plan.</p>

Table 6-1 Summary of Avoidance and Minimization Measures (Continued)

Resource Area	Avoidance and Minimization Measures
Visual resources and aesthetics	<p>Determine placement of vegetative screens at public roadways in coordination with the SCDHEC.</p> <p>Use visual screening techniques.</p> <p>Use earth tones for major mine facilities.</p> <p>Implement dust control measures.</p> <p>Direct operating lights downward to shield light sources.</p> <p>Reduce outside lighting to the minimum amount allowed for safe operations and maintenance in compliance with regulations from the Mine Health and Safety Administration.</p> <p>Minimize facility heights, where feasible.</p> <p>Perform reclamation to approximate original topography where practicable.</p> <p>During final grading of facilities, occasional large boulders that are uncovered may be left to provide topographic diversity and to break the linear appearance of the final slope.</p>
Recreation	<p>Return disturbed areas to a stable condition that can support a productive post-mining land use, including recreation.</p>
Air quality	<p>Comply with Air Quality State Construction and Operating permit requirements, conditions, and reporting.</p> <p>Operate and maintain air pollution control equipment in accordance with permit requirements.</p> <p>Implement dust control measures, including using water sprays to minimize dust at all transfer points in accordance with the conditions set forth in Haile's SCDHEC Air permit issued for the Project.</p> <p>Prepare and implement a Fugitive Dust Control Plan in accordance with conditions contained in the SCDHEC Air permit issued for the Project. Dust control measures may include haul road maintenance, wet suppression through the application of water, gravelling of road surfaces, and revegetation and/or reclamation of material stockpiles.</p> <p>Impose haul truck speed limits where necessary.</p> <p>Maintain roadways to ensure safe operation of equipment to control fugitive dust.</p> <p>Minimize the formation of hydrogen cyanide by maintaining leach solution at a high pH.</p>
Noise and vibration	<p>Determine placement of vegetative screens at public roadways in coordination with the SCDHEC.</p> <p>Perform blasting with electronic programmable detonators to minimize ground vibrations.</p> <p>Perform blasting during daylight hours as possible.</p> <p>Use sound-attenuating devices on Mill equipment where practicable.</p>
Health and safety	<p>Provide around-the-clock security through a combination of security gate personnel, video cameras, and other security measures.</p> <p>Restrict access to Project site.</p> <p>Use vegetative screens and fencing to minimize public interaction.</p> <p>Develop detailed pollution prevention plans for process chemical handling and mining operations in accordance with appropriate regulations, permits, best practices, and codes.</p> <p>Comply with the Emergency Planning and Community Right-To-Know Act.</p> <p>Implement Emergency Response Action Plans.</p>

Table 6-1 Summary of Avoidance and Minimization Measures (Continued)

Resource Area	Avoidance and Minimization Measures
Health and safety (Continued)	<p>Comply with NPDES permits, air permits, the Dam Safety permit, the SCDHEC Mine Operating permit, the Floodplain permit, stormwater permits, and building and sewer permits.</p> <p>Perform toxic release inventory reporting.</p> <p>Implement a Chemical Handling and Storage Plan.</p> <p>Comply with Mine Safety and Health Administration requirements.</p> <p>During reclamation, construct safety berms around any portions of the pit lakes that did not have these during operations.</p> <p>Place appropriate signage during closure to warn of the hazards of the pit highwalls and pit lake.</p> <p>Construct two bridges over US 601 to avoid impact on public safety by mine vehicle movement.</p> <p>Seal abandoned wells.</p>
Hazardous and toxic waste	<p>Implement a Solid and Hazardous Waste Management Plan.</p> <p>Implement a material safety data sheet program.</p> <p>Implement an identification and approval process prior to bringing any hazardous material within the Project boundary.</p> <p>Comply with Resource Conservation and Recovery Act and SCDHEC requirements for storage and handling of hazardous and toxic wastes.</p> <p>Implement waste minimization measures.</p>

Sources: Haile 2013a, 2013b.

6.2.2 Additional Mitigation Measures Being Considered by the USACE

The additional measures the USACE is considering to further mitigate potential impacts of the Haile Gold Mine Project are listed by resource area in Table 6-2. These measures are summarized from Chapter 4 and presented here for convenience. Additional avoidance, minimization, and mitigation may be considered by the USACE in its decision-making process.

Table 6-2 Additional Mitigation Measures Being Considered by the USACE

Resource Area	Mitigation Measures
Geology and soils	None proposed.
Groundwater hydrology and water quality	Issue a moratorium on potable well installation within the zone of potential groundwater impact (as depicted by the particle tracking results). No new potable supply well may be installed within this area, unless the mine operator can demonstrate that water quality criteria are being and would continue to be met.
Surface water hydrology and water quality	<p>To ensure minimum flows in Haile Gold Mine Creek, Ledbetter Pit Lake could be designed with a permanent minimum release structure.</p> <p>A variety of measures could be implemented to reduce potential impacts of reduced baseflows on streamflow, water temperatures, and water quality, including pumping depressurization water to streams in the study area.</p> <p>To mitigate impacts on stream temperatures, holding ponds or constructed wetlands could be used to store water after transport in aboveground pipes and before discharge to surface waters. Additional mitigation measures could include shading, covering, or burying the diversion pipes that are currently proposed as aboveground pipes.</p> <p>Haile would use water from the drawdown of Ledbetter Reservoir primarily on site for construction and dust management. To mitigate water quality impacts associated with potential discharge of this water to Haile Gold Mine Creek, monitoring of the water quality and sediment quality could be conducted prior to discharge to determine whether treatment is required prior to discharge. Haile and the SCDHEC would develop contingency measures to address adverse water quality detected during monitoring.</p>
Water supply and floodplains	<p>Deepen or replace shallow wells.</p> <p>Replace or modify well pumps.</p> <p>Replace wells, ponds, and springs used for water supplies with an alternative water supply that may include connections to a public water system, storage cisterns, or rooftop water collection/treatment systems.</p> <p>Install clay or synthetic liners in ponds.</p> <p>To mitigate potential impacts on water users, no water supply wells or surface water withdrawals should be permitted within the modeled zone of water quality impacts until monitoring indicates that all water quality standards are met.</p>
Wetlands and Waters of the U.S.	Expand the long-term wetland monitoring locations to address lower Haile Gold Mine Creek, upper and lower Camp Branch Creek, Champion Branch Creek, and the receiving waters of the Little Lynches River.
Terrestrial resources	<p>To minimize long-term impacts on natural communities from reductions in vegetation type and diversity and to improve the time of recovery of reclaimed areas, replant suitable locations with diverse seed mixes that include native shrubs.</p> <p>To maximize seed viability in stored growth media, place topsoil directly onto reclaimed sites instead of storing in growth media piles when possible.</p> <p>Seed growth media piles with a diverse seed mix until it is needed for reclamation, which would stabilize the soil and provide a seed source to the material.</p> <p>To increase safety for wildlife and create potential riparian habitat, design and implement a sloping littoral shelf at the edges of pit lakes to increase fringing aquatic habitat for wildlife and safe access for wildlife to the water.</p>

