Environmental Assessment

Kings Mountain Lithium Mine Project

City of Kings Mountain, North Carolina

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Revision Record

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01	07/19/2024	Draft Environmental Assessment Issued to Department of Energy for Review.
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This document is a working document. This document may change over time because of new information, or further analysis, or deliberation.

PRIVACY ADVISORY

This draft Environmental Assessment (EA) has been provided for public comment in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality NEPA Implementing Regulations (Title 40 Code of Federal Regulations [CFR] §§ 1500–1508), and 32 CFR § 989, the Environmental Impact Analysis Process which provides an opportunity for public input on applicable federal decision-making, allows the public to offer input on alternative ways for federal agencies to accomplish a proposed action and solicits comments on the agencies' analysis of environmental effects.

Public input allows the federal agencies to make better-informed decisions. Letters or other written or verbal comments may be published in this EA. Providing personal information is voluntary. Private addresses will be compiled to develop a stakeholder inventory; however, only the names of the commenting individuals and their specific comments will be disclosed. Personal information, home addresses, telephone numbers, and email addresses will not be published in the EA.

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Acronyms and Abbreviations

Acronym	Definition
°F	degrees Fahrenheit
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
Albemarle	Albemarle U.S., Inc.
amsl	above mean sea level
BCC	Bird of Conservation Concern
BG	block group
BIL	Bipartisan Infrastructure Law
BMP	best management practice
CBG	Census Block Group
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CT	census tract
DAF	Department of the Air Force
dBA	A-weighted decibel
DEMLR	North Carolina Division of Energy, Mineral, and Land Resources
DMS	dense media separation
DOE	U.S. Department of Energy
DPA	Defense Production Act
DSWM	Department of Solid Waste Management
EA	Environmental Assessment
EJ	environmental justice
EO	Executive Order
EPM	environmental protection measure
ESA	Endangered Species Act
EU	European Union
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
Gateway Trail	Kings Mountain Gateway Trail
GHG	greenhouse gas
gpm	gallons per minute
HAP	hazardous air pollutant
I-85	Interstate 85
IPaC	Information for Planning and Consultation

JD	jurisdictional determination
KMM	Kings Mountain Mine
KMSZ	Kings Mountain Shear Zone
KOP	key observation point
MBTA	Migratory Bird Treaty Act
MSHA	Mine Safety and Health Administration
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NCAC	North Carolina Administrative Code
NCDEQ	North Carolina Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
non-PAG	non-potentially acid generating
NPDES	National Pollutant Discharge Elimination System
NPI	non-process infrastructure
NWI	National Wetland Inventory
OSF	overburden storage facility
OSHA	Occupational Safety and Health Administration
PAG	potentially acid generating
PAH	polycyclic aromatic hydrocarbons
PEM	palustrine emergent wetland
PFO	palustrine forested wetland
PM	particulate matter
PM_{10}	Particulate matter with a diameter of less than 10 micrometers
$PM_{2.5}$	Particulate matter with a diameter of less than 2.5 micrometers
PPV	peak particle velocity
Proposed Project	Kings Mountain Lithium Mine Project/Preferred Site Alternative
PSS	palustrine scrub-shrub
PUB	palustrine unconsolidated bottom
RCRA	Resource Conservation and Recovery Act
ROM	run-of-mine
RSF	rock storage facility
RSF-A	rock storage facility for non-potentially acid generating rock
RSF-W	rock storage facility used to temporarily store potentially acid generating rock
RSF-X	rock storage facility for potentially acid generating rock

SHEM	safety, health, and environment manager
SHPO	North Carolina State Historic Preservation Office
SIP	State Implementation Plan
SOP	standard operating procedure
SO_2	sulfur dioxide
SRK	SRK Consulting U.S., Inc.
SWCA	SWCA Environmental Consultants
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material
Technology Center	Global Technology Center for Research and Development
TIA	traffic impact analysis
TNW	traditional navigable water
TSB	Tin-Spodumene Belt
TSF	tailings storage facility
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VIA	visual impact assessment
WOTUS	Waters of the United States
WSB	water storage basin
WTP	water treatment plant

1. INTRODUCTION

This draft Environmental Assessment (EA) was prepared by the United States (U.S.) Department of Energy (DOE) National Energy Technology Laboratory (NETL) pursuant to the National Environmental Policy Act of 1969 (NEPA) (U.S. Code, Title 42, Section 4321 et. Seq., [42 USC § 4321]) and DOE's NEPA implementing procedures (Code of Federal Regulations Chapter 10, Part 1021[10 CFR Part 1021]), to evaluate the potential environmental and social impacts of DOE's proposed action to provide funding to Albemarle U.S., Inc.'s (Albemarle's) proposed project as opposed to the No Action Alternative.

Albemarle, based in Charlotte, North Carolina, is a leading global producer of lithium-based chemicals. The company currently operates a lithium compound and metal production facility at the site of the legacy Kings Mountain Mine (KMM) in Cleveland County, North Carolina.

The DOE NETL is providing cost-shared funding to Albemarle US Inc to support the lithium material processing plant at the Kings Mountain Facility. This project aims to boost job creation and increase lithium production.

1.1. U.S. DEPARTMENT OF ENERGY'S PURPOSE AND NEED

The purpose and need for DOE action, pursuant to the Office of Manufacturing and Energy Supply Chains and in collaboration with the Office of Energy Efficiency and Renewable Energy program and the funding opportunity under the Bipartisan Infrastructure Law (BIL): Lithium Materials Processing and Lithium Manufacturing (DE-FOA-0002678), is to accelerate the development of a concentrator facility (also referred to as a "mineral processing plant"). Through a grant awarded to Albemarle, DOE proposes to partially fund the design, construction, and start of operations for a mineral processing plant that would produce approximately 420,000 metric tons of spodumene concentrate annually. DOE proposes to provide $149,658,312, and Albemarle's private cost share would be at least $244,407,734, for a total of $394,066,046. The grant funding is intended to support a portion of the anticipated cost to construct a new, commercial-scale, U.S.-based lithium materials/spodumene mineral processing plant that uses sustainably extracted spodumene minerals from the reopened and expanded mine at Kings Mountain in North Carolina. The proposed project would support DOE's Energy Strategic Goal of "protecting our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy."

BIL investments in the battery supply chain include five main steps: (i) raw material production; (ii) materials processing including material refinement;(iii) battery material/component manufacturing and cell fabrication; (iv) battery pack and end-use product manufacturing; and (v) battery end-of-life recycling.

DOE considers Albemarle's proposed project and location to be one that can meet the following BIL sections by: a) creating and retaining good-paying jobs; b) supporting inclusive and supportive workforce development efforts to strengthen America's competitive advantage; c) ensuring that the U.S. has a viable domestic battery materials processing industry to supply the

North American battery supply chain; d) expanding the U.S.'s capabilities in advanced battery manufacturing; e) enhancing national security by reducing the U.S.'s reliance on foreign competitors for critical materials and technologies; f) enhancing the domestic processing capacity of minerals necessary for battery materials and advanced batteries; and g) ensuring that the U.S. has the viable domestic manufacturing and recycling capability to support and sustain a North American battery supply chain. The proposed project site was selected due to its proximity to supporting industries and the availability of existing industrial facilities in the area, as well as the site's access to reliable green energy. The site has room for future expansion and exceptional access to transportation infrastructure and public utilities. The proposed project also has the potential to have a significant positive economic impact on the King's Mountain community.

DOE intends to further the above-described purpose and satisfy stated needs by providing financial assistance under cost-sharing arrangements to this and other projects selected under DE-FOA-0002678. These projects are needed to maximize the benefits of the clean energy transition as the nation works to curb the climate crisis. Such projects meet the objective of recruiting, training, and retaining a skilled workforce in communities that have lost jobs due to displacement of fossil fuel-based energy jobs, including jobs in internal combustion, engine vehicle and components manufacturing, as well as workforce opportunities in low and moderate-income local and rural communities. The proposed project would also meaningfully assist with the nation's economic recovery by creating U.S. manufacturing jobs in accordance with the objectives of the BIL.

1.2. DEPARTMENT OF AIRFORCE'S PURPOSE AND NEED

To promote national security and reduce dependence on foreign supplies, Presidential Determination No. 2022-11 authorizes the Department of Defense to secure a reliable, sustainable supply of critical minerals within the U.S. This directive is pursuant to Section 303(a)(5) of the Defense Production Act (DPA) of 1950, which states the Secretary of Defense shall lead this effort and has assigned oversight of the DPA Title III Executive Agent Program Office within the Air Force Research Laboratory. Therefore, the purpose of the proposed action is for the DOE and the Department of the Air Force (DAF), as a cooperating agency, to address the capability gap in procuring lithium within the U.S. The need for the action is to provide a reliable, affordable domestic lithium stream to meet the nation's demands, essential for both the U.S. economy and national defense.

The DAF supports DOE as the lead agency for NEPA requirements as well as Section 7 consultations of the Endangered Species Act and Section 106 consultations of the National Historic Preservation Act, including consultations with federally recognized Tribes and other similar regulatory consultations or other coordination requirements (See Appendix A, Department of the Air Force Cooperating Agency Letter). Once the NEPA process is completed, separate cost-shared grant funding from DAF of $225,967,885.38 would be awarded under DPA Title III to secure the domestic lithium source within the U.S. The cost share from Albemarle would be at least $136,015,693.74 with a DAF contribution of $89,952,191.64.

1.3. NATIONAL ENVIRONMENTAL POLICY ACT AND RELATED PROCEDURES

NEPA requires federal agencies to consider the potential consequences of their actions on both the natural and human environments as part of their planning and decision-making processes. This EA has been prepared in accordance with NEPA, as amended (42 USC § 4321), the President's Council on Environmental Quality's (CEQ) regulations for implementing NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR 1021). These statutes and the implementing regulations require that, as the lead federal agency, DOE perform the following:

- Assess the environmental impacts of the proposed action;
- Identify any adverse environmental effects that cannot be avoided, should the proposed action be implemented;
- Propose mitigation measures for adverse environmental effects, if appropriate;
- Evaluate alternatives to the proposed action, including a No Action Alternative; and
- Describe the cumulative impacts of the proposed action together with other past, present, and reasonably foreseeable future actions.

These provisions must be addressed before a final decision is made to proceed with a proposed federal action that has the potential to impact the human environment, including providing federal funding to a project. This EA is intended to meet DOE's and other federal agencies' regulatory and grant requirements under NEPA. Table 1: Laws, Regulations, and Executive Orders (EOs), provides a list of requirements applicable to the review of the proposed action. This EA also provides the DOE with the information needed to make an informed decision about providing financial assistance. In accordance with the regulations discussed above, this EA allows for public input into the federal decision-making process; provides federal decision-makers with an understanding of the potential environmental effects of their decisions; and documents the NEPA process.

Table 1: Laws, Regulations, and Executive Orders

National Environmental Policy Act and Laws, Regulations, and Executive Orders
Advancing Racial Equity and Support for Underserved Communities through the Federal Government (EO 13985)
Bald and Golden Eagle Protection Act
Clean Air Act
Clean Water Act
Comprehensive Environmental Response, Compensation, and Liability Act
Endangered Species Act
Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input (EO 13690)

National Environmental Policy Act and Laws, Regulations, and Executive Orders
America's Supply Chains (EO 14017)
Federal Actions to Address Environmental Justice in Minority Population and Low-income Populations (EO 12898)
Floodplain Management (EO 11988)
Migratory Bird Treaty Act
Pollution Prevention Act of 1990
Protection of Wetlands (EO 11990)
Resource Conservation and Recovery Act
Revitalizing our Nation's Commitment to Environmental Justice for All (EO 14097)
Tackling the Climate Crisis at Home and Abroad (EO 14008)
The Noise Control Act of 1972, as amended
National Historic Preservation Act
The Native American Graves Protection and Repatriation Act

EO = Executive Order

1.4. SCOPE OF ENVIRONMENTAL ASSESSMENT AND PERMITTING

This EA will be reviewed by the DOE and DAF and other cooperating agencies to determine whether the proposed project constitutes a Finding of No Significant Impact (FONSI). The EA is a stand-alone document provided as a grant requirement to the DOE and the DAF and will be sent to other federal agencies responsible for NEPA reviews.

As the lead agency, the DOE has created an Interim Action Memorandum to authorize specific tasks that can be carried out before completing the EA for the proposed project or issuing a FONSI. Elements of the Proposed Project, such as land acquisition, construction, procurement, design, permitting, and select training and hiring practices were examined by DOE and determined not to have a significant effect on the environment nor to limit the range of reasonable alternatives for the project. DOE has determined that completing the tasks as outlined in the Interim Action Memorandum will not have an adverse environmental impact; nor will they limit the choice of reasonable alternatives for the proposed project. These tasks were documented in the memorandum titled, "RE: Interim Action(s) within the scope of an ongoing EA prior to issuance of a FONSI for the Project."

The scope of the proposed action (providing federal financial assistance for construction of the facility) has been reviewed to identify potentially significant issues that would warrant detailed review in the EA. In its review, DOE considered the scope of the proposed action, the location of the facility within the city of Kings Mountain, the existing industrial setting, and the status of the permits and approvals necessary for construction of the facility. In accordance with NEPA, this EA addresses the proposed project's construction and planned operations.

The following list is a summary of proposed project activities under NEPA review:

1. Construction of an offsite tailings storage facility (TSF).

2. Construction of support infrastructure for the activities described by the proposed action including haul roads, offices, fueling facilities, vehicle wash areas, and other non-process infrastructure (NPI).
3. Construction of a bridge to connect the two KMM facility areas located north and south of Interstate 85 (I-85).
4. Construction of conveyors to transport ore, concentrate, tails, and other materials.
5. Construction of concentrate and tailings loadout areas.
6. Construction of three rock storage facilities (RSFs): one for non-potentially acid generating (non-PAG) rock (RSF-A), one for potentially acid generating (PAG) rock (RSF-X), and one which will be used to temporarily store PAG material at the bottom of the open pit while construction of RSF-X is underway (RSF-W).
7. Construction of a water treatment facility to treat runoff water from the PAG RSF area and process water from the mineral processing plant.
8. Construction of a run-of-mine (ROM) pad where ore would be stored prior to feeding the crushing circuit.
9. Resumed mining of the spodumene pegmatite resource, which would increase the size of the open pit.
10. Separation of rock from ore.
11. Construction of three overburden storage facilities (OSFs) for storage of saprolite and overburden soils removed to improve foundation conditions and stability of other facilities.

Based on DOE’s review of the scope of the proposed action, existing site conditions, and permit status, the elements of the DOE's review that have impacts analyzed by this EA include:

- Aesthetics and visual resources;
- Air quality;
- Biological resources including habitat vegetation and threatened and endangered species;
- Cultural resources;
- Geology and soils;
- Greenhouse gases (GHGs);
- Public health and safety;
- Land use;
- Parks, recreational areas, and fisheries;
- Coastal zone;
- Noise and blasting;
- Socioeconomics and environmental justice (EJ);

- Traffic and transportation;
- Waste management; and
- Water resources.

These resource areas were identified as being potentially affected by the proposed project, and each was assessed to determine the nature and extent of the impacts. This EA also examined the direct, indirect, and cumulative effects of the proposed project. The assessment combined desktop research and analysis of existing information along with select field studies including site assessments related to wetlands, flora, fauna, soils and geology, visual and aesthetic resources, and cultural resources.

Under the Endangered Species Act (ESA), DOE initiated consultations with the U.S. Fish and Wildlife Service (USFWS) and the North Carolina Wildlife Resources Commission, who will focus on wildlife and protected species, and the North Carolina Historical Commission at the State Historic Preservation Office (SHPO) under Section 106 of the National Historic Preservation Act (NHPA), who will assess historical, cultural, and archaeological resources. The U.S. Environmental Protection Agency (USEPA) will review drinking water resources, EJ, socioeconomics, and hazardous waste and pollution.

1.5. CONSULTATION WITH TRIBAL NATIONS

The DOE initiated consultations with the Catawba Indian Nation, Cherokee Nation, Eastern Band of Cherokee Nation, and Muscogee (Creek) Nation on March 13, 2024, and the United Keetoowah Band of Cherokee on September 4, 2024, through each Tribal Nation's Tribal Historic Preservation Office.

2. PROPOSED ACTION AND ALTERNATIVES

DOE makes preliminary determinations about the required level of NEPA review based on potentially significant impacts it identifies during evaluation of technically acceptable applications. DOE conducts these preliminary reviews pursuant to 10 CFR 1021.216 and prepares a synopsis for projects under the funding opportunity announcement. These preliminary NEPA determinations and environmental reviews are provided to the selection official, who considers them during the selection process. Because DOE's proposed actions are limited to providing financial assistance in cost-sharing arrangements to projects submitted by applicants in response to a competitive funding opportunity, DOE's decisions are limited to either accepting or rejecting a project as proposed, including its proposed technology and selected sites. DOE's consideration of reasonable alternatives is therefore limited to the technically acceptable applications and a No Action Alternative for each selected project.

This EA considers two alternatives: the No Action Alternative and the Proposed Action Alternative. The No Action Alternative reflects conditions without the Proposed Action Alternative and serves as a basis of comparison for determining potential effects and the environmental consequences of implementing the Proposed Action Alternative.

2.1. ALBEMARLE'S PROPOSED ACTION

Albemarle is seeking approval and funding to resume operations at KMM including site preparation, construction, operations, and closure of facilities required to process mined ore into spodumene concentrate. Tailings produced during operations will be sorted and dry stacked at the Archdale TSF.

The proposed project consists of five major phases and a milestone including:

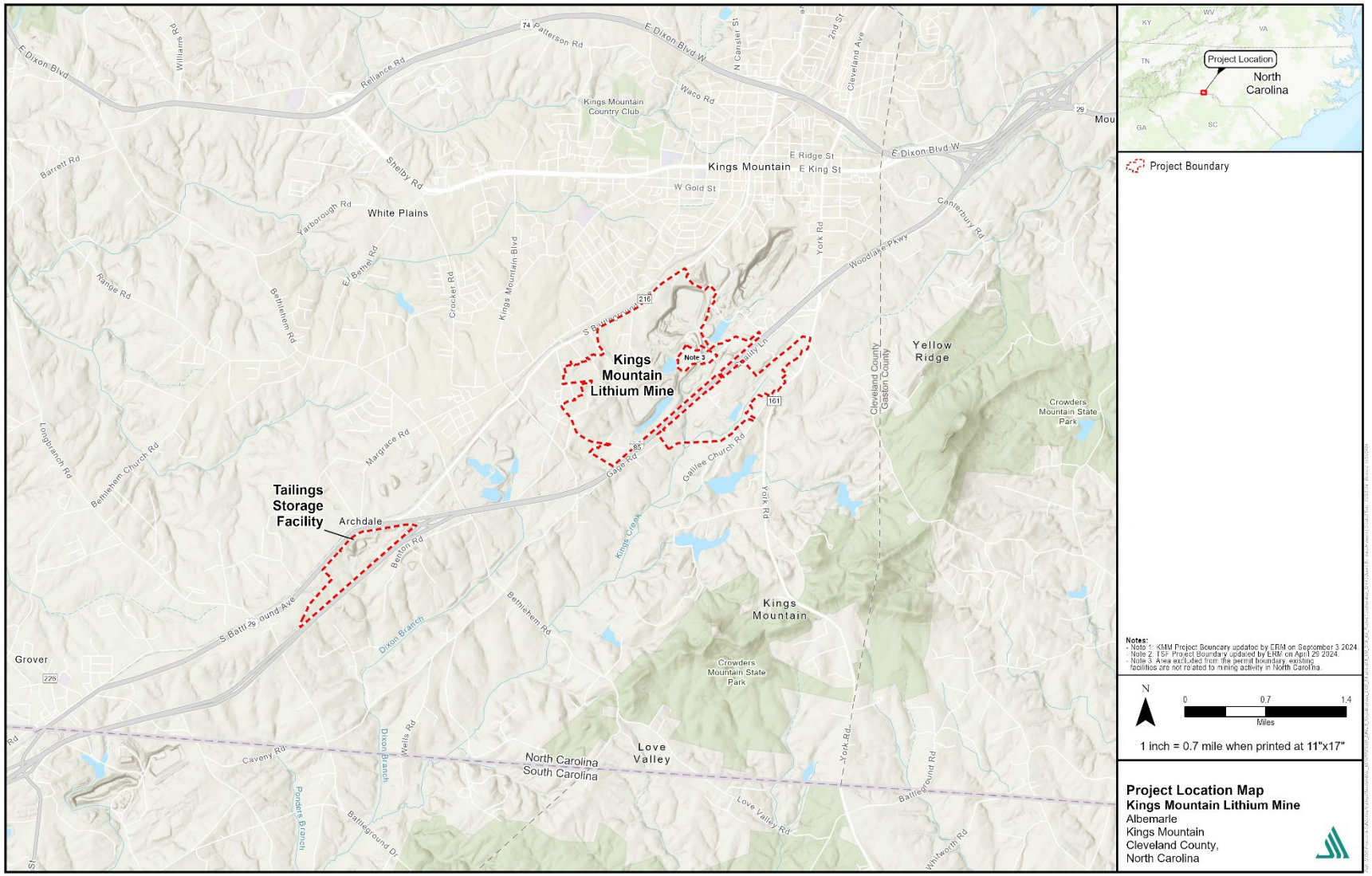
- Site preparation and access;
- Construction;
- Operations;
- Closure/cessation of mining operations; and
- Post-closure and final reclamation.

Site preparation activities will occur prior to infrastructure construction, which has been permitted by a separate state authorization. Mine closure and final reclamation will be performed after all mining and processing activities have ceased.

2.2. APPLICANT INTRODUCTION

Albemarle, headquartered in Charlotte, North Carolina, is a leading global producer of lithium-based chemicals. Albemarle currently operates a lithium compound and metal production facility (Kings Mountain Facility) at the site of the legacy KMM (also the "legacy mine") located in the city of Kings Mountain in Cleveland County, North Carolina (Figure 1: Project Location Map). To meet current and expected demand for lithium products, Albemarle intends to reopen the legacy mine to produce spodumene concentrate from the resource at the site. The spodumene will be extracted by deepening and expanding the legacy mine footprint from an existing, inactive open pit. Non-ore bearing rock, ore sorting rejects, and dense media separation (DMS) of coarse tails generated during mining operations will be managed onsite, while tailings will be transported to an offsite TSF approximately 3 miles southwest of the KMM called the Archdale TSF. Together, the KMM site and Archdale TSF constitute the Kings Mountain Lithium Mine Project (hereafter the "Proposed Project").

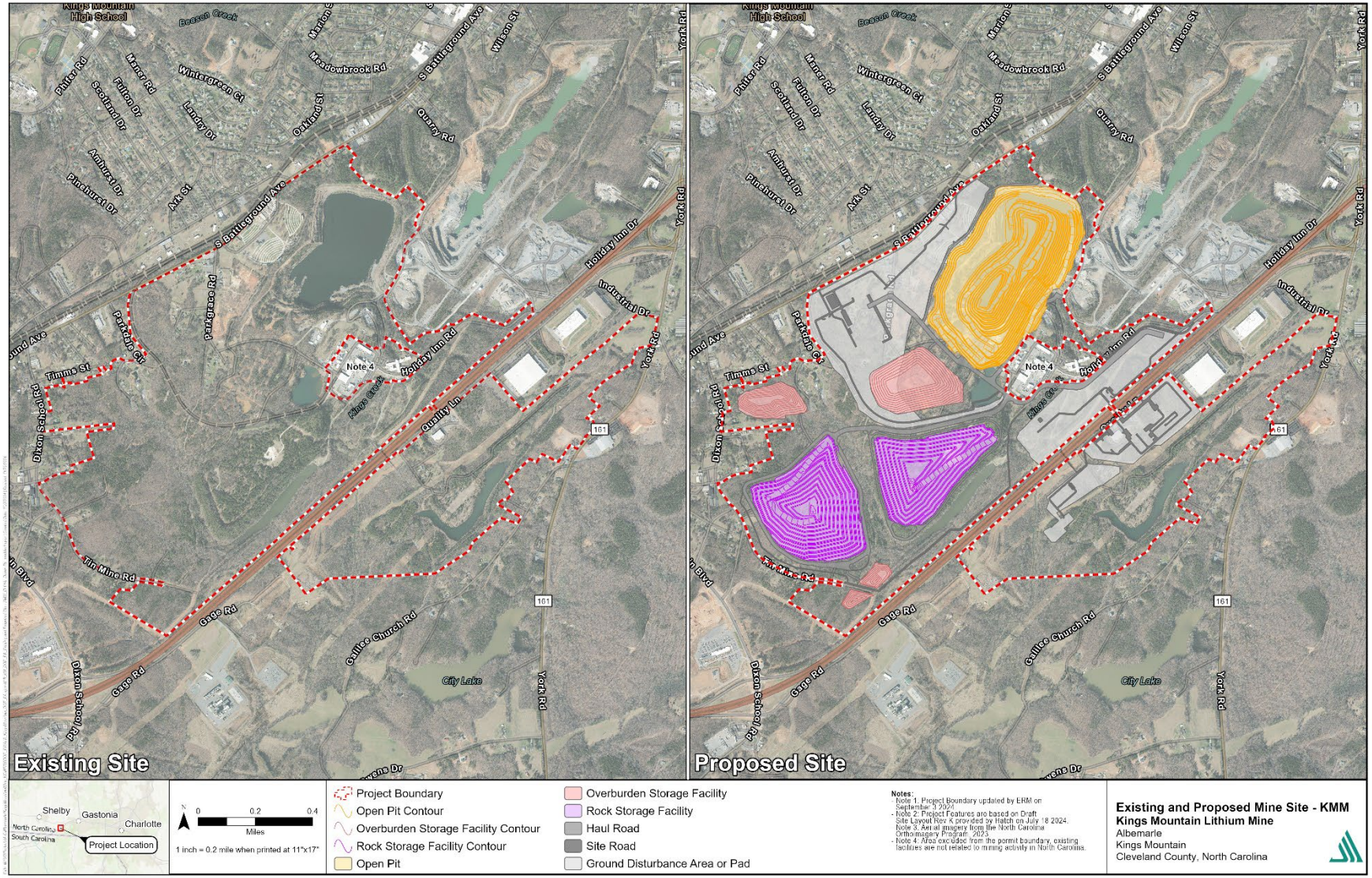
Figure 1: Project Location Map



The proposed KMM will be located in the city of Kings Mountain, Cleveland County, North Carolina, approximately 30 miles west of Charlotte within the U.S. Geological Survey (USGS) Kings Mountain, 7.5-minute quadrangle (Figure 1: Project Location Map).

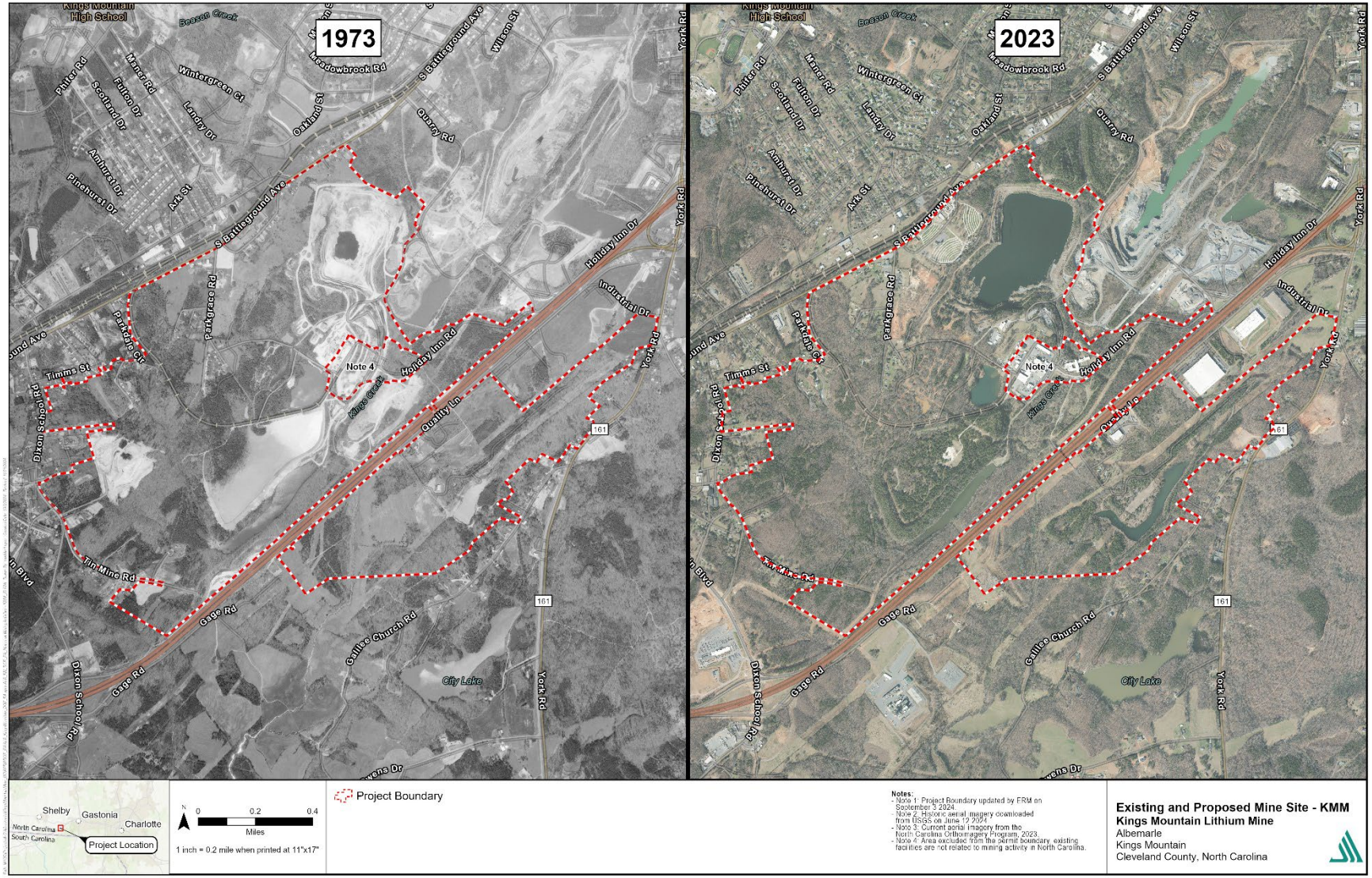
The KMM site is comprised of approximately 1,083.43 acres of disturbed, undisturbed, and developed land that is bisected by I-85, with a larger land area located on the northern side of the interstate, and a smaller land area south of the interstate. The larger area to the north is bordered by South Battleground Avenue (Highway 216), Tin Mine Road to the west, Quarry Road to the east, and I-85 to the south. The smaller southern area is bordered by I-85 to the north and York Road to the south. The northern area of the site currently includes a lithium metal and salts production facility as well as Albemarle's Global Technology Center for Research and Development (Technology Center). The existing lithium metal and salts production facility receives raw materials from other sites and is not capable of processing the spodumene concentrate product from the Proposed Project and the KMM site is impacted by previous mining activity (Figure 2: Existing and Proposed Mine Site – KMM).

Figure 2: Existing and Proposed Mine Site – KMM



The proposed Archdale TSF will be located in the city of Kings Mountain in Cleveland County, approximately 3 miles southwest of the KMM site (Figure 1: Project Location Map). The 143.8-acre Archdale TSF will be used to store filtered and compacted tailings from the spodumene concentrate process generated at the Kings Mountain Mineral Processing Plant. The tailings will be transferred from the KMM to the TSF via trucks using South Battleground Road (Highway 216) and U.S. Highway 29. This site is also impacted by previous mining activity (Figure 3: Historical Mining Activities – KMM, Figure 4: Historical Mining Activities – TSF).

Figure 3: Historical Mining Activities – KMM



Albemarle is seeking approval to resume mining operations and expand the mine footprint of the Kings Mountain Facility through the issuance of a major modification to the existing mine permit. Maintenance of the Proposed Project commenced with dewatering the existing open pit, which has filled with water over time to an elevation of 822 feet above mean sea level (amsl). Pit dewatering and associated discharge conditions were permitted under National Pollutant Discharge Elimination System (NPDES) Permit No. NC0090212. Open-pit mining will be used to deepen the existing pit and expand its footprint to the southwest. Saprolite will be removed first and transferred to one of three OSFs. The ore will be transferred to the concentrator which will process an average of 3.25 million short tons per annum (8,900 short tons per day) of ore to produce 420,000 to 440,000 short tons per annum of spodumene concentrate. The spodumene concentrate will be transported by rail to an offsite conversion plant for further refinement into lithium hydroxide monohydrate. Tailings from the spodumene concentrate process will be filtered to approximately 15 percent moisture content by weight and transported to the offsite Archdale TSF. A portion of the non-ore bearing rock with economic value as aggregate will be transported to the adjacent Martin Marietta quarry.

The Archdale TSF will be used to store filtered and compacted tailings generated from the spodumene concentrate process at the Kings Mountain Mineral Processing Plant. The tailings will be transferred to the offsite TSF via trucks using South Battleground Avenue (Highway 216) and U.S. Highway 29. Other activities associated with the Proposed Project include construction of new processing facilities, crushing circuit facilities, RSFs, NPI, haul roads, a water treatment plant (WTP), an ROM pad, a water storage basin (WSB) and sumps, fueling facilities, and stormwater management infrastructure. The individual components are described in more detail in the following sections of this document.

2.3. BACKGROUND

2.3.1. Kings Mountain

Mining at Kings Mountain started in 1883 with the discovery of cassiterite, a tin-bearing mineral, within the outcropping pegmatites. Subsequently, open-pit mining for tin occurred sporadically between 1903 and 1937. Between 1943 and 1945, under sponsorship by the U.S. government, a company named Solvay established a mineral processing plant and mined for spodumene from the outcroppings of pegmatites at Kings Mountain. In the early 1950s, Foote, a subsidiary of Newmont Mining Corporation, purchased the property and began open-pit mining to produce spodumene concentrate. In 1993, exploration and mining operations ceased. In early 1994, an open-pit lake started to form due to rebounding groundwater and precipitation. The resulting pit lake reached an elevation of 817 feet amsl. During the groundwater recovery period water was sporadically pumped from the Kings Mountain Pit Lake to an adjacent aggregate quarry to support quarry operations. In 2015, Albemarle acquired the site and resumed exploration and mine feasibility studies. Figure 3: Historical Mining Activities – KMM shows the approximate extent of historical mining activities and current aerial imagery from 1973 to 2023.

2.3.2. Archdale Tailings Storage Facility

The offsite Archdale TSF will be used for tailings storage. The Archdale TSF site has also previously been used for mining activities (Figure 4: Existing and Proposed Mine Site – TSF). Dating back to the 1970s, mica, feldspar, clay, and quartz were mined at this site by other mining companies. Prior to these mining operations, the TSF property was composed of undeveloped pastures and woodlands (Figure 5: Historical Mining Activities – TSF). Currently, the proposed Archdale TSF is comprised of approximately 143.8 acres, most of which is disturbed land as a result of mica mining operations performed by Imerys in the 1990s. Reclamation activities occurred sometime after 2014 and included slope regrading, disturbed ground revegetation, and allowing several of the open pits to flood with fresh water through natural hydrologic processes. The water was pumped and discharged. No legacy ore processing equipment or structures exist at the Archdale TSF site and approximately 15 acres of undisturbed area that has not been previously impacted remains. Remaining legacy mining features include:

- Access roads;
- Open pits, several of which currently contain water;
- Seven historical monitoring wells; and
- A water management system including a pit lake pump, pipes, pond, and culverts which facilitate a water discharge to an unnamed tributary to Dixon Branch.

Figure 4: Existing and Proposed Mine Site – TSF

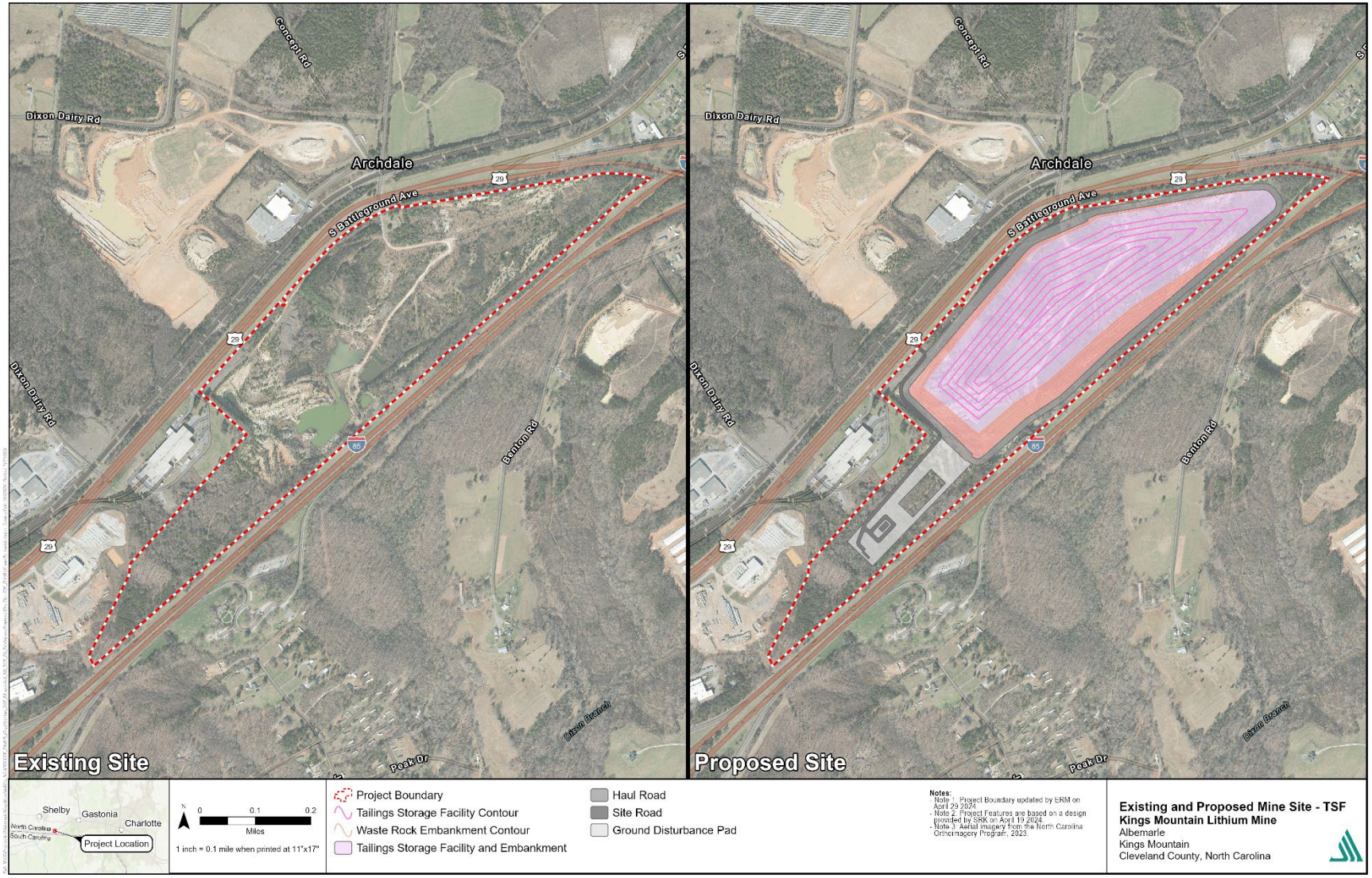
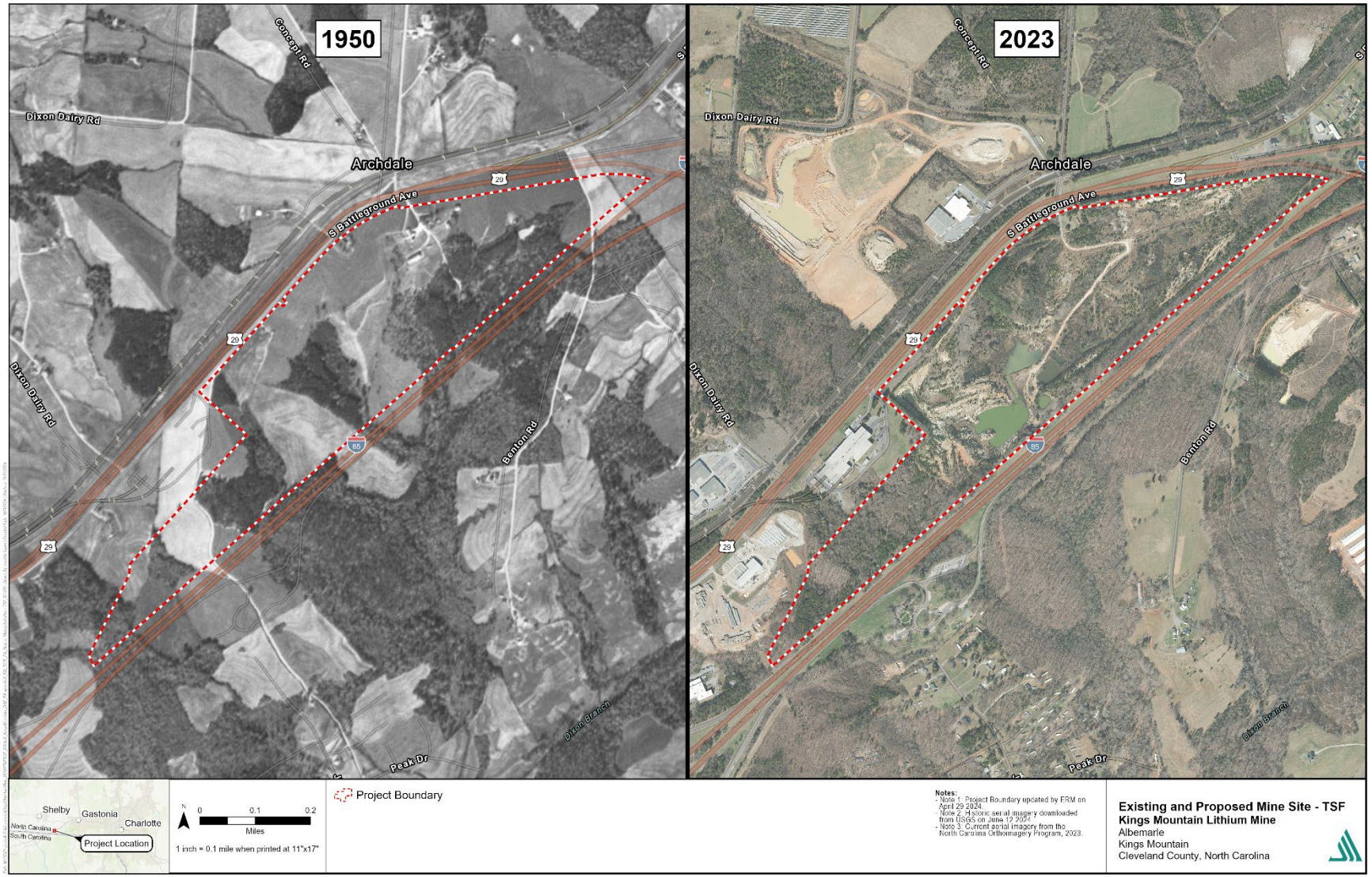


Figure 5: Historical Mining Activities – TSF



2.3.3. Existing Legacy Features

In the 1990s, the legacy KMM was reclaimed to meet closure requirements. Reclamation activities included slope grading, revegetation of disturbed ground, and allowing the open pit to flood with freshwater through natural hydrologic processes. Much of the legacy ore processing equipment and the spodumene minerals processing plant were removed, though remnants of the mining operations still exist, including:

- An open pit, containing water from rainfall, runoff, and groundwater seepage;
- A tin mine excavation pit (known as PEG-25);
- The spur rail line;
- Two tailings disposal sites;
- Several RSFs;
- A mill pond;
- An existing drainage network consisting of Kings Creek, South Creek, a legacy tailings pond Water Storage Basin 1 (WSB-1) also called Executive Club Lake, and South Creek Reservoir;
- Several repurposed mine operation support buildings; and
- Storage of radioactive mining refuse (structural steel and vessels from the legacy processing mill) within the footprint of the KMM. The refuse was encased in a clay liner and has been buried in the legacy tailings area since 2001, in accordance with a plan approved by the North Carolina Department of Environmental Quality (NCDEQ). Note: this will be removed before construction commences.

2.3.4. Proposed Project Features

Key features that will either remain in place with modifications from the legacy mine, or that will be newly added for the Proposed Project are described on Figure 6: Kings Mountain Mine Site Layout and are described below.

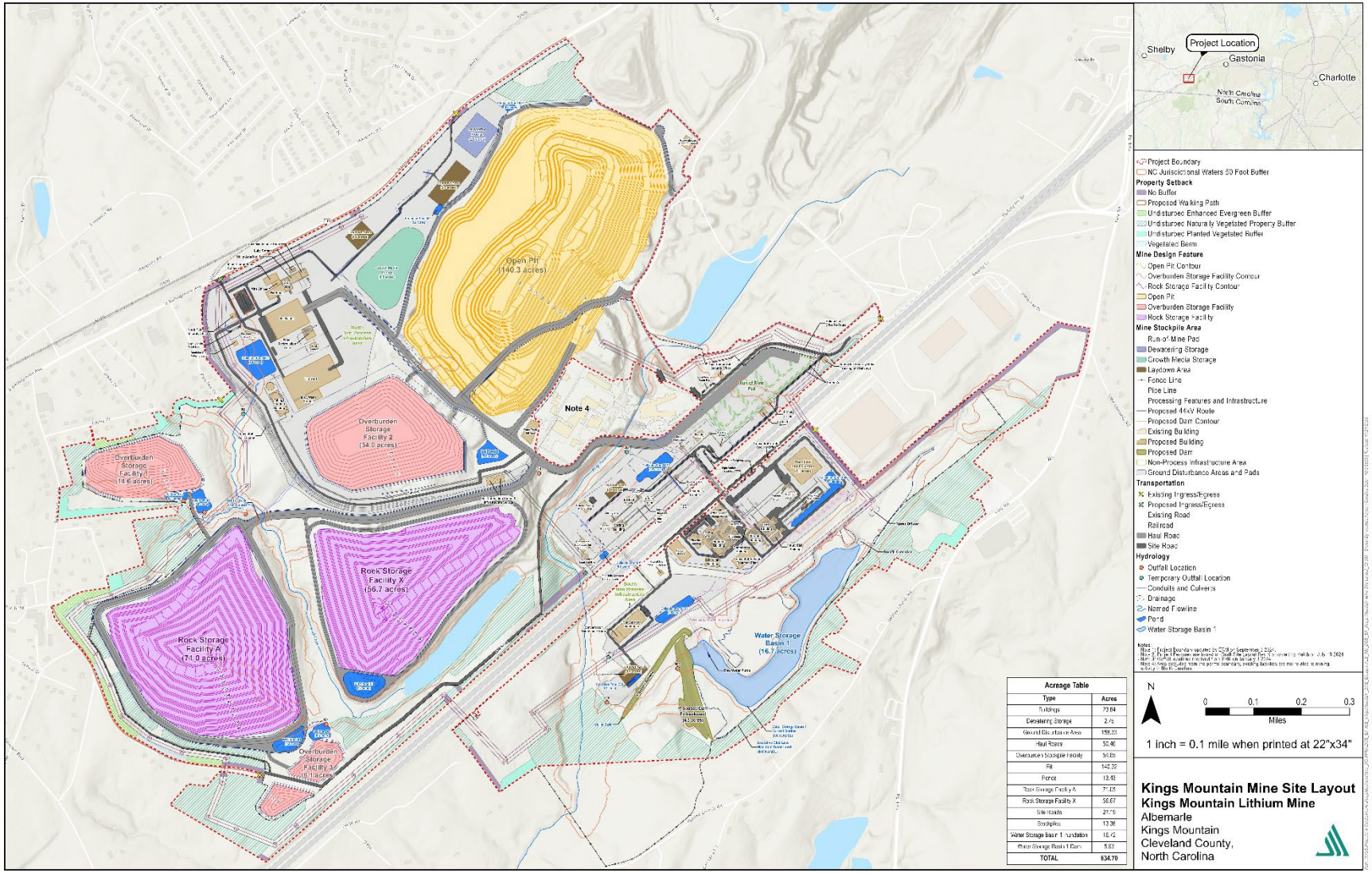
- Conveyors—a conveyor system that will be used to transport material (including over I-85).
- Crushing and screening circuit—a three-stage crushing circuit where the ore will be reduced in size to facilitate separation of the spodumene from non-lithium-bearing materials.
- Growth media storage—an area where growth media will be stockpiled for future use as soil coverage for reclamation.
- Haul roads/service roads—internal roads that will either be modified or newly constructed to transport material across the KMM site. Haul roads may be relocated during mining operations, as the pit expands. Haul roads will primarily be used by onsite haul trucks.

Service roads on the site will have several uses. The transport of tailings to the TSF will be over public roads.

- Kings Creek—a natural creek that has been altered from legacy mine operations at the KMM site and from ongoing operations at the adjacent Martin Marietta quarry. The creek enters the KMM site from the adjacent Martin Marietta facility. It will receive discharge from the Proposed Project's stormwater and wastewater outfalls, South Creek Reservoir, and WSB-1 before ultimately discharging offsite.
- Mineral processing facility—a facility designed to physically separate spodumene from pegmatite ore (i.e., concentrator).
- Mobile equipment—equipment that will be used to perform operations.
- NPI—support infrastructure including, but not limited to, non-haul roads, offices, fueling facilities, hazardous material storage, and vehicle maintenance and wash areas. Two NPI areas will be located at the KMM site (north and south of I-85), to support mining and processing operations.
- Open pit—the existing open pit that was excavated during previous mining operations. The pit will be deepened, and its footprint expanded during operations.
- OSF—an area used to store saprolite and alluvium resulting from excavations at Archdale and sub-excavation under the RSFs during site preparation activities.
- Plant feed stockpile—an area used to stockpile ore produced from the crushing circuit, and to feed the mineral processing facility.
- Ponds—temporary ponds for retention of runoff and sedimentation control specific to the water source (contact water, non-contact stormwater, PAG runoff, and non-PAG runoff).
- ROM pad—an area used to stockpile ore mined from the open pit before processing.
- RSF—an area used to store non-ore-bearing rock excavated from the open pit.
  - RSF-A—an area used to store non-PAG rock, legacy tailings, and coarse embankment material to be removed from the legacy TSF at the KMM site.
  - RSF-W—an area used to temporarily store PAG material, and a small quantity of ore sorter rejects during RSF-X construction. Material in RSF-W will be relocated to RSF-X when construction is complete.
  - RSF-X—an area used to store PAG rock, sorted ore rejects, and DMS rejects.
- South Creek—a natural creek that was historically impounded to support legacy mine operations. It enters the KMM site from an adjacent property and flows generally south through the KMM site before discharging into South Creek Reservoir. The South Creek Reservoir dam contains culverts and pipelines that convey under the dam.
- TSF—the TSF will be used to store filtered and compacted tailings generated at the mineral processing facility.

- WSB-1—the legacy TSF pond that will be modified to serve as water storage for discharges from the WTP and all contact water (treated and untreated). It will also act as a sedimentation pond and supply makeup water (water that is lost during operations) to the mineral processing facility and other mining operations.
- WTP—a WTP that will be used to treat PAG contact water runoff from RSF-X, and excess water used at the mineral processing facility.

Figure 6: Kings Mountain Mine Site Layout



Site preparation activities will occur prior to construction of the infrastructure, which will be required for tailings storage and mining operations. Reclamation will run concurrently with site disturbing activities and be completed in the post-closure phase (Table 2: Project Phase Time Periods and General Activities).

Table 2: Project Phase Time Periods and General Activities

Project Phase (approximate duration/timing)	Key Activities
Construction (2.5 years duration)	Infrastructure construction: ROM pad, crushing circuit, I-85 mineral processing facility bridge or conveyor, Kings Creek haul road culvert, RSF-A, RSF-X (initial phase), WSB-1, NPI, concentrate loadout, growth media storage, WTP.
Operations (Year 0)	Infrastructure in place (RSF-X still in initial phase configuration). Haul roads constructed including the in-pit haul road. Pit mining and mineral processing facility commences.
Operations (10 years duration)	Pit shell expanded to include consumption of the in-pit haul road. Rock continues to be stockpiled, concentrate produced, tailings generated and stored. Construction of new haul road along the pit rim to transport material.
Closure (Years 10-11)	Mining complete.
Post-closure/Final Reclamation	Removal or reclamation of surface mine facilities, relocation of PAG rock from RSF-X to the pit as backfill. Pit reflooding.

NPI = non-process infrastructure; PAG = potentially acid generating; ROM = run-of-mine; RSF = rock storage facility; WSB = water storage basin; WTP = water treatment plant

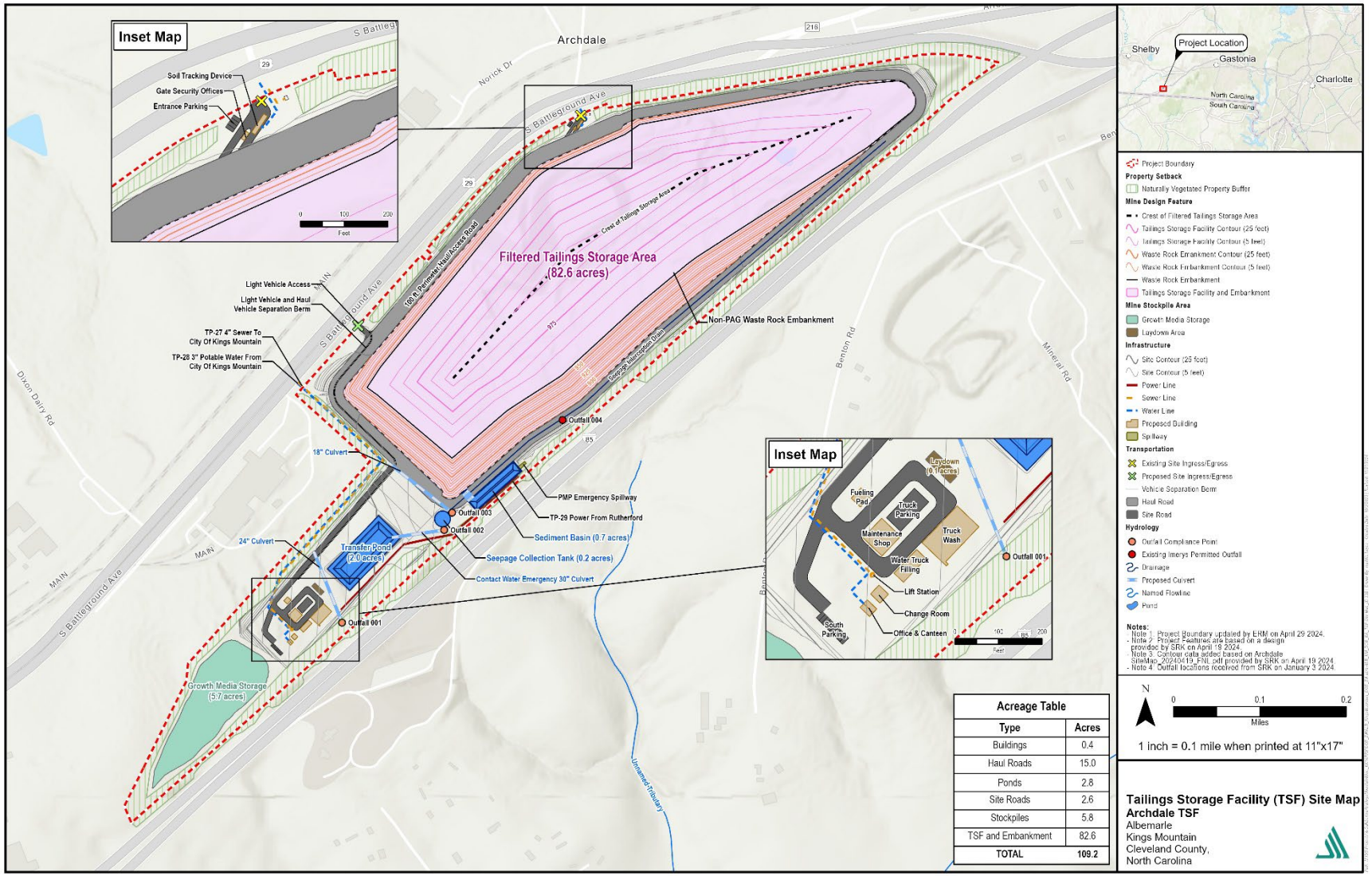
The proposed KMM site layout illustrates the locations of the main Proposed Project facilities and associated infrastructure (Figure 6: Kings Mountain Mine Site Layout). The crushing circuit, RSFs, growth media storage, north NPI, and ROM pad will be constructed north of I-85 to support operations on the south side of I-85. Internal haul roads will connect the open pit to the ROM pad, Martin Marietta, and RSFs during operations for processing and storing mined materials. The tailings truck loadout area will be located at the north NPI area, and the concentrate loadout area will be located west of the open pit. A new bridge and conveyor will be constructed over I-85 to connect the ROM pad/crushing circuit to the concentrator and south NPI area located immediately south of I-85.

WSB-1 will be located south of the concentrator and will collect all contact water, portions of the non-contact water not directly discharged to Kings Creek and South Creek, and treated, recovered water from the WTP before it is discharged from the site. WSB-1 will provide surface water control, act as a sedimentation pond, and supply water to the concentrator and mine operations.

The proposed Archdale TSF site layout (Figure 7: TSF Site Map) shows the locations of the primary components of the Proposed Project (SRK 2024c; Hatch 2023c). Filtered tailings from the KMM will be transported to the Archdale TSF and placed and compacted in a legacy open pit at the site in a dry stack configuration. The Archdale TSF will include a starter embankment

and a perimeter berm that will have an initial embankment crest elevation of 885 feet amsl (SRK 2024c). The embankment will be constructed using non-PAG waste rock sourced from KMM. Over the life of the Proposed Project, the Archdale TSF embankment will be raised in six phases, and the filtered tailings will continue to be stored to a maximum embankment crest elevation of 960 feet amsl. Contact water from the interior of the Archdale TSF will be collected in an underdrain system and seepage collection drain and directed to a contact water management pond. Water in this pond will be monitored for water quality prior to being discharged into an unnamed tributary that flows under I-85 to the south where it joins Dixon Branch south of the Archdale TSF site. Stormwater will be collected in a series of perimeter stormwater management channels and one sediment retention basin. It will ultimately be discharged into several culverts and moved offsite to the south through existing culverts under I-85.

Figure 7: TSF Site Map



Acreage Table	
Type	Acres
Buildings	0.4
Haul Roads	15.0
Ponds	2.8
Site Roads	2.6
Stockpiles	5.8
TSF and Embankment	82.6
TOTAL	109.2

2.3.5. Environmental Protection Measures

Albemarle has incorporated various environmental protection measures (EPMs) into its Proposed Project design to avoid, minimize, or mitigate potential environmental impacts from the Proposed Project. Among others, Albemarle incorporated the following key EPMs into the Proposed Project design:

- Use of legacy and active mine sites—the Proposed Project is designed to use current and former mine sites (i.e., brownfields) as a part of the Proposed Project mine plan, thereby reducing the amount of land disturbance.
- Dry stack tailings—the Proposed Project will implement dry stack tailings via a filtration process prior to storage at the Archdale TSF. The use of dry stack tailings will reduce tailings seepage, water requirements, and improve TSF safety and stability.
- Visual buffers—the Proposed Project will be surrounded by a visual buffer, either by existing vegetation or earthen berms and newly planted vegetation.
- Liner and water treatment for PAG rock storage—RSF-X will be used for the storage of PAG rock and will be lined. Associated runoff water will be treated with a reverse osmosis treatment prior to discharge.

2.4. ALTERNATIVES

An evaluation of alternatives is required under NEPA for all jurisdictional activities. NEPA requires discussion of a reasonable range of alternatives, including a No Action Alternative, and the effects of those alternatives. The practicability of the alternatives is considered under the guidelines, and no alternative may be permitted if there is a less environmentally damaging practicable alternative.

2.4.1. Alternative Site Screening Summary

To be practicable, an alternative must be available, achieve the overall project purpose, and be feasible when considering cost, logistics, and existing technology. The screening criteria for evaluating alternatives is described in Table 3: Offsite Alternative Site Screening Definitions.

Table 3: Offsite Alternative Site Screening Definitions

Screening Criteria	Description
Criteria A: Location	The alternative would only be considered practicable and achieve the overall Proposed Project's purpose if it is located within the Carolina TSB and if there was a history of previous exploration with positive identification of mineralized spodumene within the alternative identified. The TSB contains over half of the U.S. lithium supply. Spodumene-based lithium mines in the TSB were the world's leading producer of lithium from the 1950s to the 1980s. Historical knowledge of mineralized spodumene locations within the TSB narrows potential mine sites and saves capital exploration costs. Therefore, the Proposed Project should be located on previously explored properties within the TSB.
Criteria B: Mining Technology	The alternative would only be considered practicable and achieve the overall Proposed Project's purpose if it relied on open-pit, hardrock mining techniques. The TSB is a hardrock resource that can only be extracted using hardrock mining techniques. The presence of an existing open pit reduces waste handling and management costs supporting the Proposed Project's financial feasibility. Furthermore, the depth of the resource dictates the mining method. To achieve the Proposed Project's purpose of extracting spodumene-containing lithium, the alternative would only be considered practicable if it relied upon open-pit, hardrock mining techniques.
Criteria C: Historical Active Mine Sites	Historical/active mine sites are those areas with historical operations or existing mining operations. These areas typically have existing infrastructure such as roads, power, and in some cases, processing facilities. In addition, a sense of community (stakeholder) acceptance of the operation already exists. Greenfield sites refer to those areas that involve searching for mineral deposits in unexplored regions where no significant mining activities have taken place. There is typically no infrastructure in place and no previous community (stakeholder) engagement. Moreover, greenfield sites would necessarily have a greater adverse impact on natural resources than areas that have previously been disturbed by historical or existing mining operations. To achieve the Proposed Project's purpose, the alternative site would only be considered if there was historical or ongoing mining activity.
Criteria D: Minimum Mine Size	Few large parcels (≥120 acres) remain in the TSB. The alternative would only be considered practicable and achieve the Proposed Project's purpose if an initial core parcel of at least 120 acres was identified to warrant the assembly of other adjacent properties into a larger project area of approximately 800 to 1000 acres. This total mine area would be of sufficient size to extract the minimum amount of mineralized spodumene to produce sufficient lithium hydroxide needed to balance capital investment costs and to operate a mine designed to MSHA standards, while also observing state and local requirements, such as buffers.
Criteria E: Property Availability	The alternative would only be considered practicable and achieve the Proposed Project's purpose if the current landowner(s) would be willing to sell or lease the core parcel alternatives identified.
Criteria F: Environmental Impacts Minimization	The alternative would only be considered practicable and achieve the overall Proposed Project's purpose if minimal environmental impacts would occur. A desktop analysis of environmental impacts will be assessed for each alternative using publicly available NWI and NHD data. Additionally, those NWI and NHD features depicted within 100-year FEMA floodplains will be assumed to be avoided due to the additional permitting associated with impacting floodplains, allowing equal comparison across offsite alternatives of NWI and NHD features outside FEMA floodplains.

FEMA = Federal Emergency Management Agency; MSHA = Mine Safety and Health Administration; NHD = National Hydrography Dataset; NWI = National Wetland Inventory; TSB = Tin-Spodumene Belt; U.S. = United States

2.4.2. No Action Alternative

Under the No Action Alternative, Albemarle would not construct a hardrock lithium mine in the Tin-Spodumene Belt (TSB), and battery-grade lithium hydroxide made from lithium-bearing spodumene concentrates produced from hardrock mining would not be brought to the U.S. market from a domestic source. Many lithium chemicals would still be imported from outside the U.S. to meet the domestic demand, continuing the U.S.'s reliance on lithium from other countries to safeguard its national security. It can also be assumed that there would be environmental impacts associated with mines located outside the U.S., especially in areas where environmental regulations may be less stringent, although the magnitude of impacts would be unknown. Due to this factor, the No Action Alternative is not considered a practicable alternative.

2.4.3. Action Alternative

Five Action Alternative sites were evaluated: the Hallman-Beam Mine, the Kings Mountain Quarry, the Imerys Mine, the Archdale Mine, and the Kings Mountain Lithium Mine Project (Preferred Site Alternative) (Proposed Project). Each site was screened to determine its practicability in implementing the Proposed Project's purpose.

2.4.4. Offsite Alternatives

Offsite alternatives for the Proposed Project outside of the Carolina TSB were eliminated as these alternatives would be unreasonable based on the Proposed Project's purpose and need and current known reserves within the TSB. The offsite location was evaluated for tailings storage, rock storage, spodumene resource availability, and the processing plant site. A comparison of the screening criteria for the No Action Alternative and the five offsite alternatives is summarized in Table 4: Offsite Alternatives Screening Summary. Based on the screening, the Preferred Alternative (Site 5) is the only viable option for the Proposed Project.

Table 4: Offsite Alternatives Screening Summary

Screening Criteria	A Location	B Mining Technology	C Historic/Active Mine Sites	D Minimum Mine Size	E Property Availability	F Environmental Impacts Minimization
Alternative						
No Action	No	No	No	No	No	No
Site 1. Hallman-Beam Mine	Yes	Yes	Yes	Yes	No	Yes*
Site 2. Kings Mountain Quarry	No	Yes	Yes	Yes	No	Yes*
Site 3. Imerys Mine	No	Yes	Yes	Yes	No	Yes*
Site 4. Archdale Mine	No	Yes	Yes	Yes	No	Yes*
Site 5. Kings Mountain Lithium Mine (preferred)	Yes	Yes	Yes	Yes	Yes	Yes*

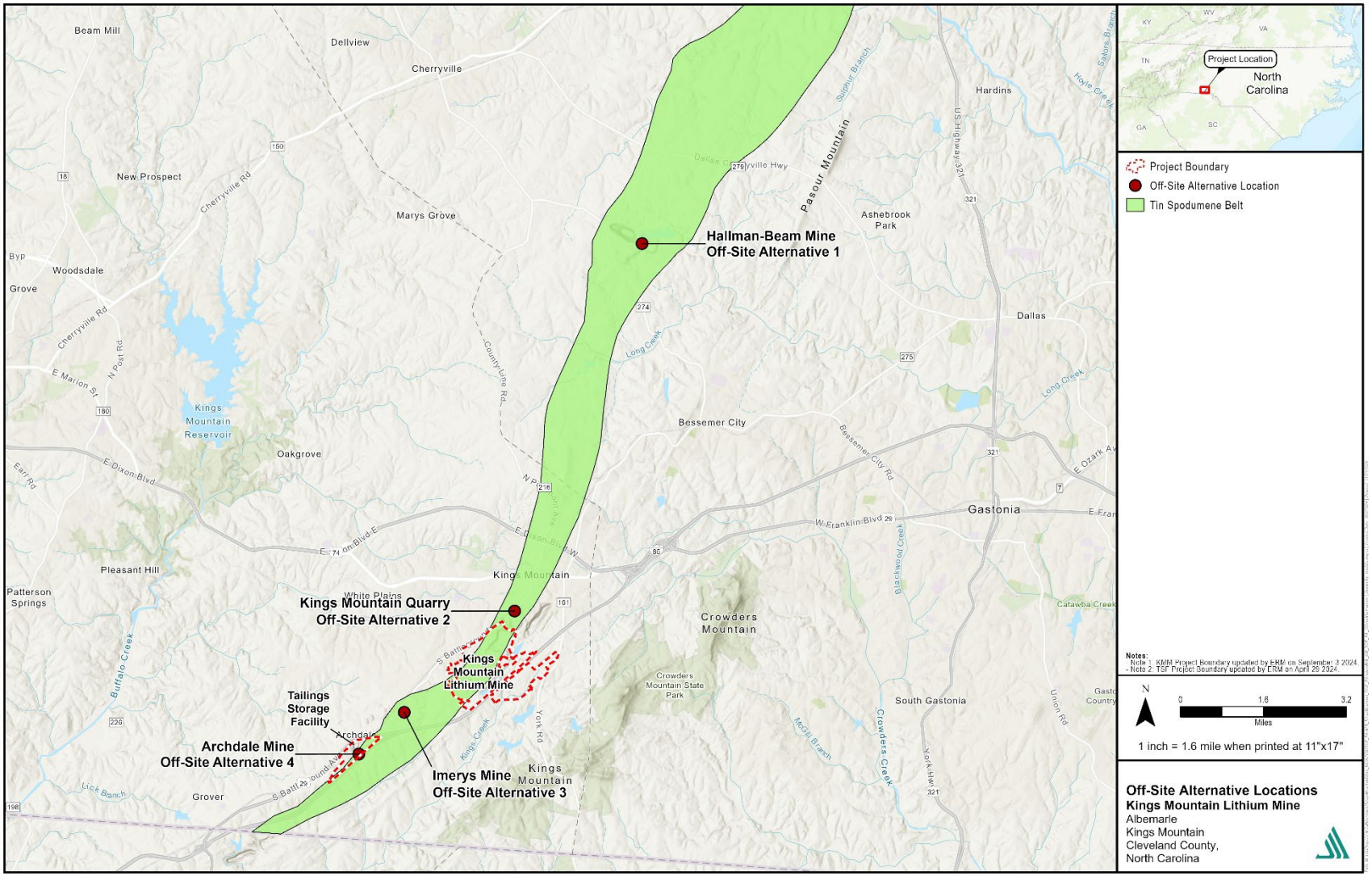
*Dependent on minimization of impacts and appropriate mitigation

The Preferred Alternative is to restart mining activities at the KMM and store tailings at the Archdale TSF. The site layout (Figure 6: Kings Mountain Mine Site Layout) was designed based on data collected during the drilling program.

Offsite Alternative 1: Hallman-Beam Mine

Between the 1950s and 1990s, the former Hallman-Beam Lithium Mine was one of the largest lithium producers where mineralized spodumene was mined from a hardrock open-pit mine. The lithium mine closed in 1998 and was purchased by Martin Marietta and continues to operate as a hardrock mine for construction aggregates (North Carolina Division of Energy, Mineral, and Land Resources [DEMLR] Mine Permit No.36-01). The parent parcel is approximately 627 acres and under one ownership. Additional parcels adjacent to this operation would need to be acquired for the site to be of sufficient size (approximately 383 acres) to extract the minimum amount of mineralized spodumene to produce sufficient lithium hydroxide to balance capital investment costs and operate a mine designed to Mine Safety and Health Administration (MSHA) standards (Figure 8: Offsite Alternative Locations). Desktop review of National Wetland Inventory (NWI) and National Hydrography Dataset (NHD) data indicates that aquatic resources occur on the parent parcel.

Figure 8: Offsite Alternative Locations



The parent parcels are not for sale, as Martin Marietta intends to continue processing construction aggregates. Impacts to aquatic resources would be variable depending on parcel availability and mine plan, but it is assumed they would be minimized to create the least possible impact. Table 5: Offsite Alternative 1 Summary details the analysis of this alternative against the screening criteria.

Table 5: Offsite Alternative 1 Summary

Screening Criteria	Criteria Satisfied	Explanation
Location (A)	Yes	The alternative satisfies the screening criteria as it is located within the TSB and is known to contain spodumene.
Mining technology (B)	Yes	This alternative satisfies the screening criteria as it was a former open-pit lithium mine and is currently an active open-pit aggregates mine. However, the infrastructure would need to be retrofitted for spodumene processing.
Historical active mine sites (C)	Yes	This alternative satisfies the screening criteria as the site contains previous hardrock mining operations.
Minimum mine size (D)	Yes	This alternative satisfies the screening criteria as the parent parcels are approximately 627 acres, and the identified Proposed Project area parcels are 383 acres for a total mine size of approximately 1100 acres.
Property availability (E)	No	This alternative does not satisfy the screening criteria as the parent parcels are not available for purchase or lease.
Environmental impacts minimization (F)	Yes	Based on review of the NHD and NWI databases, both wetland and stream resources can be found within the parent and adjacent parcels. This alternative may satisfy the screening criteria assuming minimization of impacts and appropriate mitigation were provided. The quantity of impacts would be dependent upon the resource (spodumene) location, mine pit design, waste rock and tailings requirements, and infrastructure support.

NHD = National Hydrography Dataset; NWI = National Wetland Inventory; TSB = Tin-Spodumene Belt

Offsite Alternative 2: Kings Mountain Quarry

The Kings Mountain Quarry, adjoining the King's Mountain Lithium Mine, is adjacent to the Preferred Alternative with a parent parcel of approximately 418 acres under one owner (Figure 8: Offsite Alternative Locations). The Kings Mountain Quarry, operated by Martin Marrietta, is a hardrock aggregate quarry under DEMLR Mine Permit N0. 23-02. Even though the Kings Mountain Quarry is located within the TSB, there is no evidence that the site contains mineralized spodumene. A minimum of an additional 234 acres would need to be acquired from multiple landowners to develop a mine of sufficient size for a lithium mining operation. The parent parcels are not for sale, as Martin Marietta intends to continue processing construction aggregates. This quarry has a history of impacts to wetlands and streams from activities supporting its current operation. Additional impacts to aquatic resources would be variable depending on parcel availability and mine plan, but it is assumed that there would be impacts based on NWI and NHD datasets. Table 6: Offsite Alternative 2 Summary details the analysis of this alternative against the screening criteria.

Table 6: Offsite Alternative 2 Summary

Screening Criteria	Criteria Satisfied	Explanation
Location (A)	No	The alternative does not satisfy the screening criteria. Although it is located within the TSB, there is no evidence that spodumene exists in the mining parcel.
Mining technology (B)	Yes	This alternative satisfies the screening criteria due to previous mining activities. Although located within the TSB, there is no evidence that there is mineralized spodumene in the area.
Historical active mine sites (C)	Yes	This alternative satisfies the screening criteria as the site contains previous hardrock mining operations.
Minimum mine size (D)	Yes	This alternative satisfies the screening criteria as the parent parcels are approximately 412 acres and identified project area parcels are 234 acres, for a total mine size of 646 acres.
Property availability (E)	No	This alternative does not satisfy the screening criteria as the parent parcels are not available for purchase or lease.
Environmental impacts minimization (F)	Yes	Based on review of the NHD and NWI databases, both wetland and stream resources are within the parent and adjacent parcels. The quarry has a history of wetland and stream impacts and additional impacts to aquatic resources from mining activity are likely. This alternative may satisfy the screening criteria assuming minimization of impacts and appropriate mitigation were provided. The quantity of impacts would be dependent upon the resource (spodumene) location, mine pit design, waste rock and tailings requirements, and infrastructure support.

NHD = National Hydrography Dataset; NWI = National Wetland Inventory; TSB = Tin-Spodumene Belt

Offsite Alternative 3: Imerys Mine

The Imerys Mica Mine has been in operation since the 1960s and continues to operate as an open-pit mine (DEMLR Mine Permit No. 23-03). The parent parcels comprise approximately 423 acres located within the TSB under one owner (Figure 8: Offsite Alternative Locations). Even though the Imerys Mica Mine is located within the TSB, there is no evidence that the site contains mineralized spodumene. Additional parcels adjacent to this operation would need to be acquired to be of sufficient size for operation of an open-pit mine. The core parcel is not for sale, as Imerys intends to continue mining and processing mica at the site. A minimum of an additional 250 acres, for a total mine size of 673 acres, would need to be acquired from multiple landowners to develop a mine of sufficient size. Desktop review of NWI and NHD datasets indicates that aquatic resources occur on the site. Impacts to aquatic resources would be variable depending on parcel availability and mine plan, but it is assumed that there would be impacts based on the NWI and NHD datasets. Table 7: Offsite Alternative 3 Summary details the analysis of this alternative against the screening criteria.

Table 7: Offsite Alternative 3 Summary

Screening Criteria	Criteria Satisfied	Explanation
Location (A)	No	The alternative does not satisfy the screening criteria. Although it is located within the TSB, there is no evidence that spodumene exists in the mining parcel.
Mining technology (B)	Yes	This alternative satisfies the screening criteria as it is currently an active open-pit mine; however, the infrastructure would require retrofitting for processing spodumene.
Historical Active Mine Sites (C)	Yes	This alternative satisfies the screening criteria as the site contains previous hardrock mining operations.
Minimum mine size (D)	Yes	This alternative satisfies the screening criteria as the parent parcels are approximately 423 acres and identified Proposed Project area parcels are approximately 250 acres, for a total mine size of 673 acres.
Property availability (E)	No	This alternative does not satisfy the screening criteria as the parent parcels are not available for purchase or lease.
Environmental impacts minimization (F)	Yes	Based on review of the NHD and NWI databases, both wetland and stream resources are within the parent and adjacent parcels. This alternative may satisfy the screening criteria assuming minimization of impacts and appropriate mitigation were provided. The quantity of impacts would be dependent upon the resource (spodumene) location, mine pit design, waste rock and tailings requirements, and infrastructure support.

NHD = National Hydrography Dataset; NWI = National Wetland Inventory; TSB = Tin-Spodumene Belt

Offsite Alternative 4: Archdale Mine

The Archdale Mine is adjacent to the Imerys Mine and operates under the Imerys Mine permit (DEMLR Mine Permit No. 23-03). The parent parcel is approximately 643 acres within the TSB (Figure 8: Offsite Alternative Locations). Even though it is located within the TSB, there is no evidence that the site contains mineralized spodumene. Additional parcels adjacent to this operation would need to be acquired for the area to be of sufficient size for operation of an open-pit mine. Small portions of the parent parcel are known to be for sale—an additional 298 acres, for a total mine size of 992 acres—and would need to be acquired from multiple landowners. Desktop review of NWI and NHD datasets indicates that aquatic resources occur on the site. Impacts to aquatic resources would be variable depending on parcel availability and mine plan, but impacts are assumed based on the NWI and NHD datasets. Table 8: Offsite Alternative 4 Summary details the analysis of this alternative against the screening criteria.

Table 8: Offsite Alternative 4 Summary

Screening Criteria	Criteria Satisfied	Explanation
Location (A)	No	The alternative does not satisfy the screening criteria. Although it is located within the TSB, there is no evidence that spodumene exists in the mining parcel.
Mining technology (B)	Yes	This alternative satisfies the screening criteria as it is currently an active open-pit mine; however, the infrastructure would require retrofitting for processing spodumene.
Historical Active Mine Sites (C)	Yes	This alternative satisfies the screening criteria as the site contains previous hardrock mining operations.
Minimum mine size (D)	Yes	This alternative satisfies the screening criteria as the parent parcels are approximately 643 acres and identified Proposed Project area parcels are 298 acres, for a total mine size of 992 acres.
Property availability (E)	No	This alternative does not satisfy the screening criteria as the parent parcels are not available for purchase or lease.
Environmental impacts minimization (F)	Yes	Based on review of the NHD and NWI databases, both wetland and stream resources are within the parent and adjacent parcels. This alternative may satisfy the screening criteria assuming minimization of impacts and appropriate mitigation were provided. The quantity of impacts would be dependent upon the resource (spodumene) location, mine pit design, waste rock and tailings requirements, and infrastructure support.

NHD = National Hydrography Dataset; NWI = National Wetland Inventory; TSB = Tin-Spodumene Belt

2.4.5. Onsite Alternatives

Onsite Alternative 1: Kings Mountain Mine

This alternative would restart the legacy mine, maximizing the use of the property and keeping all operations and materials storage within the KMM. The additional land required to fulfill the purpose and need for the Proposed Project at the KMM location is approximately 240 acres. Attaining the 240 acres would be accomplished by either acquiring more properties and expanding the Proposed Project boundary, impacting more Waters of the United States (WOTUS) within the KMM, or a combination of both. Kings Creek would likely be the only WOTUS north of I-85 that would not be impacted. An additional 73 acres of adjacent land would be required to store the tailings onsite. If that land was not available to purchase, an additional approximately 107 acres offsite would need to be purchased to store the tailings. Since neither of those options were pursued, an updated site layout is not available to calculate the additional potential WOTUS impacts.

Onsite Alternative 2: Kings Mountain Mine and Archdale Tailings Storage Facility Site

Approximately 10,757,620 tons of tailings are anticipated to be generated during the permitted life of the mine. Approximately 10,000,000 tons of tailings are anticipated to be stored at the Archdale TSF site. The Archdale TSF site, as described above, was specifically purchased by

Albemarle to reduce the amount of material that would be discharged into WOTUS under Onsite Alternative 1. No jurisdictional WOTUS occur within the Archdale TSF site and acquiring the Archdale TSF site removes potential WOTUS impacts in the adjacent 73 acres of the Kings Mountain site (onsite Alternative 1) and other neighboring properties that might have WOTUS.

Onsite Alternative 3 (Final Design): Kings Mountain Mine, Archdale Tailings Storage Facility Site, and Partnership with Martin Marietta to Utilize the Aggregate Byproduct

To further reduce the amount of material that would be discharged into WOTUS, Albemarle has entered into an agreement with Martin Marietta to receive and sell aggregate byproducts of the mining operation that meet Martin Marietta's specifications. Approximately 42,000,000 tons of aggregate is anticipated to be delivered to Martin Marietta over the life of the permitted mine. Without the Martin Marietta agreement, a 300-feet-tall pile of aggregate, covering approximately 110 acres, would need to be built withing the KMM site. By removing the need for aggregate to be stored at the KMM, Albemarle will be able to avoid impacting most of South Creek and associated headwaters and wetlands, as well as the South Creek Reservoir. Avoiding these impacts will largely be accomplished by separating RSF-A and RSF-X in the design, which was made possible by the reduction in onsite tailings.

Archdale Tailings Storage Facility

Archdale is one of the offsite alternatives for the mining site itself, which led to its acquisition for the TSF. Since there are no WOTUS at Archdale and space is limited, no onsite alternatives were developed.

Onsite No Action Alternative

Under the No Action Alternative, a hardrock lithium mine would not be constructed and lithium-grade lithium hydroxide made from lithium-bearing spodumene concentrates produced from hardrock mining would not be brought to the U.S. market from the Kings Mountain domestic source. Most lithium chemicals would continue to be imported from outside the U.S. to meet domestic demand. It can be assumed that there would be environmental impacts associated with mines located outside the U.S., especially in areas where environmental regulations may be less stringent, although the quantity of impacts is unknown.

2.4.6. Proposed Action—Preferred Alternative

Kings Mountain

Various alternative onsite layouts were considered during the Proposed Project's design and development. There have been three major iterations of the KMM design: Kings Mountain Tract Mine Site only; KMM with the Archdale Tract TSF Site; and Kings Mountain Tract Mine, Archdale Tract TSF Site, and a partnership with Martin Marietta to utilize the aggregate byproduct of the mining process instead of storing it onsite. The final site layout (Figure 6: Kings Mountain Mine Site Layout and Figure 7: TSF Site Map) was designed based on data collected

during the drilling program and various baseline studies evaluated in the EA. Each major iteration of the site design improved the avoidance and minimalization of NEPA impacts.

Kings Mountain Lithium Mine

The Preferred Alternative is to restart mining activities at the legacy Kings Mountain Lithium Mine. The Onsite Alternative is the former Foote Mineral Lithium Mine (Figure 2: Existing Proposed Mine Site – KMM). This open-pit mine operated from 1938 until the mid-1980s and was one of the largest producers of lithium in the world. In 2012, Rockwood Lithium acquired the land which was then acquired by Albemarle in 2015. The parent parcel is approximately 771 acres and is currently permitted for mining (DEMLR Permit Nos. 23-01 and 23-34) in accordance with the provisions of the North Carolina Mining Act of 1971. Prior to the development of this Proposed Project, approximately 509 acres were heavily disturbed by historical mining activities. The activities associated with the Proposed Project's resumption of open-pit mining at the KMM site will disturb an additional 574.43 acres, creating a total area of 1,083.43 acres.

Recent exploration has indicated that additional spodumene resources are available for extraction. Desktop review of the NHD and NWI features indicates that the site includes the headwaters of Kings Creek and South Creek.

Archdale Tailings Storage Facility

Concentrate and tailings from the concentrator will be transported by a conveyor on the I-85 bridge to a rail loadout facility for concentrate and a separate loadout facility for tailings, which will be transported by truck to the offsite Archdale TSF.

The KMM site is constrained due to available land and the need to accommodate necessary components for safe and efficient operation. The Archdale site provides some relief from the land constraints for use as a TSF, which results in decreasing the need for wetland and stream impacts. Figure 7: TSF Site Map provides an overview of the layout for the Archdale TSF facilities.

Proposed Project Construction

Kings Mountain

Many Proposed Project components will be constructed to start and sustain mining operations. Prior to construction activities, vegetation will be cleared, and growth media salvaged in approved disturbance areas. Diversion ditches will be installed to intercept non-contact surface water drainage and to convey the non-contact surface water to existing drainage outlets. Silt fences, or other best management practices (BMPs), will be installed downstream as required to prevent release of sediment to the environment.

Construction of the concentrator and associated Proposed Project infrastructure, including the crushing circuit, RSFs, OSFs, WSB-1, WTP, haul roads, access roads, I-85 bridge, NPI areas, concentrate and tailings loadouts, the railway, stormwater management system, and supporting

utilities will be completed in an anticipated 2- to 3-year period after receipt of regulatory approval.

Existing legacy tailings will be excavated and disposed of at RSF-A prior to the construction of RSF-X. RSF-A will be constructed from coarse rock sourced from the open pit and will grow as mine operations continue, reaching an ultimate height of 385 feet above surrounding grade.

The subgrade foundation for the RSF-X liner will be graded to achieve a positive drainage slope of approximately 2 percent to the perimeter drainage conveyance system. To install the high-density polyethylene liner geomembrane system, RSF-X will be constructed in two phases: Phase 1 (northeast) and Phase 2 (southwest), and construction will extend into operations. The high-density polyethylene geomembrane panels will be welded together by thermal methods (SRK 2023c). RSF-X will grow as mine operations continue, reaching an ultimate height of 210 feet above grade.

RSF-X Phase 1 will be constructed first to allow operational use in the first year of development mining (also referred to as preproduction mining or waste stripping). More Phase 1 and Phase 2 construction details and timing will be defined during the detailed design stage of the Proposed Project, prior to construction (SRK 2023b).

WSB-1 construction will involve removing legacy tailings and some coarse rock from the existing embankment to allow reconstruction of the existing concrete-lined spillway where necessary; constructing a gravel blanket drain along the downstream face of the embankment; and constructing a compacted fill buttress to improve stability (SRK 2023c). The WSB-1 embankment will consist of suitable fill materials sourced from the Proposed Project site.

During the construction period, concurrent reclamation of disturbed areas will occur where possible. Surface disturbances associated with roads, ditches, embankment faces, and the disturbed perimeter will be reclaimed after final grades are established. BMPs will be installed and maintained during construction to minimize erosion, sedimentation, and to control surface and stormwater runoff. Removal of vegetation, soil layers, legacy tailings, and embankment materials will be conducted using bulldozers, excavators, loaders, scrapers, and trucks. If bedrock is encountered during grading in preparation for the installation of the geomembrane, ripping, drilling, and/or blasting of bedrock may be required locally.

The construction of the KMM is expected to occur over a 2.5-year period. The initial construction schedule has been developed and is assumed to include the open pit, concentrator, ROM pad, crushing circuit, south NPI, north NPI, I-85 concentrator bridge/conveyor, Kings Creek haul road culvert, OSFs, RSF-X, RSF-A, and concentrate and tailings loadout.

The sequence of construction activities will be as follows:

- Implement sediment and erosion control measures.
- Execute clearing and grubbing activities. Stockpile vegetation and soil separately in designated areas.
- Develop access roads, temporary site service roads, and laydown areas.

- Commence grading to bulk cut and fill requirements.
- Place fill and install permanent drainage systems and erosion control structures (ROM pad wall).
- Develop utilities infrastructure.
- Develop permanent haul site service roads.
- Excavate for foundations and conduct piling as required.
- Construct permanent infrastructure.

Archdale Tailings Storage Facility

Initial Archdale TSF construction will consist of pit dewatering, site clearing and grubbing of existing vegetation, implementation of stormwater BMPs, and construction of access and haul roads and an embankment and perimeter berm around the former mine pit to allow storage of filtered tailings above the base topography in the area.

The footprint of the Archdale TSF will be cleared and grubbed of existing vegetation. Organic growth media will be stripped and hauled to a designated stockpile where it will be stored for reuse during the Proposed Project's post-closure phase. Unsuitable soils for lithium production, including weak saprolitic soils, will be removed and hauled from the Archdale TSF to a designated stockpile at KMM where they will be stored for reuse during facility reclamation. Based on information obtained during site characterization activities, the depth of required removal of unsuitable soils is highly variable across the site and will require direct oversight by the Archdale TSF design engineer during construction to remove and replace potential unsuitable soils. Where unsuitable soils are removed below design grade, waste rock or other suitable fill material, potentially generated through cut and fill operations within the pit base, will be used to backfill the excavations in compacted layers up to the design grade. Placement and compaction will be achieved in accordance with the technical specifications tailored to each material type.

Several legacy mica stockpiles are also present and will be removed from within the proposed excavation footprint during construction and salvaged for reclamation. These legacy mica-bearing stockpiles materials are estimated to total 0.45 million cubic yards and will be transported and stored at the growth media storage area located on the southern end of the Archdale TSF site or transported back to the KMM facility to be properly stored.

Initial construction of the Archdale TSF will include a perimeter access road constructed around the edge of the existing pit, grading for the plant site pad, and a starter embankment completely within the base of the existing pit with a 40-feet-wide crest to an elevation of 885 feet amsl. The embankment will be constructed with a 1.5 horizontal to 1 vertical interior side slope and 2.5 horizontal to 1 vertical exterior side slope. A 2-feet-thick (3-feet-wide, horizontally) layer of crushed sand filter will be placed along the interior slope face to prevent migration of tailings through the coarse waste rock outer embankment.

Waste rock hauling for embankment construction will be via over-the-highway haul trucks from the KMM pit and legacy tailings area. Only non-PAG waste rock will be used for embankment construction, as described by SRK Consulting U.S., Inc (SRK)(2024c). Temporary haul roads will be constructed as necessary within the Archdale TSF and tailings placement areas to allow all weather access for highway and site haul trucks during operations. Tailings haul trucks will access the interior of the Archdale TSF via temporary haul roads constructed off the main site haul road around the southwest corner of the Archdale TSF.

The saprolite at the base of the Archdale TSF interior will be excavated to an average depth of 10 feet and shaped to roughly mirror existing topography to provide a relatively smooth surface sloped to a single seepage collection sump at the southeastern corner of the TSF. Based on available site characterization and laboratory test data (SRK 2024c), low permeability saprolitic soils are likely to be available throughout the TSF footprint, and it is expected that moisture conditioning and compaction of in-situ soils during base preparation will provide a low permeability surface to reduce the potential for vertical migration of fluids and promote lateral flow to the TSF basal drain system described below.

The excavation base will not only provide a low permeability surface for seepage collection at the base of the tailings but cut-to-stockpile grading for base preparation will generate soil for other construction needs at the site and provide additional tailings storage capacity. Where possible, fine grained saprolitic soils excavated from the TSF base will be stockpiled for later use in facility reclamation.

Following base grading and compaction, a TSF basal drain system will be installed over the prepared TSF base to collect and remove infiltrating meteoric water and any collected seepage from upwelling groundwater. This basal drain system will consist of a series of various sizes of perforated corrugated polyethylene collection pipes placed along the existing and regraded natural flow lines and be covered with drain rock or sand. The basal drain system will convey fluids to a seepage and stormwater collection sump at the southeastern edge of the TSF interior. Collected water within the sump will be pumped from two drainpipes under the southern embankment and into a contact water management pond.

The waste rock for the starter embankment and annual raise construction is anticipated to be comprised of coarse 2-foot minus rockfill. As described above for the starter embankment, the design will include a layer of crushed sand filter along the interior slope face to form a zoned sand filter and prevent migration of tailings solids through the coarse waste rock outer embankment. Grain size distribution relationships for each component of the filter zone will be based on standard filter design calculations to verify that filters are both internally stable and compatible for use in a layered sand filtered design. If onsite materials cannot be processed to meet the necessary specifications, Albemarle will import the required materials from an outside vendor.

Site Preparation

Most of the site preparation activities and surface disturbance will focus on the infrastructure pad, service facility sites, and adjacent utility lines located on the southern end of the site.

Archdale pit dewatering activities will also need to be completed prior to initiating tailings storage activities associated with the Proposed Project.

Proposed Project Operations

Kings Mountain

Pit

The expansion of the pit will have design parameters like batter face angles of 60 degrees, a batter height of 30 feet (9.14 meters), a berm width of 21 feet (6.4 meters), an overall wall angle of 60 degrees, and a ramp width of 93 feet (28.3 meters) for transportation of material (Figure 6: Kings Mountain Mine Site Layout). The pit will be dewatered prior to construction activities.

Albemarle obtained a NPDES permit for dewatering the existing mine pit (Permit No. NC0090212). This discharge will be temporary, approximately 18 to 24 months, or until the pit lake has been dewatered and WSB-1 is constructed. The flow will be continuous initially with an approximate flow of 2,000 gallons per minute (gpm) until the pit is dewatered. After initial dewatering, pumping will continue as needed to remove accumulated rainfall and evacuate accumulated water within the pit. The receiving water will be Kings Creek. The current water quality of the discharge water meets the limits set forth in the NPDES permit.

Rock Storage Facilities

Based on site preparation material characterization, as well as operational testing, waste rock will be classified as either non-PAG or PAG. PAG waste rock will be stored in a separate, lined facility (RSF-X [71.79 acres]) at the location of the existing historical TSF. Non-PAG waste rock will be stored in RSF-A (85.94 acres) located adjacent to and southwest of RSF-X. The location of the RSFs is depicted on Figure 6: Kings Mountain Mine Site Layout. Stormwater runoff from the RSFs will be contained and treated, if necessary. Seepage from RSF-X will be collected using an underdrain collection system.

RSF-A is anticipated to be similar in nature to the material at the multiple historical RSFs that have existed at the site for decades. RSF-A will not be lined, while RSF-X will be lined. Runoff from RSF-X will be conveyed to a PAG pond and then pumped to a constructed WTP prior to discharge into WSB-1. Runoff from RSF-A is anticipated to be of sufficient quality to allow for surface discharge after being collected in sediment ponds.

At RSF-A and RSF-X approximately 41.8 million and 47.6 million tons of rock storage will be generated, respectively. Excess rock storage will be used for TSF perimeter embankment construction or placed in RSF disposal areas (SRK 2024h).

Remaining material in RSF-A will not create long-term acid generation issues, as it will be composed of non-PAG rock. Based on predictive modeling results, the risk of groundwater degradation resulting from RSF-A is considered low.

At closure, RSF-A will begin to be graded and covered with approximately 2 feet of growth media. Larger boulders are expected to protrude from the growth media due to the nature of the rock material.

Overburden Storage Facilities

Three OSFs will be constructed to store saprolite rock that will be excavated during the creation of the RSFs and preparation of the Archdale TSF.

Run-of-Mine Pad

The ROM pad will be used to temporarily stockpile ore mined directly from the open pit. The ore will be transported by haul trucks to the ROM pad before processing. The ROM pad will be located southwest of the open pit and east of the crushing and screening circuit (Appendix B, Design Drawings) (Hatch 2023a).

North Non-Process Infrastructure Area

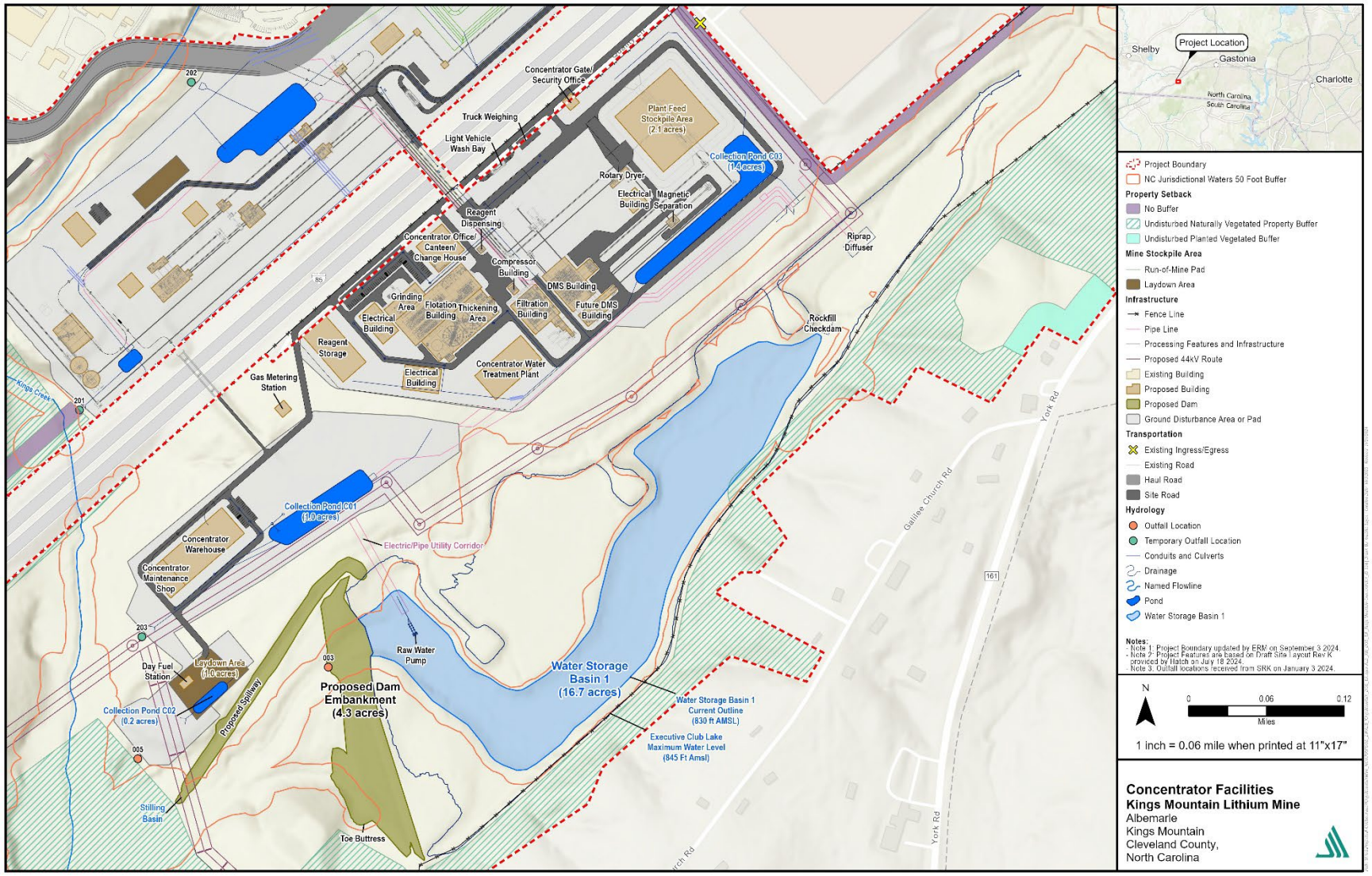
The NPI will consist of supporting infrastructure associated with mining and concentrating operations. The NPI will include but is not limited to, roads, offices, fueling facilities, hazardous material storage, security gates, fencing, power supplies, stormwater management, water and fire systems, a septic/sewer system, and vehicle wash areas. Two NPI areas will be located at the KMM site (north and south of I-85) to support mining and processing operations (Figure 6: Kings Mountain Mine Site Layout). Numerous types of mobile equipment will be required to perform mining activities during development and operations. Drilling, loading, hauling and other mine operations will involve equipment including but not limited to, deck drills, hammer drills, front end loaders, haul/maintenance/fuel trucks, excavators, track/wheel dozers, motor graders, pressure washers, forklifts, compressors, and backhoes.

Mineral Processing Facility

The DOE-funded concentrator facility (mineral processing facility) will be located on the south side of I-85 and will consist of a DMS circuit, the grinding circuit, desliming, magnetic separation, mica and spodumene flotation circuits, and concentrate and tails thickening and filtering circuits.

The separation of lithium-bearing spodumene ore and marketable byproducts from the host rock will be conducted at an onsite concentration plant (Figure 9: Concentrator Facilities), the Kings Mountain Mineral Processing Plant. Mined ore will be transported from the pit using haul trucks and will be placed on the ROM pad. From there, ore will be moved via conveyor to undergo primary and secondary crushing followed by sorting. Ore delivery, crushing, and preparation will occur north of I-85 near the existing lithium conversion plant. The crushed ore will be delivered via conveyor over I-85 to the enclosed mineral processing plant feed stockpile located south of I-85 using a new bridge constructed for the Proposed Project.

Figure 9: Concentrator Facilities



The mineral processing plant feed stockpile will provide a buffer between the crushing circuit (north of I-85) and the concentrator circuit (south of I-85). Plant feed material will undergo further milling, screening, and magnetic separation in the spodumene conversion plant facility. Spodumene and tailings will be separated using flotation processes. The resulting concentrate will be thickened and then filtered and dried to remove water to prepare it for shipping, and then will be delivered by conveyor back over I-85 for stockpiling and shipping via rail. The remnant tailings material will be thickened and filtered to remove water, and then moved by conveyor over I-85 prior to being loaded onto trucks for placement in the Archdale TSF.

Tailings

Tailings will be placed and compacted at the offsite Archdale TSF which will be reclaimed concurrently with native soil and vegetation due to the structural nature of the tailings material. The tailings material is anticipated to be similar in nature to the material that has existed for decades at the historical TSF with no identified impact to groundwater resources. The Archdale TSF will not be lined; however, stormwater runoff and seepage from the facility will be contained and collected, though it is anticipated to be of sufficient quality to discharge. Available geochemical characterization shows no potential to degrade groundwater or surface water.

Pit Inflows

The pit will receive stormwater runoff and direct precipitation, as well as inflows from groundwater. Based on historical observations from pit filling, groundwater seepage is anticipated to contribute 200 to 350 gpm to the pit. This water will need to be continually removed to allow mining.

Water treatment will extend approximately 4 years into the post-closure period. During this time, PAG seepage will be treated and PAG material from RSF-X will be backfilled into the pit. Once the backfill is complete and the pit refloods, treatment will no longer be required. Treatment facilities will then be dismantled and disposed of in accordance with applicable regulations.

Water Storage Basin 1

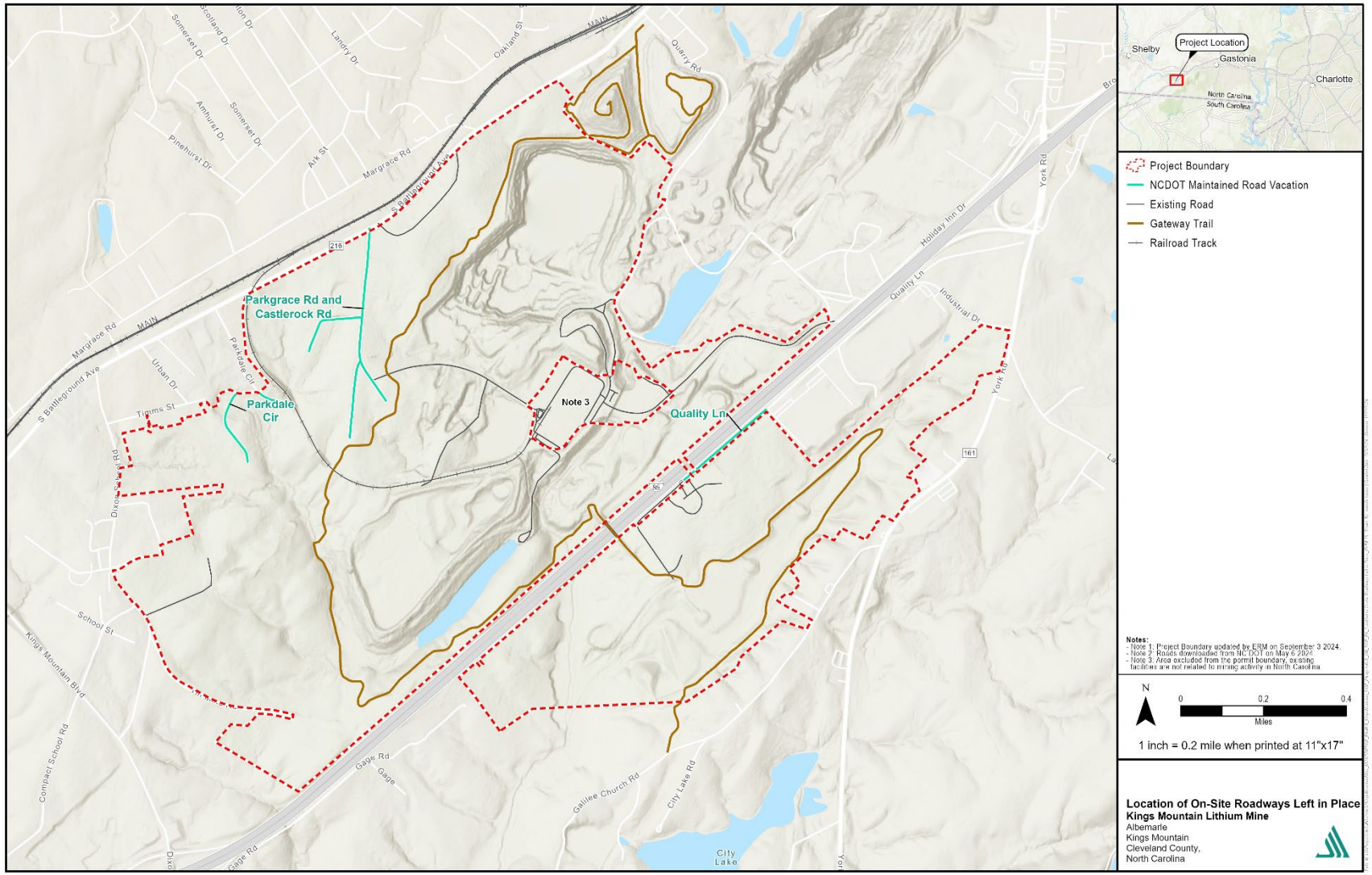
The purpose of WSB-1 will be to:

- Act as a temporary retention location before water is discharged to Kings Creek.
- Act as a final location for water quality testing before water is discharged.
- Control discharge flow to prevent disruptive surges in Kings Creek.
- Provide supply water to the processing plant for process makeup, raw water supply, and dust suppression.
- The reservoir will be designed to allow sediments to settle, reducing sediment load and turbidity downstream.

Roads

The Proposed Project will use 2.45 miles of existing roads (some of the existing roads may be modified or expanded for the Proposed Project's operations). Approximately 15.67 miles of internal roads will be constructed for pit, RSFs, OSFs, NPI, and ROM pad access throughout the KMM site. Internal haul roads will either be modified or newly constructed to transport material across the site. The haul roads will be connected to exit points and offsite roadways for material transport offsite. Haul roads may be relocated during mining operations, as the pit expands (Figure 10: Location of Onsite Roadways Left in Place).

Figure 10: Location of Onsite Roadways Left in Place



MSHA requires design road widths to be 2.5 times the width of the mine trucks used, and all mine haul roads will require berms of one-half axle height or greater for the largest truck. Existing roads will be retrofitted/widened as necessary according to MSHA standards.

Eight new internal access roads will cross streams, impacting 899.5 linear feet of stream channels.

Roads that are not needed for closure and post-closure uses such as water management/treatment, power generation, security, and monitoring will be closed. Reclamation will be achieved by ripping compacted surfaces and regrading as needed to promote proper surface drainage, covering the area with growth media where needed, and revegetating. Where possible, the larger roads that are retained will be resized for post-closure use by regrading and ripping to a width that is appropriate for anticipated post-closure traffic.

The following roads are pending either full or partial removal to accommodate the Proposed Project:

- Castle Rock (North Carolina Department of Transportation [NCDOT])
- ParkGrace (NCDOT)
- Beta Place (NCDOT)
- Beta Circle (private)
- Goodall Drive (NCDOT and partially private)
- Miracle Drive (private)
- Holiday Inn Drive (partially NCDOT)
- Quality Lane / Industrial Drive (partially NCDOT)

Conveyors

After initial separation and transport of non-ore bearing rock and delivery of ore to the ROM pad, most material will be moved within the Proposed Project boundary by conveyors to minimize fuel use and emissions. A new bridge and enclosed conveyor will be constructed over I-85 to connect the ROM pad / crushing circuit to the concentrator and south NPI area located immediately south of I-85. After haul trucks deposit ore on the ROM pad, ore will be moved through the crushing circuit by conveyor. Once primary through tertiary screening and crushing are complete, the crushed ore will be transferred by conveyor across the new bridge to the concentrator circuit.

The enclosed conveyor system that will be constructed across the new concentrator bridge will deposit ore from the crushing circuit into the enclosed plant feed stockpile south of I-85. The plant feed stockpile will supply material to the concentrator circuit via conveyor. There will be two primary outputs from the concentrator circuit: concentrate and tailings. Concentrate will be conveyed to the north side of I-85, to either the concentrator rail loadout station or concentrator truck loadout, and stockpiled. Filtered tailings will be transported north across the I-85 bridge via a conveyor to the filtered tailings loadout area located at the north NPI.

Stormwater Outfalls

Two general drainages are on the existing mine site: South Creek and Kings Creek. After construction of the OSFs and RSFs, runoff will be managed through two separate conveyance systems, one for non-contact water and one for contact water. South Creek and Kings Creek will remain largely undisturbed in their present condition.

Contact water will be collected separately in a series of lined channels and seepage ponds, with all water stored in WSB-1, centrally located in the southern portion of the KMM site. Non-contact perimeter channels have been designed to route runoff from undisturbed areas around the Proposed Project's infrastructure into Kings Creek, maintaining clean water. Erosion protection for channels was selected based on the maximum tributary catchment throughout the life of the Proposed Project, and the expected velocities during design flood events. Most of the channels will be grass lined, while those segments with steeper gradients will be lined with riprap.

Three sediment control ponds will be situated downstream of the non-contact water channels before discharging into Kings Creek. The sediment control ponds were designed using a 25-year, 24-hour storm event, exceeding North Carolina standards. WSB-1 will provide sediment control functions for all contact and non-contact water from the Proposed Project.

Seepage and contact water runoff from the active mining areas will be routed to either the non-PAG collection sump, PAG collection sump, or the ore sorting area collection sump during operations and initial closure. As active surfaces are reclaimed, runoff contributions will be eliminated with reduced seepage flows to these sumps. Once flows have decreased, the non-PAG collection sump will be breached and allowed to discharge into the non-contact perimeter channels.

The PAG collections sump associated with RSF-X will be removed once the PAG material has been relocated to the pit backfill.

Archdale Tailings Storage Facility

The Archdale TSF will be used to store 10,000,000 tons (8,427,770 placed cubic yards) of filtered tailings produced at the KMM site within the footprint of the remnant legacy open pits, which will be progressively filled over time (Burnley 2024). The proposed Archdale TSF layout (SRK 2024c; Hatch 2023b) illustrates the locations of the primary components.

The conceptual TSF design drawings for the proposed filtered TSF and its facilities, as well as plans, sections, details, slope stability analyses, and settlement calculations were designed by a professional engineer currently registered in the state of North Carolina (SRK 2024c, 2024d). Design drawings include the following components:

- Filtered TSF;
- TSF underdrain system;
- TSF starter and phased downstream embankment expansion configurations;
- Final closed configuration;

- Seepage collection drain;
- Contact water mitigation pond;
- Haul and access roads;
- Stormwater management facilities including diversion channels and a sedimentation basin;
- Roadside ditches; and
- Culverts.

It is assumed that filtered tailings included in the filtered TSF design will be delivered to the site at a moisture content of 15 percent. The perimeter embankment design provides for full containment and internal drainage of the tailings mass.

Closure (Post-Closure)

The post-closure strategy involves implementing best management approaches to develop post-mining land uses that are agreeable to all stakeholders.

Kings Mountain Vegetation

Pursuant to North Carolina mining regulations, a mine reclamation plan is required to include plans for seeding, including the time of seeding, and the amount and type of seed, and type of fertilizer, lime, and mulch per acre. The recommendations include general seeding instructions for both permanent and temporary revegetation. A preliminary seed mix and schedule is provided in Table 9: Preliminary Seed Mix Composition and Schedule.

Table 9: Preliminary Seed Mix Composition and Schedule

Seed Mix Type	Seeding Dates	Seeding Rates
North Carolina Steep Slope Mix (ERNMX-310)	All dates	45 lbs/acre
Native Habitat Strip Mine Mix (ERNMX-111)	All dates	20 lbs/acre
Native Steep Slope with annual rye (ERNMX-181)	Feb 15–Aug 15	60 lbs/acre
Native Steep Slope with grain rye (ERNMX-181-2)	Aug 15–Feb 16	75 lbs/acre

lbs = pounds

Seed will be procured from an approved seeding contractor.

Stormwater Management

As closure covers are placed over the RSFs, contact water diversion channels will be removed to allow runoff from the reclaimed surfaces to flow into the non-contact water diversion channels. This flow will be routed through sediment ponds or in-line sediment controls, such as rock check dams to control sediment as vegetation is established. The sediment ponds will ultimately discharge to Kings Creek.

Open Pit

The open pit will be partially backfilled when the PAG material is removed from RSF-X. The open pit will recharge from groundwater inflows and precipitation, which will eventually discharge through shallow groundwater and surface water outflow into Kings Creek. The pit lake will form quickly and continue to fill until the surface water discharge point is reached, which is assumed to be at 850 feet amsl. The model predicts the pit lake will not inundate the pit backfill until 2 to 3 years after the backfill is complete and will reach the surface water discharge elevation sometime between the years 2087 and 2096. An outflow channel connecting the open pit to Kings Creek will be designed once post-mining topography has been established. Pit lake water quality predictions indicate that the shallow pit lake water chemistry will meet applicable surface water quality standards. The open pit will not be stocked with fish upon closure, and it is not currently being considered for recreational use.

Post-Closure Management

Closure management plans will be developed as mine planning progresses.

Rock Storage Facilities

During closure, RSF-X material segregated during operations will be backfilled into the open pit and will eventually be submerged as the pit lake begins to form. Remaining material in RSF-A will not create long-term acid generation issues, as it will be composed of non-PAG rock. Based on predictive modeling, the risk of groundwater degradation resulting from RSF-A is considered low.

At closure, RSF-A will be graded and covered with approximately 2 feet of growth media and revegetated. Larger boulders are expected to protrude from the growth media due to the nature of the rock material.

Overburden Storage Facilities

At closure, the three OSFs will contain excavated materials beneath the surficial growth media layer consisting of saprolite C-horizon material. The OSFs will be constructed during Proposed Project development. Their final configuration will have a slope of no greater than 3 horizontal to 1 vertical and they will be revegetated once complete to meet final stabilization requirements. Runoff from the OSFs will be conveyed to natural streams or be diverted via sedimentation basins constructed downgradient of each facility. At closure, no additional activities are anticipated unless material is borrowed from the OSFs for closure activities at other facilities. In that case, disturbed areas will be revegetated. Since the majority of the OSFs are not required during operations, they may be progressively closed during construction (SRK 2024l).

Water Treatment

Water treatment will last approximately 4 years during the post-closure period. During this time, PAG seepage will be treated and PAG material from RSF-X will be backfilled into the pit. Once the backfill is complete, treatment will no longer be required. Treatment facilities will then be dismantled and disposed of in accordance with applicable permits.

Buildings and Foundations

Associated infrastructure will be decommissioned, dismantled, and the area reclaimed.

Mineral Processing Plant

The mineral processing plant site and ancillary facilities will remain active until material processing has been completed. Subsequently, plant equipment will be cleaned, decontaminated, and removed from the KMM site. Foundations will be demolished and removed, and the area reclaimed. Remaining chemicals will be disposed of in accordance with applicable regulations.

Infrastructure

Water Supply System

Water used onsite will consist of municipal potable water for drinking and other potable water needs, and non-process water. Once operations and processing cease and water supply to the Proposed Project is no longer needed, pipes and pumps will be dismantled and removed.

Roads

Roads that are not needed for closure and post-closure uses such as water management/treatment, power generation, security, or monitoring will be closed. Road closure will be achieved by ripping compacted surfaces and regrading as needed to promote proper surface drainage, covering the area with growth media where needed, and revegetating. Where possible, larger roads that are retained will be resized for post-closure use by regrading and ripping to a width that is appropriate for anticipated post-closure traffic.

Industrial and Hazardous Waste

Industrial and hazardous waste will be identified in accordance with Resource Conservation and Recovery Act (RCRA) and applicable waste regulations and disposed of offsite at an approved third-party facility.

Fencing

Fencing will be removed consistent with site safety needs and transferred to an appropriate waste disposal facility once closure is complete, and appropriate exclusionary berms have been placed at the site.

Ponds

After the closure covers are placed on the RSFs, all sumps and collection ponds will be breached and discharged into sediment channels that lead to Kings Creek.

Yard Areas

Yards and laydown areas are generally flat stretches used to store mine materials or pad areas remaining after buildings are removed. These flat spaces will require minimal grading to blend them into the surrounding topography.

Well Abandonment

All wells will be plugged once monitoring and production wells are no longer needed in accordance with North Carolina Administrative Code 15A 02C.0113 (NCAC 15A 02C.0113), Abandonment of Wells.

Monitoring

The objective of the closure and post-closure monitoring program is to track the recovery of the site toward long-term post-closure land use goals, in accordance with overall closure objectives. The monitoring program will be designed to collect information to demonstrate that the closure criteria have been achieved, revegetation and restoration objectives have been met, and the site is stable.

The strategy will be to adopt monitoring requirements for specific environmental aspects and adapt these for closure. These activities will then be implemented throughout the closure and post-closure periods. Monitoring typically required during the closure and post-closure periods is summarized in Table 10: Monitoring Summary.

Table 10: Monitoring Summary

Monitoring	Summary
Surface water	Quality monitoring of surface water, including Kings Creek and South Creek drainage, to detect changes in baseline water quality conditions for a period that meets regulatory requirements.
Groundwater	Quality monitoring of both the shallow and deep aquifers. Aquifer recovery will also be monitored via water sampling to detect changes in baseline water quality conditions for a time that meets regulatory requirements.
Pit lake	Water level and water quality will be monitored in the pit lake. This may include pit lake stratification data.
Air quality	Air quality monitoring is typically limited to the period during which potentially significant dust is generated. Once these areas have been closed, the air quality network will be decreased or totally removed.
Reclamation performance monitoring	Reclamation performance monitoring consists of comparing the reclaimed areas to analogous sites where vegetation performance and soil chemical and physical properties are measured.
Biological	Biological monitoring consists of monitoring aquatic and terrestrial resources in accordance with permitting requirements.

Reports will be prepared to document the monitoring results during the closure and post-closure phases. These reports will provide the information required to manage ongoing closure activities. The data and reports will be used to:

- Provide recommendations for improving subsequent reclamation activities.
- Indicate where reclamation and closure activities have not been successful, requiring a potential change in design criteria.
- Provide information about when care and maintenance are required during the post-closure period.
- Indicate if relinquishment criteria have been achieved.

Progressive Reclamation

Progressive reclamation involves reclamation activities that take place during operations to accelerate closure of facilities for which closure can begin during operations, or for facilities that are no longer needed for current operations.

Progressive reclamation plans will be developed before and during operations as mine planning progresses.

Archdale Tailings Storage Facility

TSF closure will include the formation of a mounded top surface of compacted tailings graded to drain to the TSF perimeter at a minimum surface grade of 3 percent. A minimum of 2 feet of growth media will be placed in loose lifts and revegetated with an approved seed mix. BMPs will be implemented to prevent erosion until vegetation is successfully established. Stormwater berms and channels will be installed as necessary to control stormwater flows off the closed surface and will be safely routed to the perimeter stormwater management system. Riprap lining or channel erosion protection products will be employed where necessary.

Water Quality Post-Closure

During post-closure, the drains simulating the water collection system under the TSF will be deactivated and the groundwater level in the facility will be allowed to recover. Particle tracking will be used to analyze the movement of the tailings contact water during post-closure.

3. EXISTING CONDITIONS AND IMPACTS TO AFFECTED ENVIRONMENT

In the following sections, qualitative and, where applicable, quantitative information is used to describe the nature and extent of specific resources that may be affected by the Proposed Project. Potential direct and indirect impacts to those resources are also discussed within the context of Proposed Project controls.

3.1. KINGS MOUNTAIN

3.1.1. Existing Permits for Existing Conditions

The existing Kings Mountain Facility currently operates under Mining Permit Numbers 23-01 and 23-34, in accordance with the provisions of the North Carolina Mining Act of 1971. Two permit modifications for site preparation and access activities have been applied for in advance of portions of the Proposed Project located at the KMM site. Site preparation activities were separated into two modifications named the East Mine and West Mine. As previously mentioned, the existing pit is currently being dewatered per the conditions of the approved NPDES Permit NC0090212.

3.1.2. Existing Conditions

The main area north of I-85 is mostly developed/disturbed and includes Albemarle's lithium compound and metal production facility, which includes a 5,000 metric ton lithium-grade lithium hydroxide facility and the Technology Center. The northwest side of this area, along South Battleground Avenue, includes an abandoned drive-in theater and recreational vehicle campground, remnants of a textile mill, and an abandoned school building. These buildings will be demolished prior to construction of the Proposed Project. Five utility rights-of-way cross the northern and central portions of the parcel. The area south of I-85 is mostly undeveloped but has been previously disturbed by industrial activity (Figure 2: Existing and Proposed Mine Site – KMM). The Kings Mountain Gateway Trail (Gateway Trail) is located along the northern and eastern boundaries of this area, with an access point and parking area off Galilee Church Road. Once construction begins, the Gateway Trail will be relocated off the KMM and Archdale TSF sites. Additionally, three utility rights-of-way cross the parcel running northeast to southwest. Seven existing man-made ponds are onsite: the accumulated water in the existing pit, PEG 25, South Creek Reservoir, No.1 Mill Pond, WSB-1 (previously referred to as Executive Club Lake), Mud Pond 1, and Mud Pond 2. Of these ponds South Creek Reservoir, and Executive Club Lake, are jurisdictional. Executive Club Lake will no longer be jurisdictional after the impacts of the Proposed Project are permitted.

The mine site is surrounded by residential, commercial, and industrial development to the north, west, and south (Figure 2: Existing and Proposed Mine Site – KMM). The Kings Mountain Quarry, operated by Martin Marietta borders the mine site area to the northeast. Primarily undeveloped land associated with Crowders Mountain State Park is to the east. No land belonging to the state park borders the mine site.

3.2. ARCHDALE TAILINGS STORAGE FACILITY

The current condition of the Archdale TSF property is impacted by industrial operations, specifically historical mining operations. Surrounding land use includes industrial/manufacturing, commercial, residential, and other mining/drilling operations.

Based on aerial historical photographs, active mining operations began at the KMM site in the mid-1990s (Figure 5: Historical Mining Activities – TSF). Prior to mining activities, the KMM site

contained agricultural land and undeveloped woods. Active mining operations ceased around 2014, and much of the area has naturally revegetated.

3.3. RESOURCE AREAS CONSIDERED AND ASSOCIATED IMPACTS

The following sections detail existing conditions, impacts, and proposed mitigation measures for each of the affected resources. Impacts are measured by how the Proposed Project affects NEPA laws.

3.3.1. Aesthetics and Visual Resources

Existing Conditions

The area around the city of Kings Mountain, North Carolina, is characterized by open valleys, rolling hills, and taller mountains that frame the landscape. Forested areas are common and provide contrast, verticality, and texture while providing a buffer between other common lands uses (e.g., agriculture, residential, commercial). Due to the prevalence of trees and other deciduous vegetation, the landscape appearance and colors change throughout the year depending on the season. This creates variation and interest that contribute to the overall scenic value of the regional landscape. The rolling topography, forested areas, and current development (e.g., buildings and other structures) limit wider landscape views in many locations, but elevated areas (e.g., hilltops, peaks) often provide open vistas from which to view the regional landscape. Residential development is centered in Kings Mountain, but there are pockets of rural residential development throughout the region. I-85 and U.S. Route 74 are major transportation corridors, and many state and local roads also provide access throughout the region. Multiple public parks, open space areas, and other tourist destinations are near the Proposed Project.

Impacts during Site Preparation, Construction, Operations, Closure, and Post-Closure

A visual impact assessment (VIA) was prepared to identify existing visual resource conditions and evaluate potential changes from the operation and post-closure phases of the Proposed Project (ERM 2024). Two analyses were completed to make up the VIA, a viewshed analysis and visual simulations from key observation points (KOPs) contrasting existing conditions to modeled Proposed Project conditions. The VIA used similar inventory processes, photographic simulations, and assessment techniques commonly applied to federal systems, including the Bureau of Land Management's Visual Resource Management system, the U.S. Forest Service's Scenery Management System, and the Federal Highway Administration's Visual Impact Assessment for Highway Projects, among others. The results of the analysis address public visibility, changes to the current landscape elements (e.g., form, line, color, texture), and estimate viewer sensitivity to scenic changes from the Proposed Project.

Based on the viewshed analysis, the Proposed Project will not be visible from most locations in the region. Table 11: Aesthetics and Visual provides a summary of anticipated changes at each KOP. The Proposed Project's facilities will be most visible in areas of the foreground. In

particular, the RSFs and TSF will be visible from about 18 percent and 14 percent of areas in the foreground, respectively. The RSFs have the greatest percentage of foreground areas from which they will be highly visible, but even these areas are small (under 5 percent of the total foreground area). Into the middle ground and background, the Proposed Project's facilities will generally not be visible, with less than 1 percent of the total area of each of these zones showing some level of visibility. Even the RSFs, the tallest of the Proposed Project's facilities, will only be visible from about 2 to 3 percent of middle ground and background areas.

Table 11: Aesthetics and Visual

KOP Location[1]	Visibility Rating	Changes in Visual Characteristics[2]	Visible Features	Height of Features	Distance from Feature
Kings Mountain					
KOP 8: Patriot Park	Limited visibility	• Top of RSF-A visible above existing tree line • Distinct, domed form that generally blends into the existing landscape • Slightly curved, weak line that follows undulating horizontal line formed by other topographic features and top of tree line • No changes in colors or textures	RSF-A	360 feet	2.05 miles
KOP 13: Holiday Inn Drive	Visible	• Buildings are visible adjacent to the road	Concentrator buildings	20-100 feet	0.8 mile
KOP 14: Lake Montonia Road	Visible	• RSF is visible above existing tree line • Distinct, domed form that generally blends into the existing landscape and is partially hidden by existing vegetation • Little to no change in colors or textures	RSF-A	360 feet	1.2 miles
KOP 16: Pinnacle Peak	Visible	• RSFs and other buildings visible in the middle ground of the panoramic view of the region • New, prominent (at focal point), rounded, definite masses but similar to other forms on the landscape • No changes in lines or textures • Colors will be similar but the dark gray of the RSFs will be more prominent and contrast with surrounding vegetated areas	RSF-A RSF-X Concentrator buildings	360 feet 220 feet 20-100 feet	2.8 miles

KOP Location[1]	Visibility Rating	Changes in Visual Characteristics[2]	Visible Features	Height of Features	Distance from Feature
KOP 18: Dixon School Road	Visible	• RSF clearly visible above existing tree line • Slightly curved, weak line that follows undulating horizontal line formed by other topographic features and top of tree line	RSF-A	360 feet	0.6 mile
KOP 19: Casino parking lot	Moderate visibility	• RSF visible behind (during leaf-off conditions) existing screening vegetation • New, large, rounded, domed form • New curving/curvilinear line but similar to existing undulating lines • No changes in colors or textures	RSF-A	360 feet	0.4 mile
KOP 20: Mount Olive Baptist Church	Limited visibility	• RSF visible behind (during leaf-off conditions) existing screening vegetation • New, large, rounded, domed form • New sloping, curving/curvilinear line • No changes in colors or textures	RSF-A	360 feet	0.1 mile
KOP 21: Dixon School Road	Limited visibility	• Rock storage slightly visible behind (during leaf-off conditions) existing screening vegetation • New, large, rounded, domed but indistinct form • New, weak, broken, curving line • No changes in colors or textures	RSF-A	360 feet	0.1 mile
KOP 24: Old Drive-In Theater	Visible	• Removal of drive-in theater and associated facilities from landscape	Project laydown areas	N/A	0.1 mile
KOP 25: Battleground Avenue	Visible	• RSF and buildings clearly visible from road	RSF Concentrator buildings	360 feet 20-100 feet	0.6 mile
KOP 26: Gateway Trail	Visible	• Top of the mine pit is visible (the visual conditions of the pit will change over time); the RSF and other buildings are also visible, but site is low on the landscape from this perspective	RSF-A Concentrator buildings Top of mine pit	360 feet 20-100 feet	0.1 mile
KOP 27: Cardio Hill	Visible	• Mine pit is visible (internal conditions of pit change over time) with RSF, and other buildings are also visible	RSF-A Concentrator buildings Top of mine pit	360 feet 20-100 feet	1.2 miles

KOP Location[1]	Visibility Rating	Changes in Visual Characteristics[2]	Visible Features	Height of Features	Distance from Feature
Top of Proposed Catawba Casino Hotel	Visible	• As the RSFs will be built out through 2033, they will be visible to anyone at the top of the hotel • After reforestation of the RSFs, the view will look more natural and in line with the existing landscape	RSF-A RSF-X Tailings load out area	360 feet 220 feet Unknown height	Unknown
Archdale TSF					
KOP 37: Dixon Dairy Road	Limited visibility	• Limited visibility behind existing structures and tree line	Archdale TSF	20-90 feet	0.4 mile
KOP 40: Margrace Road	Visible	• View of security entrance and 20-foot berm	Archdale TSF	20 feet	0.1 mile
KOP 41: I-85 TP's Restaurant and Lounge	Limited visibility	• Limited view of the TSF behind tree line	Archdale TSF	20-90 feet	0.1 mile
KOP 43: NC Welcome Center	Limited visibility	• Limited visibility behind tree line during operations • After reclamation, it will be difficult to see behind the tree line	Archdale TSF	20-90 feet	0.1 mile

Notes:
[1]KOPs listed in this table are for those where the Proposed Project would be visible. The table does not include KOPs from which the Proposed Project would not be visible.
[2]The visual changes described consider full buildout of the Proposed Project and do not incorporate potential mitigation measures.
I-85 = Interstate 85; KOP = key observation point; NC = North Carolina; RSF = rock storage facility; Technology Center = Albemarle Global Technology Center for Research and Development; TSF = tailings storage facility

Overall, the Proposed Project will be visible from locations adjacent to or at an elevation that provides views of the Proposed Project over vegetation and other screening elements (e.g., topography, buildings). The most commonly visible Proposed Project facilities will be the RSFs. These facilities will be the tallest structures on the KMM site at full buildout, so it is reasonable to expect them to also be the most visible. The TSF and other Proposed Project structures at the KMM site (e.g., communication towers, ROM pad, mineral processing facility, support buildings, etc.) near existing roads will also be partially visible. The mine pit will have limited visibility to much of the surrounding area.

The Proposed Project will primarily be visible from roads adjacent to the main mine and TSF properties, as well as from elevated viewpoints that provide panoramic views of the region.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to aesthetics or visual resources would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation measures are proposed at this time.

3.3.2. Air Quality (Clean Air Act)

Existing Conditions

Primary air quality standards were developed for pollutants to protect public health, including for sensitive populations such as children, the elderly, and asthmatics; and secondary standards were developed to protect the nation's welfare, including against decreased visibility and damage to animals, crops, and vegetation (Table 12: National Ambient Air Quality Standards).

Air quality modeling used the USEPA's American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) to evaluate impacts from criteria air pollutants such as nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM) with a diameter of 10 micrometers or less (PM_{10}), and PM with a diameter of 2.5 micrometers or less ($PM_{2.5}$), as well as hazardous air pollutants (HAPs) including benzene, polycyclic aromatic hydrocarbons (PAHs), arsenic, cadmium, lead, and nickel.

The air quality modeling results indicated that the Proposed Project would lead to increases in criteria pollutants and HAPs; however, these increases were projected to remain within the National Ambient Air Quality Standards (NAAQS) and European Union (EU) Numeric Air Quality Standards. The Proposed Project will not exceed the NAAQS for any regulated pollutants, including NO_2, CO, SO_2, PM_{10}, or $PM_{2.5}$. The assessment of HAPs against reference exposure levels and reference concentrations showed minimal potential for acute or long-term health impacts. Additionally, the concentrations of HAPs such as arsenic, benzene, PAH, cadmium, lead, and nickel were well below the EU thresholds, confirming minimal health risks. The cancer risk was found to be negligible, evaluated through the Maximum Exposed Individual and Maximum Likelihood Estimate scenarios.

The analysis used the USEPA's Modeled Emission Rates for Precursors to assess the secondary formation of $PM_{2.5}$ and ozone (O_3). The results confirmed that the significant impact levels for both $PM_{2.5}$ and O_3 will not be exceeded. Moreover, when combined with nearby monitoring data, the projected O_3 levels remained below the NAAQS and reinforced that the Proposed Project will not contribute to air quality violations.

The comprehensive air quality assessment for the Proposed Project demonstrates that it will comply with all relevant U.S. air quality standards. The findings indicate that the Proposed Project will not cause significant deterioration of ambient air quality, and the potential health risks associated with HAP emissions will be minimal.

Table 12: National Ambient Air Quality Standards

Pollutant		Primary/Secondary	Averaging Time	Level	Form
Carbon monoxide (CO)		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		Primary and secondary	Rolling 3-month average	0.15 µg/m^3 [a]	Not to be exceeded
Nitrogen dioxide (NO_2)		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and secondary	1 year	53 ppb[b]	Annual mean
Ozone (O_3)		Primary and secondary	8 hours	0.070 ppm[c]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate matter	$PM_{2.5}$	Primary	1 year	9.0 µg/m^3	Annual mean, averaged over 3 years
		Secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
		Primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide (SO_2)		Primary	1 hour	75 ppb[d]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Source: USEPA 2022

[a] In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.

[b] The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

[c] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O_3 standards.
[d] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a State Implementation Plan (SIP) call under the previous SO_2 standards (40 CFR 50.4(3)). An SIP call is a USEPA action requiring a state to resubmit all or part of its SIP to demonstrate attainment of the required NAAQS.
$\mu g/m^3$ = micrograms per cubic meter; $PM_{2.5}$ = particulate matter with an aerodynamic diameter of 2.5 microns or less; PM_{10} particulate matter with an aerodynamic diameter of 10 microns or less; ppb = parts per billion; ppm = parts per million

USEPA has concluded that the current NAAQS protect public health, including at-risk populations of older adults, children, and people with asthma with an adequate margin of safety. The airshed that contains the KMM and Archdale TSF sites in Cleveland County, North Carolina is in attainment or unclassifiable for NAAQS, meaning none of the ambient concentrations of criteria pollutants exceed the air quality standards (USEPA 2023a).

The quantity of the pollutants reasonably permitted in the air is defined based on the primary and secondary standards described above. Since 2015, all areas of North Carolina have been characterized by USEPA as meeting NAAQS (NCDEQ 2022a).[1] Albemarle has an Ambient Air Quality Monitoring Protocol (dated October 2023) that specifies conducting air quality analyses in line with NAAQS and EU Air Quality Standards (European Commission 2013).

Measurements were taken at three monitoring stations from August 1, 2023, to August 31, 2023, around the KMM site. All measurements obtained were well below NAAQS for PM_{10} and the international standard for PM_{10}.

Impacts during Site Preparation

Airborne PM has the potential to affect areas in which the Proposed Project's personnel will work, causing a potential health and safety issue. Roads will be constructed of aggregate material and the use of these roads by the Proposed Project's vehicles is anticipated to generate dust. An increase in levels of PM may potentially impact the health of site personnel and communities through which the Proposed Project's traffic will be routed and cause visual impairment and loss of wildlife and wildlife habitat as a result of long-distance transport of dust particles settling on the ground or in water.

Impacts during Construction

Construction activity will temporarily increase airborne dust particles and engine emissions. This change will be almost negligible. During construction, air emissions and dust will be generated from mobile sources (e.g., trucks, machinery) as well as ground-disruptive operations onsite. Construction activity will increase airborne dust particles and engine emissions.

Emissions from workers' vehicles and construction equipment will be temporary and transient in nature, and various BMPs, such as limiting vehicle idling, watering (if/as necessary), and use of

[1] According to data last updated in August 2022.

temporary construction entrances will be implemented to reduce potential impacts (Table 13: Facility-Wide Potential to Emit).

Table 13: Facility-Wide Potential to Emit

Air Pollutant	Potential Emissions (tons per year)
PM_{10*}	13.98
$PM_{2.5*}$	9.81
CO	36.24
NO_x	122.37
SO_2	0.17
VOC	6.62
CO_2	60,045
CH_4	0.41
N_2O	-
CO_2e	60,430

CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = hazardous air pollutant; N_2O = nitrous oxide; NOx = nitrogen oxide; $PM_{2.5}$ = particulate matter of a diameter of less than 2.5 micrometers; PM_{10} = particulate matter of a diameter of less than 10 micrometers; SO_2 = sulfur dioxide; VOC = volatile organic compounds
Note: The totals in the table above represent the total potential to emit from the site (permitted and permit exempt units), actual emissions are expected to be under these totals. All regulated sources of emissions (e.g., facility boilers) are subject to specific permitted emissions levels.

Impacts during Operations

An increase in vehicle and equipment use will result in increased noise, light, and air emissions (i.e., dust, CO, NO_2, PM) with the potential to impact the natural environment (including wildlife) as well as human health (mine personnel and nearby communities). Potential sources of Proposed Project-related impacts to air quality include the crushing circuit, conveyors, exhaust emissions from vehicles, construction equipment, generators, and fugitive dust emissions from hauling activities, road traffic, and typical operation activities. These activities have the potential to generate fugitive dust resulting in short-lived episodes when PM (PM_{10} and $PM_{2.5}$) concentrations are higher than air quality standards.

Table 14: Facility-Wide Potential to Emit

Air Pollutant	Potential Emissions (tons per year)
PM_{10*}	63.39
$PM_{2.5*}$	12.29
CO	596.04
NO_x	181.44
SO_2	5.54
VOC	33.19
CO_2	68,045
CH_4	.97
N_2O	40.2
CO_2e	80,053

Note: The totals in the table above represent the total potential to emit from the site (permitted and permit exempt units), actual emissions are expected to be under these totals. All regulated sources of emissions (e.g., facility boilers) are subject to specific permitted emissions levels.
CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = hazardous air pollutant; N_2O = nitrous oxide; NOx = nitrogen oxide; $PM_{2.5}$ = particulate matter of a diameter of less than 2.5 micrometers; PM_{10} = particulate matter of a diameter of less than 10 micrometers; SO_2 = sulfur dioxide; VOC = volatile organic compounds

Impacts during Closure and Post-Closure

No impacts are anticipated for closure or post-closure, as exposure limits will be below detection.

Table 15: Annual Decommissioning Emissions

Air Pollutant	Potential Emissions (tons per year)
PM_{10*}	18.60
$PM_{2.5*}$	3.24
CO	3.20
NO_x	7.89
SO_2	0.01
VOC	0.65
CO_2	4,773
CH_4	0.04
N_2O	-
CO_2e	4,774

CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = hazardous air pollutant; N_2O = nitrous oxide; NOx = nitrogen oxide; $PM_{2.5}$ = particulate matter of a diameter of less than 2.5 micrometers; PM_{10} = particulate matter of a diameter of less than 10 micrometers; SO_2 = sulfur dioxide; VOC = volatile organic compounds

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to air quality would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation measures are proposed at this time.

3.3.3. Climate Change (Tackling the Climate Crisis at Home and Abroad)

Existing Conditions

An examination through historical aerial photos of neighboring construction facilities that have undergone extensive clearing and ongoing aggregate operations (such as Martin Marietta's facility) reveals no discernible correlation between the Proposed Project's activities and climate change. Martin Marrietta's nearby quarry has been actively engaged in rock excavation and aggregate transportation via trucks for over two decades. Despite this prolonged mining activity, the surrounding vegetation has shown no signs of shifting toward different climate zone vegetation. Furthermore, an assessment of rainfall patterns in this area was conducted, using the construction of Martin Marietta's mining site as a reference and benchmark for comparison.

The analysis concluded that there has been no significant increase in rainfall events in the vicinity. Consequently, based on these findings, it is improbable that the Proposed Project will contribute to or reflect climate change impacts.

Temperature

The climate in the vicinity of the Proposed Project is humid subtropical with hot summers and mild winters. The monthly temperature ranges from a minimum of approximately 53 degrees Fahrenheit (°F) in January to a maximum of approximately 104°F in August, with an average temperature of approximately 60°F. Historical data show that temperatures in the area have been increasing, with an average rise of 0.3°F per decade since 1970, or roughly 1.7°F from 1895 to 2020. Climate change is expected to further contribute to this warming trend, potentially impacting surface water conditions such as increased evaporation rates and altered streamflow patterns. Predictive climate models suggest further warming in the future, potentially resulting in more frequent and severe heatwaves and droughts.

Impacts during Site Preparation, Construction, Operations, Closure, and Post-Closure

Extended periods of heavy rain can lead to construction-related issues such as runoff, flooding, and erosion. To mitigate these impacts during severe weather events that exceed typical daily conditions, BMPs will be implemented.

Unusually long-term, dry, hot weather can cause impacts to construction due to excessive dust and reduced air quality. Air quality BMPs will be used to prevent additional impacts during major weather events outside of average daily weather conditions.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to climate change as a result of the Proposed Project would occur, as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation measures are proposed.

3.3.4. Biological Resources

Existing Conditions

Various biological surveys were conducted during each season in 2022 and 2023. During these field efforts, some common mammals, reptiles, amphibians, and birds were regularly observed. Mammals observed included white-tail deer (*Odocoileus virginianus*), eastern gray squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), and raccoon (*Procyon lotor*). Additionally, black bears (*Ursus americanu*s) have been observed occasionally at the site. Common reptiles observed included eastern rat snake (*Pantherophis alleghaniensis*), northern water snake (*Nerodia sipedon*), Carolina anole (*Anolis carolinensis*), five-lined skink (*Plestiodon fasciatus*), eastern fence lizard (*Sceloporus undulatus*), eastern box turtle (*Terrapene carolina*), eastern mud turtle (*Kinosternon subrubrum*), and common musk turtle (*Sternotherus odoratus*). Common amphibians included American toad (*Anaxyrus americanus*), green frog *(Lithobates clamitans*), bullfrog (*Lithobates catesbeianus*), northern cricket frog (*Acris crepitans*), spring peeper (*Pseudacris crucifer*), northern dusky salamander (*Desmognathus fuscus*), and spotted salamander (*Ambystoma maculatum*; egg masses only).

An aquatic habitat assessment was conducted in 2022 to determine the aquatic faunal assemblage of the ponds and streams within the KMM and Archdale TSF sites (SWCA 2022a). In ponds, bluegill (*Lepomis macrochirus*) was the most common fish species, accounting for 98.4 percent of observations. Other fish recorded species included the redbreast sunfish (*Lepomis auritus*), spotted bass (*Micropterus punctulatus*), largemouth bass (*Micropterus salmoides*), and pumpkinseed (*Lepomis gibbosus*). Other fauna in pond habitats included mud turtles (*Kinosternon subrubrum*), musk turtles (*Sternotherus odoratus*), painted turtles (*Chrysemys picta*), a yellow-bellied slider (*Trachemys scripta scripta*), a northern water snake *(Nerodia sipedon*), and bullfrog tadpoles and adults (*Lithobates catesbeianus*).

Eleven fish species were observed in Kings Creek, South Creek, and two unnamed streams. The most abundant species observed in the stream habitats was the creek chub (*Semotilus atromaculatus*), which accounted for 51 percent of observed individuals. Instream riffle/runs were dominated by creek chub, bluehead chub (*Nocomis leptocephalus*), and rosyside dace

(*Clinostomus funduloides*). Pool structures in the streams were dominated by bluegill and redbreast sunfish.

The only freshwater bivalve observed was Asian clam (*Corbicula* sp.), an introduced species of mollusk that is considered invasive. Numerous individuals of crayfish were observed and captured in the two streams. All crayfish were members of the Cambarus (*Puncticambarus*) sp. C (*acuminatus*) complex.

All fish, crustacean, and bivalve species observed had an International Union for Conservation of Nature status of Least Concern, which is a species that the International Union for Conservation of Nature has classified as not being a priority for species conservation because the species is abundant in the wild. They were not endangered, vulnerable, threatened, near threatened, or conservation dependent (IUCN 2022). Additionally, none were listed by the USFWS under the ESA, and none were state listed. The aquatic features of the Archdale TSF did not contain federally protected species.

The bird species observed included northern cardinal (*Cardinalis cardinalis*), American crow (*Corvus brachyrhynchos*), and blue jay (*Cyanocitta cristata*).

The USFWS Information for Planning and Consultation (IPaC) resource list identified tricolored bat (*Perimyotis subflavus*) as having moderate potential to occur in the KMM and Archdale TSF sites or vicinity (Table 16: USFWS Federally Listed Species with Potential to Occur within the Project Area) (USFWS 2024a, 2024b).

Table 16: USFWS Federally Listed Species with Potential to Occur within the Project Area

Common Name (Scientific Name)	Listed Status	Habitat	Potential to Occur within Project Area
Tricolored bat (*Perimyotis subflavus*)	Proposed endangered	During the spring, summer, and fall (i.e., non-hibernating seasons), it primarily roosts among live and dead leaf clusters of live or recently dead deciduous hardwood trees. During winter, it hibernates in caves, culverts, or abandoned water wells. Forages both in treetops and closer to ground.	High; detected during 2022 bat acoustic surveys (SWCA 2022f).
Monarch butterfly (*Danaus plexippus*)	Candidate	Prairies, meadows, grasslands, and roadsides with milkweed (*Asclepias* spp.) and flowering plants.	Low; very limited suitable habitat along utility ROWs; individuals not identified during 2022 habitat surveys (SWCA 2022c).
Dwarf-flowered heartleaf (*Hexastylis naniflora*)	Threatened	Acidic soils along bluffs and adjacent slopes, boggy areas next to streams and creek heads, and along slopes of nearby hillsides and ravines. Endemic to upper Piedmont of North Carolina and South Carolina.	Low; suitable habitat observed; however, this species was not identified during presence/absence surveys in 2022 (SWCA 2022d).

Source: USFWS 2024a, 2024c; ROW = right-of-way

Impacts during Site Preparation

Regarding forest-dwelling species, there is risk of direct mortality if occupied roost trees are removed while in use. Since forest-dwelling species are habitat generalists and typically roost in the foliage of living trees, identifying specific roost trees can be challenging. Site preparation, however, will not impact areas of habitat or aquatic resources.

Impacts during Construction

During construction of the facility, there may be minor, localized, and temporary adverse impacts to biological resources present at the Proposed Project site. Potential adverse impacts to wildlife species during construction include disturbance from noise and human activity and risk for direct mortality from ground disturbance. Tree removal and road construction may cause mortality and loss of habitat and foraging for some species. Wildlife and wildlife habitat may be affected by increased activity onsite during the construction phase resulting in changes in species, populations, and behavior of wildlife, as well as loss of wildlife habitat or habitat connectivity in various areas. Wildlife incidents or mortalities as a result of vehicular strikes, wildlife entering active construction areas, and attraction of wildlife to food wastes may increase with increased human presence onsite. Increases in areas of disturbance and dust levels may also negatively affect wildlife habitat on or adjacent to the site.

Impacts during Operations

Impacts to biological resources are not anticipated during operations due to avoidance of the Proposed Project site from certain species of animal.

Impacts during Closure and Post-Closure

Adverse impacts to biological resources are not anticipated after closure and post-closure.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to biological resources would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation measures are proposed at this time.

3.3.5. Habitat Vegetation

Existing Conditions

The habitat vegetation at the KMM and Archdale TSF sites has been impacted by the effects of project activities over an extended period. Mining at Kings Mountain from the 1940s until 1994 heavily disturbed the KMM site. Much of the vegetative communities at the KMM and Archdale TSF sites are a result of ecological regeneration of historical mining areas. Outside of the mining areas and mine tailings landings, most of the KMM and Archdale TSF sites consist of deciduous forest and mixed deciduous-pine forests in various stages of forest succession.

In addition, portions of the KMM site with sizable wetlands and waterways have been or are currently influenced by beaver activity.

Six upland land use / vegetative communities have been mapped within the KMM and Archdale TSF sites:

Developed—This land use category includes areas recently and currently used for previously impacted activities associated with the chemical plant, Technology Center, former campground, movie theater, and recently acquired residential properties. Vegetation in these areas is primarily grasses and ornamentals. Some areas are barren ground.

Forested Upland Deciduous—Upland deciduous forests at the KMM and Archdale TSF sites are generally characterized by relatively widely spaced, large trees with a developed understory of smaller trees, shrubs, and some herbaceous plants. Dominant canopy tree species are American sweetgum, tulip tree (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), red maple, white oak (*Quercus alba*), red oak (*Quercus rubra*), mockernut hickory (*Carya tomentosa*), and chestnut oak (*Quercus montana*). Understory species commonly observed in the deciduous forest are flowering dogwood (*Cornus florida*), black cherry (*Prunus serotina*), American holly (*Ilex opaca*), American hornbeam (*Carpinus caroliniana*), eastern red cedar (*Juniperus virginiana*), greenbrier (*Smilax* spp.), blackberry (*Rubus* spp.), and spicebush (*Lindera benzoin*).

Forested Upland Evergreen—The upland evergreen forest community is dominated by stands of loblolly pine (*Pinus taeda*). Other less common evergreen trees observed were Virginia pine (*Pinus virginiana*) and shortleaf pine (*Pinus echinata*).

Forested Upland Mix—This vegetative community is the most common forest type and includes a mixture of deciduous and evergreen trees and shrubs as mentioned above. There are both mature and successional mixed forests throughout the KMM and Archdale TSF sites.

Herbaceous Upland—The herbaceous upland communities consist of non-wetland areas dominated by non-woody vegetation. These communities are common within the existing right-of-way, in recently disturbed or cleared areas, and along edge habitats (e.g., forest edges, roadsides).

Scrub-Shrub Upland—This community type is a transition between the herbaceous and forested upland areas. It includes species found in both the herbaceous community and young saplings found in the forested uplands.

Three wetland community types have been identified and delineated at the KMM site. Wetlands were determined to be non-jurisdictional. In addition, streams and open water bodies (palustrine unconsolidated bottom [PUB]) have also been identified and delineated (Figure 11: Wetland Delineations – KMM). Wetland vegetative communities include:

Palustrine Emergent Wetland (PEM)—The PEM wetland communities consist of a prevalence of hydrophytic non-woody vegetation less than 3 feet in height, generally located in open areas without a tree canopy layer. Many of the emergent wetlands are along pond and stream edges, or in small depressional areas where woody vegetation has not developed. Emergent wetlands

are also found within mowed and maintained utility line easements. Most emergent wetlands are subject to periodic inundation rather than permanent flooding. Dominant herbaceous species included giant cane (*Arundinaria gigantea*), bushy bluestem (*Andropogon glomeratus*), lamp rush (*Juncus effusus*), cottongrass bulrush (*Scirpus cyperinus*), lesser poverty rush (*Juncus tenuis*), fowl blue grass (*Poa palustris*), shallow sedge (*Carex lurida*), and goldenrod species (*Solidago* sp.).

Palustrine Forested Wetland (PFO)—The PFO wetland communities consist of a prevalence of hydrophytic woody species 20 feet or greater in height and 3 inches or greater in diameter at breast height. Most of the forested wetlands are mature forests with large trees along stream sides or within flooded areas influenced by human and/or beaver dams. Smaller forested wetlands are generally associated with the emergence of groundwater on hillsides adjacent to streams and likely do not have year-round surface water. Several forested wetlands were also observed along the edges of lakes and ponds that may be periodically inundated after large storm events. The tree strata are dominated by red maple (*Acer rubrum*), American sycamore (*Platanus occidentalis*), water oak (*Quercus nigra*), sugarberry (*Celtis laevigata*), American elm (*Ulmus americana*), and American sweetgum (*Liquidambar styraciflua*).

Palustrine Scrub-Shrub Wetland (PSS)—The PSS wetland communities consist of a prevalence of hydrophytic woody vegetation less than 20 feet tall. Most of the scrub-shrub wetlands in the KMM and Archdale TSF sites are in linear depressional areas along the Gateway Trail or within portions of the Executive Club Lake wetland complex and are subject to periodic flooding. Most of these wetlands occur as dense thickets dominated by only a few scrub-shrub species and have a sparse herbaceous layer. The scrub-shrub strata are dominated by brookside alder (*Alnus serrulate*), American sycamore, black willow (*Salix nigra*), Chinese privet (*Ligustrum sinense*), and red maple.

Details of wetlands and streams identified and delineated on the KMM site can be found on Figures 11 and 12 (Wetland Delineations – KMM, and Surface Water Features – KMM) and Figure 13: Watershed Boundaries.

Figure 11: Wetland Delineations – KMM

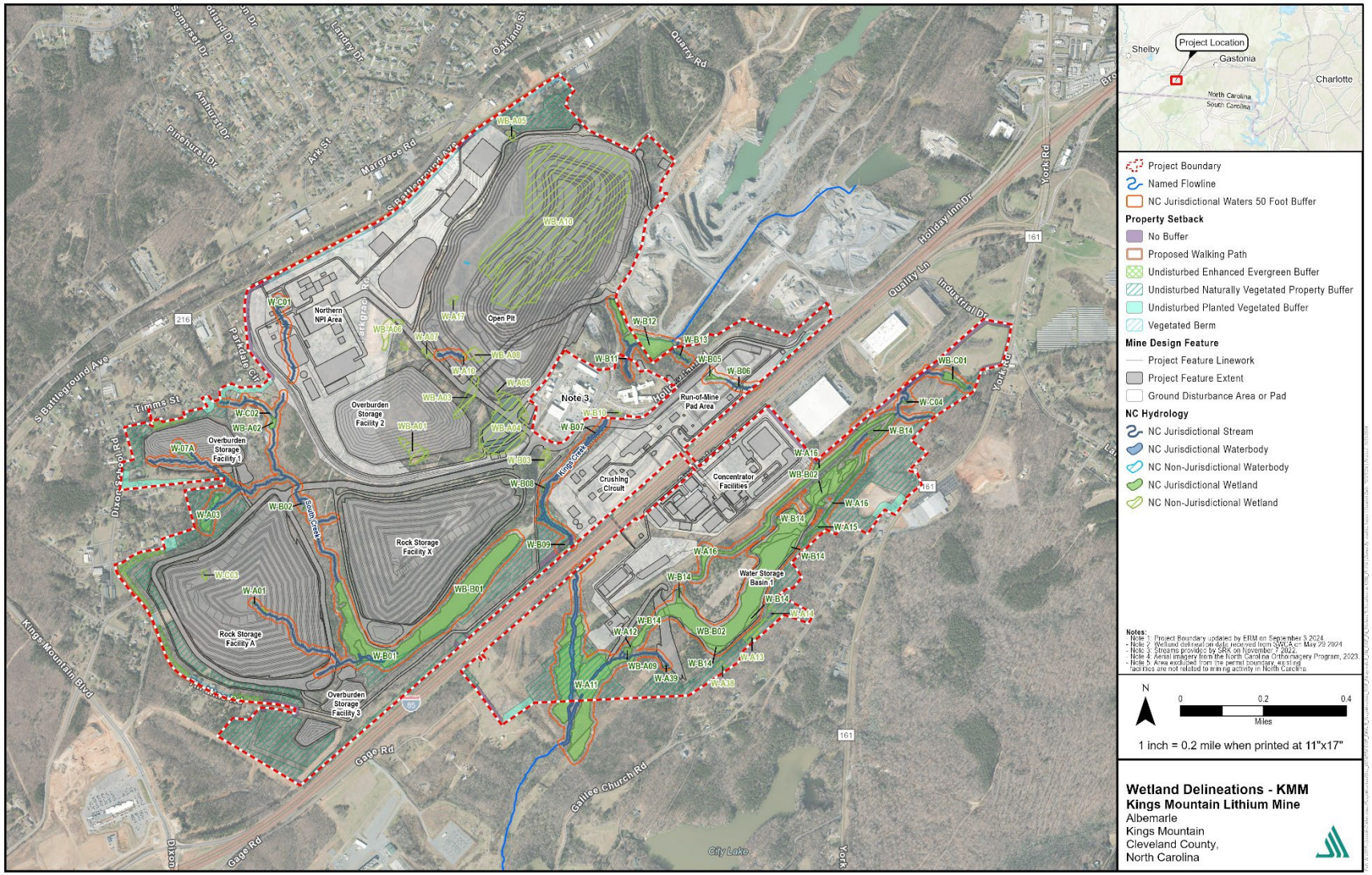


Figure 12: Surface Water Features – KMM

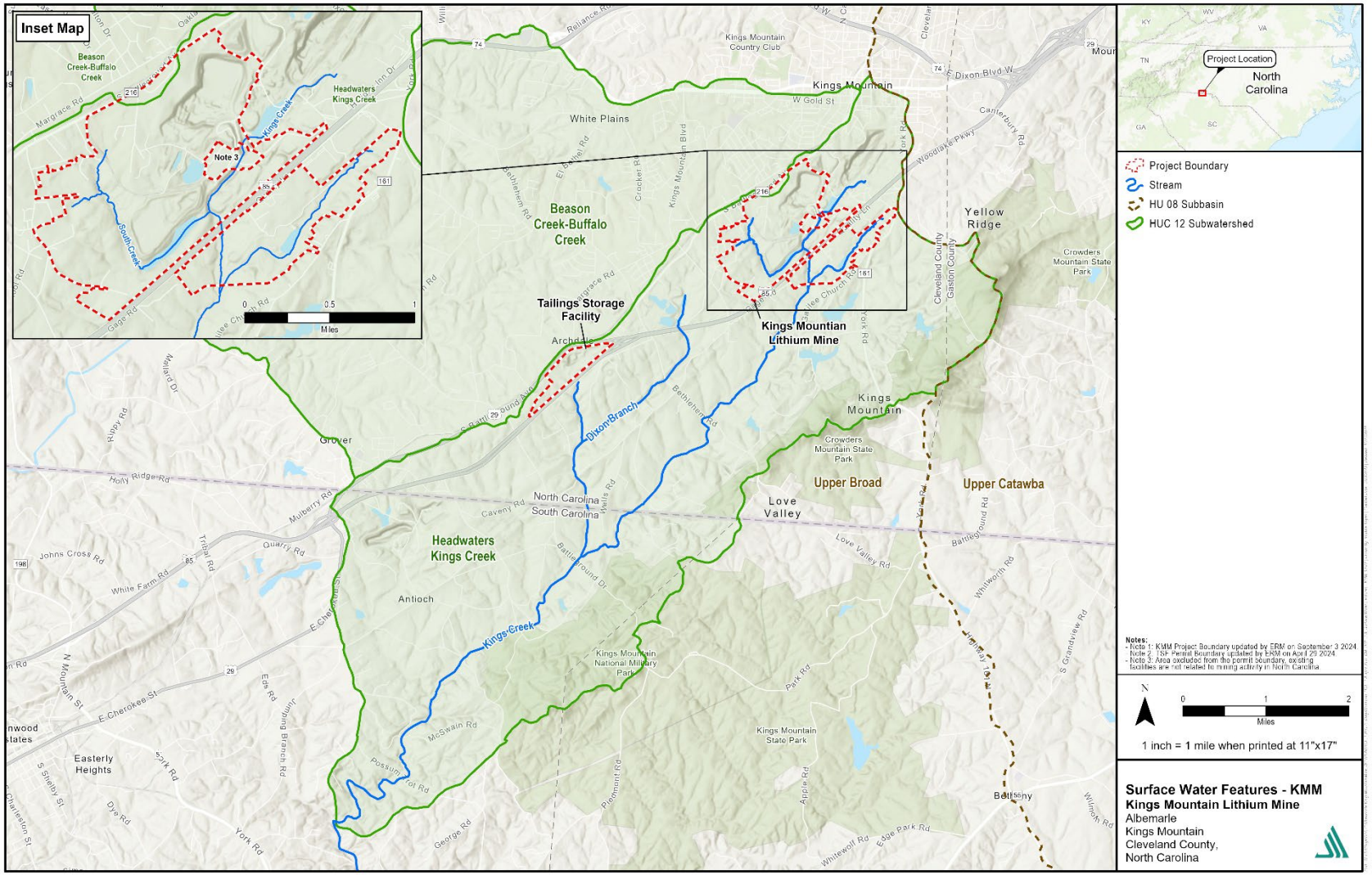
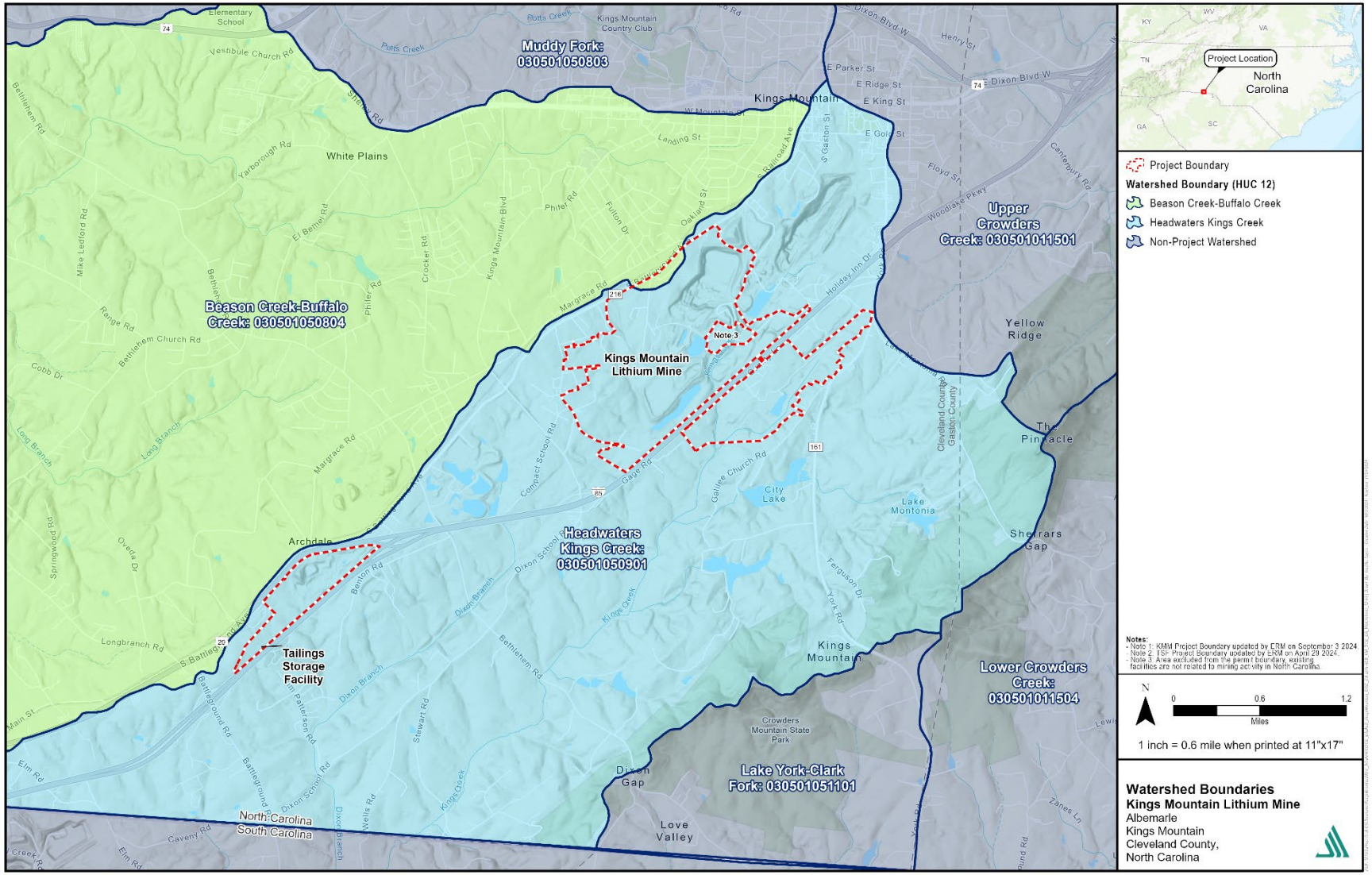


Figure 13: Watershed Boundaries



Impacts during Site Preparation

Tree removal and loss of habitat through site preparation is expected to cause damage and/or mortality to certain bat species.

Impacts during Construction, Operations, Closure and Post-Closure

Wildlife and wildlife habitat may be affected by the increase in activity onsite during the construction phase resulting in changes in species, populations, and behavior of wildlife, as well as loss of wildlife habitat or habitat connectivity in various areas. Wildlife incidents or mortalities as a result of vehicular strikes, wildlife entering active construction areas, and attraction to food wastes may increase with increased human presence onsite. Increases in disturbance areas and dust levels may also negatively affect wildlife habitat on or adjacent to the site.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to wildlife or vegetation would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation is proposed at this time.

3.3.6. Threatened and Endangered Species (Endangered Species Act of 1973)

Existing Conditions

Kings Mountain

Federally listed, threatened, and endangered species are protected under the ESA. Three species were identified on the USFWS IPaC resource list (USFWS 2024) as having the potential to occur in the KMM or vicinity (see Table 16: USFWS Federally Listed Species with Potential to Occur within the Project Area): the tricolored bat (*Perimyotis subflavus*), monarch butterfly (*Danaus plexippus*), and dwarf-flowered heartleaf (*Hexastylis naniflora*). Under the ESA, the USFWS can also propose and designate critical habitats for threatened or endangered species. No USFWS-designated critical habitats for federally listed species are within the KMM and Archdale TSF sites (Appendix C, Federally Listed Species for Kings Mountain).

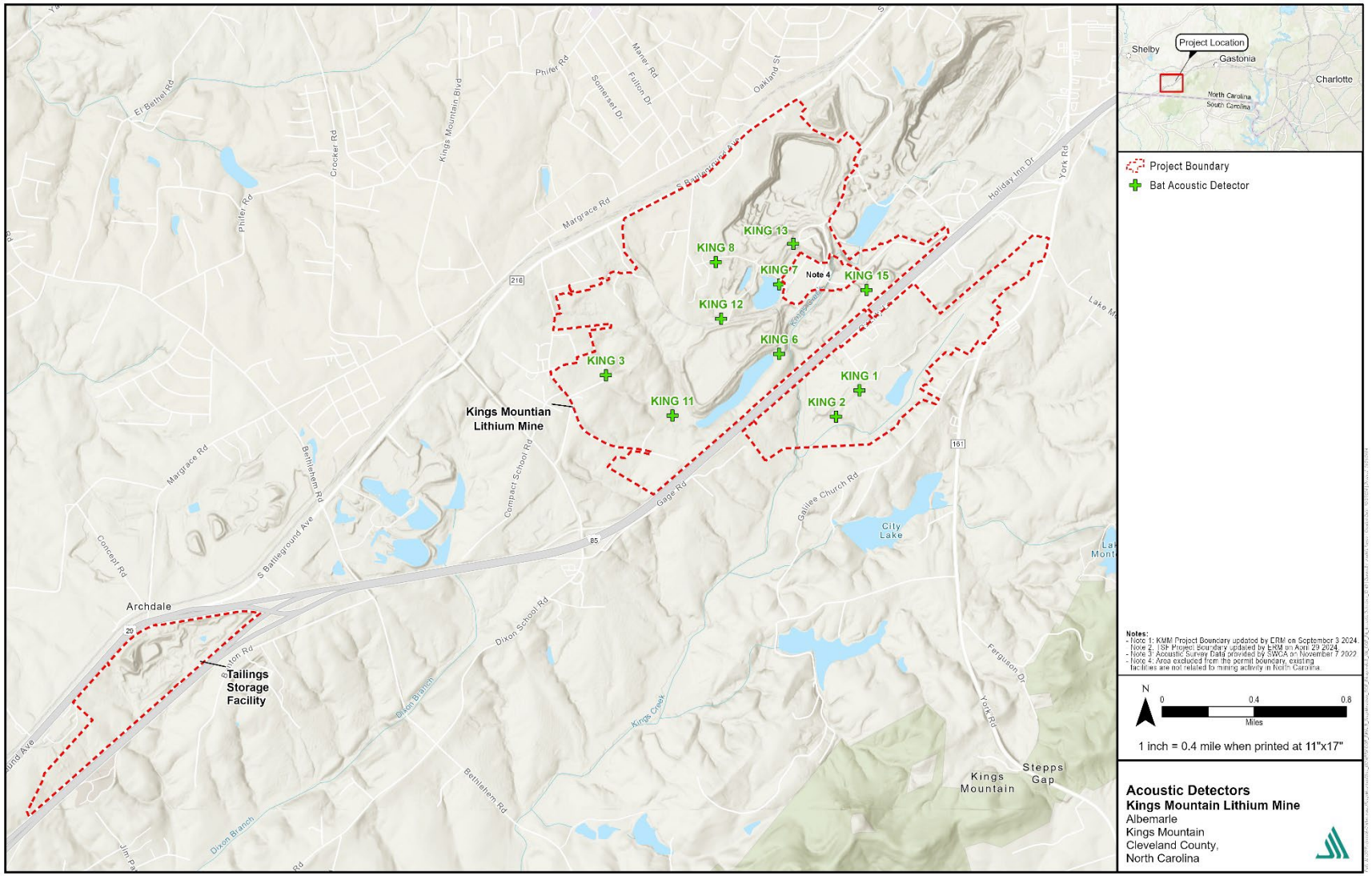
Approximately 47 acres of suitable dwarf-flowered heartleaf (*Hexastylis naniflora*) habitat are possible in the KMM and Archdale TSF sites. SWCA Environmental Consultants (SWCA) conducted presence/absence surveys in these suitable habitats during the optimal survey window, and no dwarf-flowered heartleaf populations were observed in the April and May 2024 surveys or the previous May 2022 survey. Based on the results of these presence/absence surveys, the Proposed Project will have no effect on the federally listed dwarf-flowered heartleaf. If this species is subsequently identified, any occupied habitat should be avoided until after consultation with the USFWS.

According to the USFWS, surveys are valid for 2 years and will be required again starting in April 2026, if the species is still listed at that time (SWCA 2024c). If the species is removed from the federal list, the dwarf-flowered heartleaf may remain a state-listed species.

Presence/absence surveys were also conducted during the optimal survey window within potentially suitable habitat on April 8 to 10, 2024 and May 21, 2024. The 15 survey areas covered 46.74 acres of suitable habitat varying from low to high suitability. The threatened dwarf-flowered heartleaf was not identified in any of the survey areas. Several populations of the little heartleaf, a common species, were observed during the surveys. This species is noticeably larger than dwarf-flowered heartleaf and has calyx tube lengths generally longer than 1 centimeter. However, other flowers that were observed in these areas, or often adjacent to flowerless plants, had calyx tube openings larger than 8 millimeters and/or a calyx tube longer than 1 centimeter, which are not characteristics consistent with dwarf-flowered heartleaf (SWCA 2022e).

No USFWS-designated critical habitats for federally listed species are within the KMM and Archdale TSF sites (Appendix D, Federally Listed Species for the Archdale Tailings Storage Facility). The tricolored bat (*Perimyotis subflavus*), a habitat generalist, was detected during acoustic surveys conducted by SWCA in 2022 at KMM. (Figure 14: Acoustic Detectors). This bat is not currently state or federally listed, but in September 2022, the USFWS proposed to list the tricolored bat as an endangered species in response to observed population declines resulting primarily from white-nose syndrome (Federal Register 87:56381). A final decision regarding the listing status of the species is expected in 2024.

Figure 14: Acoustic Detectors



Should the tricolored bat become listed as endangered, consultation with the USFWS recommends, to keep the Not Likely to Adversely Affect (NLAA) status, that construction should commence outside pup season and winter torpor season. The tricolored bat is expected to be present at the KMM and Archdale TSF sites May 1 to July 15 (pup season) and December 15 to February 15 (winter torpor season). Conducting pre-clearing surveys and avoiding the removal of forested habitat during these timeframes will likely minimize the potential for direct mortality, and small-scale habitat modification is unlikely to result in harm to individuals.

All other bat species have a low to very low potential to occur due to a general lack of suitable habitat, as confirmed by field surveys.

Archdale Tailings Storage Facility

Federally listed, threatened, and endangered species are protected under the ESA. Five species were identified on the USFWS IPaC resource list (USFWS 2024) as having potential to occur at the Archdale TSF or vicinity (see Table 16: USFWS Federally Listed Species with Potential to Occur within the Project Area). The tricolored bat (*Perimyotis subflavus*), monarch butterfly (*Danaus plexippus*), and dwarf-flowered heartleaf (*Hexastylis naniflora*). There is moderate potential for tricolored bat to occur at the Archdale TSF site based on the forested and shrubby habitat with surrounding aquatic features. There is no suitable habitat for the monarch butterfly or the dwarf-flowered heartleaf, as most soils and vegetation at the Archdale TSF site were substantially disturbed or removed during mining activities that only recently ceased. Regenerating vegetation is currently in a dense, successional phase that does provide suitable habitat.

The tricolored bat, a habitat generalist, was detected during acoustic surveys conducted by SWCA in 2022 at the KMM site approximately 2 miles east of the Archdale TSF site. Development within the Archdale TSF site will impact forested habitat used by this species and other bats during the summer season.

Impacts during Site Preparation

Tree removal and road construction may cause mortality, loss of habitat, and loss of foraging and prey for some species. Nightshift work involving bright lights may attract insects and other prey for certain species and may cause mortality for bats.

Impacts during Construction

Protected species may be affected by the increase in activity onsite during the construction phase resulting in changes in species, populations, and behavior of wildlife, as well as loss of wildlife habitat or habitat connectivity in various areas.

Impacts during Operations

While the Proposed Project site could serve as foraging habitat for bats, the Proposed Project is unlikely to significantly alter the overall nature and quality of foraging habitat in the region. Due to the lack of natural habitat on or near the Proposed Project site, and the presence of

surrounding industrial activities, any impacts on listed threatened and/or endangered species resulting from the Proposed Project will likely be minor. Protected species are expected to avoid the area due to ongoing operational activities that cause vibrations and disrupt their adaptive habitat.

Impacts during Closure and Post-Closure

Impacts during closure and post-closure are not anticipated.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to threatened or endangered species would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

Development within the KMM and Archdale TSF sites could impact forested habitat used by the tricolored bat and other bats during the summer season. Albemarle will comply with the USFWS's seasonal tree clearing restrictions from May 1 to July 15 (pup season) and December 15 to February 15 (winter torpor season).

Other recommended management practices that may be beneficial to all bat species include minimizing forest clearing, avoiding impacts to large and intact contiguous forested blocks, and avoiding impacts to water quality by limiting stream/wetland impacts and implementing erosion and sediment controls along waterways. Additionally, revegetating with native grassland species using a pollinator mix could promote prey diversity and abundance, which will also benefit other wildlife, such as monarch butterflies.

Should the tricolored bat become listed as endangered, consultation with the USFWS is recommended to determine suitable measures, such as habitat conservation or enhancement, to address potential adverse effects. The tricolored bat is expected to be present at the KMM and Archdale TSF sites from April through October. Conducting a pre-clearing survey and avoiding the removal of forested habitat from April through October is likely to minimize the potential for direct mortality, and small-scale habitat modification is unlikely to result in harm to individuals.

3.3.7. Migratory Bird Treaty Act of 1918 and Bald and Golden Eagle Protection Act of 1940

Existing Conditions

The Migratory Bird Treaty Act (MBTA) avian species mapped through IPaC at the KMM and Archdale TSF locations are frequently seen and consistently documented during the annual breeding bird survey in this area. Current conditions show the region as a migratory bird drop zone. The breeding bird survey is a community-driven effort aimed at tracking the population dynamics of breeding birds across North America. Notable MBTA and Bird of Conservation

Concern (BCC) species observed include the Chimney Swift (*Chaetura pelagica*), Chuck-will's-widow (*Antrostomus carolinensis*), Eastern Whip-poor-will (*Antrostomus vociferus*), Grasshopper Sparrow (*Ammodramus savannarum perpallidus*), Prairie Warbler (*Setophaga discolor*), and Wood Thrush (*Hylocichla mustelina*).

According to IPaC and the Rapid Avian Information Locator, the Bald Eagle (*Haliaeetus leucocephalus)* has the potential to occur at the KMM and Archdale TSF sites. Breeding season is from September 1 to July 31. The probability of presence is highest during the first two weeks of March. The Bald Eagle is not a BCC in this area, but it warrants attention because of the Bald and Golden Eagle Protection Act, or because of potential susceptibilities in areas from certain types of development or activities.

Persons or organizations who plan or conduct activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate conservation measures. Bald Eagle presence should be monitored and any impact(s) to the species requires a USFWS permit (USFWS 2024).

Impacts during Site Preparation

Site preparation includes the removal of trees and shrubs, which reduces habitat for roosting and nesting, as well as foraging opportunities for migratory bird species.

Impacts during Construction

Construction could cause loss of habitat and avoidance of the area for migratory bird species.

Impacts during Operations

Migratory bird species may experience minimal impacts, as they have the capacity to become mobile when disturbed and can relocate to alternative areas beyond the boundaries of operational sites.

Impacts during Closure and Post-Closure

No impacts are expected during closure and post-closure.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to migratory bird species would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation is proposed at this time.

3.3.8. Cultural Resources National Historic Preservation Act (Section 106) and the Native American Graves Protection and Repatriation Act

This section describes the existing cultural resource conditions in the vicinity of the Proposed Project site.

Existing Conditions

Kings Mountain

A Phase I archaeological survey was conducted in accordance with Section 106 of the NHPA and its implementing regulations, found at 36 CFR Part 800, and in accordance with applicable federal and state guidelines and requirements, including the North Carolina Office of State Archaeology Archaeological Investigations Standards and Guidelines (NCOSA 2017). The Phase I archaeological fieldwork was conducted between June 6 and August 22, 2022 (SWCA 2023a). Fieldwork consisted of a visual inspection, pedestrian survey, and shovel testing of the KMM site. No previously recorded archaeological sites are located within the KMM site. Geotechnical coring in floodplains however indicated potential for deeply buried archaeological sites within several locations with fine alluvial and eolian sediments below the vertical extent of shovel testing. During the survey, investigators identified 24 newly recorded sites within the KMM site. Twenty-two sites were determined to be ineligible for listing in the National Register of Historic Places. ParkGrace School and the Macedonia Baptist Church are the two sites within the Proposed Project boundary which may be determined to be eligible for the National Register of Historic Places and are still pending as demolition eligible. The survey also identified 59 aboveground historic-age resources.

During this study, no graves were found in the Proposed Project area.

SHPO issued full concurrence on SWCA's report (SHPO 2023). Letters of concurrence from SHPO are dated April 12, 2023, September 27, 2023, February 27, 2024, and October 11, 2024, and conclude there are four eligible and 55 ineligible properties. The four eligible properties are CL1717; Macedonia Baptist Church—eligible under Criterion C and meets Criterion Consideration A as an individual resource, it is also eligible as a complex or district under Criteria A and C and meets Criterion Consideration A; CL1723; and Galilee United Methodist Church—eligible under Criterion C and meets Criterion Consideration A (Appendix E, Cultural, Historical, and Archaeological Resources). Further concurrence from SHPO is pending.

Archdale Tailings Storage Facility

Phase I archaeological survey activities were conducted in accordance with Section 106 of the NHPA and its implementing regulations, found at 36 CFR Part 800, and in accordance with applicable federal and state guidelines and requirements, including the North Carolina Office of State Archaeology Archaeological Investigation Standards and Guidelines (NCOSA 2023).

The Phase I archaeological fieldwork was conducted on September 18 and September 21, 2023. Fieldwork consisted of a visual inspection, pedestrian survey, and shovel testing of the TSF area. No previously recorded archaeological sites are found in the Archdale TSF site, and investigators did not identify any during the survey. Development of the Archdale TSF will have no adverse effect on historic properties, and no additional work is recommended for the current Archdale TSF site.

No graves/human remains were found within the Proposed Project site during this study.

Impacts during Site Preparation

Site preparation will include demolition of old residential homes but is not expected to impact registered cultural historic resources at the KMM site.

Site preparation activities will not impact registered cultural historic resources at the Archdale TSF. State and federal protocols and BMPs will be implemented if historical resources are found during site preparation.

Impacts during Construction

Ground disturbing activities associated with construction such as site clearing, grading, excavation and filling have the potential to impact archaeological resources. However, located archaeological resources eligible for demolition are still being considered. These measures are implemented based on state and federal protocols and procedures if archaeological resources are found during construction.

Impacts during Operations

Operations are not anticipated to result in any impact to terrestrial archaeological resources; however, Albemarle has committed to EPMs to further reduce the risk of potential impacts to terrestrial archaeological resources. These measures are implemented based on state and federal protocols and procedures if archaeological resources are found during operations.

Impacts during Closure and Post-Closure

No impacts are anticipated to cultural, historical, terrestrial and archaeological resources during closure and post-closure activities.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to cultural resources would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation is proposed at this time.

3.3.9. Geology and Soils

Existing Conditions

Geology

The Kings Mountain deposit is situated in North Carolina's TSB and is located within a large-scale shear zone known as the Kings Mountain Shear Zone (KMSZ). The KMSZ extends for at least 37 miles and has a width of several hundred feet. It strikes northeast and exhibits steep to moderately dipping deformation, combining both ductile and semi-brittle behavior. The general topography of the Proposed Project area has been substantially altered due to mining. The Kings Mountain deposit itself is a lithium-bearing rare-metal pegmatite intrusion along the KMSZ. At its widest point in the legacy pit area, the intrusion spans approximately 1,500 feet, narrowing to 400 to 500 feet south of the legacy pit. The geology of the open pit's footprint primarily consists of metamorphic units with beds oriented to the northeast. Within this context, spodumene pegmatite intrusions intersect schist units.

Figure 15: KMM and TSF USGS 2008 Geology Map

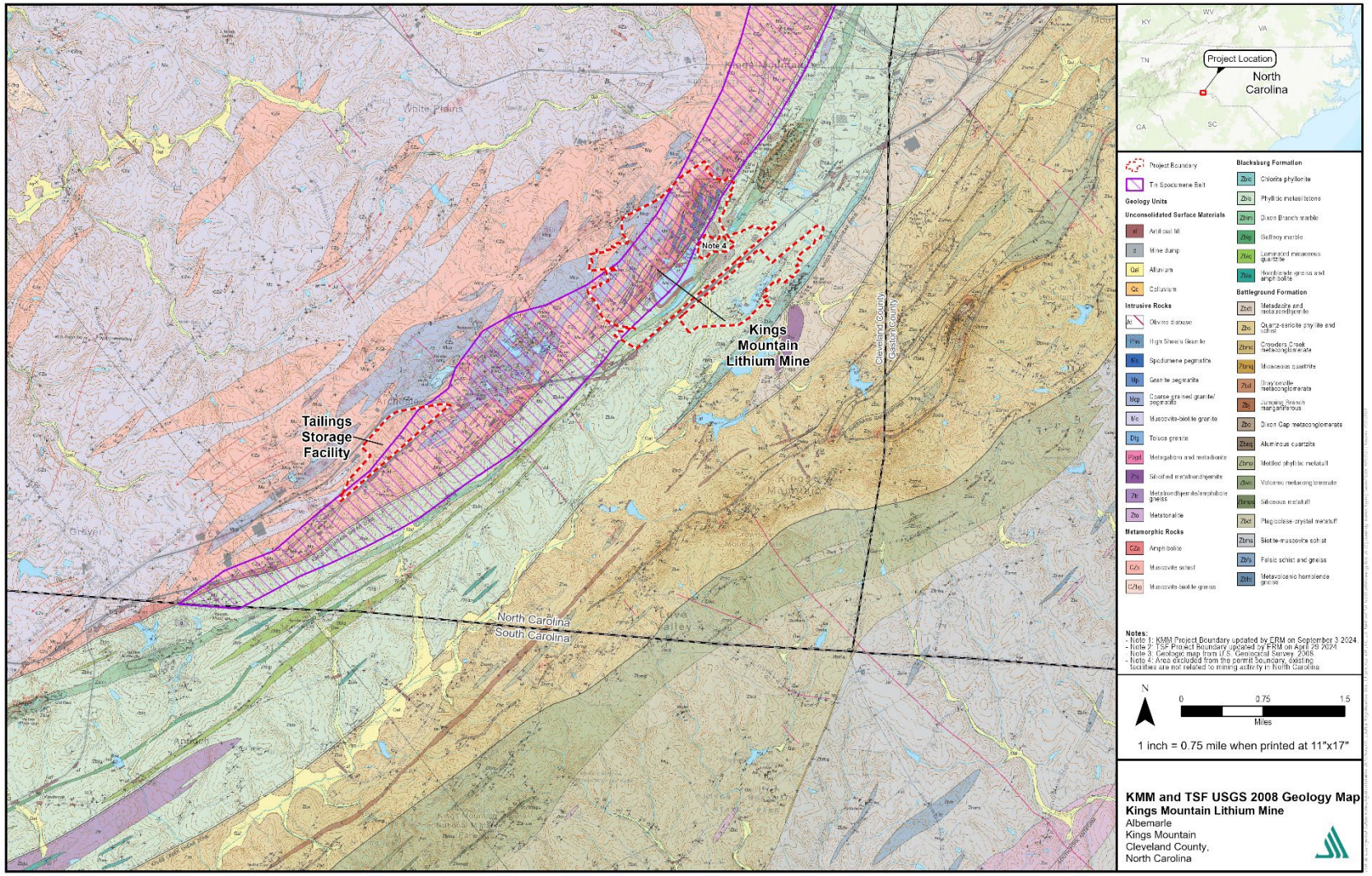
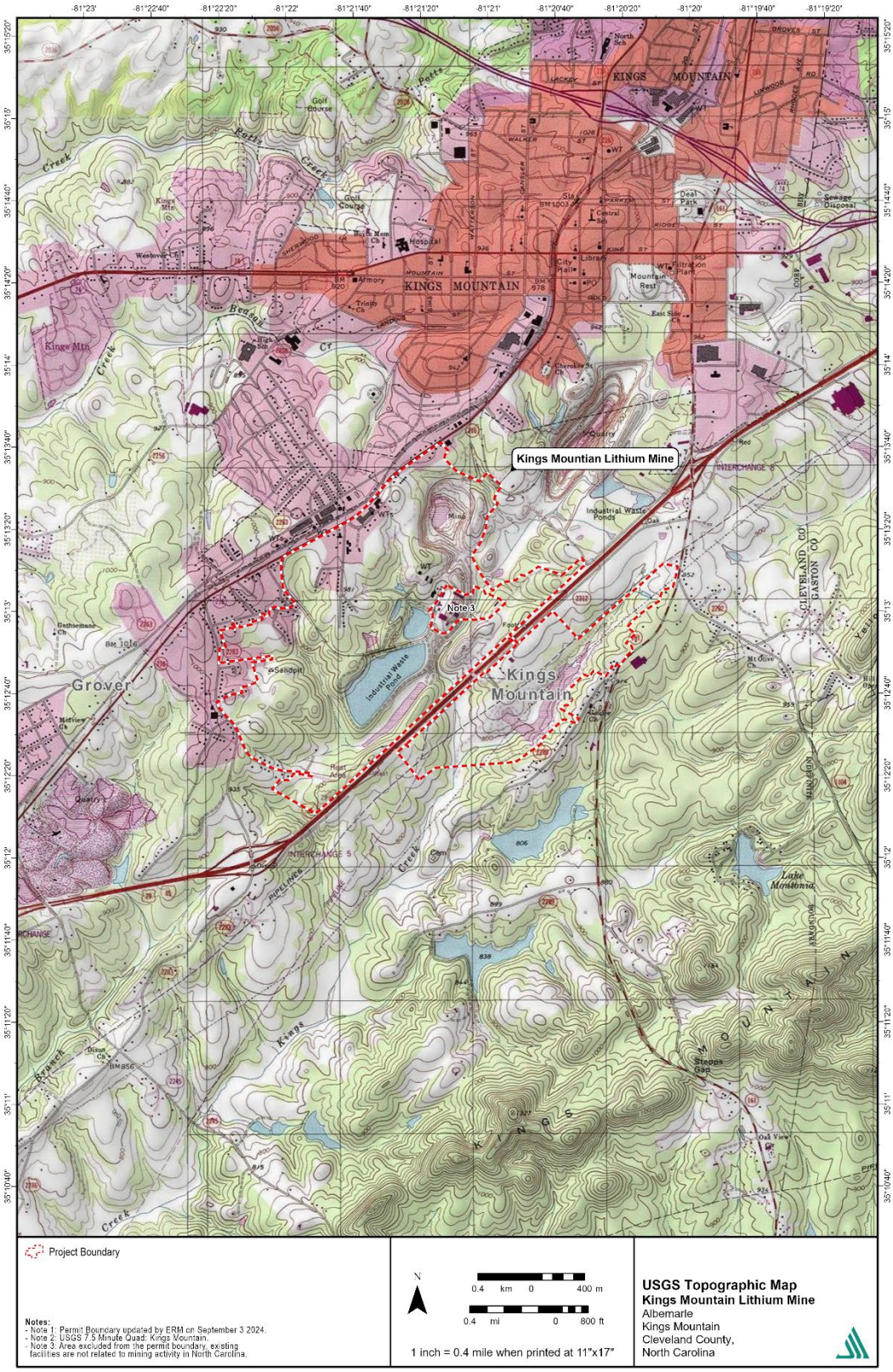


Figure 16: USGS Topographic Map



Soils

The U.S. Department of Agriculture Soil Survey has mapped 16 unit types and three non-soil units within the KMM site. Soils consist primarily of Udorthents, loamy, 0 to15 percent slopes (approximately 32 percent of the Kings Mountain tract); Madison-Bethlehem complex, 2 to 8 percent slopes (approximately 9 percent of the Kings Mountain tract); and Madison-Bethlehem complex, 8 to 15 percent slopes (approximately 8 percent of the KMM site). Most of the soils were classified as well drained. Approximately 2 percent (Chewacia loam, 0 to 2 percent slopes) of the KMM site soils were considered hydric.

At the Archdale TSF site, the soils were primarily mapped as Hulett gravely sandy loam, 2 to 8 percent slopes (26.2 percent of site); Madison gravelly sandy clay loam, 2 to 8 percent slopes, moderately eroded (21.1 percent of site); and Madison- Bethlehem complex, 8 to 15 percent slopes, very stony, moderately eroded (20 percent of site). All the soil types within the Archdale TSF were classified as well drained and were not listed as hydric.

Impacts during Site Preparation

The Proposed Project will require land disturbance and grading; however, the land is relatively flat, and the Proposed Project is designed to minimize land disturbance and grading. During site preparation, the minor disturbance impact to geological features will result from construction, trucks, excavation, concreting, and filling activities.

Impacts during Construction

Ground disturbance during construction and mining may impact some geological features and soils through replacement of soil types such as clay, limestone, and impervious surfaces.

Impacts during Operations

Ground disturbance during operations may impact some geological features and soils through mining of geological resources.

Impacts during Closure and Post-Closure

No additional impacts are anticipated during closure and post-closure activities.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to geology or soils would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

To mitigate potential future impacts to soils and underlying geology, the Proposed Project will implement spill prevention and emergency response procedures, as well as a facility monitoring and inspection program in accordance with MSHA standards. Specifically, the Proposed Project will include a spill prevention and response plan executed by an onsite emergency response

team. The goal of these plans will be to prevent spilled constituents from infiltrating the soil and reaching underlying geology and groundwater.

Throughout the construction phase and during mining operations, all erosion control measures mandated by local, state, and federal guidelines will be diligently implemented and followed. These measures will encompass various actions, including using water trucks to control dust, installing fences or similar barriers to prevent offsite releases and protect wetlands during construction, and revegetating stockpiles or disturbed soil areas. Additionally, at road entrances, materials such as riprap or gravel will be used to reduce or eliminate vehicle track-out onto public roadways caused by construction vehicles.

3.3.10. Greenhouse Gases

Existing Conditions

The CEQ issued interim guidance on January 9, 2023, relevant to the consideration of GHGs and the climate change effects of proposed actions under NEPA. The guidance advises federal agencies to consider "(1) the potential effects of a proposed action on climate change, including by assessing both GHG emissions and reductions from the proposed action; and (2) the effects of climate change on a proposed action and its environmental impacts" (CEQ 2023).

GHGs play a pivotal role in the Earth's atmospheric dynamics, effectively trapping heat and contributing to the phenomenon of global climate change (USEPA 2023b). The Intergovernmental Panel on Climate Change states that multiple lines of evidence point to continued climate change. These lines of evidence collectively indicate that human activities, particularly those resulting in increasing levels of GHGs, are a significant contributing factor to this change (IPCC 2021). The key GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons. The burning of fossil fuels, including diesel, gasoline, and natural gas, emits CO_2 and CH_4.

The USEPA has determined that current and projected concentrations of six key GHGs in the atmosphere threaten the public health and welfare of current and future generations. The primary GHGs that are expected to be emitted by the Proposed Project are CO_2, CH_4, and N_2O.

Current online resources allow for very general estimates for orders of magnitude of GHG emissions for construction projects, based on known project parameters. One of these, http://buildcarbonneutral.org, provides these rough estimates using basic input parameters such as building size (above and below ground), primary structural materials, ecoregion within the U.S., prior land use, and current and planned vegetation (or unvegetated) types.

North Carolina's net GHG emissions decreased by 23 percent between 2005 and 2018. By the year 2025, net GHG emissions are projected to decrease by 30 percent compared to 2005 values (NCDEQ 2022a).

Impacts during Site Preparation, Construction, and Operations

Site preparation of the Proposed Project will result in temporary minor GHG emissions from construction sources including the transportation of equipment and materials, use of vehicles and construction machinery, and curing of concrete.

Impacts during Closure and Post-Closure

No increase to GHG emissions is anticipated.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to GHGs would occur as a result of the Proposed Project, as existing conditions would remain unchanged.

Proposed Mitigation Measures

The Proposed Project is expected to show GHG emissions reductions greater than GHG emissions from facility operations. Therefore, the impact to GHG emissions from this Proposed Project is net positive, and no further mitigation measures are proposed.

3.3.11. Public Health and Safety

Albemarle is wholly committed to developing and implementing a safety program committed to the protection of workers, the public, and the environment. The Proposed Project's safety and health program will be compliant with the requirements of the Occupational Safety and Health Administration (OSHA), USEPA, and NCDEQ.

Impacts during Site Preparation, Construction, Operations, Closure, and Post-Closure

The facility is expected to have 150 to 300 or more workers onsite during construction. The actual number of construction workers is yet to be determined. Approximately 150 to 230 workers are expected to be onsite during plant operations. Of that number, approximately 95 will be administrative daytime workers. Forty-five operations workers will be onsite during each of the three shifts (day, swing, night). It is tentatively planned for the plant to operate 24/7.

Albemarle will hire a plant safety, health, and environment manager (SHEM) to implement the requirements of the safety program. The manager will be either a certified safety professional or certified industrial hygienist.

The primary duties of the SHEM will be to implement programs regarding:

- Personal and process safety;
- Monitoring of contractors for compliance with contract safety provisions;
- Industrial hygiene;
- Environmental management;

- Safety orientation for employees and visitors;
- Local, state, and federal permitting and compliance;
- Initiating job safety analyses and process hazard analyses;
- Safety meetings and training; and
- Site safety policies.

Standard operating procedures (SOPs) for safety will be developed.

- SOPs will be prepared and followed for plant processes to provide for worker, public, and environmental health and safety.
- All SOPs will be approved by facility management and the SHEM.
- All safety SOPs will be reviewed at least annually for accuracy and applicability.
- A safety SOP for spills and accident response will be included.
- Workers will be trained on all SOPs applicable to their duties.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to health or safety would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation measures are proposed at this time.

3.3.12. Land Use

Existing Conditions

Land use in the area is made up of industrial and commercial businesses. Developed land in Kings Mountain is made up of industrial, residential, and rural land uses. The *Kings Mountain Comprehensive Plan* aims to guide future land use planning and “development and redevelopment while preserving community character.” This plan is an approach to keeping a variety of the land uses between open space, rural and semi-rural, and urbanized environment available (City of Kings Mountain 2022b).

Onsite Land Use

The KMM and Archdale TSF sites occur within an existing mine site and are previously disturbed by mining activities. These activities have resulted in altered upland landscapes and man-made water features (ponds and reservoirs). Several waterways are located near the site's property boundaries. The largest proximal streams flow from south to north and west.

Offsite Land Use

Martin Marietta operates an aggregate quarry that borders the KMM site to the east. The southern parcel is bordered by I-85 to the north and York Road to the south. The Archdale TSF is located approximately 3 miles southwest of the KMM and is bounded by I-85 and U.S. 29. The Imerys Mine is adjacent to the Archdale TSF.

Impacts during Site Preparation

No impacts to land use are anticipated.

Impacts during Construction

As stated in Section 1, construction will consist of adding several buildings to the site through a phased approach. Figure 1: Project Location Map also shows a map of the KMM and Archdale TSF sites and surrounding land use. Much of the site will be converted to impervious surfaces due to the conversion of forested land to buildings, parking lots, and roadways. BMPs will be used to limit the damage to surfaces and runoff. Because agricultural land is considered previously disturbed, impacts to land use from construction of the KMM and Archdale TSF sites will be temporary and minor.

Impacts during Operations

The operation of the facility will bring additional cars and trucks onto the existing roads. Land use changes to these roads are not anticipated due to the additional traffic. Operations will not change any of the surrounding land use. The operation of the site will not add additional residential or commercial areas. Therefore, impacts to land use from operation of the KMM and Archdale TSF sites will be minor.

Impacts during Closure and Post-Closure

No impacts to land use are anticipated during closure and post-closure.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to land use would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation measures are proposed.

3.3.13. Parks, Recreational Areas, and Fisheries

Existing Conditions

No state or federal parks are within the Proposed Project's footprint. Crowders Mountain State Park is located east of the Proposed Project, southeast of I-85 in Gaston County. It has the highest elevation in the surrounding area and has trails that traverse parks in two states, Kings

Mountain State Park and Kings Mountain Military Park both located in North and South Carolina.

Kings Mountain is in the foothills of the Blue Ridge Mountains in a region with several recreational areas and parks. Kings Mountain has a variety of parks and playgrounds for residents including the Deal Park Walking Track, Patriots Park, and the Rick Murphey Children's Park. The Moss Lake Campground, also known as the John H. Moss Lake Recreation Park, is located on the Kings Mountain Reservoir.

The City of Kings Mountain has a Tourism Development Authority Board, which helps to promote tourism and travel in Kings Mountain. The Tourism Development Authority Board meets monthly and has eight members, three of which are representatives of local hoteliers.

The Kings Mountain Gateway Trail

The Gateway Trail, established in 2009, has become a social and cultural landmark for Kings Mountain. The trail was built in coordination with the National Park Service, Cleveland County, the City of Kings Mountain, and the State of North Carolina, and was created as a public-private partnership between Cleveland County and the Gateway Trail's non-profit. The Gateway Trail has received grants from a variety of organizations including North Carolina Adopt-a-Trail, the North Carolina Parks and Recreation Trust Fund, the Carolina Thread Trail, and others (ERM 2024).

When surveyed, multiple stakeholders expressed the importance of the Gateway Trail to the community. As the current Gateway Trail path at the KMM site is routed along the top portion of the existing pit, a small portion of the overall trail will have to be rerouted due to development of the Proposed Project.

Recreational and Commercial Fisheries

There are no public, recreational, or commercial fisheries within the KMM and Archdale TSF sites or vicinity, therefore the Proposed Project will not affect these resources/uses.

Onsite Onstream Channels

Onsite stream channels are not near any recreational or commercial fisheries; therefore, the Proposed Project will not affect these resources/uses.

Impacts during Site Preparation and Construction

Temporary impacts to the Gateway Trail at the KMM site are anticipated while the trail is relocated. Albemarle is working with the Gateway Trail Board of Directors, the City of Kings Mountain, and Cleveland County to develop a plan for a new route and associated improvements to the Gateway Trail that align with the City's master plan and avoids the Proposed Project area.

Impacts during Operations, Closure, and Post-Closure

No impacts are anticipated during operations as the Gateway Trail will be relocated and re-established.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to parks, recreational areas, or fisheries would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

Plans for construction of a new Gateway Trail route is underway. The goal of these plans is to preserve and enhance the Gateway Trail experience for all users. Albemarle is working with Gateway Trail representatives to relocate the portions of the trail that overlap the KMM site to maintain public access (ERM 2022).

3.3.14. Coastal Zone

The KMM and Archdale TSF sites are not within North Carolina's designated coastal zone; therefore, a consistency determination is not required.

3.3.15. Noise and Blasting (Noise Control Act of 1972)

Noise

Existing Conditions

The KMM and Archdale TSF sites are presently zoned as industrial. Current land uses surrounding the KMM include residential, commercial, forested areas, and other industrial mining facilities. Neighboring properties of the Archdale TSF are either undeveloped or host industrial businesses. The area surrounding the KMM site can be categorized with a noise level similar to a noisy urban residential neighborhood, which experiences estimated ambient noise levels of 67 A-weighted decibels (dBA) (ANSI 2013). Average indoor and outdoor noise levels experienced on a day-to-day basis are provided in Table 17: Indoor and Outdoor Noise Levels. The KMM's surrounding land use is made up of residential, industrial, and commercial businesses with the loudest noise-emitting source being the Senator Marshall Arthur Rauch Highway (I-85) with the potential for noise levels to reach 89.9 dBA. A smaller public road, Battleground Avenue, runs from the northwest to the southwest of the KMM site and may experience traffic-related noise levels of up to 59.9 dBA. Likewise, York Road, which runs from the northeast to the southeast of the mine, may generate noise levels of up to 59.9 dBA.

Table 17: Indoor and Outdoor Noise Levels

Outdoor Noise	Indoor Noise	Noise Level (dBA)
Jet flyover (1,000 feet)	Inside a New York subway train	100
Diesel truck (50 feet)	Food blender (3 feet)	90
Noisy urban area (daytime)	Garbage disposal (3 feet)	80
Gas lawn mower (100 feet)	Vacuum cleaner (10 feet)	70
Commercial area	Normal speech (3 feet)	65
Quiet urban area (daytime)	Dishwasher (next room)	50
Quiet urban area (nighttime)	Large conference room background noise	45
Quiet suburban area (nighttime)	Library	40
Quiet rural area (nighttime)	Bedroom at night	35

dBA = A-weighted decibel

SWCA conducted a preliminary noise measurement program to quantify the ambient sound environment of the KMM site. Monitoring began in the second quarter of 2022 and was conducted quarterly through the first quarter of 2023. Results obtained during the first quarter of 2023 (from March 21 to 28, 2023) are provided in Table 17: Indoor and Outdoor Noise Levels. Additional noise measurement programs will be conducted.

Impacts during Site Preparation and Construction

Noise will be generated by the Proposed Project's construction activities such as using vehicles, machinery, diesel generators, and vehicles, as well as drilling, excavating, blasting, etc. Noise and vibration will be generated as a result of construction activities, including the construction of the Proposed Project's infrastructure, due to the use of equipment. High levels of environmental noise and vibrations generated by the Proposed Project may impact human health (personnel and nearby communities) and wildlife receptors. The potential to impact noise sensitive receptors (e.g., workers, communities, sensitive wildlife) depends on the type of activity and the proximity of that activity to the receptor. Noises and vibration associated with construction activities may negatively impact wildlife distribution and abundance, especially in areas where these noises historically did not exist or were infrequent or minimal.

The Proposed Project will generate temporary noise during construction from heavy machinery, such as bulldozers, graders, excavators, 19.5-ton (net) quad-axle dump trucks, and cement trucks, as well as smaller tools such as jackhammers and nail guns. Noise and sound levels will be typical of new construction activities and will be intermittent and temporary.

The construction of the Proposed Project is scheduled to take place 6 days per week and 10 hours each day during daytime hours. The anticipated noise during the day is expected to blend in with the current ambient sounds. Considering the commercial nature of the area and the fact that most employees work indoors, the slight increase in noise should be imperceptible. There may be some additional noise outside of regular business hours, but this will be sporadic and should have minimal impact due to the receptor's distance from KMM and Archdale TSF and the

staff's indoor work environment. The closest homes are located half a mile east of the Proposed Project site and will not be impacted.

Impacts during Operations

Once operational, the facility's noise will be contained primarily within the Proposed Project's boundary, except for in two scenarios. First, noise will arise intermittently during the daytime from loading and unloading materials, with 196 truck trips per day (a 23.5-ton [net] tractor trailer with a 39-foot steel bed for waste rock and a 25-ton [net] tractor trailer with a 28-foot aluminum bed for tailings). Second, the facility will require continuous ventilation, which may necessitate noise mitigation measures like baffles to maintain noise levels within acceptable limits, as per OSHA's recommendation of 85 dBA—a standard adopted by many localities.

With construction noise limited to daytime hours and the Proposed Project's location next to an existing manufacturing site with no nearby residences, the noise impact during both construction and operations is expected to be minor.

Impacts during Closure and Post-Closure

No impacts to noise are anticipated for closure and post-closure

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to noise would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

The following measures will be implemented to manage potential environmental impacts associated with the generation of noise. Noise from equipment, machinery and vehicles will be minimized to the greatest extent possible. The City of Kings Mountain's noise standards are identified in Table 17: Indoor and Outdoor Noise Levels and provide the maximum noise levels at different frequencies for various use districts.

Blasting

Blasting will fragment the ore and non-ore bearing rock directly within the open pit. The shot muck (fragmented material) will be classified as ore, non-ore bearing rock, overburden, or aggregate source material by a grade control geologist, and then it will be loaded into haul trucks. The fragmented material will be transported to the proper destination, as described in previous sections. The progressive blasting, loading, and hauling of the fragmented materials from the pit will create benches in the pit.

All blasting will be done with ammonium nitrate / fuel oil, emulsion, bulk, or packaged products. Two to five blasts will typically occur each week. Blasting will only occur during daylight hours, and meteorological conditions will be monitored for unfavorable conditions. Shots will be initiated with non-el (shock-tube), electric, or electronic blasting caps.

Ground vibration from blasting is expressed in terms of peak particle velocity (PPV), given in units of inches per second. In addition to PPV, the frequency of ground vibrations is also important in terms of its ability to damage structures, and regulatory limits are therefore dependent on frequency. PPV levels increase with charge mass and reduce over distance as logarithmic decay.

A network of nine monitoring stations has been installed around the site to monitor and confirm that vibrations, noise, and overpressure produced by the blasts are below the thresholds established by state regulations. All explosives will be handled by an experienced and licensed blasting contractor. Explosive management practices will comply with all MSHA and NCDEQ rules and regulations. NCDEQ blasting requirements are identified in the two current North Carolina Kings Mountain mining permits.

- If ground vibration or air blast limits are exceeded, the operator will immediately report the event to NCDEQ with causes and corrective actions. The use of explosives at the specific blast site that produced the excessive reading will cease until corrective actions are approved.

Impacts during Site Preparation

Kings Mountain

Blasting impacts are not anticipated during site preparation.

The following blasting scenario evaluates exceedance limits:

- The high risk (51 pound/charge delay) scenario would not produce ground vibration or overpressure exceedances at any blast/receptor combination.

Archdale Tailings Storage Facility

No blasting is anticipated for the Archdale TSF.

Impacts during Construction and Operations

Modeling will be used at 61 potential blast locations spread throughout the mine pit area prior to each stage of blasting in order to ensure that no regulatory thresholds are exceeded. The regulatory limit established by North Carolina mining regulations is 129 linear decibels.

Historic Structures

No impacts to historic structures are anticipated from blasting. Noise and blasting may but are not likely to impact threatened or endangered species, especially bat species, or habitat long term. The frequency/time structure of the noise will play a role in deterring bats from being present. The charge delay and warning-creating vibrations are expected to cause the bats to flee from their habitat (Allen et al. 2021).

Impacts during Closure and Post-Closure

No impacts are anticipated from blasting during closure and post-closure.

Proposed Mitigation Measures

Certain precautions can be implemented to prevent physical hazards to persons or neighboring properties from flyrock, excessive air blasts, or ground vibrations associated with blasting (SESHAT Consultants Pty Ltd. 2023).

Accordingly, Albemarle has committed to the following mitigation strategies:

- Each blast will be pre-planned and designed to minimize impacts. Albemarle will use appropriate models to predict overpressure and ground vibration for each blast event and compare the results to regulatory thresholds. If the model predicts an exceedance of either overpressure and/or ground vibration limits, the blast will be modified (generally by reducing the charge size) so that regulatory standards are not exceeded.
- Blasting will be restricted to the daylight hours of non-holiday weekdays. No blasting will occur on weekends, at night, or during holidays. Albemarle will also monitor and evaluate weather conditions to identify unacceptable atmospheric conditions and will avoid blasting when these occur.
- Monitors will be installed to measure the blast overpressure and ground vibration to document compliance with regulatory standards. Results will be compared to the modeled/predicted values to calibrate the model to improve accuracy, as appropriate.
- A series of pre-development test blasts are planned to provide initial calibration results for the model. When mine development begins, the early stages of the program will use conservatively small charges until the attenuation characteristics of the surrounding environment are better understood. The screening modeling is based on assumed and typical conditions.

3.3.16. Socioeconomics and Environmental Justice (Executive Order 12898)

Existing Conditions

The population of Kings Mountain is approximately 11,246 (USCB 2022b). The KMM site is located in Census Tract (CT) 9505 Block Group (BG) 3, and the TSF in CT 9506.03 BG 2 with respective populations of 1,203 and 2,050 (USCB 2022b). Additionally, the cities of Gastonia and Shelby are located within commuting distances (roughly a 17- and 30-minute drive from Kings Mountain, respectively) and may serve as locations where non-local employees might choose to live after hire. Approximately 53 percent of Kings Mountain residents work outside of Cleveland County (USCB 2019). Albemarle is committed to hiring locally where possible.

Cleveland County's economy is dependent on a diverse set of industries including manufacturing, mining, automotive machining, textiles, and data centers (EDPNC 2022). The largest industries in Kings Mountain are manufacturing (24 percent), educational services, health care and social assistance (18 percent), and retail trade (11 percent) (USCB 2022a). The unemployment rate in Kings Mountain is 8.1 percent and 7.1 percent in Cleveland County, which is higher than both the state (5.3 percent) and national (5.1 percent) averages (USCB

2021b). The median household income of Kings Mountain is $42,336 and 13.7 percent of families live below the poverty line (USCB 2021b).

In 2021, approximately 13.3 percent of households in North Carolina were in poverty (USCB 2022c). In Kings Mountain, 21.1 percent of households were below the poverty level,[2] a higher proportion than those below the poverty level statewide in North Carolina (USCB 2022c). Most individuals in Kings Mountain identify as White alone (61.7 percent), followed by those who identify as Black or African American (20.6 percent), and those who identify as Hispanic or Latino (10 percent) (USCB 2022a). Out of the 19 identified census block groups (CBGs) in the study area, 14 of the CBGs have either meaningfully greater low-income or minority populations present, based on NCDEQ guidelines. Of the 14 CBGs, four CBGs have both low-income and minority populations present, six CBGs in the Proposed Project area have only meaningfully greater low-income populations present, and four CBGs have only meaningfully greater minority populations. This suggests that there are potential communities with EJ concerns in the study area.

Most residents in Cleveland County have either an associate or a bachelor's degree as their highest level of education (combined 55 percent), which is higher than Gaston County (combined 29 percent) and the U.S. overall (combined 34 percent) (My Future NC 2021). The high schools and community colleges in Kings Mountain and Cleveland County have vocational programs designed to give students hard skills in areas including manufacturing trades (North Carolina School Report Cards 2021; ERM 2022). Two four-year colleges, Gardner-Webb and the University of North Carolina-Charlotte are also located near Kings Mountain.

Kings Mountain has been growing as the Charlotte Metro area continues to expand further west toward Cleveland County. The City has proposed plans for new subdivisions that are currently undergoing an approval process, and the city council established a housing committee to evaluate the housing inventory to address the growing demand (City of Kings Mountain 2022a). Housing prices in Kings Mountain have increased year over year. The median sold price of a home in Kings Mountain in May 2024 was $254,000, up 17 percent compared to May 2023 (Redfin 2024).

The housing market and public infrastructure of Kings Mountain is not likely to be overburdened by an influx of new workers to the area, as the city of Kings Mountain is a rapidly developing suburb of the greater Charlotte Metro area with existing infrastructure to support the growing population including new housing developments in creation and planning, and numerous schools including four elementary schools, one intermediate school, one middle school, and one high school.

Several healthcare facilities are located within Kings Mountain, such as Atrium Health, which provides a wide range of services including emergency services. However, the health infrastructure is currently operating at capacity, and many residents must travel outside Kings Mountain, typically to Shelby, for basic services such as primary care, pre- and post-natal care,

[2] Poverty level as defined by the NCDEQ and American Community Survey (NCDEQ 2022c).

and pediatric care (ERM 2022, Atrium Health 2022). Social infrastructure (fire, police, utilities) is adequate for the population of Kings Mountain.

Public Engagement

From 2022 to present, Albemarle has made specific efforts to engage with potential EJ communities to share information and solicit feedback about the Proposed Project. Albemarle has performed targeted outreach and engaged with members of potential EJ communities, hosting town hall meetings and smaller community meetings in potential EJ areas at varied times and locations. During these events, Albemarle solicited feedback from the local communities and responded to questions and will incorporate this feedback where practical and reasonable during planning and operation of the Proposed Project.

Impacts during Site Preparation, Construction, and Operations

The study area has significantly more CBGs with potential EJ communities than not, and the Proposed Project could disproportionately affect potential EJ communities. Impacts from construction, operations, and closure, however, are not anticipated to be significantly adverse; and in the case of socioeconomics, may be beneficial. Proposed Project impacts during construction, operations, and closure, will not be acutely felt by communities within the study area.

The Proposed Project is not expected to have significant, adverse effects on environmental and social resources (air quality, noise, water resources, land use, traffic and transportation, health and safety, cultural heritage, or aesthetics and visual resources). The Proposed Project will, however, result in positive impacts through the creation of approximately 1000 new jobs during construction and 400 jobs during operations. The Proposed Project will create additional economic opportunity through the procurement of goods and services during construction and operations. Further, Albemarle is committed to supporting community development through workforce upskilling and supporting community programs in Kings Mountain and education programs in Cleveland County.

Impacts during Closure and Post-Closure

Impacts to socioeconomics and EJ during closure and post-closure may occur once the facilities have been shut down and related jobs are no longer available.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to socioeconomics or EJ would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

To manage potential adverse impacts associated with the Proposed Project, Albemarle developed the selected mitigations in Table 18: Selected Mitigation Measures Pertaining to Environmental Justice Concerns.

Table 18: Selected Mitigation Measures Pertaining to Environmental Justice Concerns

Impact	Mitigation
Emissions	Avoiding the idling of vehicles and machinery when not in use.
	Diesel used in site vehicles and equipment shall be low-sulfur diesel fuel where possible.
	Use of tarps, water, and other mitigation measures (such as avoiding soil stripping during excessively dry or saturated conditions) to minimize dust and particulate matter deposition.

3.3.17. Traffic and Transportation

Existing Conditions

Site traffic is expected to be generated from employee shift changes, deliveries, maintenance, and visitors to the mine as well as from truck shipments to the offsite Archdale TSF, located approximately 3 miles southwest of the KMM site between U.S. 29 / Highway 216 and I-85. A traffic impact analysis (TIA) was conducted to determine the potential traffic impacts of this development and to identify transportation improvements that may be required to mitigate impacts to the roadway network. The TIA also aimed to identify and recommend the most feasible route for the transport of tailings between the KMM and Archdale TSF as part of daily operations.

- Tailings from the processing plant will circulate between the KMM and the Archdale TSF. Necessary embankment material for the TSF (reflected as "Tailings Embankment" in the trip generation) will also circulate between the KMM and the TSF.
- Concentrate shipments from the KMM will be transported offsite via rail and as such are not proposed to be studied in this TIA/EA.

The highest expected truck count will be six per hour running 16 hours per day, 7 days per week. High truck counts will occur for construction months 3 thru 11. Truck counts for building the embankment will be three per hour (16 hours per day, 7 days per week) during construction months 12 thru 31.

Impacts during Site Preparation and Construction

No traffic detours or road closures are proposed at any point during construction. Construction traffic is anticipated to be distributed over time as follows: construction workers with shift arrivals and dismissals occurring during two off-peak time periods. A portion of the KMM site will be used as a temporary parking location for construction-related vehicles and the private vehicles of construction personnel. In addition, construction trailers and material storage will occur on the portion of the temporary parking lot on the KMM site.

The Proposed Project will also rely primarily on the same portion of the KMM site for equipment "laydown" areas as well as supply deliveries and staging. Given the robust nature of the current road infrastructure, the availability of temporary parking on the KMM site, and the shift changes occurring at non-peak hours, the impacts to traffic due to construction of the Proposed Project will be temporary and minor.

Impacts during Operations

Site traffic is expected to be generated from employee shift changes, deliveries, maintenance, and visitors to the mine as well as from truck shipments to the Archdale TSF. A summary of this trip generation is provided in Table 19: Daily Trip Generation.

Table 19: Daily Trip Generation

Proposed Trip Type	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips			Data Source
		Enter	Exit	Total	Enter	Exit	Total	
Tailings shipment (20 hours/day)	256	7	7	14	7	7	14	Other data*
Tailings embankment (20 hours/day)	234	6	6	12	6	6	12	Other data*
Mine staff	620	204	107	311	107	204	311	Other data
Mine deliveries	10	2	2	4	2	2	4	Other data*
Mine visitors and maintenance	26	10	2	12	0	10	10	Other data*
Archdale staff	24	6	6	12	6	6	12	Other data*
Archdale deliveries	4	1	1	2	1	1	2	Other data*
Archdale visitors and staff	2	1	1	2	0	0	0	Other data*
Total	**1,176**	**237**	**132**	**369**	**129**	**236**	**365**	

*Employment and operational estimates provided by the client. All non-tailings related trips will be distributed per the regional distributions split accordingly based on estimates provided by the client. Tailing shipments will occur between the mine and the TSF (Archdale).

The impacts of additional traffic to/from the KMM and Archdale TSF sites are expected to be minor given the following: i) the current road infrastructure, with ample capacity to expand to the north (the direction the traffic to/from the site will originate from or head toward); ii) good sight lines along the route; iii) some traffic, both during construction and operations, occurring at off-peak hours; and iv) a relatively low volume of truck traffic to/from the KMM and Archdale TSF sites.

Impacts during Closure and Post-Closure

No impacts to traffic are anticipated during closure and post-closure.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to traffic or transportation would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

No mitigation measures are proposed at this time.

3.3.18. Waste Management (Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation, and Liability Act, and Pollution Prevention Act of 1990)

This section discusses RCRA wastes that may be generated at the facility. Such waste may be generated at the facility during the removal of the sewer line and buried radioactive material but is not anticipated. The waste will be stored temporarily but will not be treated or disposed of at the regulated Class 1 land fill waste facility. Industrial and hazardous waste will be identified in accordance with RCRA and applicable waste regulations and disposed of offsite at an approved third-party facility. All RCRA waste will be transferred to facilities permitted by the Department of Solid Waste Management (DSWM) or other federal or state jurisdictions. Hazardous wastes will be transferred to a duly-permitted treatment, storage, and disposal facility. All solid waste generated during the Proposed Project's construction phase will be collected, placed in appropriate receptacles, and disposed of offsite in accordance with DSWM requirements. The configuration of the proposed facility and its geographic location will prevent offsite environmental impacts from waste possession and disposal.

After concrete work, waste concrete, cement mixers, and equipment will be washed down in a designated concrete washout pit. The contractor will dispose of the solids offsite. Cement and fly-ash storage bins will be enclosed, and dust and PM will be managed according to air quality guidelines. Concrete production will occur within the batch plant to contain dust, and BMPs will minimize onsite dust effects.

Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)

In February 1994, radioactive components were detected when old mining components were salvaged at the Cyprus Foote Mineral Company's Kings Mountain site. Two railcars of scrap

metal set off radiation detectors and were rejected by the nearby steel mill. The material consisted of approximately two truckloads of radioactive mining refuse created during previous mining operations and was encapsulated by a clay lining. A burial survey was performed for final approval of the permitted disposal process by the then Department of Environment, Health, and Natural Resources. A disposal plan was developed and subsequently approved to permanently bury the material onsite in the former tailings area. The plan was implemented and completed in May 2001. The then Division of Land Resources confirmed the completion of the permanent disposal activity and that the associated documentation requirements were met by Chemetall Foote Corporation. The Division of Land Resources certified attachment of the approval letter to the KMM Permit No. 23-01 and the property deed (TX-4-81, PB-4-27, Book L, Page 527) for future reference. The materials remain buried onsite at the KMM.

Radioactive material is present within the Proposed Project's footprint and has been buried in the mill tailings area since 2001. During the demolition of mining components by the previous operator, it was found that some equipment and building structures were contaminated with naturally occurring radioactivity from previous mining activities.

Impacts during Site Preparation, Construction, Operations, Closure, and Post-Closure

Kings Mountain

No RCRA, pollution, or hazardous waste impacts are expected.

Archdale Tailings Storage Facility

Archdale TSF does not have TENORM.

Proposed Mitigation Measures

No mitigation measures are proposed at this time.

Radon

Radon is a naturally occurring radioactive gas found in soils, rocks, water, and indoor and outdoor air. While the health risks of radon exposure are commonly associated with indoor air, radon in groundwater may also pose a threat to human health through ingestion or release into an indoor space.

On April 18, 2023, SWCA conducted groundwater sampling at ten groundwater wells to test for the presence of radon. Radon was detected at nine of the ten locations sampled.

Cleveland County is one of 19 counties in North Carolina known to have moderate to high susceptibility to elevated radon in water. The median level of radon in groundwater wells in the county is 3,090 picocuries per liter (Campbell et al. 2011). Geology is the primary influence on dissolved radon levels. Cleveland County is underlain by Cherryville granite, which is associated with higher-than-average radon levels due to the level of uranium within the bedrock (Waldron

et al. 2007). However, only one well, SNKM22-438, has a radon level that is higher than the median radon level for the county.

Impacts during Site Preparation, Construction, Operations, Closure, and Post-Closure

Kings Mountain and Archdale Tailings Storage Facility

Since radon occurs naturally in the environment, no impacts from the Proposed Project are anticipated.

Relocation of the Sewer Force Main Line and Sewer

A sanitary sewage conveyance pipe parallels the northwest railway spur before extending west to the city of Kings Mountain's municipal infrastructure. The pipe is approximately 5,700 linear feet and is buried at a depth of 4 feet. The current route conflicts with the development of the proposed infrastructure. Additionally, the municipality is planning to abandon the facilities which receive the sewage from this main line. As a result, decommissioning and demolition of the existing line is part of the site preparation plan.

A new line will be installed prior to decommissioning the existing line to maintain service continuity. The location of the new route is currently being determined based on the feasibility of connecting to the municipal system relative to Proposed Project activities. However, it is likely the line will follow the service road from the Kings Mountain Facility to I-85, and then west toward Kings Mountain Boulevard.

Clearing and grubbing will occur within a 15- to 20-foot corridor to allow for vehicle access. A wider corridor may be required locally where the current slope does not allow vehicle access. The relocation of the sewer force main line and sewage is expected to have negligible impacts on environmental resources.

Impacts during Site Preparation, Construction, Operations, Closure, and Post-Closure

Kings Mountain

The ground was previously impacted, and removal and replacement of the pipe will not cause adverse impacts to the environment.

Archdale Tailings Storage Facility

This relocation does not apply to Archdale TSF.

Proposed Mitigation Measures

No RCRA impacts or mitigation measures are proposed at this time.

Removal of Redundant Dominion Gas Distribution Line

Dominion Energy currently supplies the existing Kings Mountain Facility with natural gas via a buried 8-inch diameter distribution line. The natural gas line extends southward from the Kings Mountain Facility to I-85, although it is no longer in service (to be formally confirmed by Dominion Energy). The location of a portion of this line conflicts with future development of the crushing circuit and NPI areas, requiring decommissioning, purging, and demolition of the line between Kings Creek and I-85. The extent of the ground disturbance will be approximately 1,500 linear feet. Excavation is required to remove the line. The cross-section of the installation along the current route is unknown. A minimum of 2 feet of cover above the pipe, and a width of approximately 8 feet is expected. Excavation will be at a depth of 4 feet. Clearing and soil disturbance will occur within a 20-foot corridor to allow for vehicle access.

Impacts during Site Preparation, Construction, Operations, Closure, and Post-Closure

Kings Mountain

The ground was previously impacted, and removal and replacement of the pipe will not cause adverse impacts to the environment.

Archdale Tailings Storage Facility

This line removal does not apply to Archdale TSF.

Proposed Mitigation Measures

No RCRA or mitigation measures are proposed at this time.

Rerouting of Dominion Gas Line to Kings Mountain Facility

The Dominion Energy natural gas line, which serves the existing Kings Mountain Facility enters the property from the northwest and extends along the south side of the railway spur. Planned railway and other infrastructure upgrades will require the relocation of this gas line. The expected reroute length is approximately 5,500 feet of excavation, and replacement will be at a depth of 4 feet. To minimize interruption of the gas supply, a new line will be installed prior to decommissioning the existing line. The expected extent of clearing and soil disturbance will occur within a 15- to 20-foot corridor to allow for vehicle access.

Impacts during Site Preparation, Construction, Operations, Closure, and Post-Closure

Kings Mountain

The ground at the KMM site was previously impacted, and removal and replacement of the pipe will not cause adverse impacts to the environment.

Archdale Tailings Storage Facility

This line reroute does not apply to Archdale TSF.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to waste management would occur as existing conditions would remain unchanged.

3.3.19. Water Resources (Clean Water Act)

This section covers NEPA-related Proposed Project water facilities and activities, including wells, groundwater, wastewater, wetlands, stormwater, stream crossings, and dewatering. Proposed Project activities will impact jurisdictional wetlands and streams.