Table 6-2 Additional Mitigation Measures Being Considered by the USACE (Continued)

Resource Area	Mitigation Measures
Terrestrial resources (Continued)	To address potential wildlife mortality, a wildlife protection and mortality response plan could be developed in consultation with the USFWS and the SCDNR that would be incorporated into permits issued by the USACE and the SCDHEC. This plan should address secondary and physical protective measures, as well as avian monitoring and reporting requirements. Examples of protective measures to consider include hypersaline TSF solution, decoy wetlands, netting, HDPE floating balls, hazing, reducing the food sources in and around the TSF for foraging, and building alternative freshwater ponds to provide drinking sources away from the TSF.
Federally listed species	None proposed.
Socioeconomics and environmental justice	None proposed.
Land use	None proposed.
Transportation	<p>To avoid or minimize a potential temporary impact relative to traffic congestion, develop and implement a construction traffic management plan to address operation and staging of construction vehicles and equipment, and measures to minimize disruption to through-traffic on US Highway 601 during construction of the proposed Haile Gold Mine Entrance driveway and the two proposed overpasses crossing US Highway 601.</p> <p>To avoid or minimize a potential temporary impact relative to traffic congestion, develop, maintain, and implement a transportation phasing and management plan to ensure that necessary transportation improvements are in place to accommodate the Project traffic during both construction and operations.</p> <p>To avoid or minimize a potential temporary impact relative to roadway wear and tear, construct the proposed Haile Gold Mine Entrance driveway in accordance with the conceptual plan in the TIS, modified as necessary through plan development and approval by the SCDOT. The design of the proposed intersection and internal access roadway should account for the volume and weight of heavy vehicles accessing these facilities.</p>
Cultural resources	None proposed.
Visual resources and aesthetics	None proposed.
Recreation	None proposed.
Air quality	None proposed.
Noise and vibration	None proposed.
Health and safety	None proposed.
Hazardous materials and waste	None proposed.

6.2.3 Applicant's Proposed Monitoring and Management Plan

The Applicant has submitted in various documents and reports a number of plans and proposed monitoring and environmental management measures, and has compiled these into an MMP (Haile 2013a) that would be implemented throughout the life of the mine. Contents of the proposed MMP are summarized below.

The complete proposed MMP is included in Appendix G to enable readers of the EIS to understand the monitoring and management measures to which the Applicant has committed.

The objectives of Haile's proposed MMP are to:

- Identify the environmental media that Haile would monitor during the Project and provide a summary of this monitoring;
- Provide an overview of certain major operations and environmental media at the Project site that Haile anticipates would be regulated by the SCDHEC and identify Haile's commitments for each of them; and
- Provide an overview of the major Project facilities to enhance understanding of how Haile's environmental monitoring and management activities would address associated environmental impacts.

Management for environmental protection includes proper operation and maintenance of proposed mine facilities. Although most of Haile's final operational plans are not yet completed, various reports or manuals that include relevant monitoring or management information have been prepared. Manuals and operational plans prepared during Project planning would be supplemented or replaced by the finalized operational plans (or manuals) after any permits are issued to guide actual operations (Haile 2013a). USACE and SCDHEC permit conditions may require agency review and/or approval of these plans.

The following plans and draft operational manuals that are relevant to environmental management at the Project during mining and post-mining are incorporated into the MMP by reference and listed below:

- Tailing Storage Facility Operations, Inspection, and Maintenance Manual (AMEC 2012a);
- Tailing Storage Facility Emergency Action Plan (AMEC 2012b);
- Overburden Management Plan (Schafer 2010); and
- Reclamation Plan (Haile 2013c).

Current versions and/or drafts of these plans and documents can be accessed at the Haile Gold Mine EIS website (<http://www.hailegoldmineeis.com>).

The Applicant would develop additional plans to comply with other operational standards and regulations. These plans include:

- Spill Prevention, Control, and Countermeasures (SPCC) Plan;
- Stormwater Pollution and Prevention Plan (SWPPP);
- Overburden Material Testing Program;
- Operational Water Quality Monitoring and Management Plan;

- Operations plans for each major facility;
- Solid and Hazardous Waste Management Plan; and
- Post-Closure Water Quality Monitoring and Management Plan.

The MMP focuses on Haile’s commitments for monitoring as required to comply with all applicable permits and regulations. The MMP would be revised as needed based on future permitting decisions (see additional discussion regarding revisions to the MMP in Section 6.3.4 below). Table 6-3 summarizes the monitoring programs in Haile’s proposed MMP.

Table 6-3 Summary of Haile’s Proposed Monitoring Programs

Monitoring Program	Type of Monitoring	Components	Frequency
Groundwater	Water levels	Monitoring wells to monitor depressurization, drawdown extent, and impact on wells outside the Project boundary	Quarterly, or as specified
	Water quality	Basic water quality parameters: cations and anions, metals, nutrients, and other parameters including cyanide, oil and grease, and fecal coliform ^a	Quarterly or annually depending on location
Surface water	Streamflows	Streamflows	Hourly or quarterly
	Water quality	Basic water quality parameters: cations and anions, metals, nutrients, and other parameters including cyanide, oil and grease, and fecal coliform ^a	Quarterly and annually
	Stormwater	Manage and monitor in compliance with the Stormwater Pollution Prevention Plan during construction and operation	As per permit requirements
Stream channels	Stream channel configuration	Cross sections, profile, sediment	Annually
Wetlands	Vegetation	Species presence, cover, woody stems, hydrophytic species	Annually
	Soil	Soil nutrients and hydric indicators	Annually
	Water	Water quality, depth to water table, hydrologic indicators	Annually
TSF monitoring	Structural integrity	Visual examination and geotechnical instrumentation	Periodically
	Drain systems	Water quality sampling and inspection as described above in the shallow groundwater diversion system, leak collection and recovery system, and underdrain collection system	Periodically
Overburden	Overburden material testing program	Collect samples from gold assay boreholes and test geochemical properties to classify overburden as green, yellow, or red	One in ten boreholes
Johnny’s PAG	Surface water and ground-water quality	Monitor water quality as described above	According to Water Quality Monitoring Plan

Table 6-3 Summary of Haile’s Proposed Monitoring Programs (Continued)

Monitoring Program	Type of Monitoring	Components	Frequency
Mill Site and ore processing	Cyanide management	Send weak acid dissociable cyanide levels above 50 parts per million in the tailings stream through the cyanide destruct process	Continuous
	Spill containment system	Individual containment and monitoring of the Process Event Pond in the event of an emergency release Conduct incident reporting in accordance with the SCDHEC Mine Operating permit	As needed
Contact water treatment plant	NPDES permit compliance monitoring	Monitor and report in accordance to the NPDES individual discharge permit	As needed
Contact water and tailing slurry pipelines	Spill and leak monitoring	Install pressure-sensing alarms on the tailings slurry process water pipelines	As needed
Reclamation and closure monitoring	Pit lake water levels	Monitor water levels in reclaimed pit lakes	Quarterly
	Pit lake water quality	Monitor pH and water quality to determine appropriate lime additions	As per water quality sampling plan
	Surface water and groundwater	Monitor water quality as described above but decreasing in frequency over time as determined by the success of reclamation	Dependent on results during 30-year period after mine closure
	Passive treatment cells	Monitor treatment effectiveness	As per water quality sampling plan
	Vegetation	Monitor to prevent woody species from becoming established on the TSF and Johnny’s PAG	As needed

NPDES = National Pollutant Discharge Elimination System

SCDHEC = South Carolina Department of Health and Environmental Control

TSF = tailings storage facility

^a Analytes are described in more detail in the respective monitoring and management plans, and are summarized in the Haile Gold Mine Monitoring and Management Plan (Haile 2013a).

Source: Haile 2013a.

The USACE is considering a special condition of the DA permit that the Applicant adds adaptive management¹ to the MMP in order to include a process for revisions or additions as needed. Since the Draft EIS, the SCDHEC has clarified that its mining regulations include an adaptive management approach. Elements of the Mine Operating permit would be based on the anticipated or predicted operation at the outset of mining but would be refined periodically to incorporate more detailed requirements, such as unit-specific closure plans for each mine facility, as the Project progresses and as additional information becomes available. During mine construction, detailed engineered plans, including geotechnical, structural, and hydrogeologic data gathered during excavation of each pit, would be

¹ *Adaptive management* is a structured process that allows for taking action under uncertain conditions based on the best available science, closely monitoring and evaluating outcomes, and reevaluating and adjusting decisions as more information is learned.

incorporated into a unit-specific closure design prior to reaching final pit depth. The reclamation bond also would be increased if necessary during these refinements to the plan. Likewise, many of the operating, management, and monitoring plans outlined in the MMP (Appendix G) would be finalized pursuant to federal, state, and local permitting decisions to include the level of detail necessary. These plans would be refined as additional information is obtained during the mine process, constituting adaptive management.

In this way, the MMP would be a dynamic document that is revised as new information is obtained and measures would be adjusted accordingly. This adaptive management component could improve the efficiency of the MMP and result in greater effectiveness, including potential cost savings.

An adaptive management plan component to the proposed MMP would clearly identify monitoring goals and objectives, many of which are already included in the MMP. Standard permit requirements mandate compliance with such operations and monitoring plans, which would be the case for the proposed Project. Monitoring goals and objectives that would be incorporated into the MMP by the addition of an adaptive management component include:

- Parameters to be monitored;
- Location and timing of monitoring;
- Entity responsible for monitoring;
- Evaluation techniques for the information;
- Actions (contingencies, adaptive management, and corrections to future actions) that would be taken based on the information; and
- Methods by which the public can obtain information on mitigation effectiveness and monitoring results.

6.3 Avoidance, Minimization, and Compensatory Mitigation under the Clean Water Act

For projects authorized under Section 404 of the CWA, compensatory mitigation is not considered until after all appropriate and practicable steps have been taken to first avoid and then minimize adverse impacts on the aquatic ecosystem (40 CFR 230).

6.3.1 Avoidance Achieved during the DA Application Review Process

The most substantial reduction in potential impacts was achieved when the Applicant, in close coordination with analysis by the USACE, reconfigured and revised the proposed Project, as described in Chapter 2. The revised mine plan (Haile 2012) resulted in an approximately 25-percent reduction in overall acreage of direct impacts on wetlands and an approximately 32-percent reduction in direct impacts on streams compared to the site layout and mine plan filed in the Applicant's initial DA permit application (Haile 2011).

6.3.2 Minimization of Impacts

Chapter 2 describes the process by which alternatives to the proposed Project were considered, with the objective of reducing impacts on Waters of the U.S. and other environmental resources. This process considered alternative mining and ore processing methods, alternative sites for facilities, and alternate Project configurations, among other alternatives. Most alternatives were eliminated from further

consideration because they were not practicable or would not further reduce impacts on Waters of the U.S. from those of the proposed Project. The alternatives analysis identified one alternative to the proposed Project. As described in Chapter 2, the Modified Project Alternative would further reduce direct impacts on Waters of the U.S.

Other alternative Project configurations were eliminated from further consideration because the extensive groundwater lowering around the mine pits would result in considerable indirect impacts on Waters of the U.S. irrespective of the location of the mine pits (see Section 4.6, “Wetlands and Other Waters of the United States” for additional discussion). The long-term indirect impacts on Waters of the U.S. would occur nearest the mine pits, and the most substantial impacts within an approximately 0.5-mile radius, making further avoidance of direct impacts on Waters of the U.S. much less meaningful or moot.

6.3.3 Compensatory Mitigation

Compensatory mitigation is a critical tool to ensure that project impacts are offset by compensation to meet the long-standing national goal of “no net loss” of wetland functions and values, identified in EO 11990, *Protection of Wetlands*. Compensatory mitigation is used for resource losses that are specifically identifiable, reasonably likely to occur, and of importance to the human or aquatic environment. Compensatory mitigation can be carried out through restoration of an existing wetland or other aquatic site, enhancement of the functions of an existing aquatic site, creation of a new aquatic site, or preservation of an existing aquatic site.

The Mitigation Rule found at 33 CFR 332 establishes standards and criteria for the use of all types of compensatory mitigation to offset unavoidable impacts on Waters of the U.S. The Mitigation Rule identifies the steps necessary to determine the level of compensatory mitigation that is appropriate based on the wetland functions lost or adversely affected by permitted activities.

6.3.3.1 Compensatory Mitigation for Impacts on Waters of the United States

The Mitigation Rule outlines the process for selection of compensatory mitigation. The Mitigation Rule includes a preference hierarchy for the five types of compensatory mitigation: (1) mitigation banks; (2) in-lieu fee programs; (3) permittee-responsible mitigation (PRM) plans under a watershed approach; (4) PRM plans through onsite and in-kind; and (5) PRM plans through offsite and/or out-of-kind. Mitigation banks are given preference because

[They] typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis.... [They] require site identification in advance, project-specific planning, and significant investment of financial resources.