Kings Mountain

Thirty-seven distinct stream segments (22,527 linear feet total) within the KMM site (Appendix F, Wetlands) were identified. The 37 stream segments consist of 19 intermittent stream segments and 18 perennial stream segments. The ordinary highwater mark of streams within the KMM site averaged between 2 and 5 feet wide, and common substrates consist of sand, silt, and cobble. Based on the conditions observed during field investigations, the streams were classified as ephemeral, intermittent, or perennial. These forms were used during the assessment of all waterways as a standardized and replicable way of assessing the geomorphology, hydrology, and aquatic organisms present within the waterways and their potential jurisdictional status. Due to open culvert construction placed on the uplands to avoid contact with streams and allow more water flow, no jurisdictional streams are expected to be impacted.

Albemarle also identified onsite water resources for Proposed Project purposes. These are all man-made features and include the mine pit (53.22 acres), Mud Pond 1 (0.68 acres), Mud Pond 2 (1.20 acres), No. 1 Mill Pond (7.16 acres), PEG 25 (1.29 acres), Executive Club Lake (43.79 acres), South Creek, and South Creek Reservoir (8.37 acres) (Figure 13: Watershed Boundaries). Pit Lake is a mining pit that has filled with water since prior mining ceased. Mud Pond 1, Mud Pond 2, and No. 1 Mill Pond are non-jurisdictional isolated ponds on the KMM site parcel, north of I-85. South Creek is a south-flowing stream on the western portion of the KMM site, north of I-85, with the South Creek Reservoir making up the dammed portion that eventually discharges into Kings Creek. Executive Club Lake is an old tailings pond on the KMM site parcel, south of I-85, that discharges to Kings Creek. Small tributaries contribute to the flow to this lake.

Surface Waters and Groundwater

The natural drainage network in the vicinity of the Proposed Project is heavily influenced by legacy and active mining activities. The Proposed Project does not propose groundwater withdrawals, nor will construction impact groundwater, as the groundwater tables are not shallow at the KMM and Archdale TSF sites. Pit dewatering was included in the water balance

model, and it was determined there would be no adverse impacts to groundwater. Therefore, no impacts to groundwater are expected.

Diversion Channels

The diversion channel network has been designed to keep stormwater separate from wastewater.

Sediment Control Ponds

Permanent sediment basins are designed to serve areas larger than 5 acres and function for longer than 1 year; however, ponds with contributing areas of less than 5 acres are proposed. Eleven dedicated sediment basins have been designed for the site, which will capture site runoff and allow sediment to settle. WSB-1, while not designated a primary sediment control pond, will provide secondary sediment control and is therefore included for completeness.

Water Storage Basin 1

Stormwater and wastewater will be routed to the proposed WSB-1, which will be constructed above the footprint of the existing Executive Club Lake. Wastewater and other treated water streams will be pumped to WSB-1 for sediment control, mixing, and monitoring prior to release as wastewater through Outfall 003 to an unnamed tributary to Kings Creek. From the discharge point at Outfall 003, it will flow overland approximately 1,500 feet before joining Kings Creek. Since WSB-1 receives wastewater streams in addition to stormwater, the discharge at Outfall 003 will be regulated as a wastewater discharge.

WSB-1 will be constructed by restoring the historically breeched embankment to the original crest elevation of 850 feet amsl above the current discharge outlet of approximately elevation 820 feet amsl. Normal operational discharges will be managed through a series of 18-inch diameter vertical risers placed along the upstream embankment face at 5 feet vertical spacing.

Wastewater inflows to WSB-1 will be conveyed from other facilities in the Proposed Project area via the wastewater pipeline, which will discharge to the pond at the far eastern (upstream) end of the pond and will form a sediment forebay. A 5-feet-high permeable rockfill dam will serve to trap coarse sediments in the forebay. The remainder of WSB-1 will form a long, narrow lake, and with the nominal 830 feet amsl water level and a 100-year peak inflow, result in an estimated 114 hours of residence time in WSB-1. This is sufficient to trap 4-micron particle sized sediment.

Water Treatment Plant

The WTP will receive inflows of excess water from the concentrator and seepage/runoff from RSF-X routed through Collection Pond 51. The WTP will be designed for an average flow of 145 gpm and a peak flow of 327 gpm treatment capacity and be constructed adjacent to the concentrator. The WTP is designed to operate 365 days per year.

Wastewater

The objectives of the Proposed Project's water management plan are to achieve water quality and water quantity objectives, reduce potential effects on the downstream environment, and limit the infrastructure damage from storm events. Objectives will be achieved by separating clean, non-contact water from water that has come into contact with ore, waste rock, or tailings (i.e., contact water). Wastewater will originate from mine dewatering (classified as wastewater by DEMLR), and PAG contact water from RSF-X. Wastewater will be collected across the site and diverted to WSB-1 before discharging at Outfall 003.

Stormwater

Perimeter channels have been designed to route non-contact runoff from disturbed areas that have not come into contact with ore, preventing precipitation and runoff from becoming contact water. Non-contact water originating from disturbed areas is classified as stormwater and will be managed with sediment controls and monitored as per General Permit requirements before being released through a permitted outfall. Stormwater will be routed through one of the Proposed Project's sediment control ponds to manage sediment.

Outfalls

All regulated surface water from the Proposed Project site will be discharged to one of eight permanent and four temporary outfalls on Albemarle's KMM property. The four temporary outfalls will be used during the Proposed Project's construction phase only. Water will be discharged into an unnamed tributary to Kings Creek, Kings Creek, or South Creek, which eventually flows into King's Creek. Water from two RSF-A run-on catchment areas will only be exposed to undisturbed areas, therefore runoff from these two sites is not regulated.

The proposed outfall locations are shown in Table 20: Project Discharge Outfall Locations.

Table 20: Project Discharge Outfall Locations

Outfall Number	Water Origin	Water Type	Receiving Water	Notes
003	Outlet from WSB-1 dam	Wastewater	Kings Creek	Combined outlet of all the discharges going into WSB-1, including water from the WTP, open pit, ore storage and processing area ponds, Collection Pond 61, and contributing catchments. Includes both stormwater and wastewater.
005	Pond C02	Stormwater	Kings Creek	Stormwater from south NPI area, initially from temporary sediment pond then Pond C02 once it is constructed.
010	Sediment Pond 1	Stormwater	Kings Creek	Stormwater from Sediment Pond 1, which captures water from OSF-3, pit perimeter ponds, and contributing catchments. Downstream of Technology Center, near other stormwater discharge locations. May flow into the wetland area and thence to Kings Creek.

Outfall Number	Water Origin	Water Type	Receiving Water	Notes
062	Sediment Pond 62	Stormwater	South Creek	Stormwater from Sediment Pond 62, which captures runoff from OSF-1.
063	Sediment Pond 63	Stormwater	South Creek	Stormwater from Sediment Pond 63, which captures runoff from OSF-1.
064	Sediment Pond 64	Stormwater	South Creek	Stormwater from Sediment Pond 64, which captures runoff from OSF-3.
067	Haul road and railroad watershed	Stormwater	South Creek	Stormwater originating in haul road and railroad watersheds.
201*	Temporary sediment pond, then Pond M11	Stormwater	Kings Creek	Temporary (construction only) outfall. Stormwater from south NPI (north of I-85).
202*	Temporary sediment pond, then Pond M12	Stormwater	Kings Creek	Temporary (construction only) outfall. Stormwater from south NPI (north of I-85).
203*	Temporary sediment pond, then Pond C01	Stormwater	Kings Creek	Temporary (construction only) outfall. Stormwater from south NPI (south of I-85).
204*	Temporary sediment pond	Stormwater	South Creek	Temporary (construction only) outfall. Stormwater from north NPI.

* = Outfall is temporary and will be used during the Proposed Project's construction phase only.
I-85 = Interstate 85; NPI = non-process infrastructure; OSF = overburden storage facility; Technology Center = Global Technology Center for Research and Development; WSB = water storage basin;
WTP = water treatment plant

Stream Crossing

A proposed, reinforced concrete pipe culvert will be placed across the stream for NPI north and other crossings. Riprap will be used, and no live concrete will be placed in the streams. The existing stream substrate will be buried/removed if deemed unsuitable for bedding material. The pipe will be buried 1 foot down if larger than 48 inches in diameter or will be buried to a depth of 20 percent of the diameter if less than 48 inches, so as not to impede aquatic passage during low flow.

Archdale Tailings Storage Facility

No streams were identified within the Archdale TSF site.

Waste Rock

Waste rock is material from the pit containing insufficient spodumene ore to send to the concentrator and will be used to build the Archdale TSF foundation, TSF embankment, and haul road cap.

The proposed RSF-A will permanently impact 1292 feet of intermittent stream and 443 feet of perennial stream. The existing substrate in these areas will be buried/removed if deemed unsuitable for bedding.

Water treatment at the TSF will not be necessary due to mixing and diluting the tailings seepage and embankment waste rock seepage contact water with non-contact stormwater that falls on the TSF perimeter (SRK 2024c, 2024e).

Impacts during Site Preparation

No jurisdictional streams will be impacted by site preparation activities.

Impacts during Construction

Impacts to streams are expected. For the construction phase, a Stormwater Pollution Prevention Plan will be prepared and implemented to effectively prevent potential pollution or contamination of stormwater runoff. Implementation of appropriate BMPs during construction (such as silt fencing and/or straw wattles) will prevent potential impacts to the streams from turbid stormwater runoff. Once construction is complete, discharge of treated water will be directed offsite. No surface water diversion or withdrawal is proposed. No riparian vegetation will be removed.

During construction, there may be an increase in suspended particulates that may lead to increased turbidity downstream. However, the increase will be minimal and temporary due to the installation and maintenance of proper sediment and erosion control measures (e.g., turbidity curtains, silt fences, and hay bales) during construction and shortly thereafter. Erosion control measures and BMPs will be installed and maintained at all times during construction and mining operations to prevent discharges of sediment and turbid waters to offsite surface waters and onsite wetlands that would not be impacted.

Proposed Project construction activities such as clearing, grading, excavation, and stockpiling, as well as activities conducted in or near waterbodies, have the potential to alter the movement (flow) of water as well as the quantity and quality normally encountered onsite. The quality and quantity of effluent streams discharged, including stormwater, process effluents, excavation ingress water, diversion pumping, and site drainage should be managed and treated to meet applicable effluent discharge requirements.

Impacts during Site Preparation

Site preparation will involve filling in the streams with clean fill as described. Proper sediment and erosion control measures will be installed prior to and during construction so that the substrate of remaining WOTUS will not be changed or affected.

Impacts during Construction

No additional impacts to WOTUS during construction are anticipated.

Impacts during Operations

The Archdale groundwater model, using the MODFLOW-USG control-volume finite-difference simulator, was used to help calculate flows and estimate seepage rates during operations. During the operations phase, water infiltrating the tailings will be removed using collection sumps beneath the tailings.

Impacts during Closure and Post-Closure

No impacts are expected from closure and post-closure.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to surface waters would occur as a result of the Proposed Project, as existing conditions would remain unchanged.

Kings Mountain

Wetland delineations were conducted in 2023 and 2024 at the KMM site and the surrounding area. One offsite 0.3-acre wetland (Wetland A) was documented to the southeast of the KMM site, and outside the Proposed Project footprint. Black willow (*Salix nigra*) and sweetgum (*Liquidamber styraciflua*) dominated the wetland. The 2023 survey noted that the wetland could be considered jurisdictional by the U.S. Army Corps of Engineers (USACE) and the state; however, based on desktop mapping, it appears that the wetland is potentially isolated. If that is the case, the wetland will likely be considered non-jurisdictional under the Sackett vs. USEPA ruling (Sackett v. USEPA. 132 S. Ct. 1367 [2023]).

Based on the North Carolina Wetland Assessment Method and North Carolina Stream Assessment Method, most KMM wetlands and streams have been rated as having a high functional value. Nine small wetlands and isolated wetlands received a medium functional value. Only one stream in a residential area with little instream habitat and wooded buffer was rated as having a low functional value. (Figure 12: Surface Water Features – KMM).

A field investigation of the KMM site was conducted in February and March 2022, and February, June, and July 2023 (Appendix F, Wetlands). A delineation of wetlands and waterbodies was conducted to verify NWI mapping (USFWS 2015) and NHD data (USGS 2013) within the KMM site (SWCA 2024f). The requests for an approved jurisdictional determination (JD) and a preliminary JD were submitted on September 20, 2023.

Based on the delineation, 45 distinct wetlands (40.24 acres total) and 12 ponds/impoundments (85.58 acres) are on the KMM site (Figure 11: Wetland Delineations – KMM).

Additionally, 12 distinct PUB aquatic features (e.g., ponds, lakes, mining pits) totaling 85.58 acres were delineated within the KMM site area. Resources determined to be USACE non-jurisdictional are generally isolated within the KMM site and not connected to a downstream traditional navigable water (TNW) or are regulated under the NPDES permit for the Proposed Project.

Additional resources were determined to be USACE non-jurisdictional due to being isolated within the KMM site and not connected to a downstream TNW. Table 21: Impacts as a Percentage of Resources (Site and Basin) summarizes the number and acreages of jurisdictional and non-jurisdictional features. Hydrology within portions of the KMM site has been modified through historical mining land use practices. Additionally, most of the sizable wetlands and waterways have been influenced by beaver activity.

Table 21: Impacts as a Percentage of Resources (Site and Basin)

Resource	Resource Onsite	Impacted	% Onsite Resource	Resource in Basin	% Basin Resource
Wetlands	35.71	8.39	23.5	3370.11	0.25
Man-made lakes/ponds	20.88	0.14	0.67	347.98	0.04
Streams	20,580	4720	22.93	898,992	0.53

SWCA delineated 37 distinct stream segments (22,527 linear feet total) of which 19 stream segments were classified as intermittent and 18 stream segments were classified as perennial within the KMM area (Table 22: Waterways). Some of the intermittent and perennial streams segments originate as either sheet flow, ephemeral, or other connected intermittent streams before transitioning into their final classification. Non-jurisdictional features include upland swales and streams with no significant nexus.

Table 22: Waterways

Classification	Total Linear Feet within Project Area
Jurisdictional ephemeral stream	0.00
Jurisdictional intermittent stream	4,478 (19 segments)
Jurisdictional perennial stream	17,603 (18 segments)
Jurisdictional delineated waterway	0.00
Non-jurisdictional feature	446
Total	**22,527 (37 segments)**

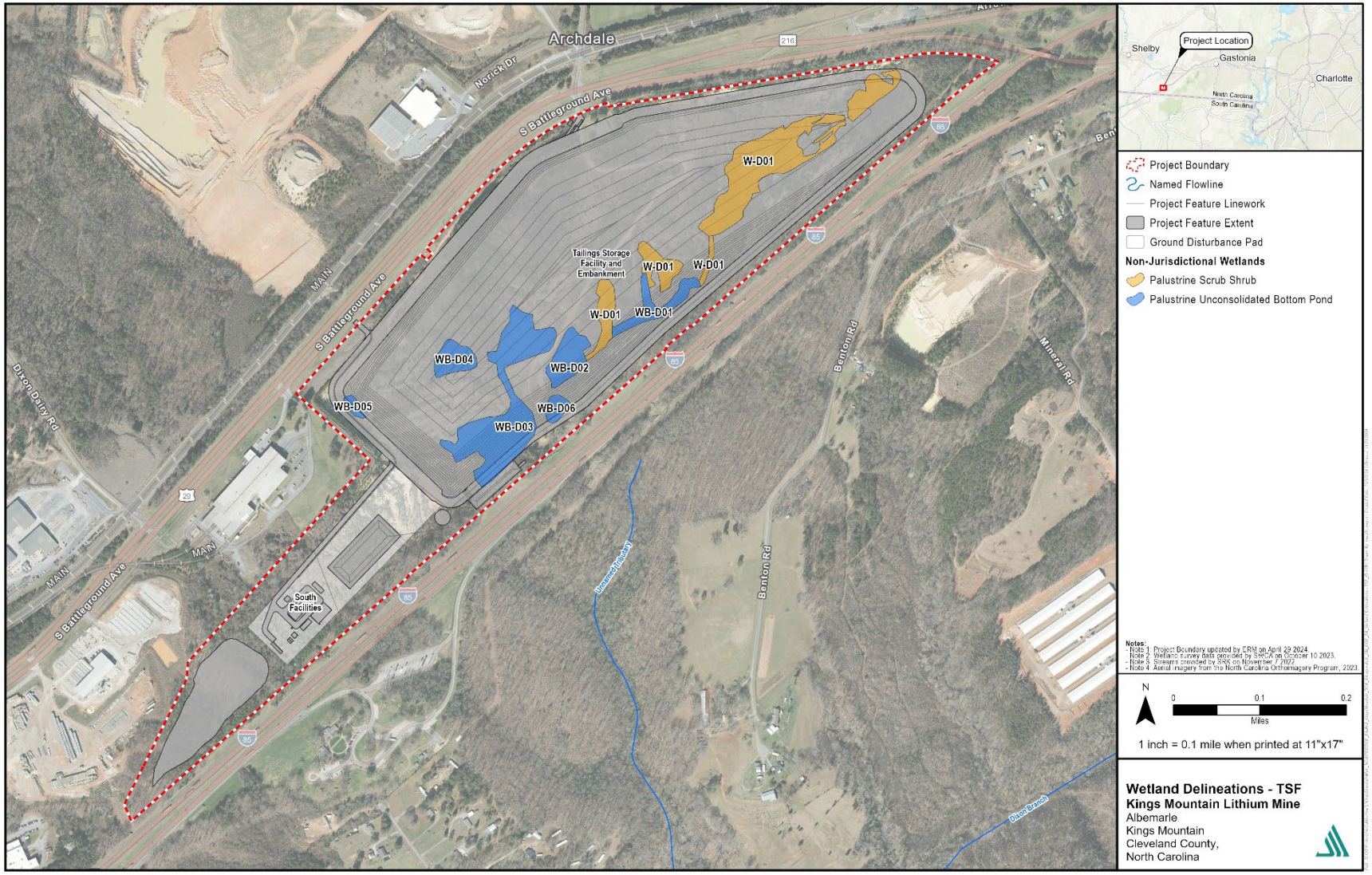
Source: 2023 SWCA Wetland Delineation Report

Sediment and erosion control measures will be implemented to prevent increased flows from negatively inundating onsite and nearby wetlands.

Archdale Tailings Storage Facility

The wetland delineation at the Archdale TSF identified one wetland complex (7.63 acres total) and six waterbodies (9.42 acres total). The waterbodies are all man-made ponds or mining pits filled with water (Figure 17: Wetland Delineations – TSF). Details are provided in the wetland and waterbody delineation report (Appendix F, Wetlands).

Figure 17: Wetland Delineations – TSF



There are no jurisdictional streams at the Archdale TSF.

A field investigation of the Archdale TSF site was completed in September 2023 (SWCA 2024f). One PSS wetland complex and six PUB waterbodies were identified. The waterbodies are all man-made ponds or mining pits filled with water.

Impacts during Site Preparation

Several WOTUS are located onsite. During the wetland delineation, one wetland complex (7.63 acres total) and six waterbodies (9.42 acres total) were identified. The waterbodies are all man-made ponds or mining pits filled with water (Figure 11: Wetland Delineations – KMM). Details are provided in the wetland and waterbody delineation report (Appendix F, Wetlands).

Wetland Impact Summary

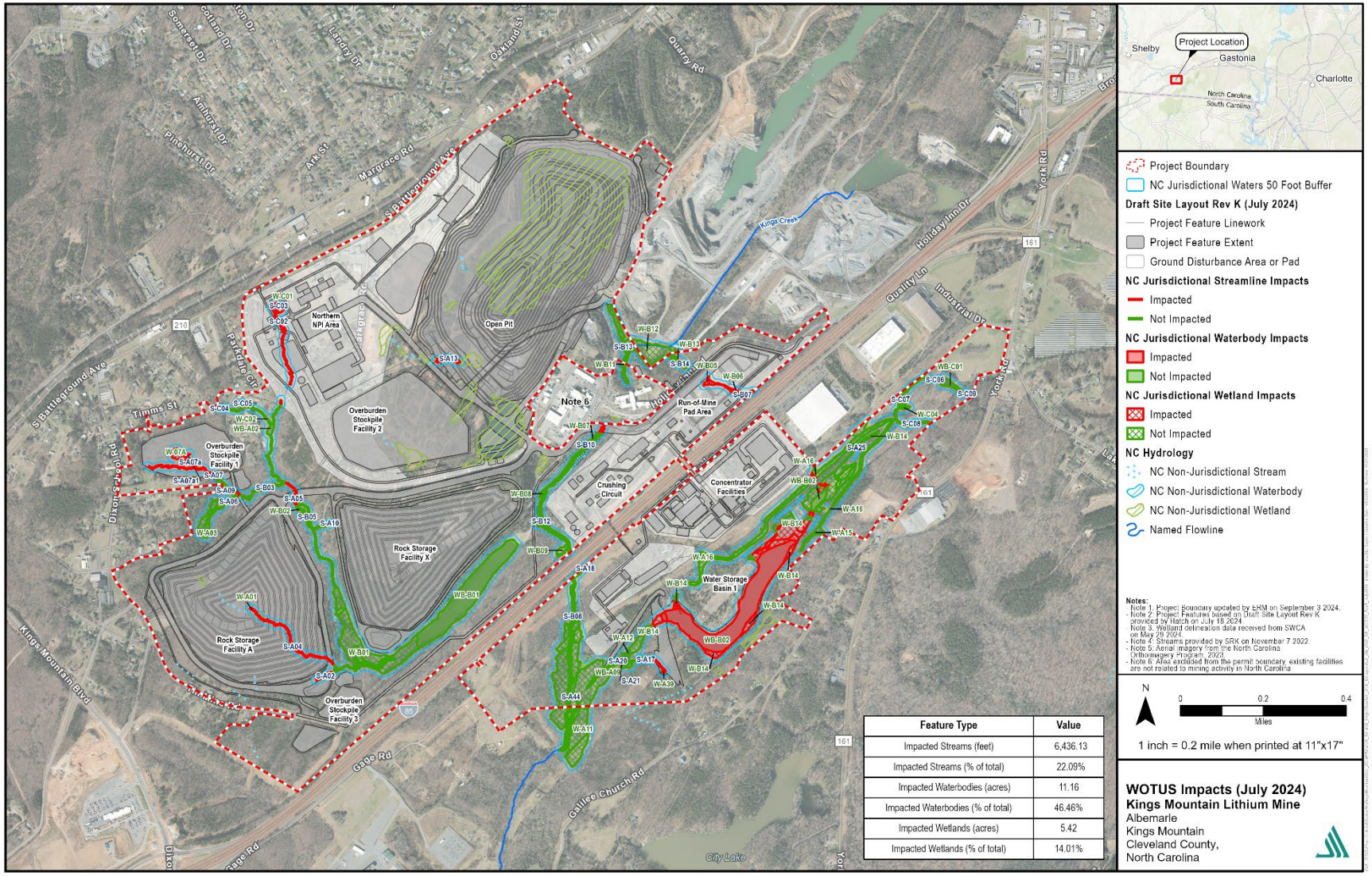
Albemarle wants to expand the existing non-jurisdictional mining pit (53.22 acres) to approximately 84.4 acres (Table 23: Impacts to 404 Jurisdictional Resources and Figure 18: WOTUS Impacts [July 2024]). The expansion will include dewatering the existing pit and transporting the water into South Creek Reservoir. The impact from the expansion will be to uplands and non-jurisdictional man-made ponds that will be dewatered and filled. During the dewatering of the existing pit, fish and other aquatic species (e.g., turtles) will be collected and relocated to other water bodies onsite. No federally protected species occur in the mine pit lake and no jurisdictional wetlands will be impacted by the expansion of the existing pit. The Proposed Project will result in impacts to 8.79 acres of wetlands, 0.14 acres of ponds (excluding inundation), and 6,226 linear feet of stream (2,013 linear feet of intermittent stream, and 4,213 linear feet of perennial stream).

Table 23: Impact Summary to 404 Jurisdictional Resources

Component/Area	Wetlands (acres)	Lakes/Ponds (acres)	Intermittent Stream (linear feet)	Perennial Stream (linear feet)
Pit	0.00	0.00	0.00	0.00
Impact Area 1: Northern NPI area	0.30	NA	96	1207
Impact Area 2-South Creek haul road crossing	NA	NA	NA	400
Impact Area 3-OSF-1 facility	0.50	NA	113	1486
Impact Area 4—RSF-A	0.02	NA	1292	443
Impact Area 5-Kings Creek haul road	NA	NA	0	116
Impact area 6-ROM pad	0.30	NA	NA	561
Impact Area 7-WSB-1 dam	0.26	0.14	226	NA
Impact Area 8-WSB inundation	7.33	11.54	286	NA
Impact Area 9-Concentrator facilities added for the pipe impacts	0.08	NA	NA	NA
Total	**8.79**	**11.68**	**2013**	**4213**

BMP = best management practice; NA = not applicable; NPI = non-process infrastructures;
OSF = overburden storage facility; ROM = run-of-mine; RSF = rock storage facility WSB = water storage basin

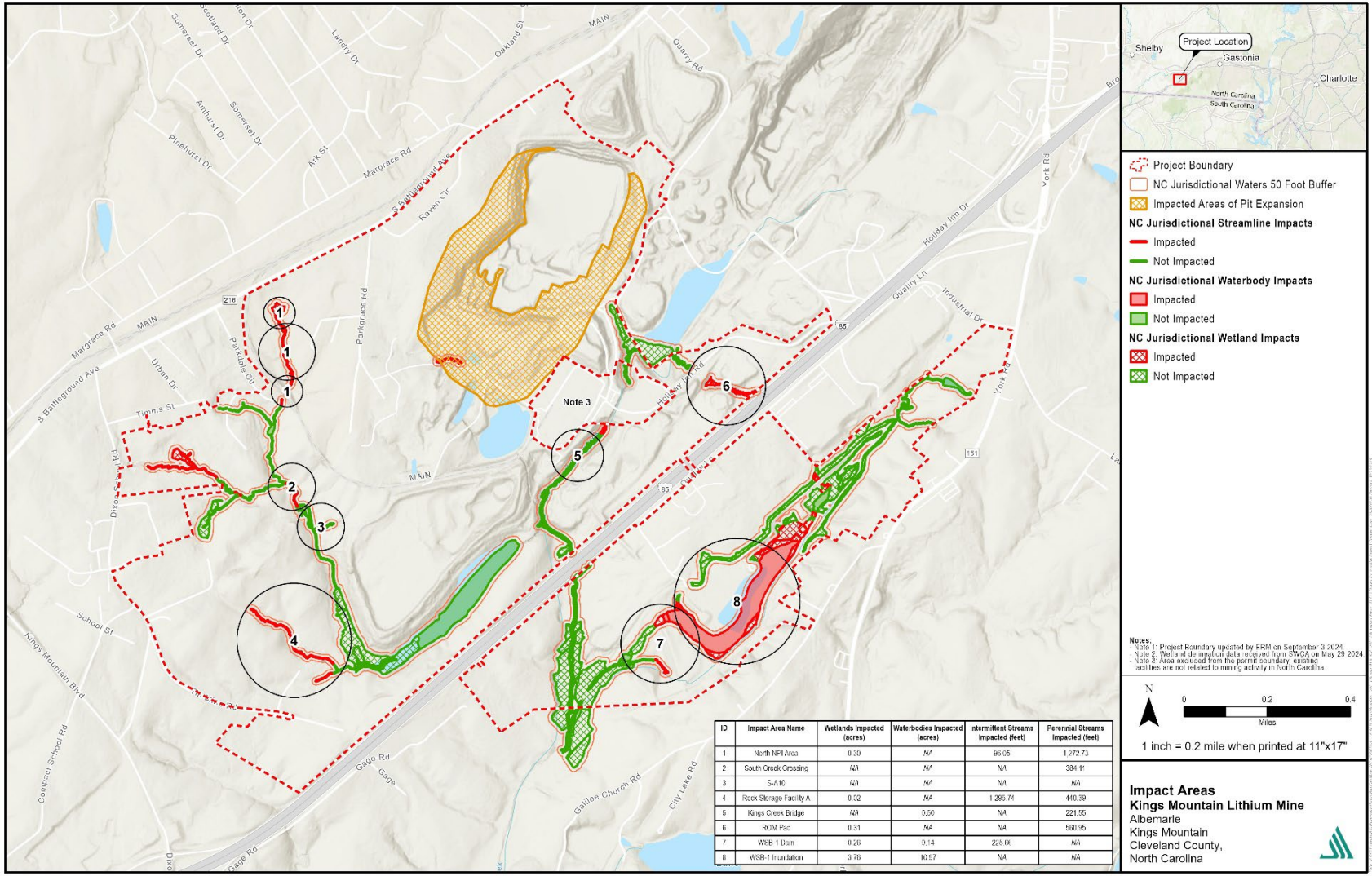
Figure 18: WOTUS Impacts (July 2024)



Nine distinct impact areas are proposed (excluding roads). Impact Area 1 will contain the construction of necessary infrastructure in the north NPI area. The activity will impact 0.30 acres of PFO (WC-01), 96 linear feet of intermittent streams (SC-03), and 1,207 linear feet of perennial streams. Impact Area 2 will consist of the South Creek Road crossing with temporary impacts to 400 linear feet (SA-05) of perennial streams to allow access to RSF-A. Impact Area 3 will be the OSF-1 facility with 0.5 acres of wetland impacts which will result from construction of the RSFs to provide slope stability, access, and stormwater management systems. Impact Area 4, RSF-A, will impact approximately 0.02 acres of PFO wetlands (WA-01), 1,292 linear feet of SA-04 intermittent streams, and 443 linear feet of perennial streams (SA-04). Impact Area 5 will be the Kings Creek haul road with impacts to 116 linear feet of perennial streams for the bridge span. Impact Area 6 will be the ROM pad and will impact 0.30 acres of wetland (WB-05) and 561 linear feet of perennial streams. Impact Area 7 will be the WSB-1 dam and will impact 0.26 acres of wetland and 226 linear feet of intermittent streams (pending new design modifications). Impact Area 8 will impact 7.33 acres of wetlands and 286 linear feet of intermittent streams. Impact Area 8 is not expected to permanently impact the wetlands due to periodic influx and change in water elevation. Impact Area 9 will be the concentrator facilities added for pipe impacts with 0.08 acres of wetlands (Figures 18: WOTUS Impacts [July 2024] and 19: Impact Areas).

The development of Proposed Project facilities and infrastructure will affect several wetlands, watercourses, and waterbodies through the removal of vegetation resulting in sedimentation and erosion, infilling of wetlands and waterbodies, or construction of diversions or culverts affecting the form and function of the waterbodies and/or watercourses. No additional wetlands other than those mentioned in Table 23: Impacts to 404 Jurisdictional Resources will be impacted during site preparation. See also Table 24: Wetlands and Palustrine Unconsolidated Bottom Features.

Figure 19: Impact Areas



ID	Impact Area Name	Wetlands Impacted (acres)	Waterbodies Impacted (acres)	Intermittent Streams Impacted (feet)	Perennial Streams Impacted (feet)
1	North NPI Area	0.30	NA	96.05	1,272.73
2	South Creek Crossing	NA	NA	NA	384.11
3	S-A1C	NA	NA	NA	NA
4	Rock Storage Facility A	0.02	NA	1,295.74	440.39
5	Kings Creek Bridge	NA	0.50	NA	221.55
6	ROM Pad	0.31	NA	NA	560.95
7	WSR-1 Dam	0.26	0.14	225.06	NA
8	WSR-1 Inundation	3.76	10.97	NA	NA

Table 24: Wetlands and Palustrine Unconsolidated Bottom Features

Classification	Number of Unique Features	Total Acres within Project Area
Jurisdictional wetlands	33	35.71
PFO	12	21.53
PSS	7	9,51
PEM	9	4.67
Jurisdictional PUBs	5	20.88
Non-jurisdictional wetlands	23	3.40
Non-jurisdictional PUBs	7	64.70

PEM = palustrine emergent wetlands; PFO = palustrine forested wetlands; PSS = palustrine scrub-shrub; PUB = palustrine unconsolidated bottom

Impacts during Construction

Impacts to wetlands are anticipated under the proposed action. Ten distinct impact areas are proposed as described in Section 3.3.19.4, Wetland Impact Summary. However, no jurisdictional wetlands will be impacted with the expansion of the existing pit.

Impacts during Operations

No impacts to wetlands are anticipated during operations.

Impacts during Closure and Post-Closure

No impacts to wetlands are anticipated during closure and post-closure.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to wetlands would occur as existing conditions would remain unchanged.

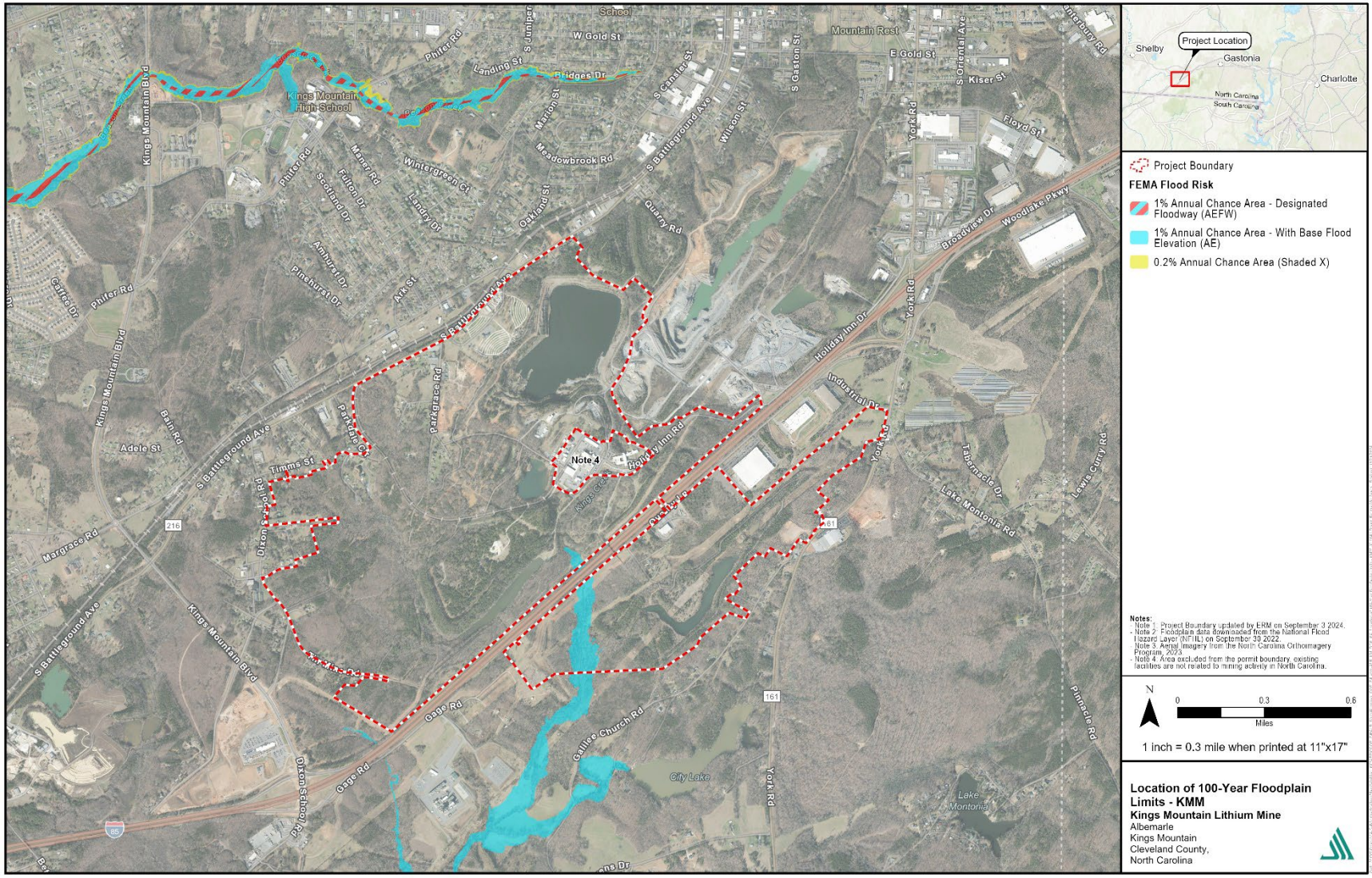
Floodplains

Kings Mountain

Floodplain management requires agencies to assess the effects their actions may have on floodplains and to consider alternatives to avoid adverse effects and incompatible development of floodplains.

No impacts to 100-year floodplains will occur at the KMM site. According to Federal Emergency Management Agency (FEMA) Map 370304, the mining site is designated as Zone X, which means the area is outside of the 0.2 percent annual chance floodplain. Additionally, FEMA National Flood Hazard Layer maps depict approximately 21 acres of the KMM site being within Zone AE of the 100-year floodplain (areas subject to inundation by the 1 percent annual chance of flood) (FEMA 2024). These mapped floodplains are located along Kings Creek (Figure 20: Location of 100-Year Floodplain Limits – KMM).

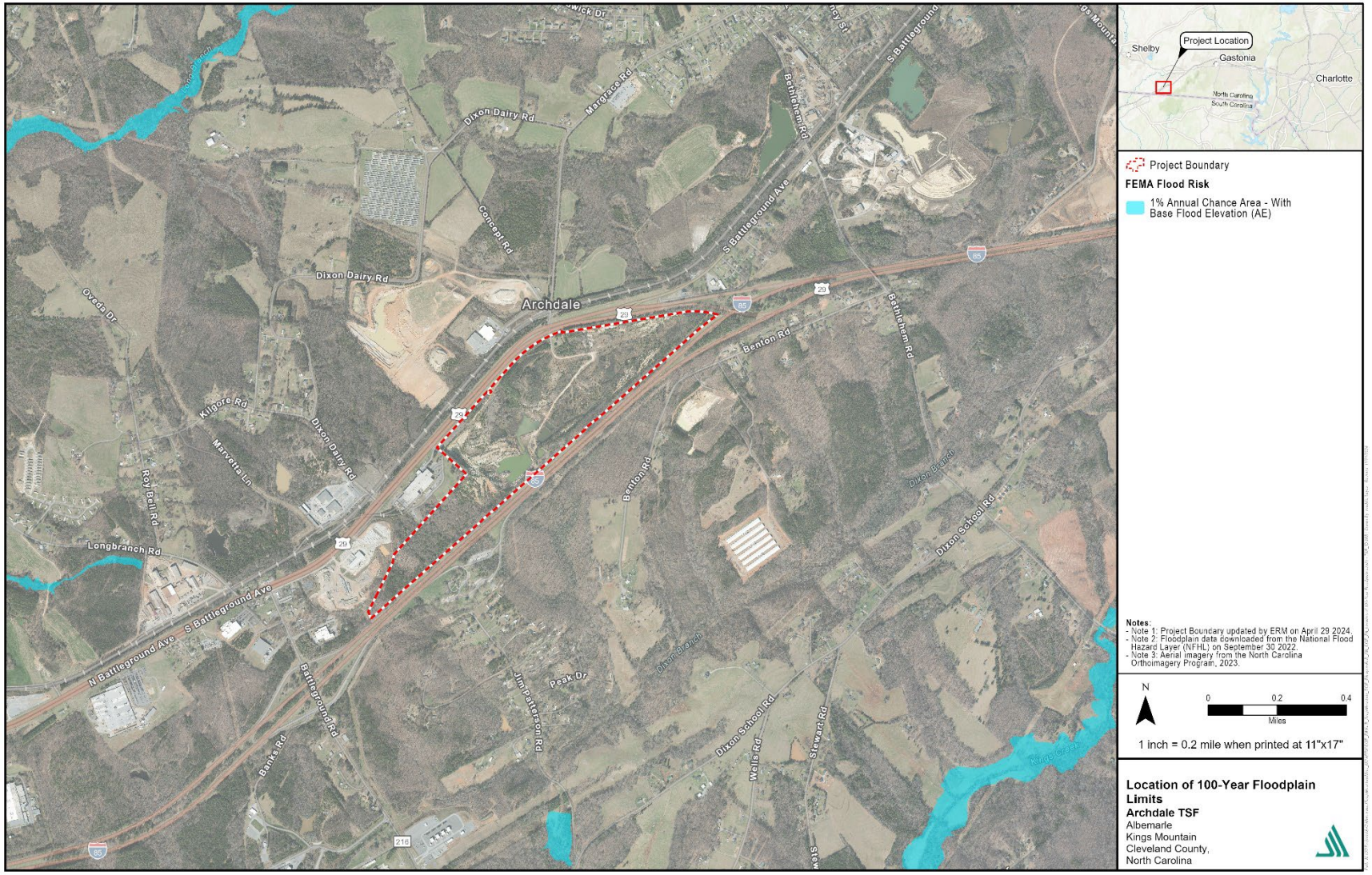
Figure 20: Location of 100-Year Floodplain Limits – KMM



Archdale Tailings Storage Facility

FEMA National Flood Hazard mapping does not depict any areas in the Archdale TSF being within Zone AE of the 100-year floodplain (Figure 21: Location of 100-Year Floodplain Limits – TSF).

Figure 21: Location of 100-Year Floodplain Limits – TSF



Impacts during Site Preparation, Construction, Operations, Closure, and Post-Closure

Construction waste may consist of RCRA Subtitle D non-hazardous solid waste. All solid waste generated during the construction phase will be collected, placed in appropriate receptacles, and disposed of offsite in accordance with legal requirements. As such, debris caught in fences during site preparation or construction may alter the natural flow of stormwater, potentially diverting it to a lower floodplain over time.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to floodplains as a result of the Proposed Project would occur, as existing conditions would remain unchanged.

Groundwater

Kings Mountain

The Piedmont and Blue Ridge aquifers within the KMM and Archdale TSF sites consist of bedrock overlain by unconsolidated weathered parent materials.

The area is characterized by ancient igneous and metamorphic rocks, with the major rock types being schist and gneiss (Versar 1984). The depth to groundwater varies from greater than 40 feet at the highest site elevations to less than 3 feet at the lowest site elevations (Versar 1984). Groundwater flows through the Piedmont and Blue Ridge aquifers in a southwestern direction. Water taken from the unconfined aquifer at the KMM site is generally not used for drinking water (Versar 1984).

Seeps and Springs

Seeps and springs were identified within the KMM site to understand and monitor site hydrology related to these resources (SWCA 2022d). Based on winter and fall surveys, there are seven seeps and 14 springs within the KMM site (Table 25: Seeps and Springs Inventory; Figure 22: Seepage Springs). Most springs form into intermittent streams that are tributaries to larger streams within the KMM site. Most seeps form into wetlands that contribute hydrology to larger streams or wetlands within the KMM site.

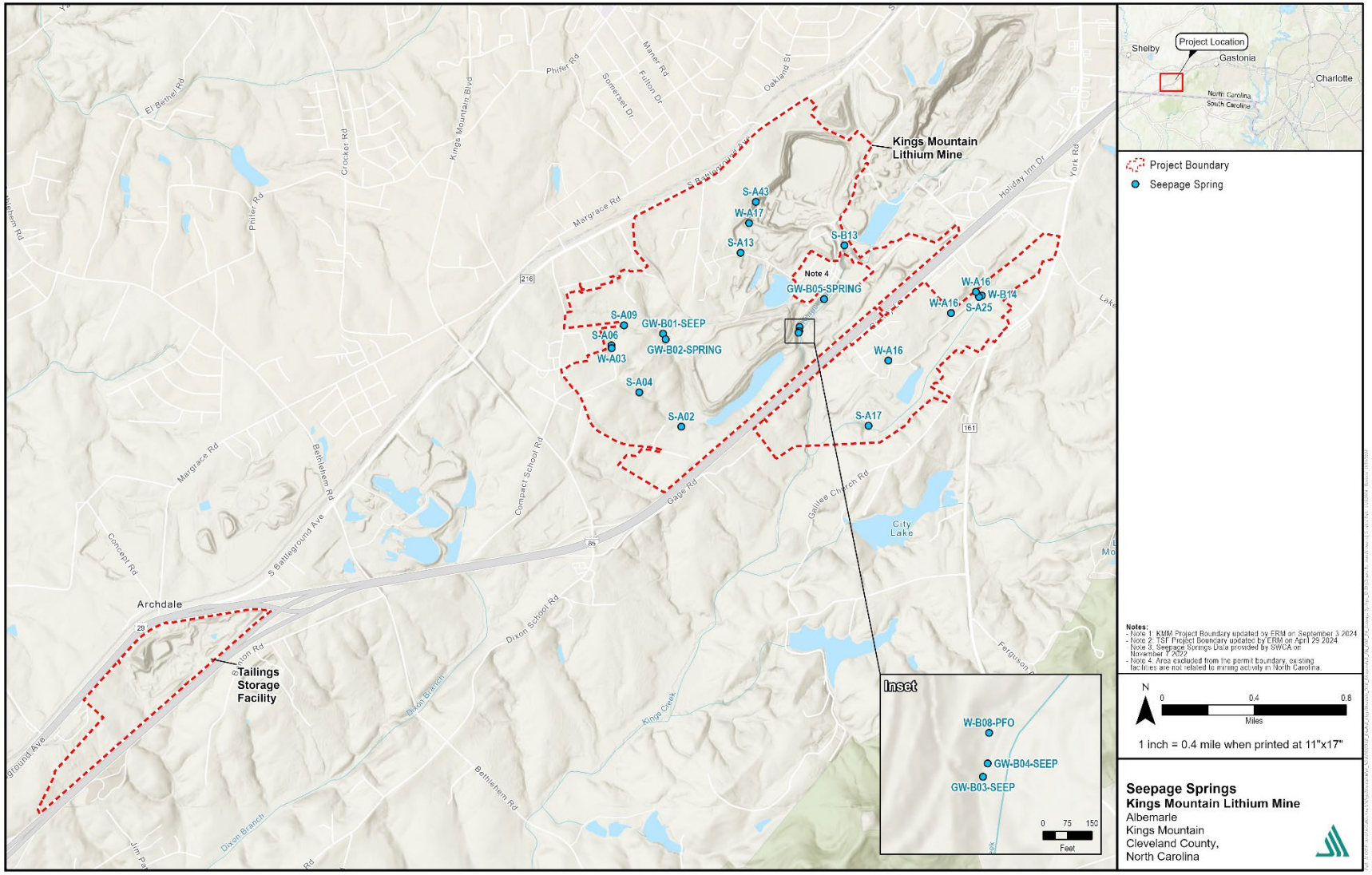
Table 25: Seeps and Springs Inventory

Location	Seeps	Springs
Main site—north of I-85	5	12
Main site—south of I-85	2	2
Total	**7**	**14**

Source: SWCA 2022d

I-85 = Interstate 85

Figure 22: Seepage Springs



Municipal and Private Water Supplies

Wells

Fifteen groundwater wells were installed across the KMM and Archdale TSF sites to enhance the ability to assess long-term changes to the deeper groundwater flow system and establish a baseline.

In 2022, two deep monitoring wells, 22 overburden monitoring wells, and four pumping wells within the overburden were installed. Well installation was completed in 2023, and quarterly samples are taken from these wells instead of at the interim monitoring points.

Results of the well surveys show there are no municipal or private water supplies within the KMM site. Approximately 260 confirmed or suspected wells were within the search area (SRK 2024i). Though most are suspected to be positive, at least 56 wells were positively identified based on previous environmental investigations (reports dating back as far as the early 1990s), well construction diagrams, and/or laboratory data since 2010. Well locations are shown on Figure 23: Existing Monitoring Well Locations – KMM and Figure 24: Existing Monitoring Well Locations – TSF. Well locations are approximate since location information is largely based on a parcel system and does not necessarily reflect exact coordinates. There are 23 confirmed and 226 suspected wells within a 2-mile radius of the KMM site.

Results of numerical groundwater modeling indicate that impacts related to a reduction in groundwater levels are expected to be minimal outside the site boundary as a result of dewatering and mining operations.

Figure 23: Existing Monitoring Well Locations – KMM

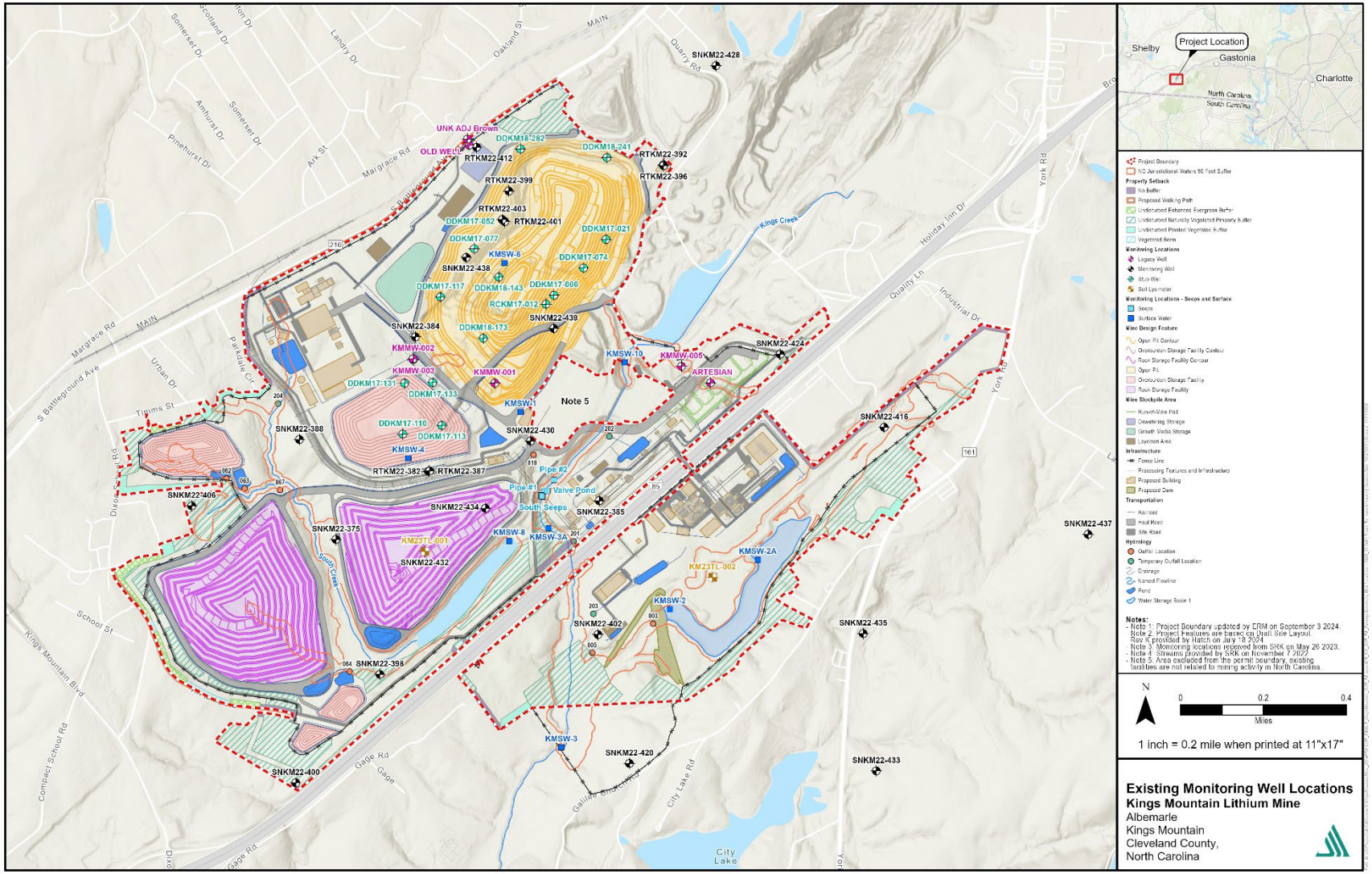
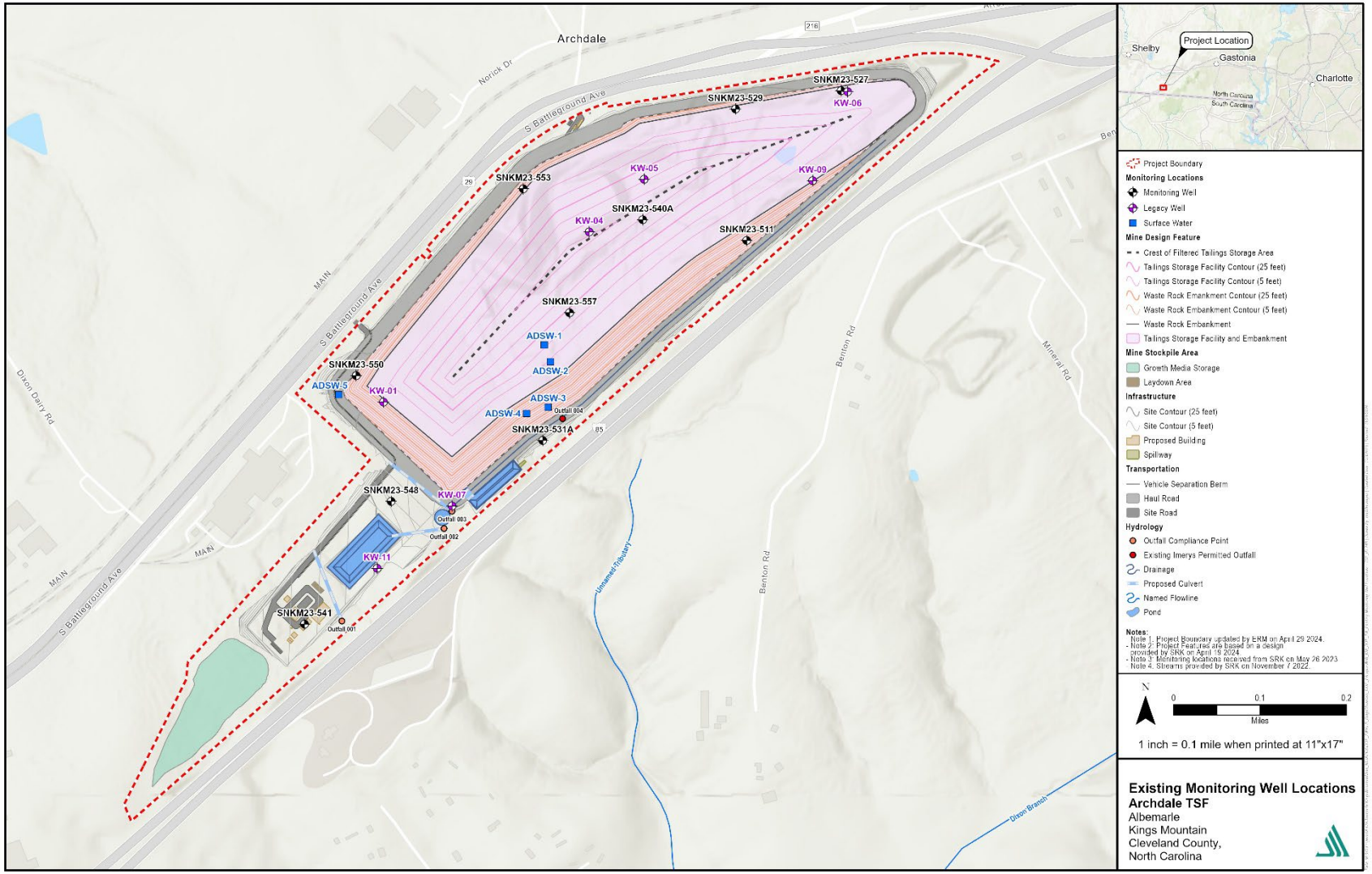


Figure 24: Existing Monitoring Well Locations – TSF



Impacts during Site Preparation

No impacts to offsite municipal and private water supplies are expected from site preparation.

Impacts during Construction

No impacts to offsite municipal and private water supplies are expected from construction.

Impacts during Operations

No impacts to offsite municipal and private water supplies are expected from operations.

Impacts during Closure and Post-Closure

No impacts to offsite municipal and private water supplies are expected from closure or post-closure. All wells will be plugged once monitoring and production wells are no longer needed in accordance with NCAC 15A 02C.0113 Abandonment of Wells.

Archdale Tailings Storage Facility

During post-closure, the drains simulating the water collection system under the TSF will be deactivated and the groundwater level in the facility will be allowed to recover. Particle tracking will be used to analyze the movement of the tailings contact water during post-closure.

In the base case, the maximum water level in the tailings was calculated to be 877 feet amsl, 65 years after the start of deposition (55.5 years after the end of operations). This corresponds to 47 feet of rise from the pit lake bottom. The highest water level elevation in the tailings from the sensitivity scenarios was 903 feet amsl, which is 73 feet above the pit lake bottom. The top of the planned TSF will be 1,004 feet amsl.

The amount of contact water moved to the downstream groundwater system was estimated at 5 gpm from the tailings and 7 gpm from the embankment for the base case, and 41 gpm from the tailings and 50 gpm from the embankment for the highest sensitivity simulations. Groundwater moving from the embankment to the groundwater system was also considered contact water for this analysis due to the likely movement of some water from the tailings to the embankment and then to the groundwater system.

Impacts during Site Preparation

Results of the numerical groundwater modeling indicated that impacts related to the reduction in groundwater levels are expected to be minimal outside the Archdale TSF site as a result of dewatering operations (Appendix F, Wetlands).

Impacts during Construction

No impacts to wells are anticipated during construction.

Impacts during Operations

Results of the numerical groundwater modeling indicate that impacts related to the reduction in groundwater levels as a result of mining operations and surface water outflow into Kings Creek (Appendix F, Wetlands) are expected to be minimal outside the Archdale TSF site boundary. An outflow channel connecting the open pit to Kings Creek will be designed once post-mining topography has been established. Pit lake water quality predictions indicate that the shallow pit lake water chemistry will meet applicable surface water quality standards. The open pit will not be stocked with fish upon closure and is not currently being considered for recreational use.

The amount of groundwater flow to the sump system is calculated to be 132 gpm due to the increased recharge to the TSF surface during operations. The drawdown cone formed while dewatering the existing pit lake is expected to remain within the facility's boundary. A 6 gpm seepage rate is estimated to be collected and managed at the toe of the TSF embankment.

Water quality of the TSF seepage water (at the base of the TSF, at the base of the TSF embankment, and under the TSF) has been analyzed and predicted by SRK (2024b). The results of the geochemical analysis modeling indicate that all parameters in the tailings seepage and waste rock embankment seepage are predicted to be below state surface water quality standards, which will allow these waters to be directly discharged to surface water.

Antimony and manganese are predicted to be elevated above the state groundwater standards in the tailing's seepage contact water. However, antimony is just slightly above the standard and within the margin of error of geochemical prediction models. Arsenic is also predicted to be elevated above groundwater standards in the waste rock embankment seepage. However, water treatment at the TSF will not be necessary due to mixing and diluting the tailings seepage and embankment waste rock seepage contact water with non-contact stormwater that falls on the TSF perimeter (SRK 2024c, 2024e).

Impacts during Closure and Post-Closure

No impacts to groundwater are anticipated during closure and post-closure.

No Action Alternative Impacts

Under the No Action Alternative, a hardrock lithium mine would not be constructed. No impacts to groundwater would occur as existing conditions would remain unchanged.

Proposed Mitigation Measures

Avoidance and minimization measures to stream crossings, surface waters, and wetlands are provided in Table 26: Example Avoidance and Minimization Measures.

Table 26: Example Avoidance and Minimization Measures

Avoidance and Minimization Measure	Actions
Mining buffers	Mining buffers of 50 feet around the entire perimeter of the KMM site will be established as required by the City of Kings Mountain.
Stream crossings	Albemarle will utilize existing stream crossings where practicable, avoiding direct impacts to most streams (4720 feet).
Stream buffers	Indirect impacts to streams will be avoided with a 100-foot stream buffer.
Stormwater BMPs	Streams will be protected by stormwater BMPs. Sediment and erosion control measures will be used to prevent impacts to downstream waters.
Spill prevention	Albemarle is developing a SWPPP and Spill Prevention, Control, and Countermeasure Plan.
Storage	Construction equipment will be kept in upland areas.
Surface waters	No live concrete will be allowed to contact surface waters.
Water quality monitoring	Water quality monitoring will be conducted to monitor site discharge and runoff.

BMP = best management practice; KMM = Kings Mountain Mine; SWPPP = Stormwater Pollution Prevention Plan

Compliance with restrictions on discharge measures will be taken so that no more than minimal adverse effects due to the proposed discharge will occur. Table 27: Compliance with Restrictions on Discharge details these actions.

Table 27: Compliance with Restrictions on Discharge

Compliance with Restrictions on Discharge	Actions
Location	The discharge of fill material has been designed to minimize or prevent the creation of standing bodies of water and provide for normal flow of water, the extent of any plume, and the disruption of periodic water inundation patterns. The material to be discharged will be similar to the existing site substrate but mixed due to the nature of mining.
Material to be discharged	The fill material will consist of waste rock and overburden taken from the site. The fill material will be free of pollutants in toxic amounts. The rock is not expected to contain natural constituents that are toxic or could become toxic and/or bioavailable as a result of the discharge. This will maintain physiochemical conditions and reduce the potency and availability of pollutants.
Material after discharge	The fill material will be stabilized after discharge to prevent erosion and slumping by using grade controls, sediment containment fencing, cover seeding, sediment basins, and stormwater controls.
Method of dispersion	Sediment fencing, sediment basins, and dewatering structures will aid in minimizing the potential of the fill material to disperse.

Compliance with Restrictions on Discharge	Actions
Effects on plant and animal populations	Fill material will be placed in disposal sites that will contain no flow or be dewatered prior to the placement of fill, and aquatic life movement will be negligible. The activities in WOTUS are not expected to create habitat conducive to the development of undesirable predators or species which have a competitive edge ecologically over indigenous plants or animals. The KMM and Archdale TSF sites are similar to surrounding landscapes and do not represent rare landscapes or contain any unique landscape elements in general; thus, the surrounding area is representative of similar plant and animal populations on the KMM and Archdale TSF sites and the activities in WOTUS will have minimal impacts to plant and animal populations relative to their presence in the surrounding area.
Effects on human use	The proposed KMM and Archdale TSF sites are located outside of public and private water intakes. Procedures for discharging fill material will minimize the disturbance of aesthetic features of the aquatic resources onsite. The activities in WOTUS are internal to the KMM and Archdale TSF sites and are generally not visible, accessible, or considered aesthetically pleasing to humans.

KMM = Kings Mountain Mine; TSF = tailings storage facility; WOTUS = Waters of the United States

The following measures will be implemented to manage potential environmental impacts to wetlands, waterbodies, and watercourses. Wetlands not identified for removal will not be disturbed. Activities conducted adjacent to or in proximity to wetlands will include sediment and erosion control measures appropriate to the activities and areas adjacent to the wetland and suitable signage will provide area demarcation. Wetlands indirectly affected by construction activities will be restored so that their functions and features are maintained. Use of appropriately sized fish screens will be employed on any pump or intakes placed in waterbodies (wetlands) or watercourses which are identified as fish-bearing or that support amphibians.

Compensatory mitigation to wetlands will be required because impacts will not be considered minimal individually and/or cumulatively and will far exceed levels that generally require compensatory mitigation. Mitigation banks in the service area do not have the appropriate number and resource-type credits available.

The impacts will be within the service area of an approved in lieu fee program (Table 28: Mitigation Type and Location). The in lieu fee program has the appropriate number and resource-type credits available per wetland type. Table 29: Compensatory Mitigation Impact Analysis for 404 Jurisdictional Resources and Table 30: Compensatory Mitigation Impact Analysis for NCDEQ-Only Jurisdictional Resources Credit calculations are based on a 2 to1 ratio for streams and 0.5 to1 for open water. Table 31: In Lieu Fee Credit Calculation and Table 32: Summary of Credits calculate the summary of credits for direct and indirect impacts. Table 33: Summary of Proposed and Required Compensatory Mitigation divides the credit type into wetlands and streams.

Table 28: Mitigation Type and Location

Mitigation Bank Credits	
In lieu fee program credits	Yes
Permittee-responsible mitigation under a watershed approach	NA
Permittee-responsible mitigation, onsite and in-kind	NA
Permittee-responsible mitigation, offsite and/or out of kind	NA

NA = not applicable

Table 29: Compensatory Mitigation Impact Analysis for 404 Jurisdictional Resources

Aquatic Resource Type	Impact (ac or lf)	Mitigation Ratio	Mitigation Credits
PFO	1.57	2:1	3.14
PSS	2.62	1.5:1	3.93
PEM	1.13	1:1	1.13
PER	4,193	2:1	8,386
INT	1,731	1:1	1,731
OW	11.11	0:1	0.00

ac = acres; INT = intermittent; lf = linear feet; OW = open water; PEM = palustrine emergent; PER = perennial; PFO = palustrine forested; PSS = palustrine scrub-shrub

Table 30: Compensatory Mitigation Impact Analysis for NCDEQ-Only Jurisdictional Resources

Aquatic Resource Type	Impact (ac or lf)	Mitigation Ratio	Mitigation Credits
PFO	1.86	2:1	3.72
PSS	5.33	1.5:1	8.00
PEM	1.60	1:1	1.60
PER	3,653	2:1	7,306
INT	2,459	1:1	2,459
OW	11.68	0:1	0

ac = acres; INT = intermittent; lf = linear feet; OW = open water; NCDEQ = North Carolina Department of Environmental Quality; PEM = palustrine emergent; PER = perennial; PFO = palustrine forested; PSS = palustrine scrub-shrub

Table 31: In Lieu Fee Credit Calculation

Feature	Direct Impacts	Indirect Impacts	Ratio	Additional Credits	Total Credits
Perennial streams	2612	0.00	2:1	NA	5224
Intermittent streams	2108	0.00	2:1	NA	4216
Open water	0.14	0.00	0.5:1	NA	0.01
Wetlands	8.39	0.00	2:1	NA	16.78
Total	**4728.53**	**0.00**	**-**	**NA**	**9456.79**

NA = not applicable

Table 32: Summary of Credits

Feature	Direct Impacts	Additional Indirect Impacts	Required Credits	Additional Credits	Total Credits
Perennial streams	2523	0.00	2:1	NA	5046
Intermittent streams	2359	0.00	2:1	NA	4718
Open water	0.00	0.00	0.5:1	NA	0.00
Wetlands	7.27	0.00	2:1	NA	40.4
Total	**4902.20**	0.00	**-**	**NA**	**9804.40**

NA = not applicable

Table 33: Summary of Proposed and Required Compensatory Mitigation

Credit Type	Required Credits
Wetland credits	8.2
Stream credits	10,117

4. CUMULATIVE IMPACTS

Cumulative impacts are potential effects on the environment from the incremental impact of the Proposed Project when added to other past, present, and reasonably foreseeable future actions undertaken by other agencies (federal or nonfederal) or persons (40 CFR Part 1508.1 ((g)).

The cumulative impacts review assessed the past, present, and anticipated future projects related to the Proposed Project's location. The primary projects analyzed for cumulative impacts included the Catawba Village commercial and residential development and the Dixon Ridge Development. As part of the conceptual plan for Catawba Village, the City of King's Mountain has outlined development plans for approximately 211.88 acres. Plans for this private development include the construction of a casino (sometimes referred to as the Catawba Two

Kings Casino), residential spaces, and various amenities. The Dixon Ridge Development is a mixed-use industrial, research, and residential development across I-85 from the future Catawba Village. Other projects in the immediate vicinity include primarily residential neighborhood developments that are not likely to have cumulative impacts with the Proposed Project.

Table 34: Cumulative Impacts details the direct, indirect, and cumulative impacts for the Proposed Project.

Table 34: Cumulative Impacts

Resource	Direct Impacts	Indirect Impacts	Cumulative Impacts	Explanation
Aesthetics and visual resources	Minor	Minor	Minor	The location of the facility is intended for industrial development. Section 3.3.1 describes the potential for minor direct and indirect impacts from the Proposed Project as a result of its design and location with respect to residential properties. Additional projects in the region would augment existing industrial and roadway infrastructure and could, therefore, have an incremental impact on visual resources.
Air quality and climate change	Minor	Minor	Minor	The Proposed Project's construction phase will result in air emissions, primarily from fugitive dust associated with earthmoving and exhaust from fuel combustion. However, emissions resulting from construction will be temporary and minimized by BMPs. In operations, the Proposed Project will support the proliferation of EVs, thereby reducing emissions from fuel combustion. Although the construction phase will have temporary impacts on air quality, the long-term effects of increased EV implementation would outweigh impacts from construction and result in a net benefit. The cumulative impacts on air quality associated with operation of the Proposed Project and the other projects in the region would be subject to regulatory oversite through the CAA.
Biological resources	Minor	Minor	Minor	Due to the current disturbed industrial land use adjacent to the Proposed Project site and the proposed facility's lack of natural habitat and low potential for wildlife use, cumulative impacts on general biological resources (wildlife and vegetation) are minor. No critical habitat is found on the Proposed Project site and there is a lack of natural habitat on or adjacent to the Proposed Project site and surrounding industrial areas.

Resource	Direct Impacts	Indirect Impacts	Cumulative Impacts	Explanation
Cultural resources	Negligible	Negligible	Negligible	Impacts to cultural resources from the proposed action are not expected. Therefore, impacts from the proposed action, when combined with other past, present, and reasonably foreseeable future actions, would have no new or increased impacts on cultural resources within the Proposed Project boundary.
Geology and soils	Negligible	Negligible	Negligible	The Proposed Project, in conjunction with the other possible identified projects on the Proposed Project site, would be designed to minimize soil disturbance and grading.
Greenhouse gases	Negligible	Negligible	Negligible	In the context of GHG emissions, the Proposed Project will have a net positive, long-term impact on the global climate and GHG emissions. This impact arises from the Proposed Project's contributions to decarbonizing U.S. transportation, which significantly outweigh the GHG emissions generated by the Proposed Project itself. Over the first 10 years of operation, batteries produced using material from the Proposed Project site are expected to eliminate between 4,493,770 to 4,600,000 metric tons of CO_2 emissions. Reducing CO_2 emissions overall would lead to lower GHG concentrations and mitigate climate change impacts, including changes in temperature, precipitation patterns, extreme weather events, and rising sea levels.
Public health and safety	Negligible	Negligible	Negligible	Impacts to health and safety from the proposed action are not anticipated as all guidelines and compliance actions will be implemented. Therefore, it is concluded that impacts from the proposed action, when combined with other past, present, and reasonably foreseeable future actions, would have no new or increased impacts on health and safety within the Proposed Project boundary or surrounding area beyond what has already been experienced.
Land use	Negligible	Negligible	Negligible	The Proposed Project, in conjunction with the other possible identified projects on the Proposed Project site, would be designed to minimize land disturbance and grading.

Resource	Direct Impacts	Indirect Impacts	Cumulative Impacts	Explanation
Noise	Moderate	Minor	Minor	The impacts from noise during construction will be intermittent and temporary. Once the Proposed Project is operational, noise impacts are expected to be minor due to the initial disturbance during site preparation and construction. This disturbance may cause wildlife to avoid the area in most cases. Consequently, it is concluded that the proposed action, when combined with other past, present, and reasonably foreseeable future actions, would not introduce new or increased noise impacts within the Proposed Project boundary or the surrounding area beyond what has already been experienced.
Socioeconomics and EJ	Negligible	Negligible	Negligible	The proposed action will have a positive environmental impact on socioeconomics and EJ. Therefore, it is concluded that impacts from the proposed action, when combined with other past, present, and reasonably foreseeable future actions, would have no new or increased negative impacts on socioeconomics and EJ within the Proposed Project boundary or surrounding area beyond what has already been experienced, and would have a positive impact on both socioeconomics and EJ.
Traffic and transportation	Minor	Minor	Minor	The increase in traffic during construction and operation of the Proposed Project is expected to be minor. There are no current plans for future additions, expansions, or other activities related to or connected with this proposal which will cumulatively increase traffic further. Albemarle does not own contiguous parcels, and no parking spaces will be eliminated by the Proposed Project. Moreover, no temporary road closures or detours will be required during either the construction or operation of the Proposed Project, and there will be no impacts to public transit. The Proposed Project will employ local workers who are already contributing to traffic in the area. They will be accessing the KMM and Archdale TSF sites in shifts which will further minimize impacts to traffic. Therefore, while there will be an incremental increase in overall traffic, no adverse cumulative effects on the region's overall transportation network are anticipated as a result of the Proposed Project.

Resource	Direct Impacts	Indirect Impacts	Cumulative Impacts	Explanation
Waste management	Negligible	Negligible	Negligible	RCRA waste will not be generated at the facility. If RCRA waste occurs at the property in the future, the waste would be stored temporarily but would not be treated or disposed at the proposed facility. All RCRA waste would be transferred to facilities permitted under local, federal, or state jurisdictions.
Water resources	Minor	Negligible	Negligible	No reasonably foreseeable development has been identified in the vicinity of the proposed KMM and Archdale TSF sites. Development consistent with existing zoning will not result in cumulative adverse impacts to wetlands and floodplains, surface water, or groundwater.

BMP = best management practice; CAA = Clean Air Act; CO_2 = carbon dioxide; EJ = environmental justice; EV = electric vehicle; GHG = greenhouse gas; KMM = Kings Mountain Mine; RCRA = Resource Conservation and Recovery Act; TSF = tailings storage facility; U.S. = United States

5. GENERAL PUBLIC INTEREST REVIEW

5.1. PUBLIC INTEREST FACTORS

All public interest factors have been reviewed and those relevant to the Proposed Project have been considered and discussed below and in Table 35: Public Interest Factors and Effects.

Table 35: Public Interest Factors and Effects

Factor	None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
Conservation			X			
Economics					X	
Aesthetics			X			
General environmental concerns			X			
Wetlands				X		
Historic properties				X		
Fish and wildlife values				X		
Flood hazards				X		
Floodplain values				X		
Land use			X			
Navigation [a]						X

Factor	None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
Shoreline erosion and accretion [b]						X
Recreation			X			
Water supply and conservation			X			
Water quality			X			
Energy needs					X	
Safety			X			
Food and fiber production						X
Mineral needs					X	
Consideration of property ownership			X			
Needs and welfare of the people					X	

[a] The Proposed Project area does not contain navigable waters, and the Proposed Project is not expected to affect navigation indirectly or directly.
[b] The Proposed Project area does not contain shoreline.

6. PUBLIC AND PRIVATE NEED

The Proposed Project serves the private need of Albemarle to create a profitable business in the domestic lithium market. The Proposed Project also serves the public need for a domestic source of lithium to insulate domestic prices in the global market.

6.1. RESOURCE USE UNRESOLVED CONFLICTS

6.1.1. Kings Mountain

No unresolved conflicts pertaining to resource use have been identified.

6.1.2. Archdale Tailings Storage Facility

No unresolved conflicts pertaining to resource use have been identified.

6.1.3. Site Preparation

No unresolved conflicts pertaining to resource use have been identified.

7. PUBLIC NOTICE RESULTS

A public notice was sent on November 26,2024

Several public outreach efforts such as; community town hall, non-government organization, and other non-profit meetings have been conducted and continue weekly to monthly. See Appendix G, Public Comments and Responses for all public outreach events.

8. FINDINGS

Based on the information presented in this EA (DOE/EA-2265), DOE finds that providing cost-shared funding to the Proposed Project does not constitute a major federal action that will significantly affect the quality of the physical, biological, or human environment within the meaning of NEPA (Table 36: Applicable NEPA Laws). Therefore, the preparation of an Environmental Impact Statement is not required, and DOE will issue a FONSI.

Table 36: Applicable NEPA Laws

Executive Order	Effect	No Effect	Likely to Affect	May Affect but Not Likely
Advancing Racial Equity and Support for Underserved Communities through the Federal Government (EO 13985)		X		
Bald and Golden Eagle Protection Act				X
Clean Air Act				X
Clean Water Act		X		
Comprehensive Environmental Response, Compensation, and Liability Act		X		
Endangered Species Act				X
Establishing a Federal Flood Risk Management Standard and a Process for further Soliciting and Considering Stakeholder Input (EO 13690)		X		
Executive Order on America's Supply Chains (EO 14017)		X		
Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations (EO 12898)		X		
Floodplain Management (EO 11988)		X		
Migratory Bird Treaty Act				X
Pollution Prevention Act of 1990		X		
Protection of Wetlands (EO 11990)		X		
Resource Conservation and Recovery Act				

Executive Order	Effect	No Effect	Likely to Affect	May Affect but Not Likely
Revitalizing Our Nation's Commitment to Environmental Justice for All (EO 14097)		X		
Tackling the Climate Crisis at Home and Abroad (EO 14008)		X		
The Noise Control Act of 1972				X
National Historic Preservation Act		X		
The Native American Graves Protection and Repatriation Act		X		

EO = Executive Order

8.1. LIST OF PREPARERS AND REVIEWERS

The preparers and reviewers of this EA are identified in Table 37: List of Preparers and Reviewers.

Table 37: List of Preparers and Reviewers

Contributors and Reviewers	Position	Email	Organization
Federal Agencies			
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AFMC = Air Force Materiel Command; DAF = Department of the Air Force; DOE = U.S. Department of Energy; EA = Environmental Assessment; ERM = ERM NC, Inc.; NEPA = National Environmental Policy Act; NETL = National Energy Technology Laboratory; TBD = to be determined; USACE = U.S. Army Corps of Engineers; USEPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service

8.2. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONTACTED

DOE coordinated with various applicable agencies, Tribal nations, and stakeholders throughout the preparation of this EA and/or while preparing the supporting technical studies. These agencies were also notified of the availability of the draft EA through consultation letters and/or direct notification of the availability of the draft EA.

8.2.1. State Agencies

- NCDEQ

8.2.2. Local Agencies

- City of King Mountain

8.2.3. Native American Tribes

- Catawba
- Cherokee
- Eastern Bans of Cherokee Indians
- Muscogee (Creek) Nation
- Keetowah Band of Cherokee

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APPENDIX A DEPARTMENT OF THE AIR FORCE COOPERATING AGENCY LETTER

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE OHIO

Mr. Ronald Onderko
Command Senior Civil Engineer
Logistics, Civil Engineering, Force Protection
and Nuclear Integration
4225 Logistics Ave, Bldg. 266
Wright-Patterson AFB, OH 45433-5332

Mr. Fred E. Pozzuto
Director, NEPA Policy and Compliance Division
Department of Energy
3610 Collins Ferry Rd, Bldg. 26, Rm 102, MS 107
Morgantown, WV 26505

Mr. Pozzuto,

The Department of the Air Force (DAF) requests formal participation from the Department of Energy (DOE) in the preparation of the Albemarle Kings Mountain Environmental Assessment (EA) analyzing the impacts of resuming mining operations at the Kings Mountain Mine as prescribed in the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR § 1501.8, *Cooperating Agencies*. Consistent with these regulations, participation of the DAF generally includes assuming responsibility for developing information and preparing analyses on issues for which the DAF has special expertise. For this action, the DAF's participation is limited to

- Defining the DAF's purpose and need and scoping information as it relates to the Defense Production Act, Title III Program;
- Breaking out the DAF's cost share funding being provided to Albemarle; and
- Reviewing the draft EA to ensure the requirements of 32 CFR § 989 are being met.

The DAF supports DOE as the lead agency for all NEPA requirements as well as any Section 7 consultations of the Endangered Species Act (16 USC §1531 et. seq.) and Section 106 consultations of the National Historic Preservation Act (54 USC § 300101 et. seq.) to include consultations with federally recognized Indian Tribes, and for any other similar regulatory consultations or coordination requirements. The lead point of contact is Ms. Shari Fort, AFMC NEPA Liaison, AFIMSC Det 6, who can be reached at shari.fort@us.af.mil.

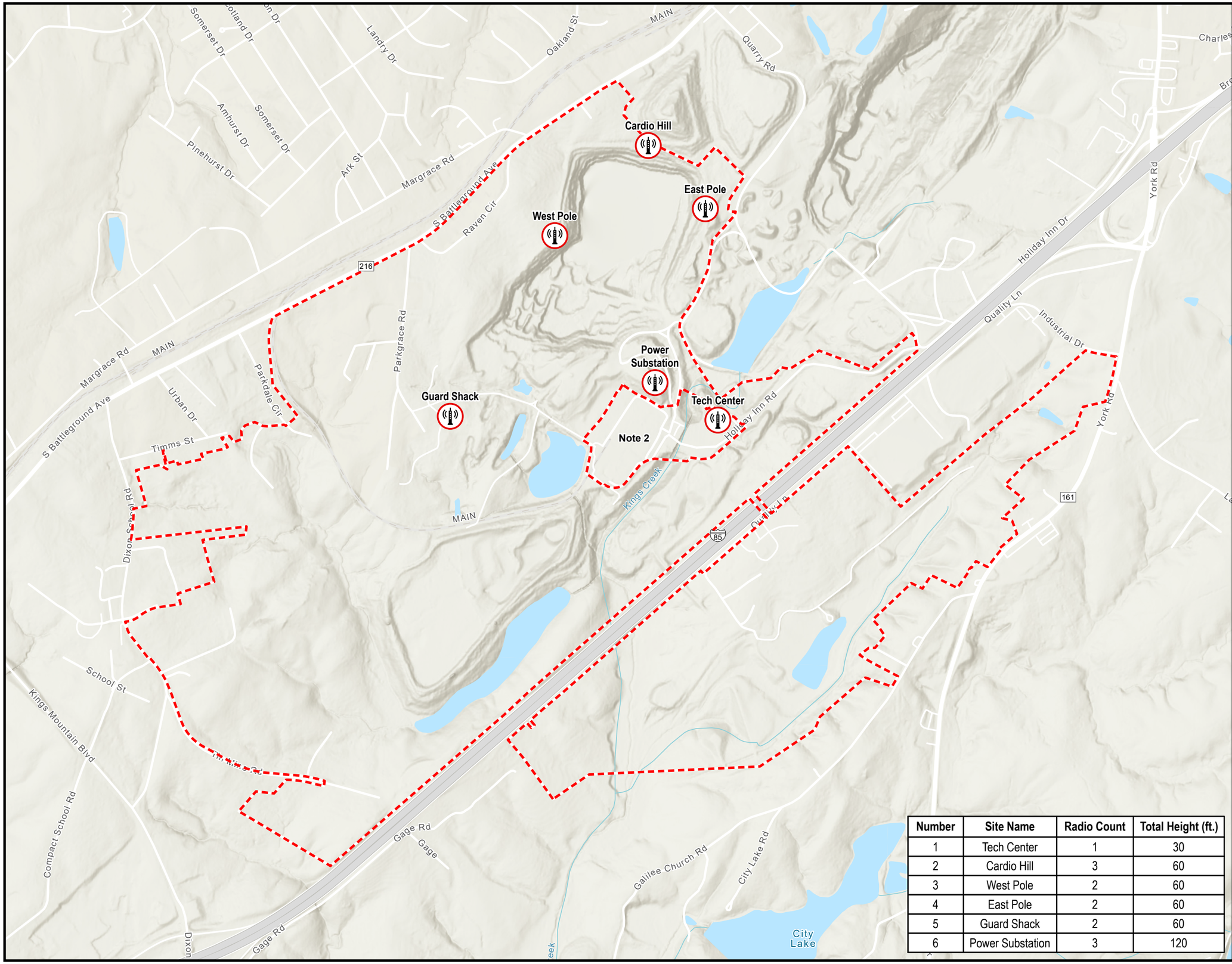
Sincerely

RONALD J. ONDERKO, P.E., NH-04, DAF
Chief, Civil Engineering Division

cc:
AF/A4CP
AFIMSC Det 6/CEB
AFMC/JAOE
AFRL/RMX

APPENDIX B DESIGN DRAWINGS

APPENDIX B-1 COMMUNICATIONS TOWERS LOCATIONS



Project Boundary

Proposed Communications Tower

Number	Site Name	Radio Count	Total Height (ft.)
1	Tech Center	1	30
2	Cardio Hill	3	60
3	West Pole	2	60
4	East Pole	2	60
5	Guard Shack	2	60
6	Power Substation	3	120

Notes:
- Note 1: Project Boundary updated by ERM on September 3 2024.
- Note 2: Area excluded from the permit boundary, existing facilities are not related to mining activity in North Carolina.

N

0 0.2 0.4

Miles

1 inch = 0.2 mile when printed at 11"x17"

Communications Tower Locations
Kings Mountain Lithium Mine

Albemarle
Kings Mountain
Cleveland County,
North Carolina

APPENDIX B-2 MINING AND CONCENTRATOR FACILITY

POTENTIAL EMISSIONS SOURCE ●

DESCRIPTION	EASTING	NORTHING
EP-011 - CONVEYOR TRANSFER POINT	1297243.1771	540684.2656
EP-012 - CONCENTRATE LOAD-OUT BINS	1297328.1302	540567.4635
EP-013 - CONCENTRATE LOAD-OUT BINS	1297374.4323	540514.6823
EP-014 - CONVEYOR TRANSFER POINT	1297384.7031	540401.5677
EP-015 - CONCENTRATE TRUCK LOAD-OUT	1297297.6771	540719.5521
EP-016 - ORE SORTING BAGHOUSE	1297784.9115	540923.9792
EP-017 - CONVEYOR TRANSFER POINT	1297898.3177	541111.0990
EP-018 - CONVEYOR TRANSFER POINT	1297921.0990	541085.1146
EP-019 - CONVEYOR TRANSFER POINT	1297981.4479	541138.0365
EP-020 - SORTING SIZING SCREEN BAGHOUSE	1297964.0365	541189.8646
EP-021 - TERTIARY CRUSHER BUILDING BAGHOUSE	1297988.4010	541172.5156
EP-022 - CRUSHER SIZING SCREENS BAGHOUSE	1298371.5990	541454.0260
EP-023 - SECONDARY CRUSHER BUILDING BAGHOUSE	1298286.4740	541592.6042
EP-024 - SORTER REJECTS BIN TRANSFER POINT	1298378.5833	541762.9531
EP-025 - COARSE TAILS REJECTS BIN TRANSFER POINT	1298399.2656	541781.0938
EP-026 - CONVEYOR TRANSFER POINT	1298703.1250	541929.4010
EP-027 - CONVEYOR TRANSFER POINT	1298852.1823	541759.4323
EP-028 - PRIMARY CRUSHER BUILDING BAGHOUSE	1299348.6979	542166.6146
EP-029A - ROM PAD TRUCK DUMPING AREA	1299646.4586	542609.2344
EP-029B - ROM PAD TRUCK DUMPING AREA	1299410.6771	542878.0938
EP-029C - ROM PAD TRUCK DUMPING AREA	1298652.9583	542213.5938
EP-029D - ROM PAD TRUCK DUMPING AREA	1298888.7396	541944.7344
EP-030 - CONVEYOR TRANSFER POINT	1298521.7656	541599.6719
EP-031 - CONVEYOR TRANSFER POINT	1298540.6354	541637.2917
EP-032 - CONVEYOR TRANSFER POINT	1298564.5104	541558.6979
EP-033 - CONVEYOR TRANSFER POINT	1298633.7083	541497.2813
EP-034 - CONVEYOR TRANSFER POINT	1299062.9427	541024.2813
EP-035 - CONVEYOR TRANSFER POINT	1299086.0469	541015.2760
EP-036 - CONVEYOR TRANSFER POINT	1299182.3854	541129.0469
EP-037 - CONVEYOR FRONT END LOADER POINT	1299208.6927	541152.1250
EP-038 - CONVEYOR TRANSFER POINT	1299109.8954	541211.7500
EP-039 - ROTARY DRIER BUILDING BAGHOUSE	1299566.0990	541318.9583
EP-040 - CONCENTRATE STOCKPILE TRANSFER POINT	1299720.4063	541571.4896
EP-041 - CONVEYOR TRANSFER POINT	1299878.9635	541390.6458
EP-042 - CONVEYOR TRANSFER POINT	1299736.3854	541116.4219
EP-043 - CONVEYOR TRANSFER POINT	1299407.1250	540976.8958
EP-044 - CONVEYOR TRANSFER POINT	1299399.2969	540984.2396
EP-045 - CONVEYOR TRANSFER POINT	1299413.3542	540968.2083
EP-046 - CONVEYOR TRANSFER POINT	1299407.6406	540872.1771
EP-047 - CONVEYOR TRANSFER POINT	1299277.8333	540745.2656
EP-048 - CONVEYOR FRONT END LOADER POINT	1299298.9323	540721.2083
EP-049 - CONVEYOR FRONT END LOADER POINT	1299336.0000	540696.3177
EP-050 - FINE TAILS REJECTS BIN TRANSFER POINT	1293971.4063	538017.6146

NOTES:

1. COORDINATES AND NORTH ORIENTATION SHOWN ARE BASED ON THE FOLLOWING COORDINATE SYSTEM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT (OR NC83F).

PRELIMINARY
NOT FOR CONSTRUCTION
FOR PERMITTING

HATCH

DRAFTSPERSON	K. PIOTROWSKI	NR	
DESIGNER	K. PIOTROWSKI	NR	
CHECKER			
DESIGN COORD.	K. PIOTROWSKI		
RESP. ENG.	K. WHEERY		
LEAD DISC. ENG.			
ENG. MANAGER	C. CLARKE		
PROJ. MANAGER	K. YOUNG		
ROLE	NAME	SIGNATURE	DATE

HATCH DRAWING NUMBER: H371132-0000-240-290-0005

REV #	DESCRIPTION	CADD	CHK'D	APPR'D	DATE
	INTERNAL REVIEW			---	

ALBEMARLE™ CORPORATION

KINGS MOUNTAIN
348 HOLIDAY INN DRIVE
KINGS MOUNTAIN, NC 28286

MINING AND CONCENTRATOR FCILITY
CRUSHER AND CONCENTRATOR AREAS
MINE SELCT PAHSE
EMISSION SOURCE LOCATION PLAN

JOB NO.	DRAFTER:	DRAWING NO.	SHT. 1 of 1	REVISION
KM22040	K. PIOTROWSKI	KM00-ME-GA-00105		A
SCALE: 1"=200'-0"	DATE			

APPENDIX C FEDERALLY LISTED SPECIES FOR KINGS MOUNTAIN

APPENDIX C-1 U.S. FISH AND WILDLIFE SERVICE IPAC RESOURCE LIST – KINGS MOUNTAIN

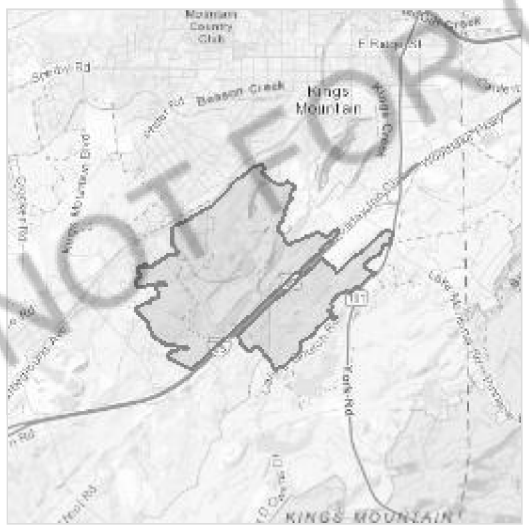
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Cleveland County, North Carolina



Local office

Asheville Ecological Services Field Office

(828) 258-3939
(828) 258-5330

160 Zillicoa Street, Suite B

Asheville, NC 28801-1082

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Dwarf-flowered Heartleaf Hexastylis naniflora Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2458	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Jul 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read

"Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

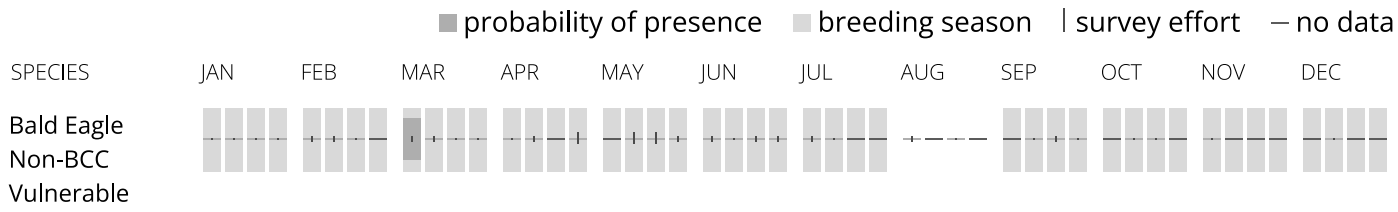
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON

Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Jul 31
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Chuck-will's-widow *Antrostomus carolinensis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Jul 10
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Grasshopper Sparrow *Ammodramus savannarum perpallidus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8329	Breeds Jun 1 to Aug 20
Prairie Warbler *Setophaga discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ( )
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1Kx
- PEM1Fh

FRESHWATER FORESTED/SHRUB WETLAND

- PSS1Ah
- PFO1Ah
- PFO1C

FRESHWATER POND

- PUBHh
- PUSKx
- PUBHx
- PUSCh
- PUBKx
- PUSCx

RIVERINE

- R2UBH
- R4SBC
- R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX C-2 BIOLOGICAL RESOURCES SUMMARY REPORT FOR THE KINGS MOUNTAIN LITHIUM MINE, CLEVELAND COUNTY, NORTH CAROLINA

Biological Resources Summary Report for the Kings Mountain Lithium Mine, Cleveland County, North Carolina

INTERIM DRAFT - APRIL 2023

PREPARED FOR

Albemarle U.S., Inc.

PREPARED BY

SWCA Environmental Consultants

BIOLOGICAL RESOURCES SUMMARY REPORT FOR THE KINGS MOUNTAIN LITHIUM MINE, CLEVELAND COUNTY, NORTH CAROLINA

Prepared for

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Kings Mountain, North Carolina 28086
Attn: Trevor Chesal

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SWCA Project No. 70316

Interim Draft

April 2023

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1 INTRODUCTION

Albemarle U.S. Inc. (Albemarle) plans to reopen the former Kings Mountain lithium mine site and construct a new processing facility (Project) in Kings Mountain, Cleveland County, North Carolina. In 2022, SWCA Environmental Consultants (SWCA) conducted a desktop review in combination with several field surveys to determine the existing biological resources within the Project area. The following surveys and reports have been completed and are summarized within this biological resources summary report. In addition to the specific surveys, SWCA has conducted multiple field surveys to document general vegetation, habitats, migratory birds, and other wildlife:

- Wetland and waterbody delineation (SWCA 2022a)
- Bat survey (SWCA 2022b)
- Dwarf-flowered heartleaf survey (SWCA 2022c)
- Monarch habitat assessment (SWCA 2022d)
- Aquatic assessment (SWCA 2022e)
- Federally and State-Listed Species Report (SWCA 2022g)

In 2023, SWCA will conduct biological surveys on additional properties acquired by Albemarle subsequent to the 2022 surveys. This interim report will be finalized with the additional 2023 data.

1.1 Location

The Project is on private land owned or leased by Albemarle. The Project area is approximately 2 miles south of downtown Kings Mountain, North Carolina, and is located on the U.S. Geological Survey (USGS) Kings Mountain, North Carolina, 7.5-minute quadrangle (Figure 1). The Project area is divided by Interstate-85 (I-85), with the main parcel on the north side of the highway and two parcels on the south side of the highway. The main parcel is bordered by South Battleground Avenue (Highway 216), Parkgrace Road, and Tin Mine Road to the west; Quarry Road to the north; and I-85 to the south and east.

1.2 Project Area Description

The main parcel is mostly developed/disturbed and includes Albemarle's lithium salts and compound processing facility and Albemarle's Global Technical Center. The west side along South Battleground Avenue includes an active drive-in theater, remnants of a textile mill, an old school building, and a recreational vehicle campground. Five utility rights-of-way (ROWs) cross the northern and central portions of the parcel. The parcel directly south of I-85 is mostly undeveloped but previously disturbed by mining. The Kings Mountain Gateway Trail abuts the northern and eastern boundaries of this parcel with an access point and parking area off Galilee Church Road. Additionally, three utility ROWs cross the parcel running northeast–southwest. The Albemarle East Property, east of York Road, is undeveloped with only a few unpaved roads for access. Undeveloped land in the three parcels consists primarily of upland forest and wetland habitats.

The Project area is surrounded by residential, commercial, and industrial development to the north, west, and south (Figure 2). The Martin Marietta mine borders the Project area to the north. To the east is primarily undeveloped land associated with Crowders Mountain State Park.

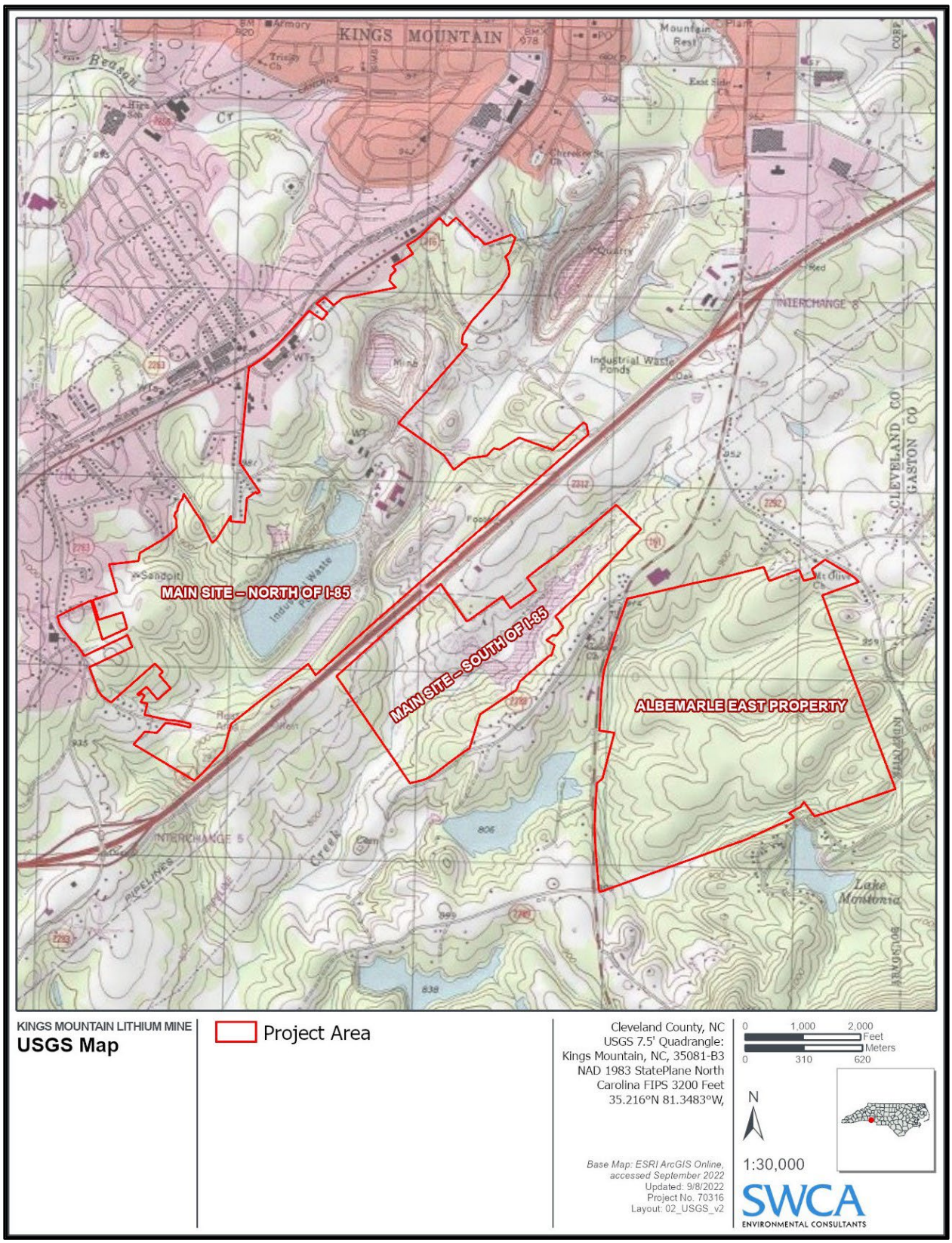

Figure 1. Project location.

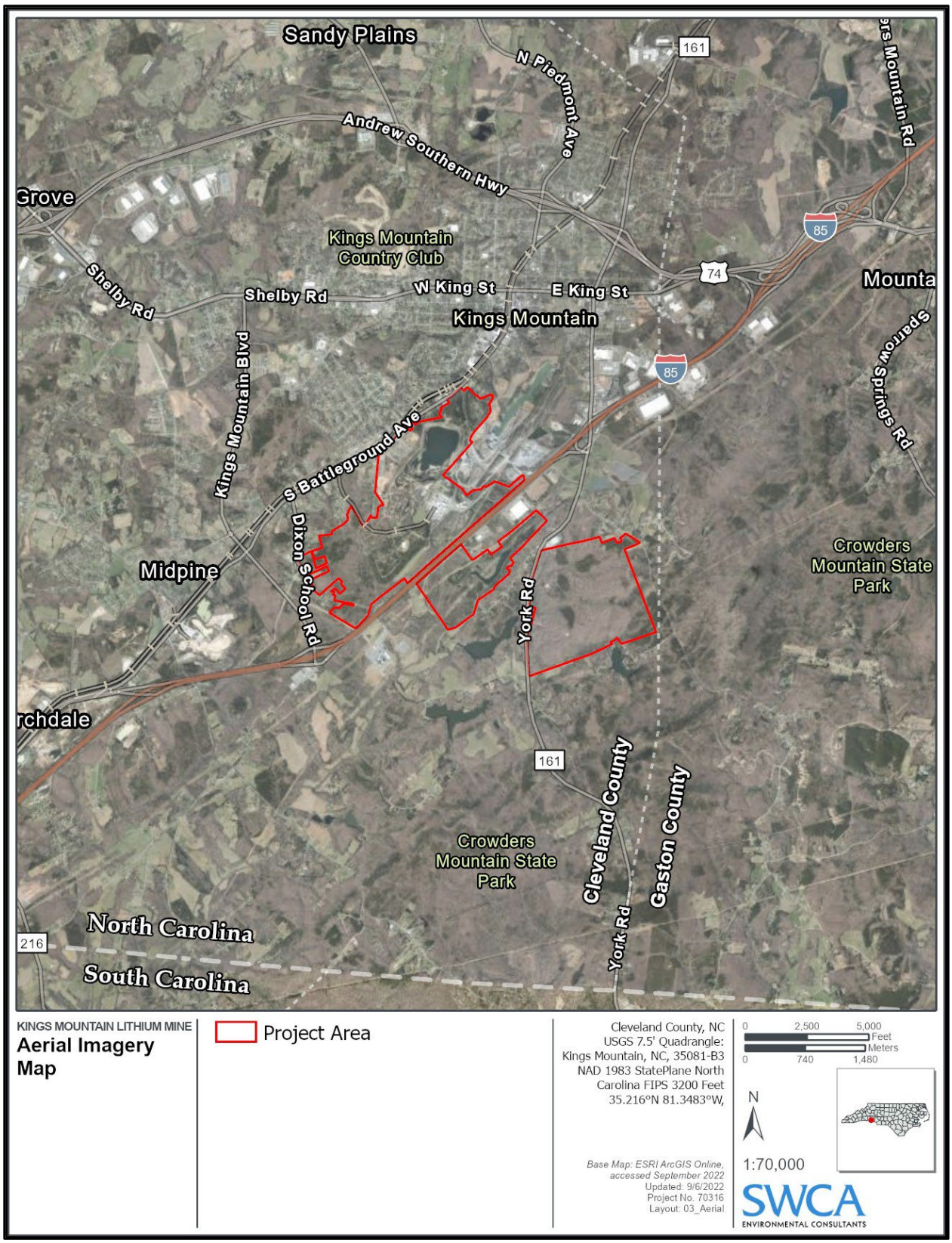

Figure 2. Aerial imagery of the Project area.

2 METHODS

2.1 Desktop Analysis

A preliminary desktop analysis was completed for the Project prior to field surveys by using a combination of existing information obtained from available public sources, including reports, published literature, online databases, and geographic information system (GIS) data. The following publicly available data sources were used to complete a desktop analysis.

Vegetation Communities and Land Use:

- Soil Conservation Service Soil Survey of Cleveland County, North Carolina (Natural Resources Conservation Service [NRCS] 2006)
- NRCS Web Soil Survey maps (NRCS 2022)
- U.S. Geological Survey (USGS) National Land Cover Database (USGS 2019a)
- USGS National Hydrology Dataset mapping (USGS 2019b)
- USGS National Gap Analysis Program (USGS 2020)
- USGS topographic maps (USGS 2022)

Wetland and Water Resources:

- Federal Emergency Management Agency (FEMA) National Flood Hazard Map (FEMA 2022)
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory Wetlands Mapper (USFWS 2022a)

Plant and Wildlife Species of Concern:

- North Carolina Natural Heritage Program (NCNHP) data and planning tools (NCNHP 2020, 2021, 2022a, 2022b)
- North Carolina Wildlife Resources Commission (NCWRC) state-listed species information (NCWRC 2022)
- USFWS Information for Planning and Consultation (IPaC) (USFWS 2022b, 2023)

Avian Resources:

- Christmas Bird Count data (National Audubon Society [Audubon] 2022)
- Important Bird Areas (Audubon 2020)
- eBird (2022)
- All About Birds (Cornell Lab of Ornithology 2019)
- USFWS Birds of Conservation Concern (BCC) (USFWS 2008)
- USGS North American Breeding Bird Survey database (USGS 2019c)

2.2 Field Surveys

Several field surveys were completed by SWCA in spring and summer 2022, including a general field reconnaissance, comprehensive wetland delineation, migratory bird nest surveys, aquatic surveys, bat acoustic surveys, a monarch butterfly (*Danaus plexippus*) habitat assessment, and presence/absence surveys for the federally listed dwarf-flowered heartleaf (*Hexastylis naniflora*). Survey methods are detailed in the individual reports (SWCA 2022a–e). Biologists conducted various biological surveys over approximately 40 days and used information gathered on habitat conditions to record baseline conditions and assess the potential for listed species to occur.

3 RESULTS

3.1 Vegetation Communities and Land Use

Elevation in the Project area ranges from approximately 755 to 1,074 feet above mean sea level (amsl). The Project area generally drains toward lower elevations to the south. The highest elevation in the surrounding area is Crowders Mountain State Park, at approximately 1,700 feet amsl.

Eighteen mapped soil types are depicted within the Project area (NRCS 2022). Soils consist primarily of Udorthents, loamy, 0 to 15 percent slopes (27% of Project area); Uwharrie silt loam, 2 to 8 percent slopes (14% of Project area); Uwharrie-Tatum complex, 8 to 15 percent slopes (8.5% of Project area); and Tatum-Montonia complex, 15 to 30 percent slopes (6.3% of Project area). Most of the soils within the Project area are classified as well drained, and approximately 5.4% are considered hydric soils (NRCS 2022). Hydric soils are soils that are saturated or inundated with water long enough to have a higher likelihood of supporting wetland conditions (NRCS 2018). The Udorthents soil consists of areas where natural soil properties and qualities have been greatly altered by excavation or intensive grading, or the natural soils have been covered by earthy fill material.

The landscape has been significantly altered on the main site parcels (both north and south of I-85) due to historic mining. Land cover maps (USGS 2019a) indicate the Project area consists primarily of deciduous forest, mixed forest, and evergreen forest with smaller portions of pasture/herbaceous, medium- to high-intensity development, open water (e.g., ponds, lakes, mining pits), and wetland habitats. SWCA refined the land cover maps and recorded dominant species within each vegetation community (Table 1; Figure 3). Outside of developed areas and open water, habitat in the Project area falls into the categories as described below.

Table 1. Vegetation Communities

Community	Acres	Percent of Project Area
Forested, Upland Deciduous	430.91	30.7
Forested, Upland Mixed	365.06	26.0
Forested, Upland Evergreen	177.1	12.6
Herbaceous Upland	70.18	5.0
Shrub-scrub Upland	33.75	2.4
Wetland	59.29	4.2
Open Water	77.53	5.5
Disturbed/Developed	189.55	13.5

3.1.1 Forested Upland

The forested upland community is the dominant habitat present in the Project area (i.e., deciduous, mixed, and evergreen forest) making up approximately 70% of the land cover. Many of the forests are secondary forests that have not been logged in the past 25 years, while some forests in the western and central portions were logged between 2006 and 2008.

3.1.1.1 DECIDUOUS

Dominant trees include American sweetgum (*Liquidambar styraciflua*), tulip tree (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), red maple (*Acer rubrum*), white oak (*Quercus alba*), red oak (*Quercus rubra*), mockernut hickory (*Carya tomentosa*), and chestnut oak (*Quercus montana*). Understory species commonly observed in the forested areas are flowering dogwood (*Cornus florida*), greenbrier (*Smilax* spp.), blackberry (*Rubus* spp.), spicebush (*Lindera benzoin*), and various successional hardwoods (oaks, hickories, sweetgum, maples).

3.1.1.2 EVERGREEN

The evergreen forest community is dominated by stands of loblolly pine (*Pinus taeda*) with some understory growth mainly consisting of successional hardwood species. Other less common evergreen trees observed included Virginia pine (*Pinus virginiana*) and shortleaf pine (*Pinus echinata*).

3.1.1.3 MIXED

The mixed forest community includes a combination of loblolly, shortleaf, and Virginia pine with deciduous trees and shrubs. The mixed forests observed generally do not have well developed herbaceous layers, but often consisted of Christmas fern (*Polystichum acrostichoides*), groundcedar (*Diphasiastrum digitatum*), Japanese honeysucke (*Lonicera japonica*), and wild onion/garlic (*Allium* spp.) when present.

3.1.2 Herbaceous Upland

The herbaceous upland and edge communities consist of areas dominated by non-woody vegetation. Dominant herbaceous species include broom-sedge (*Andropogon virginicus*), wild garlic/onion (*Allium* spp.), Kentucky bluegrass (*Poa pratensis*), goldenrod (*Solidago* spp.), clover (*Trifolium* spp.), hemp dogbane (*Apocynum cannabinum*), Japanese honeysuckle (*Lonicera japonica*), American burnweed (*Erechtites hieraciifolia*), wild strawberry (*Fragaria virginiana*), and southern crabgrass (*Digitaria ciliaris*). Herbaceous uplands are found primarily within the maintained utilities ROWs. Approximately 100 acres of herbaceous uplands are present in the Project area.

3.1.3 Shrub-Scrub

The shrub-scrub upland community is dominated by blackberry, Chinese privet (*Ligustrum sinense*), winged sumac (*Rhus copallinum*), Chickasaw plum (*Prunus angustifolia*), tree-of-heaven *(Ailanthus altissima*), and sweetgum. This community is found primarily along Executive Club Lake, along the edge of the evergreen forest adjacent to South Creek Reservoir, within portions of the ROWs, and various recently disturbed areas throughout the site in an early stage of succession.

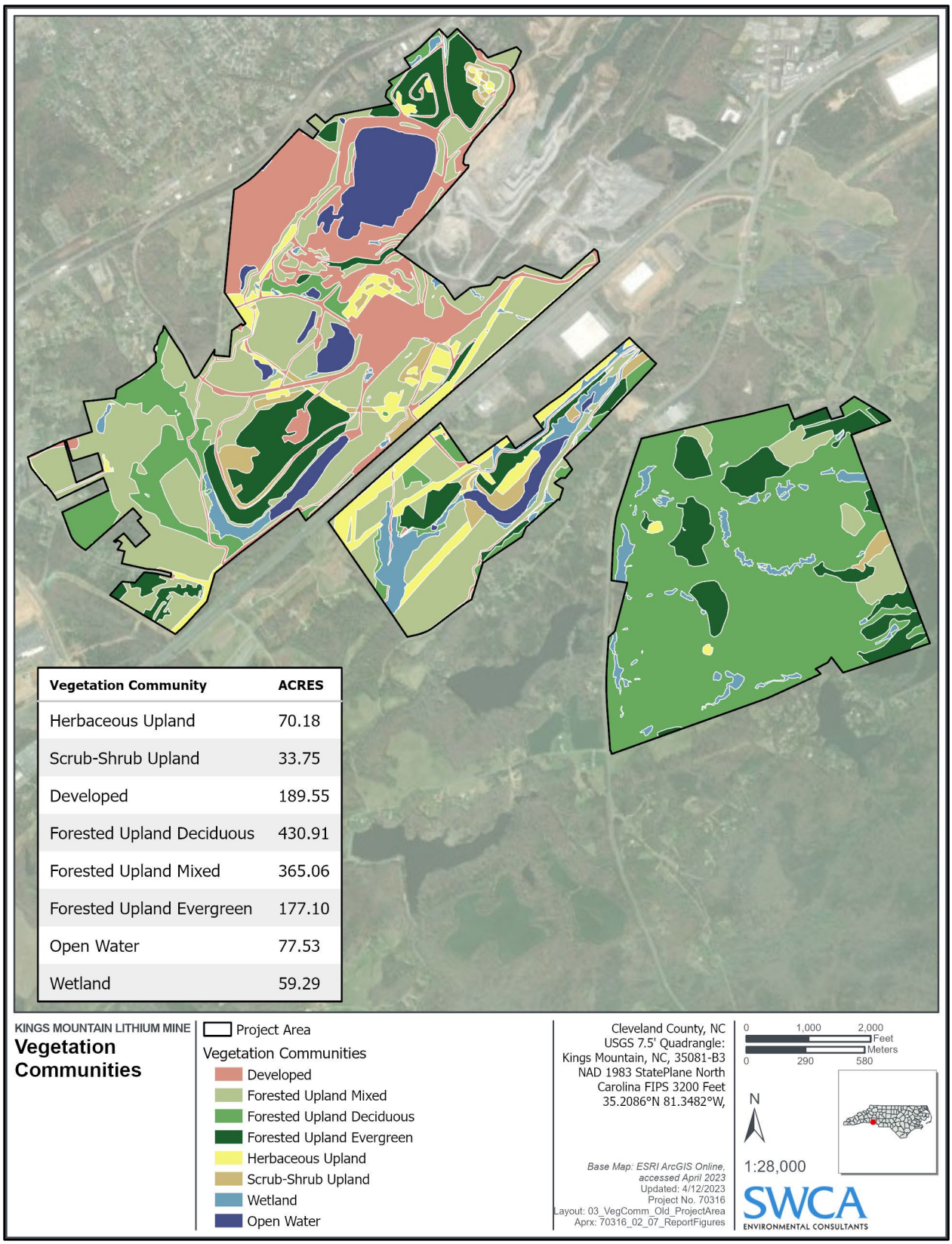

Figure 3. Vegetation communities in the Project area.