The Mitigation Rule allows that the preference hierarchy can be overridden in cases when “a permittee-responsible project will restore an outstanding resource based on rigorous scientific and technical analysis” (33 CFR 332.3[b][2]) or the selected compensatory mitigation option is environmentally preferable. In determining whether the mitigation proposal is environmentally preferable, the district engineer must assess the likelihood for ecological success and sustainability, the location of the compensation site relative to the impact site and its significance within the watershed, and the costs of the compensatory mitigation plan.

The Mitigation Rule grants the district engineer authority and discretion to determine the appropriate compensatory mitigation for impacts authorized under a DA permit.

6.3.3.2 Impacts that Require Compensatory Mitigation Pursuant to 33 CFR 332

The USACE’s intent in this Final EIS is to comply with NEPA implementing regulations by identifying and disclosing fully and completely all the potential environmental effects on the human and natural environment that may be caused as a result of the proposed Haile Gold Mine Project. With regard to potential effects on wetlands and Waters of the U.S., this includes addressing direct, indirect and secondary impacts on these aquatic resources.

Direct Impacts	Indirect Impacts	Secondary Impacts
Are “caused by the action and occur at the same time and place.” (40 CFR 1508.8)	Are “caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.” (40 CFR 1508.8)	Are “effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.” (40 CFR 230.11[h])

Direct impacts would include impacts that would result in losses of wetlands and Waters of the U.S. as a result of the direct excavation and placement of fill to construct and excavate the mine. For example, excavation of mine pits would result in the discharge of dredged or fill material, and placement of excavated overburden and pre-processed ore into temporary or permanent storage and stockpiles would directly affect wetlands and streams within the footprints of these Project features.

The distinction between *indirect* and *secondary* impacts is being made in this case for the purposes of this compensatory mitigation discussion only to differentiate between *secondary* impacts associated with the placement of fill material (such as wetland and stream habitat fragmentation) and the *indirect* impacts caused by other Project activities such as dewatering associated with groundwater pumping that are not regulated under Section 404 of the CWA and therefore do not require compensatory mitigation. It would be preferable to be able to clearly quantify exactly which impacts are secondary and which are indirect. However, since some of these impacts are interrelated, it is not possible to completely account for these separately. For example, Wetland O (Figure 4.6-2: 4.64 acres) located in upper Haile Gold Mine Creek would experience secondary impacts due to placement of fill material resulting in habitat fragmentation, in addition to indirect impacts through substantial groundwater drawdown. For the purposes of this discussion, impacts that are uniquely indirect impacts have been identified.

The direct, secondary, and indirect impacts of the proposed Project are shown in Table 6-4.

Table 6-4 Mitigation Ratios for Aquatic Resource Preservation

	Stream Linear Feet	Wetland Acres	Total Acreage of Properties
Rainbow Ranch	34,069	98	698
Cooks Mountain	45,510	630	1,131
Goodwill Plantation	104,181	1,414	2,559
Total resource	183,760	2,142	4,389
WOUS with direct impacts	26,460	120	N/A
WOUS with secondary and indirect impacts	76,288	272	N/A
WOUS with secondary impacts only	0	23	N/A
WOUS with indirect impacts only	26,200	668	N/A
WOUS with direct, secondary, and indirect impacts	128,948	1,083	N/A
Ratio of compensation to direct impacts	6.9:1	17.9:1	N/A
Ratio of compensation to direct and secondary impacts	1.8:1	5.2:1	N/A
Ratio of compensation to direct, secondary, and indirect impacts ^a	1.4:1	2.0:1	N/A

Notes:

WOUS = Waters of the U.S.

^a It should be noted that compensatory mitigation for *indirect* impacts to wetlands and other Waters of the U.S. (impacts resulting from non-jurisdictional activities such as groundwater drawdown) is not required under CWA Section 404(b)(1) Guidelines. The ratio is provided for comparative purposes only.

The USACE is in the final stages of approving the jurisdictional determination for wetlands and other Waters of the United States on the properties. All fieldwork has been completed and the values provided in the above table represent the extent of Waters of the U.S. on the sites.

6.3.3.3 Haile's Mitigation Plan

Because there are no approved mitigation banks with service areas that include the proposed Project site, Haile's original mitigation proposal submitted with the joint permit application to the USACE and the SCDHEC consisted of a PRM plan. The initial PRM plan was revised in May 2011 to include acquisition of the Rainbow Ranch tract and numerous smaller parcels with potential restoration opportunities within the Lynches River watershed. This revision of the PRM plan was not viewed favorably by the USACE and other review agencies because it included an excessive number of different parcels (over 75 different parcels) that were owned by numerous different individuals and entities. Agency and non-governmental organization comments on this version of the PRM plan raised questions and concerns regarding the feasibility and appropriateness of the PRM plan, particularly the numerous fragmented sites. The USACE advised Haile that the PRM plan was inappropriate, citing the preference for a PRM plan focused on "outstanding aquatic resources" that were "environmentally preferable" and consistent with the scale and regional impacts of the Project. With assistance from the resource agencies and environmental organizations, Haile identified and evaluated alternative mitigation opportunities, focusing on outstanding

aquatic resources. This effort was directed by the scope and complexity of the Project and by agency comment and input received during the EIS process.

A further revised version of the PRM plan entitled “Haile Gold Mine Mitigation Plan” (Haile 2013d, Appendix B) was received by the USACE on July 9, 2013. This most recent revision of the PRM plan is referred to as “Haile’s Mitigation Plan.” Haile’s Mitigation Plan proposes protection for regionally outstanding aquatic resources to compensate for impacts that are likely to occur as a result of the proposed Project. As part of Haile’s Mitigation Plan, Haile proposes to acquire environmentally preferable properties and donate them to the SCDNR Heritage Trust Program for perpetual stewardship. In documentation provided by the Applicant at the request of the USACE, Haile described identification and evaluation of potential alternative compensatory mitigation sites, first for sites within the Lynches River watershed and subsequently beyond the watershed boundaries. Selection criteria were based on those established by the South Carolina Legislature in 1976 under Section 51-17 of the South Carolina Code of Laws, the Heritage Trust Program. Because there is no federal definition for “environmentally preferable” compensatory mitigation, Haile proposed the use of criteria for projects that would be accepted under the Heritage Trust Program. For a property to be considered eligible for the Heritage Trust Program, candidate lands must include:

- *Significant natural areas containing relatively undisturbed ecosystems, unique landforms, threatened, endangered or unique plant or animal habitats or other unusual or outstanding scientific, educational, aesthetic or recreational characteristics; or*
- *Outstanding examples of historic or archaeological heritage.*

Using the criterion of suitability for the Heritage Trust Program, the Applicant consulted environmental agency personnel as part of their search for and evaluation of potential sites within the Lynches River watershed. Regional conservation goals also were considered a factor in evaluating potential sites within the watershed. Sites that would contribute to a “conservation corridor” based on proximity to other protected lands were preferred, as such locations can help maximize watershed benefits. From this search, the previously identified Rainbow Ranch tract was selected as a candidate site. Additional sites within the Lynches River watershed were limited by size or availability, and no other candidate sites were identified within that watershed.