3.1.4 Wetland

Wetlands are areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Based on field delineations, approximately 136 acres of wetlands are present in the Project area (SWCA 2022a). Section 3.2 describes the different types of wetlands recorded, as well as the difference between jurisdictional and non-jurisdictional wetlands.

3.2 Wetlands and Waterbodies

3.2.1 Regulatory Background

Wetlands and other waters within the Project area may be subject to U.S. Army Corps of Engineers (USACE) and North Carolina Department of Environmental Quality (NCDEQ) jurisdiction under Section 404 and/or 401 of the Clean Water Act (CWA). Section 404 of the CWA and 33 CFR 323 require authorization from the USACE to discharge dredged or fill material into waters of the U.S. and jurisdictional wetlands. Projects also require a 401 water quality certification from NCDEQ to certify the project will not degrade waters of the state or violate state water quality standards. Additionally, North Carolina requires an Isolated and Other Non-404 Jurisdictional Wetland and Waters Permit for impacts to waters the USACE determines are federally non-jurisdictional.

3.2.2 Waterbodies

The Project area is located within the Kings Creek (hydrologic unit code [HUC] 0305010509) and Buffalo Creek (HUC 0305010508) watersheds of the Broad River Basin (North Carolina Department of Environmental Quality 2022) (Figure 4). The Broad River is located approximately 15 miles west-southwest of the Project area. Kings Creek, a tributary of the Broad River, runs through the Project area.

There are also on-site resources named by Albemarle for Project purposes. These human-made features include Pit Lake, Mud Pond 1, Mud Pond 2, No. 1 Mill Pond, Executive Club Lake, and South Creek Reservoir (Figure 5). Pit Lake is a mining pit that has filled with water since mining ceased. Mud Pond 1, Mud Pond 2, and No. 1 Mill Pond on the main site north of I-85 are potentially isolated (pending USACE verification). South Creek is a south-flowing stream in the western portion of the main site north of I-85, with the South Creek Reservoir making up the dammed-up portion that eventually empties in Kings Creek to the east. Executive Club Lake is an old tailings pond on the main site south of I-85 that has an outflow channel to Kings Creek. Small tributaries contribute flow to this lake.

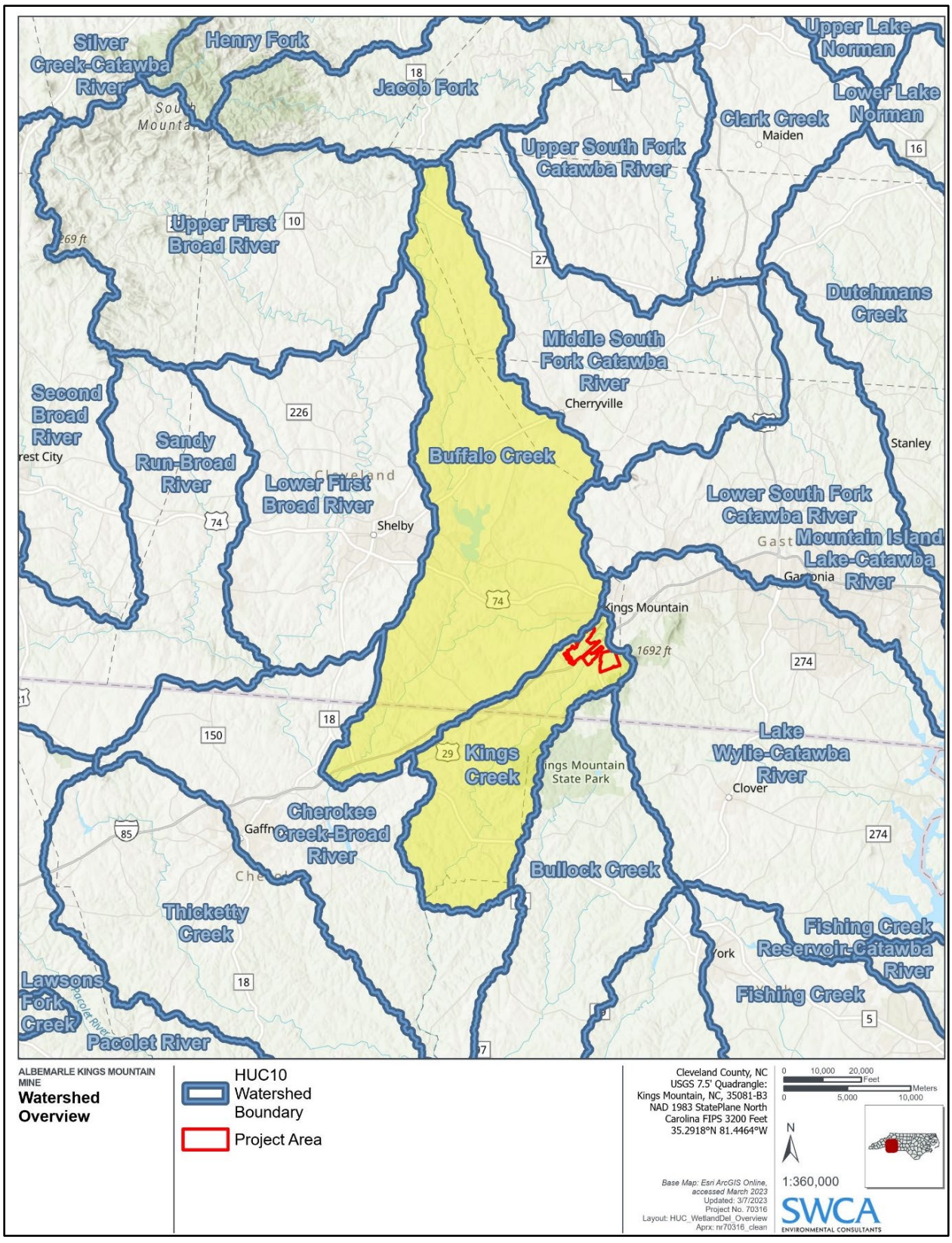

Figure 4. Watersheds.

3.2.3 Wetlands

3.2.3.1 PALUSTRINE EMERGENT WETLAND

The emergent wetland communities consist of a prevalence of hydrophytic non-woody vegetation less than 3 feet in height. Dominant herbaceous species include giant cane (*Arundinaria gigantea*), bushy bluestem (*Andropogon glomeratus*), lamp rush (*Juncus effusus*), cottongrass bulrush (*Scirpus cyperinus*), lesser poverty rush (*Juncus tenuis*), fowl bluegrass (*Poa palustris*), shallow sedge (*Carex lurida*), and goldenrod species.

3.2.3.2 PALUSTRINE FORESTED WETLAND

The forested wetland community consists of a prevalence of hydrophytic woody species over 20 feet tall. The tree strata are dominated by red maple, American sycamore (*Platanus occidentalis*), water oak (*Quercus nigra*), sugarberry (*Celtis laevigata*), American elm (*Ulmus americana*), and American sweetgum. Based on wetland delineations, approximately 43 acres of forested wetlands are present in the Project area (SWCA 2022a).

3.2.3.3 PALUSTRINE SHRUB-SCRUB WETLAND

The shrub-scrub wetland communities consist of a prevalence of hydrophytic woody vegetation less than 20 feet tall. The shrub-scrub strata are dominated by brookside alder (*Alnus serrulata*), American sycamore, black willow (*Salix nigra*), Chinese privet (*Ligustrum sinense*), and red maple. Based on delineations, approximately 10 acres of palustrine shrub-scrub wetlands are present in the Project area (SWCA 2022a).

3.2.4 Jurisdictional Determination

A delineation of wetlands and waterbodies was conducted to verify National Wetlands Inventory mapping (USFWS 2022a) and National Hydrography Dataset (USGS 2019b) within the Project area (SWCA 2022a). The USACE jurisdictional wetlands and USACE jurisdictional palustrine unconsolidated bottom (PUB) features (e.g., ponds, lakes, mining pits) delineated in 2022 are depicted in Figure 5. Additional resources were determined to be USACE non-jurisdictional based on their isolation within the Project area or lack of a significant nexus to a downstream traditional navigable water (TNW). Detailed maps are provided in the *Wetland and Waterbody Delineation Report for the Albemarle Kings Mountain Lithium Mining Project, Cleveland County, North Carolina* (SWCA 2022a).

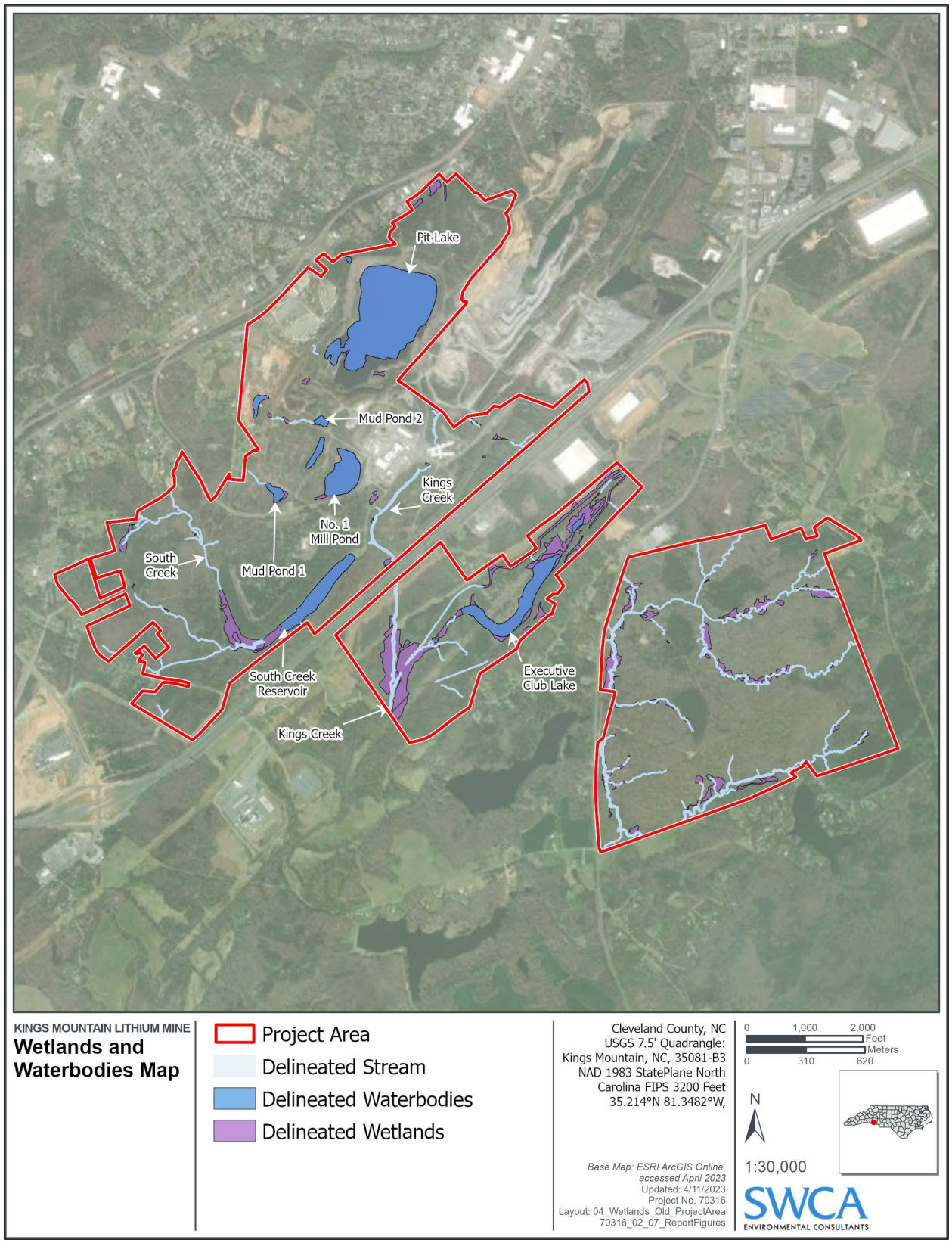

Figure 5. Overview of wetlands and waterbodies.

Table 2 summarizes the number and acreage of potential jurisdictional and non-jurisdictional features, as determined by SWCA. The final determination is pending the Approved Jurisdiction Determination (AJD) from USACE. Hydrology within portions of the Project area has been modified through historical mining land use practices. Additionally, most of the sizable wetlands and waterways have been influenced by beaver activity.

Table 2. Wetlands and PUB features

Classification	Number of Unique Features	Total Acres within Project Area
USACE Jurisdictional Wetlands	**50**	**55.34**
Palustrine forested wetland (PFO)	28	40.44
Palustrine shrub-scrub (PSS)	12	10.05
Palustrine emergent wetland (PEM)	10	4.85
USACE Jurisdictional PUBs	**4**	**20.27**
USACE Non-jurisdictional Wetlands	**15**	**3.95**
USACE Non-jurisdictional PUBs	**8**	**57.26**

Based on the waterway delineation (SWCA 2022a), there are 71 streams comprised of 30 ephemeral, 27 intermittent, and 21 perennial segments (Table 3). Some of the intermittent and perennial streams segments originate as either sheet flow, ephemeral, or intermittent before transitioning into their final classification. The ordinary high-water marks of streams averaged between 2 and 5 feet wide. Common substrates are sand, silt, and cobble. Non-jurisdictional features included upland swales and streams with no significant nexus.

Table 3. Waterways

Classification	Total Linear Feet within Project Area
USACE Jurisdictional Ephemeral Stream	9,213.8 feet
USACE Jurisdictional Intermittent Stream	10,614.4 feet
USACE Jurisdictional Perennial Stream	36,199.2 feet
USACE Jurisdictional Delineated Waterway	56,068.8 feet
USACE Non-jurisdictional Feature	5,114.5 feet

3.3 Federally Listed Species

3.3.1 Regulatory Background

Species are designated by the USFWS as threatened, endangered, proposed, candidate, or under review under the Endangered Species Act of 1973, as amended (ESA). Federally listed threatened and endangered species are protected from "take." Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Two federally listed threatened, one candidate, one proposed endangered, and one species currently under review were identified in the USFWS IPaC resource list (Appendix A) as having potential to occur in the Project area or vicinity (Table 4). Under the ESA, the USFWS can also propose and designated Critical Habitats for

threatened or endangered species. There are no USFWS-designated Critical Habitats for federally listed species within the Project area (USFWS 2022b, 2023).

3.3.2 Species List

Based on desktop research and field assessments, the potential for a species to occur in the Project area is defined as follows.

- Very low: The Project area is outside the known range of the species or is within the range, but there is no suitable habitat or the species is historical.
- Low: The Project area is located within the known range of the species, but there is limited suitable habitat or the species has not been observed in the vicinity.
- Moderate: Known species' range includes the Project area, and suitable habitat is present.
- High: There are known species occurrences within the Project area.

Table 4. USFWS Federally Listed Species with Potential to Occur within the Project Area

Common Name (*Scientific Name)*	**Listed Status**	**Habitat**	**Potential to Occur within Project Area**
Northern long-eared bat (*Myotis septentrionalis)*	Endangered*	Summer roosting in trees with loose bark over 3 inches in diameter, winters in caves, forages in forest understory.	Low; on edge of range and not detected during 2022 bat acoustic surveys.
Tricolored bat (*Perimyotis subflavus*)	Proposed endangered	During the spring, summer, and fall (i.e., non-hibernating seasons), tricolored bat primarily roosts among live and dead leaf clusters of live or recently dead deciduous hardwood trees. During winter, it hibernates in caves, culverts, and abandoned water wells. Forages both in tree tops and closer to ground.	High; detected during 2022 bat acoustic surveys.
Little brown bat (*Myotis lucifugus*)	Under review	Roosts include trees, buildings, wood piles, and under rocks. Forages around water sources, forest edge.	Low; not detected during 2022 bat acoustic surveys.
Bog turtle (*Glyptemys muhlenbergii*)	Similarity of appearance (Threatened)	Boggy marsh habitats, wet pastures, wet thickets.	Low; not detected during 2022 aquatic surveys. Does not inhabit forested wetlands or heavily impacted wetland areas.
Monarch butterfly (*Danaus plexippus*)	Candidate	Prairies, meadows, grasslands, and roadsides with milkweed (*Asclepias* spp.) and flowering plants.	Low; very limited suitable habitat along utility ROWs; individuals not identified during 2022 habitat surveys.
Dwarf-flowered heartleaf (*Hexastylis naniflora*)	Threatened	Acidic soils along bluffs and adjacent slopes, boggy areas next to streams and creek heads, and along slopes of nearby hillsides and ravines. Endemic to upper Piedmont of North Carolina and South Carolina.	Low; suitable habitat observed; however, this species was not identified during presence/absence surveys in 2022.

Source: USFWS (2022b, 2023a).

*Reclassification from threatened to endangered becomes effective January 30, 2023.

3.3.2.1 NORTHERN LONG-EARED BAT

The range of northern long-eared bat (*Myotis septentrionalis*) extends throughout most of southern Canada and the eastern and Midwestern United States (excluding parts of the southeast United States); the species is primarily associated with North American forests (USFWS 2015). Foraging occurs over open fields near caves and forests where the bats roost (USFWS 2015). Caves and mines are used for winter hibernation, and the bats require very high humidity associated with selected hibernacula. After hibernation, the bats are found in wooded or semi-wooded habitats for the duration of the summer months. The northern long-eared bat utilizes crevices and loose bark on trees (≥3.0 inches in diameter at breast height) for roosting, although it is considered to be opportunistic (USFWS 2015). Northern long-eared bat populations are declining due primarily to white-nose syndrome.

The Project area is on the southeastern edge of the known range of the northern long-eared bat. On November 30, 2022, the USFWS published a final rule reclassifying this species from threatened to endangered status under the ESA. The rule will take effect March 31, 2023. USFWS released guidance documents on March 6, 2023, outlining consultation and Endangered Species Act compliance pathways for northern long-eared bats during a 1-year interim period beginning on the effective date of their reclassification to endangered (USFWS 2023b).

Northern long-eared bats are not likely to hibernate in the Project area because of the lack of suitable winter habitat (i.e., no caves or mines). While suitable summer roosting habitat is present within the Project area, the potential for occurrence of the northern long-eared bat is low since Kings Mountain is on the extreme southeastern edge of this species' range. In summer 2022, acoustic detectors were deployed at 15 locations within suitable roosting habitat, for a total of 99 detector nights, following the *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines* (USFWS 2022c). Northern long-eared bat was not detected during the acoustic bat surveys (SWCA 2022b).

3.3.2.2 TRICOLORED BAT

Tricolored bats (*Perimyotis subflavus*) are on the decline from white-nose syndrome in North Carolina. Whereas they used to be common from the mountains to the Coastal Plain, they are now common only in patches and uncommon everywhere else. Some tricolored bats may migrate long distances, but most retreat to caves and mines to hibernate in winter. In the summer, tricolored bats can be found in a variety of habitats, from woodlands to small towns and farms, though usually not heavily populated areas. They may roost in trees or sometimes in old buildings, culverts, or tunnels. Tricolored bats roost in foliage of live trees and may form small maternity colonies during the pup-rearing season (North Carolina Bat Working Group 2013). The smallest bat in North America, the tricolored bat flies slowly in the evening to forage over openings, water, and farm fields.

Due to its decline from white-nose syndrome, tricolored bats are considered "rare or uncommon" in North Carolina. Tricolored bats have not been previously documented in Cleveland County; however, variable survey efforts are likely to contribute to lacking records (LeGrand et al. 2022; NCNHP 2022b). In September 2022, the USFWS proposed to list the tricolored bat as an endangered species in response to observed population declines resulting primarily from white-nose syndrome (Federal Register 87:56381). A final decision regarding the listing status of the species is expected in the fall of 2023. The tricolored bat was detected throughout the Project area during the acoustic bat surveys (SWCA 2022b).

3.3.2.3 LITTLE BROWN BAT

The little brown bat (*Myotis lucifugus*) has a widespread range in North America from Alaska-Canada boreal forests south through most of the contiguous United States and into central Mexico (USFWS

2022d). In the winter, little brown bats primarily hibernate in caves and cave-like structures. In summer, they can be found in trees, artificial structures, and bat houses, and under rocks and in piles of wood. Foraging habitat includes areas with streams and other bodies of water, particularly in woodlands near water.

This species was once abundant but has declined, particularly in eastern North America, due to white-nose syndrome. This species is also subject to mortality by turbines at wind energy facilities. The USFWS is currently reviewing the status of the little brown bat as a result of these described threats. The little brown bat was not detected during the acoustic bat surveys (SWCA 2022b).

3.3.2.4 BOG TURTLE

While the bog turtle (*Glyptemys muhlenbergii*) is not known to occur in Cleveland County and was not on the IPaC list for the Project area, it may occur downstream or in nearby Gaston County. This species prefers boggy, marsh habitats and generally does not inhabit forested wetlands or heavily impacted wetland areas, like those found in the Project area. Bog turtles were not encountered during the aquatic habitat assessment (SWCA 2022e).

3.3.2.5 DWARF-FLOWERED HEARTLEAF

The federally threatened dwarf-flowered heartleaf is a perennial woodland herb generally found in acidic soils along bluffs and adjacent slopes, in boggy areas next to streams and creek heads, and along the slopes of nearby hillsides and ravines (USFWS 2017). This plant is usually associated with mountain laurel (*Kalmia latifolia*) or American pawpaw (*Asimina triloba*) (Krings et al. 2021). The flowering period is March 1 through May 31.

Approximately 100 acres of potentially suitable habitat for the dwarf-flowered heartleaf are present in the Project area, consisting of forested slopes adjacent to stream sides. Most of the suitable habitat (87%) is on the Albemarle East Property (Figure 6). SWCA botanists conducted presence/absence surveys within potentially suitable habitat on May 2–5, 23, and 24, 2022. Several populations of the little heartleaf (*Hexastylis minor*), a common *Hexastylis* species, were observed during the surveys. No dwarf-flowered heartleaf individuals were observed (SWCA 2022c).

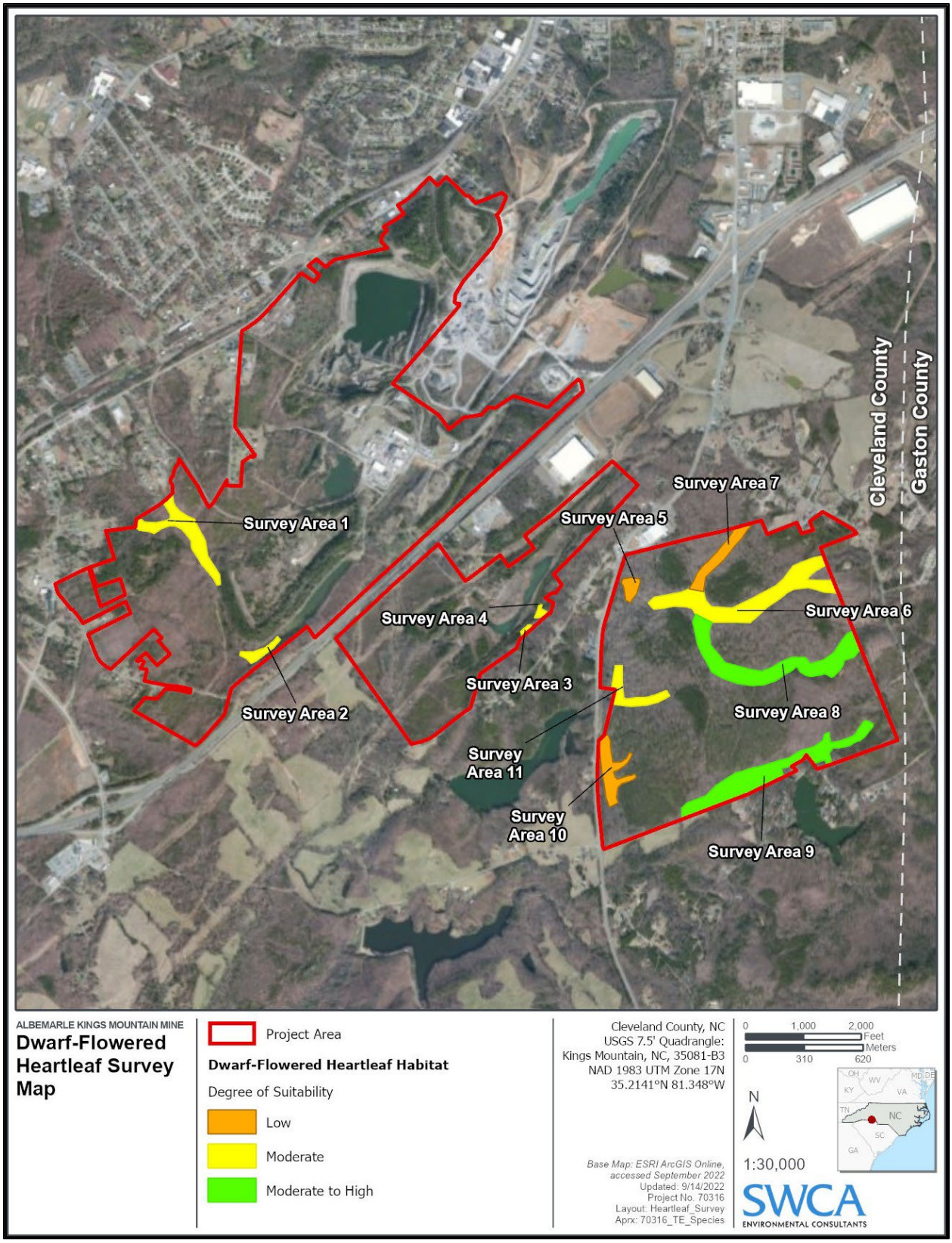

Figure 6. Dwarf-flowered heartleaf habitat.

3.3.2.6 MONARCH BUTTERFLY

The monarch butterfly is a candidate for listing across most of the United States and is known to occur within North Carolina during migration from its overwintering habitat in Mexico. The USFWS will decide whether the monarch butterfly should be listed under the ESA in 2024. Monarch breeding habitat includes agricultural fields; pastureland; prairie remnants; and urban and suburban residential gardens, trees, and roadsides. This species is highly dependent on the presence of milkweed (*Asclepias* spp.) for breeding and a diversity of flowering nectar plants for foraging (Monarch Joint Venture 2022; USFWS 2020, 2022e). Unsuitable habitat includes areas such as grasslands dominated by invasive grass species, or woody thickets too dense to support herbaceous flowering vegetation.

In spring and summer 2022, approximately 39 acres of potential monarch butterfly habitat were surveyed to assess the suitability of the habitat for monarch butterflies (SWCA 2022d). Surveys focused on utility ROWs that may provide open herbaceous habitat with nectar plants. Butterfly milkweed (*Asclepias tuberosa*) and common milkweed (*Asclepias syriaca*) were observed during summer surveys, but these host plants were generally uncommon with sparse distribution where observed. Many of the areas surveyed were densely populated with blackberry (*Rubus* spp.) and lacked the open, herbaceous habitat preferred by monarch butterflies. Overall, 25 acres were low quality and 13 acres were moderately suitable for monarch butterflies (Figure 7). Based on the data review and field reconnaissance, the potential for monarch butterflies to occur within the Project area is low due to the limited quantity and quality of the habitat. No monarch individuals were observed during 2022 spring and summer surveys.

There is a butterfly garden on the north side of the Project area along the Kings Mountain Gateway Trail. The garden was not part of the survey but is known to provide approximately 1 acre of suitable habitat for monarch butterflies.

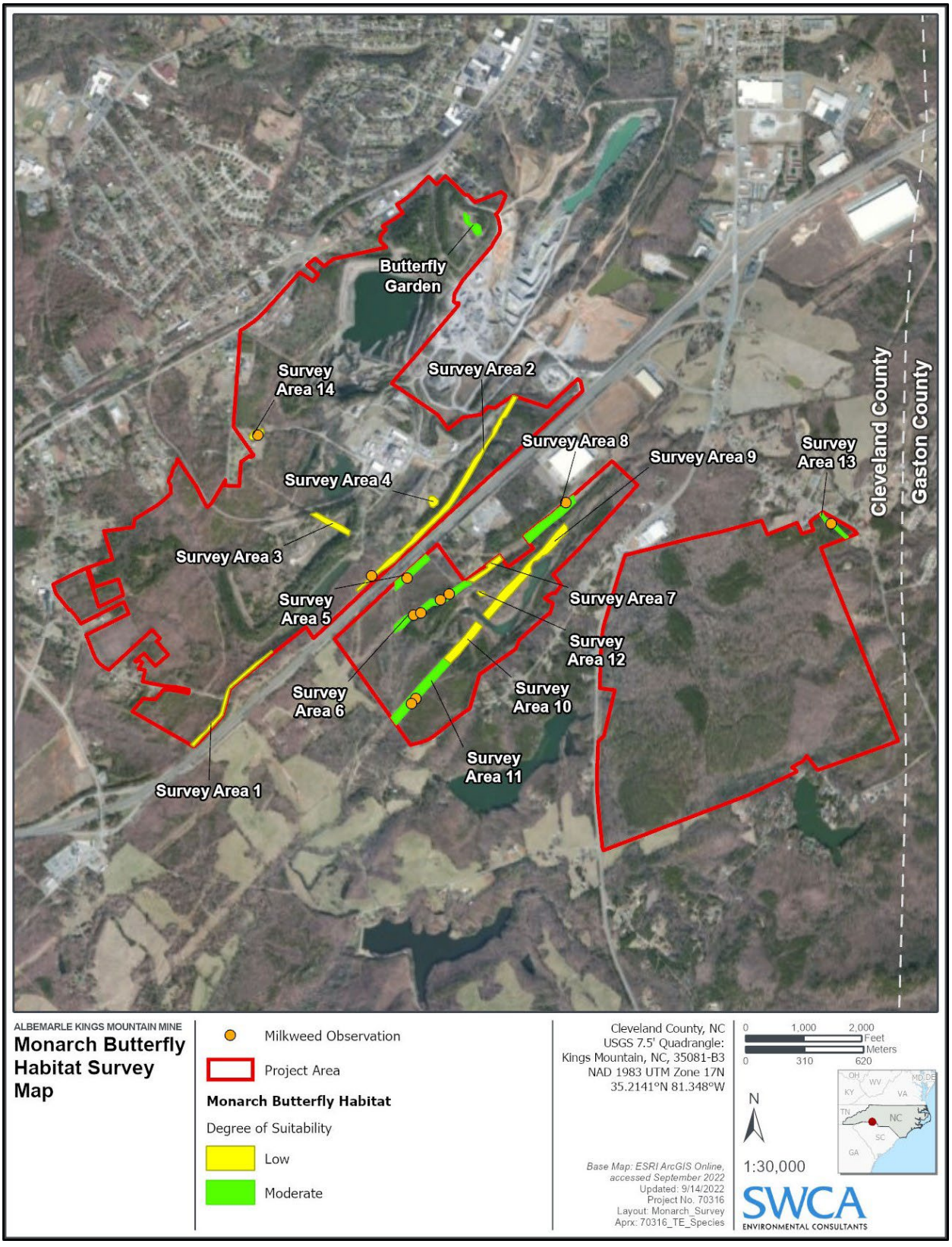

Figure 7. Monarch butterfly habitat.

3.4 State-Listed Species

3.4.1 Regulatory Background

In North Carolina, endangered, threatened, and special concern animals (referred to as "state-listed" for this report) are protected by the NCWRC via the North Carolina Endangered Species Act of 1987; and plants are legally protected by the North Carolina Plant Conservation Program via the North Carolina Plant Protection and Conservation Act of 1979. The Acts also state that they do not limit the rights of a landowner in the lawful management of his/her land. Generally, state-listed plants are protected from collection, selling, and poaching on private property without permission from the property owner and a permit from the North Carolina Department of Agriculture and Consumer Services. Overall, state-listed plants and animals receive little protection on private land if illegal development activities are avoided.

State endangered species are those determined by the NCWRC to be in jeopardy. A state threatened species is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. State special concern species are determined by the NCWRC to require monitoring but may be taken under adopted regulations. Significantly rare designations indicate rarity and need for population monitoring and conservation action. Significantly rare is a non-regulatory NCNHP designation, and species are not legally protected but have been included in the assessment below.

3.4.2 Species List

The list of state-listed species for Cleveland County was reviewed to assess whether the species have potential to occur in the Project area (Table 5) (NCNHP 2022a, 2022b). Five species are considered historical in the county, which, according to NCNHP, are species either extirpated, that have not been found in recent surveys, or that have not been surveyed recently enough to be confident they are still present but for which there is still some expectation that the species may be rediscovered. Occurrences are regarded as historical after 20 to 40 years depending on the species and the amount of habitat alteration in the area. A county status of "historical" in Table 5 should not be regarded as a definitive statement that the species is gone from the county but rather indicates that its continued existence is uncertain.

According to occurrence records provided by NCNHP (2022a, 2022b), no state-listed threatened, endangered, or special concern plant or animal species have been identified within the Project area (Appendix B). Five state-listed species have been observed within 1 mile of the Project area. Four of these species observations occurred within Crowder Mountain State Park (timber rattlesnake [*Crotalus horridus*], Carolina pygmy rattlesnake [*Sistrurus miliarius miliarius*], dwarf juniper [*Juniperus communis* var. *depressa*], and bear oak [*Quercus ilicifolia*]). The other species observed within 1 mile of the Project area, oldfield deermouse (*Peromyscus polionotus*), has not been recorded since 1977.

Table 5. State-Listed Species for Cleveland County and their Potential to Occur

Common Name	Scientific Name	State Listing Status	County Status	Potential to Occur
Birds				
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Current	Very low; lack of rivers and lakes
Loggerhead shrike	*Lanius ludovicianus*	Special concern	Current	Low; lack of open lands
Barn owl	*Tyto alba*	Special concern	Current	Low; lack of open lands

Common Name	Scientific Name	State Listing Status	County Status	Potential to Occur
Mammal				
Oldfield deermouse	*Peromyscus polionotus*	Special concern	Historical	Very low; last observed in 1977 and lack of habitat
Northern long-eared bat	*Myotis septentrionalis*	Threatened	Current	Low; on edge of range, not identified during 2022 bat acoustic surveys
Little brown bat	*Myotis lucifugus*	Significantly rare	Current	Low; not detected during 2022 bat acoustic surveys
Reptile				
Timber rattlesnake	*Crotalus horridus*	Special concern	Current	Moderate; recorded within 1 mile of Project area and suitable habitat
Carolina pygmy rattlesnake	*Sistrurus miliarius miliarius*	Special concern	Historical	Low; recorded within 1 mile of Project area in 1990, limited suitable habitat
Crustacean				
Carolina foothills crayfish	*Cambarus johni*	Significantly rare	Current	Low; not detected during 2022 aquatic surveys
Broad River stream crayfish	*Cambarus lenati*	Significantly rare	Current	Low; not detected during 2022 aquatic surveys
Broad River spiny crayfish	*Cambarus spicatus*	Special concern	Current	Low; not detected during 2022 aquatic surveys
Fish				
Carolina quillback	*Carpiodes* sp. cf. *cyprinus*	Significantly rare	Current	Very low; not detected during 2022 aquatic surveys
Seagreen darter	*Etheostoma thalassinum*	Significantly rare	Current	Low; not detected during 2022 aquatic surveys
Mollusks				
Dwarf threetooth	*Triodopsis fulciden*	Special concern	Current	Low; not known to occur in the vicinity
Plants				
American bittersweet	*Celastrus scandens*	Endangered	Current	Low; potential habitat observed, but not identified during presence/absence surveys
Smooth sunflower	*Helianthus laevigatus*	Special concern - vulnerable	Historical	Low; potential habitat observed, but not identified during presence/absence surveys
Dwarf-flowered heartleaf	*Hexastylis naniflora*	Threatened	Current	Low; potential habitat observed, but not identified during presence/absence surveys
Dwarf juniper	*Juniperus communis* var. *depressa*	Threatened	Current	Low; recorded within 1 mile but lack of suitable habitat
Rough blazing-star	*Liatris aspera*	Special concern - vulnerable	Historical	Low; no basic soils with high pH present
Spotted phacelia	*Phacelia maculata*	Endangered	Current	Low; lack of rivers, not near known occurrences

Common Name	Scientific Name	State Listing Status	County Status	Potential to Occur
Dwarf chinquapin oak	*Quercus prinoides*	Endangered	Historical	Very low; lack of suitable rocky slope habitat, historical
Bear oak	*Quercus ilicifolia*	Endangered	Current	Low; recorded within 1 mile but not known in Cleveland County, lack of suitable habitat
Pursh's wild petunia	*Ruellia purshiana*	Special Concern – Vulnerable	Current	Very low; lack of suitable habitat, very rare in the southwestern Piedmont

Source: NCNHP (2022a, 2022b)

3.4.2.1 BALD EAGLE

The bald eagle (*Haliaeetus leucocephalus*) is one of the largest raptors in North America and was listed under the ESA until 2007. The eagle is still federally protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The bald eagle prefers habitat near lakes, large rivers, and shorelines of sounds and bays (NCWRC 2022). It perches and nests in tall, isolated trees. Nests can be up to 8 feet wide and 20 feet deep. Pairs often return to the same nest each year and layer new nest material over the old.

The bald eagle is not expected to nest or forage in the Project area due to a lack of the habitat required by this species. According to the NCWRC (personal communication, Clint Barden, Biologist, NCWRC, with Simon King, SWCA Environmental Consultants, July 29, 2022), the closest nesting pair was documented in 2021 at Moss Lake approximately 6.5 miles northwest of the Project area. Bald eagles may still be present, but the area was not surveyed in 2022. According to the eBird database, there are no records within the Project area and a low (0%–10%) frequency of reporting in the Kings Mountain area (eBird 2022). No eagles were observed during any of the spring and summer 2022 biological surveys. While bald eagles could occasionally fly over the Project area, there are no large waterbodies nearby that would attract them to the vicinity. Therefore, the bald eagle has a very low potential to occur.

3.4.2.2 LOGGERHEAD SHRIKE

The loggerhead shrike (*Lanius ludovicianus*) is a songbird that inhabits large open areas with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns (Cornell Lab of Ornithology 2019). They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead shrikes are often seen along mowed roadsides with access to fence lines and utility poles, which they use for viewing prey when foraging. Populations are declining, likely due to changes in agricultural practices and the use of certain pesticides (NCWRC 2020).

The NCWRC (2022) states that this species can be “locally fairly common” in Cleveland County, likely due to the high amount of agricultural land in the county, where this species has open fields and fences to support its behavior. However, according to the eBird database, there are no records within the Project area and a low (0%–2%) frequency of reporting in the Kings Mountain area (eBird 2022). The Project area lacks open fields, and potential habitat is limited to the ROWs with open habitat for foraging and utility poles for perching. No loggerhead shrikes were observed during the spring and summer 2022 biological surveys. Therefore, this species is not expected to occur.

3.4.2.3 BARN OWL

Barn owls (*Tyto alba*) generally occur in open country areas with farmland and where there are barns or abandoned buildings for nesting (Cornell Lab of Ornithology 2019; NCWRC 2022). They also nest in woodland areas or within city limits where there are good open areas for foraging, although this is less typical. This species likely occurs in parts of Cleveland County with high amounts of agricultural land. The recent population decline is attributed to habitat loss due to changes from agriculture and open land to urban developed land.

According to the eBird database, there are no records within the Project area and a low (0%–2%) frequency of reporting in the Kings Mountain area (eBird 2022). The Project area lacks large open areas for hunting. Barn owls nest in forested or urban habitats near their hunting grounds. The Project area is largely forested, and the open areas that do exist are mainly disturbed areas associated with the mine. No barn owls were observed during spring and summer 2022 biological surveys; however, this species is mostly active at night. Overall, the barn owl has a low potential to occur.

3.4.2.4 OLDFIELD DEERMOUSE

The oldfield deermouse is a burrowing species that strongly favors sandy soils in brushy and weedy grasslands and fields (LeGrand et al. 2022). This species can occur along the sandy borders of cultivated fields, as well as overgrown sites. The deermouse tends to avoid wet habitats and forests. The oldfield deermouse can be locally common in South Carolina but is rare in North Carolina.

According to the Cleveland County inventory, this rare species has been confirmed only from Rutherford County and from evidence of its distinctive mounds along the median of I-85 in southeastern Cleveland County in 1977 (NCNHP 2003, 2022a). The Project area lacks the grasslands and weedy fields with sandy soils preferred by this mouse. Due to its historic status and lack of suitable habitat in the Project area, the oldfield deermouse is not expected to be present. No species-specific surveys were conducted.

3.4.2.5 NORTHERN LONG-EARED BAT

See Section 3.3.2.1.

3.4.2.6 LITTLE BROWN BAT

See Section 3.3.2.3.

3.4.2.7 TIMBER RATTLESNAKE

The timber rattlesnake is a large venomous snake that feeds on rodents and birds. Most timber rattlesnakes rely on their camouflage for protection and are reluctant to rattle or bite (NC Partners in Amphibian and Reptile Conservation 2022). In North Carolina, this snake is most common in the mountains and the Coastal Plain. Their populations are declining due to agriculture and development. Timber rattlesnakes are often found in wooded rocky hillsides or in mature hardwood forests with many downed logs and a layer of leaves and humus. This species is difficult to observe in the field due to its secretive nature, strong camouflage abilities, and generalized habitat.

Timber rattlesnake has not been recorded in the Project area but was observed within 1 mile at Crowders Mountain State Park in 2019 (NCNHP 2003, 2022b). The state park contains suitable timber rattlesnake habitat, including numerous rock outcroppings with surrounding forests, which is not found in the Project area. Based on habitat suitability, there is a moderate potential for this snake to occur on the Albemarle East Property and a low potential on the main parcel. The Project area generally lacks the predictive areas

to locate this species such as exposed rock outcroppings with surrounding mature forests. No timber rattlesnakes were observed during the spring, summer, or fall 2022 biological surveys, which covered a diversity of habitats such as mature forests and floodplains. However, species-specific presence/absence surveys were not conducted because the secretive nature of the species makes the snake difficult to detect, likely leading to inconclusive results.

3.4.2.8 CAROLINA PYGMY RATTLESNAKE

The Carolina pygmy rattlesnake is the smallest species of rattlesnake in the United States. In North Carolina, this snake is found in pine flatwoods, pine/oak sandhills, and other pine/oak forests in the southeastern Coastal Plain and Sandhills (NC Partners in Amphibian and Reptile Conservation 2022). The Carolina pygmy rattlesnake is very rare in the Piedmont but has been observed on dry, rocky locations in the Crowders Mountain/Kings Mountain area.

The Project area generally lacks the dry, rocky habitat that this species is known to use in the Piedmont. The Albemarle East Property is close to the location of historic (1990s) observations at Crowders Mountain State Park, but dry rocky habitat, steep slopes, and higher elevations are very limited. There is a low potential for this snake to occur on portions of the Albemarle East Property, but it is not expected to occur on the main parcel. No Carolina pygmy rattlesnakes were observed during the spring, summer, or fall 2022 biological surveys; however, no species-specific surveys were conducted.

3.4.2.9 CAROLINA FOOTHILLS CRAYFISH

The Carolina foothills crayfish (*Cambarus johni*) in known only from headwater streams in the Yadkin-Pee Dee, Catawba, and Broad River basins of the Blue Ridge Foothills and Upper Piedmont Plateau (NCWRC 2022). The species is found in streams that are typically 3 to 4 meters wide with sandy substrates, beneath undercut banks, and in leaf packs and root wads. Threat and trends have not been assessed, but the species' wide range is indicative of a secure status for a state endemic species (NatureServe 2022).

The upper reaches of Kings Creek and South Creek and larger streams on the Albemarle East Property have potential suitable habitat. However, both Kings Creek and South Creek have upstream industrial or residential development, which generally reduces crayfish diversity abundance (NatureServe 2022). This species was not found within Kings Creek or other waterbodies surveyed during the 2022 aquatic assessment (SWCA 2022e).

3.4.2.10 BROAD RIVER STREAM CRAYFISH

The Broad River stream crayfish (*Cambarus lenati*) occurs in small to medium streams in the Broad River drainage. This species is found only in the headwaters of the First Broad River subdrainage, which is in the northern portion of the river basin (NCNHP 2003; NCWRC 2022). It is not known to occur in the Kings Creek subdrainage. This species was not found within Kings Creek or other waterbodies surveyed during the 2022 aquatic assessment (SWCA 2022e).

3.4.2.11 BROAD RIVER SPINY CRAYFISH

The Broad River spiny crayfish (*Cambarus spicatus*) occurs in small to medium streams with debris in the channel and along margins (NCWRC 2022). It is known to occur in the First Broad River and North Pacolet subdrainages of the Broad River drainage, which are west of the Project area (NCNHP 2003; NCWRC 2022). It is not known to occur in the Kings Creek subdrainage. This species was not found within Kings Creek or other waterbodies surveyed during the 2022 aquatic assessment (SWCA 2022e).

3.4.2.12 CAROLINA QUILLBACK

The Carolina quillback (*Carpiodes cyprinus*) is restricted to the Broad, Catawba, and Yadkin River basins. This species is found in warm, low- to moderate-gradient reaches of most major rivers, including upper portions of associated reservoirs (South Carolina Department of Natural Resources 2015a). The Project area lacks the large, deep, and slow-moving streams and rivers preferred by this species, and therefore, this species is not expected to be present. This species was not found within Kings Creek or other waterbodies surveyed during the 2022 aquatic assessment (SWCA 2022e).

3.4.2.13 SEAGREEN DARTER

The seagreen darter (*Etheostoma thalassinum*) is endemic to North Carolina and South Carolina and is restricted to the Broad and Catawba River basins. This species is found in rock, rubble, or gravel riffles in large creeks and rivers with moderate to swift currents (South Carolina Department of Natural Resources 2015b). Within the Project area, this species has a low potential to occur in the upper portions of Kings Creek and South Creek, as well as a few of the larger streams on the Albemarle East Property. This species was not found within Kings Creek or other waterbodies surveyed during the 2022 aquatic assessment (SWCA 2022e).

3.4.2.14 DWARF THREETOOTH

The dwarf threetooth (*Triodopsis fulciden*) is a small terrestrial snail species. It is endemic to North Carolina in the southwestern Piedmont in Burke, Catawba, Cleveland, and Lincoln Counties (NatureServe 2022). There is little information available about this species due to lack of research. Based on the very broadly defined habitat (NCNHP 2020), suitable habitat is potentially present in the more dense, moist forests along South Creek and on the on the Albemarle East Property. No species-specific surveys were conducted due to lack of information on this species.

3.4.2.15 AMERICAN BITTERSWEET

American bittersweet (*Celastrus scandens*) is a high-climbing or sprawling woody vine reaching 30 feet. Habitat includes woodlands, stream banks, rocky hillsides, thickets, fence rows, and roadsides. In North Carolina, the species is typically found only on moist slopes with rich soils over mafic rocks in mesic and rich cove forests. Mafic rocks are igneous rocks with a high content of magnesium, iron, and often calcium that typically weather into deeper, higher-pH (less acidic) soils that can be rich and productive (U.S. Forest Service 2022). It generally does not grow along forested borders where the invasive Asiatic bittersweet (*C. orbiculatus*) grows. The native American bittersweet is being replaced in the northeastern United States by the more aggressive Asiatic bittersweet, which has escaped from cultivation (University of Texas 2022). Potentially suitable habitat is present along sloped areas adjacent to streams on the Albemarle East Property and along the upper portions of South Creek and a tributary on the main parcel. The flowering period is May through June, but this plant can be identified by its showy scarlet fruit in the fall.

Between October 24 and 28, 2022, SWCA biologists conducted surveys to confirm the presence or absence of American bittersweet in potential suitable habitat (SWCA 2022g). No American bittersweet was observed within the 79.3-acre survey area. The invasive Asiatic bittersweet was observed along some forested edges of the Gateway Trail on the main site south of I-85. The bittersweet observed had five or greater seeds per fruit, broadly obovate leaves, and fruits scattered along the branches, which are all characteristics of Asiatic bittersweet, not American bittersweet (LeGrand, Sorrie, et al. 2022; USGS 2007). Based on the surveys, it is unlikely the American bittersweet is present within the Project area.

3.4.2.16 SMOOTH SUNFLOWER

Smooth sunflower (*Helianthus laevigatus*) occurs locally in Maryland, West Virginia, Virginia, western North Carolina, and northern South Carolina. Although smooth sunflower has a somewhat restricted range, it is abundant in glades, barrens, and along roadsides within that range, especially in Virginia (NatureServe 2022). In North Carolina and South Carolina, all occurrences are in disturbed areas on slate-derived soils. The principal threats to this species are fire suppression, succession to woody species, and invasion by exotic plant species. Other threats include development, herbicide use, and mowing during the flowering and growing seasons. This sunflower has a potential to occur in suitable habitat along woodland edges and within the existing ROWs. This plant grows up to 7 feet tall and flowers August through November.

Between October 24 and 28, 2022, SWCA biologists conducted surveys to confirm the presence or absence of smooth sunflower in potential suitable habitat (see Figure 8). Habitats surveyed included both open and dense ROWs, as well as open areas adjacent to on-site roads and the Gateway Trail. No smooth sunflower individuals were observed within the 68.7-acre survey area (SWCA 2022g). Another *Helianthus* species, the small wood sunflower (*Helianthus microcephalus*) was observed in a few areas within ROWs and along the edges of the Gateway Trail. The observed *Helianthus* species had longer leaf stalks (>1 cm, typically 1–3 cm) and lacked the typical "rubbery" texture of *H. laevigatus* (LeGrand, Sorrie, et al. 2022). Based on the surveys, it is unlikely the smooth sunflower is present within the Project area.

3.4.2.17 DWARF-FLOWERED HEARTLEAF

See Section 3.3.2.5.

3.4.2.18 DWARF JUNIPER

The dwarf juniper (*Juniperus communis*) is a low-spreading, evergreen shrub, with bluish berry-like fruits and no flowers. This species is widely distributed throughout the United States; however, it is rare and local in the southwestern Piedmont, where it occurs only in a restricted set of habitats (very dry west-facing slopes). The variety in North Carolina (*Juniper communis* var. *depressa*) is found in thin, rocky soils on slopes around granitic domes and rocky summits (LeGrand, Sorrie, et al. 2022). Dwarf juniper is susceptible to juniper blight.

Dwarf juniper was recorded within 1 mile of the Project area at Crowder Mountain State Park in 2003 and 2018 (NCNHP 2022a, 2022b). This is one of only three populations known in the state (NCNHP 2003). The Project area lacks the required rocky slope habitat, and this species is not expected to be present in the Project area. No species-specific surveys were conducted due to lack of suitable habitat.

3.4.2.19 ROUGH BLAZING-STAR

Rough blazing-star (*Liatris aspera*) is found in dry soil of prairies and plains, openings in rocky woodlands, and along power lines and roadsides through these habitats. This species prefers basic soils with high pH (LeGrand, Sorrie, et al. 2022). This flower is rare in the southwestern Piedmont. It is found in dry and often rocky places in the southwestern part of the state (LeGrand, Sorrie, et al. 2022). All recorded occurrences in Cleveland County are either extirpated, have not been found in recent surveys, or have not been surveyed recently enough to be confident they are still present. Rough blazing-star has lavender flowers August through September and fruits starting in early October.

The Project area contains acidic soils (NRCS 2022), which are unlikely to support this species. The Project area also generally lacks open, dry habitats. Therefore, rough blazing-star is not expected to be present. No species-specific surveys were conducted due to lack of suitable habitat.

3.4.2.20 SPOTTED PHACELIA

The spotted phacelia (*Phacelia maculata*) is an annual herb found in granite flatrocks and bottomland openings that flowers in April. The spotted phacelia is moderately widespread from south-central North Carolina south to Georgia and west to Mississippi. It is most abundant in the southwestern part of its range and very rare in North Carolina (NatureServe 2022). There are only two known occurrences in North Carolina along a river in Cleveland County, where it occurs in openings in bottomland forests (LeGrand, Sorrie, et al. 2022). The source does not state which river it is located along; however, there are no rivers within the nearby Project vicinity. This plant is not expected to be present in the Project area as it is considered very rare and there is a lack of suitable habitat. No species-specific surveys were conducted due to lack of suitable habitat.

3.4.2.21 DWARF CHINQUAPIN OAK

The dwarf chinquapin oak (*Quercus prinoides*) is a deciduous shrub, typically 5 to 6 feet tall (LeGrand, Sorrie, et al. 2022). It grows in dry or mesic edge or opening habitat in acidic soils. Most records are from dry acidic slopes with openings or other early succession vegetation, often with rocky areas. This species is very rare and strongly declining in the Piedmont. Declines are likely due to fire suppression. All recorded occurrences in the county are from the 1950s, and this species has not been found in recent surveys (NCNHP 2003). Therefore, it is considered historic in Cleveland County. The Project area lacks rocky slopes, and dwarf chinquapin oak is not expected to be present. No species-specific surveys were conducted due to lack of suitable habitat.

3.4.2.22 BEAR OAK

Bear oak is a small deciduous tree, typically only reaching 15 to 20 feet tall. These trees are typically found as scattered individuals or very small stands (LeGrand, Sorrie, et al. 2022). In North Carolina, it is restricted to thin, dry, acidic soils near the highest elevations of a ridge or mountain. Bear oak is not known to occur in Cleveland County but has been recorded within 1 mile at higher elevations in Crowder Mountain State Park in 2003 (NCNHP 2022a, 2022b). The populations in the park are experiencing shading from competing vegetation leading to declines from competition with other woody species (NCNHP 2003). The Project area lacks suitable rocky outcrop, mountainous habitat, and bear oak is not expected to be present in the Project area. It is unlikely new sites will be discovered for this species (LeGrand, Sorrie, et al. 2022). No species-specific surveys were conducted due to lack of suitable habitat.

3.4.2.23 PURSH'S WILD PETUNIA

Pursh’s wild petunia (*Ruellia purshiana*) is a perennial herb restricted to dry to somewhat mesic, high-pH soil in partly shaded conditions (LeGrand, Sorrie, et al. 2022). It favors glades and barrens, woodland borders, open woods, and other similar sites. In the Piedmont, this species blooms in May. There are disturbed areas on the main site north of I-85 that are relatively similar to the barren, open forest habitat preferred by this species. However, based on field observation of that area, it would be unlikely to support this plant. Soils within the Project area are acidic, ranging from 4.6 to 6.2 pH (NRCS 2022). Therefore, this species is not expected to be present in the Project area. No species-specific surveys were conducted due to lack of suitable habitat.

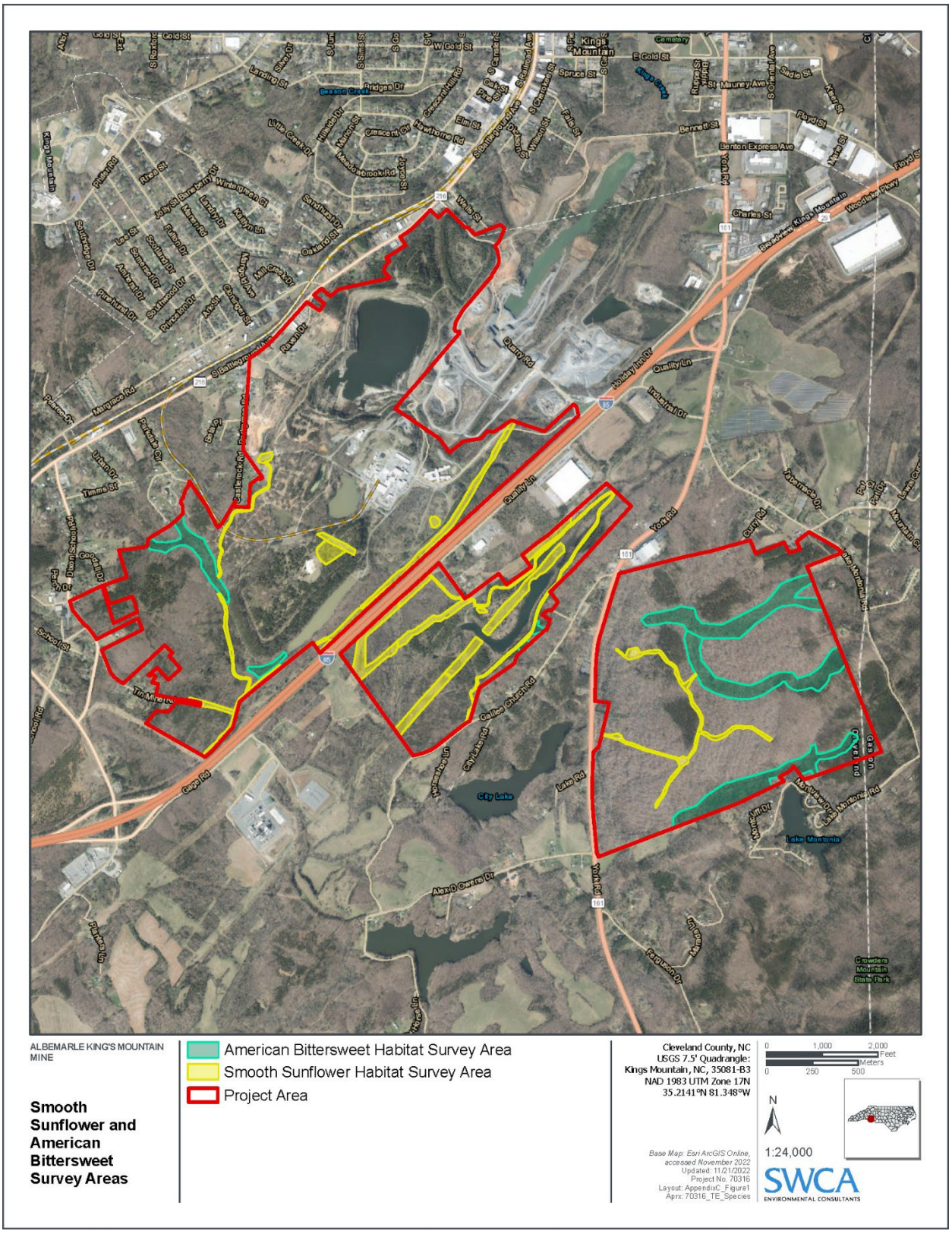

Figure 8. Smooth sunflower and American bittersweet habitat.

4 MIGRATORY BIRDS

Migratory birds are protected under the federal Migratory Bird Treaty Act of 1918 (MBTA), which makes it illegal to destroy or disturb nests with birds or eggs in them. The MBTA prohibits the "take" (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS. "Take" may be intentional or unintentional and is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." The MBTA applies to most bird species and their nests, eggs, feathers, or other parts. The MBTA does not apply to introduced species such as rock pigeon (*Columba livia*), house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), and non-migratory upland game birds. Table 6 lists the species commonly observed in the survey area during the summer 2022 surveys (SWCA 2022f).

Table 6. Bird Species Commonly Observed within the Survey Area

Common Name	Scientific Name
Tufted titmouse	*Baeolophus bicolor*
Northern cardinal	*Cardinalis cardinalis*
American crow	*Corvus brachyrhynchos*
Blue jay	*Cyanocitta cristata*
Downy woodpecker	*Dryobates pubescens*
House finch	*Haemorhous mexicanus*
Northern mockingbird	*Mimus polyglottos*
Indigo bunting	*Passerina cyanea*
Eastern towhee	*Pipilo erythrophthalmus*
Summer tanager	*Piranga rubra*
Carolina chickadee	*Poecile carolinensis*
Northern parula	*Setophaga americana*
Prairie warbler	*Setophaga discolor*
Pine warbler	*Setophaga pinus*
Eastern bluebird	*Sialia sialis*
American goldfinch	*Spinus tristis*
Field sparrow	*Spizella pusilla*
Carolina wren	*Thryothorus ludovicianus*
White-eyed vireo	*Vireo griseus*
Mourning dove	*Zenaida macroura*

The bird species observed in the Project area are all species observed regularly in the region (LeGrand et al. 2022) and are regularly recorded during the annual Breeding Bird Survey, a volunteer-based program designed to monitor the status and trends of North American breeding bird populations, along the nearby Flay Route (USGS 2019c). None of the bird species observed in the Project area are USFWS Birds of Conservation Concern. Birds of Conservation Concern are listed by the USFWS and defined as "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA of 1973" (USFWS 2021).

5 GENERAL WILDLIFE

5.1 Terrestrial

Various biological surveys were conducted during each season in 2022. During these field efforts, some common mammals, reptiles, and amphibians were regularly observed. Mammals observed include white-tail deer (*Odocoileus virginianus*), eastern gray squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), and raccoon (*Procyon lotor*). Additionally, black bears (*Ursus americanus*) have been observed occasionally within the site. Common reptiles observed include eastern rat snake (*Pantherophis alleghaniensis*), northern water snake (*Nerodia sipedon*), Carolina anole (*Anolis carolinensis*), five-lined skink (*Plestiodon fasciatus*), eastern fence lizard (*Sceloporus undulatus*), eastern box turtle (*Terrapene carolina*), eastern mud turtle (*Kinosternon subrubrum*), and common musk turtle (*Sternotherus odoratus*). Common amphibians include American toad (*Anaxyrus americanus*), green frog (*Lithobates clamitans*), bullfrog (*Lithobates catesbeianus*), northern cricket frog (*Acris crepitans*), spring peeper (*Pseudacris crucifer*), northern dusky salamander (*Desmognathus fuscus*), and spotted salamander (*Ambystoma maculatum*) (egg masses only).

5.2 Aquatic

An aquatic habitat assessment was conducted in 2022 to determine the aquatic faunal assemblage of the ponds and streams within the Project area (SWCA 2022e). In ponds, bluegill (*Lepomis macrochirus*) was the most common fish species, accounting for 98.4% of observations. Other fish species recorded included the redbreast sunfish (*Lepomis auritus*), spotted bass (*Micropterus punctulatus*), largemouth bass (*Micropterus salmoides*), and pumpkinseed (*Lepomis gibbosus*). Other fauna in pond habitats included mud turtles (*Kinosternon subrubrum*), musk turtles (*Sternotherus odoratus*), painted turtles (*Chrysemys picta*), a yellow-bellied slider (*Trachemys scripta scripta*), a northern water snake (*Nerodia sipedon*), and bullfrog tadpoles and adults (*Lithobates catesbeianus*).

Eleven fish species were observed in Kings Creek, South Creek, and two unnamed streams. The most abundant species observed in the stream habitats was the creek chub (*Semotilus atromaculatus*), which accounted for 51% of observed individuals. In-stream riffle/runs were dominated by creek chub, bluehead chub (*Nocomis leptocephalus*), and rosyside dace (*Clinostomus funduloides*). Pool structures in the streams were dominated by bluegill and redbreast sunfish. Less common, but also observed in pool structures with woody debris or other cover, were spotted bass and warmouth (*Lepomis gulosus*). White crappie (*Pomoxis annularis*), largemouth bass (*Micropterus salmoide*s), flathead catfish (*Pylodictis olivaris*) were observed but were very uncommon.

The only freshwater bivalve observed was Asian clam (*Corbicula* sp.), an introduced species of mollusk that is considered invasive. Asian clams were observed only on the Albemarle East Property. No aquatic snail species were observed in the four streams surveyed. Numerous individuals of crayfish were observed and captured in the two streams within the Albemarle East Property. All crayfish were members of the *Cambarus* (*Puncticambarus*) sp. *C* (*acuminatus*) complex.

Overall, South Creek showed very low species diversity above the lower sections that were flooded by beaver dams, with the upper stream sections being composed of only creek chub. King's Creek had a significant fish barrier (a low water dam), and no species were observed above the dam except a single mosquito fish (*Gambusia affinis*). Below the dam, some species diversity was observed, including bluehead chub, bluegill, redbreast sunfish, spotted bass, and mosquito fish. The Albemarle East Property streams had the highest species diversity longitudinally across entire stream sections. Sampled sections demonstrated classic species compositions associated with pool vs. riffle run habitats, with deeper pools

containing bluegill, warmouth, and occasionally spotted bass. Riffle/run habitats contained primarily chub and dace species with some bluegill. Larger-bodied creek chub and rosyside dace were also found in pools with associated woody debris or other cover.

All fish, crustacean, and bivalve species observed have an International Union for Conservation of Nature (IUCN) status of Least Concern, which is a species that the IUCN has classified as not being a priority for species conservation because the species is still abundant in the wild. They are not endangered, vulnerable, threatened, near threatened, or conservation dependent (IUCN 2022). Additionally, none are listed by the USFWS under the ESA, and none are state listed.

6 SUMMARY AND CONCLUSIONS

The Project area is dominated by forested upland vegetation (69.3%), and 13.5% is disturbed/developed. Jurisdictional and non-jurisdictional wetlands and streams are present and detailed in the *Wetland and Waterbody Delineation Report for the Albemarle Kings Mountain Lithium Mining Project, Cleveland County, North Carolina* (SWCA 2022a). SWCA submitted both an Approved Jurisdictional Determination (AJD) and Preliminary Jurisdictional Determination (PJD) request to the USACE in February 2023. This will determine the final wetland acreage and linear feet of streams that are jurisdictional.

No federally listed species have been identified within the Project area. The northern long-eared bat was not detected during acoustic surveys, and the site is on the extreme southeastern edge of its range. Although suitable habitat is present, the dwarf-flowered heartleaf was not identified during presence/absence surveys. The potential monarch butterfly habitat within the Project area is mostly low quality, and there is very little milkweed present to support this species. Tricolored bat was detected throughout the Project area during acoustic surveys. This bat is not state or federally listed, but the USFWS has proposed listing this species as endangered under the ESA.

Timber rattlesnake, American bittersweet, and smooth sunflower are state-listed species that have potential to occur based on suitable habitat. However, American bittersweet and smooth sunflower were not present during biological surveys. Surveys were not conducted for timber rattlesnake due to the lack of predictive survey areas within the Project area (e.g., rock outcrops) and the secretive nature of the species. However, numerous biological surveys were conducted throughout a diversity of habitats (e.g., forests, floodplains) in the Project area and no timber rattlesnakes were observed. All other state-listed species have a low or very low potential to occur, primarily due to lack of suitable habitat.

This report will be updated after additional biological surveys are conducted in 2023.

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Appendix A. IPaC List

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Cleveland County, North Carolina

Local office

Asheville Ecological Services Field Office

(828) 258-3939
(828) 258-5330

160 Zillicoa Street
Asheville, NC 28801-1082

http://www.fws.gov/nc-es/es/countyfr.html

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Dwarf-flowered Heartleaf Hexastylis naniflora Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2458	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31

Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Kentucky Warbler Oporornis formosus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 20
Prairie Warbler Dendroica discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Prothonotary Warbler Protonotaria citrea This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

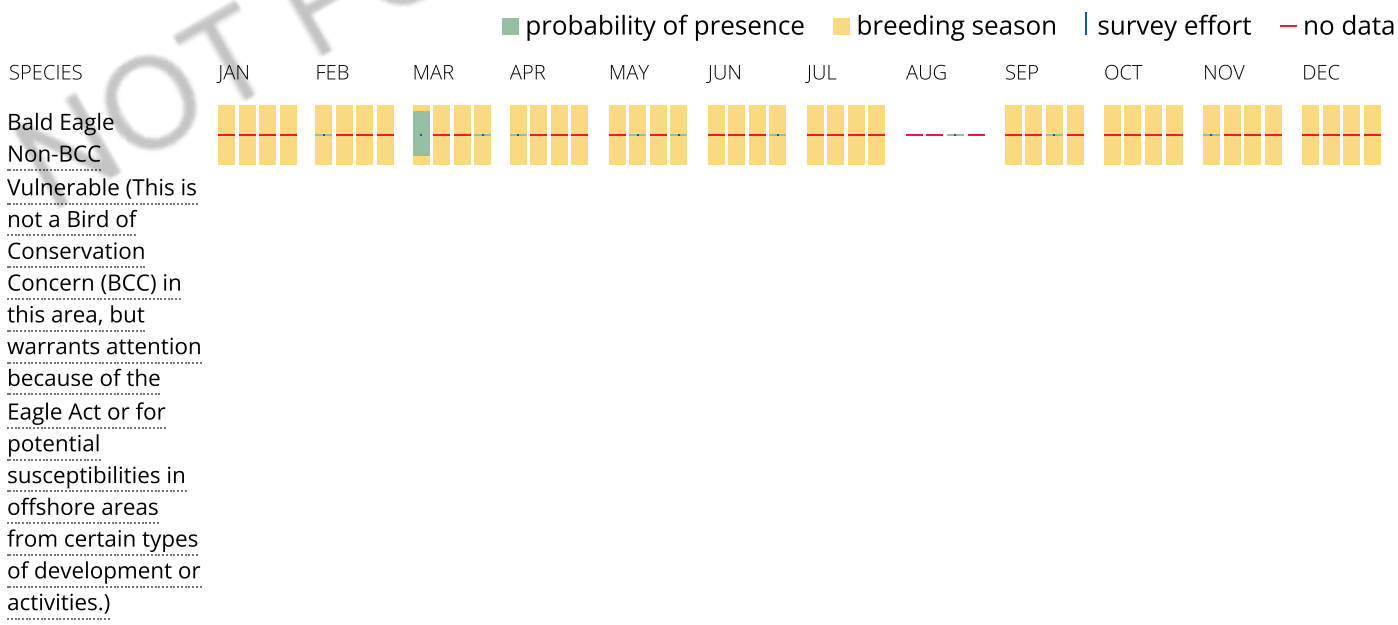
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

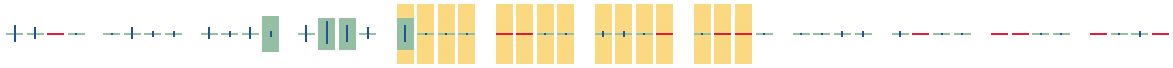
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

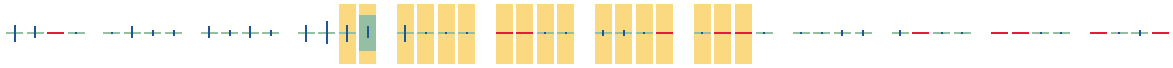
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



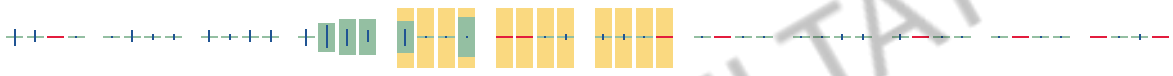
Eastern Whip-poor-will BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



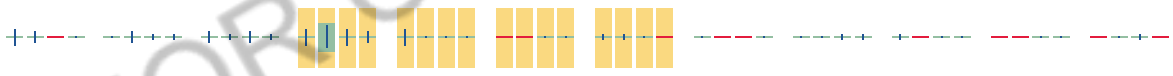
Kentucky Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



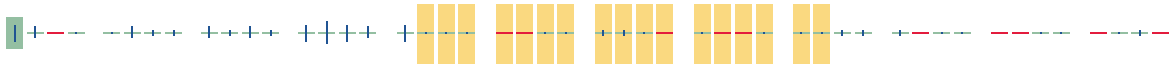
Prairie Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



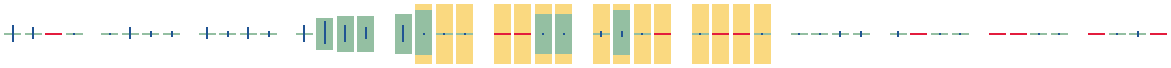
Prothonotary Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Red-headed Woodpecker BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Wood Thrush BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds

guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid

or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix B. NCNHP List

NC DEPARTMENT OF
NATURAL AND CULTURAL RESOURCES

Roy Cooper, **Governor**

D. Reid Wilson, **Secretary**

Misty Buchanan
Deputy Director, Natural Heritage Program

NCNHDE-17108

February 9, 2022

Simon King
SWCA Environmental Consultants
4001 Winecott Drive
Apex, NC 27502
RE: Albemarle Main Boundary; 00070316-000-RDU

Dear Simon King:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

Based on the project area mapped with your request, a query of the NCNHP database indicates that there are no records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. Please note that although there may be no documentation of natural heritage elements within the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is found within the project area or is indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

The NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Land and Water Fund easement, or Federally-listed species are documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919-707-8603.

Sincerely,
NC Natural Heritage Program

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Albemarle Main Boundary
Project No. 00070316-000-RDU
February 9, 2022
NCNHDE-17108

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Mammal	38341	Peromyscus polionotus	Oldfield Deermouse	1977	H	4-Low	---	Special Concern	G5	S1
Natural Community	1261	Low Mountain Pine Forest (Montane Pine Subtype)	---	2010	NR	4-Low	---	---	G3G4	S2?
Vascular Plant	17711	Pycnanthemum torreyi	Torrey's Mountain-mint	1935-07-23	H	4-Low	---	Significantly Rare Throughout	G2	S1

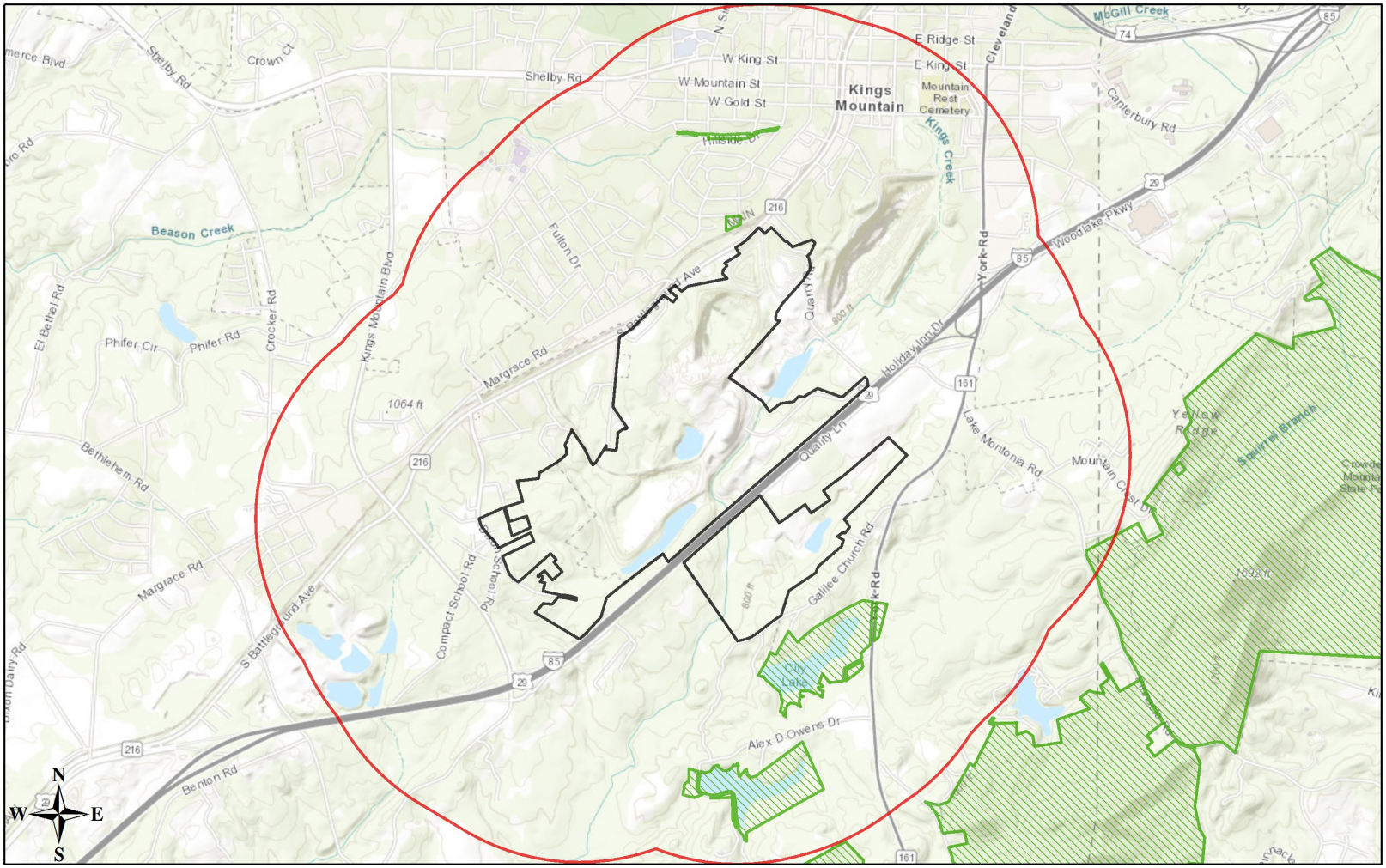
No Natural Areas are Documented Within a One-mile Radius of the Project Area

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
City of Kings Mountain Open Space	City of Kings Mountain	Local Government
City of Kings Mountain Open Space	City of Kings Mountain	Local Government
City of Kings Mountain Open Space	City of Kings Mountain	Local Government
City of Kings Mountain Open Space	City of Kings Mountain	Local Government
Crowders Mountain State Park	NC DNCR, Division of Parks and Recreation	State

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/help. Data query generated on February 9, 2022; source: NCNHP, Q4, January 2022. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-17108: Albemarle Main Boundary



February 9, 2022

- Project Boundary
- Buffered Project Boundary
- Managed Area (MAREA)

1:39,070

0 0.325 0.65 1.3 mi

0 0.5 1 2 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

NC DEPARTMENT OF
NATURAL AND CULTURAL RESOURCES

Roy Cooper, **Governor**

D. Reid Wilson, **Secretary**

Misty Buchanan
Deputy Director, Natural Heritage Program

NCNHDE-17109

February 9, 2022

Simon King
SWCA Environmental Consultants
4001 Winecott Drive
Apex, NC 27502
RE: Albemarle Separate Parcel; 00070316-000-RDU

Dear Simon King:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

A query of the NCNHP database indicates that there are records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. These results are presented in the attached 'Documented Occurrences' tables and map.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is documented within the project area or indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

Also please note that the NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Land and Water Fund easement, or an occurrence of a Federally-listed species is documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919-707-8603.

Sincerely,
NC Natural Heritage Program

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Intersecting the Project Area
Albemarle Separate Parcel
Project No. 00070316-000-RDU
February 9, 2022
NCNHDE-17109

No Element Occurrences are Documented within the Project Area

There are no documented element occurrences (of medium to very high accuracy) that intersect with the project area. Please note, however, that although the NCNHP database does not show records for rare species within the project area, it does not necessarily mean that they are not present; it may simply mean that the area has not been surveyed. The use of Natural Heritage Program data should not be substituted for actual field surveys if needed, particularly if the project area contains suitable habitat for rare species. If rare species are found, the NCNHP would appreciate receiving this information so that we may update our database.

No Natural Areas are Documented within the Project Area

Managed Areas Documented Within Project Area*

Managed Area Name	Owner	Owner Type
City of Kings Mountain Open Space	City of Kings Mountain	Local Government

*NOTE: If the proposed project intersects with a conservation/managed area, please contact the landowner directly for additional information. If the project intersects with a Dedicated Nature Preserve (DNP), Registered Natural Heritage Area (RHA), or Federally-listed species, NCNHP staff may provide additional correspondence regarding the project.

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/help. Data query generated on February 9, 2022; source: NCNHP, Q4, January 2022. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Albemarle Separate Parcel
Project No. 00070316-000-RDU
February 9, 2022
NCNHDE-17109

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Butterfly	12302	Satyrium favonius ontario	Northern Oak Hairstreak	2001-05-15	C?	3-Medium	---	Significantly Rare	G4G5T4	S2S3
Natural Community	18325	Dry Oak--Hickory Forest (Piedmont Subtype)	---	2010	B?	4-Low	---	---	G4G5	S4
Natural Community	8178	Low Elevation Rocky Summit (Acidic Subtype)	---	2010	A	2-High	---	---	G3?	S2
Natural Community	1261	Low Mountain Pine Forest (Montane Pine Subtype)	---	2010	NR	4-Low	---	---	G3G4	S2?
Natural Community	5921	Piedmont Monadnock Forest (Typic Subtype)	---	2010	AB	2-High	---	---	G3G4	S3
Reptile	34819	Crotalus horridus	Timber Rattlesnake	2019-08-20	E	3-Medium	---	Special Concern	G4	S3
Reptile	504	Sistrurus miliarius miliarius	Carolina Pigmy Rattlesnake	1990-Fall	H?	3-Medium	---	Special Concern	G5T4T5	S2
Vascular Plant	516	Asplenium bradleyi	Bradley's Spleenwort	2006-11-09	B	3-Medium	---	Significantly Rare Peripheral	G4	S2
Vascular Plant	19543	Fothergilla major	Large Witch-alder	1919-05	H	4-Low	---	Significantly Rare Throughout	G3	S3
Vascular Plant	23605	Juniperus communis var. depressa	Dwarf Juniper	2003-08-15	E	3-Medium	---	Threatened	G5T5	S1
Vascular Plant	3853	Juniperus communis var. depressa	Dwarf Juniper	2003-08-15	E	3-Medium	---	Threatened	G5T5	S1
Vascular Plant	23408	Juniperus communis var. depressa	Dwarf Juniper	2018-06-15	E	2-High	---	Threatened	G5T5	S1

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	17711	Pycnanthemum torreyi	Torrey's Mountain-mint	1935-07-23	H	4-Low	---	Significantly Rare Throughout	G2	S1
Vascular Plant	1485	Quercus ilicifolia	Bear Oak	2003-08-15	E	3-Medium	---	Endangered	G5	S2
Vascular Plant	863	Thermopsis mollis	Appalachian Golden-banner	2001-06-15	E	2-High	---	Significantly Rare Throughout	G3G4	S2

Natural Areas Documented Within a One-mile Radius of the Project Area

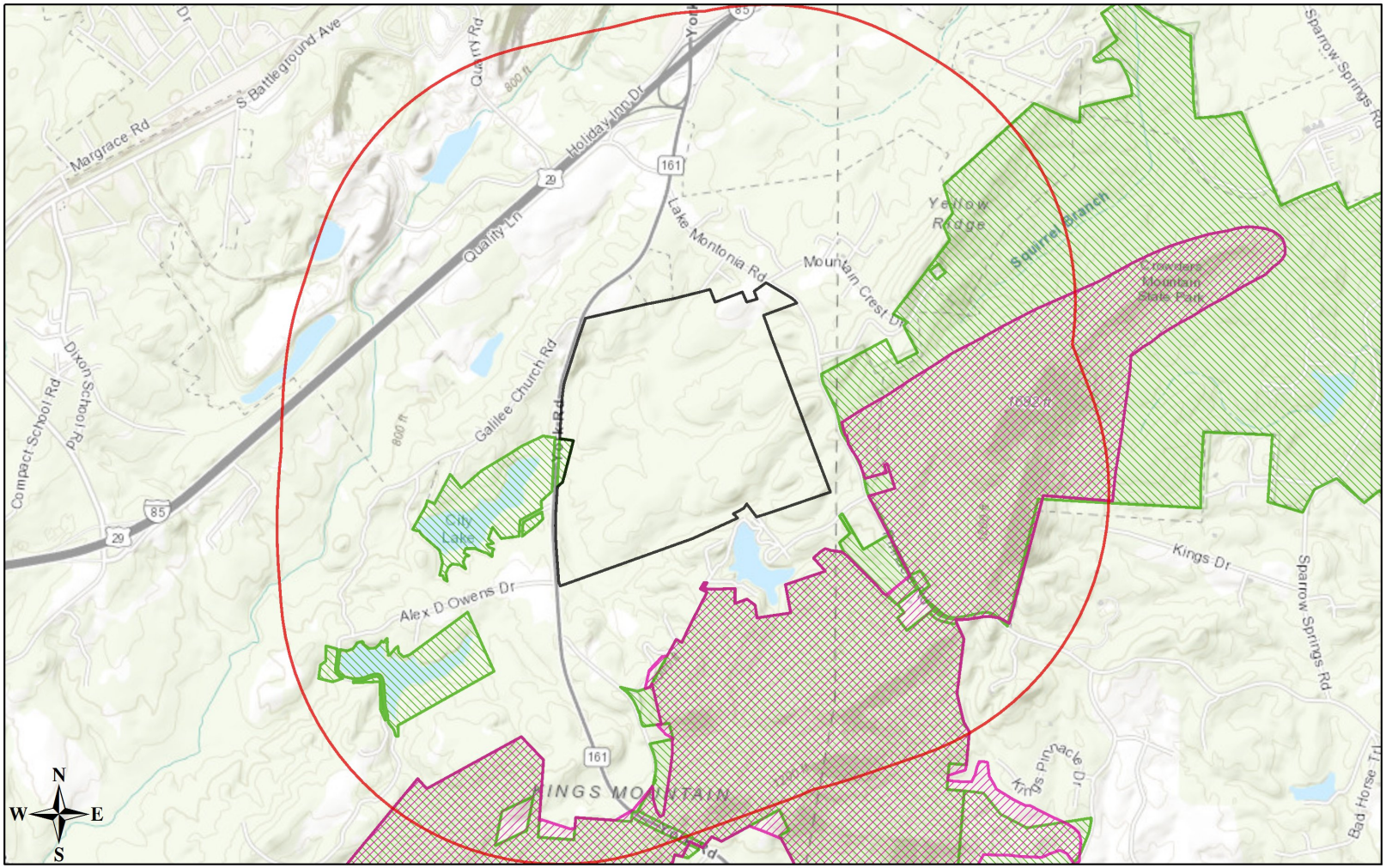
Site Name	Representational Rating	Collective Rating
Crowders Mountain State Park and Vicinity	R2 (Very High)	C2 (Very High)

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
City of Kings Mountain Open Space	City of Kings Mountain	Local Government
City of Kings Mountain Open Space	City of Kings Mountain	Local Government
Crowders Mountain State Park	NC DNCR, Division of Parks and Recreation	State
Crowders Mountain State Park Dedicated Nature Preserve	NC DNCR, Division of Parks and Recreation	State

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/help. Data query generated on February 9, 2022; source: NCNHP, Q4, January 2022. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-17109: Albemarle Separate Parcel



February 9, 2022

- Project Boundary
- Buffered Project Boundary
- NHP Natural Area (NHNA)
- Managed Area (MAREA)

1:31,323

0 0.275 0.55 1.1 mi

0 0.425 0.85 1.7 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

APPENDIX C-3 DWARF-FLOWERED HEARTLEAF REPORT FOR THE KINGS MOUNTAIN LITHIUM MINE, CLEVELAND COUNTY, NORTH CAROLINA

Dwarf-flowered Heartleaf Report for the Kings Mountain Lithium Mine, Cleveland County, North Carolina

JUNE 2024

PREPARED FOR

Albemarle U.S., Inc.

PREPARED BY

SWCA Environmental Consultants

DWARF-FLOWERED HEARTLEAF REPORT FOR THE KINGS MOUNTAIN LITHIUM MINE, CLEVELAND COUNTY, NORTH CAROLINA

Prepared for

Albemarle U.S., Inc.
348 Holiday Inn Drive
Kings Mountain, North Carolina 28086
Attn: John Kuhn

Prepared by

SWCA Environmental Consultants
113 Edinburgh South Drive, Suite 120
Cary, North Carolina 27511
(919) 212-2200
www.swca.com

SWCA Project No. 70316

June 2024

CONTENTS

Appendices

Figures

Tables

1 INTRODUCTION

On behalf of Albemarle U.S., Inc. (Albemarle), SWCA Environmental Consultants (SWCA) conducted dwarf-flowered heartleaf (*Hexastylis naniflora*) presence/absence surveys for the Kings Mountain Lithium Mining Project (Project) located in southeastern Cleveland County, North Carolina.
The dwarf-flowered heartleaf is a federally threatened species under the Endangered Species Act of 1973, as amended (ESA). A desktop review and field reconnaissance determined that approximately 47 acres of suitable dwarf-flowered heartleaf habitat are present in the Project area. No dwarf-flowered heartleaf populations were observed during presence/absence surveys conducted during the plant's flowering season in April and May of 2024 or in the previous survey conducted during May of 2022.

1.1 Location

The Project is on private land owned or leased by Albemarle and consists of approximately 1,146 acres (Project area). The Project is approximately 2 miles south of downtown Kings Mountain, North Carolina, and is located on the U.S. Geological Survey (USGS) Kings Mountain, North Carolina, 7.5-minute quadrangle (Figure 1). The Project area is divided by Interstate-85 (I-85), with the main parcel on the north side of the highway and a smaller parcel on the south side of the highway. The main parcel is bordered by South Battleground Avenue (Highway 216), Parkgrace Road, and Tin Mine Road to the west, Quarry Road to the north, and I-85 to the south and east.

1.2 Project Area Description

The northern and central portions of the main parcel are mostly developed/disturbed from historic mine use and include Albemarle's processing facility and Global Technical Center as well as the historic mining operations. The northern portion includes a closed drive-in movie theater and campground, and remnants of a textile mill and a school. The western portion of the main parcel north of I-85 is largely undeveloped forested land. Five utility rights-of-way (ROWs) cross the northern and central portions of the parcel. The parcel directly south of I-85 is mostly undeveloped but historically has been used for tailings placement in the eastern portion. Undeveloped land in the Project area consists primarily of forest and aquatic habitats. The Project area is surrounded by residential, commercial, and industrial development to the north, west, and south (Figures 1 and 2). The Martin Marietta aggregate quarry borders the Project area to the northeast. To the east is primarily undeveloped land associated with Crowders Mountain State Park.

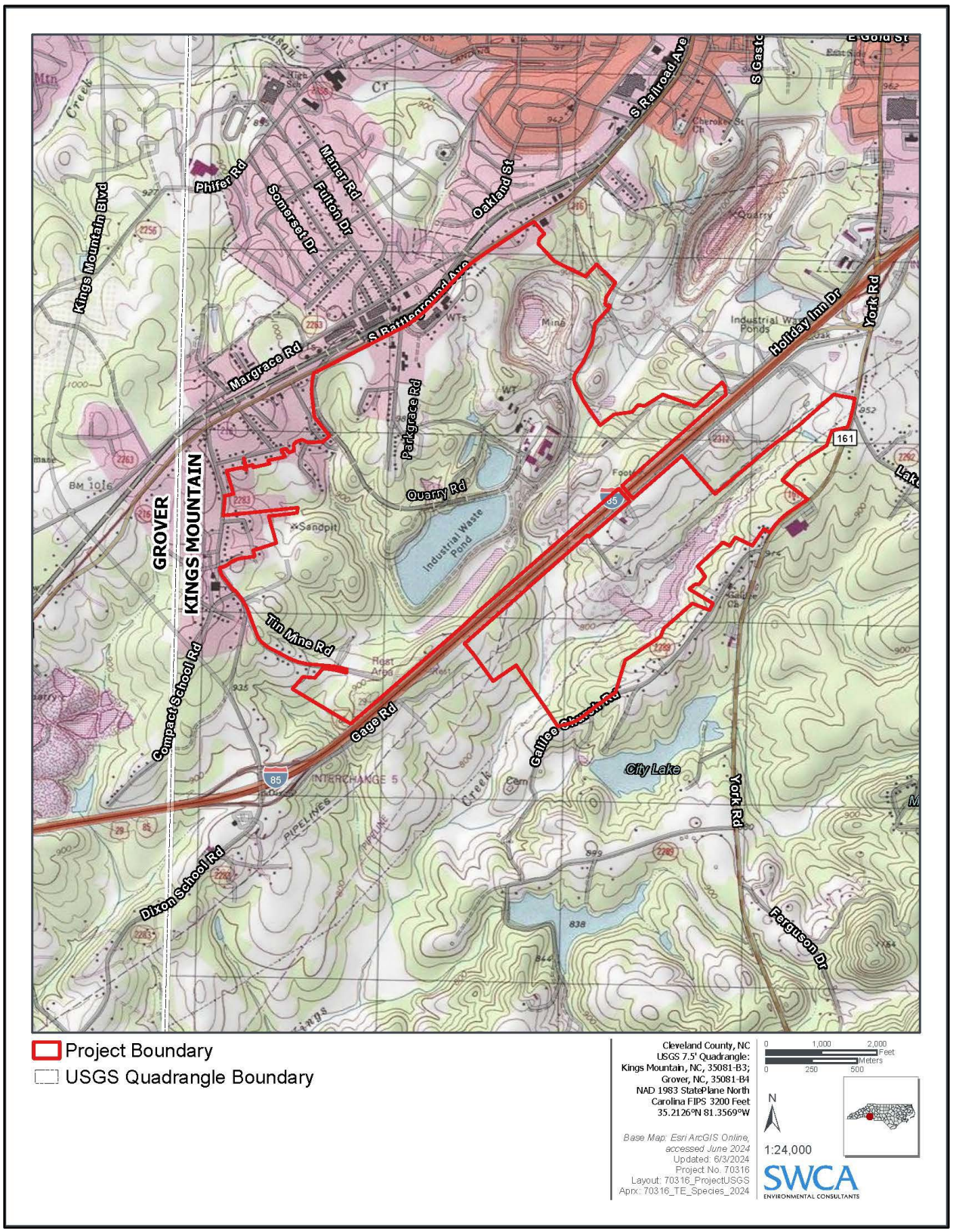


Figure 1. Project location.

Figure 2. Aerial imagery of the Project area.

2 SPECIES BACKGROUND

2.1 Description

Dwarf-flowered heartleaf is a clump-forming perennial woodland herb growing from rhizomes (University of Texas 2016). The leaves are supported by long, thin leaf stems that connect to an underground stem. The small jug-shaped flowers found near the base of the leaf stems are usually beige to dark brown or purple and appear from mid-March to early June (U.S. Fish and Wildlife Service [USFWS] 2019, as cited in Blomquist 1957; Gaddy 1980, 1981). The dwarf-flowered heartleaf is not identifiable by its leaves and is best differentiated from other *Hexastylis* species by having the smallest flowers in the *Hexastylis* genus. Dwarf-flowered heartleaf flowers typically have calyx tube openings 4 to 8 millimeters (mm) wide but often 5 mm or less and/or a calyx tube less than 1.1 centimeters (cm) in length (Gaddy 1987; Krings et al. 2024; Weakley and Southeastern Flora Team 2024). The calyx is defined as the flower whorl that consists of all the sepals, often used when the sepals are fused together (Roland et al. 2016). Additionally, another identifying characteristic is the ovary being half-inferior (Krings et al. 2024). The optimal survey window for this species is from March 1 to May 31 (USFWS 2022b). According to multiple county records, the dwarf-flowered heartleaf, the little heartleaf (*Hexastylis minor*), and the large-flower heartleaf (*Hexastylis shuttleworthii*) are the only species in the genus *Hexastylis* documented in Cleveland County (USFWS 2019, as cited in Murrell et al. 2007; LeGrand et al. 2024). Little heartleaf is the only species in Cleveland County likely to be confused with dwarf-flowered heartleaf, but it generally has larger flowers with a calyx tube typically 12 to 25 mm long (Krings et al. 2024; Weakley and Southeastern Flora Team 2024).

Figure 3. Representative photo of *Hexastylis naniflora*. Photo credit: Alan M. Cressler.

2.2 Habitat

Dwarf-flowered heartleaf is an upper Piedmont endemic that occurs in mesic deciduous forests on slopes and bluffs with moderately permeable, acidic sandy-loam soils. It is generally found along moderate to dry bluffs, slopes, or ravines in deciduous forests or within moist soils adjacent to creeks, streams, or

along lakes and rivers (LeGrand et al. 2024; USFWS 2021). This plant is typically associated with mountain laurel (*Kalmia latifolia*) and is often found growing under or next to mountain laurel (LeGrand et al. 2024). Overall, the dwarf-flowered heartleaf has a restricted range based on limiting habitat characteristics, such as slope aspect, soil types and moisture availability, and forest type (Wagner 2013). It appears to be restricted to Pacolet sandy loams, Madison gravelly sandy loams, and Musella fine sandy loams (USFWS 2019, as cited in Gaddy 1981, 1987), and is most commonly predicted to occur on north-facing slopes between 8 to 10.5 percent (Wagner 2013).

2.3 Range

The dwarf-flowered heartleaf is only known to occur in the southwestern Piedmont of North Carolina and adjacent areas of South Carolina (North Carolina Natural Heritage Program [NCNHP] 2003). The current reported range is Cherokee, Greenville, and Spartanburg Counties, South Carolina, and Alexander, Burke, Caldwell, Catawba, Cleveland, Gaston, Iredell, Lincoln, Polk, and Rutherford Counties, North Carolina (NatureServe 2022). Several known populations are in protected areas of Cleveland County, including the Knob Creek Natural Area, West Shelby Mesic Slope, Broad River/Sandy Run Natural Areas, Hicks Hill Bluffs and Forests, First Broad Hop-hornbeam Natural Area Beaverdam Creek Natural Area, and the Rutherford County portion of Rollins/South Mountains Natural Area, which extends into Cleveland County (NCNHP 2003). This species has not been found during surveys of Crowder Mountain State Park (NCNHP 2003; Tompkins and Luckenbaugh 2018), which is the closest natural area to the Project, and there are no documented occurrences within 1 mile of the Project area (NCNHP 2022a, 2024).

2.4 Threats

The greatest threats to the dwarf-flowered heartleaf are from commercial and residential development and road improvements and construction (NatureServe 2022). Other threats include incompatible forestry practices, off-road vehicles, and invasive plants. Many occurrences are appropriately protected and managed by the States of North Carolina and South Carolina, and many of these populations are found on protected conservation land.

2.5 Status

Dwarf-flowered heartleaf was federally listed as threatened in 1989 and currently remains listed as threatened under the ESA. However, on April 21, 2021, the USFWS proposed delisting the species due to an increase in known, stable populations, some of which have more than 1,000 individuals (86 *Federal Register* 21994). According to the proposed delisting, data indicate that the threats to the species have been eliminated or reduced to the point that the species no longer meets the definition of a threatened species. Until the species is formally delisted, all ESA laws and regulations still apply. The dwarf-flowered heartleaf is also state-listed as threatened in North Carolina by the North Carolina Department of Agriculture and Consumer Affairs Plant Conservation Program (PCP). The PCP's mission is to develop regulations, programs, and partnerships to help protect imperiled species in North Carolina.

3 METHODS

3.1 Desktop Analysis

A preliminary desktop analysis was completed for the Project prior to field surveys by using a combination of existing information obtained from available public sources, including reports, published

literature, online databases, and geographic information system (GIS) data. The following publicly available data sources were used to complete a desktop analysis:

- Google Earth aerial imagery (Google 2024)
- USGS National Land Cover Database (USGS 2019a)
- USGS National Hydrology Dataset (USGS 2019b)
- Natural Resources Conservation Service (NRCS) Web Soil Survey maps (NRCS 2024)
- USFWS National Wetlands Inventory maps (USFWS 2022a)
- NCNHP data and planning tools (NCNHP 2021, 2022a, 2022b, 2024)
- Vascular Plants of North Carolina website (LeGrand et al. 2024)

These sources were used to characterize the resources in the Project area and surrounding area.

3.2 Field Surveys

A general field reconnaissance was conducted within the Project area in February and March of 2022 and June of 2023 concurrent with a wetland delineation to find potentially suitable habitat for the dwarf-flowered heartleaf. Additionally, in May 2022, prior to on-site surveys, SWCA's lead biologist visited an off-site area with a known dwarf-flowered heartleaf population approximately 17 miles west of the Project area along a greenway to observe the flowers and known suitable habitat. Between 2022 and 2024 the Project area changed and, as such, SWCA expanded the survey area to include these additions during the 2024 presence/absence survey.

SWCA conducted presence/absence surveys within the identified suitable habitat in the Project area during the flowering period (March 1 through May 31) in 2022 and again in 2024. Surveys were reconducted in 2024 due to a 2-year expiration date on presence/absence surveys for the dwarf-flowered heartleaf (USFWS 2022b). During on-site surveys, two SWCA biologists walked meandering transects throughout potential suitable habitat within the Project area to search for dwarf-flowered heartleaf plants. When plants within the genus *Hexastylis* were encountered, biologists observed the flowers, if present, and measured the calyx tube length and the calyx tube opening to determine if these characteristics were consistent with the dwarf-flowered heartleaf (Figure 4 and 5 below). Representative photos of *Hexastylis* plants and flowers observed were taken for each survey area, as provided in Appendix A, and their locations are shown on detailed survey maps in Appendix B. This method was approved by the USFWS (personal communication, email from Rebeka Reid, USFWS, to Simon King, SWCA, on April 20, 2022). SWCA coordinated with the USFWS, NCNHP, and University of North Carolina Herbarium and utilized the recommended species' keys to determine *Hexastylis* species in the field (Gaddy 1987; Krings et al. 2024; Weakley and Southeastern Flora Team 2024).

Figure 4. Example of SWCA's measuring methodology for the calyx tube opening during a survey. The yellow line indicates the measured portion.

Figure 5. Example of SWCA's measuring methodology for calyx tube length during a survey. The yellow line indicates the measured portion.

4 RESULTS

4.1 Project Area Habitats

Most of the Project area landscape in the northern, central, and eastern portions has been significantly altered due to historic mining. The western and southern portions are generally undeveloped forested lands. Land cover maps (USGS 2019a) indicate the Project area consists primarily of deciduous forest, mixed forest, and evergreen forest with smaller portions of pasture/herbaceous, medium to high intensity development, open water (e.g., ponds, lakes, mining pits), and wetland habitats. Field surveys confirmed that most of these land-cover types are fairly accurate. Outside of developed areas and open water, habitat in the Project area falls into five major communities: forested upland, forested wetland, emergent wetland, shrub-scrub wetland, herbaceous and edge uplands.

Potentially suitable habitat for the dwarf-flowered heartleaf was observed within the Project area during field reconnaissance activities in February and March 2022, June 2023, and May 2024. Areas determined to be suitable for the dwarf-flowered heartleaf were generally mature deciduous forests along slopes and bluffs adjacent to aquatic features in the Project area. Areas determined to have low suitability were generally sloped forested areas with loamy soils adjacent to aquatic features but had an herbaceous layer dominated by invasive species such as Japanese honeysuckle (*Lonicera japonica*), Japanese stilt grass (*Microstegium vimineum*), wisteria (*Wisteria sinensis, W. floribunda*), and English ivy (*Hedera helix*). Areas determined to have moderate suitability generally included mature deciduous forests with loamy to

sandy loam soils on slopes adjacent to aquatic features that lacked a dominance of invasive species but also lacked mountain laurel and optimal soil types. Areas determined to have high suitability were forested areas on slopes and areas adjacent to streams or lakes with sandy loams, mountain laurel present, and north-facing slopes. Forested areas that were determined to be unsuitable generally included dense, early successional forested habitats, forests dominated by pine trees, forested areas lacking the proper slope and aspect, and forested areas previously heavily disturbed during historic mining activities. Some survey areas had a mix of suitability throughout and, as such, are stated as low to moderate or moderate to high suitability (see Section 4.2, Survey Results; Table 1; Figure 6).

According to the NRCS (2024), no Pacolet sandy loam, Madison gravelly sandy loams, or Musella fine sandy loam soils are mapped within the Project area, which are the soils the species seems restricted to (USFWS 2019, as cited in Gaddy 1981, 1987). Approximately 19.4 percent of the Project area consists of Madison-Bethlehem complex soils with a gravelly sandy clay loam texture which has components of the Madison series (NRCS 2024). However, since most of these soils are classified with slopes between 2 to 8 percent rather than 8 to 10.5 percent and are sandy clay loams rather than sandy loams, they are likely not optimal soils to support the dwarf-flowered heartleaf.

Overall, approximately 10.73 acres of low suitability, 11.29 acres of low to moderate suitability, 1.91 acres of moderate suitability, and 22.81 acres of moderate-to-high suitability habitat for the dwarf-flowered heartleaf was identified and surveyed in the Project area.

4.1.1 Forested Upland

The forested upland community is the dominant habitat present in the Project area. Dominant trees include American sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), tulip tree (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), red maple (*Acer rubrum*), white oak (*Quercus alba*), red oak (*Quercus* spp.), mockernut hickory (*Carya tomentosa*), and chestnut oak (*Quercus montana*). Understory species commonly observed in the forested areas are flowering dogwood (*Cornus florida*), greenbrier (*Smilax* spp.), blackberry (*Rubus* spp.), spicebush (*Lindera benzoin*), and various successional hardwoods (oaks, hickories, sweetgum, maples). Suitable habitat surveyed includes portions of the forested upland habitat.

4.1.2 Palustrine Forested Wetland

The forested wetland community consists of a prevalence of hydrophytic woody species over 20 feet tall. The tree strata are dominated by red maple, American sycamore (*Platanus occidentalis*), water oak (*Quercus nigra*), sugarberry (*Celtis laevigata*), American elm (*Ulmus americana*), and American sweetgum. The forested wetland habitat was determined not to be suitable for the dwarf-flowered heartleaf and, therefore, was not surveyed. However, some areas immediately adjacent to forested wetlands were suitable and were surveyed.

4.1.3 Palustrine Shrub-Scrub Wetland

The shrub-scrub wetland community consists of a prevalence of hydrophytic woody vegetation less than 20 feet tall. The shrub-scrub strata are dominated by brookside alder (*Alnus serrulata*), American sycamore, black willow (*Salix nigra*), Chinese privet (*Ligustrum sinense*), and red maple. The shrub-scrub wetland habitat in the Project area was determined not to be suitable for the dwarf-flowered heartleaf and, therefore, was not surveyed. However, some areas immediately adjacent to shrub-scrub wetlands were suitable and were surveyed.

4.1.4 Palustrine Emergent Wetland

The emergent wetland community consists of a prevalence of hydrophytic non-woody vegetation less than 3 feet in height. Dominant herbaceous species include giant cane (*Arundinaria gigantea*), bushy bluestem (*Andropogon glomeratus*), lamp rush (*Juncus effusus*), cottongrass bulrush (*Scirpus cyperinus*), lesser poverty rush (*Juncus tenuis*), fowl blue grass (*Poa palustris*), shallow sedge (*Carex lurida*), and goldenrod species (*Solidago* sp.). The emergent wetland habitat was determined not to be suitable for the dwarf-flowered heartleaf and, therefore, was not surveyed. Potentially suitable habitat does not include emergent wetland habitat.

4.1.5 Herbaceous Upland

The herbaceous upland and edge communities consist of non-wetland areas dominated by non-woody vegetation. Dominant herbaceous species include broom-sedge (*Andropogon virginicus*), wild garlic/ onion (*Allium* spp.), Kentucky blue grass (*Poa pratensis*), goldenrod, clovers (*Trifolium* spp.), hemp dogbane (*Apocynum cannabinum*), Japanese honeysuckle (*Lonicera japonica*), American burnweed (*Erechtites hieraciifolia*), wild strawberry (*Fragaria virginiana*), and southern crabgrass (*Digitaria ciliaris*). Herbaceous uplands are found primarily within the maintained utilities ROWs. The herbaceous upland habitat was determined not to be suitable for the dwarf-flowered heartleaf and, therefore, was not surveyed.

4.2 Survey Results

SWCA biologists conducted presence/absence surveys during the optimal survey window within potentially suitable habitat on April 8 to 10, 2024 and May 21, 2024. The 15 survey areas covered 46.74 acres of suitable habitat varying from low to high suitability (Table 1; Figure 6).

The threatened dwarf-flowered heartleaf was not identified within any of the survey areas (Table 1). Several populations of the little heartleaf, a common species, were observed during the surveys. This species is noticeably larger than dwarf-flowered heartleaf and has calyx tube lengths generally longer than 1 cm. SWCA biologists encountered some *Hexastylis* plants that lacked flowers and, therefore, prevented identification to species level. However, other flowers that were observed in these areas, or often adjacent to flowerless plants, had calyx tube openings larger than 8 mm and/or a calyx tube longer than 1 cm, which are not characteristics consistent with dwarf-flowered heartleaf (Gaddy 1987; Krings et al. 2024; Weakley and Southeastern Flora Team 2024). SWCA biologists determined that none of the observed flowering *Hexastylis* species were dwarf-flowered heartleaf, as observed flowers never exhibited features consistent with this species. Photographs of suitable habitat and *Hexastylis* plants and flowers observed are provided in Appendix A; additionally, representative photos of unsuitable habitat are also provided.

Table 1. Results of 2024 Dwarf-flowered Heartleaf (*Hexastylis naniflora*) Presence/Absence Survey within the Project Area

Survey Area	Acres	Degree of Suitability	Observations
A	3.68	Low to moderate	No *Hexastylis naniflora* or any other *Hexastylis* species observed.
B	11.66	Moderate to high	No *Hexastylis naniflora* observed. All other *Hexastylis* plants observed had calyx tube openings >8 mm and/or a calyx tube >1 cm in length.
C	4.11	Low	No *Hexastylis naniflora* observed. All other *Hexastylis* plants observed had calyx tube openings >8 mm and/or a calyx tube >1 cm in length.

Survey Area	Acres	Degree of Suitability	Observations
D	4.04	Low to moderate	No *Hexastylis naniflora* or any other *Hexastylis* species observed.
E	8.34	Moderate to high	No *Hexastylis naniflora* observed. All other *Hexastylis* plants observed had calyx tube openings >8 mm and/or a calyx tube >1 cm in length.
F	1.35	Low to moderate	No *Hexastylis naniflora* or any other *Hexastylis* species observed.
G	1.95	Low to moderate	No *Hexastylis naniflora* or any other *Hexastylis* species observed.
H	0.22	Moderate	No *Hexastylis naniflora* observed. All other *Hexastylis* plants observed had calyx tube openings >8 mm and/or a calyx tube >1 cm in length.
I	0.12	Moderate	No *Hexastylis naniflora* observed. All other *Hexastylis* plants observed had calyx tube openings >8 mm and/or a calyx tube >1 cm in length.
J	0.32	Moderate	No *Hexastylis naniflora* observed. All other *Hexastylis* plants observed had calyx tube openings >8 mm and/or a calyx tube >1 cm in length.
K	0.80	Moderate	No *Hexastylis naniflora* observed. All other *Hexastylis* plants observed had calyx tube openings >8 mm and/or a calyx tube >1 cm in length.
L	0.45	Moderate	No *Hexastylis naniflora* observed. All other *Hexastylis* plants observed had calyx tube openings >8 mm and/or a calyx tube >1 cm in length.
M	2.81	Moderate to high	No *Hexastylis naniflora* or any other *Hexastylis* species observed.
N	0.27	Low to moderate	No *Hexastylis naniflora* or any other *Hexastylis* species observed.
O	6.62	Low	No *Hexastylis naniflora* or any other *Hexastylis* species observed.