In recognition of the need for additional compensatory mitigation and in coordination with the environmental and resource agencies, Haile expanded the search to include sites in the applicable ecoregion. Broadening the search area was consistent with agency comments received on Haile’s originally submitted PRM plan, which recommended consideration of the ecoregion in mitigation site selection. Expanding the search to the appropriate ecoregion, the Cooks Mountain and Goodwill Plantation properties were identified as outstanding resources within the Wateree River watershed (HUC 03050104, USEPA Level III Southeastern Plains ecoregion) and were selected as candidate sites. Prior to submittal of Haile’s Mitigation Plan, the SCDNR assisted in coordinating an effort to determine the level of consensus for including the two out-of-watershed tracts (Cooks Mountain and Goodwill Plantation) into Haile’s plan. In November 2012, with the cooperation of Haile, the SCDNR began leading field visits to the properties. During this time, approximately 20 trips were made that included at least 65 different individuals. Each field day lasted an entire day and included a comprehensive review of the natural resource features of the Cooks Mountain and Goodwill Plantation tracts. The focus was appropriately placed on resource quality, which is partly a function of the quantity of wetland and stream systems on the properties. A consensus among environmental professionals, including resource agency representatives, that visited the properties was that the properties are accurately described as “outstanding, ecologically significant, and worthy of protection” as part of the compensatory mitigation for the impacts of the proposed Project.

In a September 16, 2013 letter to the USACE (Appendix P4), the SCDNR supported Haile's Mitigation Plan, concurring that—with the exception of Rainbow Ranch—compensatory mitigation sites within the watershed were not available. In this letter, the SCDNR independently concluded, based on its own research within the impact watershed, that opportunities for landscape-level compensation were not available (see the letter from the SCDNR to USACE, September 16, 2013; Appendix P4). In a January 23, 2014 letter to the USACE (Appendix P4), the USFWS described their role in assisting in the search for compensatory mitigation and commented that acquisition and preservation of the Rainbow Ranch, Cooks Mountain, and Goodwill Plantation will provide “superior ecological benefits” over previous versions of Haile's compensatory mitigation proposals (see the letter from the USFWS to the USACE, January 23, 2014; Appendix P4).

Overall, Haile's Mitigation Plan involves perpetual preservation of three sites totaling approximately 4,389 acres and endowments for site maintenance, management, and long-term stewardship of all three sites. Together, the Goodwill Plantation and Cooks Mountain properties would provide an approximately 3,660-acre wildlife corridor within the Congaree, Wateree, and Santee (COWASEE) Basin Focus Area. The plan proposes to convey ownership of all or portions of three properties—Rainbow Ranch, Cooks Mountain, and Goodwill Plantation (brief descriptions provided below)—located within the same ecoregion as the proposed Project. Ownership would be conveyed to the SCDNR as a Heritage Preserve under SCDNR's Heritage Trust Program. The Heritage Trust Program was created to “set aside a portion of the state's rich natural and cultural heritage in a system of heritage preserves to be protected for the benefit of present and future generations.” It should be noted that the original estimates of wetland acreages and stream linear feet presented in Haile's Mitigation Plan (Appendix B) have been revised since publication of the Draft EIS. The USACE is in the final stages of approving the jurisdictional determination for wetlands and Waters of the U.S. on the properties. All fieldwork has been completed and the values provided herein represent the extent of Waters of the U.S. on the sites.

- **Rainbow Ranch** – Rainbow Ranch is a 698-acre site located in the Lynches River watershed (HUC 03040202) and USEPA Level III Piedmont and Southeastern Plains ecoregions in Lancaster County. The site is adjacent to 2,267 acres of state preserve lands. The approximately 98 acres of palustrine wetlands in the site include scrub-shrub, forested, and emergent communities and 34,069 linear feet of stream. The property includes federally designated critical habitat for the Carolina heelsplitter mussel. The Sandhills chub, a state-listed species of concern, is anticipated also to benefit from the downstream water quality improvements to the Lynches River provided by preservation of this property. Rainbow Ranch is adjacent to the Forty Acre Rock Heritage Preserve, a South Carolina Heritage Trust Preserve, and the privately-owned Carolina Heelsplitter Conservation Bank. Rainbow Ranch's inclusion in the Forty Acre Rock Heritage Preserve will increase the size of the Preserve by over 30 percent.
- **Cooks Mountain** – Cooks Mountain is comprised of two parcels totaling approximately 1,131 acres located in the Wateree River watershed in Richland County; the site is adjacent to the Goodwill Plantation site. Within this acreage are 630 acres of primarily palustrine forested and scrub-shrub wetlands, and 45,510 linear feet of stream (which includes 13,606 linear feet of shoreline comprising the west bank of the Wateree River). These are described by Haile as “functional and in an undisturbed state relative to passive recreation use.” The Cooks Mountain site includes high levels of plant diversity unique to relatively undisturbed areas and topographic relief not commonly found in this region of South Carolina (e.g., elevations approaching 400 feet above sea level adjacent to the Wateree River). In addition to compensatory wetland mitigation, the Cooks Mountain site offers the potential for other public benefits such as low-impact recreation (e.g., hunting and hiking), environmental education events at the existing education center, and cultural resource and biodiversity research opportunities.

- **Goodwill Plantation** – The Goodwill Plantation site is 2,559 acres located in the Wateree River watershed in Richland County. Its northern boundary abuts the Cooks Mountain property. Within this acreage are 1,414 acres of primarily palustrine forested and scrub-shrub wetlands, and 104,181 linear feet of stream (which includes 29,695 linear feet of shoreline comprising the west bank of the Wateree River). These are described by Haile as “functional and in an undisturbed state relative to passive recreation use.” The site contains diverse plant communities and supports a reproductive population of the rare Carolina egg-in-a-nest mint (*Macbridea caroliniana*).