3.sdf

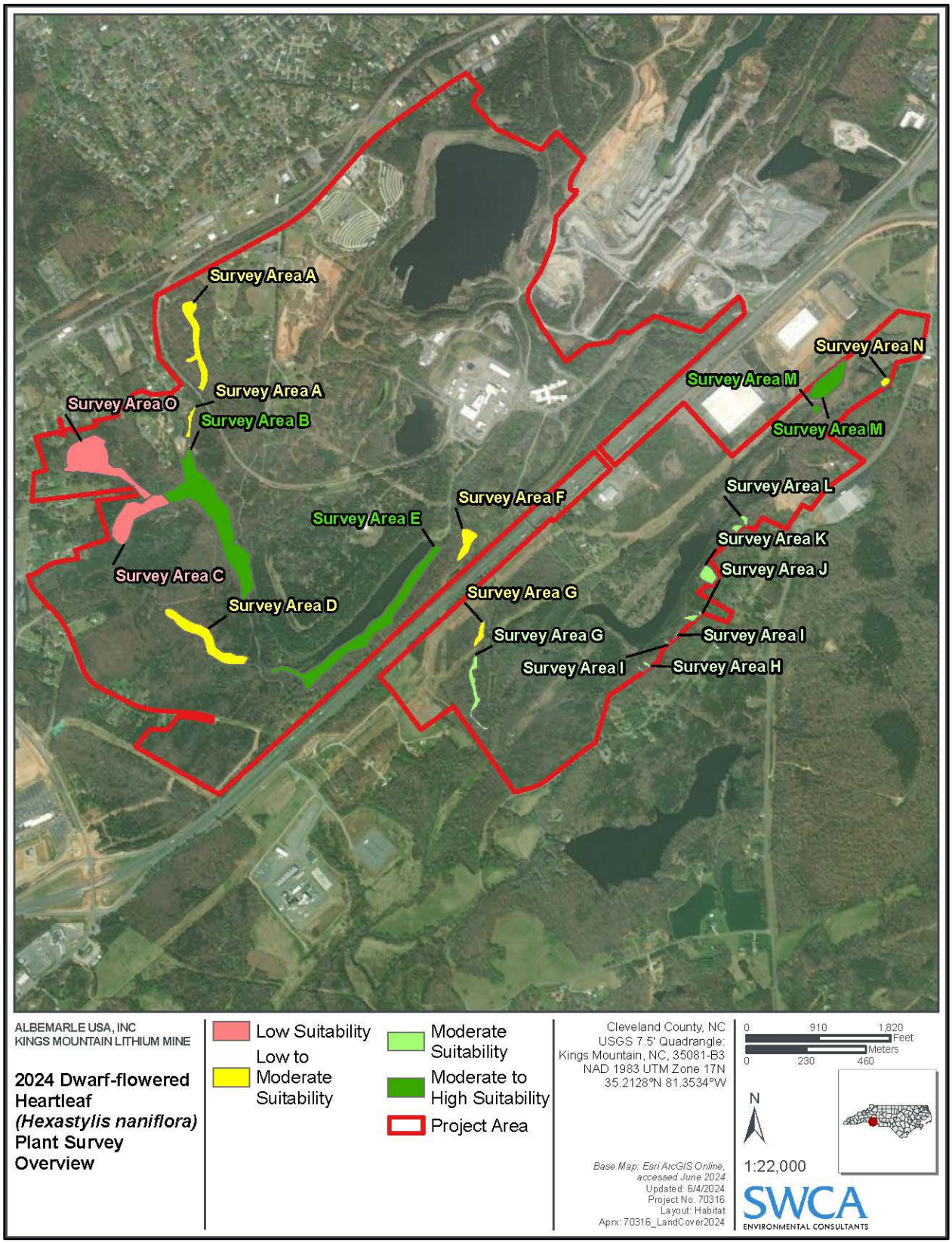


Figure 6. 2024 Dwarf-flowered heartleaf plant survey overview map.

5 SUMMARY AND CONCLUSIONS

Approximately 47 acres of suitable dwarf-flowered heartleaf habitat are present within the Project area. SWCA conducted presence/absence surveys in these suitable habitats during the optimal survey window, and no dwarf-flowered heartleaf populations were observed in the April and May 2024 surveys or the previous May 2022 survey. As such, based on the results of these presence/absence surveys, it is SWCA's professional opinion the Project will have no effect on the federally listed dwarf-flowered heartleaf. If this species is subsequently identified, any occupied habitat should be avoided until after consultation with the USFWS. According to the USFWS, surveys are valid for 2 years and would be required again, starting in April 2026, if the species is still listed at that time (USFWS 2022b). If the species is removed from the federal list, the dwarf-flowered heartleaf may remain a state-listed species.

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APPENDIX A

Photographs

Photo Point 1. Representative low/moderate suitability habitat surveyed at the northern portion of Survey Area A. No *Hexastylis* observed. Location: 35.21921, -81.365206.

Photo Point 2. Representative low/moderate suitability habitat surveyed along the central portion of Survey Area A. No *Hexastylis* observed. Location: 35.218343, -81.365335.

Photo Point 3. Moderate suitability habitat surveyed along the southern portion of Survey Area A north of railroad. No *Hexastylis* observed. Location: 35.217646, -81.365074.

Photo Point 4. Low/moderate suitability habitat surveyed along the southern portion of Survey Area A south of railroad. No *Hexastylis* observed. Location: 35.215642, -81.365552.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 5. High suitability habitat surveyed along the northern portion of Survey Area B. Location: 35.214058, -81.365509.

Photo Point 6. Additional photo of high suitability habitat surveyed within the northern portion of Survey Area B. Location: 35.213867, -81.365608.

Photo Point 7. Moderate suitability habitat in the northwestern portion of Survey Area B. Location: 35.213372, -81.36637.

Photo Point 8. Common *Hexastylis minor* flowers observed in the northern portion of Survey Area B. Location: 35.214913, -81.365665.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 9. Common *H. minor* flowers observed in the northern portion of Survey Area B. Location: 35.213653, -81.36499.

Photo Point 10. Common *H. minor* flowers observed in the northwestern portion of Survey Area B. Location: 35.213484, -81.365851.

Photo Point 11. Moderate suitability habitat surveyed in the central portion of Survey Area B. Location: 35.212182, -81.364193.

Photo Point 12. Common *H. minor* flowers observed in the central portion of Survey Area B. Location: 35.212287, -81.364172.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 13. Common *H. minor* growing along the stream in the southern portion of Survey Area B. Location: 35.210753, -81.362938.

Photo 14. Unsuitable habitat not surveyed just east of Survey Area B. Location: 35.210243, -81.362753.

Photo Point 15. Low suitability habitat surveyed in the eastern portion of Survey Area C. Location: 35.213093, -81.366703.

Photo Point 16. Common *H. minor* observed in the eastern portion of Survey Area C. Location: 35.213158, -81.366757.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 17. Low suitability habitat surveyed in the central portion of Survey Area C. No *Hexastylis* spp. observed. Location: 35.212751, -81.367814.

Photo Point 18. Low suitability habitat surveyed in the western portion of Survey Area C. No *Hexastylis* spp. observed. Location: 35.212448, -81.368635.

Photo Point 19. Low suitability habitat surveyed in the southeastern portion of Survey Area D. No *Hexastylis* observed here. Location: 35.207733, -81.36309.

Photo Point 20. Moderate suitability habitat observed in the central portion of Survey Area D. No *Hexastylis* spp. observed. Location: 35.208285, -81.364807.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 21. Moderate suitability habitat surveyed in the central portion of Survey Area D. No *Hexastylis* spp. observed. Location: 35.208601, -81.364947.

Photo Point 22. Low to moderate suitability habitat surveyed in the northwestern portion of Survey Area D. No Hexastylis spp. observed. Location: 35.20939, -81.366416.

Photo Point 23. Example of habitat south of Survey Area D; determined to be not suitable. Area not surveyed. Location: 35.207008, -81.363195.

Photo Point 24. Moderate suitability habitat surveyed in the western portion of Survey Area E. Location: 35.207426, -81.361552.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 25. Representative photo of common *H. minor* observed in western portion of Survey Area E. Location: 35.207308, -81.361155.

Photo Point 26. Representative moderate to high suitability habitat surveyed in the southwestern portion of Survey Area E. Location: 35.206826, -81.360581.

Photo Point 27. Representative common *H. minor* observed in the southwestern portion of Survey Area E. Location: 35.206867, -81.36061.

Photo Point 28. Representative high suitability habitat surveyed in the southwestern portion of Survey Area E. Lower end of slope. Location: 35.207527, -81.360022.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 29. Representative *H. minor* observed in the high suitability habitat in the southwestern portion of Survey Area E. Location: 35.207614, -81.359765.

Photo Point 30. Representative high suitability habitat surveyed in the southwestern portion of Survey Area E. Upper end of slope. Location: 35.207574, -81.359405.

Photo Point 31. Representative *H.* minor observed in the upper slope high suitability habitat in the southwestern portion of Survey Area E. Location: 35.207505, -81.359511.

Photo Point 32. Representative moderate suitability habitat surveyed in the central portion of Survey Area E. Location: 35.20917, -81.357107.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 33. Representative *H. minor* observed in the moderate suitability habitat in the central portion of Survey Area E. Location: 35.2091, -81.357129.

Photo Point 34. Representative moderate suitability habitat surveyed in the northern portion of Survey Area E. Location: 35.210266, -81.35627.

Photo Point 35. Representative *H. minor* observed in the moderate suitability habitat in the northern portion of Survey Area E. Location: 35.210739, -81.355895.

Photo Point 36. Additional example of *H. minor* observed in the moderate suitability habitat in the northern portion of Survey Area E. Location: 35.211011, -81.355734.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 37. Additional example of *H. minor* observed in the southwestern portion of Survey Area E. Location: 35.207049, -81.360712.

Photo Point 38. Representative moderate suitability habitat surveyed in the northern portion of Survey Area F. No *Hexastylis* spp. observed. Location: 35.212244, -81.353701.

Photo Point 39. Representative moderate suitability habitat surveyed in the central portion of Survey Area F. No Hexastylis spp. observed. Location: 35.211798, -81.353748.

Photo Point 40. Representative low suitability habitat in the southern portion of Survey Area F. No *Hexastylis* spp. observed. Location: 37.294375, -77.281546.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 41. Representative unsuitable habitat along Kings Creek north of Survey Area E and F. Area was not surveyed. Location: 35.213052, -81.354248.

Photo Point 42. Additional example of unsuitable habitat along Kings Creek north of Survey Area E and F. Area was not surveyed. Location: 35.215288, -81.352612.

Photo Point 43. Example of low to moderate suitability habitat in the northern portion of Survey Area G. No *Hexastylis* spp. observed. Location: 35.208331, -81.353402.

Photo Point 44. Example of moderate suitability habitat in the central portion of Survey Area G. No *Hexastylis* spp. observed. Location: 35.20682, -81.353398.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 45. Representative moderate suitability habitat surveyed in the southern portion of Survey Area G. No *Hexastylis* spp. observed. Location: 35.206229, -81.353336.

Photo Point 46. Moderate suitability habitat surveyed in the southern portion of Survey Area G. No *Hexastylis* spp. observed. Location: 35.205698, -81.353454.

Photo Point 47. Representative unsuitable successional habitat east of the Kings Creek floodplain. Area not surveyed. Location: 35.20689, -81.35134.

Photo Point 48. Additional representative unsuitable successional habitat east of the Kings Creek floodplain. Area not surveyed. Location: 35.207232, -81.350933.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 49. Representative moderate suitability habitat surveyed in Survey Area H. Location: 35.207508, -81.346508.

Photo Point 50. Representative common *H. minor* observed in Survey Area H. Location: 35.207464, -81.346459.

Photo Point 51. Additional representative common *H. minor* observed in Survey Area H. Location: 35.20758, -81.346124.

Photo Point 52. Moderate suitability habitat in the southern portion of Survey Area I. Location: 35.208332, -81.345284.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 53. Representative *H. minor* observed in the southern portion of Survey Area I. Location: 35.208347, -81.345337.

Photo Point 54. Moderate suitability habitat in the northern portion of Survey Area I. Location: 35.208332, -81.345284.

Photo Point 55. Representative *H. minor* observed in the southern portion of Survey Area I. Location: 35.20855, -81.344961.

Photo Point 56. Representative moderate suitability habitat surveyed in the western portion of Survey Area J. Location: 35.209211, -81.344366.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 57. Representative common *H. minor* observed Survey Area J. Location: 35.209229, -81.344026.

Photo Point 58. Example of unsuitable habitat not surveyed to the north of Survey Area J. Location: 35.209494, -81.344138.

Photo Point 59. Representative moderate suitability habitat surveyed in Survey Area K. Location: 35.210831, -81.343513.

Photo Point 60. Representative common *H. minor* observed in Survey Area K. Location: 35.210559, -81.343783.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 61. Representative moderate suitability habitat surveyed in Survey Area L. Location: 35.212279, -81.342458.

Photo Point 62. Representative *H. minor* observed in Survey Area L. Location: 35.212553, -81.342064.

Photo Point 63. Example of unsuitable successional pine habitat north of Survey Area L. Area not surveyed. Location: 35.21354, -81.34153.

Photo Point 64. Moderate suitability habitat surveyed in the southern portion of Survey Area M. No *Hexastylis* spp. observed. Location: 35.216503, -81.339074.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 65. Moderate suitability habitat surveyed in the south-central portion of Survey Area M. No *Hexastylis* spp. observed. Location: 35.216887, -81.339186.

Photo Point 66. Representative high suitability habitat surveyed in the central portion of Survey Area M. No *Hexastylis* spp. observed. Location: 35.217496, -81.338722.

Photo Point 67. Representative high suitability habitat surveyed in the eastern portion of Survey Area M. No *Hexastylis* spp. observed. Location: 35.217522, -81.338191.

Photo Point 68. Representative moderate suitability habitat surveyed in the northern portion of Survey Area M. No *Hexastylis* spp. observed. Location: 35.217965, -81.337837.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

Photo Point 69. Representative unsuitable habitat between Survey Area M and Survey Area N. Area was not surveyed. Location: 35.21807, -81.336914.

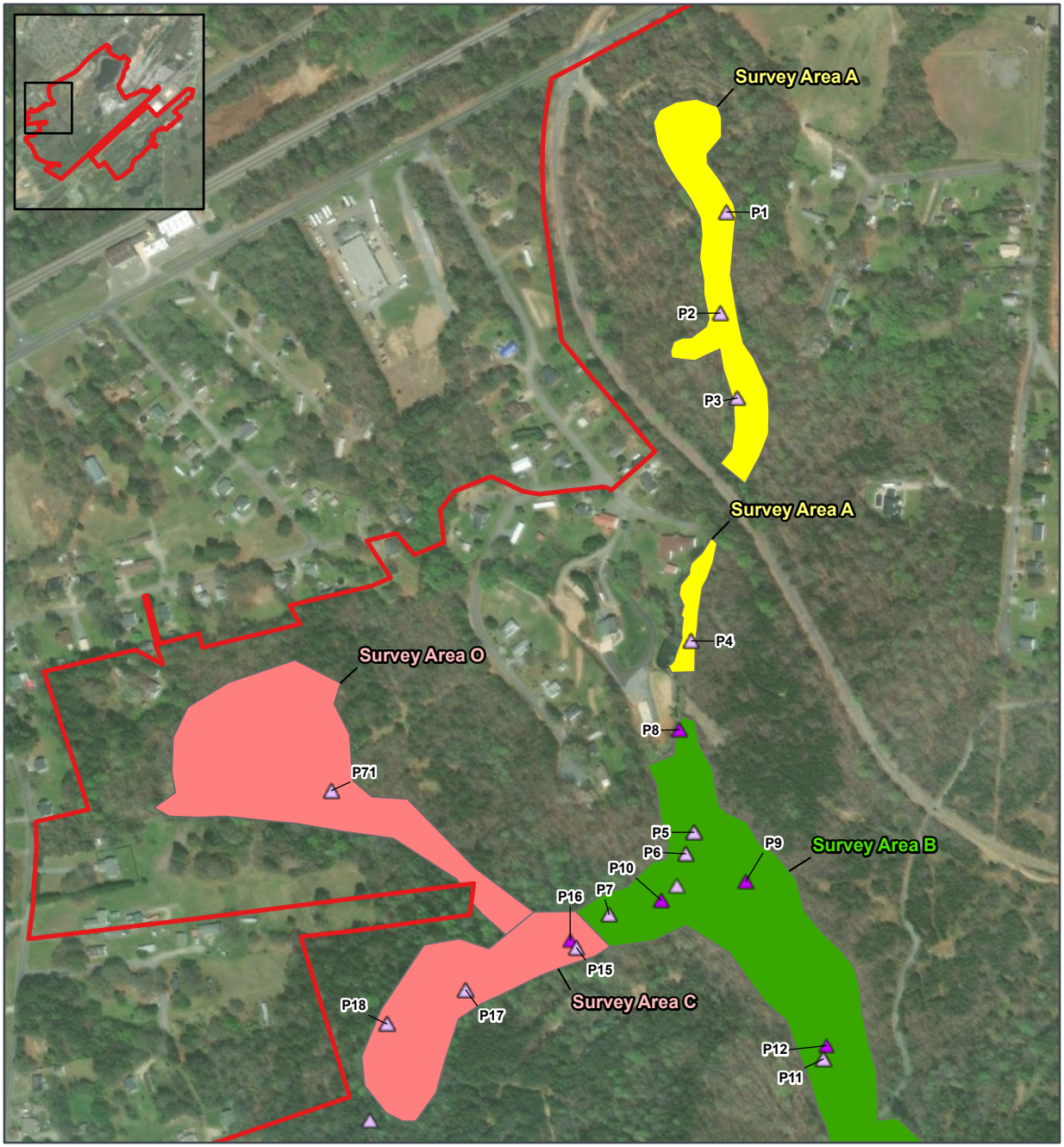
Photo Point 70. Representative low to moderate suitability habitat surveyed in Survey Area N. No *Hexastylis* spp. observed. Location: 35.217349, -81.336149.

Photo Point 71. Representative low suitability habitat in the central portion of Survey Area O. No *Hexastylis* spp. observed. Location: 35.214615, -81.369533.

*Refer to Appendix B for locations of Survey Areas and Photo Points.

APPENDIX B

Detailed Survey Area Maps



ALBEMARLE USA, INC
KINGS MOUNTAIN LITHIUM MINE

2024 Dwarf-flowered Heartleaf *(Hexastylis naniflora)* Plant Survey Detail Map

Habitat Photo Point
Plant Photo Point
Low Suitability
Low to Moderate Suitability
Moderate to High Suitability

Cleveland County, NC
USGS 7.5' Quadrangle:
Kings Mountain, NC, 35081-B3
NAD 1983 UTM Zone 17N
35.2162°N 81.3672°W

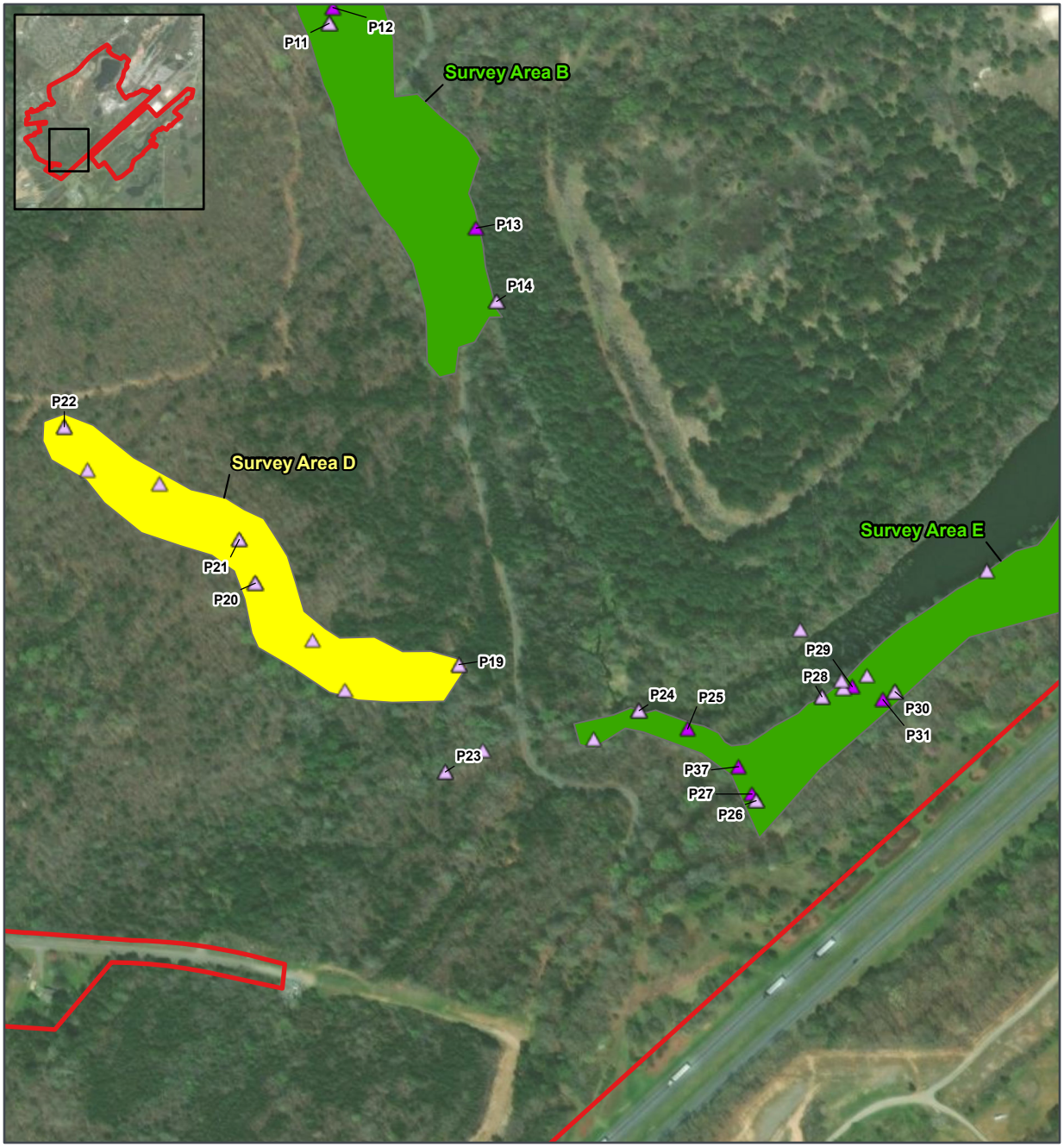
0 240 480 Feet
0 60 120 Meters

N

1:6,000

Base Map: Esri ArcGIS Online, accessed June 2024
Updated: 6/4/2024
Project No. 70316
Layout: Habitat_series
Aprx: 70316_LandCover2024

SWCA ENVIRONMENTAL CONSULTANTS



ALBEMARLE USA, INC
KINGS MOUNTAIN LITHIUM MINE

2024 Dwarf-flowered Heartleaf *(Hexastylis naniflora)* Plant Survey Detail Map

Page 2 of 6

- Habitat Photo Point
- Plant Photo Point
- Low to Moderate Suitability
- Moderate to High Suitability

Cleveland County, NC
USGS 7.5' Quadrangle:
Kings Mountain, NC, 35081-B3
NAD 1983 UTM Zone 17N
35.2084°N 81.3625°W

0 200 400 Feet
0 50 100 Meters

N

1:5,000

Base Map: Esri ArcGIS Online, accessed June 2024
Updated: 6/4/2024
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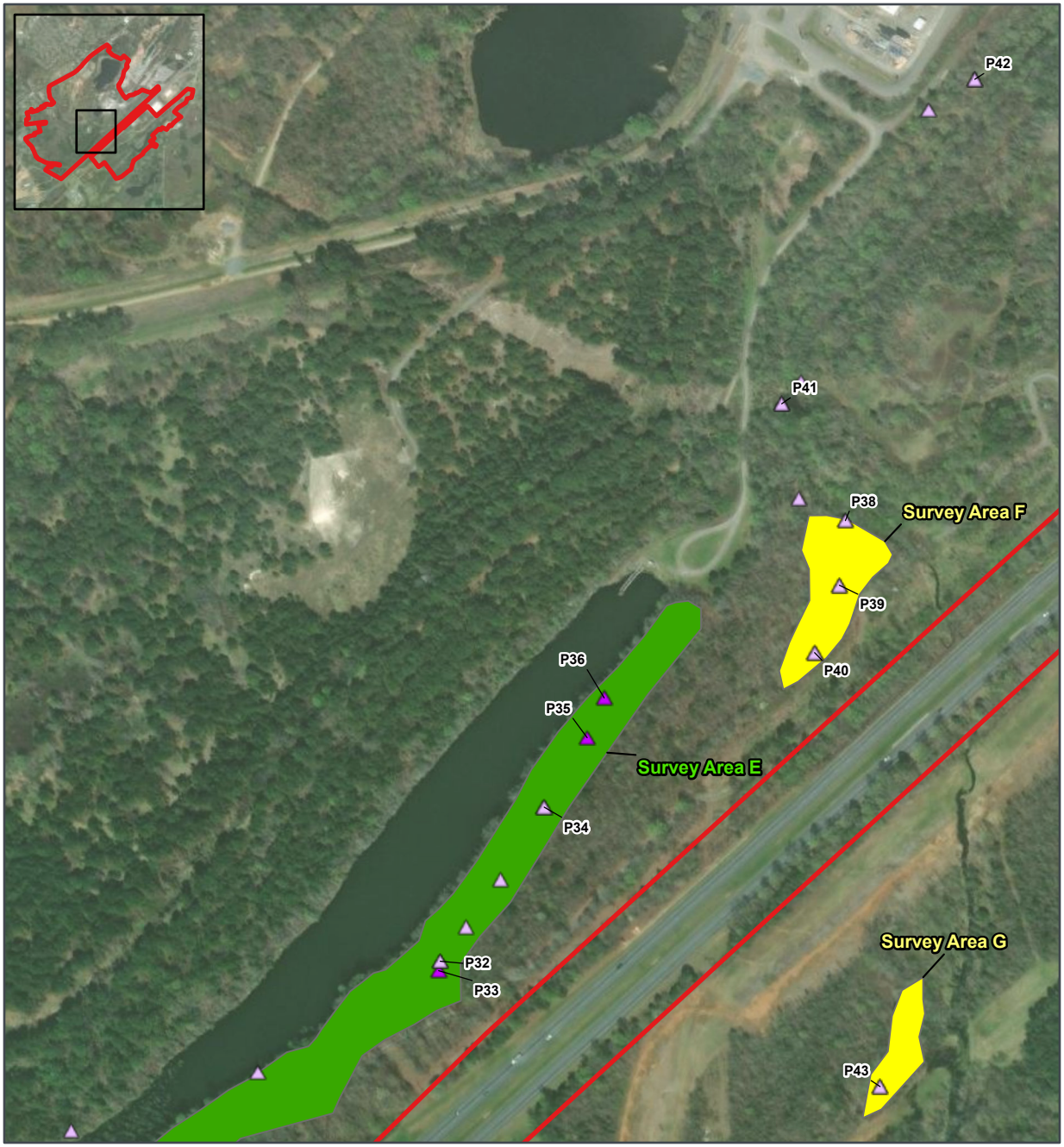
Layout: Habitat_series
Aprx: 70316_LandCover2024

SWCA ENVIRONMENTAL CONSULTANTS



ALBEMARLE USA, INC
KINGS MOUNTAIN LITHIUM MINE

2024 Dwarf-flowered Heartleaf *(Hexastylis naniflora)* Plant Survey Detail Map

Page 3 of 6

Habitat Photo Point

Plant Photo Point

Low to Moderate Suitability

Moderate to High Suitability

Cleveland County, NC
USGS 7.5' Quadrangle:
Kings Mountain, NC, 35081-B3
NAD 1983 UTM Zone 17N
35.2119°N 81.3563°W

0 200 400 Feet
0 50 100 Meters

N

1:5,000

Base Map: Esri ArcGIS Online, accessed June 2024
Updated: 6/4/2024
Project No. 70316
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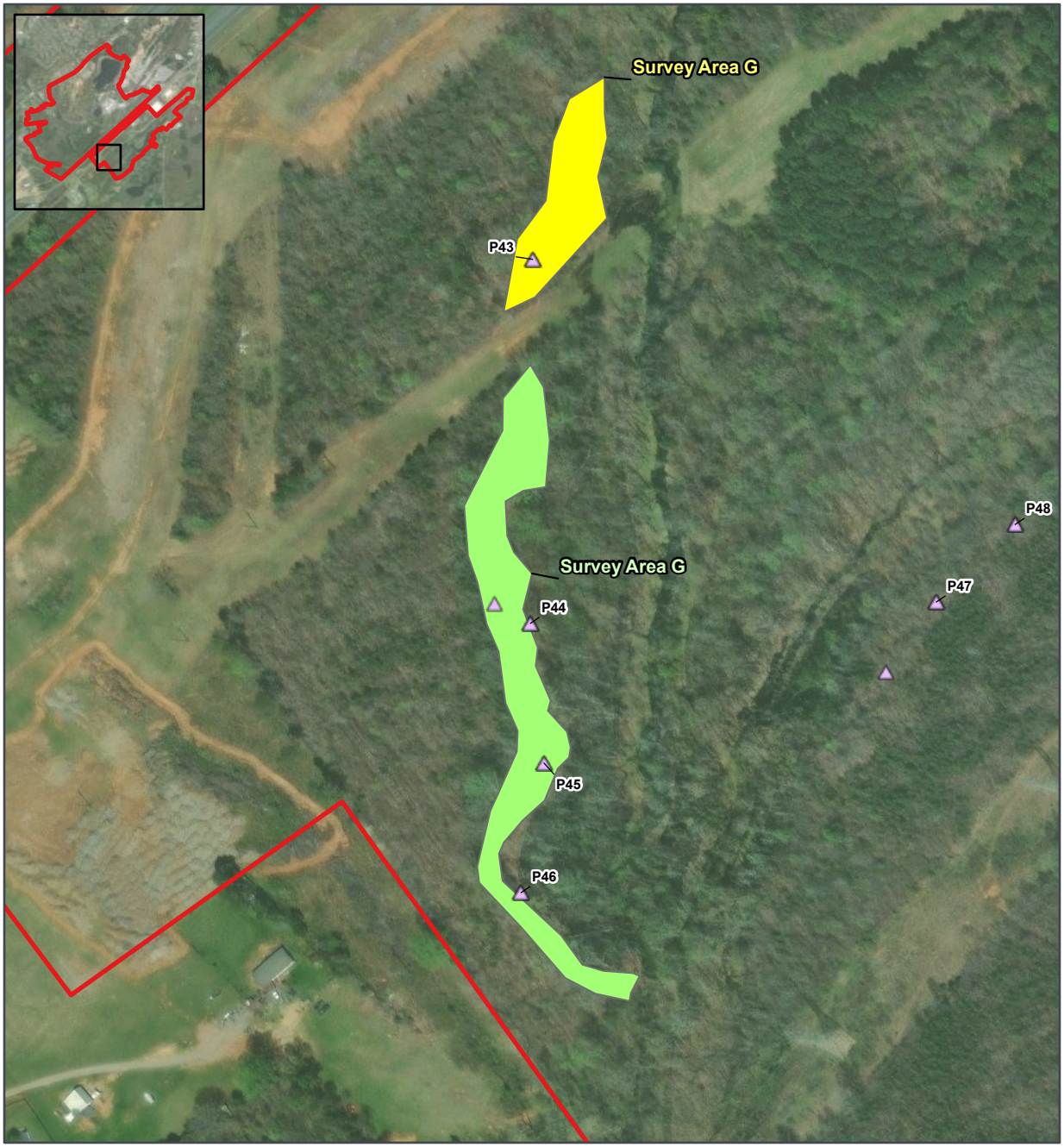

ALBEMARLE USA, INC
KINGS MOUNTAIN LITHIUM MINE

2024 Dwarf-flowered Heartleaf *(Hexastylis naniflora)* Plant Survey Detail Map

Page 4 of 6

Habitat Photo Point

Low to Moderate Suitability

Moderate Suitability

Cleveland County, NC
USGS 7.5' Quadrangle:
Kings Mountain, NC, 35081-B3
NAD 1983 UTM Zone 17N
35.207°N 81.3534°W

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Feet
0 30 60
Meters

N

1:3,000

Base Map: Esri ArcGIS Online, accessed June 2024
Updated: 6/4/2024
Project No. 70316
Layout: Habitat_series
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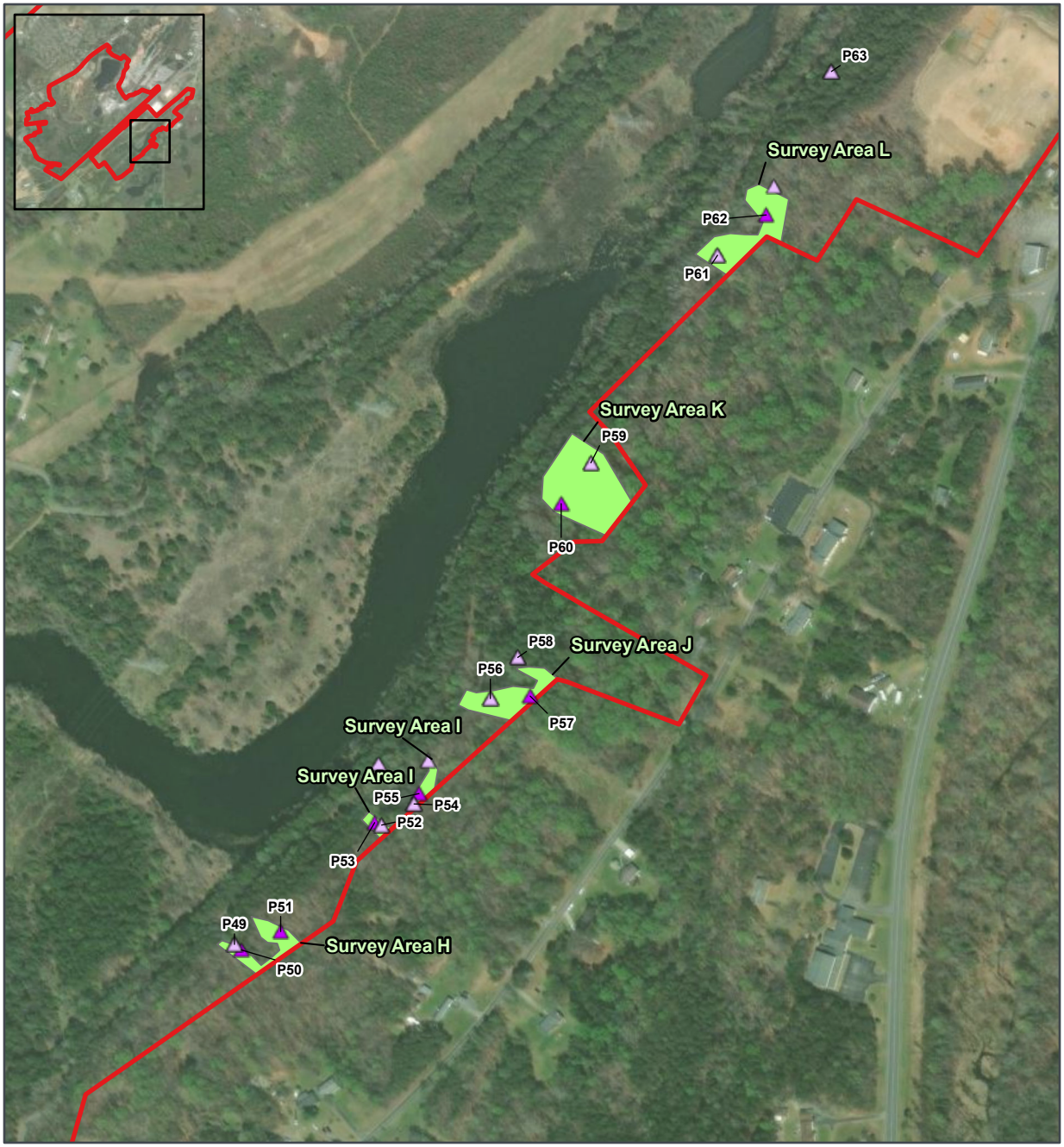
SWCA
ENVIRONMENTAL CONSULTANTS



ALBEMARLE USA, INC
KINGS MOUNTAIN LITHIUM MINE

2024 Dwarf-flowered Heartleaf *(Hexastylis naniflora)* Plant Survey Detail Map

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Habitat Photo Point

Plant Photo Point

Moderate Suitability

Cleveland County, NC
USGS 7.5' Quadrangle:
Kings Mountain, NC, 35081-B3
NAD 1983 UTM Zone 17N
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0 50 100 Meters

N

1:5,000

Base Map: Esri ArcGIS Online, accessed June 2024
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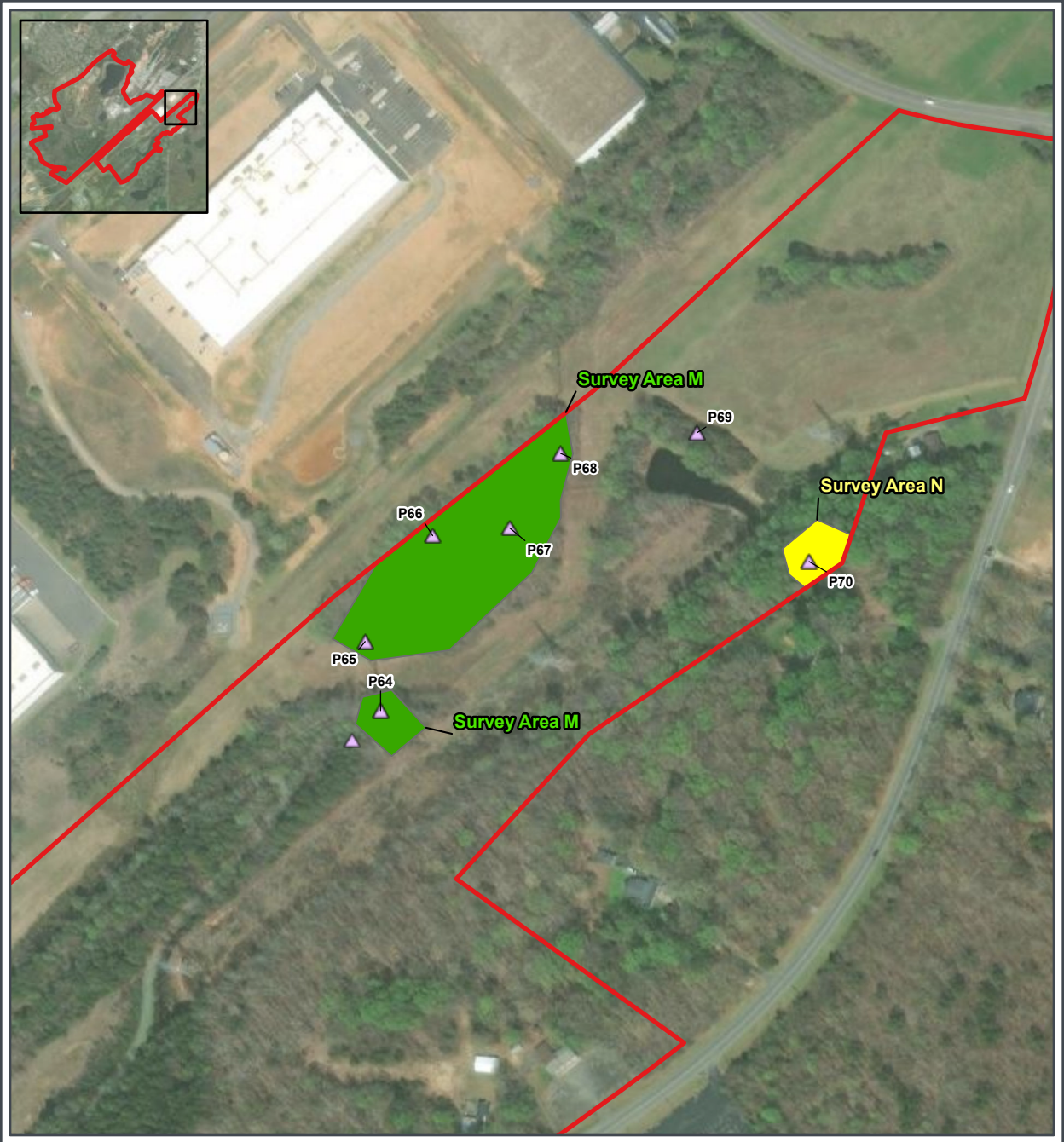
Aprx: 70316_LandCover2024

SWCA ENVIRONMENTAL CONSULTANTS



ALBEMARLE USA, INC
KINGS MOUNTAIN LITHIUM MINE

2024 Dwarf-flowered Heartleaf *(Hexastylis naniflora)* Plant Survey Detail Map

Page 6 of 6

Habitat Photo Point

Low to Moderate Suitability

Moderate to High Suitability

Cleveland County, NC
USGS 7.5' Quadrangle:
Kings Mountain, NC, 35081-B3
NAD 1983 UTM Zone 17N
35.2173°N 81.338°W

0 160 320
Feet
0 40 80
Meters

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1:4,000

Base Map: Esri ArcGIS Online, accessed June 2024
Updated: 6/4/2024
Project No. 70316
Layout: Habitat_series
Aprx: 70316_LandCover2024

SWCA
ENVIRONMENTAL CONSULTANTS

APPENDIX C-4 BAT SURVEY REPORT FOR THE KINGS MOUNTAIN LITHIUM MINE, CLEVELAND COUNTY, NORTH CAROLINA

Bat Survey Report for the Kings Mountain Lithium Mine, Cleveland County, North Carolina

NOVEMBER 2022 (REVISED JULY 2024)

PREPARED FOR

Albemarle U.S., Inc.

PREPARED BY

SWCA Environmental Consultants

BAT SURVEY REPORT
FOR THE KINGS MOUNTAIN LITHIUM MINE, CLEVELAND COUNTY, NORTH CAROLINA

Prepared for

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348 Holiday Inn Drive
Kings Mountain, North Carolina 28086
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Prepared by

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SWCA Project No. 070316

November 2022

Revised July 2024

CONTENTS

Appendices

Figures

Tables

1 INTRODUCTION

On behalf of Albemarle U.S., Inc. (Albemarle), SWCA Environmental Consultants (SWCA) conducted bat surveys at the proposed Kings Mountain Lithium Mine Project (Project) in Cleveland County, North Carolina (Figure 1). Several bat species, including some listed, or proposed for listing, by U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act, have potential to occur within the Project area. Therefore, in June 2022 acoustic bat surveys were conducted within the Project area. The objective of the surveys was to determine the species composition of the local bat population, document the presence or probable absence of currently listed species and those under review, and collect any other data that may be useful for Project design and development (e.g., roost locations for *Myotis* species).

The Project is in the range of the tricolored bat (*Perimyotis subflavus*) and little brown bat (*Myotis lucifugus*), and gray bats (*Myotis grisescens*) have been documented in neighboring Gaston County (USFWS 2024, USFWS personal communication, May 13, 2024). USFWS has proposed listing the tricolored bat as endangered, the little brown bat is under review for listing, and the gray bat is listed as endangered.

2 METHODS

SWCA proposed a phased approach designed to meet or exceed all recommendations found in the USFWS's 2022 *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines* (USFWS Guidelines; USFWS 2022). The intended data collection would begin with preliminary acoustic surveys and continue with mist-net and radiotelemetry studies if acoustic data suggested additional data were necessary.

2.1 Level of Effort Determination

For the purposes of this survey, SWCA has assumed that all forested habitat qualifies as suitable summer bat habitat. The USFWS Guidelines recommend 14 detector nights of survey and two detector locations for every 123 acres of suitable northern long-eared bat summer habitat but do not provide a recommendation for other species. The Project area contains approximately 600 acres of forested habitat and is bordered by another 136 acres of suitable habitat to the north and east. Meeting the recommended level of effort in the USFWS Guidelines required a minimum level of effort of 84 detector nights. SWCA's study design included a survey level of effort of 114 detector nights, more than 33% higher than the minimum level of effort. It is presumed that the additional level of effort accounts for differences in detectability in other species that occur within the Project area and is more than sufficient to determine the presence or absence of bats. Fifteen acoustic deployment locations were selected throughout representative habitat, and one detector was deployed at each for a minimum of seven nights.

Mist-net and radiotelemetry levels of effort were based on the acoustic data collection and were to be conducted only if the additional data would be useful for project design or agency consultation.

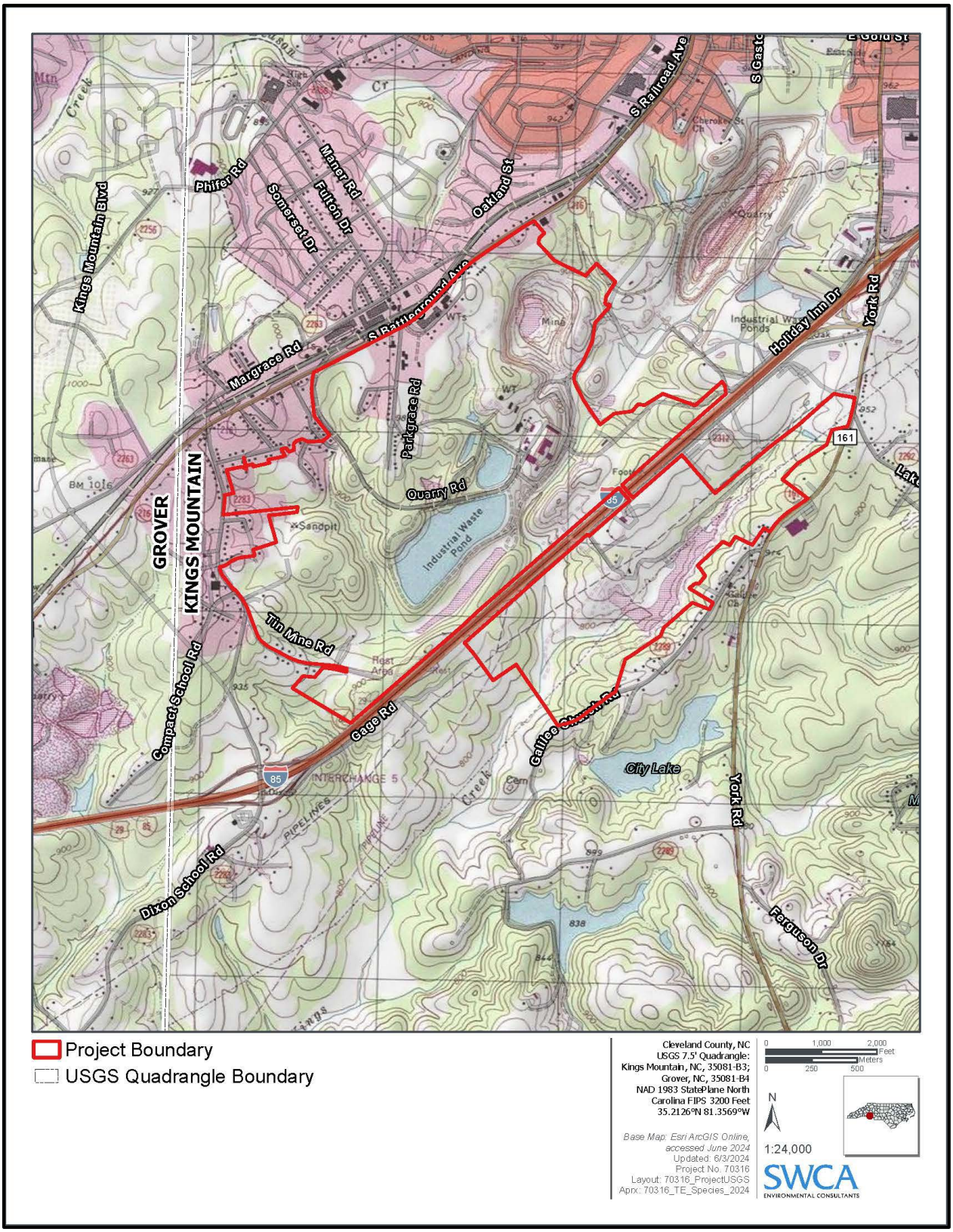

Figure 1. Kings Mountain Project area, Cleveland County, North Carolina.

2.2 Acoustic Survey

2.2.1 Detector Deployment

An SWCA qualified biologist (Sam Schratz, resume provided in Appendix A) deployed acoustic detectors (Titley Scientific AnaBat Express or Swifts both recording in zero-crossing format) at each detector location. Detector locations were chosen on-site by a qualified bat biologist trained and experienced in acoustic survey methods. Each detector was equipped with a directional express or swift microphone atop approximately 3-meter (m) poles. Microphones were angled up at an approximately 45-degree angle away from vegetation into the targeted flight corridor or foraging area. No aftermarket weatherproofing was added. Photographs of detector setups and deployment locations are provided in Appendix B. Selection of detector deployment locations was based on on-site conditions with an emphasis on locations that are more likely to lead to collection of high-quality, diagnostic calls. Diagnostic bat calls are most useful from recordings collected in areas that contain little "clutter" (i.e., anything perceived by a bat that provokes it to modulate echolocate in an attempt to navigate more quickly). SWCA reviewed Project area maps for areas of ecological importance (e.g., water sources, foraging habitat, travel corridors) and selected a mixture of higher and lower clutter areas to place detectors. In the field, detector locations were adjusted to sample these areas while remaining at least 3 m in any direction from vegetation or other obstructions in the cone of reception.

Detectors were deployed at 15 detector locations to sample various habitat types (10 on-site and five off-site locations; Figure 2). The 15 detector deployment locations were recorded using handheld geographical positioning system units (Table 1). Prior to mobilization, all detectors were reviewed for firmware updates and proper functioning. Functionality was confirmed by a qualified bat biologist at the time of deployment and at the conclusion of survey.

2.2.2 Survey Conditions

Detectors were programmed to begin data collection 30 minutes prior to sunset and conclude 30 minutes after sunrise on each day of survey.

Certain weather criteria must be met for acoustic data to be valid. A survey night was considered invalid if any of the following occurred during the first 5 hours of sampling effort:

- Temperatures fell below 10 degrees Celsius
- Precipitation exceeded 30 minutes or continued intermittently
- Windspeed was greater than 4 m/second for 30 minutes or more

Hourly weather conditions were monitored using Visual Crossing Corporation historical weather data function, which extrapolates weather data available from nearby weather stations (Visual Crossing Corporation 2022). This allows for the most accurate remotely collected data, though a known and relevant limitation is that wind speeds are calculated at 10 m above ground level, which in many scenarios will overestimate wind speed in forest interiors where many acoustic detectors were deployed.

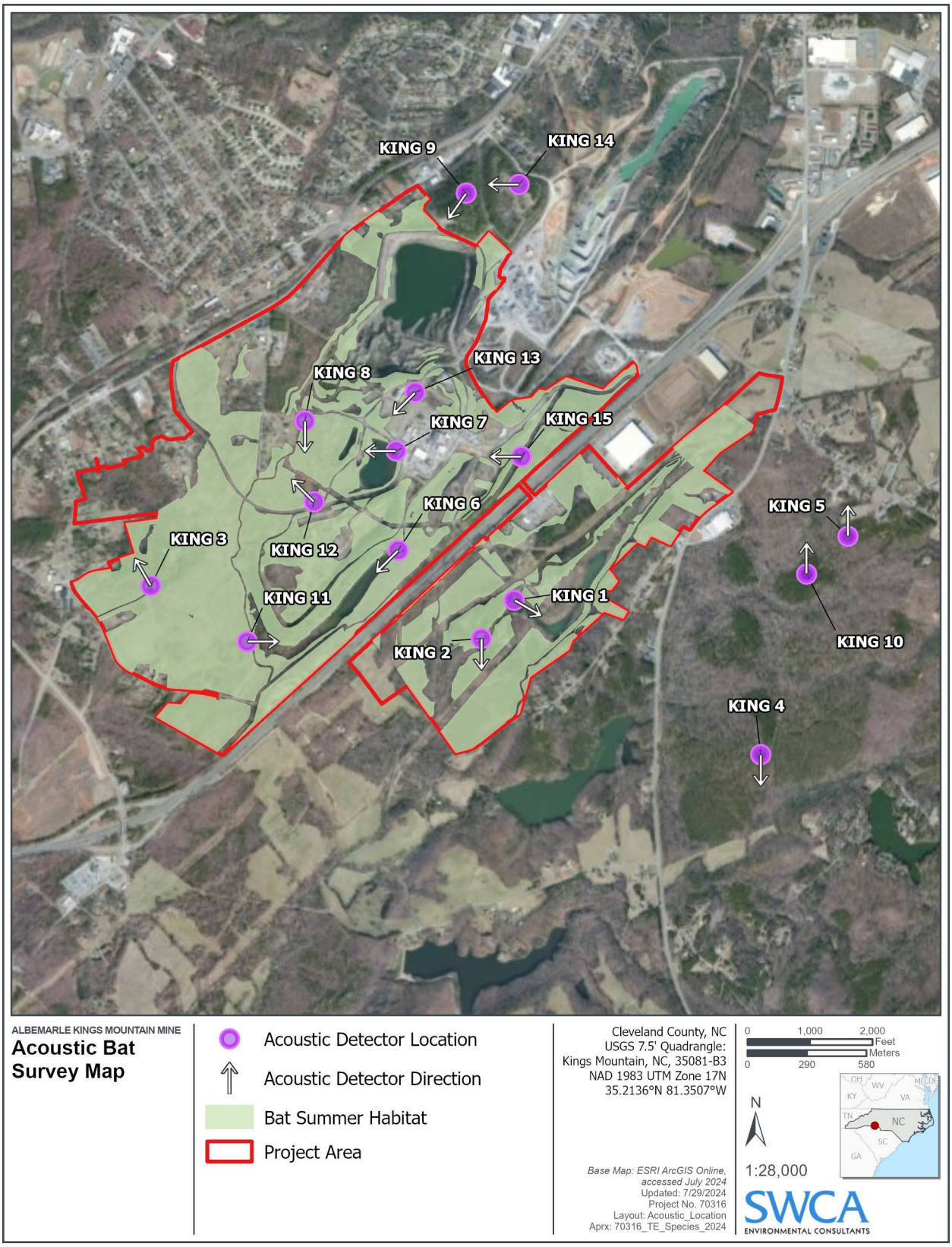

Figure 2. Detector locations used during the Kings Mountain acoustic bat survey, Cleveland County, North Carolina.

Table 1. Summary of Acoustic Detector Deployment Locations for the Kings Mountain Acoustic Bat Survey

Detector Location	Latitude and Longitude*	Valid Survey Nights	Habitat Description**
KING-1	35.20984, -81.34863	7	KING-1 was placed along a travel corridor connecting a deciduous forest patch to Executive Club Lake, which offers water resources and foraging habitat.
KING-2	35.20816, -81.35038	0	KING-2 was placed in mixed forest and scrub/shrub along a travel corridor connecting other forest with a small pond and wetland habitat.
KING-3	35.21042, -81.36811	8	KING-3 was placed in an opening near mixed hardwood (oaks, sweetgum saplings) and pine forest with numerous travel corridors.
KING-4	35.20309, -81.33539	7	KING-4 was placed in an opening at the intersection of three travel corridors through upland primarily deciduous forest.
KING-5	35.21271, -81.33075	7	KING-5 was placed in an opening along a travel corridor through mixed forest.
KING-6	35.21202, -81.35486	8	KING-6 was placed in a mowed clearing by a lake and assorted hardwoods (maples, oaks) and pines.
KING-7	35.21639, -81.35499	7	KING-7 was placed in a maintained lawn near a large impoundment with an emergent wetland fringe.
KING-8	35.21770, -81.35989	8	KING-8 was placed in old-field habitat along a network of travel corridors through upland forested habitat.
KING-9	35.22774, -81.35128	8	KING-9 was placed along a travel corridor in a kudzu (*Pueraria montana*)-dominated opening surrounded by upland deciduous forest.
KING-10	35.21104, -81.33296	7	KING-10 was placed along a travel corridor in a mixed upland forest.
KING-11	35.20798, -81.36293	8	KING-11 was placed within early successional forest dominated by mixed hard and softwood species.
KING-12	35.21414, -81.35938	8	KING-12 was placed between a pond and railroad tracks in heavily vegetated grasses and wild berry bushes.
KING-13	35.21897, -81.35398	8	KING-13 was placed in grassland/old-field habitat near patches of scrub/shrub and forest.
KING-14	35.22813, -81.34845	8	KING-14 was placed near scrub/shrub, old-field, and upland deciduous forest habitat.
KING-15	35.21616, -81.34827	0	KING-15 was placed within old-field/right-of-way habitat adjacent to upland deciduous forest.

*Expected accuracy is <3m
**References to upland and wetland habitat are based on qualitative observations only and independent from regulatory definitions of either upland or wetland relative to potentially jurisdictional waters.

2.2.3 Acoustic Analysis

Data were initially analyzed using Kaleidoscope Pro Version 5.6.5 software and its Bats of North America classifier version 5.4.0 set to neutral sensitivity. Species included for consideration were big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*L. cinereus*), silver-haired bat (*Lasionycteris noctivagans*), Seminole bat (*Lasiurus seminolus*), gray bat, little brown bat, evening bat (*Nycticeius humeralis*), and tricolored bat. Follow-up qualitative manual analysis was performed by a qualified biologist (Drew Carson, resume provided in Appendix A) to confirm or refute determinations of presence made by Kaleidoscope Pro. Calls were compared against accepted quantitative parameters such as characteristic frequency (Fc), slope, and time between calls; qualitative parameters such as red bats' typical variation of Fc across a call sequence in comparison to other species' relative consistency; and numerous voucher calls for each target species. Example voucher calls for the target species are provided in Appendix C.

2.3 Mist-Net Survey and Radiotelemetry

A determination of the necessity for mist-net surveys and radiotelemetry would be conducted at the conclusion of acoustic surveys.

If determined necessary, mist-net sites would be selected during field reconnaissance by qualified bat biologists with appropriate permits allowing for survey of the target species. Site selection would be based on the presence of appropriate habitat and conditions conducive to effective mist-netting. Primary site selection criteria included presence of canopy cover and an open flyway in areas that provided optimum chance to capture the target species. Biologists would place nets across a flight corridor where the canopy cover and vegetation created a funneling effect to facilitate capture of bats to the maximum extent possible. Biologists would remove captured bats from the nets and record the following data: species, sex (if readily obvious upon capture), time of capture, and capture height in net. Biologists would identify all bats to species based upon distinctive morphological characteristics (e.g., body size, hair color, ear length, tragus shape, presence/absence of a keeled calcar, and additional characters). If *Myotis* species are captured, it can be beneficial to determine their diurnal roost locations via radiotelemetry.

3 RESULTS

3.1 Acoustic Survey

3.1.1 Detector Deployment

In June 2022, detectors were deployed following the USFWS Guidelines in areas where bats would be expected to occur if the species were present within and near the Project area. Detectors were deployed at 15 detector locations to sample various habitat types (10 on-site and five off-site locations; Figure 2). Each detector was deployed for a minimum of seven nights. The survey consisted of 99 valid detector nights (see Table 1). Detectors at locations King2 and King15 experienced equipment malfunction and did not record data. The detector at location King8 recorded comparatively few calls, including nights with no calls. However, bats were detected at King8, and log files indicated proper functionality for the duration of survey.

3.1.2 Survey Conditions

Acoustic data was collected between June 8 and June 30, 2022. Weather was monitored throughout the survey to confirm conditions were appropriate for recording acoustic data. A summary of hourly conditions throughout the survey is provided in Appendix D. Weather was confirmed to be valid for the duration of the survey.

3.1.3 Acoustic Analysis

A total of 19,846 bat calls were identified by Kaleidoscope Pro analysis. Of these, the software assigned 14,632 calls to species, leaving 5,214 calls that were determined to have been created by bats but were indiscernible to species (Table 2). After the automated analysis, the results were manually verified. Table 2 presents the results of the automated analysis, depicting for each site how many passes were assigned to each species followed by the maximum likelihood estimator (MLE) for each species at each site. Bolded text indicates a statistically significant likelihood (i.e., <0.05) of occurrence of a given species at a given

site according to Kaleidoscope. The output from Kaleidoscope automated identification which provide number of passes and MLE for each site/night were submitted along this report.

Table 2. Results of Automated and Manual Analysis for the Kings Mountain Acoustic Bat Survey

Site	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-Haired Bat	Seminole Bat	Gray Bat	Little Brown Bat	Evening Bat	Tricolored Bat	Brazilian Free-Tailed Bat
	# Passes MLE	# Passes MLE	# Passes MLE	# Passes MLE	# Passes MLE	# Passes MLE	# Passes MLE	# Passes MLE	# Passes MLE	# Passes MLE
KING1	**60** **0.00**	8 1.00	15 0.39	26 0.94	**128** **0.00**	**2** **0.00**	0 1.00	15 1.00	**100** **0.00**	**123** **0.00**
KING2	Equipment Malfunction									
KING3	**253** **0.00**	**29** **0.00**	**133** **0.00**	6 1.00	**56** **0.00**	**22** **0.00**	2 1.00	13 1.00	**124** **0.00**	25 1.00
KING4	**703** **0.00**	5 0.93	31 1.00	**146** **0.01**	**48** **0.00**	0 1.00	2 1.00	13 1.00	**117** **0.00**	62 0.08
KING5	**136** **0.00**	**19** **0.00**	**19** **0.04**	19 1.00	**51** **0.00**	0 1.00	4 0.68	15 1.00	8 0.85	**61** **0.00**
KING6	**69** **0.00**	4 1.00	**74** **0.00**	31 1.00	**268** **0.00**	**5** **0.00**	1 1.00	11 1.00	**213** **0.00**	**248** **0.00**
KING7	147 0.73	9 1.00	**211** **0.00**	216 0.94	**580** **0.00**	**13** **0.00**	2 1.00	20 1.00	**1,001** **0.00**	**1,433** **0.00**
KING8	0 1.00	1 0.34	**3** **0.01**	0 1.00	1 0.73	0 1.00	0 1.00	0 1.00	**8** **0.00**	**2** **0.24**
KING9	**3,514** **0.00**	**72** **0.01**	146 1.00	86 1.00	**321** **0.00**	3 1.00	5 1.00	24 1.00	**139** **0.00**	**518** **0.00**
KING10	**128** **0.00**	**14** **0.00**	7 0.99	3 1.00	**62** **0.00**	1 0.19	0 1.00	10 1.00	**28** **0.00**	11 0.47
KING11	**52** **0.00**	**8** **0.01**	**15** **0.00**	**33** **0.00**	**35** **0.00**	0 1.00	1 1.00	6 1.00	7 0.33	**35** **0.00**
KING12	**116** **0.00**	**9** **0.00**	**17** **0.00**	8 1.00	1 1.00	0 1.00	0 1.00	0 1.00	**18** **0.00**	9 0.94
KING13	**132** **0.00**	**8** **0.00**	**90** **0.00**	33 1.00	**13** **0.00**	0 1.00	0 1.00	0 1.00	**22** **0.00**	**420** **0.00**
KING14	**196** **0.00**	**17** **0.00**	**145** **0.00**	111 1.00	**53** **0.00**	0 1.00	1 1.00	14 1.00	**19** **0.00**	**726** **0.00**
KING15	Equipment Malfunction									

Kaleidoscope determined that tricolored bats were statistically likely to have occurred at all sites with where equipment functioned properly except for sites King7 and King8 (Table 2). Manual verification confirmed that tricolored bats are present within the dataset at all sites. Examples of calls recorded during this survey that were classified by Kaleidoscope as tricolored bats and confirmed as such through manual review are provided in Appendix C.

Kaleidoscope determined that gray bats were statistically likely to have occurred at four sites: King1, King3, King6, and King7. There were no sites where the software determined statistical likelihood of little brown bats occurrence. A SWCA qualified bat biologist reviewed all calls classified as gray bat or little brown bat by Kaleidoscope, and reviewed all high-frequency (i.e., calls with Fc >35 kHz as

determined by Kaleidoscope) calls for each site/night where statistical likelihood of gray bats was determined via the software's analysis. No additional filters were used.

Through manual review it was determined that none of the calls classified as gray bats or little brown bats are likely to have been made by either species. Justifications for changes to each species identification for each call are provided in Appendix C. The primary categories for misidentification were:

- Calls more likely to have been produced by red bats due to the inconsistency in Fc across pulses
- Calls with insufficient data (e.g., too few pulses) to make a positive determination
- Likely tricolored bat calls made in higher clutter situations that trend toward resembling gray bat calls, but that did not have consistent key characteristics of gray bat calls.

Red bats have an extensive call repertoire with pulses that can vary significantly within and between calls, and routinely produce *Myotis*-like call sequences (e.g., three or more pulses) as a portion of an overall call. This can, and regularly does, lead to false identification by automated identification software, as is the case in this situation. Though portions of these calls may resemble others known to have been made by *Myotis*, when reviewed in context, they are clearly most likely to have been made by red bats rather than gray bats or little brown bats.

Review of the high-frequency calls on site/nights with statistical likelihood of presence of gray bats as determined by Kaleidoscope did not reveal any evidence of gray bat presence within the dataset.

Manual review confirmed that tricolored bats are present within the Project area, but demonstrated probable absence of gray bats and little brown bats.

3.2 Mist-Net Surveys and Radiotelemetry

Based on the results of the acoustic bat surveys, it was determined that additional data from mist-net and radiotelemetry studies would not be valuable for the Project. Species presence was confidently assessed through acoustic survey alone. It was determined that no additional data would be necessary for project design or agency coordination and that the value of the data that could be collected via mist-net survey and radiotelemetry would not appropriately offset the stress to the local bat population. Therefore, no mist-net survey or radiotelemetry studies were recommended or conducted.

4 DISCUSSION

Acoustic bat surveys used survey methods that met or exceeded the recommendations provided by the USFWS Guidelines to determine the presence or probable absence of the tricolored bat, little brown bat, and gray bat. SWCA surveyed for 99 complete detector nights on nights with valid weather conditions. Automated analysis indicated a statistical likelihood of presence of tricolored bats throughout the Project area. It was confirmed via qualitative, manual review that tricolored bats (a proposed endangered species) are present within the dataset collected at each detector site. Probable absence of gray bats and little brown bats was determined via manual review.

Recommended management practices that may be beneficial to all bat species include minimizing forest clearing, avoiding impacts to large and intact contiguous forested blocks, and avoiding impacts to water quality by limiting stream/wetland impacts and implementing erosion and sediment controls. Additionally, revegetating with native grassland species using a pollinator mix could promote prey diversity and abundance.

5 LITERATURE CITED

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Visual Crossing Corporation. 2022. Visual Crossing Weather (June 2022). [data service]. Retrieved from https://www.visualcrossing.com/. Accessed September 2022.

APPENDIX A

Biologist Qualifications

SWCA | Resume

DREW R CARSON, BAT BIOLOGIST AND SENIOR PROJECT MANAGER

Mr. Carson is a Biologist specializing in providing assistance with Endangered Species Act (ESA) compliance. He has 18 seasons of presence/absence bat survey experience. Mr. Carson has been trained in and is experienced with both mist-netting and conducting acoustic monitoring surveys as described in the USFWS guidelines. He has held state permits and/or conducted bat surveys in AR, GA, IL, IN, IA, KY, MD, MO, OH, OK, PA, SD, TN, TX, VA, and WV. He currently holds permit ES06873B which grants broad authority to capture and handle Indiana bats, gray bats, northern long-eared bats, and Ozark big-eared bats.

Mr. Carson's acoustic survey experience includes conducting long-term, passive monitoring surveys for wind energy development projects ranging from Texas to Ohio; conducting presence/probable absence surveys following USFWS guidelines for such efforts as multi-state transmission lines down to single-parcel efforts; species inventories; Indiana bat maternity colony monitoring; and activity monitoring at potential hibernacula. He has attended multiple, week-long detector deployment and analysis training courses hosted by Kim Livengood and Chris Corben, in addition to attendance at various bat working group workshops. He recently co-hosted a week-long internal acoustic analysis training at SWCA with Vesper Bat Detection Services. He has experience with various types of acoustic survey equipment, including the AnaBat II and ZCAIM, AnaBat SD1, AnaBat SD2, AnaBat Swift, AnaBat Express, Wildlife Acoustics SM4Bat, and Wildlife Acoustics Echometer Touch II. He has been trained to use AnaLook, Kaleidoscope Pro, and BCID.

YEARS OF EXPERIENCE

18

EXPERTISE

Ecology of bats in the Eastern U.S.

ESA compliance, specifically relating to listed bat species

Midwestern botany

EDUCATION

B.S., Environmental and Plant Biology; Ohio University; Athens, Ohio; 2009

Certification, Environmental Studies; Ohio University, Athens, Ohio; 2009

ACOUTIC SURVEY TRAINING

AnaBat (Acoustic Bat Monitoring) Techniques Workshop; 2010 and 2012

SELECTED PROJECT EXPERIENCE

Indiana Bat Maternity Colony Status Monitoring, Southwestern Pennsylvania. Confidential Client – January 2020-Present. SWCA's client requested assistance with determining the status of a previously identified maternity colony that had shifted on the landscape and its location was no longer known. Using the previously collected acoustic, mist-net, and telemetry data, SWCA created a habitat suitability model and analyzed our clients various land holdings in the vicinity to identify areas where the colony was most likely to occur. SWCA conducted acoustic surveys at nine study areas to determine which locations had the highest acoustic activity levels for Indiana bats and other *Myotis* species. Mist-netting was conducted on the three study areas with the highest levels of activity. Mr. Carson prepared the study design and preformed the acoustic identification and mist-net surveys.

Listed Bat Species Surveys, Clean Line Plains & Eastern Transmission Line; Oklahoma, Arkansas, and Tennessee – August 2015 – August 2017. SWCA's client proposed development of a ~750 mile transmission line to connect the large electricity market in the southeast U.S. with ongoing wind energy development in the Great Plains. SWCA conducted surveys for listed bat species across the proposed route. Mr. Carson was the Deputy Task Manager for listed bat species surveys. In that role, he developed and executed state-specific study plans in close coordination with each state's USFWS Ecological Services Field office. He conducted mist-net surveys and acoustic surveys in each state, and oversaw all data collection and reporting at the conclusion of the survey. In addition to summer mist-netting, Mr. Carson conducted acoustic presence/absence surveys in locations that were not conducive to mist-netting. In the winter of 2016-2017, Mr. Carson conducted long-term acoustic monitoring at potential hibernacula as well.

Northern Long-eared Bat Swarming Habitat Acoustic Survey, Confidential Client, Upper Midwest – June 2021 – May 2022. SWCA's client requested assistance with understanding northern long-eared bat swarming activity and behavior around a known northern long-eared bat hibernaculum. SWCA developed an acoustic survey study plan to determine the habitat characteristics, weather factors, seasonality, and other factors that influence northern long-eared bat swarming at the hibernaculum. Up to 25 acoustic detectors were deployed at various distances

and within various habitat types up to 5 miles from the known hibernaculum. Species occurrence and activity levels were compared across the detectors and the covariates were modeled to determine influence. Mr. Carson led the study design, agency coordination, acoustic analysis, and reporting for this effort.

Bat Species Inventory and Northern Long-Eared Bat Presence/Absence Survey – Patuxant Naval Air Station, Maryland – June 2012. Mr. Carson completed two seasons of survey at the Patuxant Naval Air Station to develop a bat species inventory and determine the presence or absence of northern long-eared bats. As the project manager, Mr. Carson was responsible for development and implementation of a study plan that included acoustic and mist-net survey techniques.

2012-2022 Long-Term, Passive Acoustic Monitoring Bat Studies – Confidential Wind Project Sites – Texas, South Dakota, North Dakota, Indiana, Ohio, Minnesota, Iowa, and Illinois – 2010 - Present.
Mr. Carson led pre-construction, passive, acoustic monitoring studies at numerous facilities in the central and eastern U.S.: three in Texas. His responsibilities included selecting survey sites based on bat habitat within the Project areas, managing field staff, analysis of the data collected, and preparing reports for each study. Analyses included use of automated identification programs as well as manual verification.

PRESENTATIONS

Modeling Indiana Bat Population Densities in the Midwest and Ozark-Central Recovery Units: Implications for Regional Development; Poster, AWEA 2018 Wind Project Siting Seminar (in preparation)

WNS – Endangering Bats and Your Bottom Line; Oral Presentation, Environmental Federation of Oklahoma 2017

Changed Circumstances: Operational Facilities and Federally Listed Bat Species AWEA 2016 Wind Project Siting Seminar

Bat Listings – Reasons, Challenges, and Opportunities; Oral presentation, AWEA 2014 Wind Project Siting Seminar

Northern Long-eared Eastern Small-footed Bats: Are Indiana bats Just the Beginning?; Poster Presentation, AWEA WINDPOWER 2014

Indiana Bat Presence/Absence Survey at a Proposed Wind Energy Development in Shelby County, Ohio* - Confidential Client – May-August 2011. In order to understand the potential for impacts to local bat populations, the client requested bat surveys following USFWS and ODNR guidelines. Coordination was conducted with staff in the USFWS Columbus Ecological Services Field office and the ODNR Division of Wildlife to develop a project specific study-plan that met the request of the client and the requirements of agencies. The study plan included long-term acoustic monitoring as well as summer mist-net surveys *Role: Project Manager, Lead Field Biologist. Managed and conducted all aspects of the acoustic monitoring project, including agency coordination, and served as a lead field biologist for mist-net surveys.*

Indiana Bat and Northern Long-Eared Bat Presence Absence Survey at a Proposed Utility Scale Wind Energy Facility in Illinois – May-August 2014. The client proposed to develop an 8,000 acre utility scale wind energy facility in northern Illinois, within the known range of the Indiana bat and northern long-eared bat. The client requested presence/absence surveys for the species in order to understand the potential for the facility to have impacts on local populations of these and other bat species. *Role: Project Manager, Lead Field Biologist. Managed all aspects of the project, including budget, schedule, agency coordination, field surveys, and reporting.*

Indiana Bat Presence/Absence Survey at a proposed Quarry Expansion Site in Northern Ohio - Confidential Client – May – August 2013. As part of Section 7 consultation for a proposed quarry expansion project, the client was informed that they would need to address the potential presence of the Indiana bat within their proposed project area. The client requested the development of a project-specific study plan and the execution of that plan. Summer mist-net surveys were performed following USFWS guidelines to determine the presence or absence of the Indiana bat within the project area. *Role: Lead field biologist. Lead a team of biologists conducting field surveys.*

Bat Species Surveys for Utopia Pipeline Projects; Ohio; Kinder Morgan, Inc - February 2015 – December 2016. SWCA is providing environmental services for a 240-mile pipeline. The project includes surveys for listed bat species. Mr. Carson is the lead for listed bat species surveys issues for the project, which includes coordination with agency personnel and management of all field survey crews. *Role: Threatened and Endangered Species Lead, Bat Ecologist.*

Indiana Bat, Northern Long-Eared Bat, and Virginia Big-Eared Bat Presence Absence Survey Along a Proposed 23 Mile Transmission Line Improvement Project in West Virginia* - May – August 2014. As part of a series of transmission line improvements, including upgrades and replacements to both transmission lines and substations, the client requested assistance with ESA compliance specific to Indiana bats, northern long-eared bats, and Virginia big-eared bats. Presence/absence studies were executed following a study plan developed to follow the West Virginia guidelines, including mist-net surveys and a mine/cave portal survey. *Role: Task Manager, Lead Field Biologist. Managed the listed bat species portion of the project, including schedule, agency coordination, field surveys, and reporting.**

SAMUEL SCHRATZ, M.S., ACOUSTIC DETECTOR DEPLOYMENT LEAD

Sam Schratz is a federally permitted (ESPER0003023) bat biologist for SWCA's Chicago office. He specializes in bat research and also has experience in avian, mammal, and amphibian studies. Mr. Schratz has worked for or with state, federal, and tribal agencies in matters regarding wildlife and natural resources. He has participated in two training courses: an 8-day Comprehensive Bat Acoustic Training Course with Bat Survey Solutions and a virtual acoustic training workshop with Titley Electronics. His master's research focused on southeastern *Myotis* and Rafinesque's big-eared bat occupancy in the Cache River National Wildlife Refuge using acoustic and mist-net survey methods.

YEARS OF EXPERIENCE

9

TRAINING

8-Day Comprehensive Bat Acoustic Course, Bat Survey Solutions

Titley Electronic Acoustic Training Workshop, Titley Electronics

EXPERTISE

Bat surveys and identification (Mist-Netting and Acoustics)

Geographic Information Systems (GIS)

Esri GIS mapping software and programming (ArcGIS, ArcInfo, etc.)

Stormwater Pollution Prevention Plans (SWPPPs)

Water quality monitoring and analysis

EDUCATION

M.S., Biology; Arkansas State University, Jonesboro, Arkansas; 2016

B.S., Biology; Illinois State University, Normal, Illinois; 2012

PERMITS

Former West Virginia Division of Natural Resources Scientific Collecting Permit (Tyler, Wetzel, Doddridge Counties)

MEMBERSHIPS

Member, Bat Conservation International

Member, Arkansas State University

Member, Arkansas State University

Member, Midwest Bat Working Group

Member, The Wildlife Society

SELECTED PROJECT EXPERIENCE (* denotes project experience prior to SWCA)

Indiana Bat Habitat Assessment; EBI Consulting; Pike County, Kentucky. SWCA assessed the survey area for Indiana bat suitability for a proposed communication infrastructure project. *Role: Volunteer. Collected and uploaded data in Collector.*

Bat Migration Mist-Net Survey; U.S. Fish and Wildlife Service; Marrion and Ralls Counties, Missouri. SWCA assisted with mist-net deployment, data collection, and transmitting of Indiana bats for spring migration study. *Role: Support Staff.*

Bat Acoustic Surveys; Invenergy; Worth County, Iowa, and Cass County, North Dakota. SWCA deployed Anabat Swifts on MET Towers using K-Bat system. *Role: Site Lead. Deployed ground-based detectors within suitable habitat.*

***Surveyed for Threatened and Endangered Bats; Arkansas State Wildlife Management Areas; Arkansas.** *Role: Bat Survey Consultant. Duties included deploying and recovery of acoustic monitoring equipment, mist netting for bats, and identifying bats to species.*

***Survey for Northern Long-Eared Bats; Arkansas State Wildlife Management Areas; Arkansas.** *Role: Bat Survey Consultant. Located optimal sites for mist net deployment, mist net handling and monitoring techniques, and identified and handled eastern U.S. bat species such as gray bat.*

Journeyman Pad Mist Net Survey; Confidential Client; Confidential Location. SWCA conducted wetlands services for a new well pad location. *Role: Crew Leader. Site lead for crew of up to three persons; compiled data and generated reports.*

Hilltopper Wind Project Post-Construction Monitoring; Enel Green Power North America, Inc.; Sangamon County, Illinois. SWCA provided post-construction avian and bat monitoring and on-site worker environmental training support in accordance with the U.S. Fish and Wildlife Service Wind Energy Guidelines and approved project Bird and Bat Conservation Strategy. The final report included methods, results, and estimated project fatality levels for birds and for bats (per megawatt or per turbine basis), adjusted to account for search frequency, searcher efficiency, carcass removal rates, and proportion of area searched. SWCA worked with state and federal agencies to attain handling permits for migratory birds and threatened or endangered species. Role: *Field technician. Seeded carcasses for searcher efficiency trials throughout wind farm.*

Fairbanks Solar; Invenergy, LLC; Sullivan County, Indiana. SWCA conducted a desktop water resources survey, performed a field water resources delineation; and performed additional field studies to support the development of an approximately 250-megawatt solar facility. *Role: Biological Consultant.*

APPENDIX B

Photograph Log

Photograph 1. KING 1, facing south (6/8/2022).

Photograph 2. KING 2, facing north (6/8/2022).

Photograph 3. KING 3 , facing east (6/14/2022).

Photograph 4. KING 4, facing east (6/7/2022).

Photograph 5. KING 5, facing east (6/7/2022).

Photograph 6. KING 6, facing north (6/14/2022).

Photograph 7. KING 7, facing west (6/30/2022).

Photograph 8. KING 8, facing west (6/14/2022).

Photograph 9. KING 9, facing west (6/22/2022).

Photograph 10. KING 10, facing east (6/7/2022).

Photograph 11. KING 11, facing north (6/14/2022).

Photograph 12. KING 12, facing north (6/14/2022).

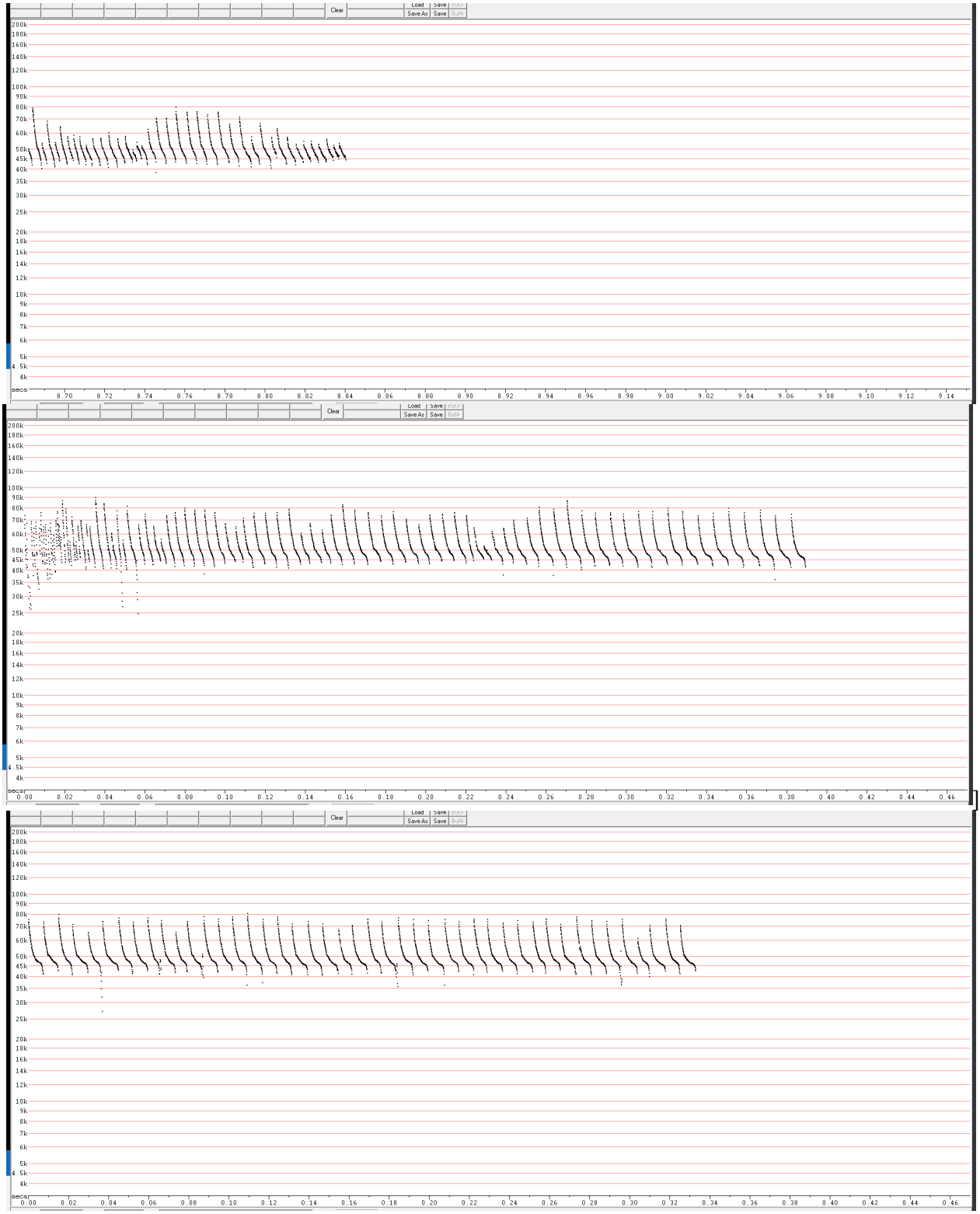
Photograph 13. KING 13, facing east (6/30/2022).

Photograph 14. KING 14, facing east (6/22/2022).

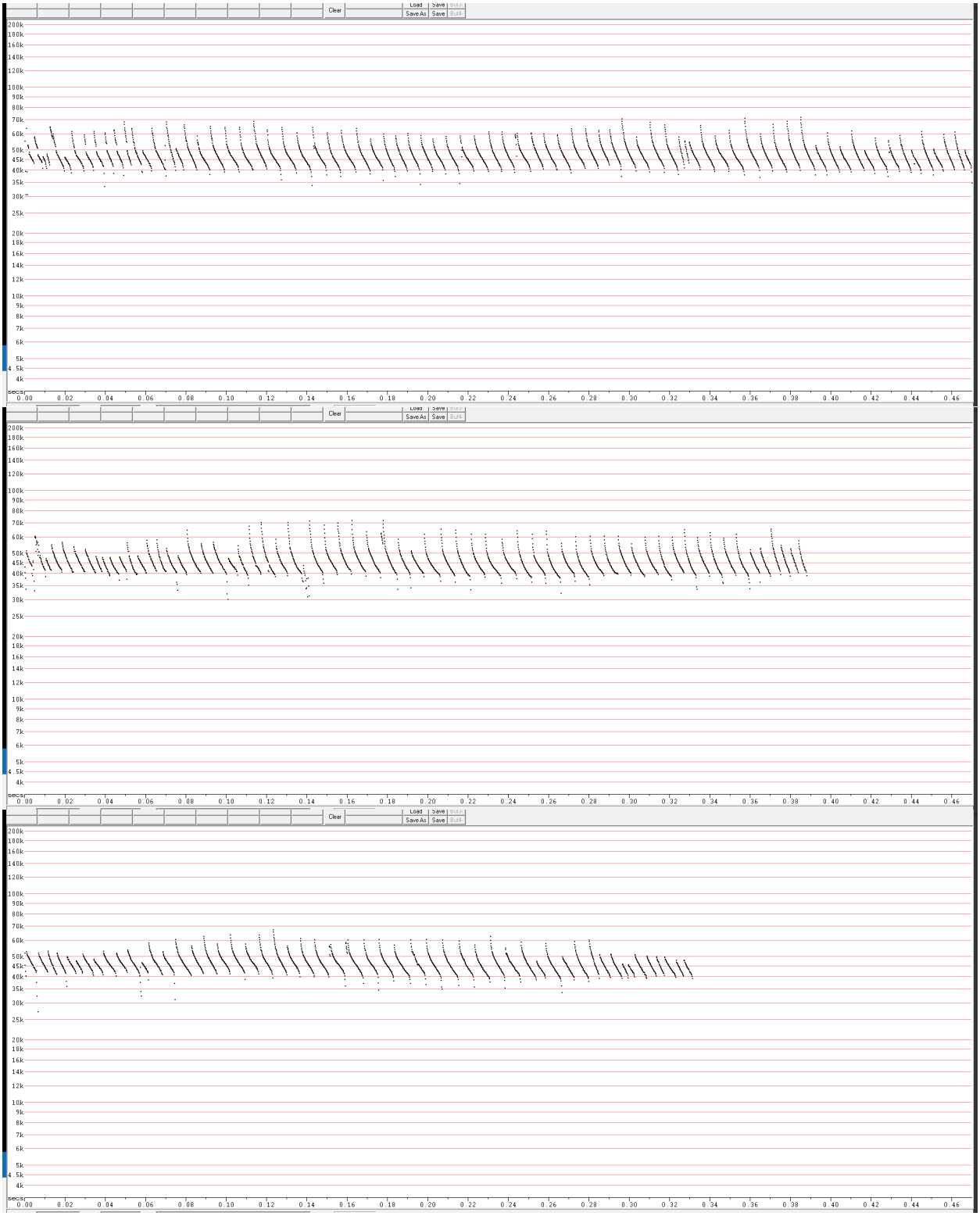
Photograph 15. KING 15, facing south (6/30/2022).

APPENDIX C

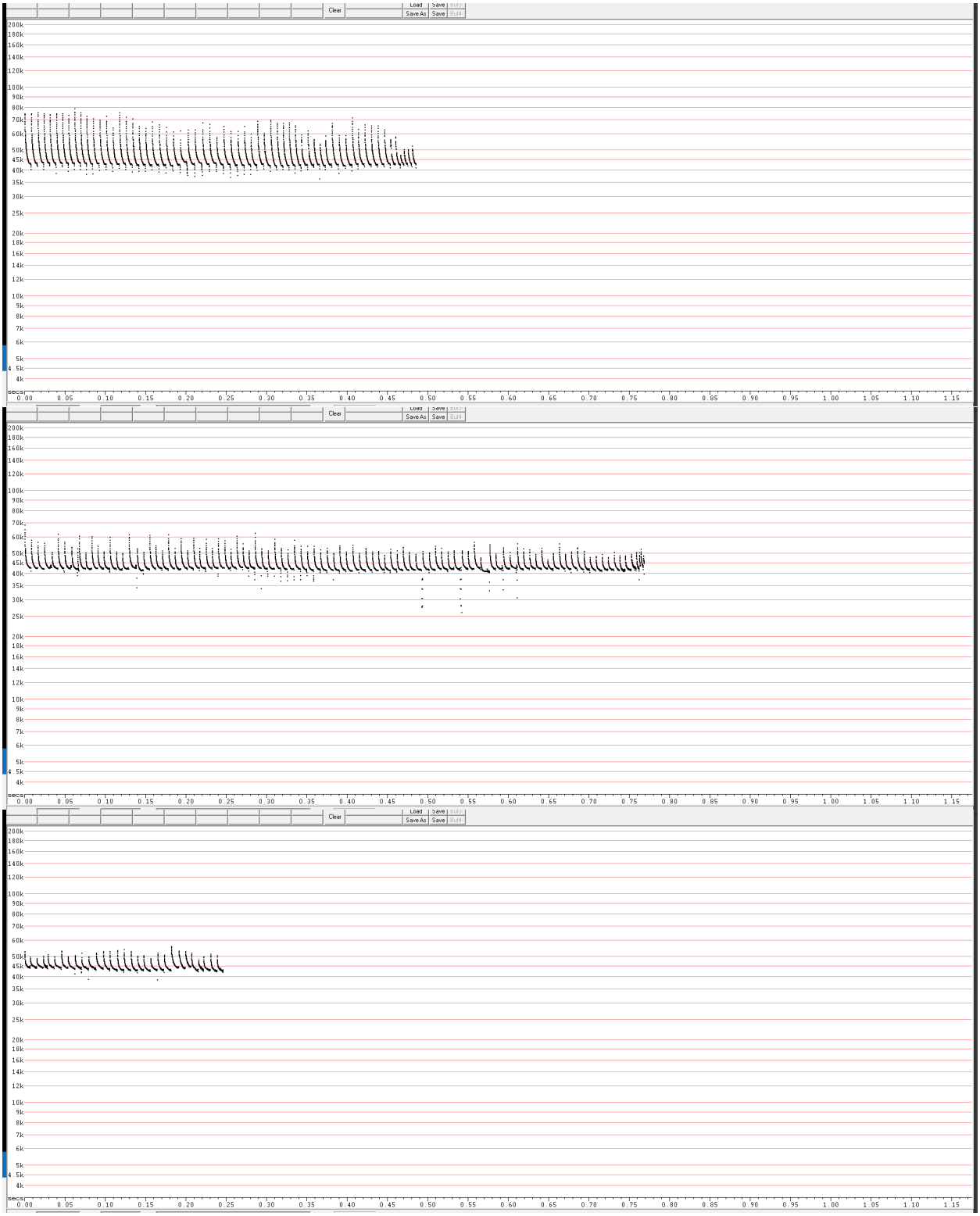
Manual Review Summary



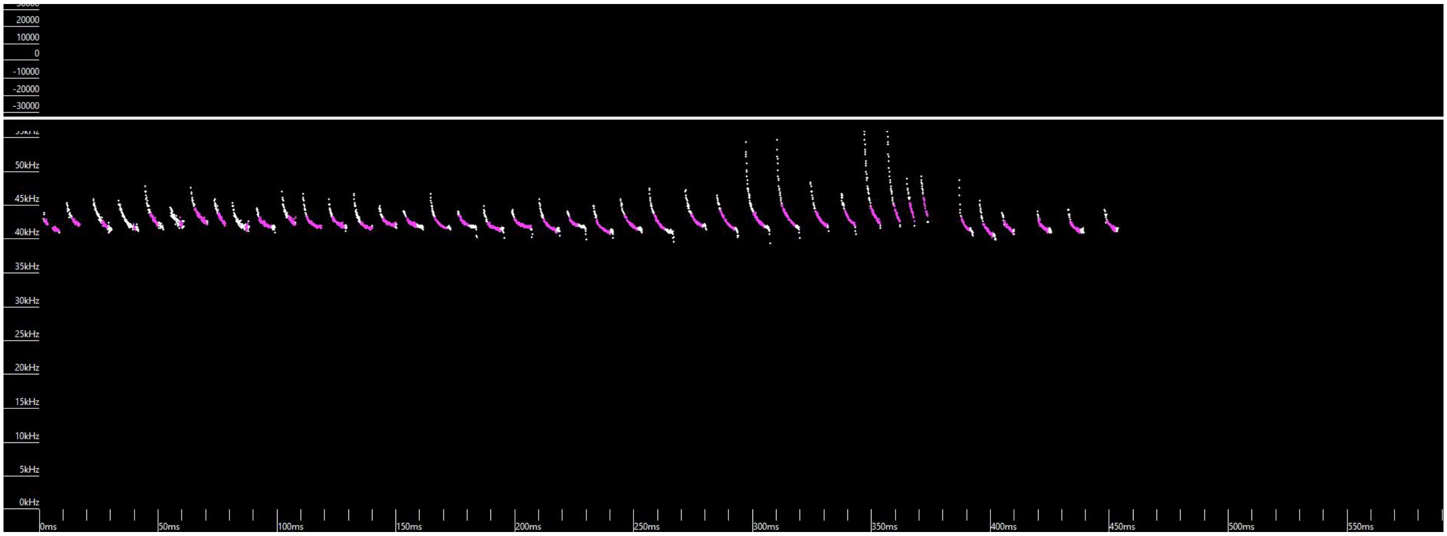
Figures 1-3. Voucher gray bat calls. Expected Fc = 45 kHz, may dip to 40 kHz. These exhibit a characteristic sharp decrease in slope at midpoint in the call (i.e., approximately 47-50 kHz in these calls), which manifests as an angular inflection point rather than curved. Images above depicted at F7 scale in AnalookW.

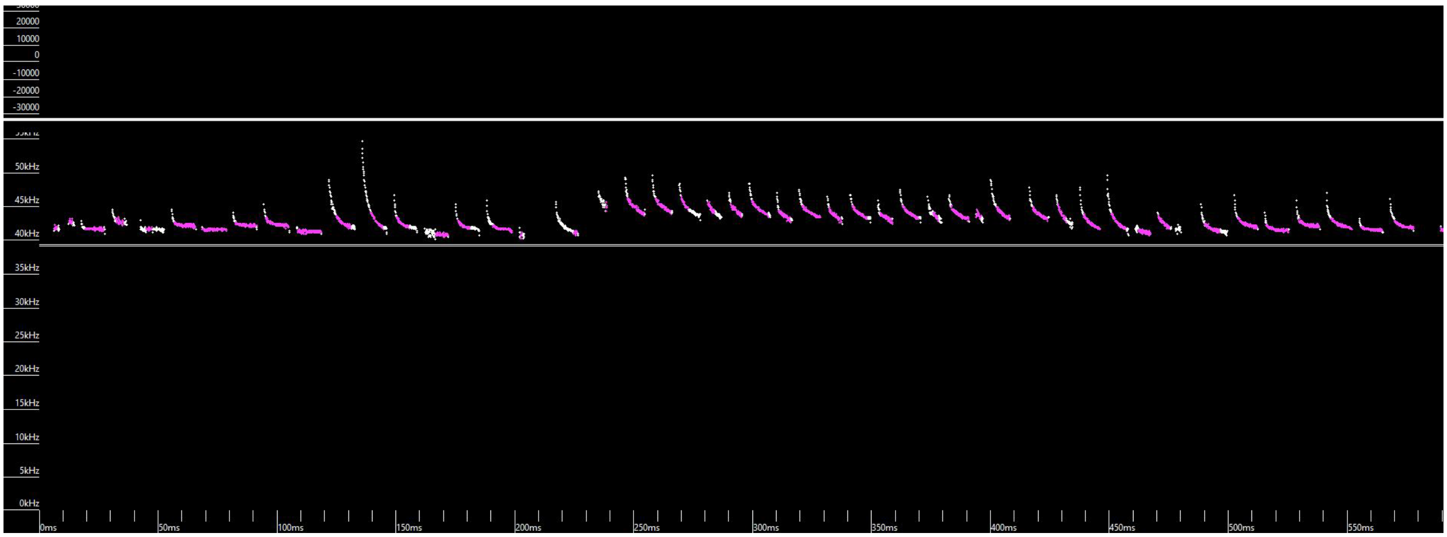


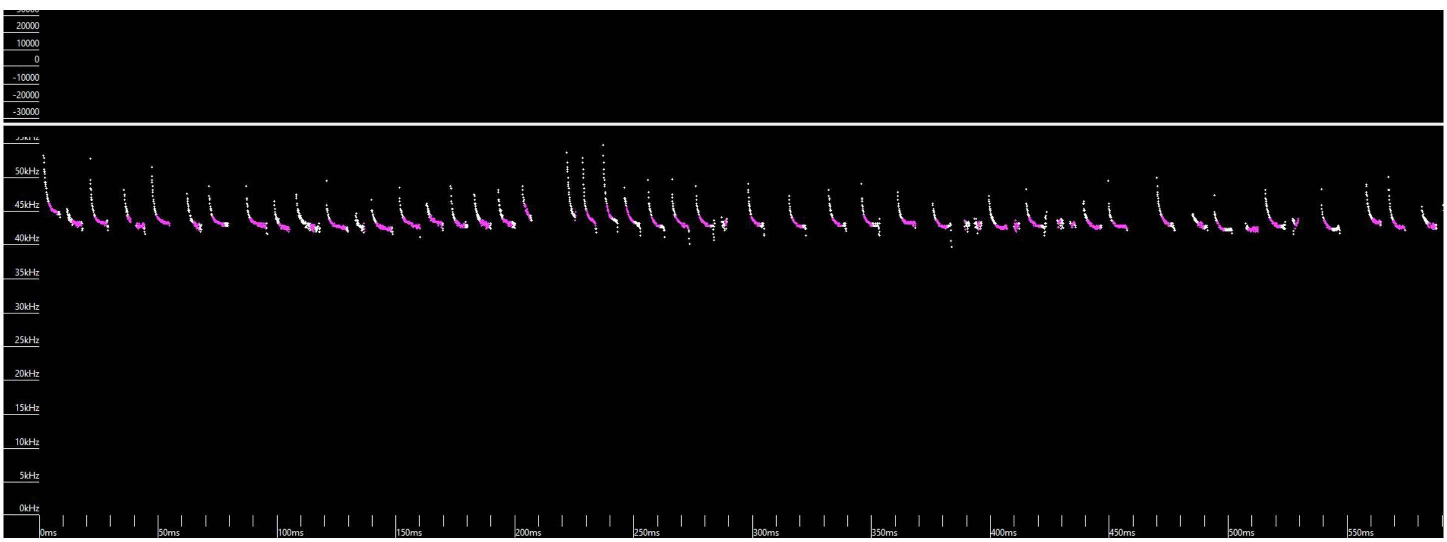
Figures 4-6. Voucher little brown bat calls. Expected Fc = 40 kHz, may dip to 35 kHz. Calls in the open have lower slope than other *Myotis*, and will have a more gradual change in slope. Images above depicted at F7 scale in AnalookW.



Figures 7-9. Voucher tricolored bat calls. Expected Fc = 40-45 kHz. Tend to exhibit long sequences of similar calls, with low slope “hockey stick” shape in low clutter calls. Images above depicted at F6 scale in AnalookW.







Figures 10-12. Representative tricolored bat calls collected within the Kings Mountain Project Area sites King7, King6, and King9 on June 24, June 22, and June 6, 2024. Calls exhibit Fc within tricolored bat expected range and relatively consistent across entire call. Examples of characteristic "hockey stick" shape evident

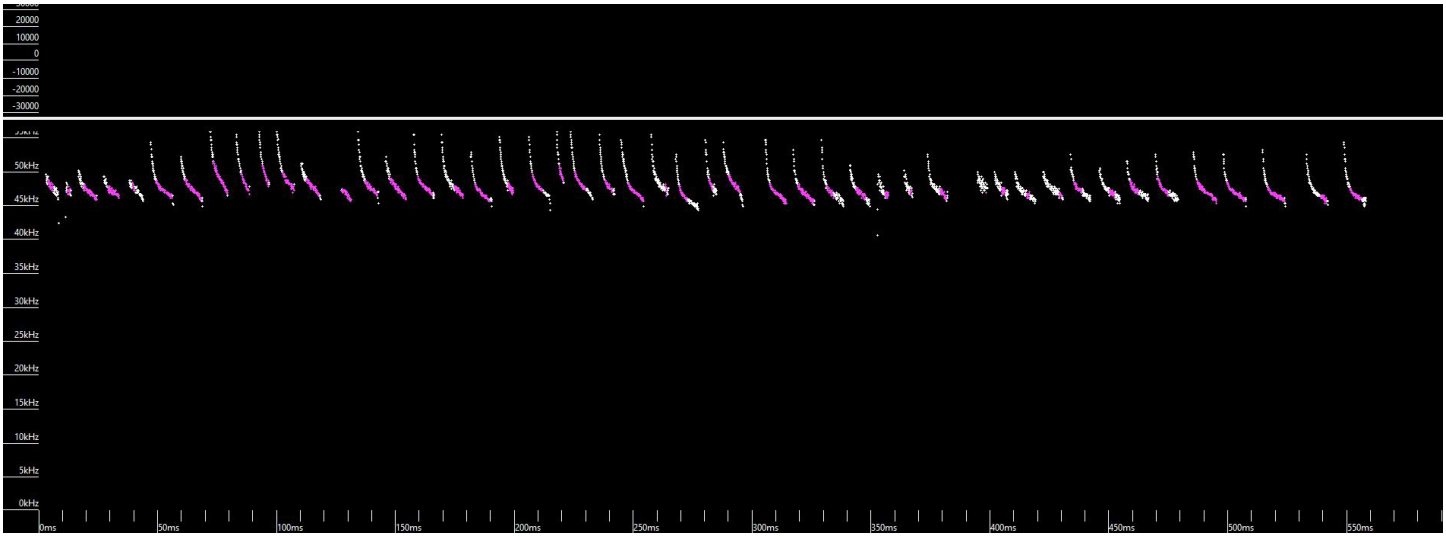


Figure 13. Call "2022-06-13 21-10-10.zc" collected at King1, classified as MYGR by Kaleidoscope. Lacks characteristic consistency across pulses. Few pulses show sharp slope decrease, others show a slower, more curved decrease.

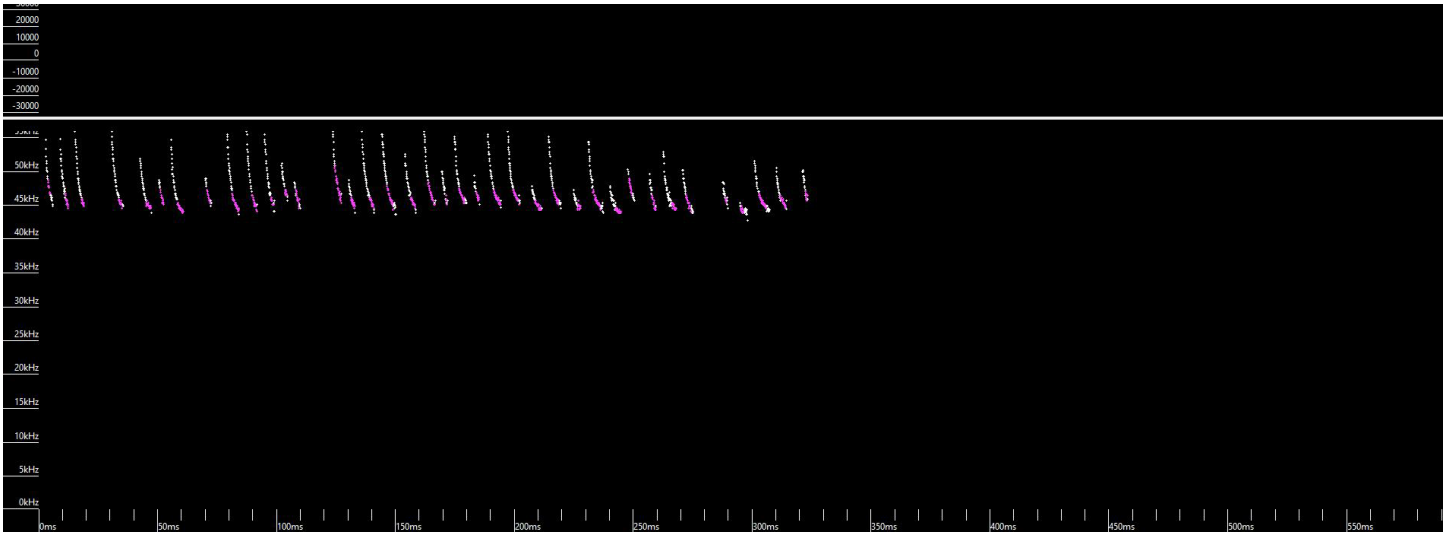


Figure 14. Call "2022-06-17 02-05-56.zc" collected at King3, classified as MYGR by Kaleidoscope. A high clutter call that lacks sufficient information to make confident species identification.

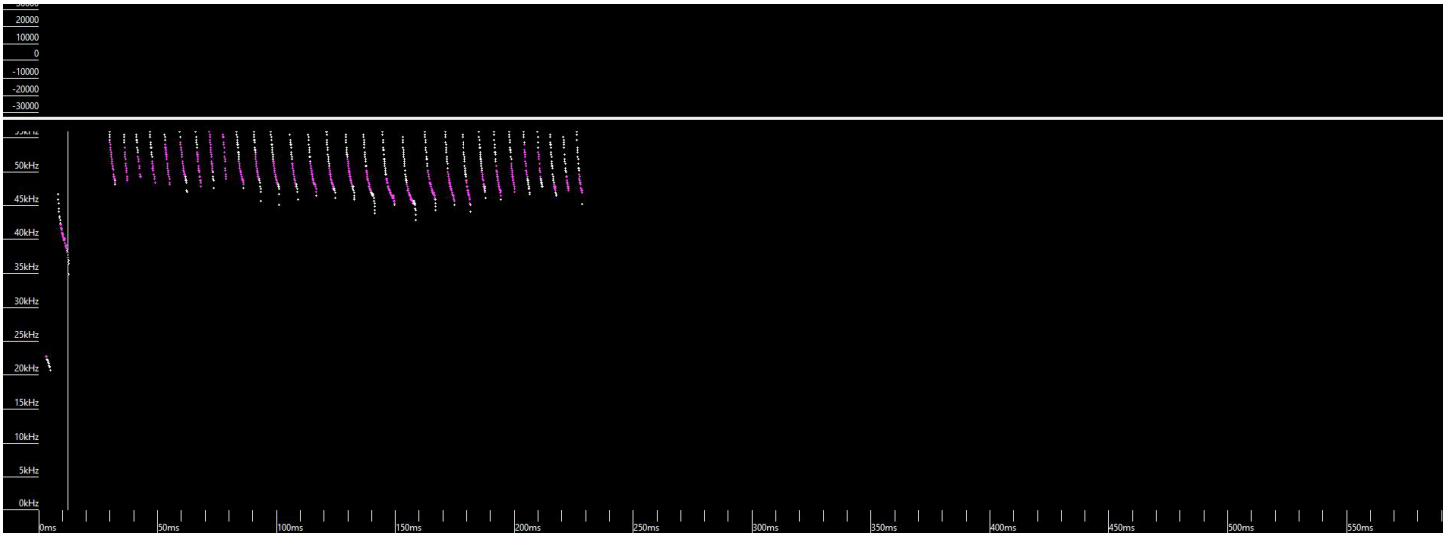


Figure 15. Call "2022-06-26 00-18-10.zc" collected at King6, classified as MYGR by Kaleidoscope. Inconsistent Fc across sequence. A high clutter call that lacks sufficient information to make confident species identification.

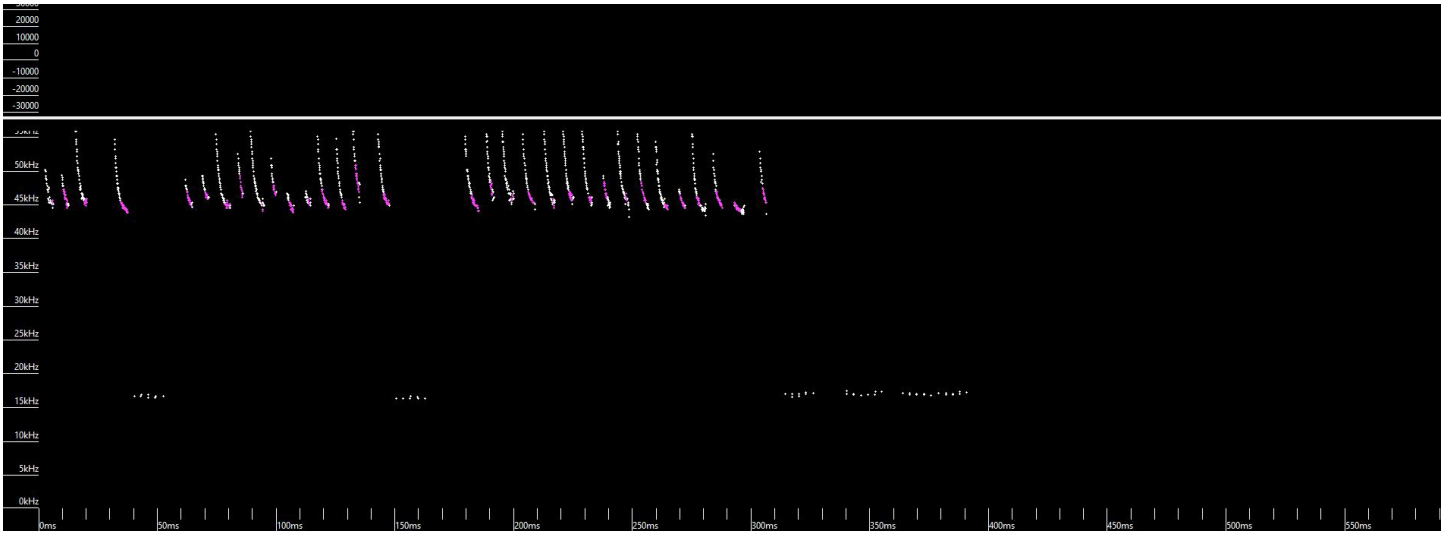


Figure 16. Call "W6162136.03#" collected at King6, classified as MYGR by Kaleidoscope, lacks the characteristic sharp decrease in slope and consistency across pulses. This is more likely a red bat.

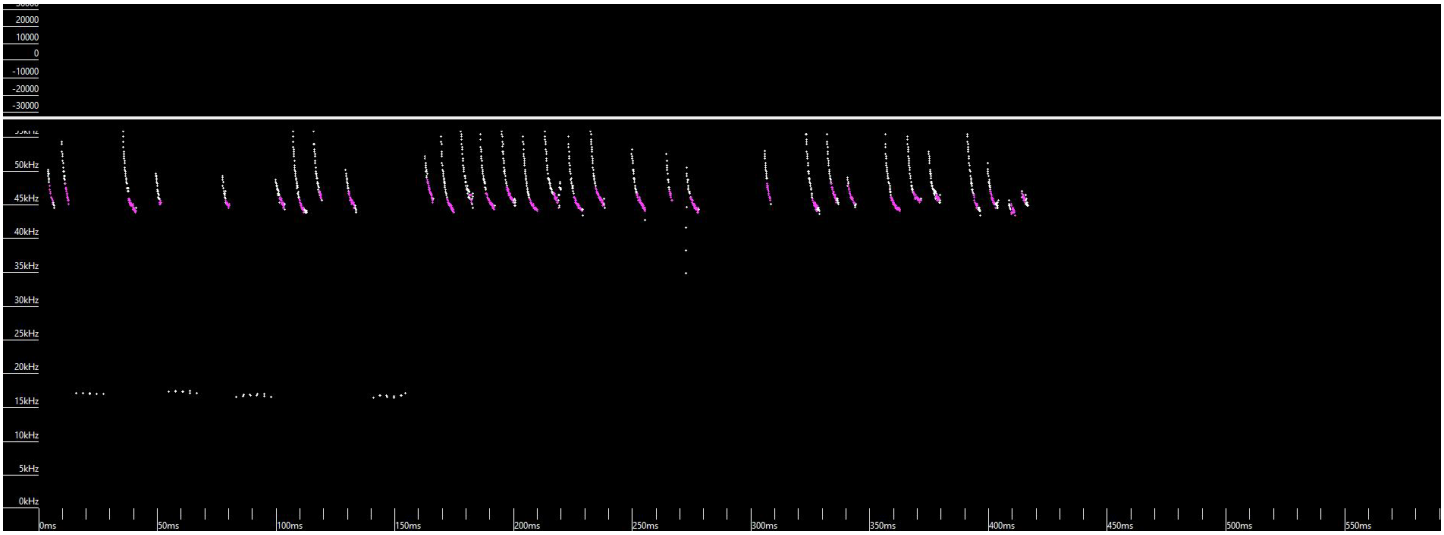


Figure 17. Call "2022-06-17 02-01-27.zc" collected at King3, classified as MYGR by Kaleidoscope. Fc is inconsistent across sequence, some pulses have sharp decrease in slope others more curved. This is more likely red bat.

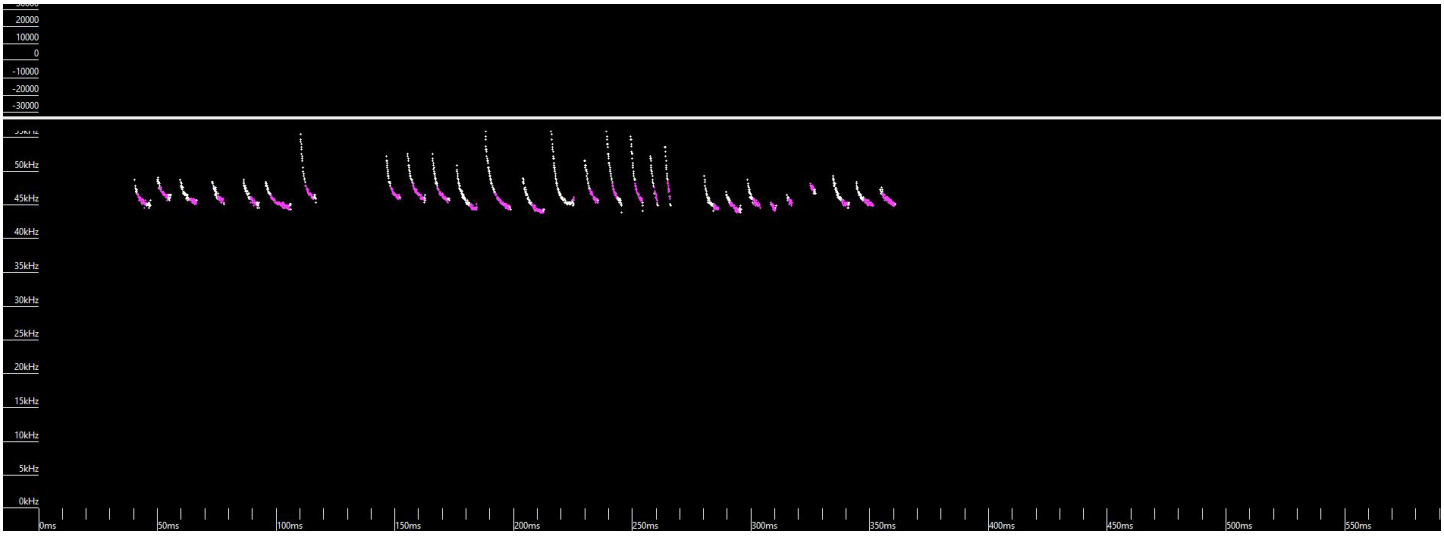


Figure 18. Call "2022-06-17 02-00-38.zc" collected at King3 classified as MYGR by Kaleidoscope. Most pulses have long and slow decrease in slope. More indicative of tricolored bat or red bat.

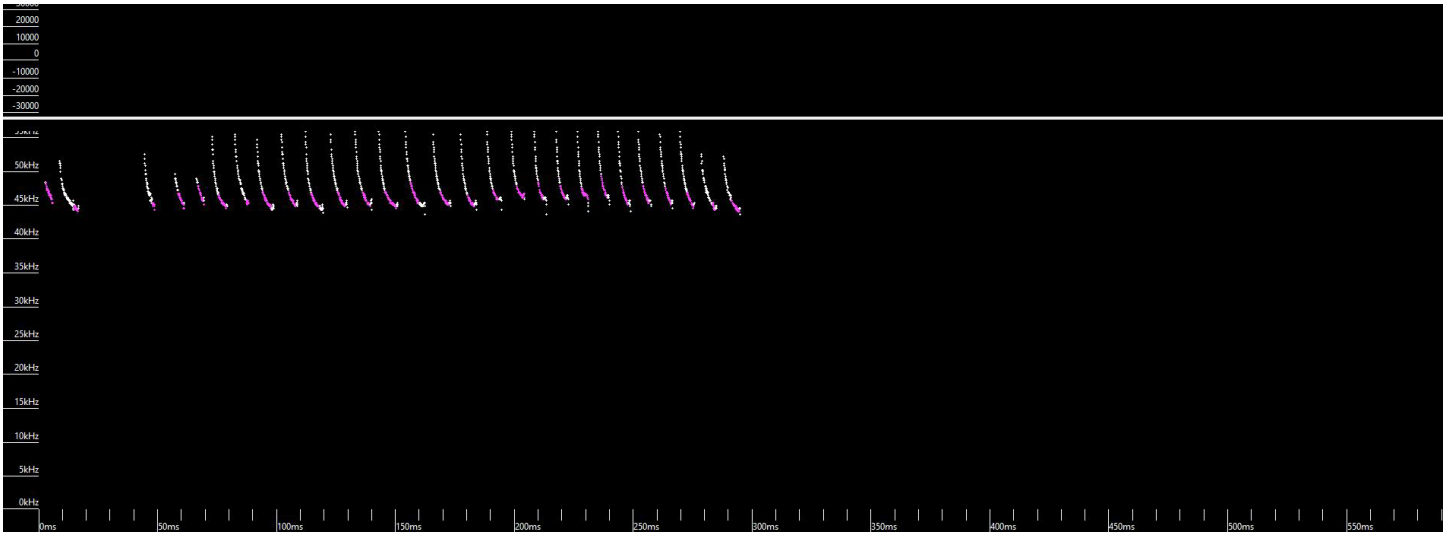


Figure 19. Call "2022-06-26 22-40-50.zc" collected at King7, classified as MYGR by Kaleidoscope. Lacks characteristic sharp decrease in slope. More likely tricolored bat in higher clutter.

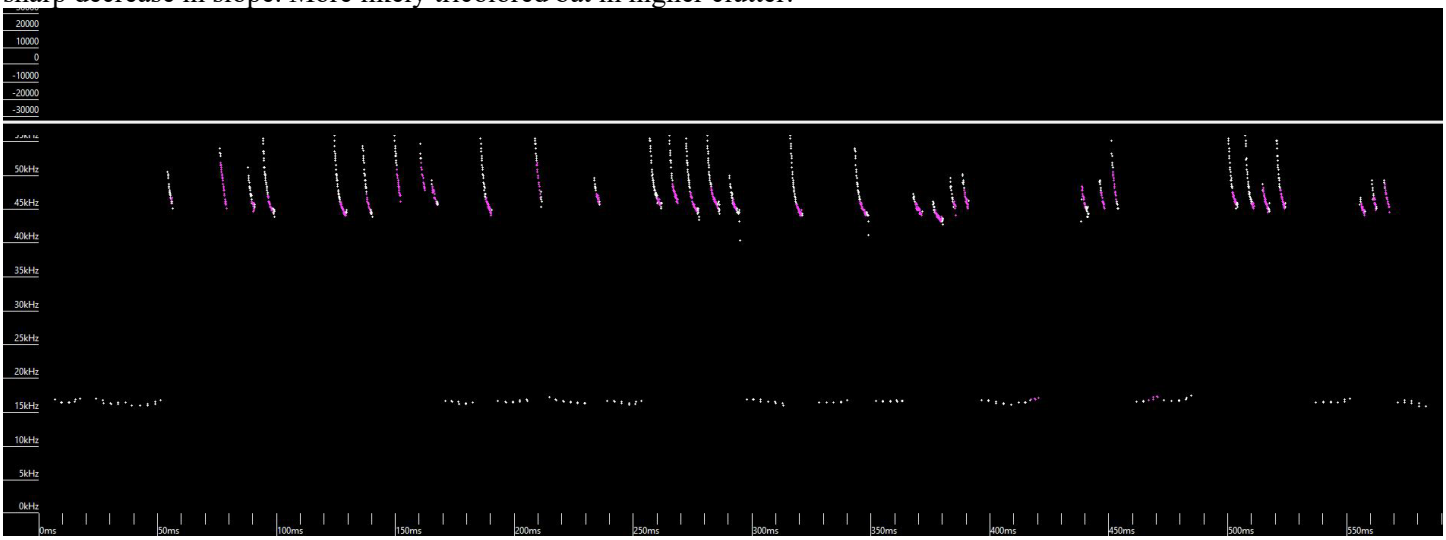


Figure 20. Call "2022-06-17 01-59-25.zc" collected at King3, classified as MYGR by Kaleidoscope. Inconsistent Fc across sequence is characteristic of red bat.

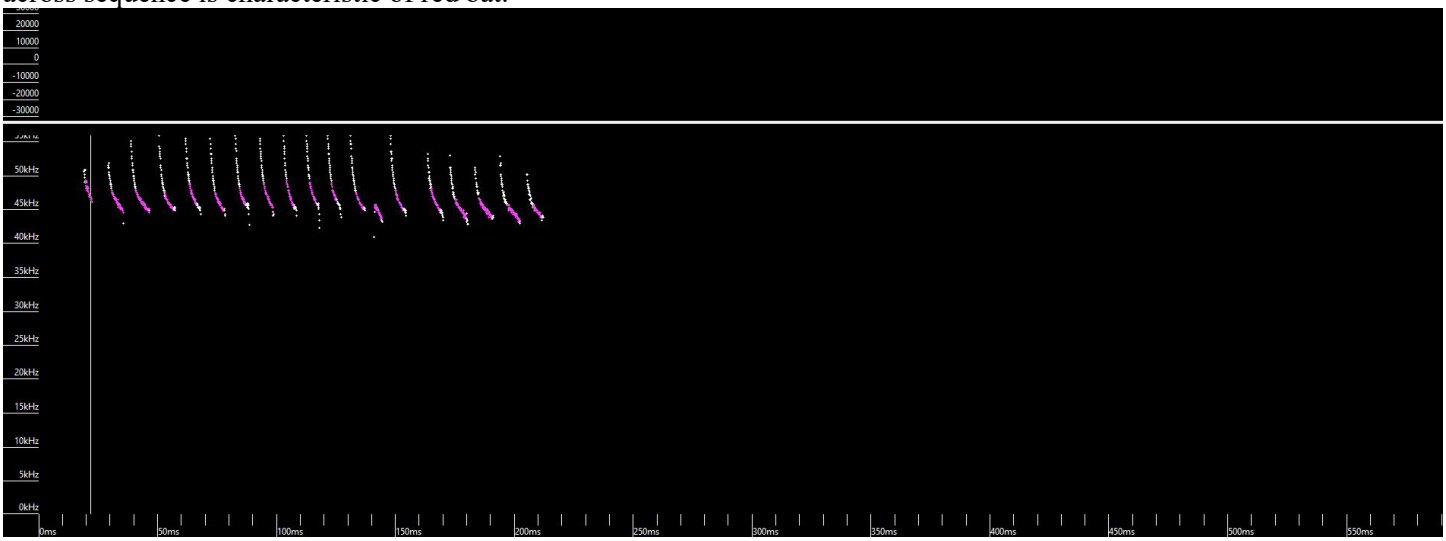


Figure 21. Call "W6142145.15#" collected at King6, classified as MYGR by Kaleidoscope. Decrease in slope within pulses varies significantly across calls, more suggestive of red bat.

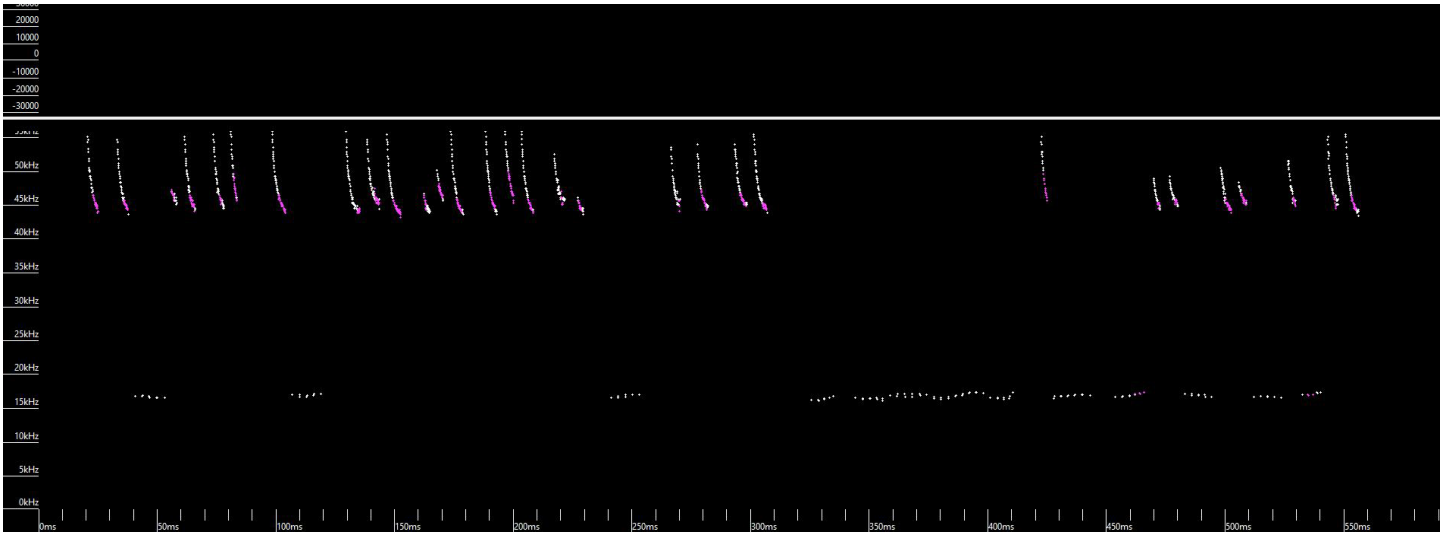


Figure 22. Call "2022-06-17 02-01-07.zc" collected at King3, classified as MYGR by Kaleidoscope. Inconsistent slopes and Fc throughout sequence indicative of red bat.

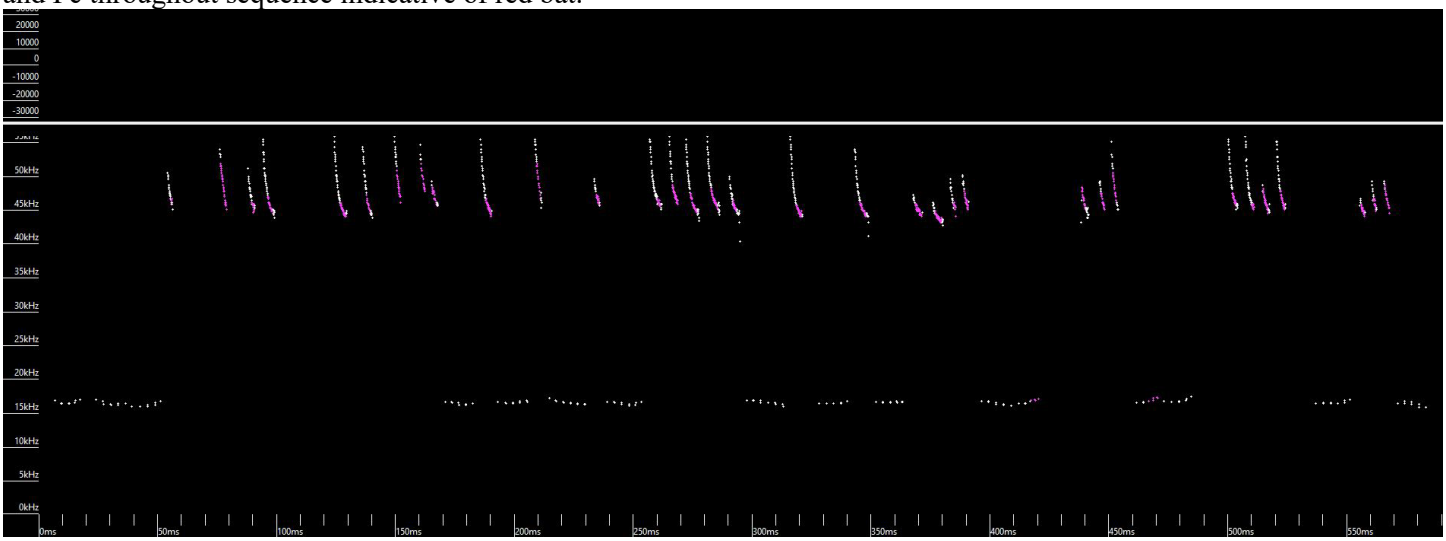


Figure 23. Call "2022-06-17 01-59-42.zc" collected at King3, classified as MYGR by Kaleidoscope. Inconsistent slopes and Fc throughout sequence indicative of red bat.

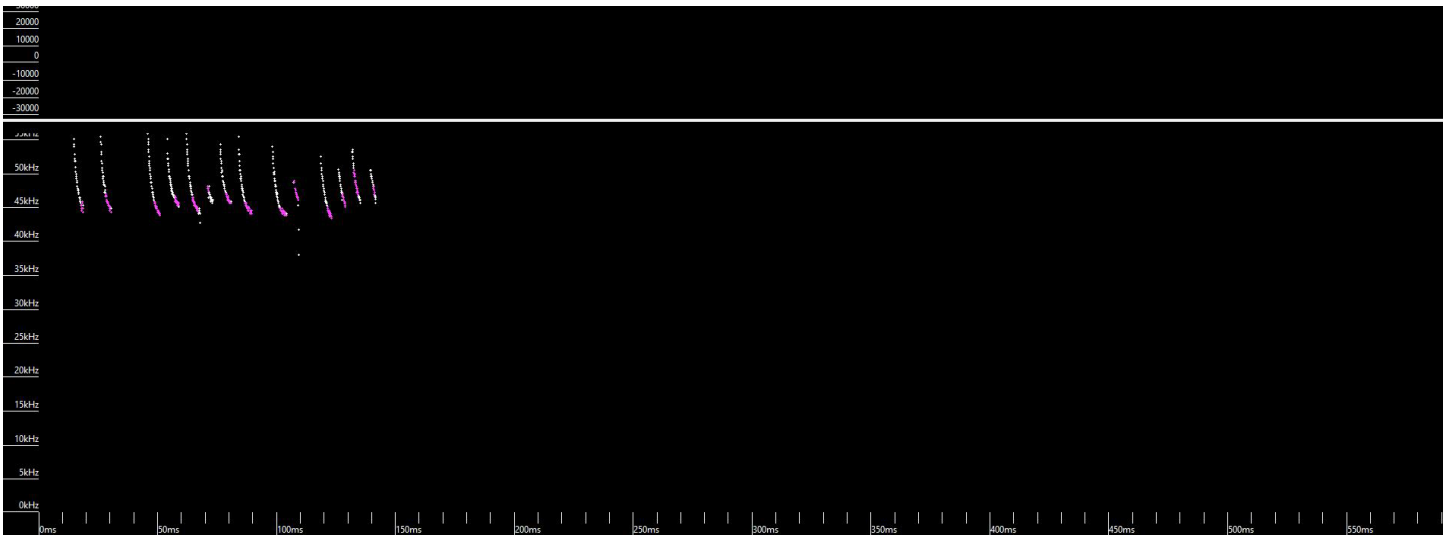


Figure 24. Call "2022-06-17 02-05-48.zc" collected at King3, classified as MYGR by Kaleidoscope. Inconsistent slopes and Fc throughout sequence indicative of red bat.

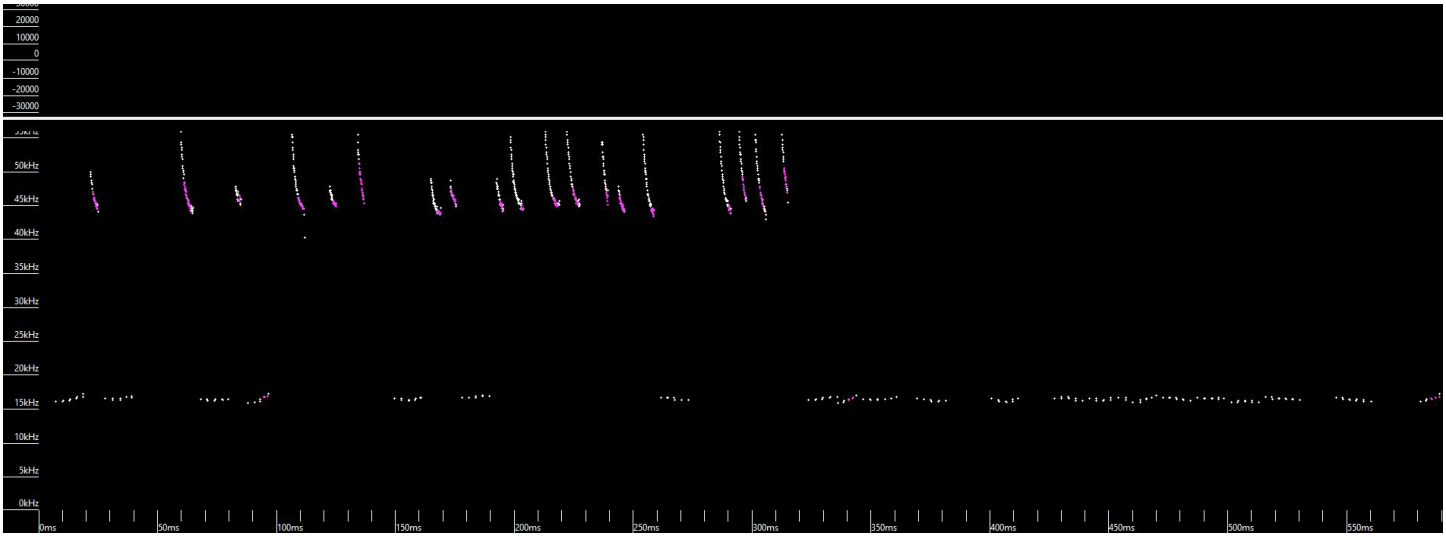


Figure 25. Call "2022-06-17 01-58-32.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination, however inconsistent slopes and Fc throughout sequence indicative of red bat.

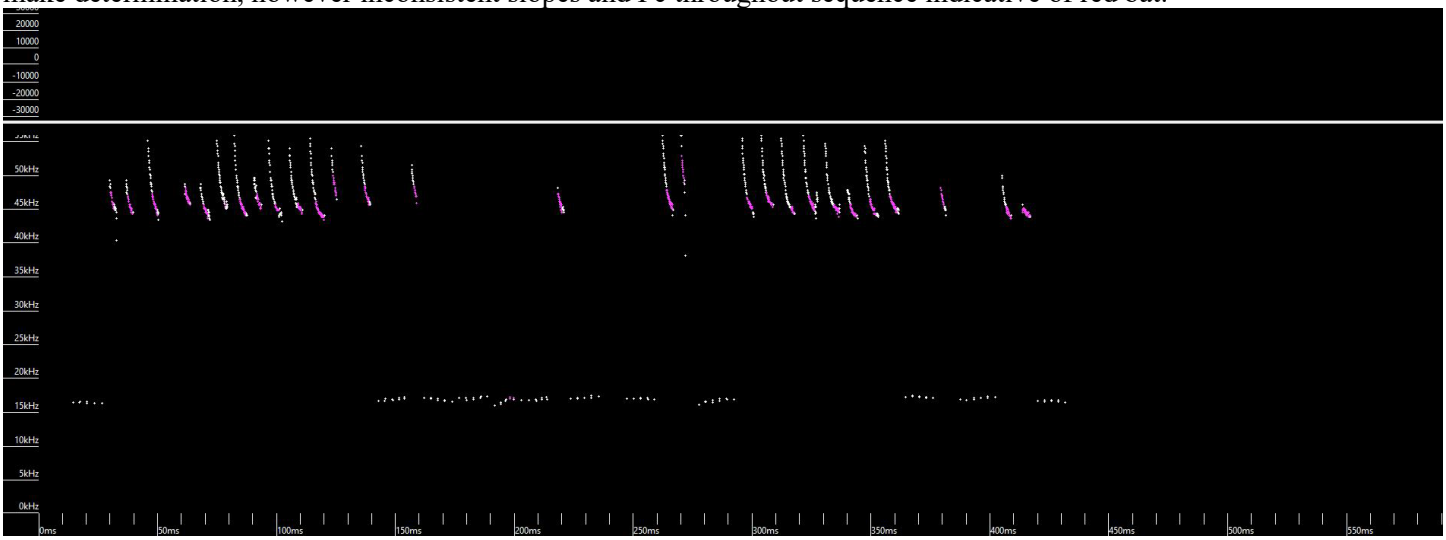


Figure 26. Call "2022-06-17 02-00-20.zc" collected at King3, classified as MYGR by Kaleidoscope. Inconsistent slopes and Fc throughout sequence indicative of red bat.

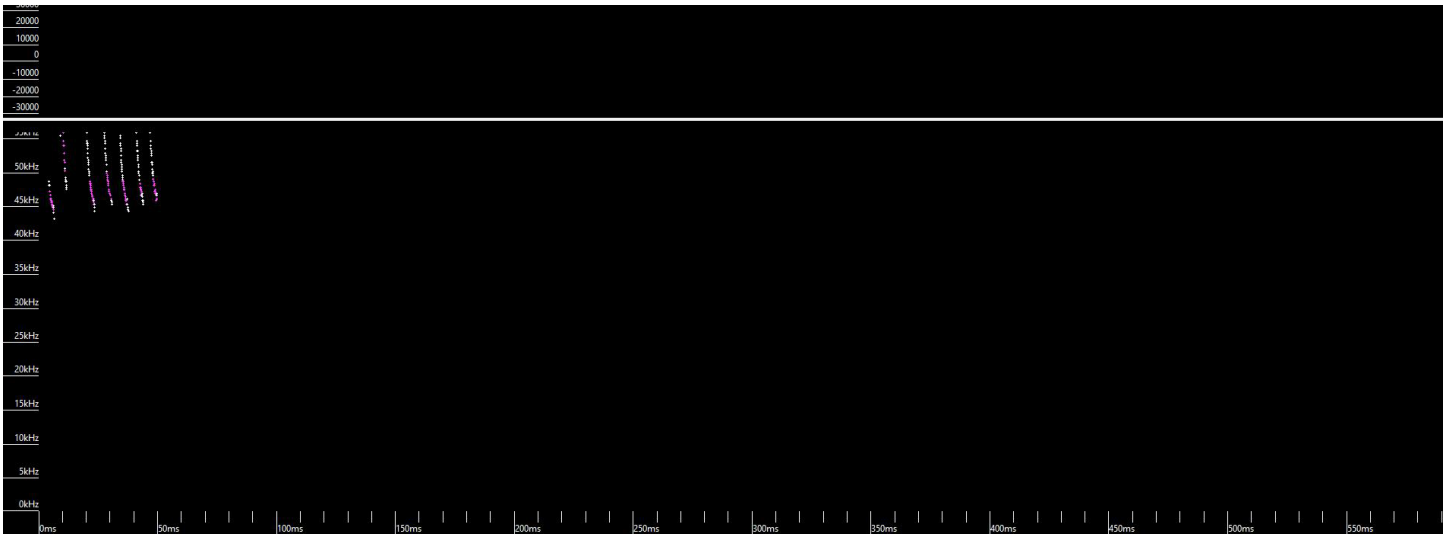


Figure 27. Call "2022-06-17 00-16-47.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

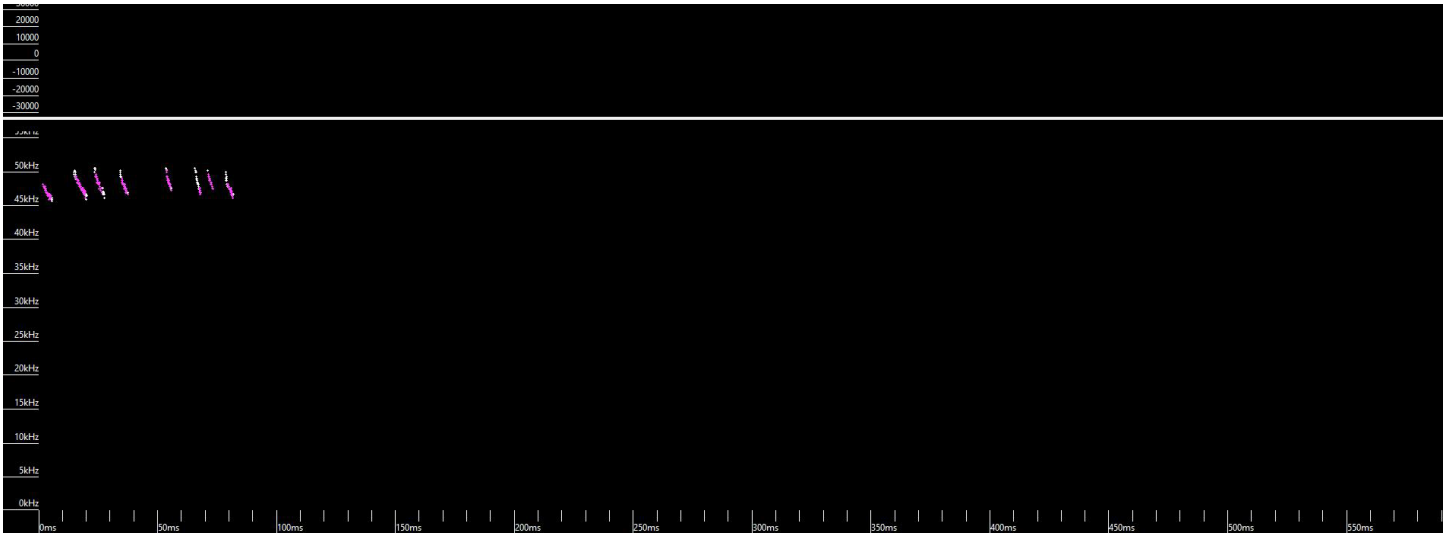


Figure 28. Call "W6162147.03#" collected at King6, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

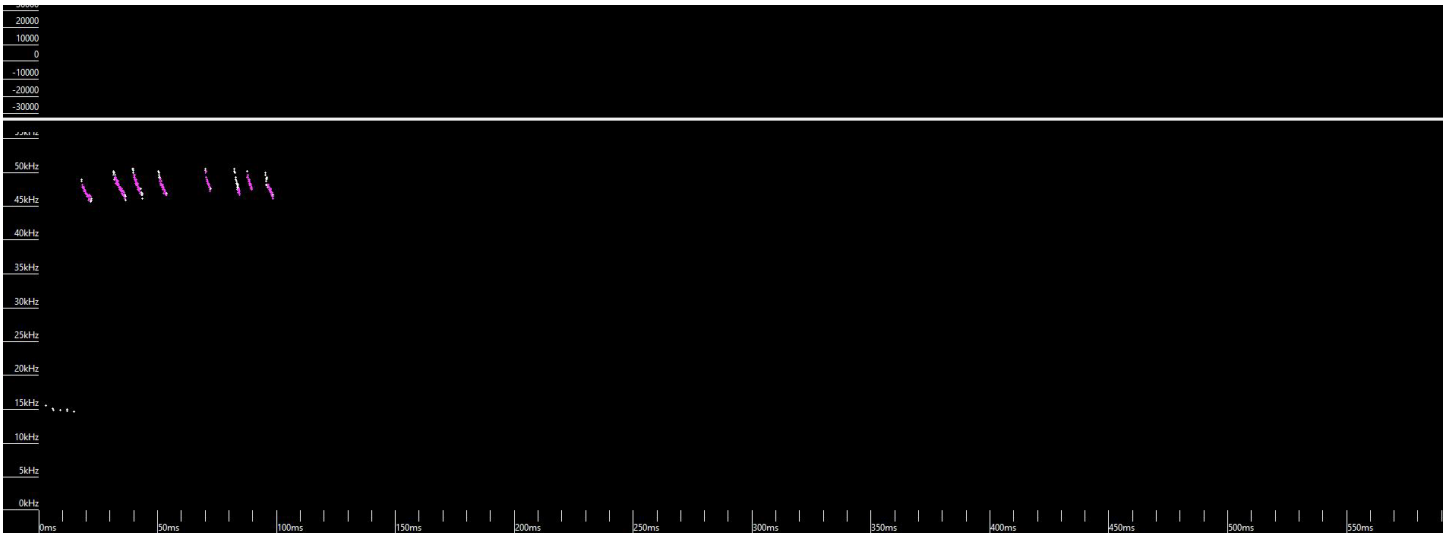


Figure 29. Call "2022-06-16 21-46-41.zc" collected at King7, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

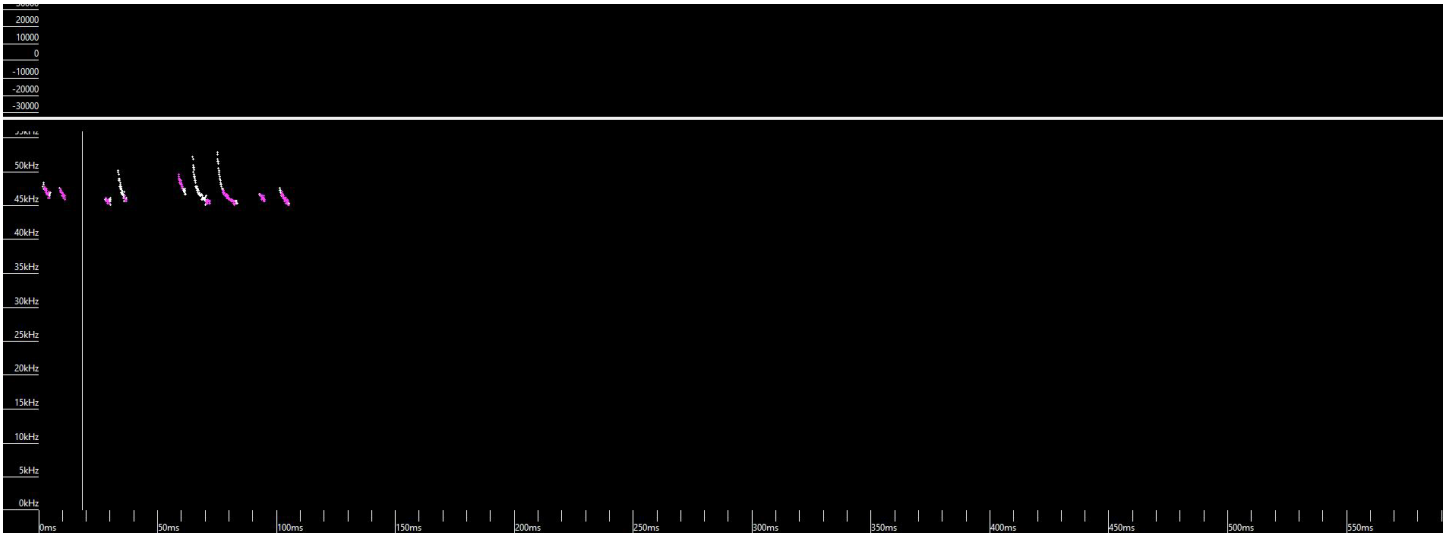


Figure 30. Call "W6162212.04#" collected at King6, classified as MYGR by Kaleidoscope. Insufficient data to make determination. Pulses indicate slow decrease in slope, uncharacteristic of gray bats.

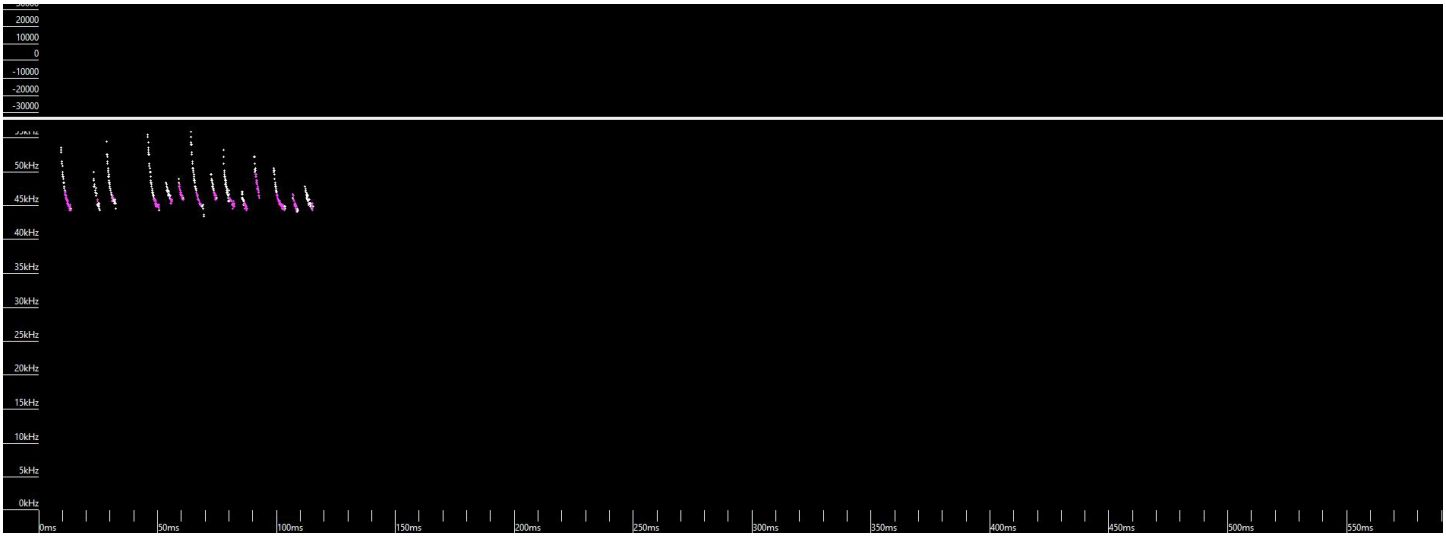


Figure 31. Call "2022-06-17 02-05-28.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination, though variation across pulses indicative of red bat.

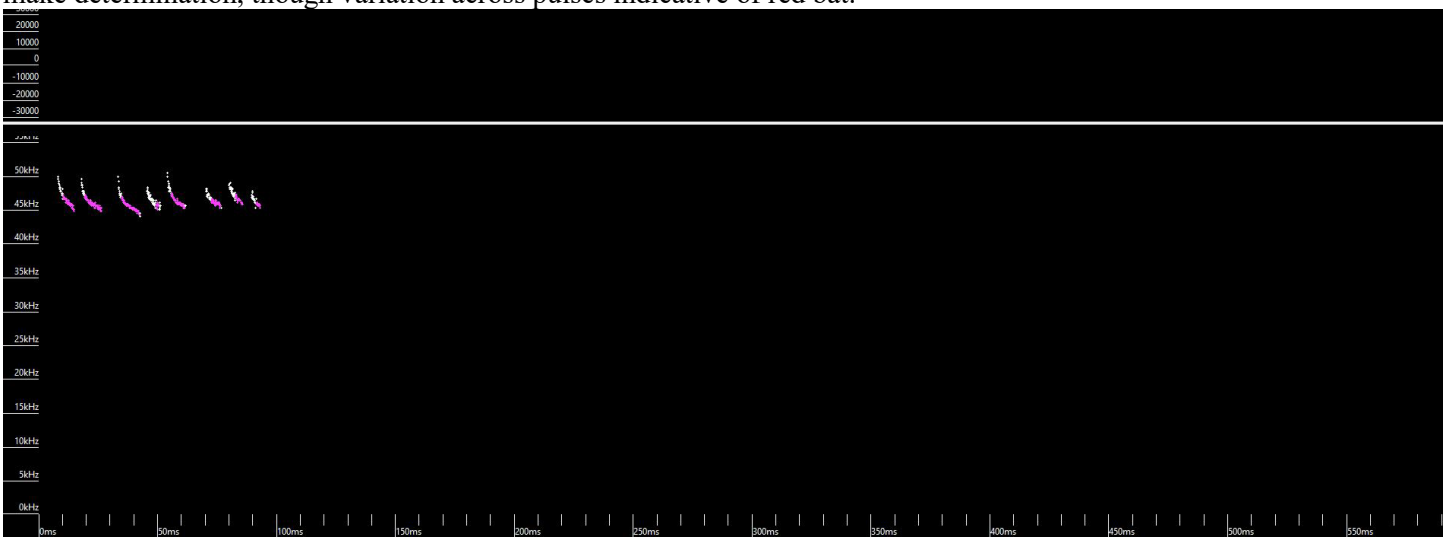


Figure 32. Call "2022-06-23 22-36-46.zc" collected at King7 classified as MYGR by Kaleidoscope. Duration of call more indicative of tricolored bat.

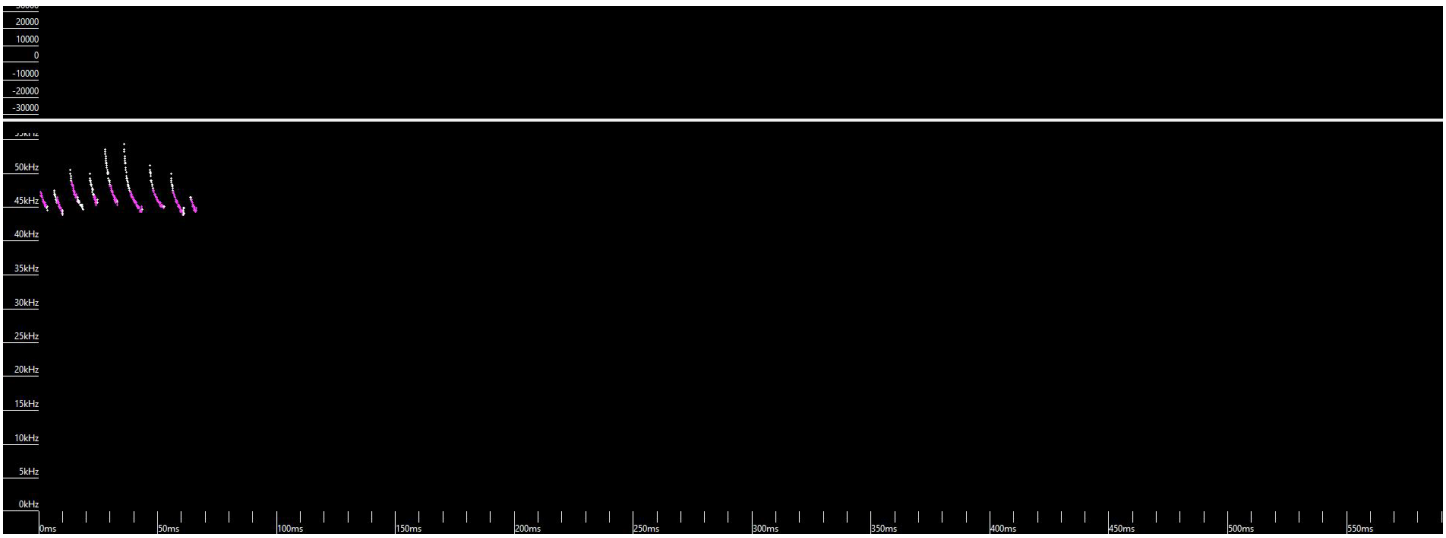


Figure 33. Call "2022-06-12 03-04-20.zc" collected at King1, classified as MYGR by Kaleidoscope. Insufficient data to make determination. Variation in Fc and shape indicative of red bat.

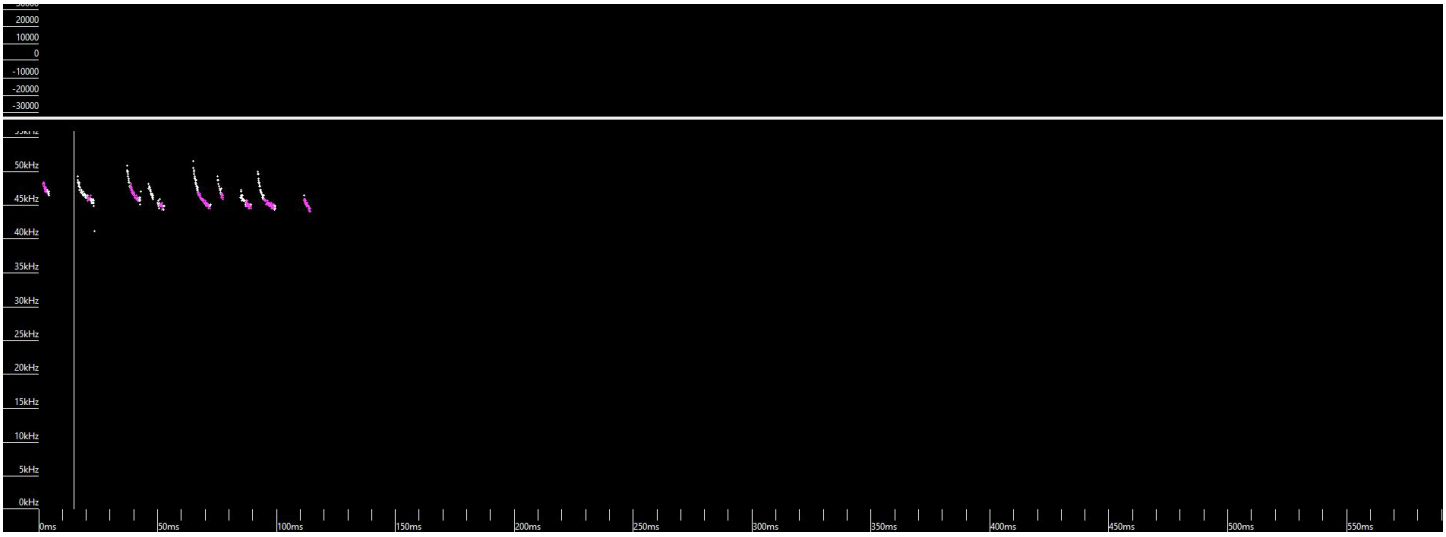


Figure 34. Call "W6162228.42#" collected at King 6, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

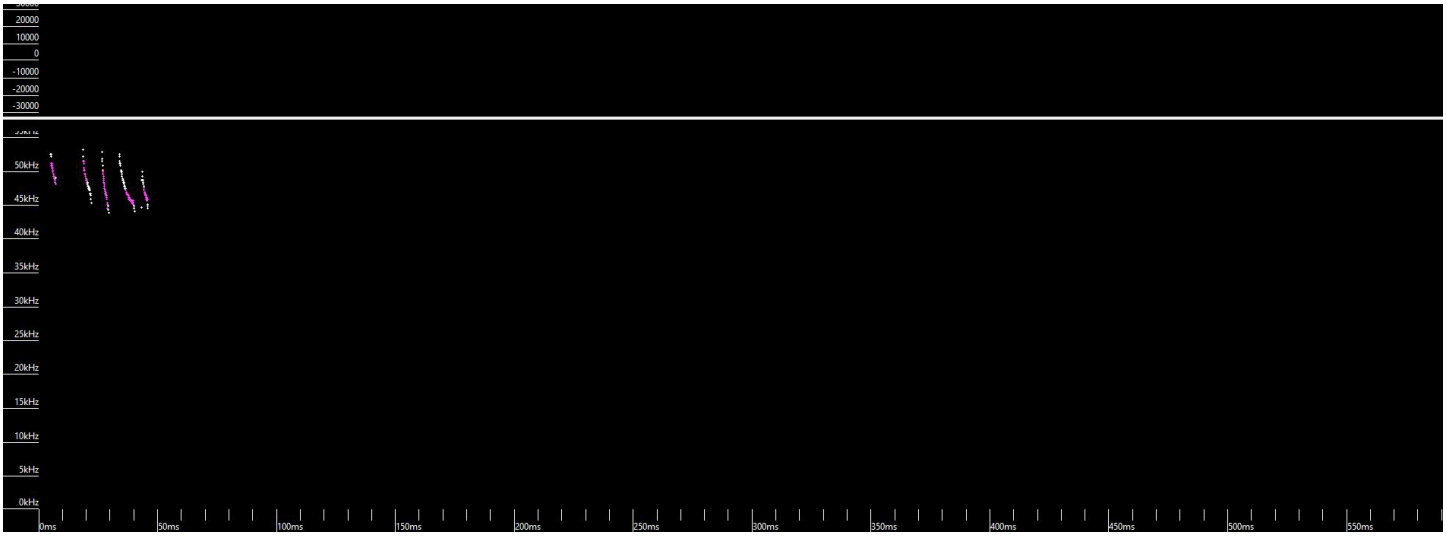


Figure 35. Call "2022-06-19 23-11-36.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

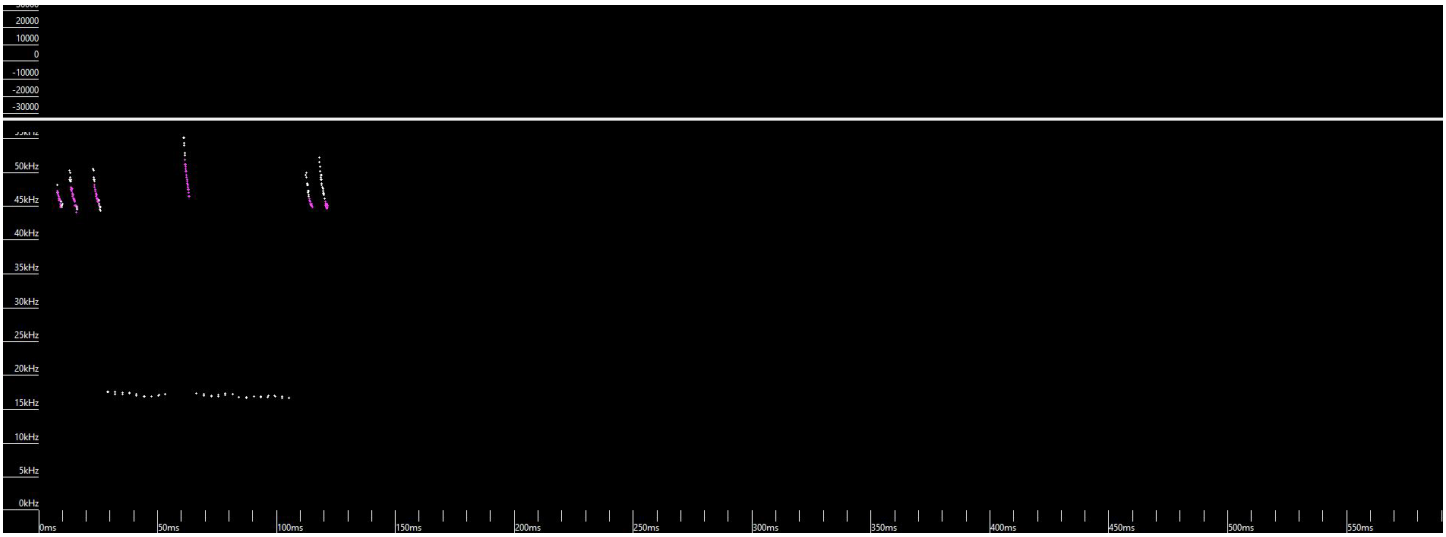


Figure 36. Call "2022-06-17 02-04-35.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

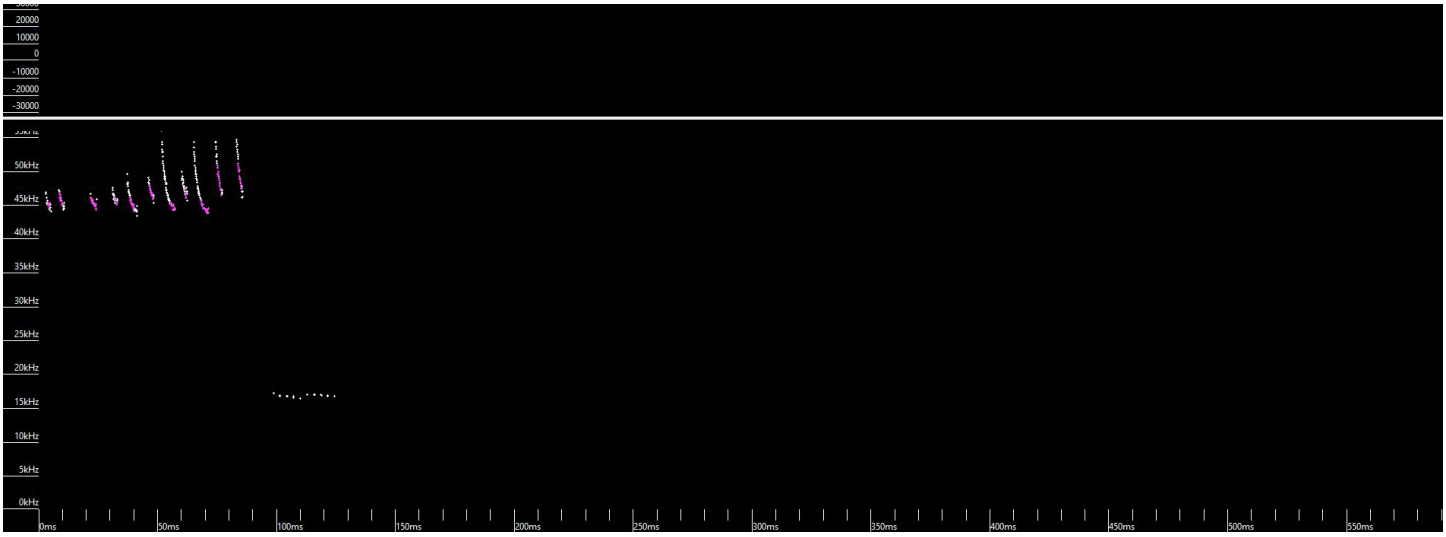


Figure 37. Call "2022-06-17 02-30-36.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination, though variation in Fc throughout sequence indicative of red bat.

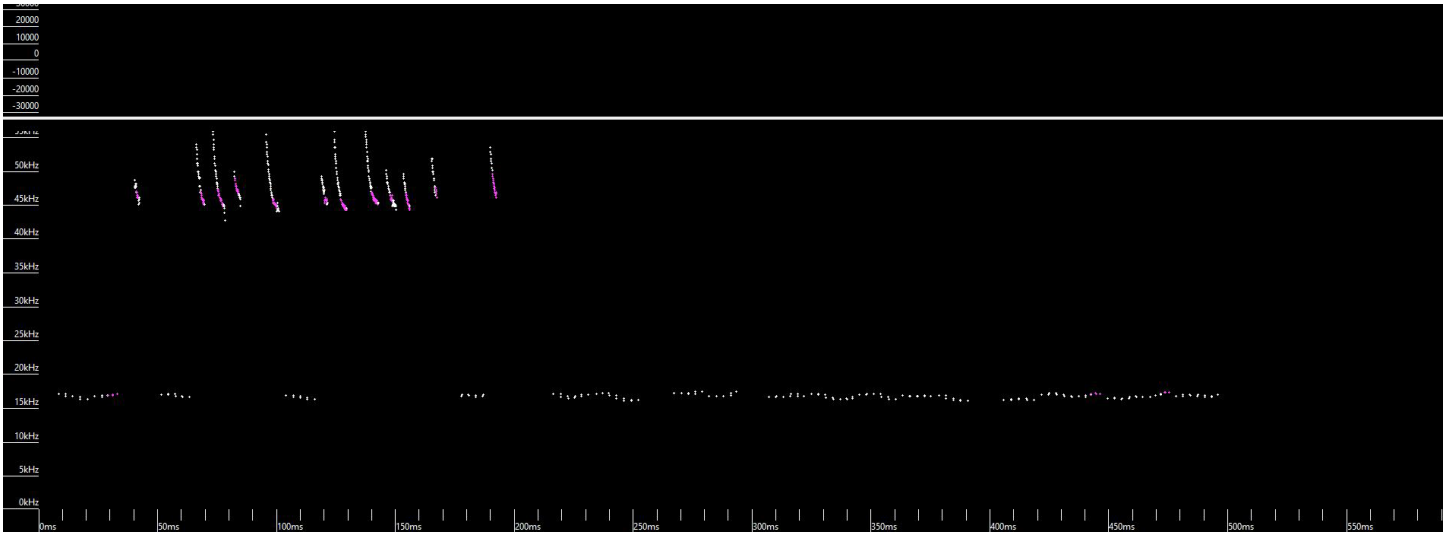


Figure 38. Call "2022-06-17 02-00-00.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

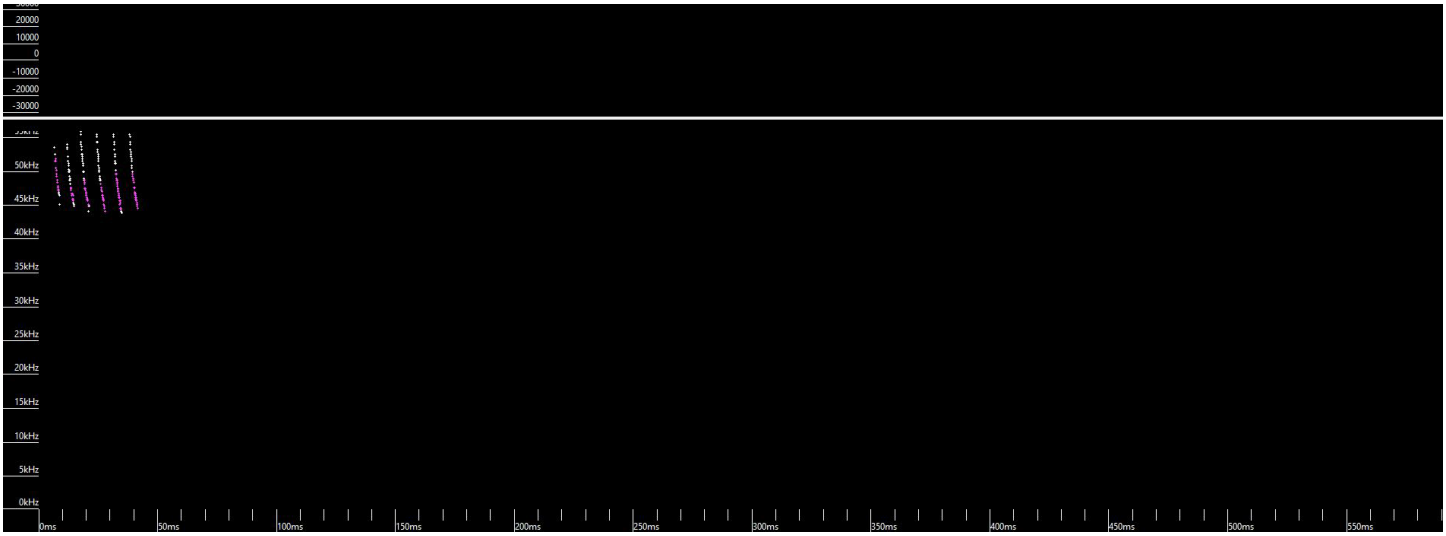


Figure 39. Call "2022-06-18 02-54-27.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

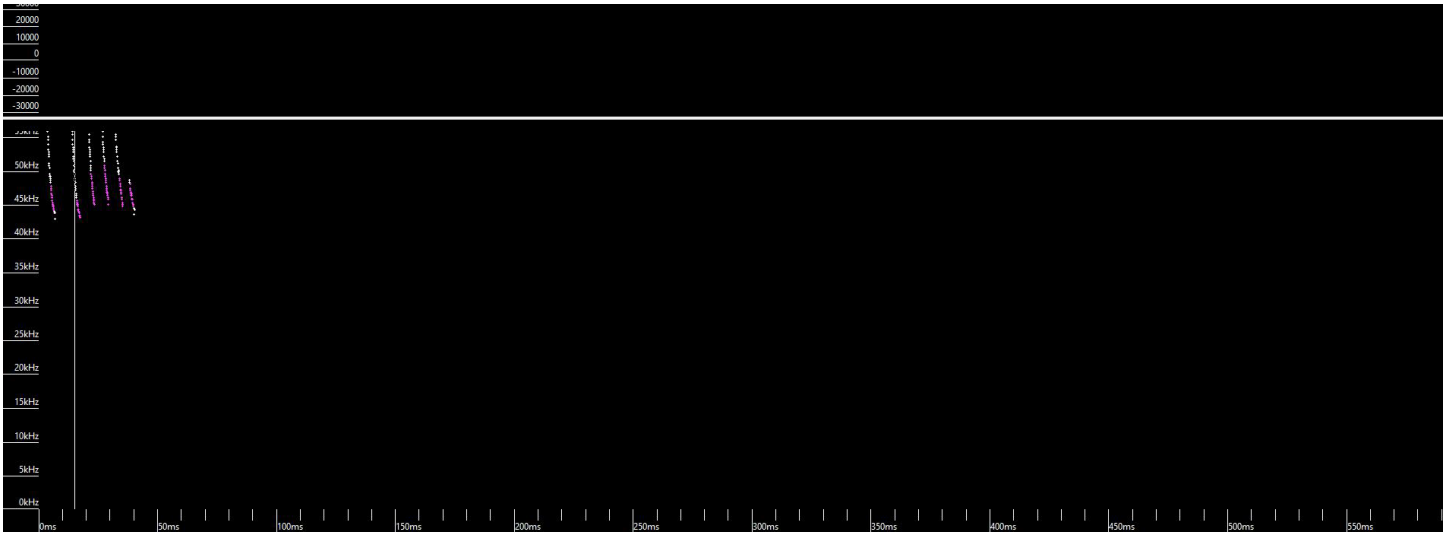


Figure 40. Call "2022-06-25 04-45-43.zc" collected at King9, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

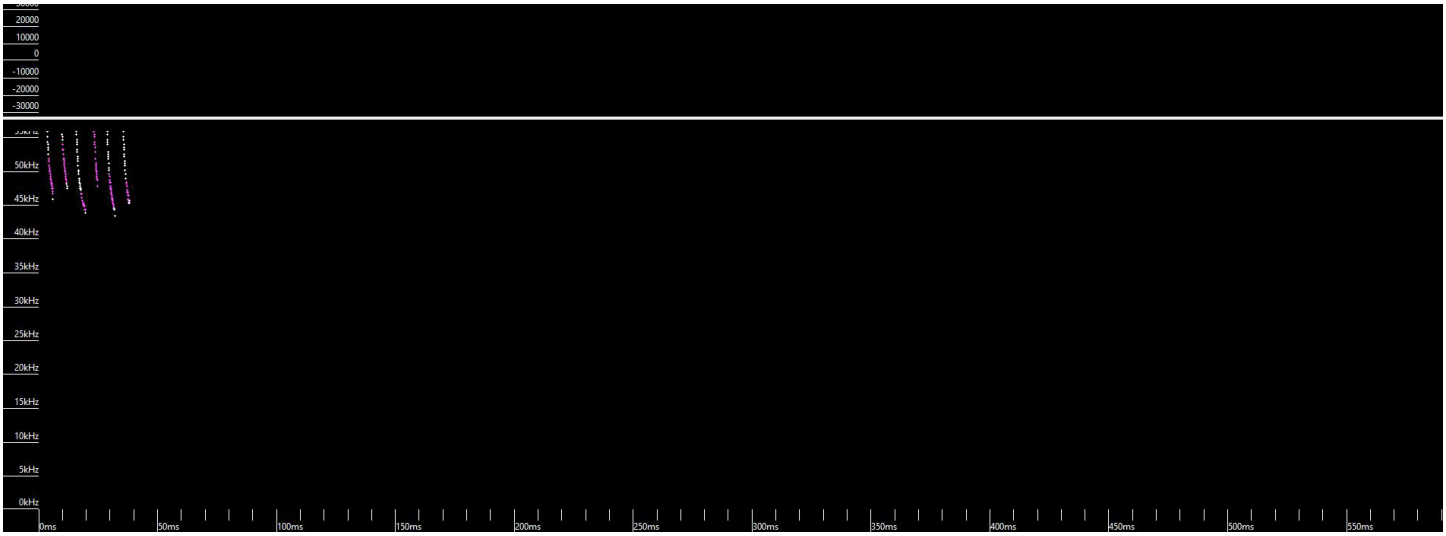


Figure 41. Call "2022-06-29 04-56-50.zc" collected at King9, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

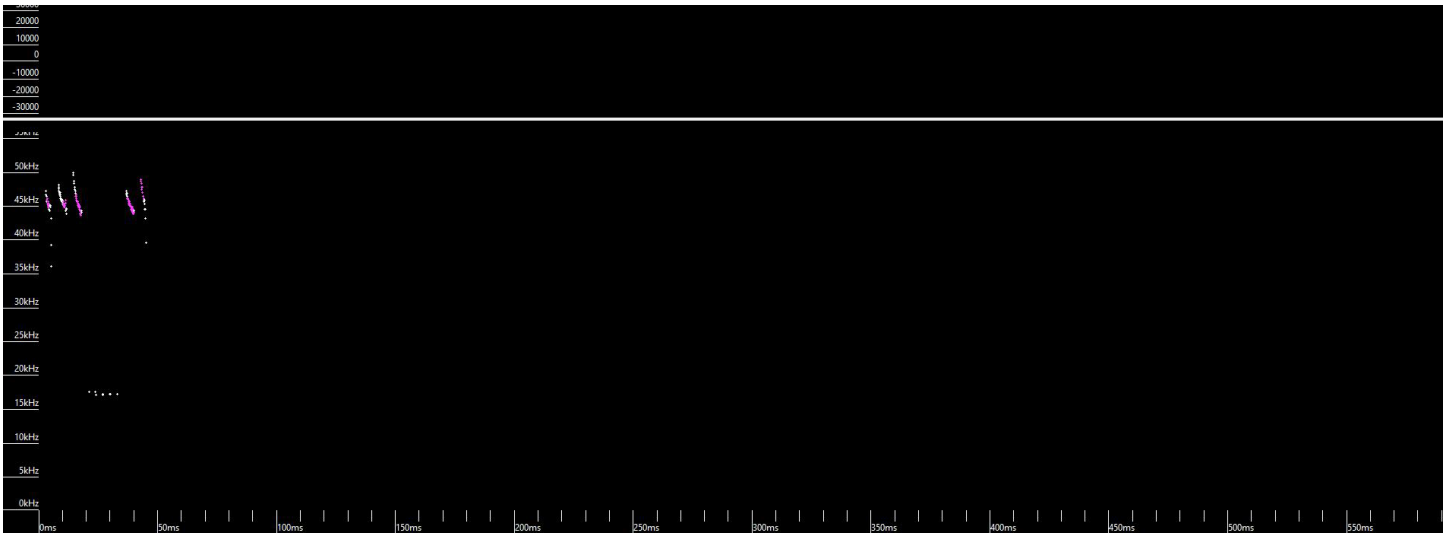


Figure 42. Call "2022-06-17 02-27-12.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

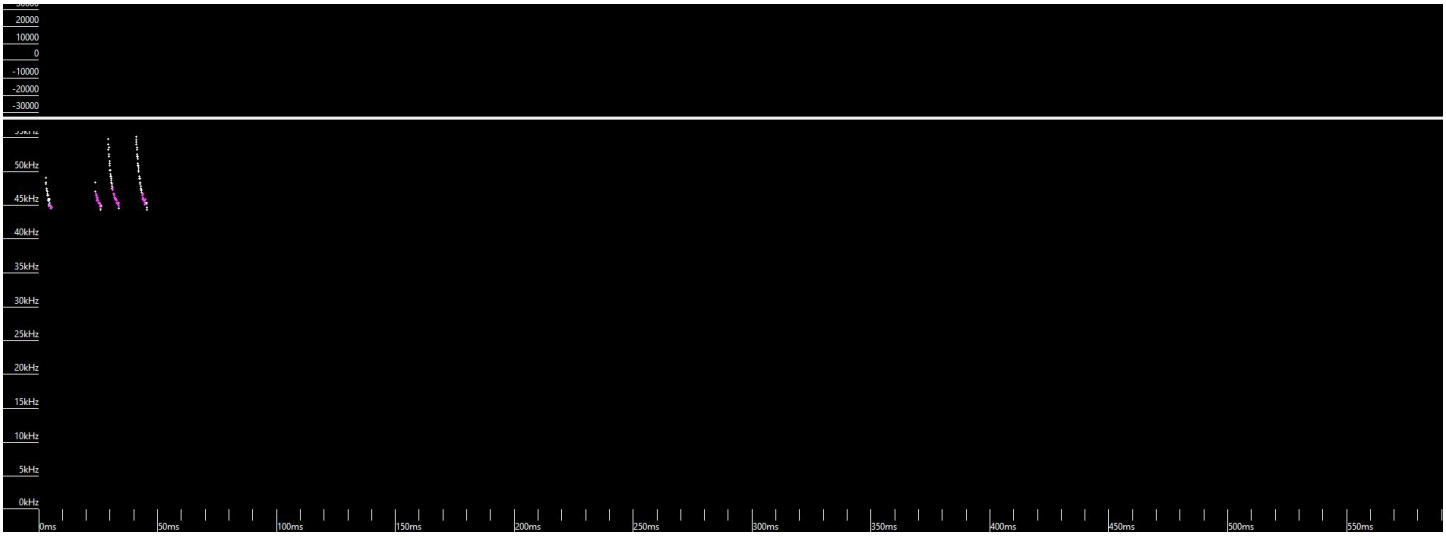


Figure 43. Call "2022-06-17 02-05-24.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

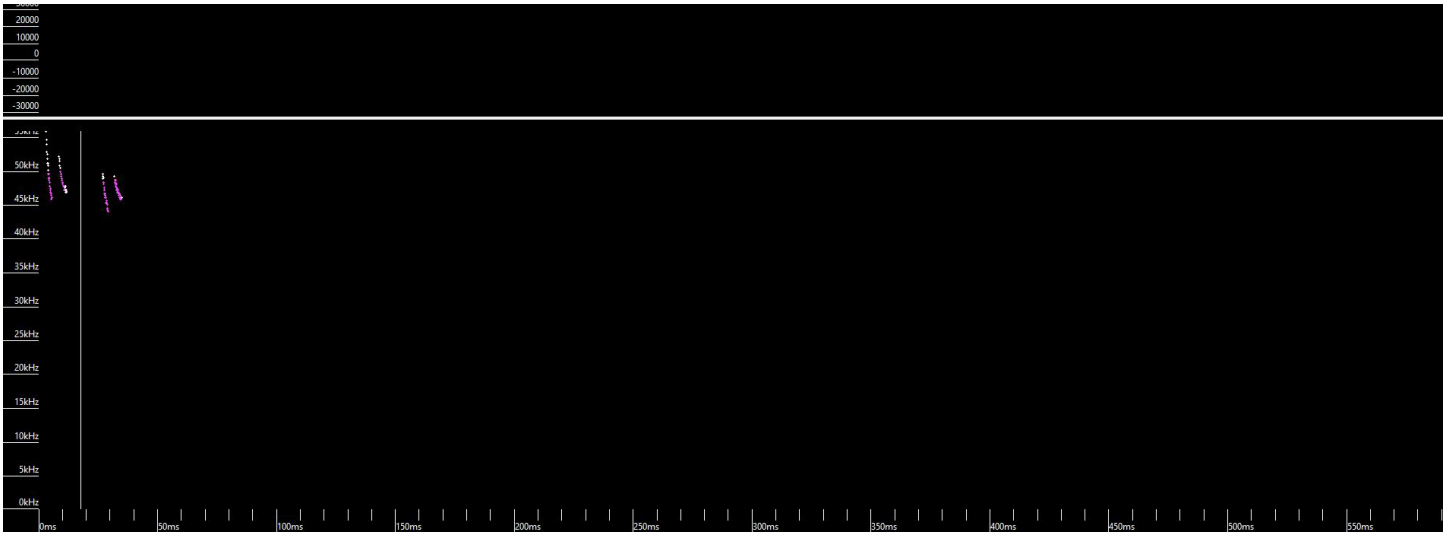


Figure 44. Call "2022-06-19 23-12-45.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

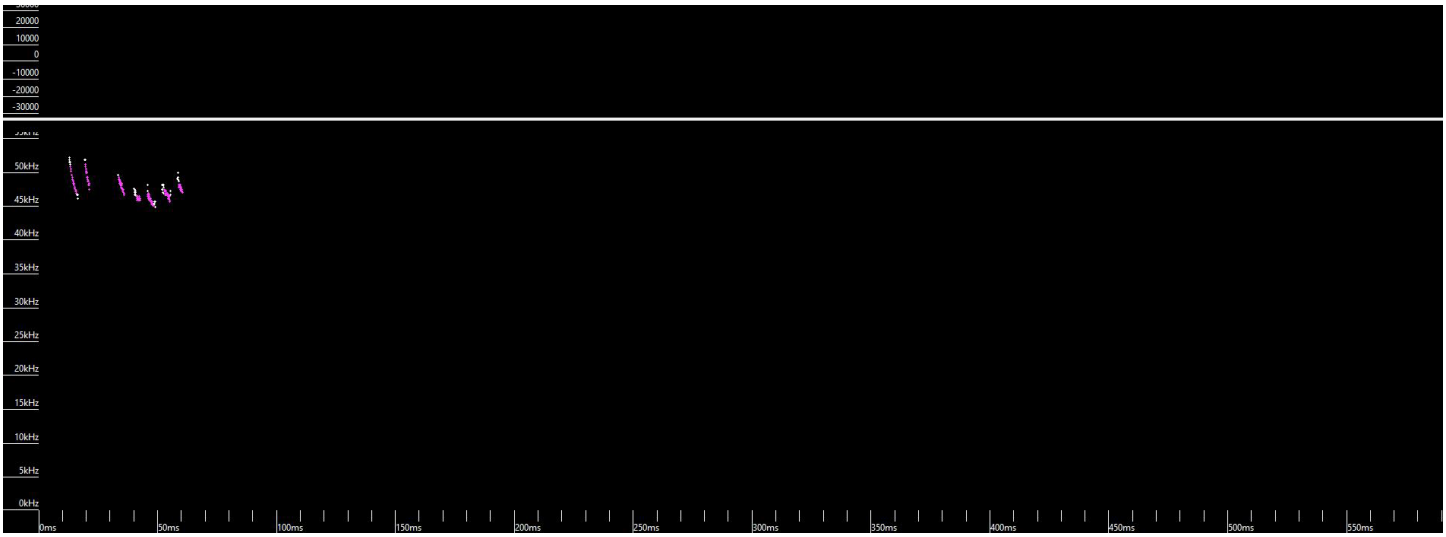


Figure 45. Call "2022-06-23 22-16-51.zc" collected at King7, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

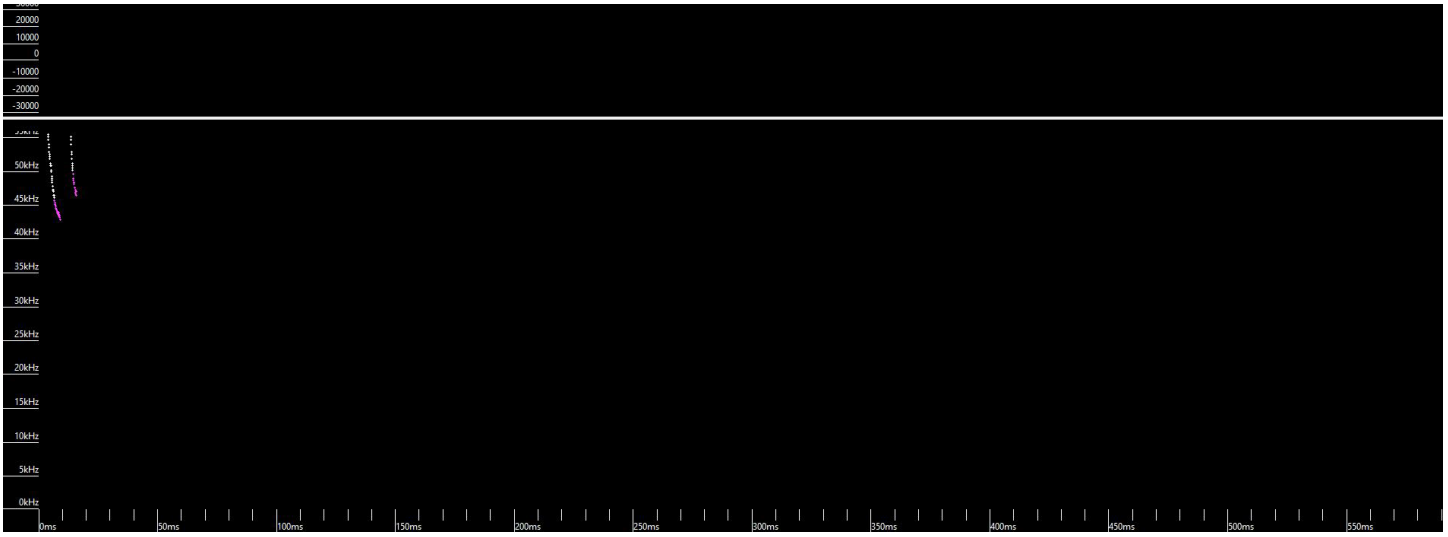


Figure 46. Call "2022-06-10 00-30-06.zc" collected at King1, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

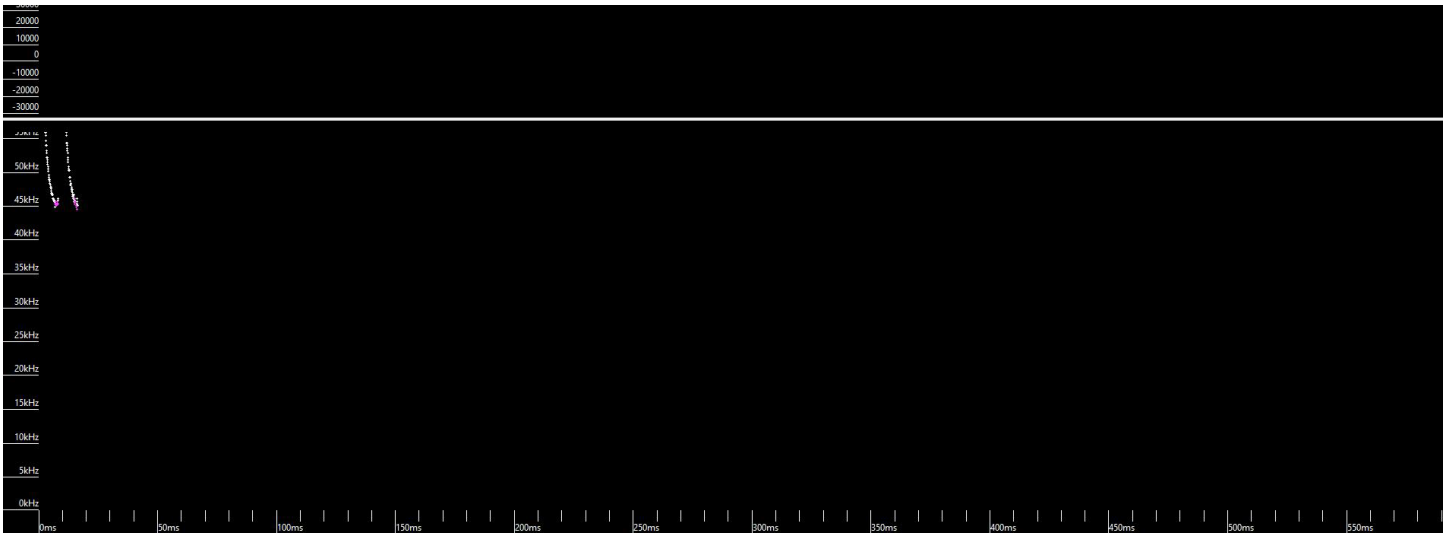


Figure 47. Call "2022-06-19 22-59-05.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

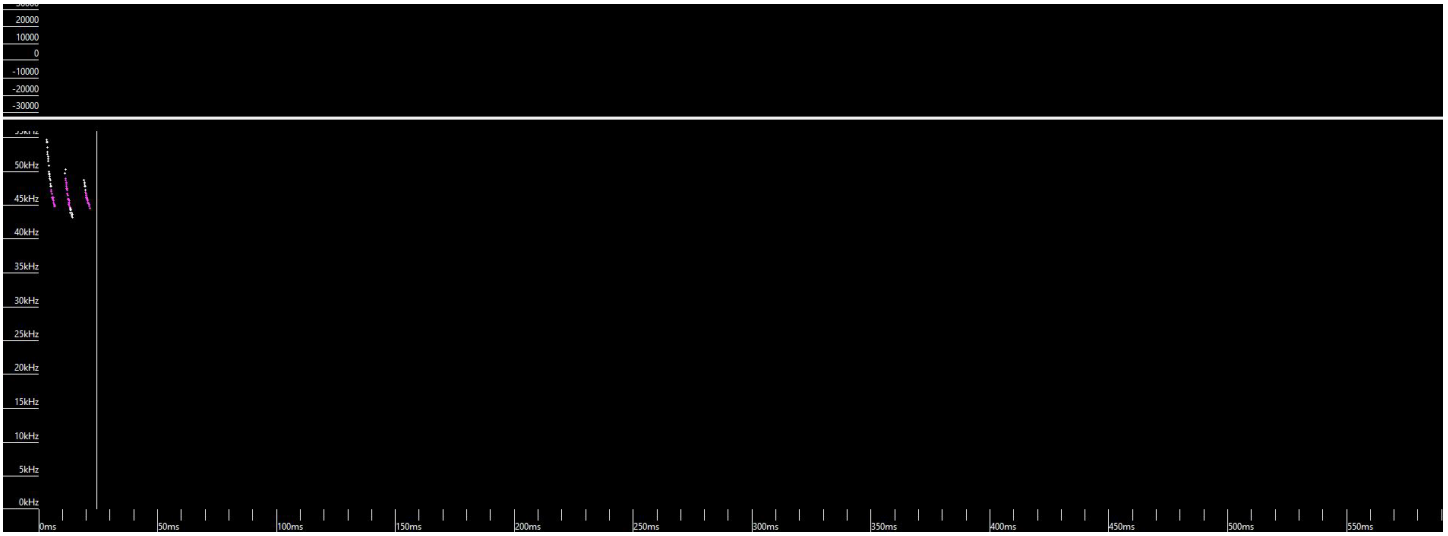


Figure 48. Call "2022-06-18 02-24-48.zc" collected at King3, classified as MYGR by Kaleidoscope. Insufficient data to make determination.

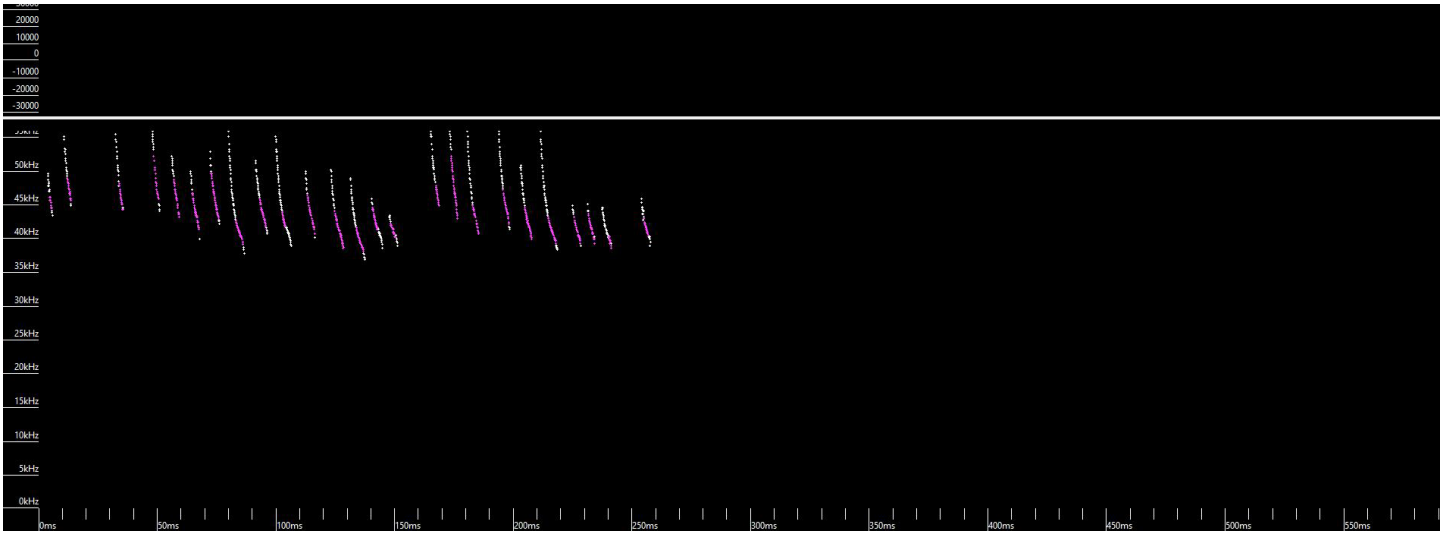


Figure 49. Call "2022-06-13 02-00-30.zc" collected at King5, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat.

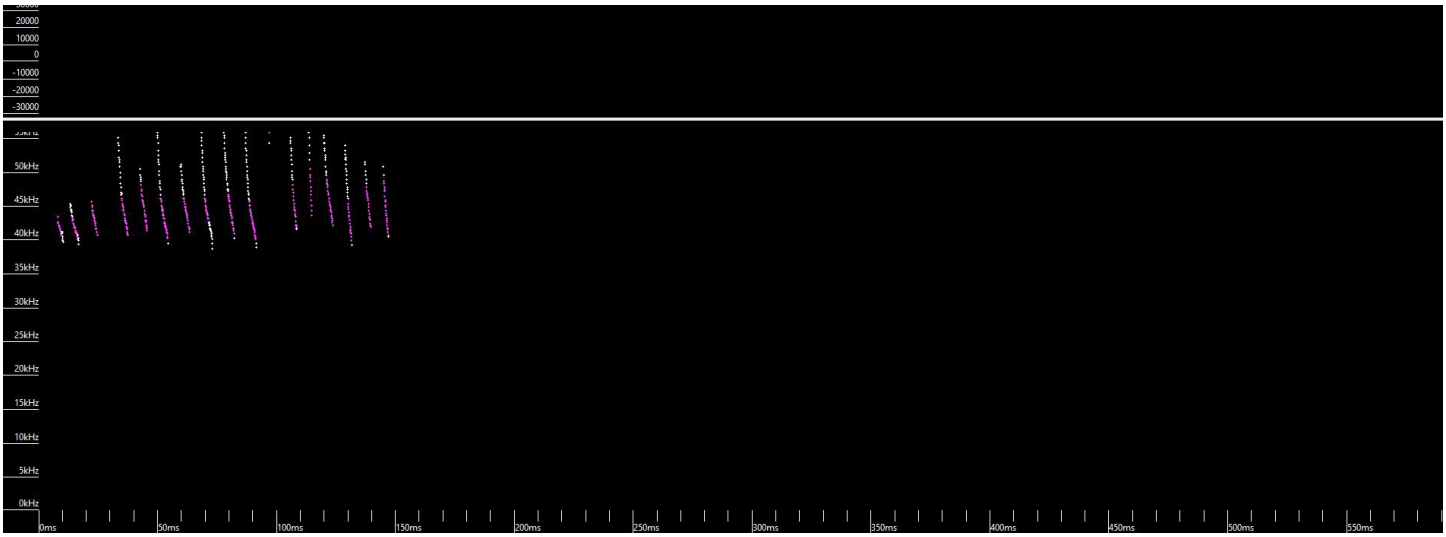


Figure 50. Call "2022-06-09 22-50-18.zc" collected at King4, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat.

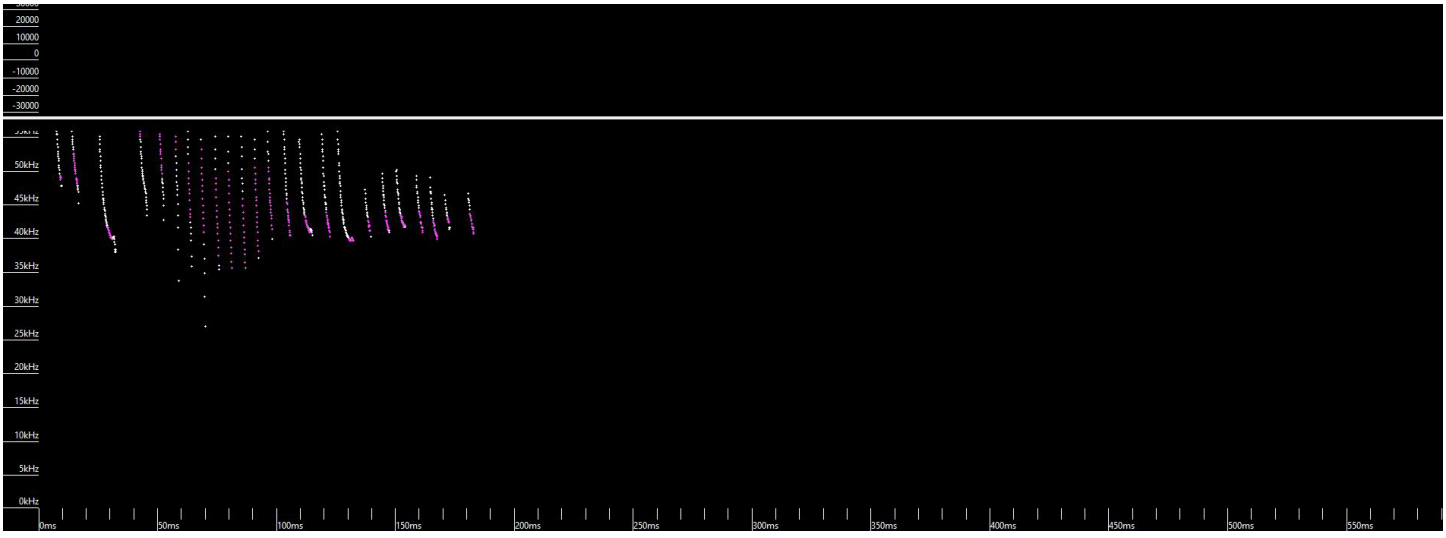


Figure 51. Call "2022-06-16 21-46-40.zc" collected at King3, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat.

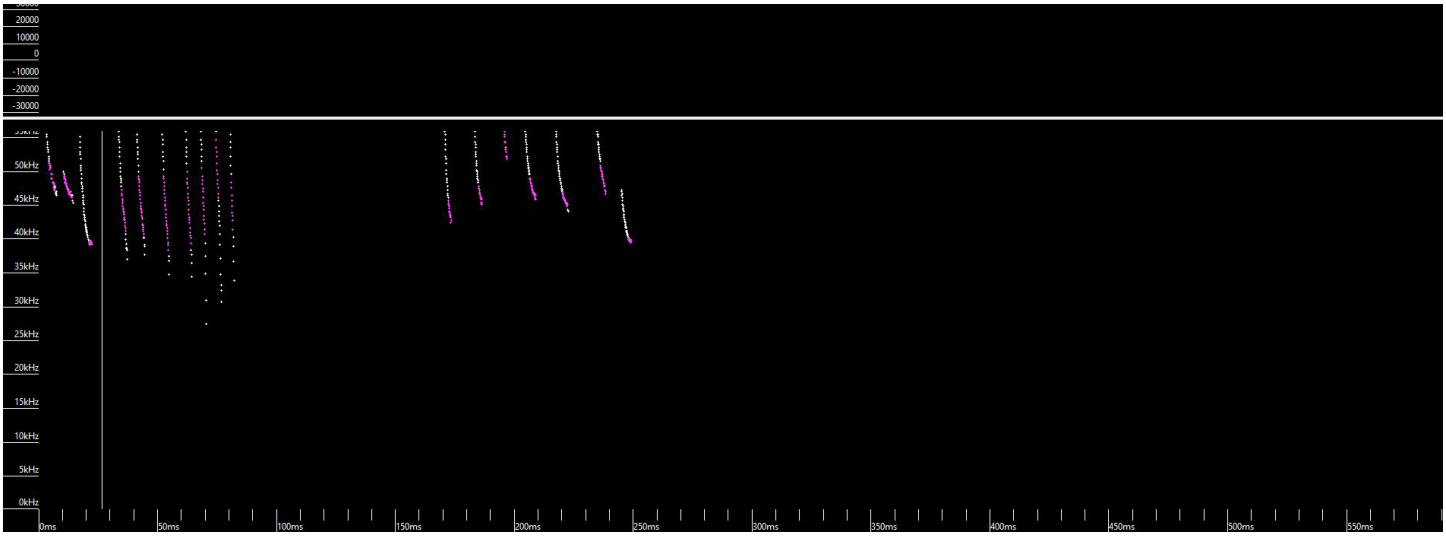


Figure 52. Call "2022-06-30 02-19-20.zc" collected at King9, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call inconsistent with little brown bat.

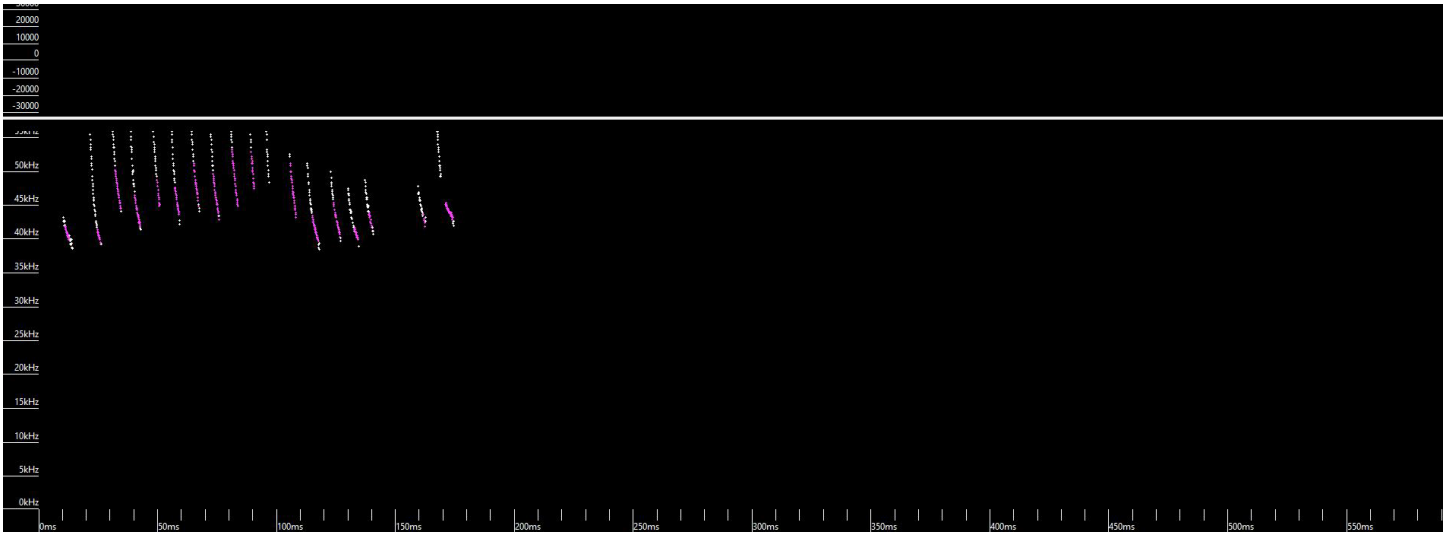


Figure 53. Call "2022-06-09 22-58-03.zc" collected at King5, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat.

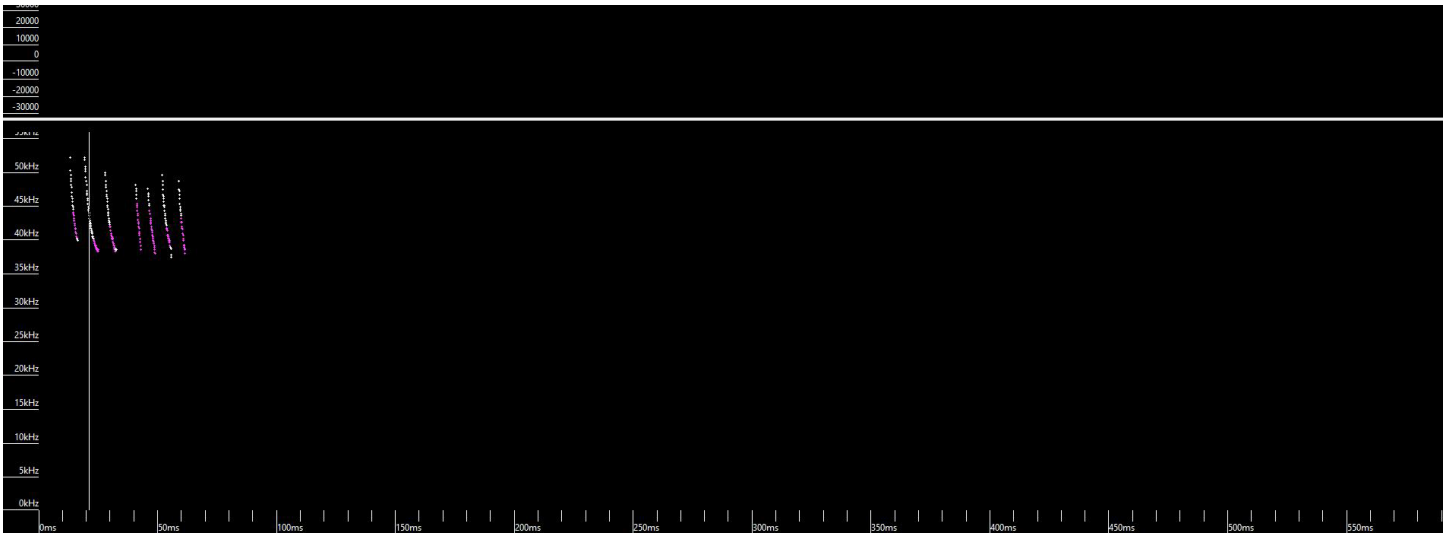


Figure 54. Call "2022-06-10 05-21-03.zc" collected at King4, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat, but insufficient data to make determination.

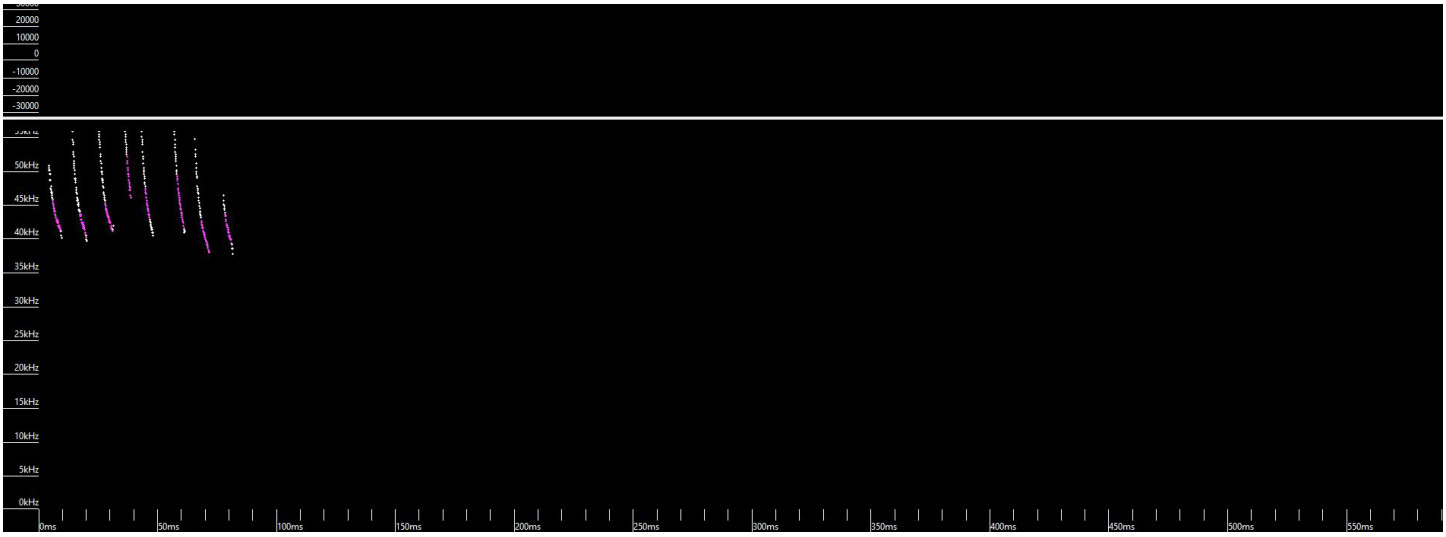


Figure 55. Call "2022-06-09 22-52-42.zc" collected at King5, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat.

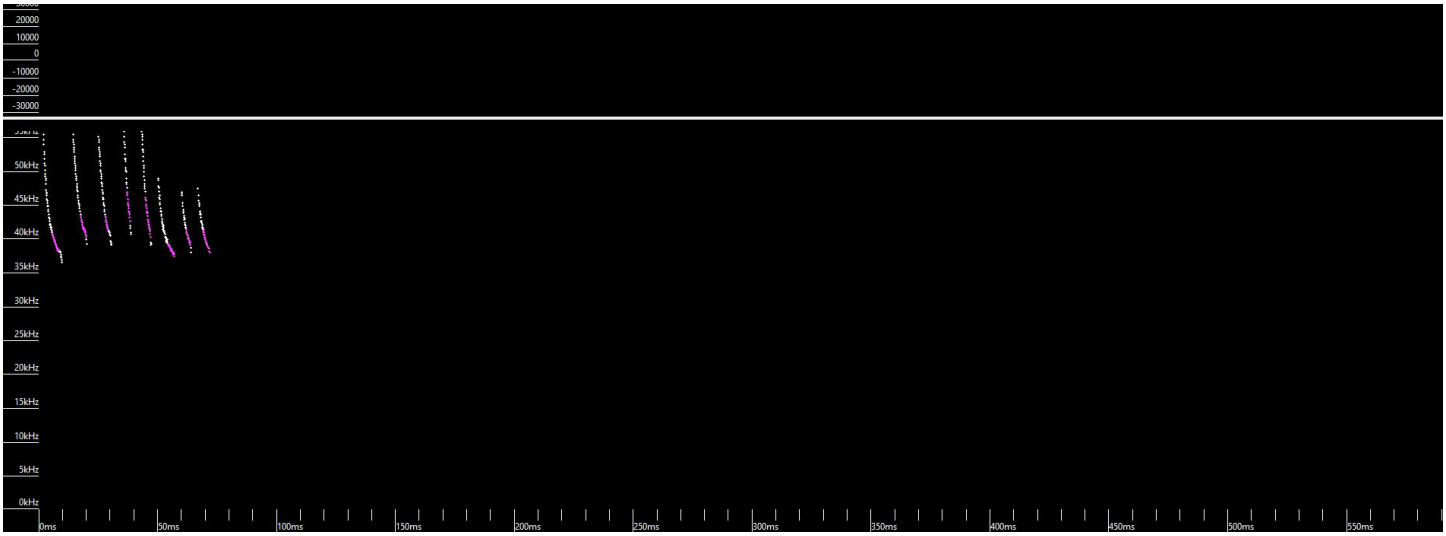


Figure 56. Call "W6172227.04#" collected at King6, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat.

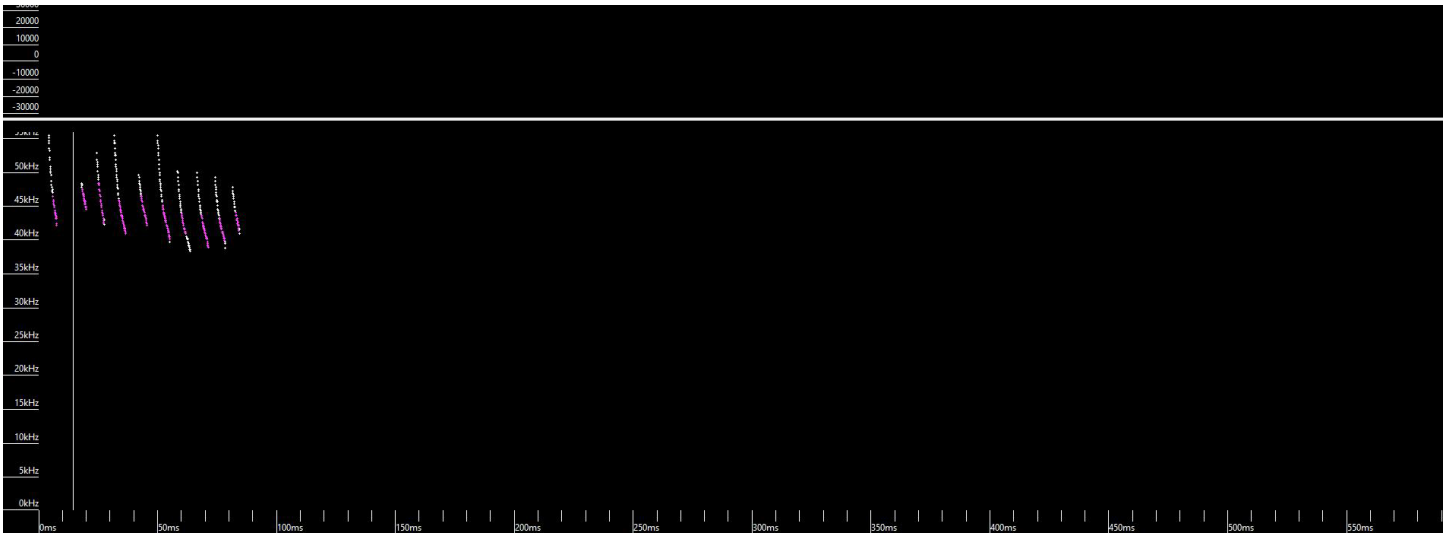


Figure 57. Call "2022-06-10 21-31-37.zc" collected at King5, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat.

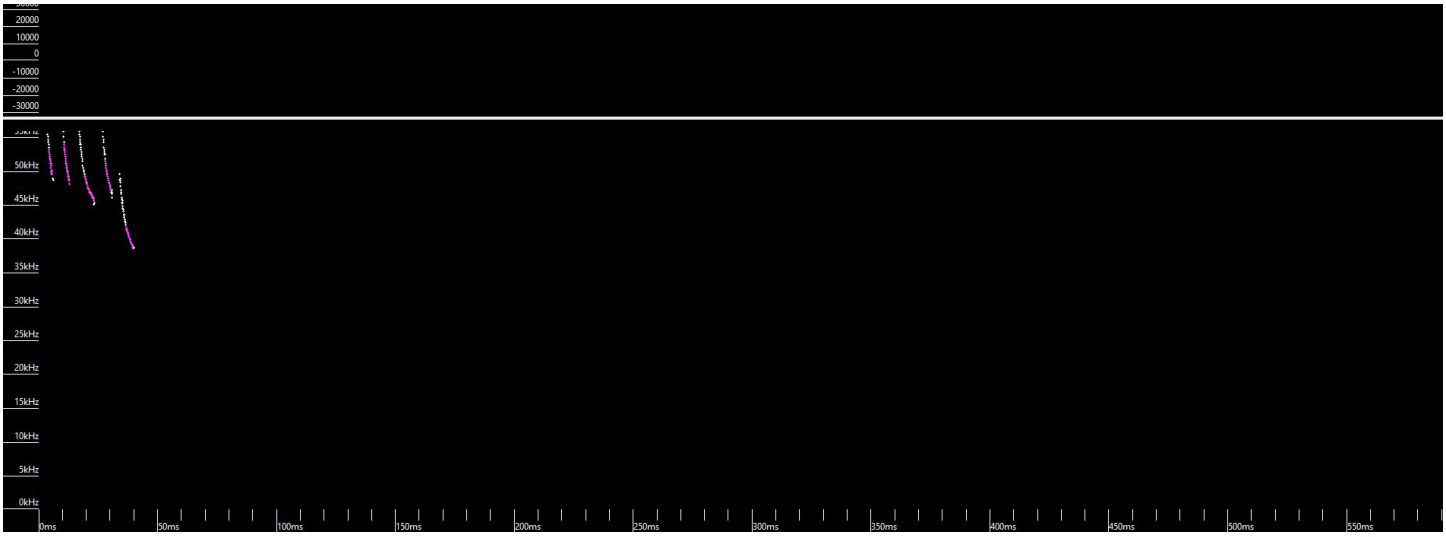


Figure 58. Call "2022-06-30 02-17-58.zc" collected at King9, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat.

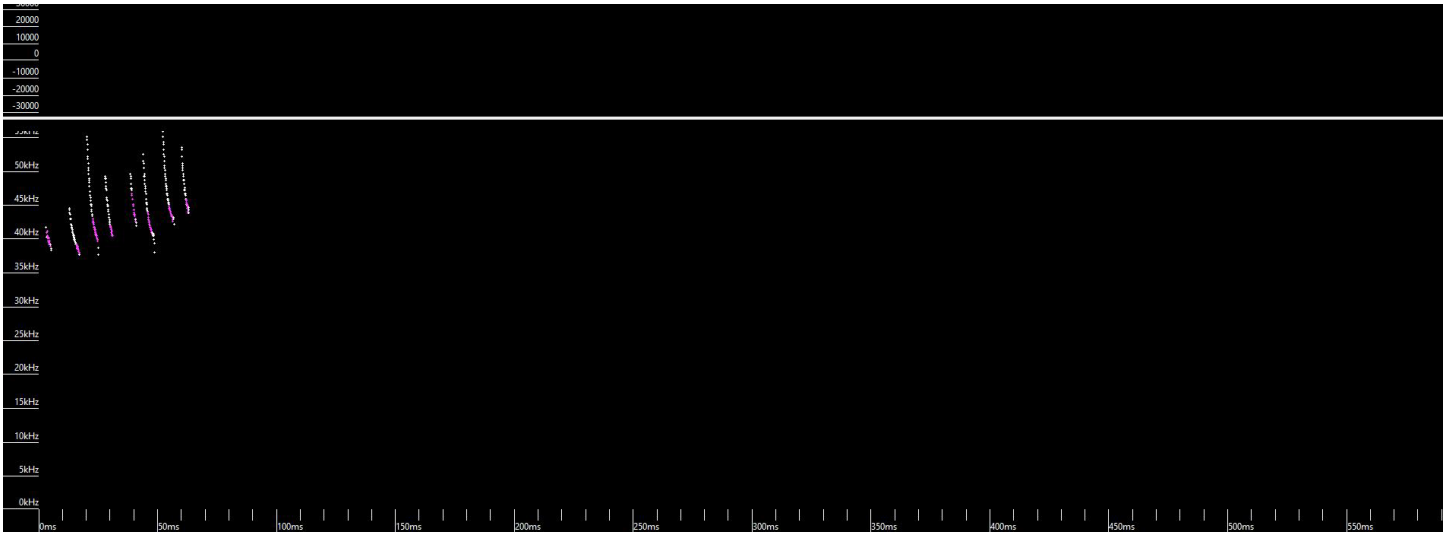


Figure 59. Call "2022-06-29 21-18-25.zc" collected at King9, classified as MYLU by Kaleidoscope. Variation of Fc and shape across call indicative of red bat.

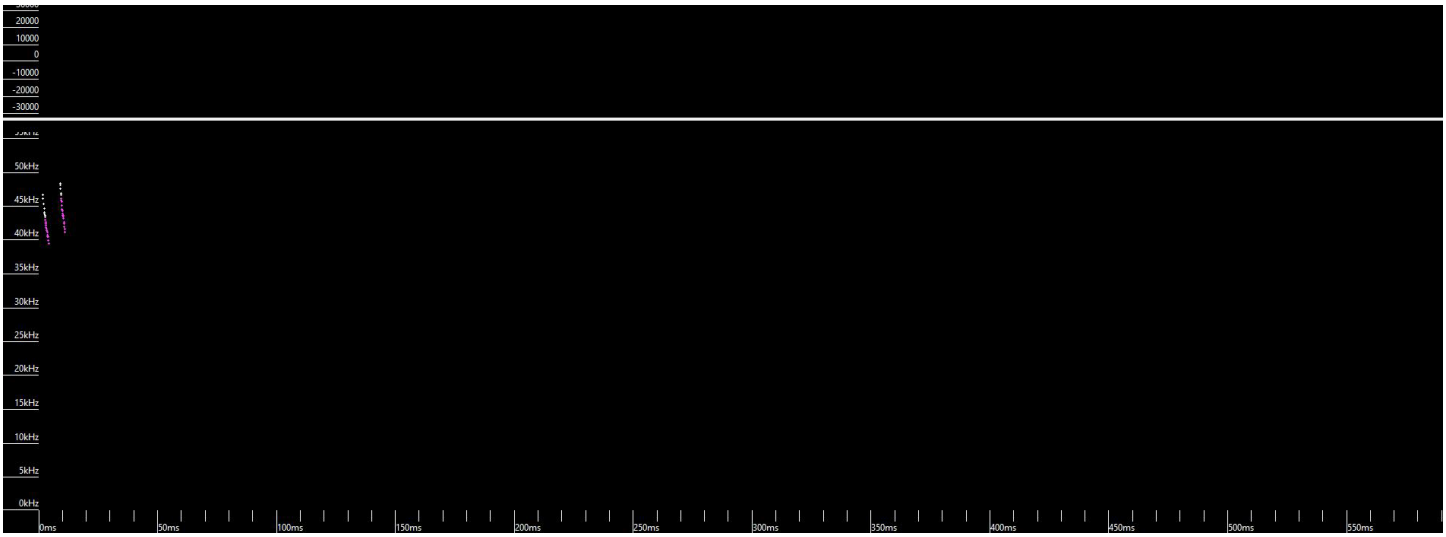


Figure 60. Call "2022-06-20 21-27-47.zc" collected at King14, classified as MYLU by Kaleidoscope. Insufficient data to make determination.

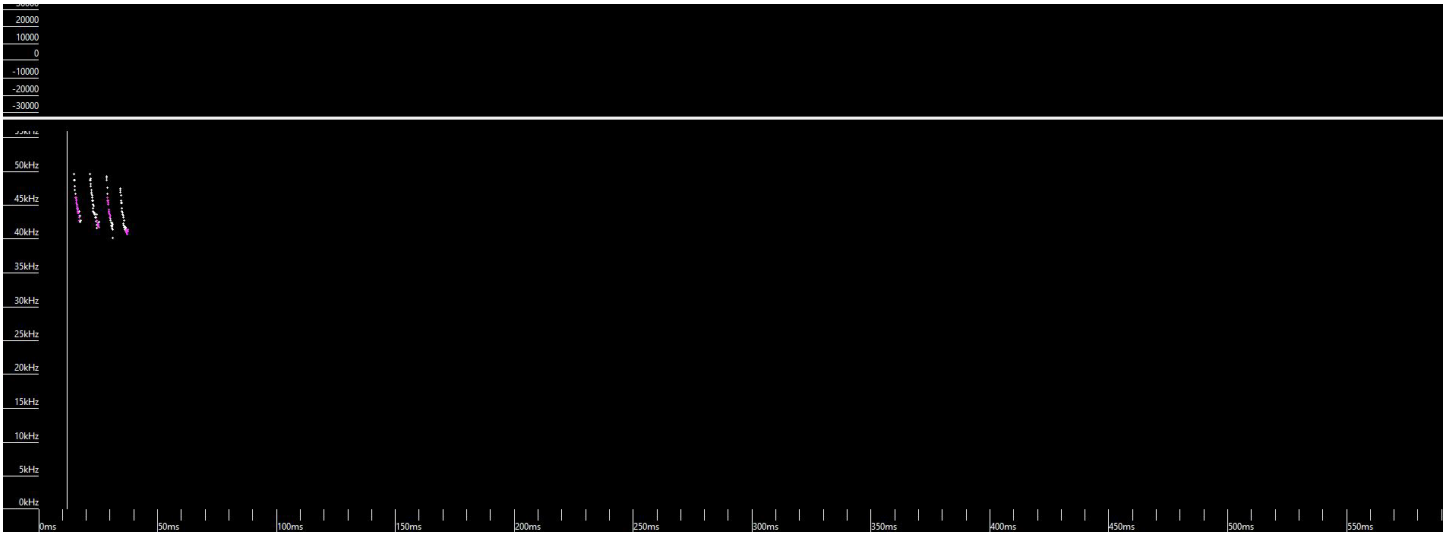


Figure 61. Call "2022-06-15 00-07-42.zc" collected at King3, classified as MYLU by Kaleidoscope. Insufficient data to make determination.