In addition to the purchase price of the actual properties, Haile would provide \$9.4 million to the Heritage Trust Program in endowments. That amount would be divided into \$4.5 million for maintenance, management, and restoration of the mitigation sites and \$4.9 million for projects benefiting the Carolina heelsplitter mussel. The proposed endowment would allow the Heritage Trust Program to manage the properties in a holistic, ecological manner and would provide ample opportunities over the long term to restore and enhance wetlands and streams on all three tracts.

Additional public benefits provided by preservation of the Goodwill Plantation include perpetual protection of numerous cultural resources known to occur on the site, including portions of Goodwill Plantation itself, which has been listed in the NRHP since 1986.

On April 22 and 23, 2014, the USACE participated in an inter-agency field visit to Rainbow Ranch, Cooks Mountain, and Goodwill Plantation. The purpose of the field visit was to allow the USACE to review the properties in the company of representatives from the SCDHEC, the USEPA, the USFWS, the SCDNR, the SHPO, and Haile and their ecological consultants. Although representatives from the SHPO were unable to attend that field visit, they have visited the sites on other occasions. The field visit allowed participants to gain a first-hand appreciation for the cultural importance of the sites, particularly for the Goodwill Plantation and Cooks Mountain properties. From an ecological and Waters of the U.S. perspective, the site visit allowed participants to review and evaluate the expansiveness and highly interconnected nature of the swamp system, including the water sources of the Wateree River floodplain downslope combined with the Colonel’s Creek stream system providing perennial flow from upslope.

6.3.3.4 Comprehensive Ecological Mitigation Approach

In the case of Haile’s Mitigation Plan, because the impacts occur outside the service area of approved mitigation banks and in-lieu fee programs, Haile proposed permittee-responsible mitigation. Because of the circumstances described above, Haile’s Mitigation Plan is composed of the following components: preservation on one site within the watershed (Rainbow Ranch) and preservation on two sites that are outside the watershed but within the same ecoregion as the Project (Cooks Mountain and Goodwill Plantation).

As noted earlier, the Mitigation Rule specifies a preference hierarchy for the five types of compensatory mitigation: (1) mitigation banks; (2) in-lieu fee programs; (3) PRM plans under a watershed approach; (4) PRM plans through onsite and in-kind; and (5) PRM plans through offsite and/or out-of-kind.

A portion of Haile’s Mitigation Plan is within Type 3, and a portion is within Type 5. As indicated above, an exhaustive search was conducted by the SCDNR to locate permittee-responsible mitigation in the watershed (Type 3). However, the SCDNR indicated that they could not locate opportunities where landscape-scale type mitigation could be met (SCDNR 2013; Appendix P4). The Mitigation Rule allows that the preference hierarchy can be overridden in cases when “a permittee-responsible project will restore an outstanding resource based on rigorous scientific and technical analysis” (33 CFR 332.3[b][2]). In addition, the Mitigation Rule requires that district engineers consider what would be “environmentally

preferable” when evaluating compensatory mitigation options (33 CFR 332.3[a]). Specifically, at 33 CFR 332.3(b)(6), the Mitigation Rule states

If, after considering opportunities for on-site, in-kind compensatory mitigation ... [Type 4], the district engineer determines that these compensatory mitigation opportunities are not practicable, are unlikely to compensate for the permitted impacts, or will be incompatible with the proposed project, and an alternative, practicable off-site and/or out-of-kind mitigation opportunity is identified that has a greater likelihood of offsetting the permitted impacts or is environmentally preferable to on-site or in-kind mitigation, the district engineer should require that this alternative compensatory mitigation be provided.

When determining whether Haile’s Mitigation Plan is “environmentally preferable,” the district engineer must assess the likelihood for ecological success and sustainability, the location of the compensation site relative to the impact site and its significance within the watershed, and the costs of the compensatory mitigation plan.

Another issue that must be addressed in order to determine compliance with the Mitigation Rule is the fact that Haile’s Mitigation Plan is preservation only. Although the Mitigation Rule allows the district engineer to accept preservation-only proposals, the following criteria must be met:

- (i) The resources to be preserved provide important physical, chemical, or biological functions for the watershed;*
- (ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available;*
- (iii) Preservation is determined by the district engineer to be appropriate and practicable;*
- (iv) The resources are under threat of destruction or adverse modifications; and*
- (v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust). (33 CFR 332.3[h])*

Key Considerations in Assessing the Proposed Mitigation Plan

Taking into consideration the requirements listed above, when assessing the acceptability of Haile’s Mitigation Plan, the following points are pertinent:

1. All three sites would be conveyed to the South Carolina Heritage Trust Program, which would afford “the highest order of long-term protection that can be provided by state government” (SCDNR 2013; Appendix P4) and would therefore achieve a high likelihood for ecological success and sustainability of the sites.
2. All three sites are located adjacent to other protected lands and would provide significant value to the watersheds in which they are located. Furthermore, each of these compensatory mitigation properties represents an important and significant addition to ongoing regional conservation efforts.

- a. The Rainbow Ranch is adjacent to 2,267 acres of state preserve lands: the Forty Acre Rock Heritage Preserve, a South Carolina Heritage Trust Preserve, and the privately-owned Carolina Heelsplitter Conservation Bank.
 - b. The Goodwill Plantation and Cooks Mountain properties would provide an approximately 3,660-acre wildlife “conservation corridor” based on proximity to other protected lands within the Congaree, Wateree, and Santee (COWASEE) Basin Focus Area.
3. The \$9.4 million endowment to the Heritage Trust Program for these properties is regarded as one of the highest funding endowments ever provided to a long-term financing mechanism for compensatory mitigation property in South Carolina.
4. Recognizing that all three mitigation sites contribute significantly to the ecological sustainability of the Wateree and Lynches watersheds, and are of statewide significance due to both size and ecological features, the preservation of these sites is considered by the State to be a high priority. The preservation of these sites in perpetuity represents a strategic selection of appropriate mitigation that would maintain the quality and quantity of multiple watersheds, as well as the ecological sustainability of the region. Preservation of the three sites is particularly valuable for protecting unique, rare, or difficult-to-replace aquatic resources, and preservation is sometimes the most appropriate form of compensatory mitigation for resources of statewide significance.
5. Rainbow Ranch is within the same watershed as the proposed Project and contains approximately 98 acres of palustrine wetlands, including scrub-shrub, forested, and emergent communities, and 34,069 linear feet of streams. The site includes outstanding aquatic resources, including the Carolina heelsplitter mussel, a federally-listed endangered species, and its critical habitat. In addition, the Sandhills chub, a state-listed species of concern, is anticipated also to benefit from downstream water quality improvements to the Lynches River provided by preservation of the property.
6. The Cooks Mountain site is within the same ecoregion as the proposed Project and contains approximately 630 acres of primarily palustrine forested and scrub-shrub wetlands, and 45,510 linear feet of stream. It includes high levels of plant diversity unique to relatively undisturbed areas and topographic relief not commonly found in this region of South Carolina. The site offers the potential for other public benefits such as low-impact recreation (e.g., hunting and hiking), environmental education events at the existing education center, and biodiversity research opportunities.
7. The Goodwill Plantation site is within the same ecoregion as the proposed Project and contains approximately 1,414 acres of primarily palustrine forested and scrub-shrub wetlands and 104,181 linear feet of stream. The site contains diverse plant communities and supports a reproductive population of the rare Carolina egg-in-a-nest mint. The site offers the potential for other public benefits such as low-impact recreation (e.g., hunting and hiking), environmental education events, and biodiversity research opportunities.
8. The benefits to the public from all three sites are significant, including public access to over 4,300 acres of upland and aquatic resources for recreation, education, and research.
9. All three properties are currently in private ownership; as such, development of these properties is possible. Under Haile’s Mitigation Plan, the sites would be removed from private ownership and become part of South Carolina’s Heritage Trust Program. Any threat of development (such as threats from development activities, sand mining, transportation, and forestry practices among others) would be eliminated, and the sites would be preserved for the benefit of the regional environment.