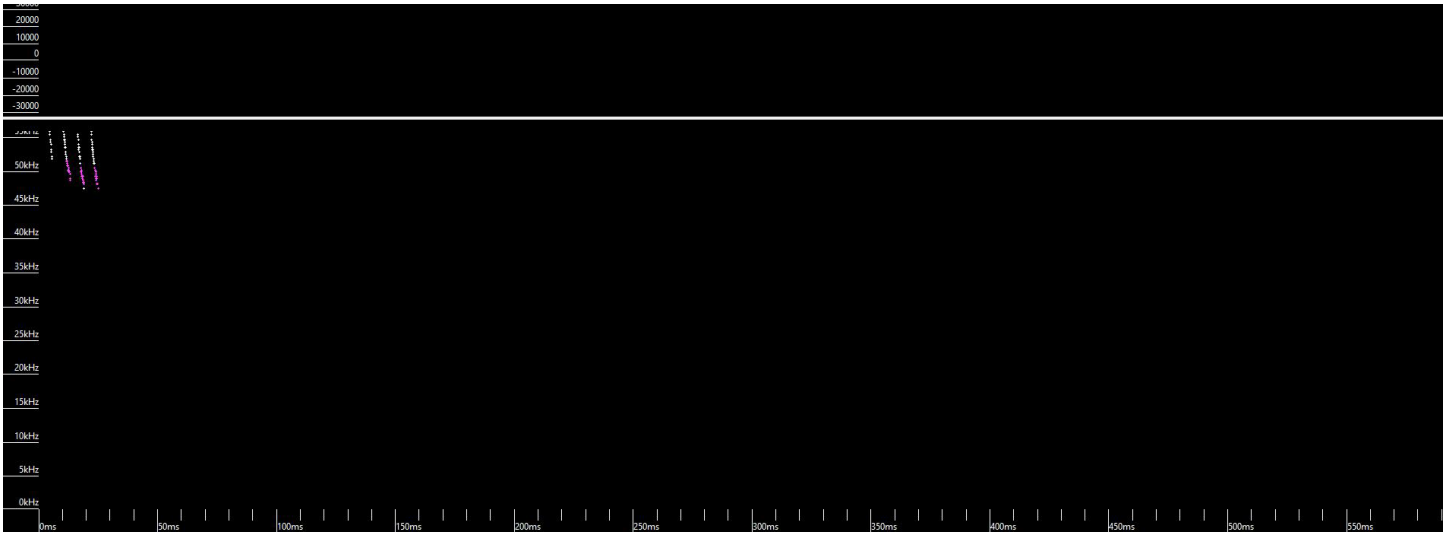


Figure 62. Call "2022-06-30 02-17-55.zc" collected at King9, classified as MYLU by Kaleidoscope. Insufficient data to make determination.

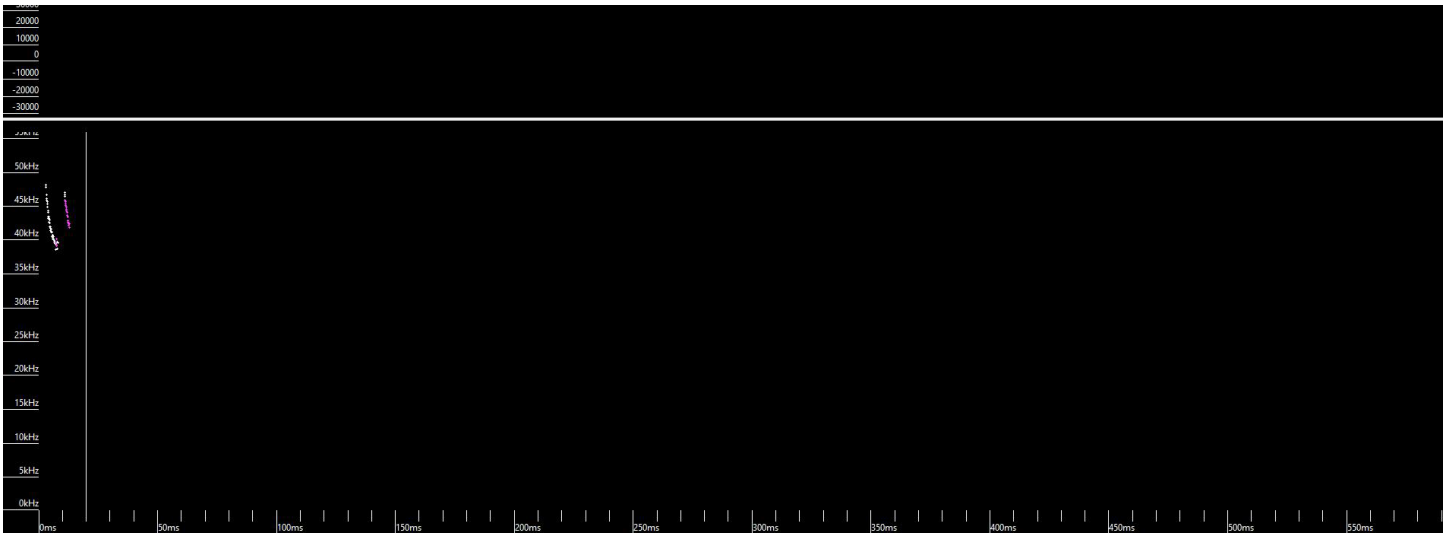


Figure 63. Call "2022-06-23 22-25-42.zc" collected at King9, classified as MYLU by Kaleidoscope. Insufficient data to make determination.

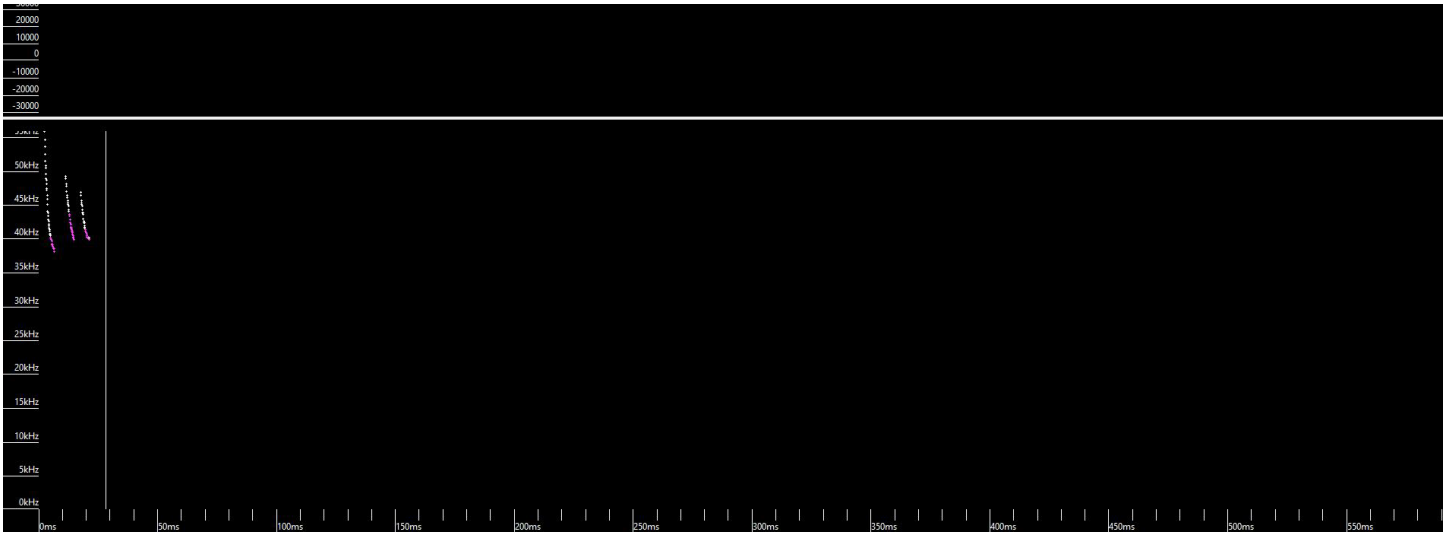


Figure 64. Call “W6190101.24#” collected at King9, classified as MYLU by Kaleidoscope. Insufficient data to make determination.

APPENDIX D

Weather Log

Survey Night	Sunset	Sunrise	Date and Time	Temperature (F)	Precipitation (inches)	Wind Speed (mph)	Comment
6/8/2022	20:38	6:10	6/7, 20:00	77.9	0	3.4	Valid
			6/7, 21:00	74.9	0	2.3	
			6/7, 22:00	72.8	0	0	
			6/7, 23:00	70.5	0	0	
			6/8, 00:00	69.1	0	0.5	
			6/8, 01:00	68.6	0	1	
			6/8, 02:00	68.1	0	0	
			6/8, 03:00	67.5	0	0	
			6/8, 04:00	66.7	0	0	
			6/8, 05:00	66.7	0	0	
			6/8, 06:00	66.8	0	0	
			6/8, 07:00	67.6	0	0	
6/9/2022	20:38	6:10	6/8, 20:00	79.8	0	5.4	Valid
			6/8, 21:00	77.9	0	4.9	
			6/8, 22:00	75.8	0	5.3	
			6/8, 23:00	75.2	0	4.4	
			6/9, 00:00	75	0	6	
			6/9, 01:00	74.3	0	5.6	
			6/9, 02:00	73.9	0	3.6	
			6/9, 03:00	73.2	0	4.9	
			6/9, 04:00	72	0	1.7	
			6/9, 05:00	71.1	0	3.8	
			6/9, 06:00	70.7	0	3.6	
			6/9, 07:00	70.4	0	4.5	
6/10/2022	20:39	6:10	6/9, 20:00	80.6	0	5.6	Valid
			6/9, 21:00	77.3	0	5.3	
			6/9, 22:00	74.5	0	5.8	
			6/9, 23:00	72.2	0	4.9	
			6/10, 00:00	69.6	0	4.2	
			6/10, 01:00	66.3	0	0.6	
			6/10, 02:00	65.7	0	4.7	
			6/10, 03:00	63.3	0	4.1	
			6/10, 04:00	63.7	0	4.9	
			6/10, 05:00	62.6	0	4.2	
			6/10, 06:00	60.7	0	4.2	
			6/10, 07:00	62.9	0	5.4	
6/11/2022	20:39	6:10	6/10, 20:00	73.4	0	0.7	Valid
			6/10, 21:00	70.5	0	0	
			6/10, 22:00	67.4	0	0.7	
			6/10, 23:00	66.4	0	0	
			6/11, 00:00	65.9	0	0	
			6/11, 01:00	66.6	0	1.5	
			6/11, 02:00	66.4	0	0	
			6/11, 03:00	64.2	0	1	
			6/11, 04:00	63.6	0	0	

Survey Night	Sunset	Sunrise	Date and Time	Temperature (F)	Precipitation (inches)	Wind Speed (mph)	Comment
			6/11, 05:00	61	0	0	
			6/11, 06:00	61.9	0	0.6	
			6/11, 07:00	62.2	0	0	
6/12/2022	20:39	6:10	6/11, 20:00	79	0	0	Valid
			6/11, 21:00	74.8	0	0.6	
			6/11, 22:00	74.7	0	2.7	
			6/11, 23:00	73.6	0	6.1	
			6/12, 00:00	73	0	3.6	
			6/12, 01:00	72.5	0	4.4	
			6/12, 02:00	71.6	0	3.4	
			6/12, 03:00	70.7	0	0	
			6/12, 04:00	69.4	0	0	
			6/12, 05:00	68.5	0	0	
			6/12, 06:00	67.3	0	0	
			6/12, 07:00	68.6	0	0	
6/13/2022	20:40	6:10	6/12, 20:00	84.6	0	0.7	Valid
			6/12, 21:00	80.1	0	0.7	
			6/12, 22:00	78.2	0	0	
			6/12, 23:00	75.1	0	0.6	
			6/13, 00:00	73.7	0	0.7	
			6/13, 01:00	72.8	0	0	
			6/13, 02:00	71.5	0	0	
			6/13, 03:00	72.7	0	2.1	
			6/13, 04:00	71	0	0	
			6/13, 05:00	69.7	0	2.1	
			6/13, 06:00	69.6	0	2.1	
			6/13, 07:00	71.3	0	0	
6/14/2022	20:40	6:10	6/13, 20:00	86.7	0	1.2	Valid
			6/13, 21:00	84.6	0	0.7	
			6/13, 22:00	81.9	0	0.6	
			6/13, 23:00	80.7	0	0.7	
			6/14, 00:00	78	0	0	
			6/14, 01:00	76	0	2.1	
			6/14, 02:00	77.8	0	2.1	
			6/14, 03:00	77.2	0	0.7	
			6/14, 04:00	75.2	0	0	
			6/14, 05:00	74	0	0.6	
			6/14, 06:00	73.2	0	2	
			6/14, 07:00	76.5	0	7.5	
6/15/2022	20:41	6:10	6/14, 20:00	83.4	0	2.7	Valid
			6/14, 21:00	80.9	0	1.5	
			6/14, 22:00	78.1	0	2.1	
			6/14, 23:00	76.4	0	0.6	
			6/15, 00:00	75.5	0	2.1	

Survey Night	Sunset	Sunrise	Date and Time	Temperature (F)	Precipitation (inches)	Wind Speed (mph)	Comment
			6/15, 01:00	75.2	0	2.1	
			6/15, 02:00	73.9	0	0	
			6/15, 03:00	73.8	0	0	
			6/15, 04:00	72.9	0	0	
			6/15, 05:00	72.4	0	0	
			6/15, 06:00	71.8	0	0	
			6/15, 07:00	74.3	0	4.4	
6/16/2022	20:41	6:10	6/15, 20:00	86.1	0	0	Valid
			6/15, 21:00	83.2	0	0	
			6/15, 22:00	81	0	0	
			6/15, 23:00	81.2	0	0	
			6/16, 00:00	78.9	0	0	
			6/16, 01:00	78.2	0	1.8	
			6/16, 02:00	78.6	0	3	
			6/16, 03:00	78	0	3.7	
			6/16, 04:00	77.4	0	5.2	
			6/16, 05:00	77	0	3.5	
			6/16, 06:00	76	0	4.7	
			6/16, 07:00	76.6	0	4.3	
6/17/2022	20:41	6:10	6/16, 20:00	71.5	0.01	1.8	Valid; precipitation extremely light, stops within first hour
			6/16, 21:00	70.6	0.01	3.5	
			6/16, 22:00	70.4	0	5.7	
			6/16, 23:00	69.6	0	0.8	
			6/17, 00:00	68.9	0	0	
			6/17, 01:00	68.6	0	0.7	
			6/17, 02:00	69.3	0	3.7	
			6/17, 03:00	70.2	0	0	
			6/17, 04:00	69.9	0	3.8	
			6/17, 05:00	70.9	0	2.9	
			6/17, 06:00	71.6	0	4.8	
			6/17, 07:00	72.6	0	5.8	
6/18/2022	20:42	6:10	6/17, 20:00	76.7	0	3.8	Valid
			6/17, 21:00	73.5	0	0.5	
			6/17, 22:00	71.1	0	0	
			6/17, 23:00	70.8	0	1	
			6/18, 00:00	69.8	0	0.9	
			6/18, 01:00	68.5	0	0	
			6/18, 02:00	67.3	0	0	
			6/18, 03:00	67.9	0	0.5	
			6/18, 04:00	66.2	0	0.7	
			6/18, 05:00	65.4	0	0.5	
			6/18, 06:00	63.2	0	0.7	
			6/18, 07:00	65.6	0	1	

Survey Night	Sunset	Sunrise	Date and Time	Temperature (F)	Precipitation (inches)	Wind Speed (mph)	Comment
6/19/2022	20:42	6:11	6/18, 20:00	80.6	0	8.2	Valid
			6/18, 21:00	76.5	0	5.4	
			6/18, 22:00	74	0	5.8	
			6/18, 23:00	71.1	0	4.4	
			6/19, 00:00	68.8	0	5.2	
			6/19, 01:00	65.1	0	2.9	
			6/19, 02:00	63.2	0	5	
			6/19, 03:00	61.8	0	4.8	
			6/19, 04:00	59.4	0	4.1	
			6/19, 05:00	57.5	0	4.8	
			6/19, 06:00	55.2	0	3.2	
			6/19, 07:00	56.2	0	4.3	
6/20/2022	20:42	6:11	6/19, 20:00	74.1	0	0	Valid
			6/19, 21:00	67.9	0	0	
			6/19, 22:00	64.5	0	0	
			6/19, 23:00	63.4	0	0	
			6/20, 00:00	61.9	0	0	
			6/20, 01:00	59.4	0	0	
			6/20, 02:00	58.1	0	0.5	
			6/20, 03:00	56.7	0	0.9	
			6/20, 04:00	55.9	0	0.7	
			6/20, 05:00	56.7	0	3.1	
			6/20, 06:00	54.9	0	2.3	
			6/20, 07:00	56.4	0	1.8	
6/21/2022	20:43	6:11	6/20, 20:00	77.5	0	4.5	Valid
			6/20, 21:00	73.6	0	3.9	
			6/20, 22:00	70.7	0	3.9	
			6/20, 23:00	68.5	0	1.5	
			6/21, 00:00	65.7	0	1.5	
			6/21, 01:00	63.7	0	0	
			6/21, 02:00	62.6	0	0.7	
			6/21, 03:00	61	0	0	
			6/21, 04:00	60	0	3.4	
			6/21, 05:00	59	0	2	
			6/21, 06:00	58.7	0	0.7	
			6/21, 07:00	61.8	0	1.9	
6/22/2022	20:43	6:11	6/21, 20:00	83	0	0.5	Valid
			6/21, 21:00	76.2	0	0	
			6/21, 22:00	72.9	0	0	
			6/21, 23:00	70.1	0	0	
			6/22, 00:00	67.2	0	0	
			6/22, 01:00	65.5	0	0.5	
			6/22, 02:00	63.1	0	1.8	
			6/22, 03:00	63	0	0	
			6/22, 04:00	61.9	0	0.5	

Survey Night	Sunset	Sunrise	Date and Time	Temperature (F)	Precipitation (inches)	Wind Speed (mph)	Comment
			6/22, 05:00	61.4	0	0	
			6/22, 06:00	61.2	0	0	
			6/22, 07:00	61	0	0	
6/23/2022	20:43	6:12	6/22, 20:00	90.6	0	2.7	Valid
			6/22, 21:00	88.2	0	4.1	
			6/22, 22:00	84.2	0	1.3	
			6/22, 23:00	81	0	1.8	
			6/23, 00:00	80.3	0	0.8	
			6/23, 01:00	76	0	0	
			6/23, 02:00	73.7	0	0	
			6/23, 03:00	73.6	0	0.7	
			6/23, 04:00	74.9	0	4.3	
			6/23, 05:00	74.5	0	0.5	
			6/23, 06:00	73	0	2.5	
			6/23, 07:00	73	0	1.8	
6/24/2022	20:43	6:12	6/23, 20:00	80.1	0	4.1	Valid
			6/23, 21:00	75.7	0	0.5	
			6/23, 22:00	73	0	0	
			6/23, 23:00	72.1	0	0	
			6/24, 00:00	71	0	0	
			6/24, 01:00	70.9	0	0	
			6/24, 02:00	71.2	0	1	
			6/24, 03:00	72	0	4.1	
			6/24, 04:00	71	0	4.3	
			6/24, 05:00	70.4	0	5.2	
			6/24, 06:00	70.8	0	6.6	
			6/24, 07:00	70.7	0	5.1	
6/25/2022	20:43	6:12	6/24, 20:00	82.6	0	0	Valid
			6/24, 21:00	77	0	0	
			6/24, 22:00	75.7	0	0	
			6/24, 23:00	73.8	0	0	
			6/25, 00:00	73	0	0.5	
			6/25, 01:00	70.8	0	0.5	
			6/25, 02:00	73	0	1.8	
			6/25, 03:00	72.7	0	2.8	
			6/25, 04:00	72.5	0	2.2	
			6/25, 05:00	71.7	0	0.7	
			6/25, 06:00	70.9	0	1.3	
			6/25, 07:00	70.3	0	2.4	
6/26/2022	20:43	6:12	6/25, 20:00	80.6	0	0	Valid
			6/25, 21:00	76.8	0	0	
			6/25, 22:00	76.6	0	0	
			6/25, 23:00	73.8	0	0	
			6/26, 00:00	72.7	0	0	

Survey Night	Sunset	Sunrise	Date and Time	Temperature (F)	Precipitation (inches)	Wind Speed (mph)	Comment
			6/26, 01:00	71.2	0	0	
			6/26, 02:00	69.9	0	0	
			6/26, 03:00	71.3	0	2.5	
			6/26, 04:00	70.3	0	1.8	
			6/26, 05:00	69	0	1.8	
			6/26, 06:00	69.1	0	0.5	
			6/26, 07:00	68.7	0	1.2	
6/27/2022	20:43	6:13	6/26, 20:00	79.4	0	0	Valid
			6/26, 21:00	75.9	0	0	
			6/26, 22:00	75.3	0	0	
			6/26, 23:00	74.5	0	0.5	
			6/27, 00:00	73.7	0	0	
			6/27, 01:00	73.1	0	1.8	
			6/27, 02:00	72.9	0	0.5	
			6/27, 03:00	71.5	0	0	
			6/27, 04:00	72.6	0	3.5	
			6/27, 05:00	72.7	0	3.5	
			6/27, 06:00	72.6	0	4.1	
			6/27, 07:00	71.8	0	3.7	
6/28/2022	20:43	6:13	6/27, 20:00	72.6	0.42	0.6	Valid; rainfall stops within first hour
			6/27, 21:00	71.7	0	1.8	
			6/27, 22:00	70.8	0	0	
			6/27, 23:00	70.3	0	0	
			6/28, 00:00	70.7	0	0.9	
			6/28, 01:00	71	0	2	
			6/28, 02:00	70.6	0	3.4	
			6/28, 03:00	68.7	0	5.6	
			6/28, 04:00	67.2	0	4.9	
			6/28, 05:00	66.9	0	4.2	
			6/28, 06:00	67.1	0	5.2	
			6/28, 07:00	67.9	0	6	
6/29/2022	20:43	6:14	6/28, 20:00	76.5	0	0	Valid; rainfall occurred after first 5 hours
			6/28, 21:00	74	0	0	
			6/28, 22:00	72.9	0	0.5	
			6/28, 23:00	73.4	0	3	
			6/29, 00:00	73.2	0	1.8	
			6/29, 01:00	72.3	0	0	
			6/29, 02:00	68.1	0.05	0	
			6/29, 03:00	66.8	0	0	
			6/29, 04:00	66.8	0	0	
			6/29, 05:00	66.8	0	0	
			6/29, 06:00	66.8	0	0	
			6/29, 07:00	69.2	0	0	

Survey Night	Sunset	Sunrise	Date and Time	Temperature (F)	Precipitation (inches)	Wind Speed (mph)	Comment
6/30/2022	20:43	6:14	6/29, 20:00	80.5	0	2.2	Valid
			6/29, 21:00	78.1	0	2.2	
			6/29, 22:00	75.3	0	2.6	
			6/29, 23:00	73.6	0	0	
			6/30, 00:00	72.8	0	0	
			6/30, 01:00	70.5	0	0	
			6/30, 02:00	69.2	0	0	
			6/30, 03:00	68.2	0	0	
			6/30, 04:00	67.9	0	0	
			6/30, 05:00	67.1	0	0	
			6/30, 06:00	66.4	0	0	
			6/30, 07:00	67	0	0	

APPENDIX D FEDERALLY LISTED SPECIES FOR THE ARCHDALE TAILINGS STORAGE FACILITY

APPENDIX D-1 FEDERALLY LISTED AND STATE-LISTED SPECIES REPORT FOR THE ALBEMARLE KINGS MOUNTAIN ARCHDALE TRACT, CLEVELAND COUNTY, NORTH CAROLINA

Federally Listed and State-Listed Species Report for the Albemarle Kings Mountain Archdale Tract, Cleveland County, North Carolina

JANUARY 2024

PREPARED FOR

Albemarle U.S., Inc.

PREPARED BY

SWCA Environmental Consultants

FEDERALLY LISTED AND STATE-LISTED SPECIES REPORT FOR THE ALBEMARLE KINGS MOUNTAIN ARCHDALE TRACT, CLEVELAND COUNTY, NORTH CAROLINA

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SWCA Project No. 70316

January 2024

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1 INTRODUCTION

On behalf of Albemarle U.S., Inc. (Albemarle), SWCA Environmental Consultants (SWCA) has prepared an assessment of federally listed and state-listed species for the Kings Mountain Archdale Tract (project) in Cleveland County, North Carolina, approximately 30 miles west of Charlotte, North Carolina (Figure 1). The project area is approximately 131.5 acres and includes two parcels (PIN 2583445453 and 2583129880). This assessment addresses plant and animal species protected under the Endangered Species Act of 1973, as amended (ESA), as well as North Carolina state-listed species protected under Endangered and Threatened Wildlife and Wildlife Species of Special Concern of the State of North Carolina (North Carolina General Statutes 113-331). A desktop review in combination with field observations was used to determine the potential for listed plants and wildlife to occur in the project area.

1.1 Location

The project area borders the north side of Interstate 85 (I-85) and the south side South Battleground Avenue (Figure 2). The project is located approximately 4.5 miles southwest of downtown Kings Mountain, North Carolina, and is located on the U.S. Geological Survey (USGS) Grover, North Carolina, 7.5-minute quadrangle (see Figure 2).

1.2 Project Area Description

The project area is currently part of a mine facility permitted by the North Carolina Division of Energy, Mineral, and Land Resources. Based on historical aerial photographs, the project area began active mining operations in the mid-1990s (Google Earth Pro 2023). Prior to mining activities, the project area contained agricultural land and undeveloped woods. Active mining operations ceased around 2013, and much of the area has naturally revegetated (Figure 3). The project area is bordered by woodlands, agricultural fields, and a solar field to the north and west (Figure 4). There is industrial development to the southwest, and I-85 lies to the southeast.

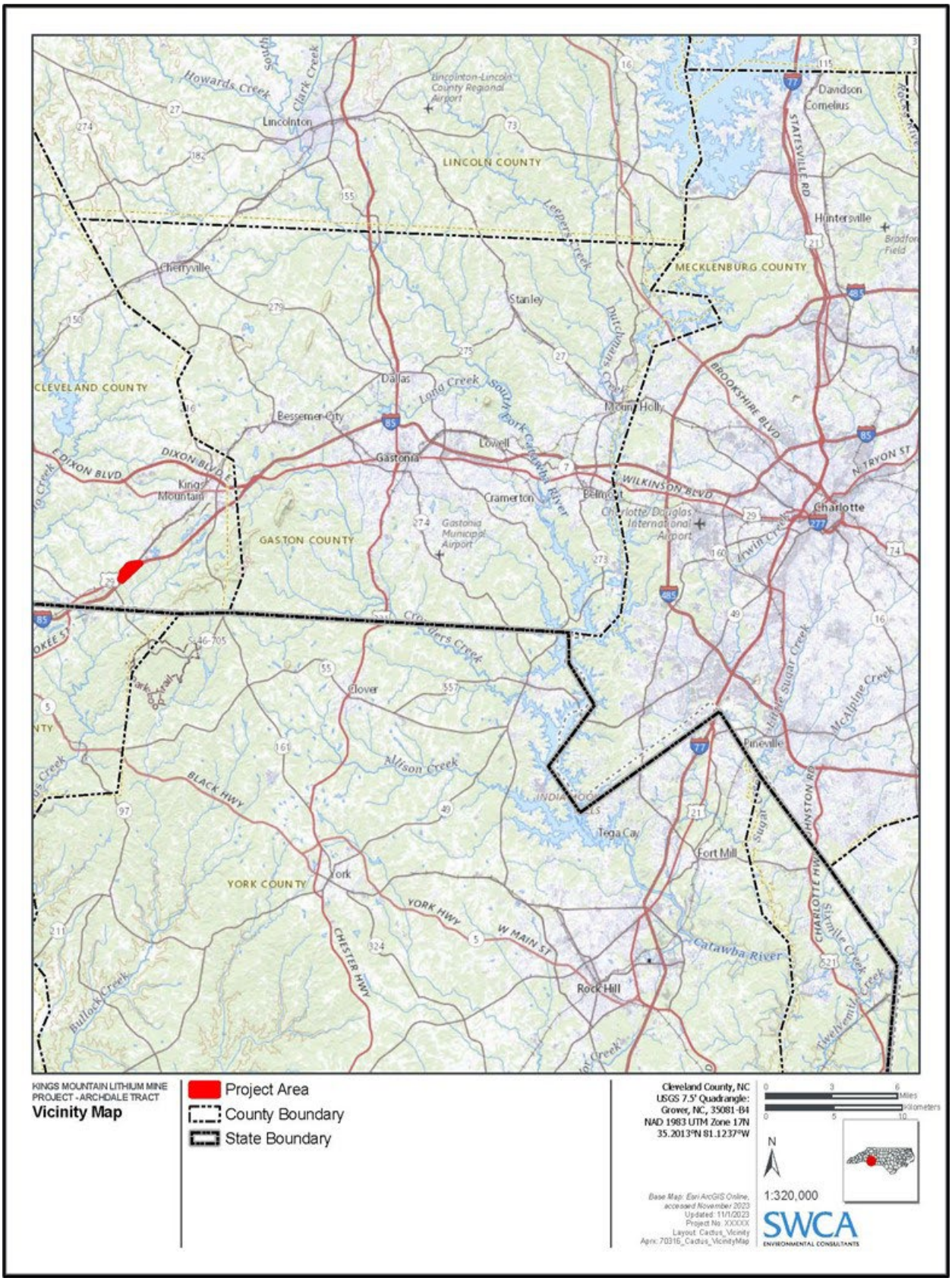

Figure 1. Project vicinity map.

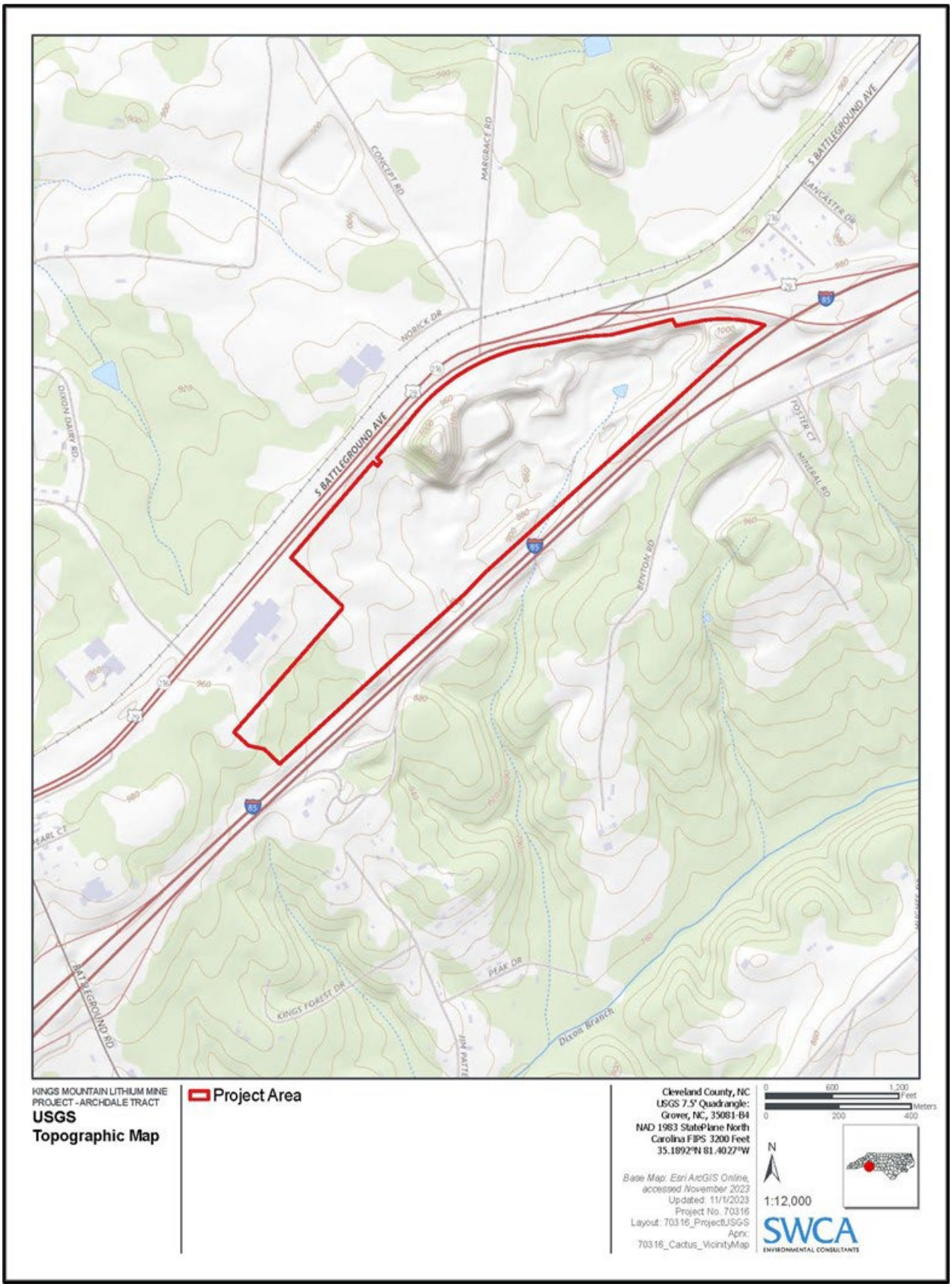

Figure 2. Topographic map.

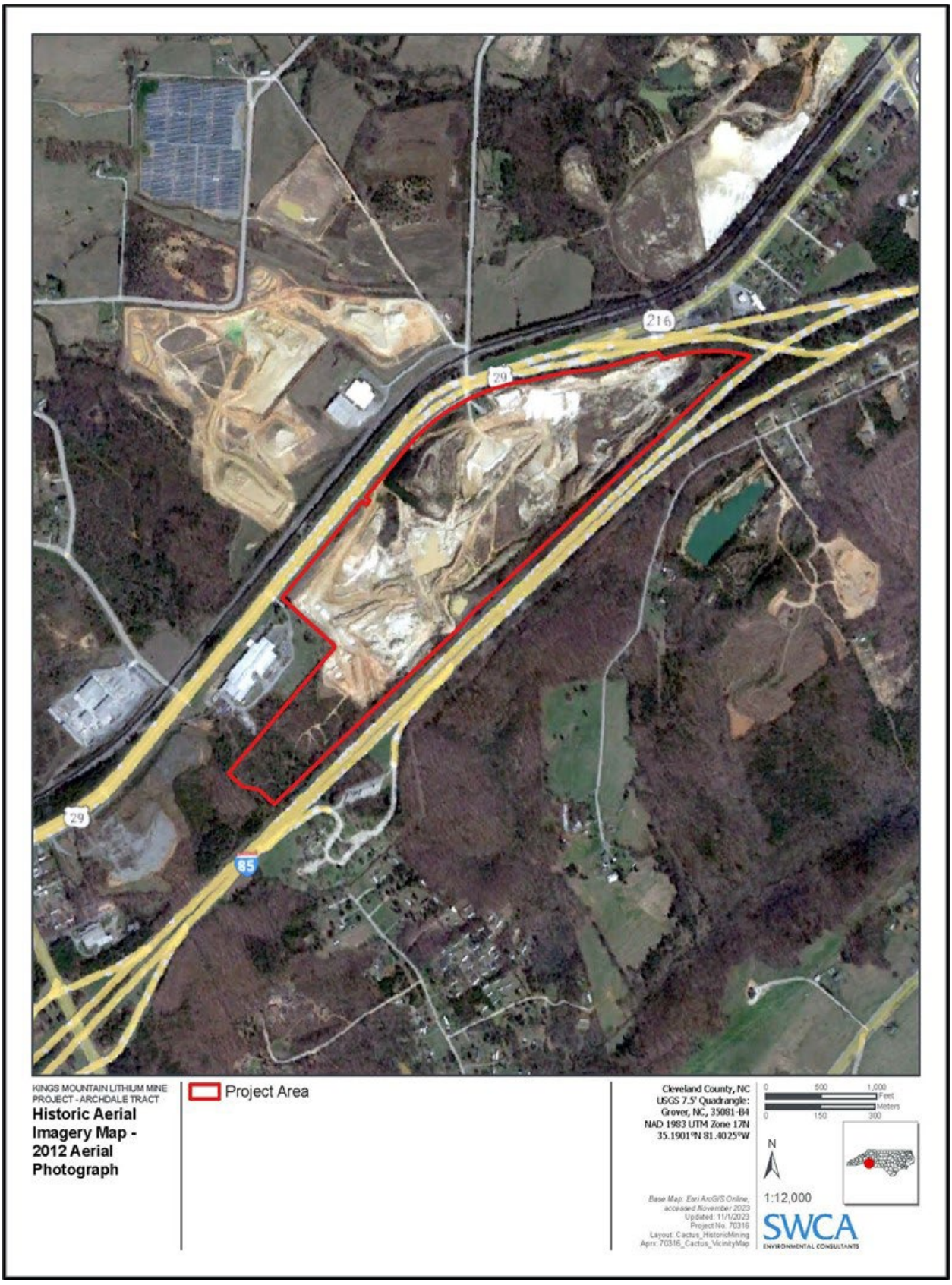

Figure 3. Aerial imagery of historic mining in the project area during 2012.

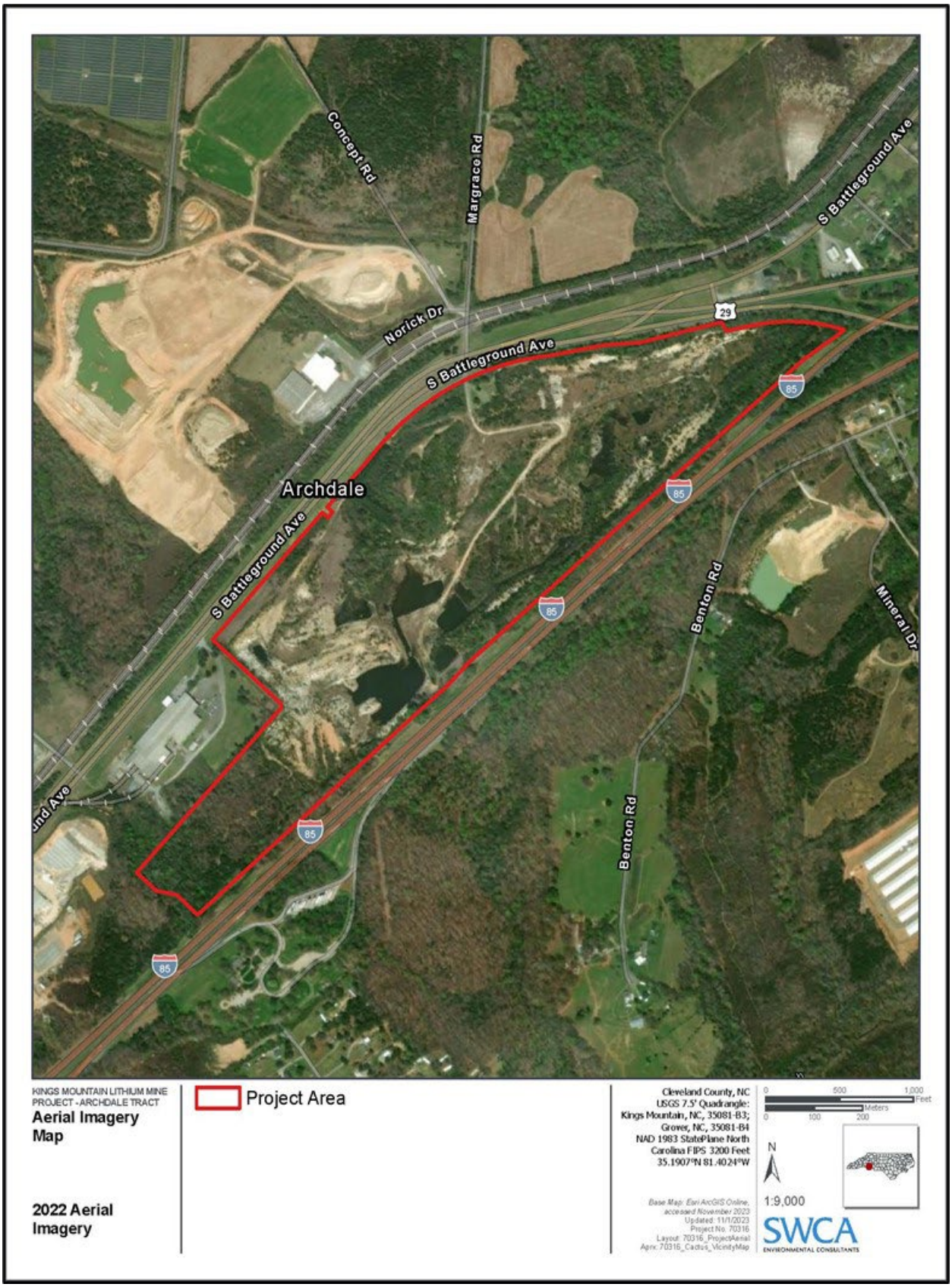

Figure 4. Aerial imagery of current conditions in the project area.

2 METHODS

SWCA methodology consisted of a desktop analysis of available literature and databases and field surveys. The following categories were used to define the potential for protected species to occur based on these study methods.

- **Very low**: The project area is outside the known range of the species, or the project area is within the species' range but there is no suitable habitat or the species is historical.
- **Low:** The project area is within the known range of the species, but there is limited suitable habitat or the species has not been observed in the vicinity.
- **Moderate:** The species' known range includes the project area, and suitable habitat is present.
- **High:** There are known species occurrences within the project area.

2.1 Desktop Analysis

A preliminary desktop analysis was completed for the project prior to field surveys by using a combination of existing information obtained from available public sources, consisting of reports, published literature, online databases, and geographic information system (GIS) data. The following publicly available data sources were used to complete a desktop analysis.

- USGS National Land Cover Database (USGS 2019)
- Natural Resources Conservation Service (NRCS) Web Soil Survey maps (NRCS 2023)
- U.S. Fish and Wildlife Service (USFWS) list of threatened and endangered species within the project area and county (USFWS 2023a, 2023b)
- North Carolina Natural Heritage Program (NCNHP) data and planning tools (NCNHP 2022a, 2022b, 2023a, 2023b)
- North Carolina Wildlife Resources Commission (NCWRC) state-listed species information
- Historical aerial imagery (Google Earth Pro 2023)

These sources were used to characterize the resources in the project area and determine what listed species may occur.

2.2 Field Surveys

Field surveys were completed in September and October 2023 and included a habitat assessment for federally listed and state-listed species. Habitat surveys included meandering walks throughout the project area concurrent with wetland delineations. Dominant plant species and general vegetation communities were documented. Presence/absence surveys for certain species did not occur due to the timings outside of seasonal requirements.

The field evaluations included determining the likely presence or absence of wetlands and other jurisdictional waters in accordance with methods in the *Corps of Engineers Wetlands Delineation Manual* (U.S. Army Corps of Engineers [USACE] 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region* (Version 2.0) (USACE 2012). Wetlands were identified by positive indicators of hydrology, hydrophytic vegetation, and hydric soils (SWCA 2023). Data collected were used to approximate the wetland

boundary and were recorded on USACE Eastern Mountains and Piedmont wetland determination data forms. Wetland boundaries were recorded using GPS units capable of submeter accuracy and were flagged. Observations from wetland delineations were used when determining suitable habitat for aquatic species.

3 RESULTS

3.1 Habitat

Factors such as elevation, soil type, and vegetation cover are considered when determining a species' potential to occur. The project area is located within the Kings Creek (Hydrologic Unit Code [HUC] 0305010509) watershed of the Broad River Basin. Elevation in the project area ranges from approximately 850 to 1,050 feet above mean sea level (see Figure 2) (USGS 2023). The project area generally drains toward lower elevations to the south. However, the general topography of the project area has been substantially altered due to mining.

Figure 5 depicts the soil unit types mapped within the project area (NRCS 2023). The mapped soils do not reflect the mine activities that have occurred since the mid-1990s. The soils are primarily mapped as Hulett gravely sandy loam, 2 to 8 percent slopes (26.2% of project area), Madison gravelly sandy clay loam, 2 to 8 percent slopes, moderately eroded (21.1% of project area); and Madison-Bethlehem complex, 8 to 15 percent slopes, very stony, moderately eroded (20.0% of project area). All of the soil types within the project area are classified as well drained and are not listed as hydric (NRCS 2023).

Most of the deeper pits associated with the historic mining have filled with water, and some wetlands have developed in these pits. During the wetland delineation, one wetland complex (7.63 acres total) and six waterbodies (9.42 acres total) were identified. The waterbodies are all man-made ponds or mining pits filled with water (Figure 6). As detailed in the delineation report, the wetlands and waterbodies are all non-jurisdictional (SWCA 2023).

The landscape has been significantly altered in the project area due to historic mining, which ceased operation approximately 10 years ago in 2013. Land cover maps (USGS 2019) indicate that the project area consists primarily of hay/pasture (49.2%) and barren land (15.5%) with smaller portions of herbaceous, forest, shrub/scrub, development, and open water (e.g., ponds, lakes, mining pits) (Figure 7). Review of the current aerial imagery and SWCA's in-field assessment suggests the hay/pasture category is the barren and early successional shrubby/herbaceous land found in the historic mining areas rather than actual hay/pasture. SWCA observed that natural regeneration of herbaceous, shrubby, and forest habitat has occurred over waste rock piles and other areas historically disturbed by mining (Google Earth Pro 2023). These habitats are all generally in a dense, successional stage of growth, with most trees being less than 10 years old with average widths of 5 to 8 inches diameter breast height. Vegetation communities found in these habitats are discussed below.

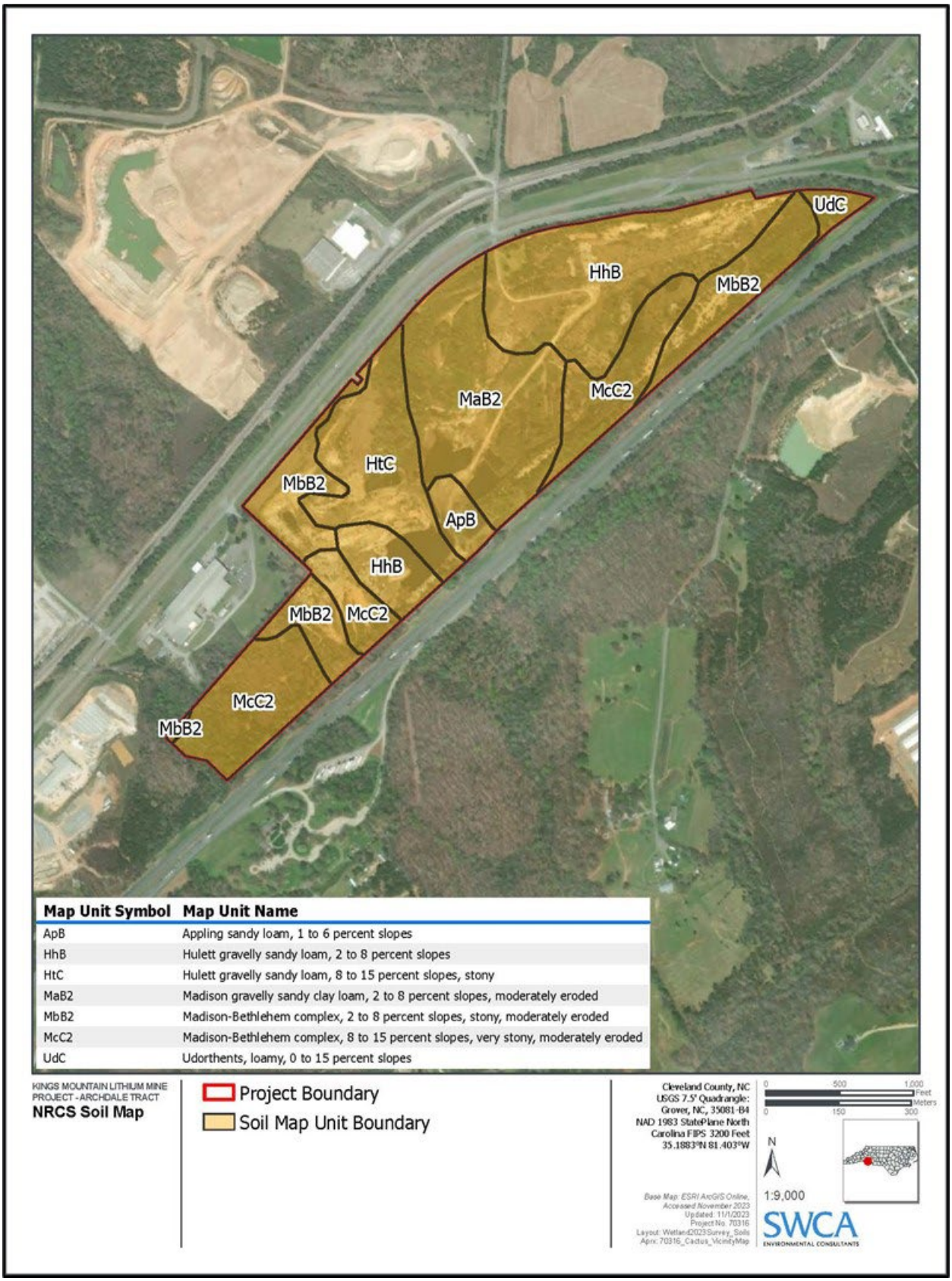

Figure 5. NRCS mapped soil types within the project area.

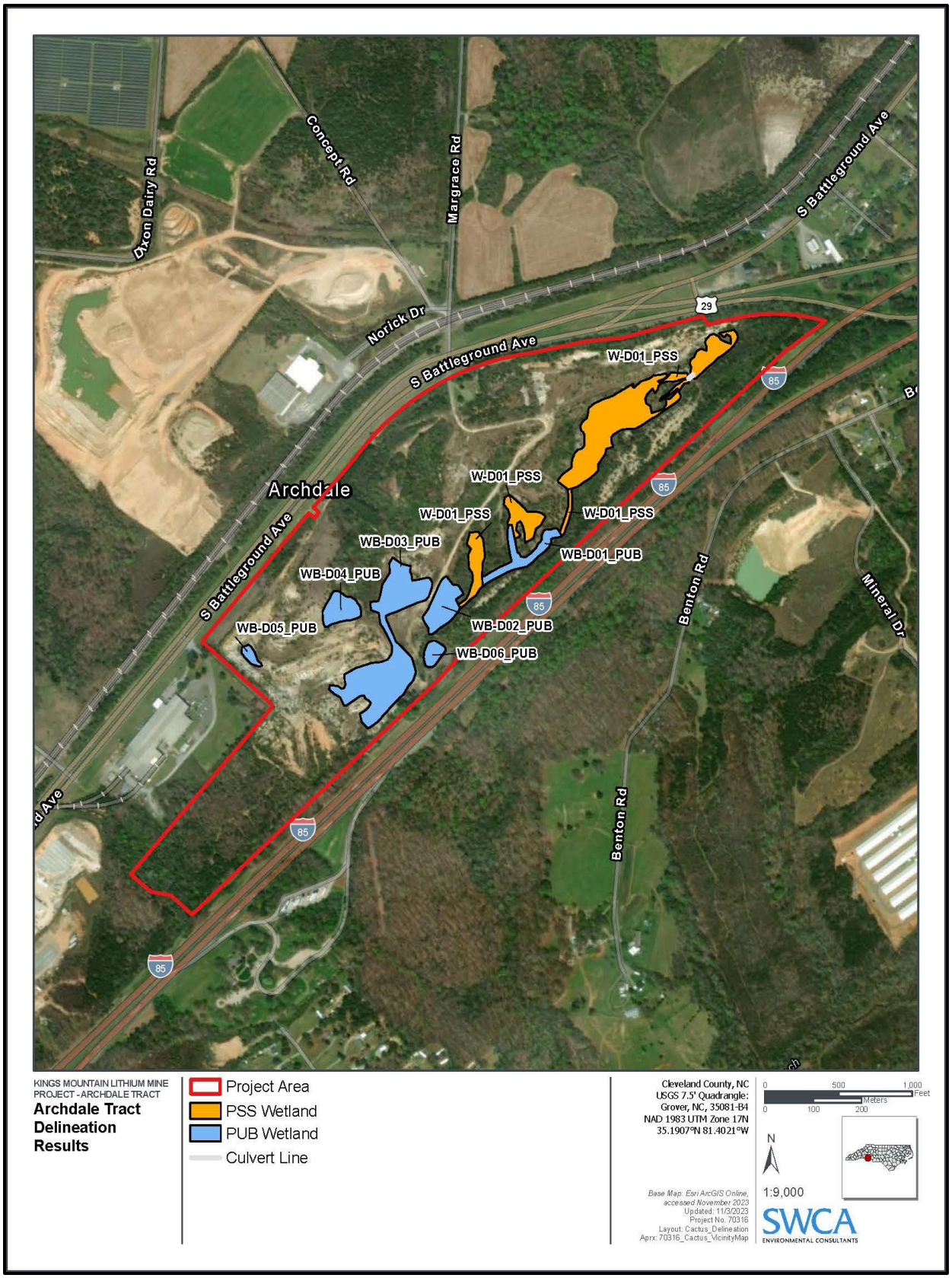

Figure 6. SWCA delineated water resources in the project area.

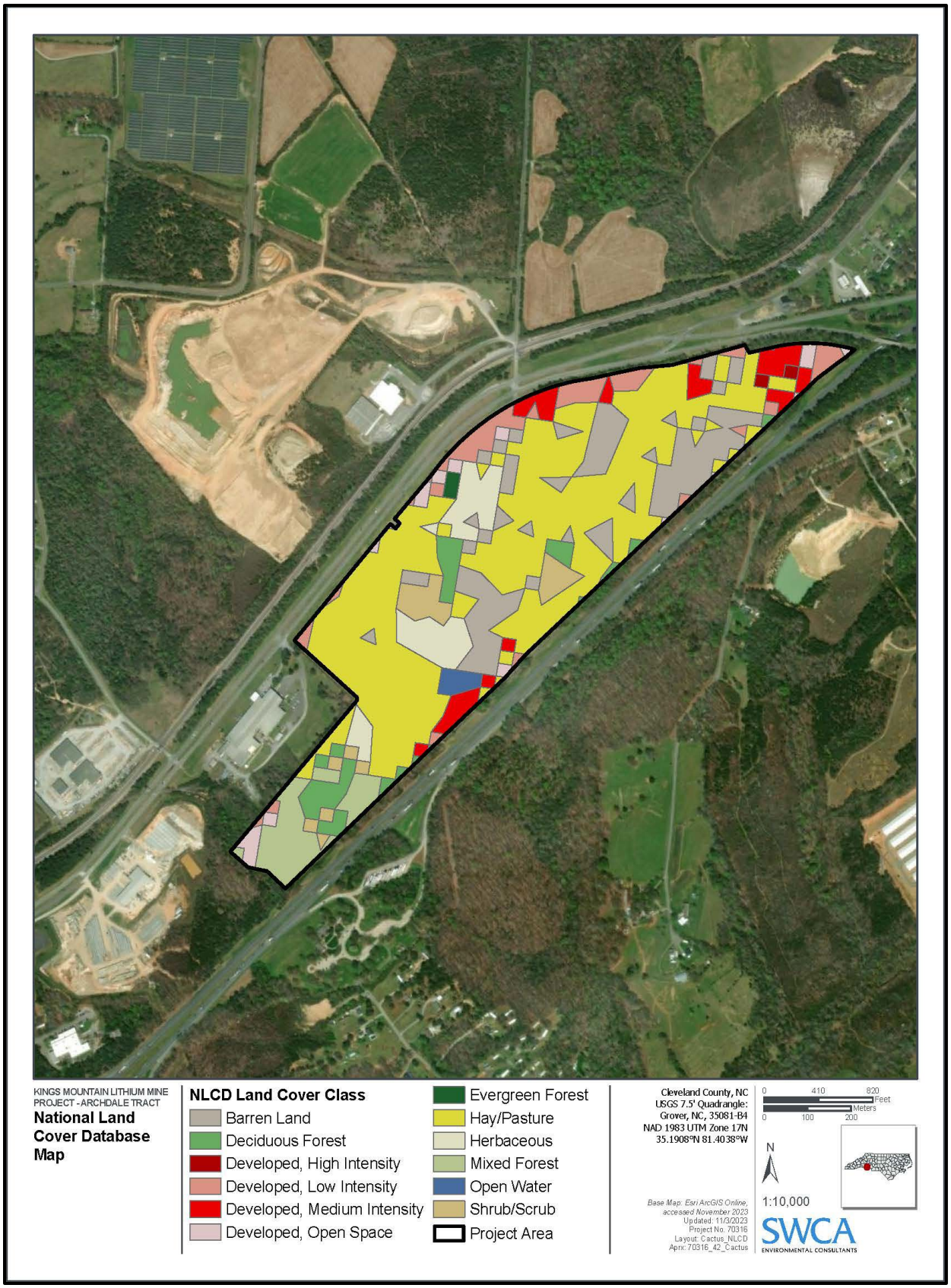

Figure 7. National Land Cover Dataset map.

3.1.1 Forested Upland

The forested upland communities (i.e., deciduous, mixed, and evergreen forest) make up a moderate amount of the project area. Most of the forests are from natural recruitment after historical mining activities ended. The oldest forest stands occupy approximately 15 acres of the project area in the southwestern portion. This forested land is regenerating from a clear cut around 2005 and has remained relatively undisturbed during the historic mining activities. A few areas between the project boundary and the surrounding roads contain mature trees along the edges. Lastly, a few large stands of mature pine trees and deciduous trees are present in the north-central portion along the mining spoils and its adjacent hillside. The remaining forested areas are generally 10 years old or less.

3.1.1.1 DECIDUOUS

There is very little mature deciduous forest in the project area. A small area of mature deciduous forest is located along the western slope of the mining spoil pile. Most deciduous forests are successional forests regenerating on historic mined lands and are generally characterized by relatively dense, younger trees with a developed understory of smaller trees, shrubs, and some herbaceous plants. Dominant canopy tree species are American sweetgum (*Liquidambar styraciflua*), tulip tree (*Liriodendron tulipifera*), red maple (*Acer rubrum*), white oak (*Quercus alba*), red oak (*Quercus rubra*), and persimmon (*Diospyros virginiana*). Understory species observed in the mature deciduous forest are black cherry (*Prunus serotina*), American holly (*Ilex opaca*), eastern red cedar (*Juniperus virginiana*), greenbrier (*Smilax* spp.), and blackberry (*Rubus* spp.). These understory species generally fill in the gaps between trees, with the blackberry and greenbrier species occupying areas with greater sunlight access.

3.1.1.2 EVERGREEN

The evergreen forest community is dominated by stands of loblolly pine (*Pinus taeda*), with Virginia pine (*Pinus virginiana*) and shortleaf pine (*Pinus echinata*) occurring less commonly. Other than a few patchy sections of mature pine trees along the roads and the mining spoil pile, most are successional pine forests regenerating in the historic mining areas. The pine forests generally contain densely spaced trees with a moderate amount of understory vegetation, primarily the dominant successional deciduous species discussed above.

3.1.1.3 MIXED

The mixed forest community is the most common forest type and includes a combination of the dominant deciduous and evergreen trees and shrubs mentioned in the previous sections. These are mostly successional mixed forests regenerating throughout the historic mining areas.

3.1.2 Herbaceous Upland

The herbaceous upland and edge communities consist of areas dominated by non-woody vegetation. These communities are common within the recently disturbed or cleared areas and along edge habitats (e.g., forest edges, roadsides). Dominant herbaceous species are common native and non-native species that prefer disturbed areas including broom-sedge (*Andropogon virginicus*), goldenrod (*Solidago* spp.), dog fennel (*Eupatorium capillifolium*), clover (*Trifolium* spp.), American pokeweed (*Phytolacca americana*), American burnweed (*Erechtites hieraciifolius*), Chinese bushclover (*Lespedeza cuneata*), and southern crabgrass (*Digitaria ciliaris*). Numerous portions of the project area are dominated by invasive, non-native kudzu (*Pueraria montana*) and wisteria (*Wisteria* spp.), especially along the mine highwalls.

3.1.3 Shrub-Scrub

The shrub-scrub upland community is dominated by blackberry, Chinese privet (*Ligustrum sinense*), winged sumac (*Rhus copallinum*), and sweetgum. This community is found throughout recently disturbed areas in the project area in an early stage of succession. Shrub-scrub areas are generally dense and have plant heights up to approximately 15 feet. Blackberry thickets are common understory species in many of the taller shrub-scrub areas.

3.1.4 Wetlands

Based on SWCA field delineations in September 2023, approximately 7.6 acres of isolated (non-jurisdictional) shrub-scrub (PSS) wetlands are present in the project area (SWCA 2023). Additionally, six distinct isolated (non-jurisdictional) palustrine unconsolidated bottom (PUB) aquatic features (e.g., historic mine ponds and runoff channels) totaling 9.42 acres were delineated within the project area.

The shrub-scrub wetland communities consist of a prevalence of hydrophytic woody vegetation less than 20 feet tall. The shrub-scrub strata are dominated by Brookside alder (*Alnus serrulata*), silky willow (*Salix sericea*), and groundsel bush (*Baccharis halimifolia*). Based on delineations, approximately 7.6 acres of palustrine shrub-scrub wetlands are present in the project area (SWCA 2023). The wetland is one large, connected complex wholly contained within the historic mining pits.

3.2 Federally Listed Species

Species are designated by the USFWS as threatened, endangered, proposed, candidate, or under review under the ESA. Federally listed threatened and endangered species are protected from "take." Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The USFWS Information for Planning and Consultation resource list (Appendix A) identified tricolored bat (*Perimyotis subflavus*), monarch butterfly (*Danaus plexippus*), and dwarf-flowered heartleaf (*Hexastylis naniflora*) as having potential to occur in the project area or vicinity (Table 1) (USFWS 2023a, 2023b). In addition, the desktop review identified little brown bat (*Myotis lucifugus*) as potentially occurring in the area. Under the ESA, the USFWS can also propose and designated critical habitats for threatened or endangered species. There are no USFWS-designated critical habitats for federally listed species within the project area (USFWS 2023a).

Table 1. USFWS Federally Listed Species with Potential to Occur within the Project Area

Common Name (Scientific Name)	Listed Status	Habitat	Potential to Occur within Project Area
Tricolored bat (*Perimyotis subflavus*)	Proposed endangered	During the spring, summer, and fall (i.e., non-hibernating seasons), it primarily roosts among live and dead leaf clusters of live or recently dead deciduous hardwood trees. During winter, it hibernates in caves, culverts, and abandoned water wells. Forages both in treetops and closer to ground.	Moderate; forested habitat present; detected during SWCA's 2022 bat acoustic surveys at the main site approximately 2 miles east of the Archdale Tract.
Little brown bat (*Myotis lucifugus*)	Under review	Roosts include trees, buildings, wood piles, and under rocks. Forages around water sources and forest edges.	Moderate; forested habitat present; however, was not detected during 2022 bat acoustic surveys at the main site approximately 2 miles east of the Archdale Tract.

Common Name (Scientific Name)	Listed Status	Habitat	Potential to Occur within Project Area
Monarch butterfly (*Danaus plexippus*)	Candidate	Prairies, meadows, grasslands, and roadsides with milkweed (*Asclepias* spp.) and flowering plants.	Low; limited suitable habitat. .
Dwarf-flowered heartleaf (*Hexastylis naniflora*)	Threatened	Acidic soils along bluffs and adjacent slopes, boggy areas next to streams and creek heads, and along slopes of nearby hillsides and ravines. Endemic to upper Piedmont of North Carolina and South Carolina.	Low; limited suitable habitat.

Source: USFWS (2023a, 2023b)

3.2.1 Tricolored Bat

Tricolored bats (*Perimyotis subflavus*) are on the decline from white-nose syndrome in North Carolina. Whereas they used to be common from the mountains to the coastal plain, they are now common only in patches and uncommon everywhere else. Some tricolored bats may migrate long distances, but most retreat to caves and mines to mate (mid-August to mid-October) and then hibernate for winter (mid-October to spring) (USFWS 2021). In the spring and summer, tricolored bats can be found in a variety of habitats, from woodlands to small towns and farms, though usually not in heavily populated areas. They may roost in trees or sometimes in old buildings, culverts, or tunnels. Tricolored bats roost in foliage of live trees and may form small maternity colonies during the pup-rearing season (May 1– July 31) (North Carolina Bat Working Group 2013). The smallest bat in North America, the tricolored bat flies slowly in the evening to forage over openings, water, and farm fields.

Due to its decline from white-nose syndrome, tricolored bats are considered “rare or uncommon” in North Carolina. Tricolored bats have not been previously documented in Cleveland County; however, variable survey efforts are likely to contribute to lacking records (LeGrand and Gatens et al. 2023; NCNHP 2022b). In September 2022, the USFWS proposed to list the tricolored bat as an endangered species in response to observed population declines resulting primarily from white-nose syndrome (*Federal Register* 87:56381). A final decision regarding the listing status of the species is expected in the fall of 2023.

While the project area is a recently closed mine with large levels of historic disturbance, there remain small areas with mature trees and enough successional trees have regenerated to provide suitable habitat in areas for the tricolored bat. Acoustic bat surveys have not yet occurred at the Archdale Tract but were conducted in 2022 at the main site approximately 2 miles east of the project area (SWCA 2022). During those surveys, the tricolored bat was detected. Overall, since there is suitable habitat and it has been detected in the vicinity, this species has the potential to occur within the project area.

3.2.2 Little Brown Bat

The little brown bat (*Myotis lucifugus*) has a widespread range in North America from Alaska–Canada boreal forests south through most of the contiguous United States and into central Mexico (USFWS 2023c). In the winter (October to mid-March), little brown bats primarily hibernate in caves and cave-like structures (NatureServe 2023a). In spring and summer, they can be found in trees, artificial structures, and bat houses, as well as under rocks and in piles of wood. Foraging habitat includes areas with streams and other bodies of water, particularly in woodlands near water. In September and October these bats swarm and mate near their winter hibernating sites. This species was once abundant but has declined, particularly in eastern North America, due to white-nose syndrome. The USFWS is currently reviewing the status of the little brown bat as a result of these described threats.

While the project area is a recently closed mine with large levels of historic disturbance, there remain small areas with mature trees and enough successional trees have regenerated to provide suitable habitat in areas for the tricolored bat. The little brown bat was not detected during the acoustic bat surveys conducted at the main site approximately 2 miles east of the project area (SWCA 2022).

3.2.3 Dwarf-Flowered Heartleaf

The federally threatened dwarf-flowered heartleaf is a perennial woodland herb generally found in acidic soils along bluffs and adjacent slopes, in boggy areas next to streams and headwaters, and along the slopes of nearby hillsides and ravines. This plant is usually associated with mountain laurel (*Kalmia latifolia*) or American pawpaw (*Asimina triloba*) (LeGrand and Sorrie et al. 2023). The flowering period is March 1 through May 31.

The sloped portions of the project area are generally all in response to the historic mining and are not suitable habitat for this species due to intense historic disturbance that removed most vegetation and surface soils. Additionally, no mountain laurel or American pawpaw were observed in sloped forested areas. The relatively undisturbed 15 acres of forest in the southwestern most portion of the project area is mostly flat, dry upland forests and is also not suitable habitat. Overall, this species is not expected to occur due to a lack of suitable habitat and substantial historical mining disturbance.

3.2.4 Monarch Butterfly

The monarch butterfly is a candidate for listing across most of the United States and is known to occur within North Carolina during migration from its overwintering habitat in Mexico. The USFWS is anticipated to determine whether the monarch butterfly should be listed under the ESA in 2024. Monarch breeding habitat includes agricultural fields; pastureland; prairie remnants; and urban and suburban residential gardens, trees, and roadsides. This species is highly dependent on the presence of milkweed (*Asclepias* spp.) for breeding and a diversity of flowering nectar plants for foraging (Monarch Joint Venture 2022; USFWS 2020, 2023d). Unsuitable habitat includes areas such as grasslands dominated by invasive grass species, or woody thickets too dense to support herbaceous flowering vegetation.

The project area generally lacks the preferred monarch butterfly habitat. The herbaceous vegetation communities are fairly barren and restricted to recently disturbed areas consisting of native and non-native weedy species. Other herbaceous areas are intermixed with successional woody vegetation and shrubby species mentioned above.

3.3 State-Listed Species

3.3.1 Regulatory Background

In North Carolina, endangered, threatened, and special concern fauna (referred to as "state-listed" in this report) are protected by the NCWRC under the North Carolina Endangered Species Act of 1987; flora are protected by the North Carolina Plant Conservation Program under the North Carolina Plant Protection and Conservation Act of 1979. The Acts also state that they do not limit the rights of a landowner in the lawful management of his/her land. Generally, state-listed plants are protected from collection, selling, and poaching on private property without permission from the property owner and a permit from the North Carolina Department of Agriculture and Consumer Services. Overall, state-listed plants and animals receive little protection on private land.

State endangered species are those determined by the NCWRC to be in jeopardy without human intervention. State threatened species are likely to become endangered species within the foreseeable future throughout all or a significant portion of their range. State special concern species are determined by the NCWRC to require monitoring but may be taken under adopted regulations. Significantly rare designations indicate rarity and need for population monitoring and conservation action. *Significantly rare* is a non-regulatory NCNHP designation, and such species are not legally protected but have been included in the assessment below.

3.3.2 Species List

The list of state-listed species for Cleveland County was reviewed to assess whether the species have potential to occur in the project area (Table 2) (NCNHP 2022a, 2022b, 2023a, 2023b). Five species are considered historical in the county, which, according to NCNHP, are either extirpated species that have not been found in recent surveys or species that have not been surveyed recently enough to be determined to be present but for which there is still some expectation that the species may be rediscovered. Occurrences are regarded as historical after 20 to 40 years depending on the species and the amount of habitat alteration in the area. A county status of "historical" in Table 2 should not be regarded as a definitive statement that the species is gone from the county, but rather, indicates that its continued existence is uncertain.

According to occurrence records provided by NCNHP (2023a), no state-listed threatened, endangered, or special concern plant or animal species have been identified within the project area (Appendix B). One state-listed species, the yellowfin shiner (*Notropis lutipinnis*), has been observed within 1 mile of the project area; however, no streams are present within the project area to support this species.

Table 2. State-Listed Species for Cleveland County and Their Potential to Occur

Common Name	Scientific Name	State Listing Status	County Record Status	Potential to Occur
Birds				
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Current	Low; limited suitable habitat due to lack of rivers and large lakes.
Loggerhead shrike	*Lanius ludovicianus*	Special Concern	Current	Low; lack of open lands.
Barn owl	*Tyto alba*	Special Concern	Current	Low; lack of open lands.
Mammals				
Northern long-eared bat	*Myotis septentrionalis*	Threatened	Current	Very low; not identified during 2022 bat acoustic surveys. Project is located outside of 2023 revised range boundary.
Little brown bat	*Myotis lucifugus*	Significantly Rare	Current	Moderate; potential suitable habitat; however, not detected during 2022 bat acoustic surveys at the nearby main site with better habitat.
Tricolored bat	*Perimyotis subflavus*	Endangered	N/A	Moderate; detected 2 miles away by SWCA acoustic surveys in 2022.
Reptiles				
Timber rattlesnake	*Crotalus horridus*	Special Concern	Current	Moderate; forested and rocky habitats are present.
Carolina pygmy rattlesnake	*Sistrurus miliarius miliarius*	Special Concern	Historical	Low; lack of suitable habitat.
Crustaceans				

Common Name	Scientific Name	State Listing Status	County Record Status	Potential to Occur
Carolina foothills crayfish	*Cambarus johni*	Significantly Rare	Current	Very low; no streams present.
Broad River stream crayfish	*Cambarus lenati*	Significantly Rare	Current	Very low; no streams present.
Broad River spiny crayfish	*Cambarus spicatus*	Special Concern	Current	Very low; no streams present.
Fish				
Carolina quillback	*Carpiodes* sp. cf. *cyprinus*	Significantly Rare	Current	Very low; no streams present.
Seagreen darter	*Etheostoma thalassinum*	Significantly Rare	Current	Very low; no streams present.
Yellowfin shiner	*Notropis lutipinnis*	Special Concern	Historical	Very low; no streams present. Last documented occurrence within 1 mile was in 1980.
Plants				
American bittersweet	*Celastrus scandens*	Endangered	Current	Low; limited suitable habitat.
Smooth sunflower	*Helianthus laevigatus*	Special Concern – Vulnerable	Historical	Low; limited suitable habitat.
Dwarf-flowered heartleaf	*Hexastylis naniflora*	Threatened	Current	Low; limited suitable habitat; soils and sloped areas are heavily disturbed.
Rough blazing-star	*Liatris aspera*	Special Concern – Vulnerable	Historical	Low; limited suitable habitat; soils are heavily disturbed and listed as acidic.
Dwarf chinquapin oak	*Quercus prinoides*	Endangered	Historical	Very low; lack of suitable rocky slope habitat.
Pursh's wild petunia	*Ruellia purshiana*	Special Concern – Vulnerable	Current	Very low; lack suitable habitat; acidic soils in project area; very rare in the southwestern Piedmont.

Sources: NCNHP (2022a, 2022b, 2023a, 2023b)

3.3.2.1 BALD EAGLE

The bald eagle (*Haliaeetus leucocephalus*) is one of the largest raptors in North America and was listed under the ESA until 2007. The eagle is still federally protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The bald eagle prefers habitat near lakes, large rivers, and shorelines of sounds and bays (NCWRC 2023a). It perches and nests in tall, isolated trees. Nests can be up to 8 feet wide and 20 feet deep. Pairs often return to the same nest each year and layer new nest material over the old.

The bald eagle has a low potential to nest in the project area or vicinity. According to the NCWRC (personal communication, Clint Barden, Biologist, NCWRC, with Simon King, SWCA Environmental Consultants, July 29, 2022), the closest nesting pair was documented in 2021 at Moss Lake approximately 6.5 miles northwest of the project area. According to the eBird database, there are no records within the project area and a low (0%–10%) frequency of reporting in the Kings Mountain area (eBird 2023). There is a low probability of bald eagles to forage at water-filled mining pits in the project area as they likely do not possess food sources similar to natural waterbodies. Bald eagles could occasionally fly over, but no eagles were observed during the 2023 biological surveys. Overall, the bald eagle has a low potential to occur.

3.3.2.2 LOGGERHEAD SHRIKE

The loggerhead shrike (*Lanius ludovicianus*) is a songbird that inhabits large open areas with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns (Cornell Lab of Ornithology 2019). They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead shrikes are often seen along mowed roadsides with access to fence lines and utility poles, which they use for viewing prey when foraging. Populations are declining, likely due to changes in agricultural practices and the use of certain pesticides (NCWRC 2020).

The NCWRC (2020) states that this species can be "locally fairly common" in Cleveland County, likely due to the high amount of agricultural land in the county, where this species has open fields and fences to support its behavior. However, according to the eBird database, there are no records within the project area and a low (0%–2%) frequency of reporting in the Kings Mountain area (eBird 2023). While the project area contains trees and shrubs, it lacks fields or rights-of-way with open habitat for foraging and utility poles for perching. No loggerhead shrikes were observed during the 2023 biological surveys. Overall, this species has a low potential to occur.

3.3.2.3 BARN OWL

Barn owls (*Tyto alba*) generally occur in open rural areas with farmland and where there are barns or abandoned buildings for nesting (Cornell Lab of Ornithology 2019; NCWRC 2023b). They also nest in woodland areas or within city limits where there are good open areas for foraging, although this is less typical. This species likely occurs in parts of Cleveland County considering the high amounts of agricultural land. The recent population decline is attributed to habitat loss due to changes from agriculture and open land to urban developed land.

According to the eBird database, there are no records within the project area and a low (0%–2%) frequency of reporting in the Kings Mountain area (eBird 2023). The project area lacks structures for potential nesting and large open areas for hunting. The project area is mainly successional habitats, and the open areas that do exist are mainly disturbed areas associated with the mine. No barn owls were observed during 2023 biological surveys; however, this species is mostly active at night. Overall, the barn owl has a low potential to occur.

3.3.2.4 NORTHERN LONG-EARED BAT

As the project area is outside of the 2023 revised range boundary for the northern long-eared bat (*Myotis septentrionalis*), this species is not expected to occur (USFWS 2023e). Additionally, it was not detected during the 2022 SWCA acoustic surveys at the nearby main site where more suitable habitat was present.

3.3.2.5 LITTLE BROWN BAT

See Section 3.2.2.

3.3.2.6 TRICOLORED BAT

See Section 3.2.1.

3.3.2.7 TIMBER RATTLESNAKE

The timber rattlesnake (*Crotalus horridus*) is a large venomous snake that feeds on rodents and birds. Most timber rattlesnakes rely on their camouflage for protection and are reluctant to rattle or bite (NC Partners in Amphibian and Reptile Conservation 2022). In North Carolina, this snake is most common in the mountains and the Coastal Plain. Their populations are declining due to agriculture and development. In the Piedmont where the project area is located, timber rattlesnakes are often found in wooded rocky hillsides or in mature hardwood forests with many downed logs and a layer of leaves and humus (Palmer and Braswell 1995). However, they can also be found in young forests with predominantly leaf litter, as well as wetlands and shrubby habitat. This species is difficult to observe in the field due to its secretive nature, strong camouflage abilities, and generalized habitat.

Based on habitat suitability, there is a moderate potential for this snake to occur in the project area due to a variety of habitats being present (e.g., forests, wetlands). However, the project area has been severely disturbed due to mining and generally lacks the exposed rock outcroppings with surrounding mature forests the snake prefers. No timber rattlesnakes were observed during the 2023 biological surveys that included a diversity of habitats such as forests, mining spoil piles, and wetlands. However, species-specific presence/absence surveys were not conducted because the secretive nature of the species makes the snake difficult to detect, likely leading to inconclusive results. Overall, the timber rattlesnake has a moderate potential to occur due to potential suitable habitat in the project area.

3.3.2.8 CAROLINA PYGMY RATTLESNAKE

The Carolina pygmy rattlesnake (*Sistrurus miliarius miliarius*) is the smallest species of rattlesnake in the United States. In North Carolina, this snake is found in pine flatwoods, pine/oak sandhills, and other pine/oak forests in the southeastern Coastal Plain and Sandhills (NC Partners in Amphibian and Reptile Conservation 2022). The Carolina pygmy rattlesnake is very rare in the Piedmont but has been observed on dry, rocky locations in the Crowders Mountain/Kings Mountain area.

The project area generally lacks the dry, rocky habitat that this species is known to use in the Piedmont. According to NCNHP, there are historic (1990s) observations at the nearby Crowders Mountain State Park (~5 miles east of project area), but the preferred dry rocky habitat with steep slopes in higher elevations are very limited in the project area. No Carolina pygmy rattlesnakes were observed during the 2023 biological surveys; however, no species-specific surveys were conducted due to a lack of suitable habitat and the secretive nature of the species. Overall, the Carolina pygmy rattlesnake has a low potential to occur due to poor habitat and substantial historical disturbance to most of the project area.

3.3.2.9 CAROLINA FOOTHILLS CRAYFISH

The Carolina foothills crayfish (*Cambarus johni*) in known only from headwater streams in the Yadkin-Pee Dee, Catawba, and Broad River Basins of the Blue Ridge Foothills and Upper Piedmont Plateau (NCWRC 2023c). Streams are typically 3 to 4 meters wide with sandy substrates, beneath undercut banks, and in leaf packs and root wads. Threat and trends have not been assessed, but the species' wide range is indicative of a secure status for a state endemic species (NatureServe 2023b).

The project area lacks streams and therefore contains no suitable habitat for this species; it is therefore not expected to occur.

3.3.2.10 BROAD RIVER STREAM CRAYFISH

The Broad River stream crayfish (*Cambarus lenati*) occurs in small to medium streams in the Broad River drainage. This species is found only in the headwaters of the First Broad River subdrainage, which is in the northern portion of the river basin (NCNHP 2003; NCWRC 2023d). It is not known to occur in the Kings Creek subdrainage. The project area lacks streams and therefore contains no suitable habitat for this species; it is therefore not expected to occur.

3.3.2.11 BROAD RIVER SPINY CRAYFISH

The Broad River spiny crayfish (*Cambarus spicatus*) occurs in small to medium streams with debris in the channel and along margins (NCWRC 2023e). It is known to occur in the First Broad River and North Pacolet subdrainages of the Broad River drainage, which are west of the project area (NCNHP 2003; NCWRC 2023e). It is not known to occur in the Kings Creek subdrainage. The project area lacks streams and contains no suitable habitat for this species; it is therefore not expected to occur.

3.3.2.12 CAROLINA QUILLBACK

The Carolina quillback (*Carpiodes cyprinus*) is restricted to the Broad, Catawba, and Yadkin River Basins. This species is found in warm, low- to moderate-gradient reaches of most major rivers, including upper portions of associated reservoirs (South Carolina Department of Natural Resources [SCDNR] 2015a). The project area lacks streams and contains no suitable habitat for this species; it is therefore not expected to occur.

3.3.2.13 SEAGREEN DARTER

The seagreen darter (*Etheostoma thalassinum*) is endemic to North Carolina and South Carolina and is restricted to the Broad and Catawba River Basins. This species is found in rock, rubble, or gravel riffles in large creeks and rivers with moderate to swift currents (SCDNR 2015b). The project area lacks streams and contains no suitable habitat for this species; it is therefore not expected to occur.

3.3.2.14 AMERICAN BITTERSWEET

American bittersweet (*Celastrus scandens*) is a high-climbing or sprawling woody vine reaching 30 feet. Habitat includes woodlands, stream banks, rocky hillsides, thickets, fence rows, and roadsides. In North Carolina, the species is typically only found on moist slopes with rich soils over mafic rocks in mesic and rich cove forests. Mafic rocks are igneous rocks with a high content of magnesium, iron, and often calcium that typically weather into deeper, higher-pH (less acidic) soils that can be rich and productive (U.S. Forest Service 2022). It generally does not grow along forested borders where the invasive Asiatic bittersweet (*Celastrus orbiculatus*) grows. The native American bittersweet is being replaced in the northeastern United States by the more aggressive Asiatic bittersweet, which has escaped from cultivation (University of Texas 2022). The flowering period is May through June, but this plant can be identified by its showy scarlet fruit in the fall. According to the NRCS web soil survey (NRCS 2023), the soils within the project area range from 5.3–6.2 pH, which are all acidic. Additionally, most surface soils have been excavated or significantly disturbed during previous mining activities. Based on this information, paired with the high level of historic disturbance, successional forest habitats, and dry slopes, the American bittersweet has a low potential to occur.

3.3.2.15 SMOOTH SUNFLOWER

Smooth sunflower (*Helianthus laevigatus*) occurs locally in Maryland, West Virginia, Virginia, western North Carolina, and northern South Carolina. Although smooth sunflower has a somewhat restricted range, it is abundant in glades, barrens, and along roadsides within that range, especially in Virginia (NatureServe 2023c). In North Carolina and South Carolina, all occurrences are in disturbed areas on slate-derived soils. The principal threats to this species are fire suppression, succession to woody species, and invasion by exotic plant species. Other threats include development, herbicide use, and mowing during the flowering and growing seasons. This sunflower has a potential to occur in suitable habitat along woodland edges and within existing rights-of-way. This plant grows up to 7 feet tall and flowers from August through November.

The project area contains some herbaceous vegetation communities, but these are generally restricted to recently heavily disturbed areas consisting of native and non-native weedy species, successional woody vegetation, and shrubs. Overall, the habitat is poor, and the smooth sunflower has a low potential to occur.

3.3.2.16 DWARF-FLOWERED HEARTLEAF

See Section 3.2.3.

3.3.2.17 ROUGH BLAZING-STAR

Rough blazing-star (*Liatris aspera*) is found in dry soil of prairies and plains, openings in rocky woodlands, and along power lines and roadsides through these habitats. This species prefers basic soils with high pH (LeGrand and Sorrie et al. 2023). This flower is rare in the southwestern Piedmont. It is found in dry and often rocky places in the southwestern part of the state (LeGrand and Sorrie et al. 2023). All recorded occurrences in Cleveland County are either extirpated, have not been found in recent surveys, or have not been surveyed recently enough to determine their presence. Rough blazing-star has lavender flowers from August through September and fruits starting in early October.

The project area contains acidic soils with a low pH (NRCS 2023), which are unlikely to support this species. Additionally, most surface soils have been excavated or significantly disturbed during previous mining activities. The project area also lacks prairies and rocky woodlands with openings. Therefore, rough blazing-star has a low potential to occur.

3.3.2.18 DWARF CHINQUAPIN OAK

The dwarf chinquapin oak (*Quercus prinoides*) is a deciduous shrub, typically 5 to 6 feet tall (LeGrand and Sorrie et al. 2023). It grows in dry or mesic edge or opening habitat in acidic soils. Most records are from dry acidic slopes with openings or other early successional vegetation, often with rocky areas. This species is very rare and strongly declining in the Piedmont. Declines are likely due to fire suppression. All recorded occurrences in the county are from the 1950s, and this species has not been found in recent surveys (NCNHP 2003). Therefore, it is considered historic in Cleveland County. The project area lacks rocky slopes other than the waste rock piles, and the potential for dwarf chinquapin oak to occur in these areas is very low. Additionally, while the NRCS (2023) describes the project area as having relatively acidic soils (5.3–6.2 pH), most of the surface soils have been excavated or severely disturbed due to mining. No species-specific surveys were conducted due to lack of suitable habitat and this species' historical status. Overall, the dwarf chinquapin oak has a very low potential to occur.

3.3.2.19 PURSH'S WILD PETUNIA

Pursh's wild petunia (*Ruellia purshiana*) is a perennial herb restricted to dry to somewhat mesic, high-pH soil in partly shaded conditions (LeGrand and Sorrie et al. 2023). It favors glades and barrens, woodland borders, open woods, and other similar sites. In the Piedmont, this species blooms in May. The project area contains some woodland borders, but most forests are dense successional forests that are not suitable. Additionally, soils within the project area are not high pH soils, but are described as acidic, ranging from 5.3–6.2 pH; however, they have been disturbed due to historic mining activities (NRCS 2023). Overall, this species has a very low potential to occur.

4 SUMMARY AND CONCLUSIONS

No federally listed species have been identified within the project area. There is a moderate potential for the little brown bat and tricolored bat to occur in the project area based on the forested and shrubby habitat with surrounding aquatic features. There is no suitable habitat for the monarch butterfly or the dwarf-flowered heartleaf, as most soils and vegetation in the project area were substantially disturbed or removed during mining activities that only recently ceased. Regenerating vegetation is currently in a dense, successional phase that does provide suitable habitat.

Timber rattlesnake is the only state-listed species that has a moderate potential to occur based on suitable habitat. Surveys were not conducted for timber rattlesnake due to the lack of predictive survey areas within the project area (e.g., rock outcrops) and the secretive nature of the species. However, biological surveys were conducted throughout a diversity of habitats (e.g., forests, floodplains) in the project area during the species' active period in 2023, and no timber rattlesnakes were observed. All other state-listed species have a low or very low potential to occur, primarily due to lack of suitable habitat.

Tricolored bat, a habitat generalist, was detected during acoustic surveys conducted by SWCA in 2022 at the main site approximately 2 miles east of the project area. This bat is not currently state-listed or federally listed, but the USFWS has proposed listing this species as endangered under the ESA. Development within the project area would impact forested habitat used by this species and other bats during the summer season. Recommended management practices that may be beneficial to all bat species include minimizing forest clearing, avoiding impacts to large and intact contiguous forested blocks, and avoiding impacts to water quality by limiting stream/wetland impacts and implementing erosion and sediment controls along waterways. Additionally, revegetating with native grassland species using a pollinator mix could promote prey diversity and abundance, which would also benefit other wildlife, such as monarch butterflies.

The USFWS has not yet provided any guidance for tricolored bat. Should the tricolored bat become listed as endangered, consultation with the USFWS is recommended to determine suitable measures, such as habitat conservation or enhancement, to address any potential adverse effects. The tricolored bat is expected to be present in the project area from April through October. As a forest-dwelling species, there is risk of direct mortality if occupied roost trees are removed during a time when they are occupied. Because the species is a habitat generalist that typically roosts in foliage of living trees, it is difficult to determine specific roost trees. Avoiding the removal of forested habitat from April through October is likely to minimize the potential for direct mortality, and habitat modification at a small scale is unlikely to result in harm to individuals.

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APPENDIX A

U.S. Fish and Wildlife Service Information for Planning and Consultation Resource List

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Cleveland County, North Carolina

Local office

Asheville Ecological Services Field Office

(828) 258-3939
(828) 258-5330

160 Zillicoa Street
Asheville, NC 28801-1082

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Dwarf-flowered Heartleaf Hexastylis naniflora Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2458	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

Additional information can be found using the following links:

- Eagle Managment https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Jul 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

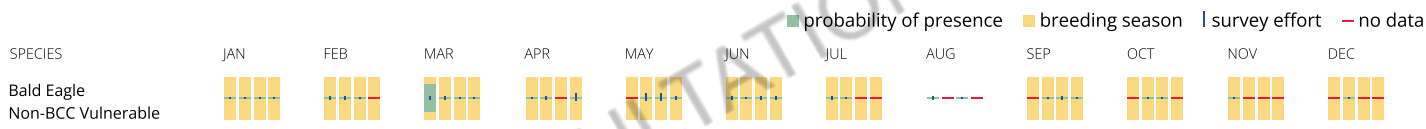
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/ documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area,

visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Jul 31
Chimney Swift Chaetura pelagica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Prairie Warbler Dendroica discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

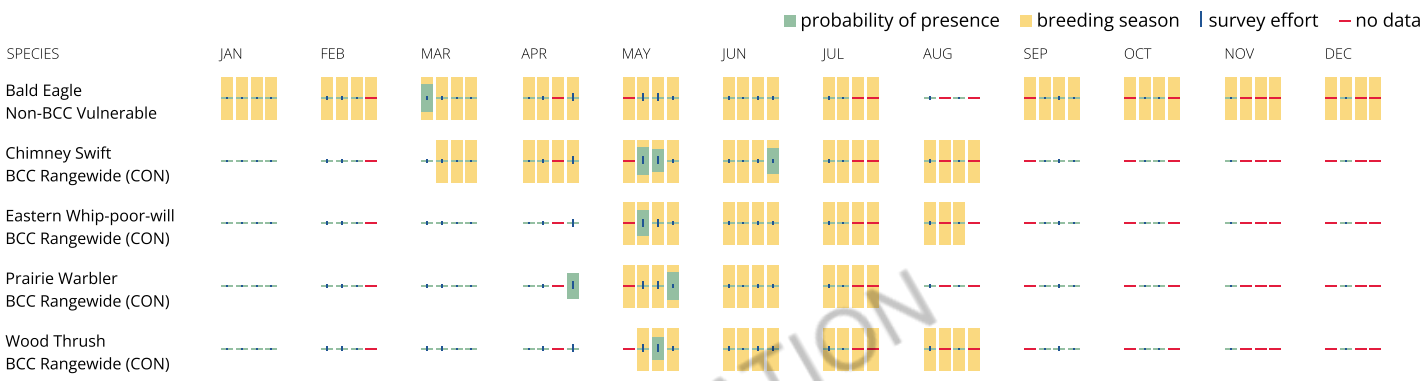
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

- R4SBC
- R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX B

North Carolina Natural Heritage Program Resource Report

NC DEPARTMENT OF
NATURAL AND CULTURAL RESOURCES

Roy Cooper, **Governor**

D. Reid Wilson, **Secretary**

Misty Buchanan
Deputy Director, Natural Heritage Program

NCNHDE-23849

November 1, 2023

Simon King
SWCA Environmental Consultants
20 E Thomas Rd
Phoenix, AZ 85012
RE: Archdale Site

Dear Simon King:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

Based on the project area mapped with your request, a query of the NCNHP database indicates that there are no records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. Please note that although there may be no documentation of natural heritage elements within the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is found within the project area or is indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

The NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Land and Water Fund easement, or Federally-listed species are documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact the NCNHP at natural.heritage@dncr.nc.gov.

Sincerely,
NC Natural Heritage Program

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Archdale Site
November 1, 2023
NCNHDE-23849

Element Occurrences Documented Within a One-mile Radius of the Project Area

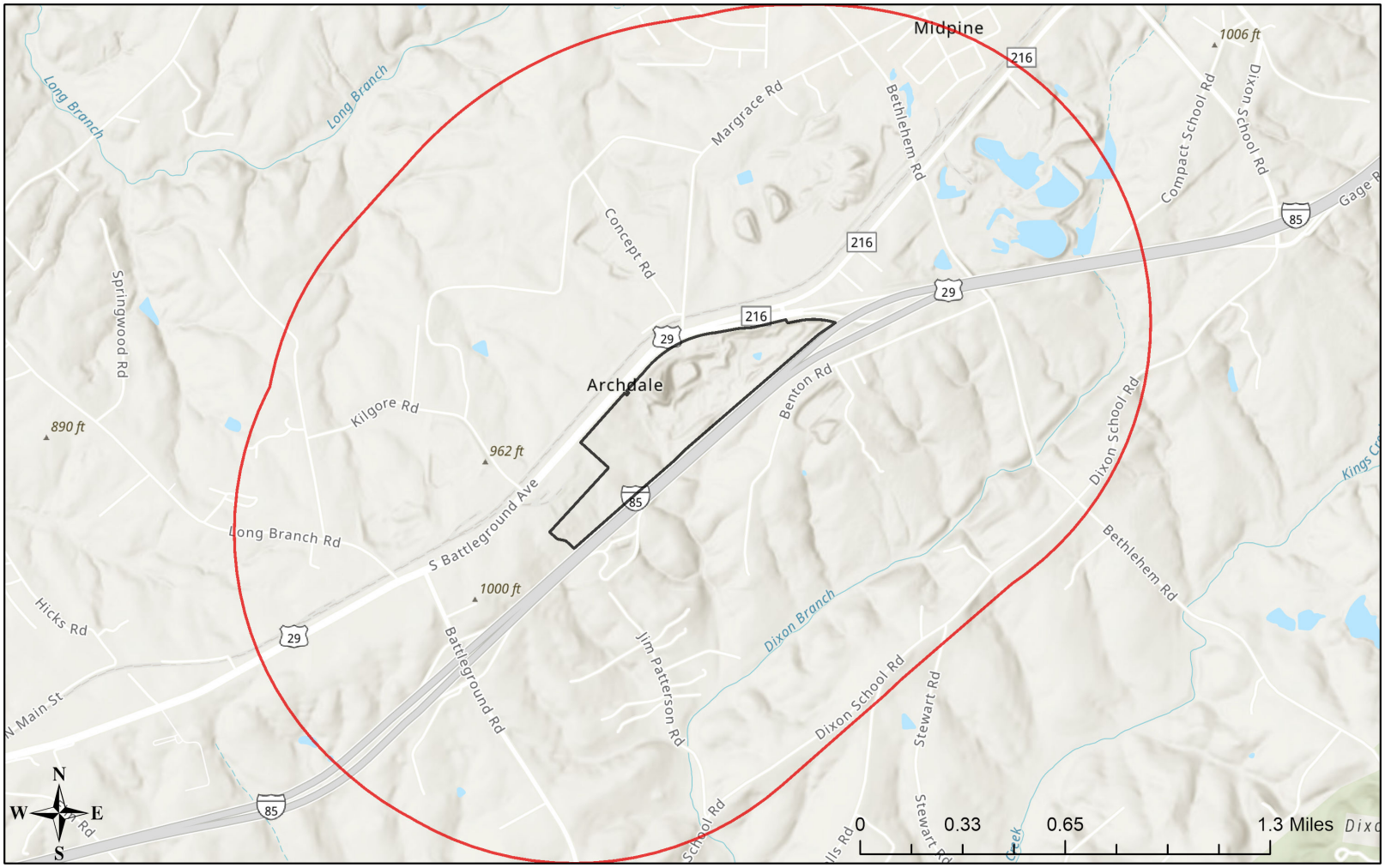
Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Freshwater Fish	42729	Notropis lutipinnis	Yellowfin Shiner	1980-09-03	H	3-Medium	---	Special Concern	G4Q	S2

No Natural Areas are Documented Within a One-mile Radius of the Project Area

No Managed Areas are Documented Within a One-mile Radius of the Project Area

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/help. Data query generated on November 1, 2023; source: NCNHP, Fall (October) 2023. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-23849: Archdale Site



November 1, 2023

Buffered Project Boundary

Project Boundary

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

APPENDIX D-2 U.S. FISH AND WILDLIFE SERVICE IPAC RESOURCE LIST – ARCHDALE

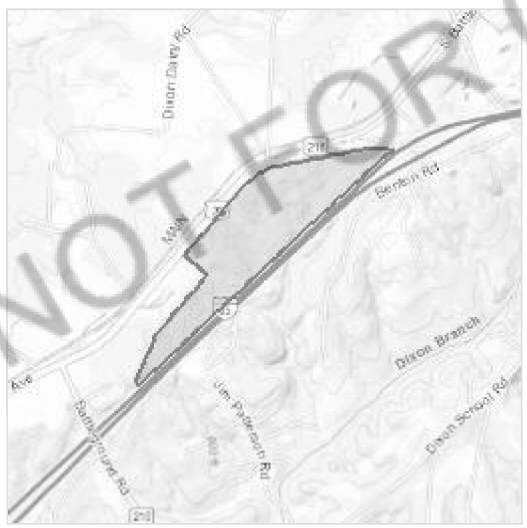
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Cleveland County, North Carolina



Local office

Asheville Ecological Services Field Office

(828) 258-3939
(828) 258-5330

160 Zillicoa Street, Suite B

Asheville, NC 28801-1082

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Dwarf-flowered Heartleaf Hexastylis naniflora Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2458	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Jul 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read

"Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

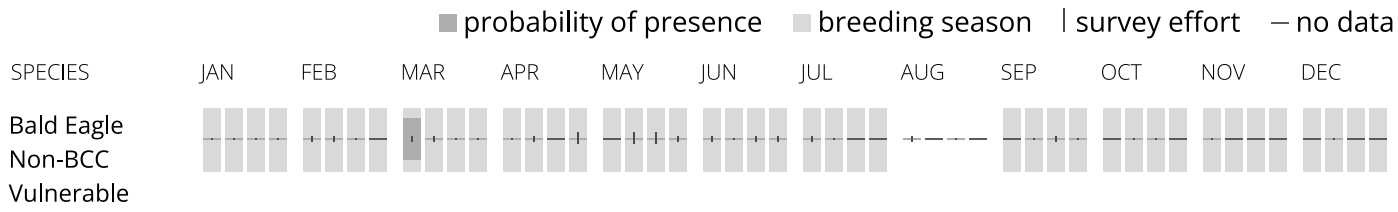
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON

Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Jul 31
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Chuck-will's-widow *Antrostomus carolinensis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Jul 10
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Grasshopper Sparrow *Ammodramus savannarum perpallidus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8329	Breeds Jun 1 to Aug 20
Prairie Warbler *Setophaga discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

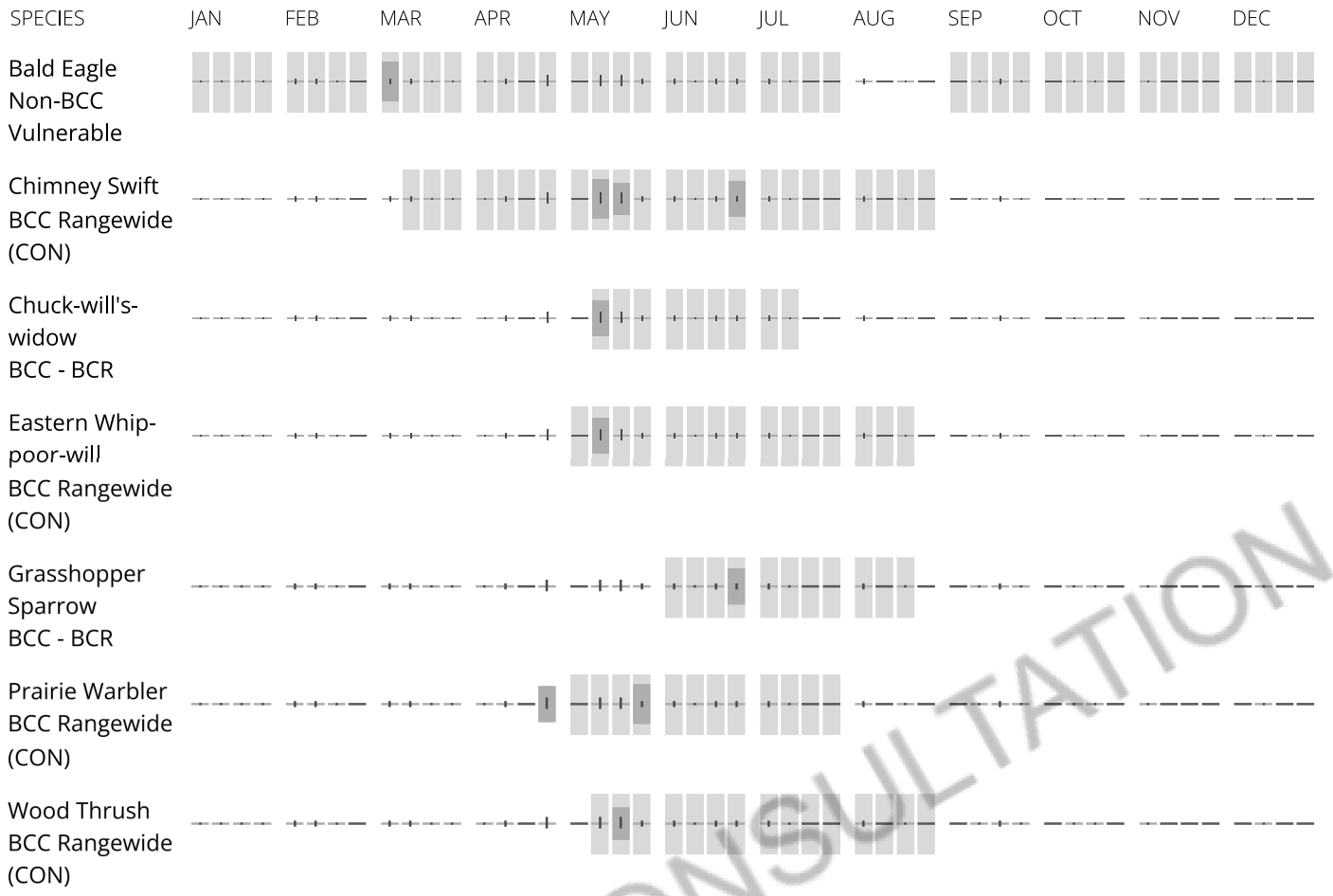
Breeding Season ( )
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

- R4SBC
- R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX E CULTURAL, HISTORICAL, AND ARCHAEOLOGICAL RESOURCES

APPENDIX E-1 2023 STATE HISTORIC PRESERVATION OFFICE HISTORIC STRUCTURE SURVEY REPORT, KINGS MOUNTAIN MINING PROJECT, CLEVELAND COUNTY, ER 22-1248

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary D. Reid Wilson

Office of Archives and History
Deputy Secretary, Darin J. Waters, Ph.D.

September 27, 2023

Hannah Curry
SWCA Environmental Consultants
113 Edinburgh South Drive
Cary, NC 27511

hannah.curry@swca.com

Re: Historic Structure Survey Report, Kings Mountain mining project, Cleveland County, ER 22-1248

Dear Ms. Curry:

Thank you for your letter of July 27, 2023, transmitting the Historic Structure Survey Report (HSSR), "Historic Structures Survey for Kings Mountain, Cleveland County, North Carolina," prepared by SWCA for the Albemarle, U.S., Inc. We have reviewed the HSSR and offer the following comments.

While we concur that the following resources are eligible for listing in the National Register of Historic Places for the reasons listed in the HSSR, the report should be amended to provide clear boundary maps, descriptions, and justifications for both schools.

- CL0291, Park Grace School; eligible under Criterion A - education and Criterion C - architecture.
- CL0297, Compact School; eligible under Criterion A - education and Ethnic History.

Resources that appear to be eligible for the Register must be presented with a boundary map, boundary description, and boundary justification within their individual evaluation sections. The map at the end of the document showing tax parcels highlighted as "eligible" or "ineligible" is not a satisfactory proposed boundary map.

We also concur that the following forty-four properties are ineligible for listing.

SSN	Resource	SSN	Resource
• CL0242	Glass House	• CL1728	109 Timms Street
• CL1277	Falls-Dixon-Hambright House	• CL1732	127 Tin Mine Road
• CL1718	1321 S. Battleground Avenue	• CL1733	103 Beta Court
• CL1719	1325 S. Battleground Avenue	• CL1734	105 Beta Court
• CL1720	1327 S. Battleground Avenue	• CL1735	111 Beta Place
• CL1724	Albemarle Milling and Mining Complex	• CL1736	113 Beta Place
• CL1726	114 Raven Circle	• CL1737	115 Beta Place
• CL1727	109 School Street	• CL1738	119 Beta Place

SSN	Resource
• CL1739	107 Castlerock Road
• CL1740	131 Castlerock Road
• CL1741	311 Industrial Drive
• CL1743	323 Industrial Drive
• CL1746	106 Miracle Drive
• CL1747	107 Miracle Drive
• CL1748	106 Parkdale Court
• CL1749	203 Parkdale Circle
• CL1750	217 Parkdale Circle
• CL1752	221 Parkdale Circle
• CL1753	223 Parkdale Circle
• CL1755	227 Parkdale Circle
• CL1756	106 Parkgrace Road
• CL1757	1111 S. Battleground Avenue

SSN	Resource
• CL1758	124 Parkgrace Road
• CL1759	126 Parkgrace Road
• CL1760	128 Parkgrace Road
• CL1761	130 Parkgrace Road
• CL1762	132 Parkgrace Road
• CL1763	140 Parkgrace Road
• CL1764	142 Parkgrace Road
• CL1765	146 Parkgrace Road
• CL1766	114 Pennant Drive
• CL1767	117 Tin Mine Road
• CL1768	119 Tin Mine Road
• CL1770	139 Tin Mine Road
• CL1771	-- York Road
• CL1772	1050 York Road

We cannot concur that the following resources are eligible for the National Register because the report does not provide any substantive argument about the historic significance of these resources. Please address the concerns/recommended revisions discussed below.

- CL0240, Hostetler House
- CL1716, Commercial Building
- CL1728, House
- CL1729, House
- CL1742, House
- CL1751, House
- CL1754, House
- CL1769, House

For a resource to be eligible for the National Register, the resource must have historic integrity *and* historic significance. The investigator frequently assumes that because a resource retains good integrity, it is eligible for the National Register, without giving serious consideration to historic significance. This has resulted in numerous recommendations of eligibility based only on a property's having integrity.

In general, the report does not use comparable examples effectively. Comparable examples are guides or thresholds against which subject resources can be compared. The best comparable examples are resources that are already listed in the National Register or North Carolina's Study List. If no "like" resources in a related geographic area are designated in some way, then compare the subject resources to a selection of typical resources the investigator has seen throughout a related geographic area. Comparing a subject resource to other resources allows the investigator to place the subject resource on a scale, which should help facilitate the evaluation.

Furthermore, the investigator needs to compare subject resources to like resources: comparable examples are resources with historical uses, forms, styles, and/or materials that are like the subject resource. Comparing an auto repair shop to a church because they both have windows on the front elevation is not a useful comparison. That comparison does not tell the reviewer where the auto shop falls on the continuum of auto shops in Cleveland County. Comparing a Modernist church to a Modernist church that is listed in

the Register or the state Study List in the same county or region can be an effective way to demonstrate that the subject resource is or is not eligible.

Additionally, we cannot concur with the report's findings that the following churches are eligible for the National Register. Please address the concerns/recommended revisions discussed below.

- CL1717, Macedonia Baptist Church, which includes the parsonage and a baseball field
- CL1723, Galilee United Methodist Church
- CL1725, Adams Chapel AME Zion Church

The missing information includes an assessment of how each church meets or does not meet Criteria Consideration A regarding religious properties. The report also lacks the strong contextual arguments required to support the assertations that each of these churches has the historic significance necessary for National Register eligibility. Simply stating that a resource is the last of a type, particularly when the resource is something (a 1950s church) that occurs frequently in most North Carolian counties, is not solid footing for eligibility. The report's assertation that these churches represent post-war prosperity is not supported with a thorough examination of other post-war resources and a discussion of why or how a 1950s church's representation of post-war prosperity would rise to the level of significance necessary for National Register eligibility. Finally, declaring that a resource is the best example of a type or style without demonstrating that through comparison properties does not give the reviewer the information to concur with the investigator's conclusions.

Applying better comparable examples (CL1699 makes an excellent comparable example for Galilee United Methodist Church) will strengthen or undermine the report's argument, thus providing the necessary information to concur or not.

Finally, the two properties (CL1744 & CL1745) which could not be accessed due to ownership at the time of study, appear to be potentially accessible today. We recommend that staff make a second attempt to access and remove the previous owner's information from the report.

Please address the issues listed above and provide a revised digital copy of the revised HSSR to us for review and comment. Once approved, we will request a final hard copy of the report and any deliverables changed to reflect our recommended revisions. Contact Katie Harville, Environmental Review Specialist, with questions regarding deliverables.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@dncr.nc.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona Bartos, Deputy
State Historic Preservation Officer

cc: Katie Harville, NC HPO katie.harville@dncr.nc.gov

APPENDIX E-2 PHASE I ARCHAEOLOGICAL SURVEY FOR THE PROPOSED KINGS MOUNTAIN MINING PROJECT, ARCHDALE TRACT, CLEVELAND COUNTY, NORTH CAROLINA

Phase I Archaeological Survey for the Proposed Kings Mountain Mining Project, Archdale Tract, Cleveland County, North Carolina

JANUARY 2024

PREPARED FOR

Albemarle, U.S., Inc.

PREPARED BY

SWCA Environmental Consultants

PHASE I ARCHAEOLOGICAL SURVEY FOR THE PROPOSED KINGS MOUNTAIN MINING PROJECT, ARCHDALE TRACT, CLEVELAND COUNTY, NORTH CAROLINA

ER-22-1248

Prepared for

Albemarle, U.S., Inc.
348 Holiday Inn Drive
Kings Mountain, North Carolina 28086

Prepared by

SWCA Environmental Consultants
113 Edinburgh South Drive, Suite 110
Cary, North Carolina 27511
(919) 292-2200

Written by:

Kathryn A. Mohlenhoff, Ph.D., RPA
Jeffrey Clarke

Matthew Jorgenson, M.A., RPA
Cultural Resources Team Lead

SWCA Project No. 70316

SWCA Cultural Resources Report No. 23-809

January 2024

ABSTRACT

Albemarle, U.S., Inc. (Albemarle), is proposing to resume and expand lithium mining activities for the Kings Mountain Mining Project on recently acquired private property in Cleveland County, North Carolina. The portion of the project discussed in this report will be referred to as the Archdale Tract.

Phase I archaeological survey activities were conducted in accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, found at 36 Code of Federal Regulations 800. The Phase I survey was also conducted in accordance with applicable federal and state guidelines and requirements, including the North Carolina Office of State Archaeology (OSA) *Archaeological Investigation Standards and Guidelines* (OSA 2023a).

SWCA Environmental Consultants (SWCA) conducted the Phase I archaeological fieldwork on September 18 and September 21, 2023. Fieldwork consisted of a visual inspection, pedestrian survey, and shovel testing of the project area. No previously recorded archaeological sites are located within the project area, and investigators did not identify any sites during the survey. SWCA has determined development of the Archdale Tract will have no adverse effect on historic properties, and no additional work is recommended for the current project area.