- a. There is a potential threat of adverse effects on the Goodwill Plantation site from land development activities as the property is located approximately 15 miles east of the City of Columbia, adjacent to the Wateree River and with approximately 1,500 developable upland acres. The property has good access with frontage on US Highway 76/378, a four-lane highway, and is currently zoned RU in Richland County which allows agriculture uses and low-density residential development.
 - b. Cooks Mountain has an existing conservation easement that establishes certain rights to the property owner, including rights to maintain and replace the existing and additional new structures; to relocate farm maintenance buildings and facilities; construct new septic systems, new roads, and landfill and borrow areas; and to engage in other land management practices.
 - c. Model conservation easements required by the USACE for the protection of compensatory mitigation properties include restrictions not covered by the existing conservation easement; consequently, the threats of development would be removed.
10. For Haile's Mitigation Plan, the USACE would execute an MOA with the SCDNR as the long-term property owner and steward. This MOA would govern use of the properties consistent with the Heritage Trust Program in perpetuity and would provide additional protection and conservation measures beyond those covered by the existing conservation easement.
11. With regard to cultural resources, the Goodwill Plantation is well known for its highly significant historic and cultural values, and was listed on the NRHP in 1986 for its significance to the history of South Carolina. Cooks Mountain is important historically, as it was a landmark for early travelers and explorers to the area and could have been used by prehistoric and historic occupants. A review of the topography of the Rainbow Ranch site indicates that there are numerous locations that would have been suitable for prehistoric and historic human occupation. However, no detailed cultural resource surveys have been completed on the properties.
12. Haile's Mitigation Plan provides preservation for a total of 2,142 acres of wetlands and 183,760 feet of streams. The direct impacts from the Project are expected to be approximately 120 acres of wetlands (mitigation ratio of 17.9:1) and 26,460 linear feet of stream (mitigation ratio of 6.9:1). The acreage from direct and secondary impacts of the proposed Project (it is noted groundwater drawdown associated with some of these secondary impact areas also would cause indirect effects) are expected to be 415 acres of wetlands (mitigation ratio of 5.2:1) and 102,748 linear feet of stream (mitigation ratio of 1.8:1) (see Table 6-4). While not quantified, it is important to note that a portion of the overall impacts would be temporary, and some areas are expected to recover over time.

Long-Term Financing versus Financial Assurances

The USACE also must consider financial assurances when evaluating mitigation proposals. USACE regulations at 33 CFR 332.4(c)(13) address financial assurances:

A description of financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with its performance standards....

Regulations at 33 CFR 332.3(n)(1) also address financial assurances and are relevant here:

The district engineer shall require sufficient financial assurances to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with applicable performance standards. In cases where an alternate

mechanism is available to ensure a high level of confidence that the compensatory mitigation will be provided and maintained (e.g., a formal, documented commitment from a government agency or public authority) the district engineer may determine that financial assurances are not necessary for that compensatory mitigation project.

Regulations at 33 CFR 332.4(c)(11) address long-term management:

A description of how the compensatory mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management...

It is important to note the difference between financial assurances and long-term funding mechanisms. As stated in the Preamble to the Mitigation Rule (33 CFR 332):

In this rule, financial assurances are used to provide a high level of confidence that compensatory mitigation projects will be completed, whereas long-term management measures are used to help ensure the long-term sustainability of compensatory mitigation projects. Funding for financial assurances is handled differently than funding for long-term management. The final rule clearly differentiates between financial assurances for construction and establishment of compensatory mitigation projects and funding mechanisms for long-term management of those projects. In general, funding for long-term management should not be phased out over time, since those activities usually need to be conducted for substantial periods of time. (73 Fed. Reg. 19594, at 19648–49 [April 10, 2008].)

The need for any financial assurances, as described in 33 CFR 332.4 (c)(13), would be met in Haile's Mitigation Plan proposal through purchase of the three properties by Haile and subsequent donation to the SCDNR Heritage Trust Program. With respect to long-term funding, projects resulting in restoration and enhancement for Waters of the U.S. to be accomplished by the SCDNR as the long-term manager would be accomplished and managed through use of portions of the long-term management funds (i.e., both the \$4.5 million and the \$4.9 million endowments).

Based on the intent that the \$4.9 million is to fund projects that benefit the Carolina heelsplitter mussel, that portion of the endowment funds would be used for work on the Rainbow Ranch property where the Carolina heelsplitter and its critical habitat occur. Projects at Cooks Mountain and Goodwill Plantation would be funded primarily by a portion of the \$4.5 million portion of the endowment and by additional revenues generated from timber management that would be conducted, as appropriate, on these respective properties. This approach to considering financial assurance is consistent with the intent of 33 CFR 332.3 (n)(1) and (2) wherein "flexibility is afforded since government agencies tend to be relatively stable entities, and operate in the public interest" (73 Federal Register 19594 at 19639[April 10, 2008]). A formal, documented commitment by the SCDNR (in the form of a Memorandum of Agreement [MOA] between SCDNR and USACE) will memorialize SCDNR's role as the long-term manager for the mitigation sites.

Haile's Mitigation Plan indicates that long-term ownership, maintenance, and management would be the responsibility of the SCDNR pursuant to the Heritage Trust Program. As described in Section 3.7 of Haile's Mitigation Plan, the \$4.5 million portion of the endowment would be funded by an initial payment of \$1 million, with \$300,000 annual payments until all funds are received. The intent of the endowment is to substantially supplement the long-term maintenance and management program to be provided by the Heritage Trust Program. In its September 16, 2013 letter to the USACE (SCDNR 2013),

the SCDNR specifically addressed long-term protection for the properties according to Section 51-17-10 of the South Carolina Code of Laws, stating:

These properties all meet that legislative definition, and protection under the South Carolina Heritage Trust Act utilizes a long-term protection instrument that arguably is of a higher standard, e.g., protection by the State of South Carolina, than a conservation easement held by a qualified third party or other jurisdiction. In addition, the Applicant proposes to provide \$4.5 million for the maintenance and management of these sites...

The USACE regards the proposed total endowment of \$9.4 million to be one of the highest funding endowments ever provided to a long-term financing mechanism for compensatory mitigation property. In addition, the USACE recognizes the commitment to long-term stewardship that is implied by the level of protection (*protection* being inclusive of maintenance and management) afforded through the Heritage Trust Program, and further that this commitment to long-term protection also has been expressly stated by the SCDNR. As stated above, SCDNR's role as the long-term manager will be documented in an MOA between the SCDNR and the USACE.

6.3.3.5 USACE Conclusions Regarding the Comprehensive Ecological Mitigation Approach

Taking into consideration these factors, the USACE believes that Haile's Mitigation Plan adequately compensates for the aquatic resource functions that would be lost as a result of the proposed Project. Because of the high conservation values of the Cooks Mountain and Goodwill Plantation tracts in Richland County, in addition to the important habitat and water quality values offered by the preservation of almost 700 acres at Rainbow Ranch in Lancaster County, the preservation-only mitigation plan is appropriate. The likelihood of success for the compensatory mitigation is very high, and the differences between the functions lost at the impact site and the functions to be preserved by the compensation are considerable, with little to no temporal losses expected. Minimal temporal loss would occur because the excavation of mine pits and accumulation of corresponding OSAs would occur over the 12-year period described in the mine plan. Preservation would be achieved immediately and well in advance of the Project's direct impacts.

Because of comments received on the Draft EIS and the SCDNR's role as the principal advocate for and steward of South Carolina's natural resources, the SCDNR has volunteered to incorporate ecological restoration activities on these three mitigation sites as a component of its long-term maintenance and management plans under the Heritage Trust Program. The SCDNR's efforts, to be documented in an MOA constituting a formal commitment to the USACE, ultimately would create future opportunities to restore/enhance wetlands and streams on these three sites. The SCDNR is drafting a restoration/enhancement plan that outlines potential restoration opportunities for all three sites and would meet the 12 elements required of compensatory mitigation plans consistent with the 2008 Mitigation Rule (33 CFR 332). Currently, the SCDNR plan has identified approximately 110 acres of wetlands contiguous with Wateree River swamp and approximately 2,000 linear feet of stream with restoration/enhancement potential. The SCDNR restoration/enhancement plan will be provided to and evaluated by the USACE prior to the DA permit decision.

Together, Haile's Mitigation Plan and the SCDNR restoration/enhancement plan constitute the two components of the Comprehensive Ecological Mitigation Approach.

The USACE is currently actively working with the SCDNR to develop an agreement between the two agencies to document and memorialize both agencies' roles and responsibilities regarding the long-term maintenance and management of the compensatory mitigation sites. In accordance with

33 CFR 332.3(n)(1), the executed MOA would be a formal, documented commitment from the SCDNR that would address (1) long-term site protection pursuant to Heritage Trust Program guidelines in Section 51-17 of the South Carolina Code of Laws; and (2) accomplishment of identified restoration/enhancement projects as described above and that the SCDNR has committed to design and implement at the three properties to augment the amount and ecological functions of waters on the tracts. An important component of this MOA will address the assessment and inventory of cultural resources for the properties. This information will help the SCDNR to protect these resources and will help the public to better understand the cultural significance of the properties under Heritage Trust Program care. The USACE expects that the MOA would be completed and executed prior to completion of the ROD for the Project and will not make a permit decision until the MOA is successfully executed.

6.4 Literature Cited

AMEC. See AMEC Earth & Environmental, Inc.

AMEC Earth & Environmental, Inc. 2012a. Haile Gold Mine, Inc. Duckwood Tailing Storage Facility Operation, Maintenance, and Inspection Manual. August 31.

AMEC Earth & Environmental, Inc. 2012b. Emergency Action Plan (EAP), Haile Gold Mine, Inc. Duckwood Tailing Storage Facility, Lancaster County, South Carolina. August.

ARCADIS. See ARCADIS U.S., Inc.

ARCADIS U.S., Inc. 2013. Potential Hazards and Measures to Prevent Adverse Impacts to Birds and Other Wildlife. Submitted to Haile Gold Mine, Inc. on July 23, 2013.

Ecological Resource Consultants, Inc. 2013. Wetland Monitoring Plan.

ERC. See Ecological Resource Consultants, Inc.

Haile. See Haile Gold Mine, Inc.

Haile Gold Mine, Inc. 2011. Joint Federal and State Application for Activities Affecting Waters of the United States for Critical Areas of the State of South Carolina, January 11.

Haile Gold Mine, Inc. 2012. Revised Permit Application and Supplemental Information. August 15.

Haile Gold Mine, Inc. 2013a. Haile Gold Mine Monitoring and Management Plan. November.

Haile Gold Mine, Inc. 2013b. Haile Avoidance and Minimization Efforts. December 19.

Haile Gold Mine, Inc. 2013c. Haile Gold Mine Reclamation Plan, Prepared by Schlumberger Water Services, December 2010 and Updated by AMEC Environmental Infrastructure, November 2013.

Haile Gold Mine, Inc. 2013d. Haile Gold Mine Mitigation Plan. Prepared by Newkirk Environmental, Inc. July 9.

Schafer. See Schafer Limited, LLC.

Schafer Limited, LLC. 2010. Haile Gold Mine Overburden Management Plan. Submitted to Romarco Minerals, Inc. November.

SCDHEC. See South Carolina Department of Health and Environmental Control.

SCDNR. See South Carolina Department of Natural Resources.

South Carolina Department of Health and Environmental Control. 2005. BMP Handbook. July. Website: <https://www.scdhec.gov/environment/water/swater/BMPhandbook.htm>. Accessed on July 14, 2013.

South Carolina Department of Natural Resources (SCDNR). 2013. Letter to the USACE regarding Haile's Mitigation Plan, September 16, 2013. Included as Appendix P4 to the Final EIS.

USACE and USEPA. See U.S. Army Corps of Engineers and U.S. Environmental Protection Agency.

U.S. Army Corps of Engineers and U.S. Environmental Protection Agency. 2008. Compensatory Mitigation for Losses of Aquatic Resources, Final Rule. April 10.