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CONTENTS

Figures

Tables

CHAPTER 1. INTRODUCTION

SWCA Environmental Consultants (SWCA) conducted a Phase I archaeological investigation on behalf of Albemarle, U.S., Inc. (Albemarle), in support of the Kings Mountain Mining Project. Albemarle is proposing to resume and expand lithium mining activities on 131.2 acres (53.09 hectares), composed of one parcel recently acquired by Albemarle. The parcel is located in southeast Cleveland County, North Carolina, and is approximately 4.3 miles (6.9 kilometers [km]) southwest of the city of Kings Mountain, North Carolina (Figure 1-1 through Figure 1-3). The lead federal agency for the project is the U.S. Army Corps of Engineers. Due to federal involvement, the project must comply with Section 106 of the National Historic Preservation Act.

SWCA conducted the Phase I survey on September 18 and September 21, 2023. The goal of the Phase I survey was to identify any archaeological sites and high potential areas that may be affected by the proposed undertaking. Jeff Clarke (field director) conducted fieldwork with crew member Peyton Harrison. Dr. Kathryn Mohlenhoff also attended the first day of fieldwork for a site visit and meeting. Dr. Mohlenhoff oversaw report production, undertaken by herself as well as Jeff Clarke. During the survey, investigators identified no previously recorded or previously undocumented archaeological sites. Based on the results of the survey, SWCA determined no historic properties will be affected by the proposed undertaking, and no further work is recommended.

This report outlines the results of the Phase I survey for the project and is structured in accordance with the North Carolina Office of the State Archaeology (OSA) *Archaeological Investigations Standards and Guidelines* (Guidelines; OSA 2023a). The following sections summarize the environmental setting and archaeological and cultural background of the project area, followed by the methodology used during fieldwork, detailed results of the survey, and project management recommendations.

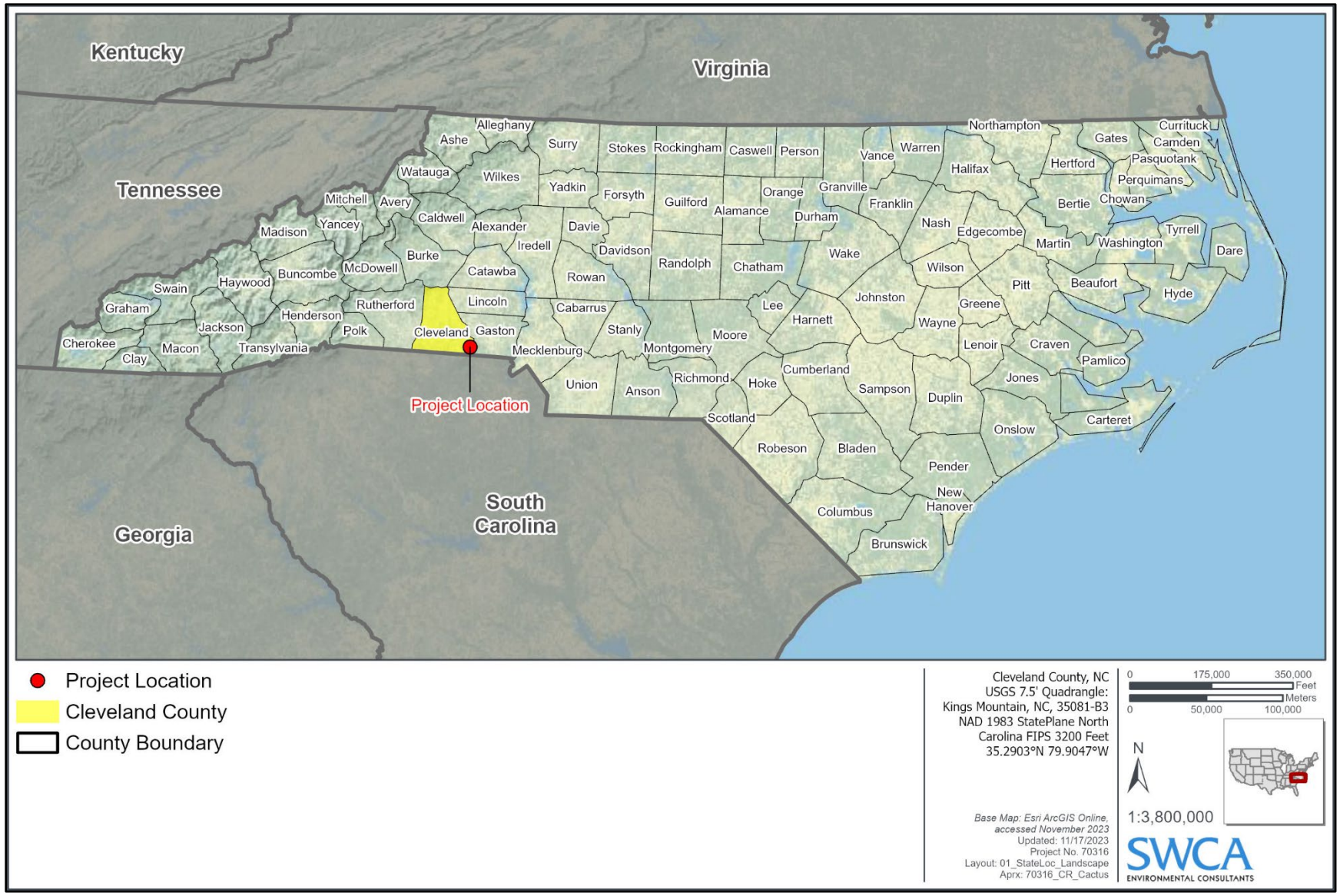

Figure 1-1. Proposed location of the project within Cleveland County, North Carolina.

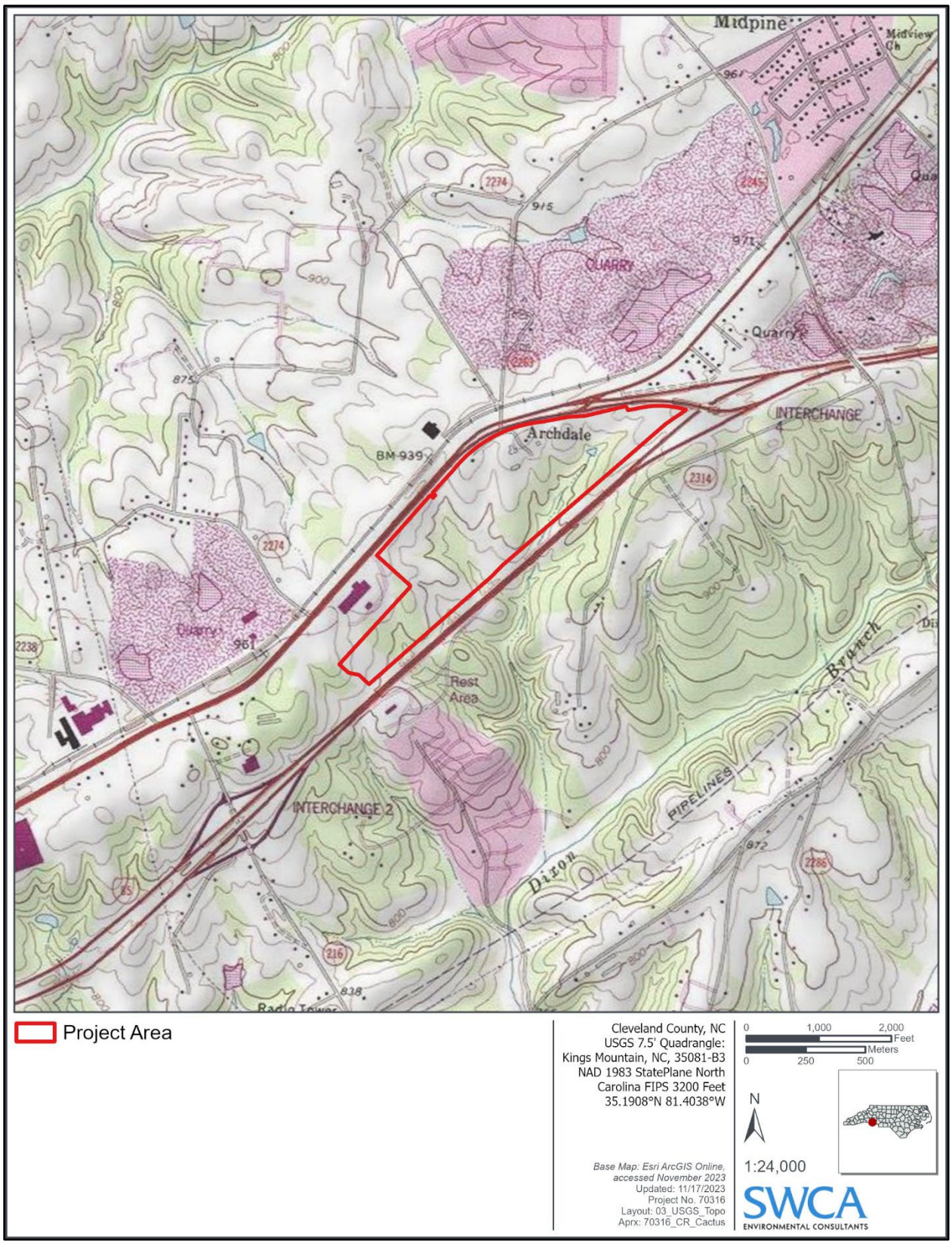

Figure 1-2. Project overview map, topographic base.

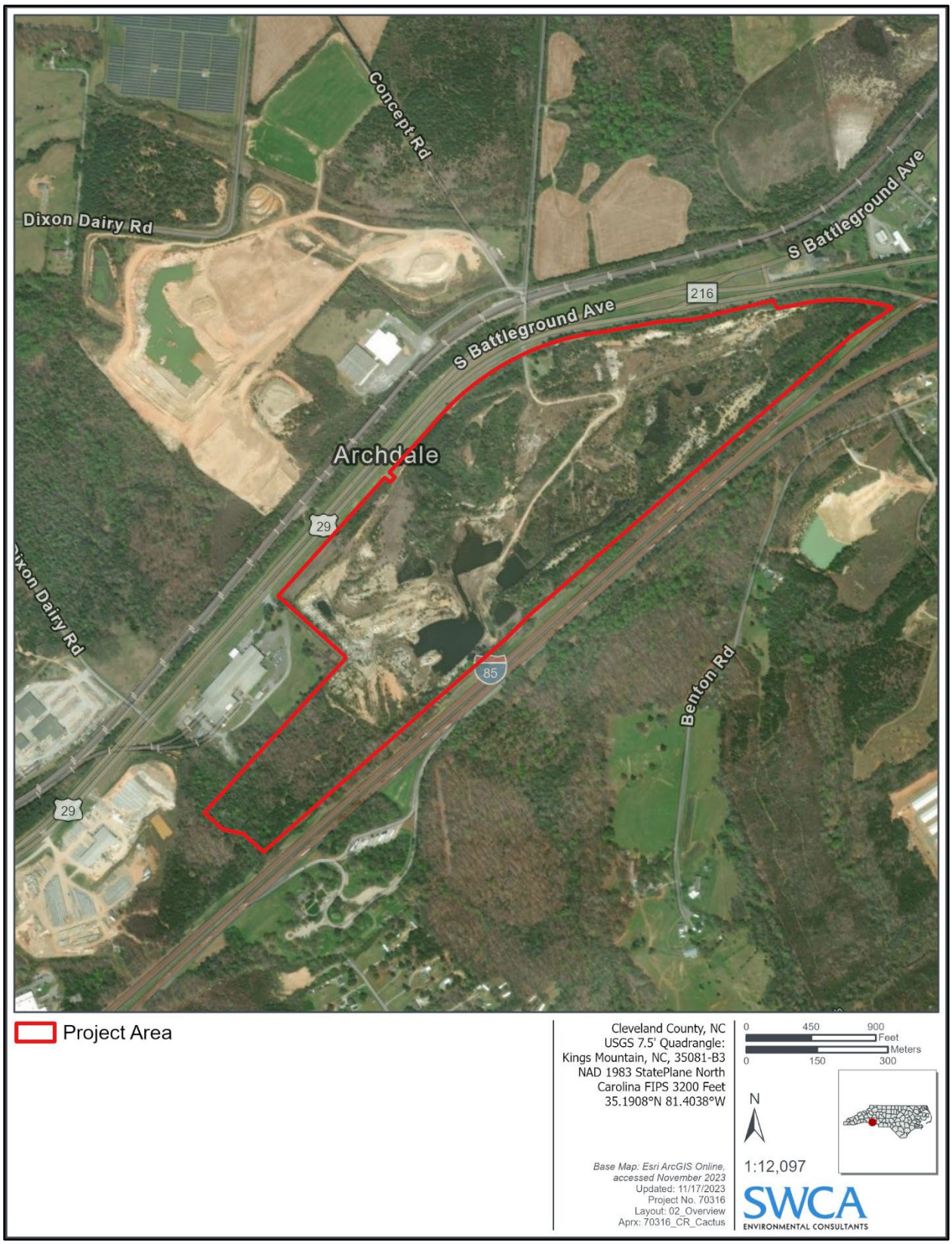

Figure 1-3. Project overview map, aerial imagery base.

CHAPTER 2. ENVIRONMENTAL SETTING

This section presents the environmental factors that have influenced the precontact and historical occupation of the project area. A discussion of relevant factors such as physiography, geology, soils, flora and fauna, hydrology, and current and past land use help provide an understanding of the local environment. This information is then synthesized with the literature review, which helped guide the development of probability areas within the project area and the methodology that was employed during the Phase I archaeological survey.

PHYSIOGRAPHY

The project area is within the Piedmont physiographic province between the Coastal Plain and the Blue Ridge Mountains. Elevations range from 300 to 600 feet above mean sea level (amsl) at the boundary with the Coastal Plain east of the project area, to approximately 1,500 feet amsl at the foot of the Blue Ridge Mountains (North Carolina Department of Environmental Quality 2023).

The Piedmont province is characterized by rolling to hilly upland with a well-defined drainage pattern. Streams have dissected the original plateau, leaving narrow to fairly broad upland ridgetops and short slopes adjacent to the major streams (Natural Resources Conservation Service [NRCS] 2006:439). The Piedmont province was a gently sloping plain until uplift raised the region to its present elevation and streams consequently incised into the bedrock to form the hilly terrain present today. The exposed bedrock of the Piedmont has been physically and chemically weathered so that a moderately deep zone of reddish soil and soft, decayed rock is characteristic of the region (Billingsley et al. 1957:3).

The landscape within the project area and its immediate vicinity is representative of the regional physiography. Gently rolling uplands predominate, interspersed with localized areas of more pronounced slope (i.e., greater than 15 percent). The majority of the project area has had the natural physiography altered by human activity. These areas present as large, pronounced depressions (e.g., the main mine pit), water impoundment (e.g., tailings ponds), large piles of waste rock, and areas of extreme slope (i.e., greater than 100 percent) where the most intensive deposition of mine tailings took place.

GEOLOGY AND LATE QUATERNARY EOLIAN-ALLUVIAL STRATIGRAPHIC SEQUENCES

The project area is on the narrow Kings Mountain Belt, between the Inner Piedmont Belt to the west and the Charlotte Belt to the east (North Carolina Geological Survey 1985). The Kings Mountain Belt is composed of metamorphic and sedimentary rock dating to 400 to 500 million years ago and contains lithium deposits. The Inner Piedmont Belt consists of older metamorphic rock that is 500 to 750 million years old and contains gneiss and schist. The Charlotte Belt is composed of younger igneous rock that is 300 to 500 million years old and includes granite, diorite, and gabbro. The region is mapped as being underlain mainly by metamorphic rock. Dominant types include biotite gneiss, schist, slate, quartzite, phyllite, and amphibolite (NRCS 2006:440).

Within drainage boundaries, overlying bedrock is a complex sequence of eolian and alluvial deposits dating back to at least to the Late Pleistocene and potentially to the Last Glacial Maximum or even earlier. Eolian dune and sand sheet deposits are widespread throughout the unglaciated Atlantic Coastal Plain and have been optically stimulated luminescence (OSL) dated to the Pleistocene, ca. 92,000 to 5,000 years ago, although most dates cluster in the Late Pleistocene, ca. 35,000 to 14,000 years ago (Swezey 2020). Sand sheets in the Piedmont have been recorded in central and northern Virginia and have been dated to the Late Pleistocene (Feldman et al. 2000; Swezey 2020).

The Carolina Sandhills are directly southeast of the project area, located in northern South Carolina. They are a likely source for these Late Pleistocene sediments, and it is likely that these eolian sediments correlate with the sand sheets observed in the Piedmont of Virginia. Deposition of regional sand sheets in this location would occur when the predominant winds originated from the southeast during winter months. Deposition occurs in cold, dry, sparsely vegetated, and windy environments that occurred during the Pleistocene. After deposition, sand sheets are stabilized by vegetation and resistant to erosional process as they are secured in place by complex root networks of overlying forests. These eolian deposits can thus also contain buried paleosols, although they would be weakly developed given the environmental conditions, which would have promoted a slow rate of pedogenesis.

During the Pleistocene-Holocene Transition and even into the early Holocene, drainage networks worldwide underwent massive shifts in their fluvial regimes. The drainages in the area became actively flowing streams, which began to deposit a thick sequence of very fine silty sediments through overbank flooding. Throughout the Holocene, a significant portion of this overbank flooding was likely enhanced by the construction of beaver dams, which were, and still are, common throughout the area. Recent studies of beaver ponds in the Piedmont and Coastal Plain of Virginia and North Carolina indicate that floodplain sediment accumulation rates due to beaver ponds average 15 to 20 millimeters (mm) per year (Kroes and Bason 2015). This rate of floodplain deposition from overbank flooding leads to the construction of very deep floodplain alluvial sequences along portions of these drainages where slope is relatively gradual.

SOILS

A review of the NRCS Web Soil Survey database (NRCS 2023) identified several soil types within the project area (Table 2-1). The majority of the project area is composed of upland soils that formed on saprolite or residuum on interfluves and hillslopes on ridges.

Table 2-1. Soils within the Project Area

Map Unit Symbol	Map Unit Name	Acres in Project Area	Percentage of Project Area	Landform	Parent Material
ApB	Appling sandy loam, 1 to 6 percent slopes	3.2	2.5	Interfluves	Saprolite derived from granite and gneiss and/or schist
HhB	Hulett gravelly sandy loam, 2 to 8 percent slopes	34.4	26.2	Interfluves	Residuum weathered from mica schist and/or other micaceous metamorphic rock
HtC	Hulett gravelly sandy loam, 8 to 15 percent slopes, stony	16.9	12.9	Hillslopes on ridges	Residuum weathered from mica schist and/or other micaceous metamorphic rock
MaB2	Madison gravelly sandy clay loam, 2 to 8 percent slopes, moderately eroded	27.7	21.1	Interfluves	Residuum weathered from mica schist and/or other micaceous metamorphic rock
MbB2	Madison-Bethlehem complex, 2 to 8 percent slopes, stony, moderately eroded	21.0	16	Interfluves	Residuum weathered from mica schist and/or other micaceous metamorphic rock
McC2	Madison-Bethlehem complex, 8 to 15 percent slopes, very stony, moderately eroded	26.2	20.0	Hillslopes on ridges	Residuum weathered from mica schist and/or other micaceous metamorphic rock

Map Unit Symbol	Map Unit Name	Acres in Project Area	Percentage of Project Area	Landform	Parent Material
UdC	Udorthents, loamy, 0 to 15 percent slopes	1.8	1.4	Interfluves	Loamy and clayey human-transported material derived from igneous, metamorphic, and sedimentary rock

Source: NRCS (2023)

HYDROLOGY

The project area is located within the 24,868-square-mile (64,408 km^2) Santee River Basin. This drainage network extends from portions of western North Carolina into South Carolina (Figure 2-1). Kings Creek flows southward into South Carolina, where it eventually joins the Broad River in Smyrna, South Carolina. The Broad River flows southeast and joins the Saluda River at Columbia, South Carolina. This confluence forms the Congaree River which then flows southeastward until it joins the Catawba-Wateree and forms the Santee River. The Santee River flows southeastward until it empties into the Atlantic Ocean roughly 186 miles to the southeast between the cities of Georgetown and Charleston, South Carolina.

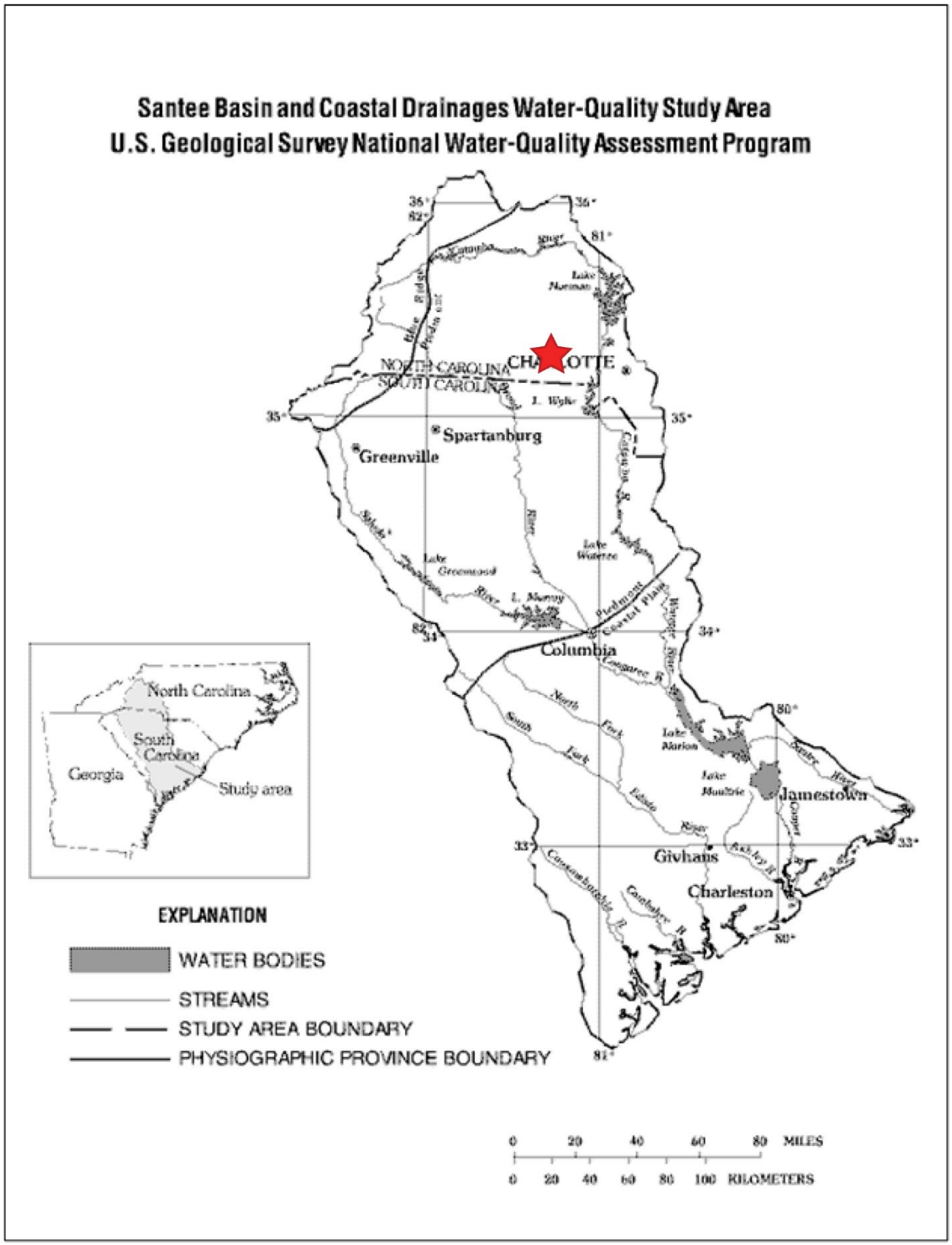

Figure 2-1. Project area drainage network, shown as part of the U.S. Geological Survey Santee Basin and Costal Drainages Water-Quality Study Area; red star denotes project location (Source: USGS 2022).

CLIMATE

The region receives between 40 and 70 inches (102–178 centimeters [cm]) of rain annually. This precipitation is relatively evenly distributed throughout the year, but occurs with the greatest intensity during the summer growing season in the form of thunderstorms; hurricanes can cause periods of intense rainfall throughout the fall and winter. Average annual temperatures vary within a relatively narrow range for a temperate climate, between 54 and 65 degrees Fahrenheit (12–18 degrees Celsius) (NRCS 2006:452). An average of 230 frost-free days can be expected per year, ranging between 185 and 275 days in any particular year. Latitude is the primary determinant of climate in this region, followed by elevation above mean sea level (NRCS 2006:452).

FLORA AND FAUNA

The region supports a combination of hardwood and pine forests, including loblolly pine (*Pinus taeda*), slash pine (*Pinus elliottii*), white oak (*Quercus alba*), northern red oak (*Quercus rubra*), sweetgum (*Liquidambar styraciflua*), tuliptree (*Liriodendron tulipifera*), and American sycamore (*Platanus occidentalis*) as the principal species. The most common wildlife species found in the region consist of white-tailed deer (*Odocoileus virginianus*), eastern cottontail rabbit (*Sylvilagus floridanus*), squirrel (*Sciuridae* spp.), northern bobwhite quail (*Colinus virginianus*), and mourning dove (*Zenaida macroura*) (NRCS 2006:453). Notably, the project area is home to a population of Carolina beavers (*Castor canadensis carolinensis,* a subspecies of the North American beaver). These large rodents are native to the North Carolina Piedmont. Although they were overhunted and locally eradicated, they were reintroduced to the area in the 1930s (Smith 2021). Their lengthy habitation in this area alongside precontact human populations provided a particularly good opportunity for human hunter-gatherers to take advantage not only of the beavers themselves for meat and furs, but also of the niche habitats they created in the form of beaver-dammed streams, which were excellent locations for fishing (e.g., *Seattle Times* 2009). Furthermore, these large, still pools created calm areas that were less subject to flooding, a further draw for human settlement.

PALEOENVIRONMENT

Large paleoenvironmental studies across much of the Southeast have provided detailed information on climate and vegetative communities in the Pleistocene and the early to mid-Holocene epochs (Anderson et al. 1996:4). Temperature trends from the Late Pleistocene into the Holocene followed global patterns, which reflected the end of a glacial period and transition into an interglacial period (the Holocene). Despite being part of a late glacial period, the region between the Southern Appalachian Mountains and the Atlantic Ocean in the Southeast has been described as a "warm thermal enclave" (Russell et al. 2009). This unique microenvironment would have resulted in much greater biodiversity than other regions in North America at the time. Southeastern forests and prairies were occupied by "Floridian" Ice Age biota. Mammoth (*Mammuthus* spp.), mastodon (*Mammut americanum*), bison (*Bison bison*), camel (*Camelops* spp.), horse (*Equus occidentalis*), giant ground sloth (*Megatherium* spp.), saber-toothed tiger (*Smilodon* spp.), bear (*Ursus* spp.), white-tailed deer, Virginia opossum (*Didelphis virginiana*), rabbit (*Oryctolagus* spp.), raccoon (*Procyon lotor*), and squirrel were all present during the Late Pleistocene (Anderson et al. 2015). By 12,850 years before present (B.P.), these Late Pleistocene fauna went extinct, coinciding with the beginning of the Younger Dryas.

Global temperatures and precipitation rates began to rise at the end of the Pleistocene and continued to increase until the Middle Holocene, when they reached their height. During the Holocene, average temperatures were affected by three events: 1) the Holocene Climatic Optimum (8900–5800 B.P.), when average temperatures stabilized at 1.6 degrees Celsius higher than modern temperatures (Kaufman et al.

2004); 2) the Medieval Climate Anomaly, when temperatures were near the modern average from about 1150 to 600 B.P., and 3) a temporary decrease in temperatures known as the Little Ice Age (500–100 B.P.) (Mann et al. 2009).

Precipitation rates throughout the Southeast also shifted during the Late Pleistocene and into the Holocene due to the global climatic trends discussed above. During the Late Pleistocene, annual precipitation in the project area averaged approximately 40 cm, which nearly tripled at the end of the Pleistocene to an annual average of 80 to 120 cm (Suther et al. 2018). Annual rates continued to increase until there were significant shifts during the Medieval Climate Anomaly followed by the Little Ice Age (Boyles et al. 2004; Willard et al. 2011).

During the Pleistocene, the project area was located close to the border of the full glacial boreal forest, which was dominated by jack pine and spruce (Delcourt and Delcourt 1983). Coniferous forests, during the late Pleistocene, were probably park-like and not as homogeneous as modern forests in the region. Around 12,500 B.P., modern plant communities started to develop, often creating complex ecosystems where modern flora and fauna interacted with extinct species (Delcourt 1978).

At the start of the Holocene, there was an increase in precipitation and the climate became warmer. This shift facilitated the establishment of modern plant communities and the extinction of numerous Pleistocene species. Homogeneous oak and hickory woodlands replaced the park-like spruce and jack pine forests (Bryson et al. 1970; Watts 1975). The warmer and wetter climate of the early Holocene came to an end with the hypsithermal. The hypsithermal lasted from 8000 to 5000 B.P., and is characterized by a decrease in precipitation. Overall, the project area would have been forested throughout the Holocene, which would have provided a diversity of resources for humans and fauna alike.

CURRENT LAND USE

There are two primary land uses within the project area: forested zones and mining zones. The native tree species in forested zones in many instances grow from a substrate that was heavily impacted by mining activities carried out during the late twentieth to early twenty-first century. Mining zones are those that are presently the location of a mine site that is currently in the reclamation process.

The majority of the project area is located within a mining zone, with only a small portion of the project area located within a forested zone. The forested zone is within the southwestern portion of the project area. The forested zone consists of a mix of deciduous and coniferous growth (Figure 2-2 and Figure 2-3), with overgrown dirt access paths throughout. The mining zone includes mining pits, ponds, access roads, and steep slopes (Figure 2-4 through Figure 2-8).

Figure 2-2. Overview of shovel testing area within the southwestern portion of the project area, facing northeast.

Figure 2-3. Overview of shovel testing area within the southwestern portion of the project area, facing northeast.

Figure 2-4. Overview of sloped, forested landscape within the northeastern portion of project area, facing southeast.

Figure 2-5. Overview of previous mining activity disturbance within the northeastern portion of the project area, facing northwest.

Figure 2-6. Overview of mining road within the northeastern portion of the project area, facing south.

Figure 2-7. Overview of previous mining activity disturbance within the northern portion of the project area, facing north.

Figure 2-8. Overview of previous mining activity disturbance within the western portion of the project area, facing east.

CHAPTER 3. CULTURAL AND ARCHAEOLOGICAL BACKGROUND

This section provides an overview of the precontact and historic period occupation of the project area. This cultural context will be used to understand the results of the survey and how they fit into what is known about the past. A summary of previous archaeological investigations is also provided. Building on what is known about the past research conducted in proximity to the project, a probability assessment for cultural resources being present in the project area follows.

CULTURAL CONTEXT

Pre-Clovis Occupations in the Southeast (ca. pre-13,500 B.P.)

For several decades, the Meadowcroft Rockshelter in Pennsylvania has been an anomalous site with intriguing evidence indicative of early human occupations predating the classic Clovis Paleoindian assemblages that have long been thought to be the first inhabitants of North America (Adovasio et al. 1999:427–428). However, within the past few decades, data from other sites along the Atlantic and Gulf coastal plains have begun to convince many archaeologists that there may have been a pre-Clovis occupation that predates 13,500 B.P. by several thousand years. The Topper Site in South Carolina (Chandler 2001; Goodyear and Sain 2018) and the Cactus Hill site in southern Virginia (McAvoy and McAvoy 1997) have produced well-documented pre-Clovis assemblages. Other sites in the Southeast such as Capps and Shelley (Ensor 2018) in southeastern Alabama, and Vero (Hemmings et al. 2018) in Florida have also produced artifacts that appear to pre-date classic Clovis occupations.

Currently, the earliest chronometric dates associated with pre-Clovis artifacts range between 14,500 and 15,500 years ago, which come from the Page-Ladson Site in Florida and the Debra L. Friedkin Site in Texas (Waters 2019). At the Page-Ladson Site, chronometric data come from a sinkhole context that contained a human-modified mastodon tusk and lithic artifacts. Seventy-one radiocarbon dates indicated an age of approximately 14,500 years ago for the assemblage (Halligan et al. 2016). Data from the Friedkin Site, obtained through OSL methods, indicate an age of approximately 15,500 years B.P. (Waters et al. 2018).

Although distinct diagnostic artifacts for these assemblages have not yet been thoroughly defined, typical artifact types include “small flake tools such as side and end scrapers, spokeshaves, utilized flakes, gravers, prismatic blades, and bend-breaks…and by larger artifacts such as cores, choppers, and planes” (Goodyear and Sain 2018:13–15). The Friedkin Site contained an enormous assemblage of lithic artifacts including complete and fragmentary projectile points, prismatic blades and bladelets, and debitage. There are indications that possibly pentagonal (Cactus Hill) and lanceolate (Meadowcroft) point forms may be associated with the early, pre-Clovis occupations.

Paleoindian Period (ca. 13,500–10,000 B.P.)

The first relatively well-documented inhabitants of eastern North America have been termed Paleoindians by archaeologists. This cultural period corresponds with the early postglacial period in eastern North America and is marked by the retreat of the Laurentide ice sheet. The end of the Paleoindian period coincides with the Pleistocene/Holocene epoch transition, which in most areas of the Southeast is estimated to be ca. 10,000 B.P.

The first widely accepted human presence in North Carolina was during the Paleoindian period. During the period, the project area underwent a massive environmental shift. The much colder climate of

the Pleistocene gave way to a warmer and wetter Holocene climate. Large megafauna were replaced with a variety of smaller mammals whose flexible diet and behavior were better suited to Holocene biotic communities. Traditionally, this period has been broken up into three subperiods: Early (12,500–10,900 B.P.), Middle (10,900–10,500 B.P.), and Late (10,500–10,000 B.P.) (Anderson et al. 1996:7). These subperiods are based on projectile point seriation. Throughout the Early Paleoindian period, projectile points were large with distinctive fluting. During the Middle and Late Paleoindian periods, projectile points were smaller, and the fluting of the Early Paleoindian period was replaced by basal thinning (McNett et al. 1977). This shift in lithic technology likely relates to the changing resources that Paleoindian groups were encountering, as megafauna slowly went extinct and human groups relied more heavily on small game and plant resources.

Daniel and Goodyear (2006), building on a wide-ranging survey of fluted points across the state, have developed a settlement system model based on patterns in the distribution of Paleoindian fluted points. They argue that fluted point densities show two Paleoindian settlement clusters. The first is centered on the eastern Piedmont and the high-quality sources of metavolcanic stone found at the Fall Line.

The second settlement cluster is focused on the mountains. Daniel and Goodyear (2006) argue that the settlement pattern and movement of Paleoindian groups was restricted by lithic sources, such that groups were logistically tethered to these resources. This mirrors Gardner's (1983) model of Paleoindian groups in the Northern Shenandoah Valley, in which he hypothesized that Paleoindian mobility was dictated by the groups' distance from lithic resources.

A few sites in the Piedmont region and the adjacent Coastal Plain region of North Carolina have yielded data relevant to the Paleoindian period. Researchers at the Pasquotank Site (31PK1) in the northeastern Coastal Plain region recovered a large lithic assemblage from the Paleoindian component of the site (Daniel et al. 2007). The framework for the culture history of the Paleoindian and Early Archaic periods in North Carolina is founded on the Hardaway Complex, which includes fluted projectile points that represent the Early and Middle Paleoindian periods. The Hardaway Complex was defined based on assemblages found in stratified deposits at the Hardaway Site, first reported by Coe (1964) and located in the Piedmont region. Discovered in the Uwharrie Mountain Range on the west bank of the Yadkin River, the Hardaway Site is one of the earliest sites in North Carolina. Hardaway-Dalton points, also recovered from the site, are thought to be associated with the Dalton complex of the midwestern United States and are diagnostic of the Late Paleoindian and Early Archaic periods (Ward and Davis 1999:42).

Archaic Period (10,000–3000 B.P.)

The Archaic period in the North Carolina Piedmont region reflects trends apparent throughout the Midsouth generally and is characterized by an increase in population from the Paleoindian period and novel cultural adaptations to new Holocene biotic communities. The Archaic period was a time of major climatic change. Holocene environments continued to expand until the start of the Hypsithermal Climatic period (8000 B.P.), at which point the modern environment of the Piedmont region was almost fully developed.

The Archaic period has traditionally been divided into three subperiods: the Early (10,000–8000 B.P.), the Middle (8000–5000 B.P.), and the Late (5000–3000 B.P.) (Ward and Davis 1999). These periods roughly correspond to changes in lithic technology, resource extraction, subsistence strategies, and settlement systems.

Many Paleoindian technological traits were used throughout the Early Archaic. The main identifiers of the subperiod are an increase in population and a shift to subsistence patterns that were better suited to the early Holocene environment. During this period, modern environmental conditions continued to develop,

and northern hardwoods replaced the full glacial boreal forests (Bryson et al. 1970; Watts 1975). The shift in climate provided favorable environmental conditions for groups to increase in size. In the context of growing population, new settlement strategies emerged.

Early Archaic settlement was focused on major river systems. The Fall Line was an especially important environmental zone, as evidenced by the number of sites located in this area. During the Early Archaic, populations were still relatively low, and groups were still highly mobile, spending most of their time in small, scattered bands. There was an apparent shift in hunting strategy favoring smaller game, although larger animals were continuing to be exploited. The Hardaway site demonstrates that, during this subperiod, groups adapted to the changing environment by establishing larger seasonal camps (Phelps 1983:23). Anderson and Sassaman (1996), in their band-macroband model, postulate that groups of 50 to 150 individuals used drainage systems by establishing base camps in the Piedmont or Upper Coastal Plain in the winter and then radiated out in smaller groups toward the coast during the late spring through the early fall. The Palmer projectile point type is considered the earliest projectile point to exhibit characteristics particular to the Early Archaic and is distinguished by a small corner-notched blade with pronounced serrations and a ground base. The earlier Kirk Corner Notched type represents the transition between the Paleoindian and Early Archaic periods (Coe 1964:81; Phelps 1983:23). Additionally, the use of hafted end scrapers and other formal tools such as perforators, drills, and gravers increased during the Early Archaic period (Coe 1964; Davis and Daniel 1990; Ward and Davis 1999).

The Middle Archaic period coincides with the warmer global temperatures that characterized the Hypsithermal climatic period. Archaeological evidence indicates a well-documented trend toward increased exploitation of freshwater shellfish throughout the Midsouth during the Middle Archaic, along with increasing population and social circumscription more generally. These processes no doubt heavily conditioned more complex means of within- and between-group identity formation, some of which were materialized in the form of gift-giving and are visible in the archaeological record (Anderson and Sassaman 2012:74). Two distinct site types become apparent during the Middle Archaic: base camps and temporary procurement camps (Ward and Davis 1999:73). Temporary procurement camps are found throughout the landscape, but base camps are usually located near stream confluences. The Middle Archaic toolkit is characterized by a reliance on mostly expedient lithic technology, a less formalized toolkit, and a greater prevalence of ground stone artifacts. Bifurcate projectile points are diagnostic of the change between the Early and Middle Archaic. Stanly Stemmed projectile points are diagnostic of the early Middle Archaic, whereas Morrow Mountain projectile points became more common during the middle and late portions (Davis and Daniel 1990).

During the Late Archaic period, site densities continued to increase. The highly mobile groups of earlier periods were replaced with more sedentary settlements at strategic locations on the landscape, which coincided with the emergence of pottery and horticulture (Ward 1983; Ward and Davis 1999). Indeed, many of the key settlement strategies practiced during the later Woodland period were established during the Late Archaic period. Groups focused on major drainages and abandoned many of the smaller tributary streams (Ward and Davis 1999:74). Continued focus on reliable, seasonally available gathered resources and the related increase in population densities resulted in more constrained mobility patterns, as evidenced by the appearance of sites that were seasonally reoccupied throughout the subperiod. This redundant land use is visible in the accumulation of dense middens along rivers (Anderson and Sassaman 2012:75). Regional population growth is attested to by a doubling in site density for the Late Archaic such that "virtually no major area of the Southeast was unoccupied" (Anderson and Sassaman 2012:91–92; see also Anderson 1996; Milner 2004). Functionally related to the intensification in subsistence strategies and growing populations of the Late Archaic was the development of more efficient food processing techniques. Most prominent among these innovations were thermally resilient containers such as soapstone vessels and early pottery, both of which first appear during this time.

Stallings Ware, one of the first pottery wares created in eastern North America, has been found in the Southern Coastal Plain of North Carolina as early as 4500 B.P. (Phelps 1983:26). Croaker Landing ware is an early ceramic type found in the northern Coastal Plain region and was most likely contemporary with Marcey Creek ware, the earliest pottery type in the Mid-Atlantic tidewater region (Ward and Davis 1999). Late Archaic pottery was not widely used and possibly does not represent a major technological shift in cooking practice (Herbert 2011). Late Archaic toolkits show a greater investment in the curation of tools and the expedient use of debitage and cores. Savannah River Stemmed, Halifax (Coe 1964), and Otarre Stemmed (Oliver 1985) projectile points are the most common diagnostic artifacts associated with Late Archaic sites.

Woodland Period (3000–1000 B.P.)

The Woodland period is defined by an increase in sedentism, improvements in pottery technology, increased use of ground stone tools, the development and growth of horticulture as a subsistence practice, and the further domestication of wild cultigens (Ward and Davis 1999:3-4). Groups also started to take on regional identities within the Piedmont region. In general terms, the Woodland cultures of the Piedmont region were only marginally influenced by other cultural traditions that evolved elsewhere in the eastern Woodlands (i.e., Hopewell, Swift Creek, Mississippian chiefdoms; Ward and Davis 1999:78). Woodland societies became more internally complex, developed elaborate mortuary rituals, on occasion constructed earthen mounds used as burial facilities and house platforms, and engaged in far-reaching trade and exchange of exotic items. However, the degree to which Woodland peoples engaged in these activities varies widely from the mountains to the coast (Ward and Davis 1999:3). Archaeologists have divided the Woodland period into three subperiods: Early (3000–2300 B.P.), Middle (2300–1800 B.P.), and Late (1800–350 B.P.).

The Early Woodland period is characterized by the continuation of Archaic cultural patterns across the Piedmont region but adding the widespread use of pottery. The majority of large precontact sites in the Piedmont region generally contain both Archaic remains and Woodland pottery (Ward 1983:70). While pottery production, semisedentary villages, and horticulture originated in the Late Archaic period, these innovations became the norm rather than the exception during the Early Woodland period (Ward and Davis 1999:76). The Badin ceramic series, as identified by Coe (1964:27–29), is associated with one of the earliest ceramic traditions in the Piedmont region. Badin pottery has characteristics of, and possible relationships with, southern coastal ware types such as Thom's Creek and northern ware types in Virginia such as Accokeek and Stony Creek (Ward and Davis 1999:97). The Badin series, first recognized at the Doerschuk Site, consists of well-made pottery tempered with sand and the occasional pebble. Badin pottery is usually finished with a cord-wrapped or fabric-wrapped paddle. In conjunction with the appearance of Badin pottery, coarsely flaked triangular Badin projectile points are also first observed in the archaeological record of this time. Badin projectile points represent a departure from the large, stemmed spear points identified in the preceding Late Archaic Savannah River phase and are thought to mark the beginning of a tradition of triangular points associated with the bow and arrow (Ward and Davis 1999:80). The subsequent Middle and Late Woodland periods are characterized by the acceleration of cultural trends widely adopted during the Early Woodland period.

During the Middle Woodland, horticulture assumed a greater importance than during the preceding periods. In addition to hunted and gathered resources, cultivated plant species including native cultigens and exogenous species such as maize (*Zea mays*) took on increased importance during this subperiod. Middle Woodland sites are generally larger than Early Woodland sites. Yadkin pottery is generally thought to temporally follow the Badin ceramic series based on evidence from the Doerschuk Site excavations. Yadkin pottery is similar to Badin pottery, with the exception that it is generally tempered with crushed quartz and exhibits new surface treatments, which consist of check stamping, linear check stamping, and simple stamping (Ward and Davis 1999:82). Projectile points associated with Yadkin

pottery are typically large triangular projectile points that resemble Badin projectile points but are more finely flaked (Ward and Davis 1999:84). Yadkin phase sites are identified more frequently than Early Woodland Badin phase sites, especially in the southern Piedmont and South Carolina Coastal Plain. While subsistence evidence relating to Yadkin phase lifestyles is rare, evidence of prolonged Yadkin site occupations was observed at the Town Creek Site (Ward and Davis 1999:85).

It is not clear what transpired during the waning centuries of the Woodland period in the Catawba River valley. By about 1000 B.P., Mississippian ideology was changing cultural material and lifeways. To the northeast in the northern and eastern Piedmont regions, groups never fully embraced the Mississippian cultural mores, maintaining a Late Woodland lifestyle until contact with European explorers and subsequent settlers. But in the Catawba and Yadkin/Pee Dee valleys, South Appalachian Mississippian cultural traits are observed perhaps as early as 1070 B.P. (Oliver 1992:40–47). Ward and Davis (1999:Figure 1.5) speculate that the Yadkin phase in the Southern Piedmont and Western Foothills lasted until the fluorescence of the Pee Dee and Catawba Valley Mississippian cultures.

Mississippian Period (1000–400 B.P.)

The Mississippian period is marked by a rise of ceremonialism, expansion of the construction of large public constructions, significant intensification of maize agriculture, and more rigid social organizations. These took the form of ranked societies. In some regions, settlement became securely permanent, and evidence of repeated structure rebuilding is noted. Site types include large mound centers with truncated pyramidal mounds fronting plazas, smaller non-mound villages, and dispersed farmsteads. There is increasing evidence that territorial boundaries between societies were closely maintained during the Mississippian period. For example, the Catawba Valley Mississippian is defined for the Catawba River region, to the east the Yadkin-Pee Dee region is marked by the presence of the Pee Dee culture, and to the west in the Appalachian Summit region is the Cherokee groups (Boudreaux 2007; Coe 1964; Keel 1976; Moore 2002).

Cultural groups in the Catawba River region after 1000 B.P. were a part of the cultural complex termed South Appalachian Mississippian (Caldwell 1958; Ferguson 1971). This is a large cultural complex that included South Carolina and Georgia as well as portions of North Carolina, Tennessee, Alabama, and Florida (Boudreaux 2007:Figure 1.3; Ferguson 1971:Map 1). In turn, South Appalachian Mississippian was a large regional variant on the generalized Southeastern Mississippian culture complex and is largely denoted from the latter by the presence of complicated stamped pottery that was not shell-tempered, as it was throughout much of the remainder of the Mississippian areas. In its most generalized subdivisions, the South Appalachian Mississippian has been divided into three subperiods: Etowah (1000–800 B.P.), Savannah (800–650 B.P.), and Lamar (650–450 B.P.).

Specifically, the cultural groups from the Catawba River Valley from ca. 800 to 300 B.P. are termed the Catawba Valley Mississippians (Moore 2002). The following discussion provides details about the Catawba Valley Mississippians, which is largely drawn from Moore (2002). Based on the archaeological evidence along the length of the Catawba River, Moore (2002) has divided the region both spatially as well as temporally. Geographically, Moore (2002) divides the region into the Upper Catawba Valley, the upper Yadkin Valley, and the Middle and Lower Catawba Valley. The project area is most proximate to the latter.

The definitions for the Middle and Lower Catawba Valley phases rely on the local ceramic series—the Cowans Ford series, as defined by Moore (2002:265–267). Although this series is largely similar to the Burke series to the north, one fundamental difference prompted Moore to define the new series—the presence of sand and fine crushed quartz temper (as opposed to the soapstone and other constituents used in the Burke series). In large part, the Cowans Ford series was defined based on ceramic assemblages

recovered during the Cowans Ford Reservoir Survey of 1960–1962. During this project, some 300 sites were identified and at least 10 were tested, although "there is no written project report and very little documentation of survey activities" (Moore 2002:128). Most of these sites are now underwater in Lake Norman following completion of the reservoir construction in 1963.

As mentioned, Cowans Ford series ceramics are identified by the presence of sand (fine, medium, and coarse) and fine crushed quartz (up to 2 mm) combined with a suite of surface treatments including complicated stamped (both curvilinear and rectilinear), plain/smoothed, burnished, incised, and corncob impressed (Moore 2002:265–267). Minority surface treatments discussed by Moore (2002:140) include brushed, cord marked, simple stamped, fabric impressed, and net impressed, but these minority types are very rare.

Only one phase has been defined for the Lower Catawba Valley region: the Belk Farm phase (ca. 320–275 B.P.), which is the early historic component at the Belk Farm site (31MK85) (Moore 2002:182). Cowans Ford Complicated Stamped, Plain/Smoothed, Burnished, and Corncob Impressed are present at the site, as is "fine cord-marked pottery." Further, glass trade beads have been recovered from the site.

Little else is known about the cultures of the middle and lower valley regions during the time post-dating 800 B.P. The similarities to both the neighboring Upper Catawba phases, and in turn, to the larger Lamar cultural complex throughout much of the Southeast are quite evident. Moore (2002:125) notes one significant difference—a general lack of mounds in the Middle and Lower Catawba Valley regions. "Without mounds to investigate, the region received none of the early attention accorded to the upper Catawba and Yadkin River valleys" (Moore 2002:125). From notes on the site map for 31CT30, tested during the Cowans Ford Archaeological Survey, bulldozer trenches "'started about center of mound.' This is the only reference I found to a mound" (Moore 2002:130).

During the fifteenth and sixteenth centuries, factors antecedent to, and coeval with, European conquest brought an end to the Mississippian lifestyle, although elements of the material culture, belief systems, place names, and social structure of classic Mississippian society lingered into the eighteenth century as viable social organizations, and elements of material culture remain a part of modern American lifeways.

Contact Period and Catawba Ethnogenesis (ca. 400–200 B.P.)

Work by Moore (2002) and research by archaeologists from the University of North Carolina's Research Laboratories of Archaeology (RLA) on the Catawba Project have made great strides in understanding of the contact and early historic periods in the Catawba River Valley (e.g., Davis and Riggs 2004; Fitts 2006; Harrington 2006; Heath 2004; McReynolds 2004; Plane 2004; Riggs et al. 2006). Moore (2002:Chapter 1) has compiled some details regarding the genesis of the historic Catawba and their movements during the eighteenth century. Davis and Riggs (2004:2–5) have formalized the time between the late seventeenth century and 1840 by defining six periods of the historic Catawba, "each characterized by distinctive political, economic, and social trends." The six periods defined by Davis and Riggs (2004:2–5) are:

- English Contact period (ca. 1675–1715)
- Coalescent period (1716–1759)
- Late Colonial period (1760–1775)
- Revolutionary period (1776–1781)
- Federal period (1781–1820)
- 1820–1840 (the sixth period is not named per se in Davis and Riggs 2004)

English Contact period (ca. 1675–1715). The English Contact period is marked by the presence of numerous and distinct Native populations in the region. Apparently, none were named "Catawba", and Lawson's reference to the "Katapau" is likely the closest. John Lawson's 1701 voyage through the Carolinas is one of the earliest accounts of the Katapau, or Catawba Indians (Lawson 2001:43–44 [1709]; Moore 2002:11). During his travels, Lawson provided great detail about the individual groups of Natives he met along the way. In general, Lawson found these Native groups to be individually distinct while also associated with one another. The Chickanee, Congeree, Esaws, Katapaus, Santee, Sugerees, Waxhaws, and others occupied the lower Catawba River region during this time in a confederation (Moore 2002:11). This coalition of Native groups was largely in control of trade with the Virginia and Carolina colonies in the late 1600s and early 1700s. "The English colonies quickly developed strong trade relations with the Catawba Nation and established a century-long military alliance that held firm until the American Revolution" (Davis and Riggs 2004:2).

Archaeological work pertaining to the Native American inhabitants of the Lower Catawba during the English Contact period is scant, and largely based on work at the Belk Farm site. Dates provided by Moore (2002:182) for the Belk Farm phase (see above) are largely the same for Davis and Riggs' (2004:2) English Contact period—1680 to 1725 for the former and 1675 to 1715 for the latter. Characteristics of the Belk Farm phase and the Coalescent period (see next) are rather similar, indicating some level of cultural continuity into the mid-eighteenth century.

Coalescent period (1716–1759). The Yamasee War of 1715–1716 drastically changed the political landscape in the region. The war decimated Native American groups in the region, precipitating many to seek refuge with the Catawba, thus "continuing the amalgamation of the Catawba confederation" (Moore 2002:12). The Yamasee War, largely carried out by the Yamasees, Creeks, Choctaws, and Cherokee, but with early support from the Catawbas, Cheraws, and Waterees, was conducted to push traders and settlers out of their lands (Moore 2002:11–12). After the Yamasee War, the Catawba were unable to maintain their importance, though. The remaining groups settled into a small area of several towns on the Catawba River about the present-day North Carolina–South Carolina border. Where Lawson described a rather populous region during his voyages, accounts in the early to mid-eighteenth century painted a different picture of a small group of Natives in a handful of towns (Moore 2002:13).

Excavations at Nassaw Town and Weyapee by the RLA have established the framework for the Coalescent period (Fitts et al. 2007). Nassaw Town—occupied from about 1721 to 1759, when a smallpox epidemic reduced the population by half—is located east of the Catawba River in York County near present-day Fort Mill, South Carolina. Work at the site produced an artifact assemblage that is extensive and varied. In general, the assemblage contains a mix of European trade goods and traditional South Appalachian Mississippian ceramics. European trade goods from the site consisted of weapons (primarily guns, but also knives and a sword), tools (scissors, awls, axe, hoes) and other functional metal items (thimbles, pins, horse tack, keys and padlock), containers (glass, brass kettle, and lead-glazed ceramics), and adornment items (glass beads and metal decorative items). Food remains also evidence a mixed use of Old World and New World sources including corn, hickory nuts, peaches, and deer (New World) as well as cattle and pigs (Old World) (Fitts et al. 2007:24). One of the more intriguing recoveries from Nassaw Town were the ceramics, which by and large, are similar to other assemblages documented from late prehistoric South Appalachian Mississippian sites such as Belk Farm (Brett H. Riggs and R. P. Steven Davis, Jr., personal communication 2009). This period marks the end of the continued production of traditional ceramics.

Late Colonial period (1760–1775). A smallpox epidemic in 1759 decimated approximately half of the remaining Catawba population. During the next 15 years, population decline and further consolidation of small groups was the norm. It is during the Late Colonial period that the individual group distinctions give way and "the survivors were now known simply as Catawbas" (Davis and Riggs 2004:3). In 1760,

the Catawbas moved south, down the river valley to Pine Tree Hill, which is near present-day Camden, South Carolina. The Pine Tree Hill treaty of 1760 established a 15-square-mile (39-km^2) reservation for the Catawba in South Carolina. The following year, though, without the treaty having truly been implemented, they would move back north to establish two towns that were only about 7 miles (11 km) south of their old towns.

Excavations at Old Town (Davis and Riggs 2004:8–13), a Catawba town occupied from about 1761–1780, shows sharp contrast to the excavations discussed above at Nassaw Town and Belk Farm. At least five cabin seats were identified at Old Town. The presence of rectangular cellar pits (likely located beneath cabin floors) and a lack of individually set post features, indicates that the Catawba adopted both rectangular cellars and cribbed log structures at this time, compared to the earlier use of earthfast structures and less-regular storage pits (e.g., round to oval). Numerous European trade goods were recovered at Old Town, indicating a relatively direct connection to European traders. Unlike the ceramics recovered from Nassaw Town, though, "Most of the Catawba vessels [from Old Town] are exceptionally well-made renditions of English ceramic forms. Plates, cups, bowls, and pans exhibit smudged and highly burnished or polished surfaces, and some vessels have hand-painted designs" (Davis and Riggs 2004:11). Given a 1759 end to Nassaw Town and a 1761 beginning of Old Town, it appears that almost overnight, the Catawba changed pottery styles, shifting from traditional South Appalachian Mississippian wares for use by themselves, to the production of English-style wares for both their own use as well as for sale to colonists in the region.

Revolutionary period (1776–1781). By the Revolutionary War, the Catawba Nation had been reduced to some 600 individuals and they lived in a single town near Twelve Mile Creek (Davis and Riggs 2004:3–4). In 1775, the nearly century-long alliance with the English was ended, and the Catawba sided with the Americans, serving with South Carolina troops during the war. Doing so secured the Catawba's position, with the post-Revolutionary government of South Carolina finally recognizing the reservation lands established in 1760.

Federal period (1781–1820). At the onset of the Federal period, the Catawba once again established a single town to live in, located in the uplands above the Waxhaw Old Fields (Davis and Riggs 2004:4–5). A combination of subsistence farming and hunting provided the Catawba's main needs; however, they also participated in cash transactions for supplement. By 1791, much of their 15-square-mile (39-km^2) reservation was leased out to Euro-American farmers. Also, by the early nineteenth century, Catawba potters were traveling as far as Charleston, South Carolina, to sell their wares, adding to their land-rental income.

Based on excavations at the New Town site in South Carolina, which dates from about the end of the Revolutionary war to about 1820, Riggs et al. (2006:65–77) have defined ceramic characteristics and a range of vessel forms related to post-Revolutionary Catawba pottery. New Town pottery sherds are described as generally temperless. Vessel surfaces are exclusively plain with most exhibiting burnished surfaces. Only one vessel (evidenced by 35 sherds) exhibited a non-plain surface (smoothed-over incised lines). In addition to these ceramic characteristics and vessel forms, work at the New Town and Bowers sites recovered a wide variety of post-Revolutionary Catawba material culture. This included Catawba pipes, English pearlware and creamware, glass vessels (bottle and stemware fragments), glass beads, brass buttons, lead shot, and numerous iron and other metal items (e.g., snaffle bits, kettle and Dutch oven fragments, forks, Jew's harps, thimbles, knife blades, padlock, hooks, buckle, coins, silver fasteners and ornaments, and fragments of a flintlock pistol). Catawba houses were of log crib construction, and if present, fireplaces were made of stone or logs with stick-and-clay chimneys.

1820–1840. The third and fourth decades of the nineteenth century saw continued decline of Catawba population, and yet another physical move from the settlement above the Waxhaw Old Fields on the east side of the Catawba River to the west side of the river (where the Catawba reservation is located today).

Post 1840. The Treaty of Nation Ford was signed in 1840, which was supposed to cede the original reservation to South Carolina in exchange for a new one in Haywood County, North Carolina. This original agreement never met full fruition on the part of South Carolina, although many Catawba did move to their Cherokee neighbors as expected, only to return to their homelands a short time later. Instead, to fulfill the terms of the treaty, South Carolina gave the Catawba approximately 630 acres (255 hectares) in their homeland in the late 1850s (Moore 2002:15).

The next 100 years saw the further erosion of the traditional Catawba culture as they struggled to maintain a self-identity within the social and political landscape of the early twentieth century (Moore 2002:15). In the late 1950s and early 1960s, a series of votes among the Catawba, coupled with negotiations between the Catawba and the Bureau of Indian Affairs, culminated in the formal dissolution of federal recognition in 1962. Hudson (1965) noted that 631 Catawbas were on the final tribal roll at their termination of federal recognition. In 1973, the Catawbas formed into a non-profit corporation, and subsequently regained federal recognition in 1994 (Moore 2002:15). Today, the Catawba Nation comprises over 2,000 individuals, most living in their traditional lands around Catawba and Rock Hill, South Carolina.

HISTORIC CONTEXT

The First Colony and Early European Settlement (1520–1750)

Europeans first arrived in North Carolina in the mid-1520s, when passing ships occasionally made landfall along the barrier islands of the Outer Banks to replenish supplies or get fresh water (Heath and Swindell 2011). In 1526, Luis Vasquez de Ayllon sailed up the Cape Fear River and established a colony for the Spanish Crown. The Spanish colony was soon abandoned and moved to the coast of South Carolina. In 1540, Hernando De Soto traversed a small portion of western North Carolina in the course of his expedition through a broad portion of the southeastern United States then known as “La Florida” (Ready 2005:18). English ambitions regarding the Americas were first realized by Sir Walter Raleigh, who sent two ships under the command of Arthur Barlowe and Philip Amadas to find a suitable place for an English colony (Ordahl Kupperman 1984:16). The expedition reached the Outer Banks on July 13, 1584. Returning to England, Barlowe and Amadas reported that the sheltered island of Roanoke would be an ideal location for a colony. Soon after their return, Raleigh sent out another expedition in the spring of 1585 (Ready 2005:21). This expedition was under the control of Ralph Lane and Sir Richard Grenville. The second expedition left 107 colonists under the direction of Ralph Lane to start a settlement. Grenville returned to England to gather additional supplies. The new settlement soon grew short on supplies and the colony was abandoned on June 19, 1586 (Ready 2005:24).

Raleigh attempted a third expedition with the explicit purpose of creating a colony. John White was appointed the governor of the proposed colony. White reached Roanoke Island on July 22, 1587 (Ordahl Kupperman 1984:107). Arriving too late to plant crops, the colonists soon ran out of supplies and White was forced to return to England. White was delayed in England by preparations to fight the Spanish Armada and could not return until August 16, 1590 (Ready 2005:27). White found the colony abandoned, surrounded by a log palisade, and the word “CROATOAN” carved into a tree, but did not locate the colonists. After the failure of Raleigh and the Roanoke Colony, no attempt at colonization was made in North Carolina until King Charles II gave the area to his supporters. The supporters, known as the Lords Proprietors, were given a royal charter for the lands between the Albemarle Sound and Florida (Powell 1989:53). The Lords Proprietors grant was largely unknown territory and was seen by the

English Crown as primarily a buffer between the Spanish in Florida and the English colonies in Virginia and New England (Ready 2005:40). In 1700, John Lawson was commissioned by the Lords Proprietors to survey the Carolina Lands. Starting in Charleston, South Carolina, Lawson visited much of the Piedmont and the Coastal Plain of North Carolina (Lawson 2001 [1709]).

The Lords Proprietors were given considerable latitude in governing their land. The government established by the Proprietors aimed to combine elements of monarchical, aristocratic, and democratic governments, but was mostly ignored by colonists. The chaotic nature of colonial North Carolina resulted in multiple rebellions (Ready 2005:43). By the first decade of the eighteenth century, the English disposition toward Native American as trading partners had changed to one that viewed Native American people as obstacles to westward European expansion (Ready 2005:32). Relationships further declined with the rapid increase in the Native slave trade. Through the mid-seventeenth and early eighteenth centuries, relations with Native American groups deteriorated rapidly, as evidenced by the Third Anglo-Powhatan War, Bacon's Rebellion, Chowanoke Wars, and Coree Wars (Heath and Swindell 2011:10–12). This undercurrent of resistance among Native American groups in North Carolina would ultimately manifest in the Tuscarora War.

During the early postcontact period, Tuscarora groups had begun to reorganize themselves into nascent chiefdoms (Heath and Swindell 2011:10–11). After a brief but fierce series of engagements, the Lower Tuscarora groups entered into diplomatic negotiations to halt hostilities, and the colonial government readily agreed. These agreements were broken repeatedly by the colonists, who launched devastating campaigns into the Lower Tuscarora territory. The Upper Tuscarora were largely spared from the violence and destruction associated with the Tuscarora War, but by 1802, virtually all of the Upper Tuscarora had migrated to lands under the control of the Five Nations of the Iroquoian Confederation in New York and eastern Canada.

European populations likewise adjusted to the increasingly bellicose, chaotic environment through migration and changes to sociopolitical organization. After living through the Tuscarora War, one colonist remarked that all of the colonists in North Carolina should be removed to the South and the region abandoned (Ready 2005:37). The Lords Proprietors divided the Carolina Lands into northern and southern portions, and Edward Hyde was appointed as the first governor of the former on January 24, 1712. Some 17 years later, in the culmination of a royal effort to acquire the land that had begun in 1689, the Lords Proprietors sold the majority of their shares in the colony to the Crown on July 25, 1729. North Carolina remained under royal governance until the American Revolutionary War (Powell 1989:84).

Revolutionary War and Federal Period (1750–1860)

The Federal period was a time of growth for North Carolina. The slave system developed more slowly in the Piedmont region compared to the Coastal Plain region; North Carolina's eastern counties consistently had larger populations of enslaved people. None of North Carolina's western counties ever had an enslaved population that was larger than the Euro-American population; the slave system in the western portion of North Carolina was primarily associated with small farms, rather than with large plantations (Connor et al. 1919:204).

The economy in North Carolina during the mid- to late eighteenth century was focused on land resources and slavery (Powell 1989:131). Naval stores and lumber products from the rich Carolina forests were key colonial industries (Margulies 2006:42). As large swaths of the colony were cleared, agriculture started to take on an increasingly important role in the economy. The vast majority of colonial North Carolina farmers were subsistence farmers, but export production of corn, tobacco, wheat, beef, and pork also increased. A general lack of robust roads suitable for high-volume trade and travel contributed to the development of settlement patterns focused on waterways during this period.

Slavery as a sociopolitical and economic institution and practice had existed since the early days of the colony and became widespread by the 1720s. Initially most prevalent in the Lower Cape Fear basin in the early eighteenth century, by the time of the American Revolution it was institutionalized and practiced throughout the North Carolina colony, as attested by census data. The 1790 census listed the white population as 288,204 and the enslaved population as 100,572 (Ready 2005:69). This was a consistent ratio of white to enslaved populations up until the Civil War. North Carolina did not develop a large slave plantation economy like those prevalent in other parts of the southeast United States during the early eighteenth century (Ready 2005:71).

In the decades following the Crown's assumption of North Carolina's governance, royal governors repeatedly clashed with local elected assemblies regarding authorities to tax, establish courts, and other fundamental matters of political order (Ready 2005:89–91). By the 1770s, the rift between representatives of the Crown and the elected colonial assembly had grown sufficiently deep to persuade leaders of the latter to align themselves and their constituents with Virginia and other colonies in opposition to British rule, which would result in the American Revolution (Ready 2005:105–106). North Carolina contributed just under 7,800 soldiers to the Continental Army, the smallest per-capita muster of the colonies. Perhaps more significant to the overall effort were the North Carolinians who operated as informal, unpaid militia unattached to regular military units. These largely ad hoc forces degraded British military capacity in decisive, although relatively unheralded, engagements compared to the better-known battles of the war (Ready 2005:120).

Such an engagement was fought just 5 miles (8 km) to the south of the project area discussed in this report. The Battle of Kings Mountain saw the defeat of a 1,200-strong British force by 900 frontiersmen known as "Overmountain Men," and was distinctive because it took place without the participation of a single officer of the Continental Army. The British commander, Patrick Ferguson, had been dispatched to the vicinity of present-day northern South Carolina by Lord Cornwallis, commander of the main British force making its way inland from Charles Town (Charleston). Charged with protecting Cornwallis's western flank, one of Ferguson's first acts was to send a paroled prisoner with a message to the "disorganized rabble" in the mountains of present-day western North Carolina threatening to "burn the whole country" if they did not swear allegiance to the King (Ready 2005:126). Though it is generally inferred that his purpose was to discourage opposition, Ferguson's threat evidently alarmed the local population sufficiently to inspire several hundred loosely organized frontiersmen to move against him. Ferguson's defensive position on the small ridge after which the battle was named was quickly overrun and his forces were dealt heavy casualties, one of which was Ferguson himself. After this relatively minor engagement, the British advance into North Carolina was blunted as Cornwallis had his forces abandon Charlotte and flee south (Powell 1989:199–200; Ready 2005:125–128).

Antebellum Period

During the Antebellum period, the region initially was in decline, but eventually many key institutions and practices were developed that would revolutionize life in North Carolina. At the start of the period, several factors led to a decline in the standard of living in North Carolina, including destructive agricultural practices resulting in depleted soils, the lack of educational opportunities, the need for transportation and communication networks, and the lack of strong commercial and industrial bases. These factors often fueled westward immigration. Between 1815 and 1850, approximately a third of the population of North Carolina left the state (Powell 1989:249). It was not until the mid-nineteenth century that local groups started to address these issues. A focus on better farming methods, the development of private schools, and the connection to the larger national railroad network helped improve the economic situation in North Carolina.

The Trail of Tears migration of Cherokee populations to Oklahoma from the western extremes of North Carolina, among other states, may be viewed in the overall context of early nineteenth-century population movement. It is distinguished, however, from contemporary migrations in that it was coerced by the U.S. Army, led by General Winfield Scott. From the late eighteenth century to 1828, populations drawn from several Indigenous groups had emigrated from western North Carolina in the face of steadily increasing numbers of settlers of European descent. By the time Scott and his forces moved into the southern Appalachians, perhaps hundreds of Cherokee and Creek had moved west. The broad consensus among historians is that the 1828 discovery of gold in north Georgia and the election of Andrew Jackson were the two most determinative circumstances that led to the Trail of Tears (Ready 2005:202). In practice, it involved an 1838 military campaign that swept through Cherokee settlements, whose inhabitants were obliged to pack their belongings in short order to be herded into stockades before they were sent west. Perhaps more than a quarter of the 12,000 people who began the trek died en route (Ready 2005:204). Those who survived, and their descendants, are today known as the Western Cherokee. The mountains of Western North Carolina were the home of a comparatively smaller contingent of Cherokee known to history as the Qualla, who successfully resisted the effort and formed the nucleus of the Eastern Cherokee (Ready 2005:205).

The land that now comprises Cleveland County, named for Colonel Benjamin Cleveland, a participant in the Revolutionary War battle of Kings Mountain, was inhabited by Indigenous Cherokee and Catawba groups until they were displaced by in-migrating European-descended populations. The county was formed from Rutherford and Lincoln Counties in 1841 during a period of vigorous settlement and population increase (Mazzocchi 2006).

During this period, gold mining was a major factor in the increasing settlement of the area. According to local newspaper accounts, gold mining began in 1834, when Mrs. Ben Briggs discovered gold in a spring on her property, referred to as Kings Mountain Gold Mine (Patterson 1935). Gold mining operations continued until 1913 and yielded approximately $750,000 to $1,000,000 in gold, most of which was minted in Charlotte, North Carolina (Patterson 1935). In 1936, the old Kings Mountain Gold Mine was leased to M. A. Hilford, who reopened the mine (*Durham Sun* 1936). In 1984, Texasgulf Minerals and Metals Inc. (Texasgulf) began taking core samples at the old Kings Mountain mine, in hopes of reopening the mine (Horan 1984). Texasgulf explored a 400-acre parcel of land approximately 1.5 miles south of Kings Mountain, North Carolina, along State Highway 161, where the old Kings Mountain Gold Mine was located. The area was described as heavily forested with abandoned mine shafts and mining prospect pits (Horan 1984). Based on review of historical documentation, the old Kings Mountain Gold Mine is likely located on the Eastern Property parcel portion of the project area.

The American Civil War and Reconstruction (1860–1900)

North Carolina was one of the last states to join the Confederacy at the outset of the Civil War. Culturally, North Carolina did not share many of the institutions that much of the South had in common, such as the plantation system and large enslaved populations. This caused a division among North Carolinians regarding secession. Wilmington and the Cape Fear region became a hotbed for secessionists, while areas in the western portion of the state favored remaining in the Union (Barrett 1963:7). North Carolina was neutral until Fort Sumter was taken by secessionists in South Carolina. A wave of allegiance to the southern cause swept across North Carolina. Shortly thereafter, on May 20, 1861, North Carolina overwhelmingly passed an ordinance of secession (Barrett 1963:15).

By population, North Carolina only made up one-ninth of the Confederacy, while one-sixth to one-seventh of all Confederate forces were made up of men from North Carolina (Barrett 1963:28). The Union Army soon saw North Carolina as a key objective. After establishing a foothold on the North Carolina coast, Union forces directed their attention to the Confederate supply routes connecting

Virginia and the Deep South. There is no evidence of any engagement or conflict of any size in Cleveland County or near the project area.

The Civil War caused major economic and cultural disruption throughout North Carolina. The occupation of the state by Union forces had left the landscape devastated (Hardy 2011:115). Union troops were stationed throughout North Carolina until the summer of 1866. On June 25, 1868, North Carolina was readmitted into the Union (Hardy 2011:124).

Reconstruction was a period of great disorganization and conflict for North Carolina, as it was for much of the South. The freeing of African-American enslaved people resulted in the disruption of many key labor-intensive industries. However, the destruction caused by the Civil War was eventually replaced with growth, prosperity, and wealth. This was partially due to the industrialization of much of the South with the advent of textile mills and ironworks. This industrialization caused the population in urban areas to grow by 5 million people between 1880 and 1910 (Ayers 1992:55).

As much of the South's economy grew and modernized, the marginalization and harassment of African-Americans remained stubbornly constant. Between the end of the Civil War and 1941, 168 African- Americans were lynched in North Carolina (Newkirk 2009:3). All social and political institutions were segregated by race, and African-Americans would remain politically, socially, and economically marginalized for much of the twentieth century (Berry 1978). It was not until the advent of the Civil Rights Movement and the struggle to desegregate the South during the mid-twentieth century that African-Americans would gain a voice in society.

Twentieth Century

North Carolina continued to grow and develop economically in the early twentieth century. During World War I, North Carolina was a major textile supplier to the U.S. Army (Rafle 2002). Beginning in the 1920s, the production of textiles, North Carolina's main industry, began to decline, foreshadowing the general economic decline of the U.S. economy in the 1930s. With changing styles brought on by the jazz culture of the 1920s, clothing changed rapidly. A woman's dress in 1910 took approximately 10 to 11 yards of fabric to produce. By 1920, a dress required only 2 yards (Davis 2003:4). North Carolina textile mills ignored the changing fashions, resulting in overproduction, layoffs, and the merging of mills. Agriculture, historically a major industry in Cleveland County, was heavily affected by the Great Depression, but like the textile mills, farmers started to feel the effects of the economic downturn in the 1920s with the plummeting price of agricultural goods (Davis 2003:10). By 1930, the economy of North Carolina was in the downward spiral that characterized the U.S. economy generally during the Great Depression.

The United States' entry into the World War II decisively ended the hardships of the 1930s in North Carolina as it did in the rest of the nation, although North Carolina had already begun to enjoy a modicum of economic resurgence before 1941 (Powell 1989:496). As massive increases in defense spending coursed through all states, the effects in North Carolina were felt most markedly in military installations and their supporting communities and industries. Expansion of existing facilities at Fort Bragg and Cherry Point Marine Air Station combined with newly constructed bases such as Camp Lejeune, Camp Davis, Seymour Johnson Air Base in Goldsboro, Camp Butner north of Durham, and the Overseas Replacement Depot in Greensboro helped to invigorate the statewide economy. North Carolina's textile industry, a state economy staple since Reconstruction, supplied the swelling military ranks with finished goods and raw material for sheets, towels, canvas, socks, parachutes, blankets, underwear, outer clothing, and shoelaces. By war's end, North Carolina military installations were responsible for training more U.S. servicemen than any other state (Powell 1989:500–502).

Against the backdrop of the Great Depression and world war, a nascent lithium mining industry began to emerge in western North Carolina during the 1930s and 1940s. Following the first commercial venture in the state to extract lithium (*Durham Sun* 1936), industrial interest in the rich spodumene deposits located near Kings Mountain began to manifest earnestly in the 1940s. The Solvay Process Company, at the time the nation's largest producer of alkali metals, established a lithium concentration facility in 1943 on a site within Albemarle's present holdings (*News and Observer* 1942).

The rapid urbanizing effects of the New Deal and the World War II felt in other states did not manifest in North Carolina during the postwar years, which saw a comparatively gradual shift from a rural, agricultural economy to an industrial-urban one (Ready 2005:369). State-funded initiatives aided the process. Governor W. Kerr Scott's 1949 "Go Forward" program funded school construction, port improvements in Wilmington and Morehead City, road construction paving farm-to-market roads, and rural electric and telephone lines. The "Nickels for Know-How" program funded agricultural research at North Carolina State College (Powell 1989:514–515).

By the time ownership of Solvay Process Company's lithium processing facilities and associated mine at Kings Mountain passed to Foote Mineral Company (Foote) in 1951, lithium's role as a key material for atomic weapons production resulted in lucrative government contracts to supply the Atomic Energy Commission (*Foote Prints* 1976). Expanded lithium applications in the aerospace industry intensified lithium production for use in more efficient batteries for space vehicles and, presaging twenty-first century developments, electric automobiles (*Foote Prints* 1967). Vigorous research efforts, supported substantially by Foote scientists, further broadened industrial applications in industries such as pharmaceuticals, artificial rubber, missile fuels, and welding that sustained lithium mining and processing throughout most of the second half of the twentieth century (*Foote Prints* 1976; Horan 1989).

The 1950s also saw the establishment and development of Research Triangle Park, today a nexus of research carried out through partnerships among government, higher education, and private industry (Powell 1989:530–532). Effects of its establishment were felt over the next two decades as ancillary technology-oriented ventures sprang up in the Raleigh-Durham and Charlotte areas (Ready 2005:371). Among the innovations emerging from the park itself were Astroturf and medications for the treatment of acquired immunodeficiency syndrome (AIDS) (Rafle 2002).

At Kings Mountain, Foote's enterprise remained one of the region's top employers through the 1970s and 1980s, growing until the early 1990s, when foreign lithium imports altered the market, resulting in reduced production (Henderson 2019). Thereafter, the facility changed hands in transactions among several concerns, the last of which was Albemarle's purchase of the property in 2014. Today, considerable optimism attends the reinvigoration of western North Carolina's lithium industry as the promise of lithium applications in electric automobile batteries stands to fulfill a longstanding expectation (*Foote Prints* 1967; Li 2022).

PREVIOUSLY RECORDED ARCHAEOLOGICAL SITES AND INVESTIGATIONS

A research request filed with the OSA on November 16, 2023, identified two archaeological sites (Table 3-1) and four archaeological investigations (Table 3-2) within 1 mile (1.6 km) of the project area (Figure 3-1). There are no previous investigations located within the project area. There are no previously recorded archaeological sites within or directly adjacent to the project area.

Table 3-1. Previously Documented Archaeological Resources within 1 mile (1.6 km) of the Project Area

Site Number	Site Type	NRHP Eligibility
31CL67	Historic	Not eligible
31CL140	Historic	Undetermined

Source: OSA (2023b)
NRHP = National Register of Historic Places

Table 3-2. Previous Archaeological Investigations within 1 mile (1.6 km) of the Project Area

Environmental Review No.	Survey Name	Conducted by, Date
ER 00-7689	Phase I Archaeological and Historic Architectural Survey of The Williams Gas Pipelines – Transco Proposed Sundance Expansion Project: Kings Mountain and Mooresville Loops Cleveland, Gaston, Iredell, and Rowan Counties, NC	New South Associates, 2000
	Addendum to the Phase I Archaeological and Historic Architectural Survey of The Williams Gas Pipelines – Transco Proposed Sundance Expansion Project: Two Proposed Contractor/Pipe Storage Yards Cleveland and Iredell Counties, North Carolina	New South Associates, 2001
ER 16-0551	Phase I Archaeological Survey Line T-001A, Phase II Pipeline Replacement Project Cleveland, Polk, and Rutherford Counties, North Carolina	S&ME, Inc., 2016
ER 17-1533	Phase I Archaeological Survey of the Proposed Transcontinental Gas Pipe Line, LLC Project in Cleveland County, North Carolina	Apogee, Inc., 2017

Source: OSA (2023b)

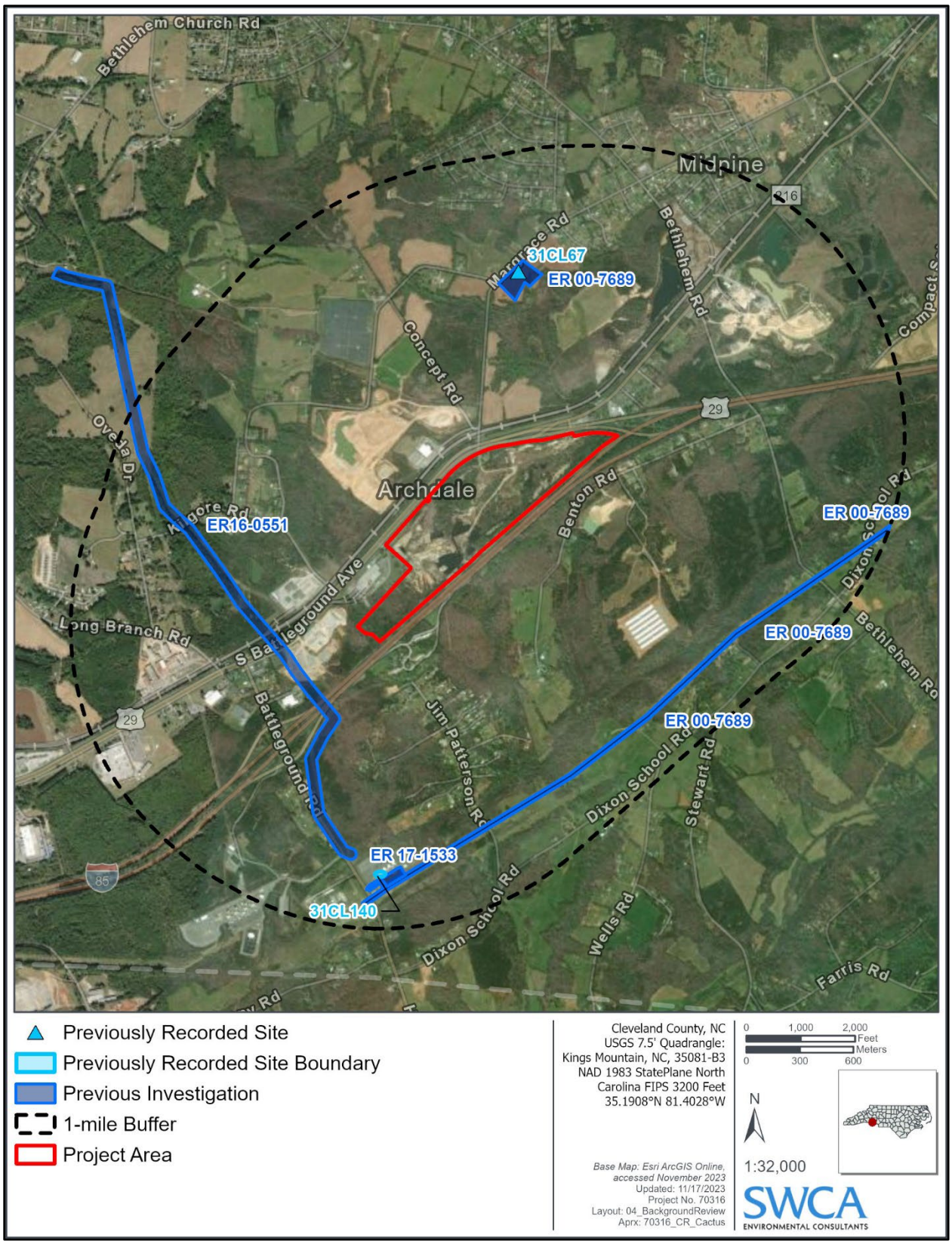

Figure 3-1. Previously recorded sites and investigations in the project area and a 1-mile buffer.

Previous Archaeological Investigations

Due to the limited amount of survey within the project area, further analysis of previous survey work in the general project region was undertaken to better understand the potential results of the current undertaking. A summary of research into previous survey work in the general region is provided below.

ER 00-7689

An archaeological and historic architectural survey of two sections of a gas pipeline, the southern section of which (called the Kings Mountain Loop) measured 8.85 miles (14.24 km) in length and 200 feet (61 meters [m]) in width (Joseph and Port 2000, 2001). The survey identified three archaeological sites, none of which are in or within 1 mile (1.6 km) of the current project area.

In 2001, an additional survey was conducted for this project for two proposed contractor/pipe laydown yards. The survey identified one archaeological site outside of but within 1 mile (1.6 km) of the current project area.

ER 16-0551

An archaeological survey for a proposed pipeline replacement project measuring 57 miles (92 km) in length and 100 feet (31 m) in width (Nagle 2016). The survey identified 23 archaeological sites, none of which are in or within 1 mile (1.6 km) of the current project area.

ER 17-1533

A survey was conducted for a 2-acre (0.8-hectare) area for Transcontinental Gas Pipe Line, LLC, located 0.3 mile (0.5 km) north of the intersection of Battleground Road (Route 216) and Dixon School Road (State Route 2283) (Winterhoff and Beverly 2017). One site was observed and recorded, however the project area changed which resulted in the site no longer being within the project area. No cultural material was observed in the final project area.

Previously Recorded Archaeological Sites

SWCA's archival research effort gathered information about previously recorded archaeological sites within a 1-mile (1.6-km) buffer of the project area. No previously recorded sites have been recorded within the project area. Archival research revealed that some of the previous archaeological investigations conducted within 1 mile (1.6 km) of the project area (discussed above) resulted in the discovery and recording of archaeological sites both within and beyond the 1-mile (1.6-km) buffer. The discussion below includes all previously recorded sites located within 1 mile (1.6 km) of the project area.

31CL67

This twentieth-century domestic site is located 0.6 mile (1 km) north of the present project area, approximately 263 feet (80 m) west of the intersection of Kings Mountain Boulevard and Phifer Road. It was recorded during a 2001 survey in support of two proposed contractor/pipe storage yards for pipeline construction (ER No. 00-7689; Joseph et al. 2000).

The site consisted of a sparse collection of historic-era artifacts, consisting largely of nails, glass, and non-diagnostic ceramics. The majority of the observed artifacts appear outside of the project's area of potential effects. The investigators recommended it not eligible for the National Register of Historic

Places (NRHP) and recommended no further work (Joseph et al. 2000). The OSA later determined the site not eligible for the NRHP (OSA 2023b).

31CL140

This historic-era domestic site is located 0.8 mile (1.3 km) south of the project area, approximately 363 feet (111 m) west of the intersection of Battleground Road and Transco Drive in Cleveland County. It was recorded during a 2017 survey in support of a compliance project (Winterhoff and Beverly 2017). After the site was recorded, the project area changed, which resulted in the site no longer being within the project area. The associated report did not include information on the site, however a site form was submitted.

Although Winterhoff and Beverly's 2017 report does not provide information on the site, the site form indicates the presence of nails and glass artifacts. The artifacts were observed within the plow zone. The investigators recommended the site not eligible for the NRHP and recommended no further work (OSA 2023b).

HISTORICAL DOCUMENTATION

A review of historical documentation using historic-era topographic maps and aerials depicts the project area as having been used primarily for agricultural activities until the late twentieth century. During the late twentieth century the project area transitioned from being used for agricultural activities to being used as an active mining site.

Historical topographic maps suggest that, by 1908, various structures were present along unnamed roads within and surrounding the project area, with three structures depicted in the project area at this time (U.S. Geological Survey [USGS] 1908). A railroad is also shown on the map, labeled "SOUTHERN RR ATLANTA LINE" along the northwestern boundary of the project area and running into the city of Kings Mountain (USGS 1908). The 1930 map of Cleveland County from the North Carolina County Road Survey (NCCRS) depicts a majority of the roads seen within the project area as "Unimproved County Highways" (NCCRS 1930), and the 1938 map of Cleveland County from the North Carolina State Highway and Public Works Commission (NCSHPWC) shows the project area as continuing to have various roads and structures within the boundaries, the majority of which are labeled as "Graded and Drained Roads". Various structures are seen labeled as "Farm Units" or "Non-Farm or Tenant House" (NCSHPWC 1938).

In a 1956 historical aerial photograph, the project area appears to be forested and agricultural land (National Environmental Title Research [NETR] 2023). The project area continues to appear to be used for agricultural purposes through the 1994 aerial imagery (NETR 2023). The aerial imagery in 1999 begins to show the large areas of ground disturbance due to the start of mine activities (NETR 2023). All of the structures originally depicted on the 1908 map no longer appear on the aerial imagery from 1999 (NETR 2023). The aerial imagery from 1999 to 2013 shows the mine site expanding throughout most of the project area, leaving only the southwestern portion untouched. Vegetation at the mine site appears to begin returning on the 2013 aerial imagery, which indicates the beginning of the mine reclamation process (NETR 2023).

The most recent aerial photograph of the project area from 2023 continues to show the southwestern portion of the project area to be largely undeveloped and forested, while the rest of the project area continues to be a mine reclamation site (NETR 2023).

In summary, the project area has gone through significant changes throughout the late twentieth century, where mining and mining-related activities, have been intensive and ongoing throughout the early twenty-first century. Many of the buildings depicted as being present in the early twentieth century have been demolished due to mining disturbances or are no longer present on the more recent USGS topographic map and modern aerial images.

ARCHAEOLOGICAL SITE POTENTIAL

PRECONTACT SITE POTENTIAL

Based on the results of the initial site visit and historical background review of the project area, the project area has a low probability of containing a significant number of intact buried archaeological sites. Moderate site potential exists in the uplands; any sites here would be at or very close to the surface, however, as a majority of the uplands consist of weathered bedrock. Due to previous mining activities, a large mining pit is located in most of the project area. This pit, in addition to the widespread presence of large rock piles resulting from mining activities, indicates exceedingly low potential for discovery of archaeological remains in these locations.

In addition to the factors mentioned above, a review of sites in proximity to the project area and general trends of precontact settlement systems in the Piedmont of North Carolina has identified several trends that can help identify probability areas within the project area. Environmental factors including proximity to water, the presence of well-drained soils, slope, general topography, and other such variables have been found to correlate strongly with the presence of precontact sites. Conditions within much of the project area are not ideal for precontact site preservation, and potential is generally low.

HISTORIC SITE POTENTIAL

There is a higher probability of historic sites and structures within the project area. Historic site location influences follow parameters similar to those of precontact sites, with some additional influences. Proximity to water sources in the early historic period would influence the locations for settlements, especially navigable water sources. The highest-probability areas for historic archaeological sites are those in proximity to the mapped locations of buildings depicted on the 1908 Kings Mountain, North Carolina, USGS quadrangle.

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CHAPTER 4. METHODOLOGY

The Phase I archaeological methodology used for this project has been developed in accordance with the OSA's Guidelines (OSA 2023), relevant federal regulations and guidelines, and the background research conducted for the project. In general, the methodology used was designed to identify and assess possible effects to potentially significant archaeological sites eligible for the NRHP that are present within the project area.

BACKGROUND RESEARCH

Background research was conducted in two parts: prior to fieldwork to determine the likelihood of encountering archaeological resources, and after fieldwork to further explore the context of the resources identified. This background research also determined areas of past disturbance and historical occupation in the project area and established a land use history of the project area. On November 16, 2023, SWCA visited the OSA in Raleigh, North Carolina, where OSA staff provided SWCA with information regarding previously recorded resources in the project area or within 1 mile (1.6 km) of the project area. SWCA also reviewed various online databases and historical cartographic sources to better understand the likelihood of encountering archaeological sites within the project area. Unique environmental conditions that may influence the preservation of archaeological deposits were also considered. SWCA performed a review of historical maps using online USGS archives.

Ongoing background research was conducted throughout the project to place the results of the survey in appropriate cultural and historical contexts. SWCA particularly focused on the history of mining activity in the vicinity of the project area using USGS archives and online periodical repositories to review mining trade publications, federal and state monographs and bulletins, and relevant local newspaper reports from 1915 to the present day. These latter included the *Charlotte Observer, Charlotte News, Rocky Mount Telegram* (North Carolina), *Gastonia Gazette, Durham Sun, News and Observer* (Raleigh), and the *Kings Mountain Herald*. A substantial amount of trade publication information came from *Foote Prints*, a newsletter-like quarterly published by the Foote Mineral Company, a former owner of the Kings Mountain lithium mine and associated processing facilities prior to Albemarle. The information compiled from these sources was integrated into the Historic Context section above, as well as relevant site contexts outlined below.

FIELD METHODOLOGY

Pedestrian survey provides a detailed investigation of the project area. SWCA conducted subsurface testing based on the probability model established for the project. In areas that were determined to have the potential to contain archaeological resources, the survey methodology was designed based on the degree and depth of disturbance anticipated during the construction of the project. For the localities where depth of ground disturbance will be limited to less than 1 m (3.3 feet), investigators excavated shovel tests at least 10 cm (4 inches) into culturally sterile subsoil or 1 m (3.3 feet) below ground surface, whichever was encountered first. As the majority of the project area was forested and presented ground surface visibility of less than 50 percent, the primary field method employed in the survey was systematic pedestrian survey with subsurface testing via shovel tests at 30- and 60-m (99- and 197-foot) intervals in areas inferred to have high and low/moderate probability of cultural material, respectively.

Altogether, 8.92 percent (14.7 acres or 0.02 square mile) of the project area was surveyed using the methods described below. Survey of the remainder was omitted due to various landscape conditions including excessive slope, inundation, and prior disturbance. Areas with higher probability of containing

precontact and historic archaeological sites were tested more thoroughly than areas unlikely to contain archaeological resources. Each area within the project area was classified as follows:

- **High Probability—3.18 acres (0.01 square mile):** investigated through pedestrian survey, including full visual inspection of the surface and shovel testing at the 30-m (100-foot) intervals.
- **Low/Moderate Probability Areas – 11.8 acres (0.02 square mile):** investigated through pedestrian survey, including full visual inspection of the surface and shovel testing. Per the 2023 OSA Guidelines, an expanded shovel testing interval of 60 m (200 feet) was applied to these areas.
- **Low to No Probability Areas – 116.4 acres (0.18 square mile):** visually inspected to confirm the results of the background research and initial field visit. Unless visual inspection reveals errors in prior assessments, pedestrian survey and shovel testing would not be performed in these areas.

Systematic Pedestrian Survey

SWCA archaeologists performed a systematic pedestrian survey throughout the project area. Per OSA Guidelines (OSA 2023), survey team members were spaced at intervals no greater than 10 m (33 feet) to ensure that surface manifestations of buried features, aboveground remains of historic-era structures, evidence of disturbance, etc., could be observed and recorded. Systematic pedestrian survey was conducted regardless of ground visibility. Archaeological remains encountered through this method were recorded using a tablet outfitted with a GPS receiver capable of submeter accuracy and supplemented by field notes and photography. Archaeologists also took overview photographs of representative locations to document the range of topography and vegetation found within the project area.

If artifacts were to be observed on the surface, collection would be carried out such that all artifacts bearing potentially temporally diagnostic attributes were recovered and a representative sample of the range of all present artifact types were obtained. At any sites that presented especially dense surface scatters, a sample of potentially diagnostic artifacts would be collected to represent the range and number of diagnostic types. Material that was not or could not be collected was described in field notes and documented with photographs while in the field. Systematic pedestrian survey was supplemented with subsurface testing in the form of shovel tests. When a site was identified, close-interval transects (approximately 1 m [3.3 feet] apart) were used to determine site boundaries, and shovel tests (see below) were systematically placed at close intervals to characterize the subsurface potential and extent of the site.

Shovel Testing

SWCA archaeologists excavated shovel tests at locations within the project area that presented less than 50 percent ground surface visibility and had been classified as having high or low/moderate probability of containing precontact or historic-era remains. Shovel tests were excavated along transects spaced 30 m (99 feet) apart from one another. In areas of low/moderate probability, transects were spaced 60 m (197 feet) apart and the standard interval between shovel tests was 60 m (197 feet). Transects in areas of low/moderate probability were placed in a staggered arrangement to reduce the size of sites that could potentially be missed by the survey.

Shovel tests had a minimum diameter of 30 cm (12 inches) and were excavated according to natural strata at least 10 cm (4 inches) into archaeologically sterile sediments or to a depth of 1 m (3.3 feet) below ground surface, whichever was encountered first. Excavated soils and sediments were screened using standard ¼-inch hardware cloth. Data regarding texture, depth, and color were recorded for the strata

observed in each shovel test, and profile maps were created and photographs taken of representative shovel tests.

Site Delineation

Per the 2023 OSA Guidelines, when cultural material was recovered from the surface through systematic pedestrian survey or from shovel test excavation, additional radial shovel tests would be excavated in proximity to the initial "positive" shovel test to locate and delineate the site boundaries and sample the material culture present. Radial shovel tests would be placed to the north, south, east, and west at an interval no greater than 15 m (49 feet)(i.e., half the standard interval) from the initial shovel test. The horizontal limits in each of the four directions were considered established when two shovel tests containing no cultural material ("negative" shovel tests) were excavated along those cardinal lines. Internal radial shovel tests to determine spatial organization of remains within site boundaries were not excavated.

LABORATORY METHODS

No artifacts were observed or collected during this survey. If encountered during the survey, they would have been returned to SWCA's Cary, North Carolina, archaeological laboratory, where they would have been processed, catalogued, and analyzed.

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CHAPTER 5. RESULTS

SWCA conducted a systematic pedestrian field survey on September 18 and September 21, 2023, with a crew of one field technician and one field director, totaling four person-days in the field. The entire project area was investigated. Due to the poor ground visibility within the project area, systematic pedestrian survey and shovel testing were the primary survey methods employed. The shovel testing area was located in a mixed deciduous and coniferous growth forest on an upland (Figure 5-1). During the survey, 40 shovel tests were excavated; all were negative for cultural materials (Figure 5-2 and Figure 5-3).

Figure 5-1. Overview of the shovel test area, facing north.

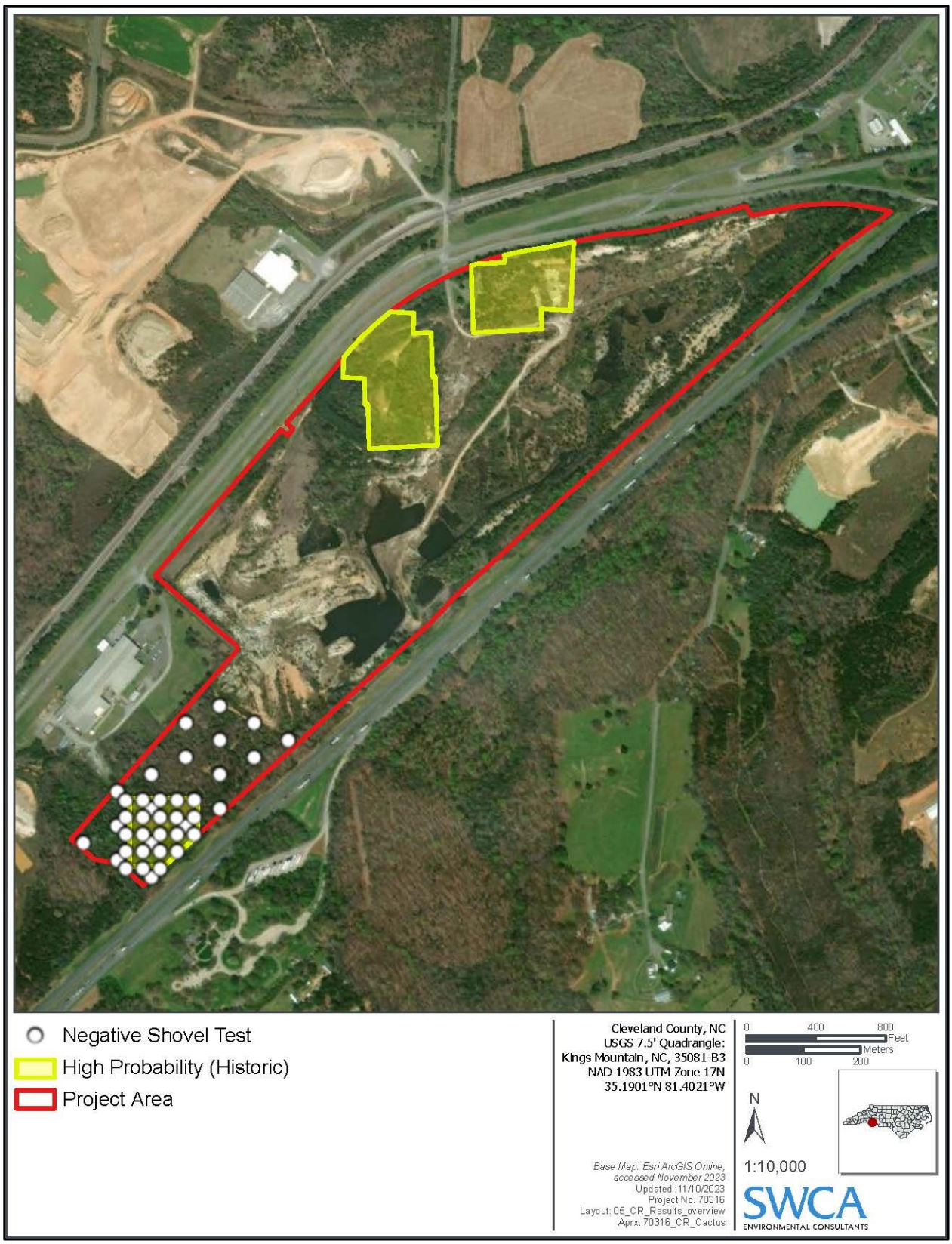

Figure 5-2. Overview of survey results.

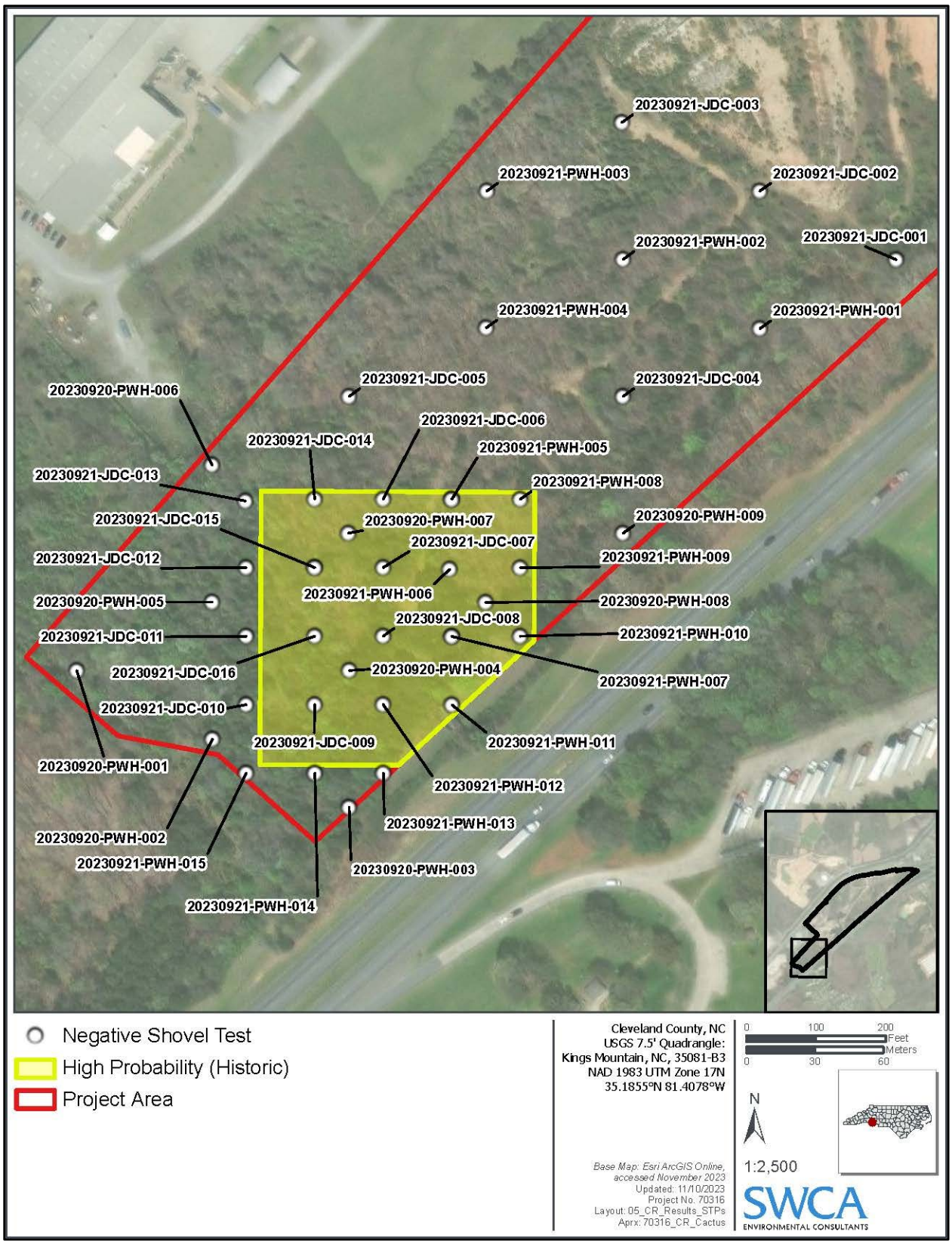

Figure 5-3. Overview of survey results, within the shovel testing area.

The typical soil profile in the uplands identified in the project area consists of one stratum overlying subsoil. Stratum I was an O/A horizon consisting of yellowish brown (10YR 5/4) sandy clay loam. Subsoil was a B horizon consisting of yellowish red (5YR 5/6) sandy clay, with small (approximately 2 to 7 cm [0.8–2.8 inch]) weathered bedrock gravels whose frequency increased with depth (Figure 5-4).

Figure 5-4. Representative soil profile from shovel test 20230920-PHW-005.

During review of historical topographic maps, three high probability areas for historic cultural materials were identified. After review of aerial imagery and on-the-ground visual inspection, two of the three high probability areas were not shovel tested due to previous mining disturbance. The majority of the project area is located within an abandoned mine. The areas that were previously disturbed due to past mining activities were not shovel tested. These areas were inspected by the field crew and documented with photographs. Aerial imagery from 2006, 2008, and 2012 shows the full extent of disturbance related to the past mining activities within the project area (Figure 5-5 through Figure 5-7). The survey did not result in the identification or documentation of any archaeological sites.

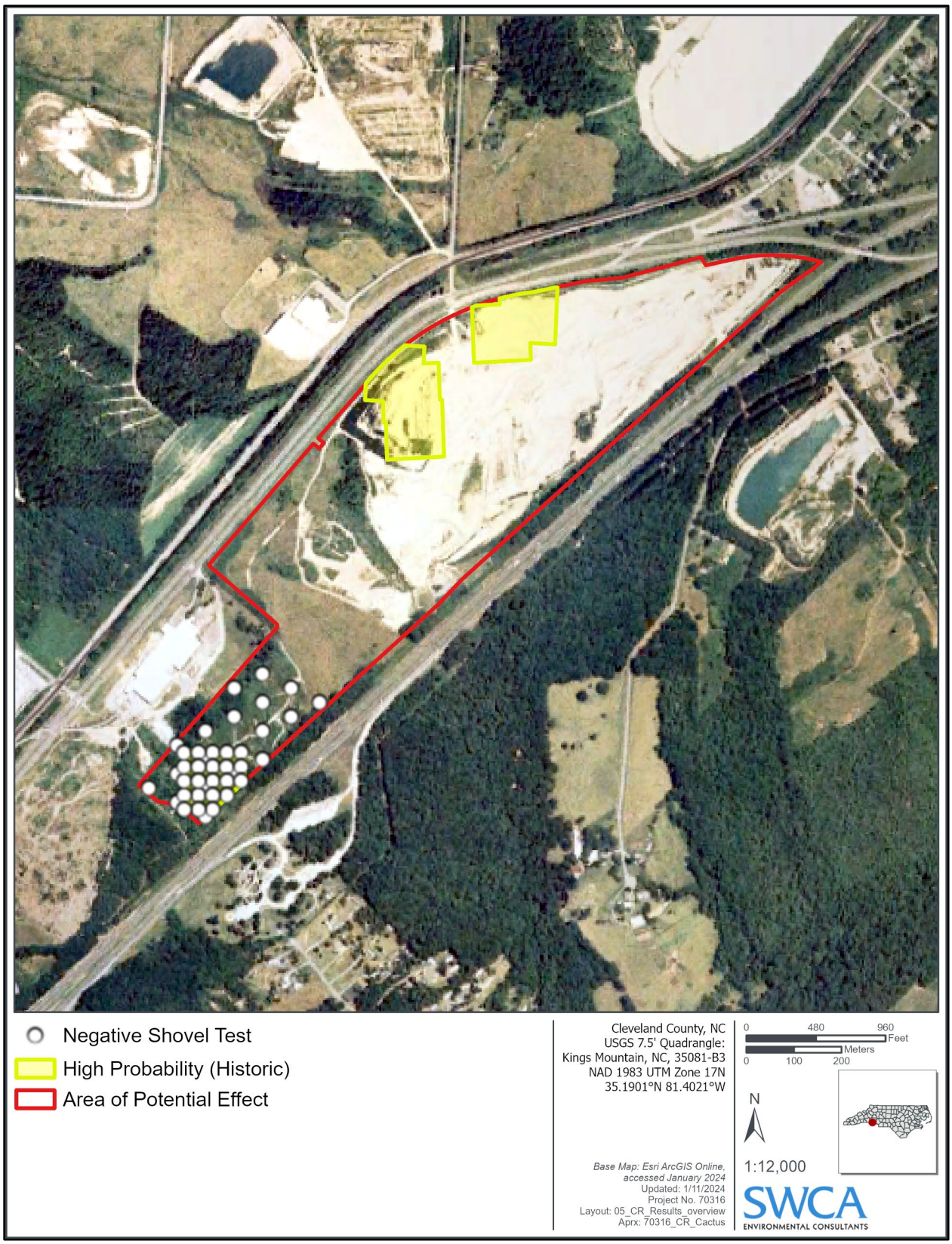

Figure 5-5. Overview of survey results with aerial imagery from 2006.

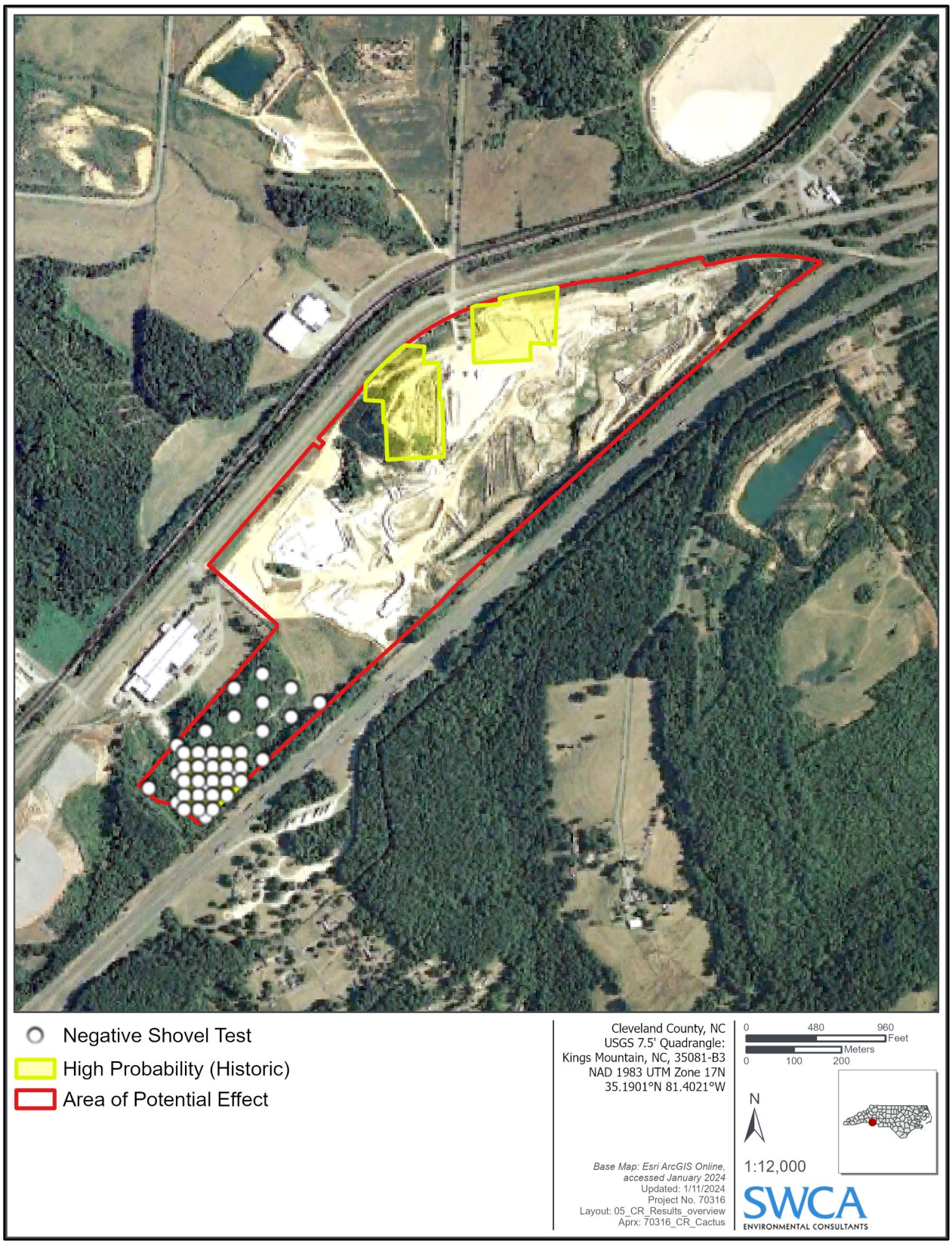

Figure 5-6. Overview of survey results with aerial imagery from 2008.

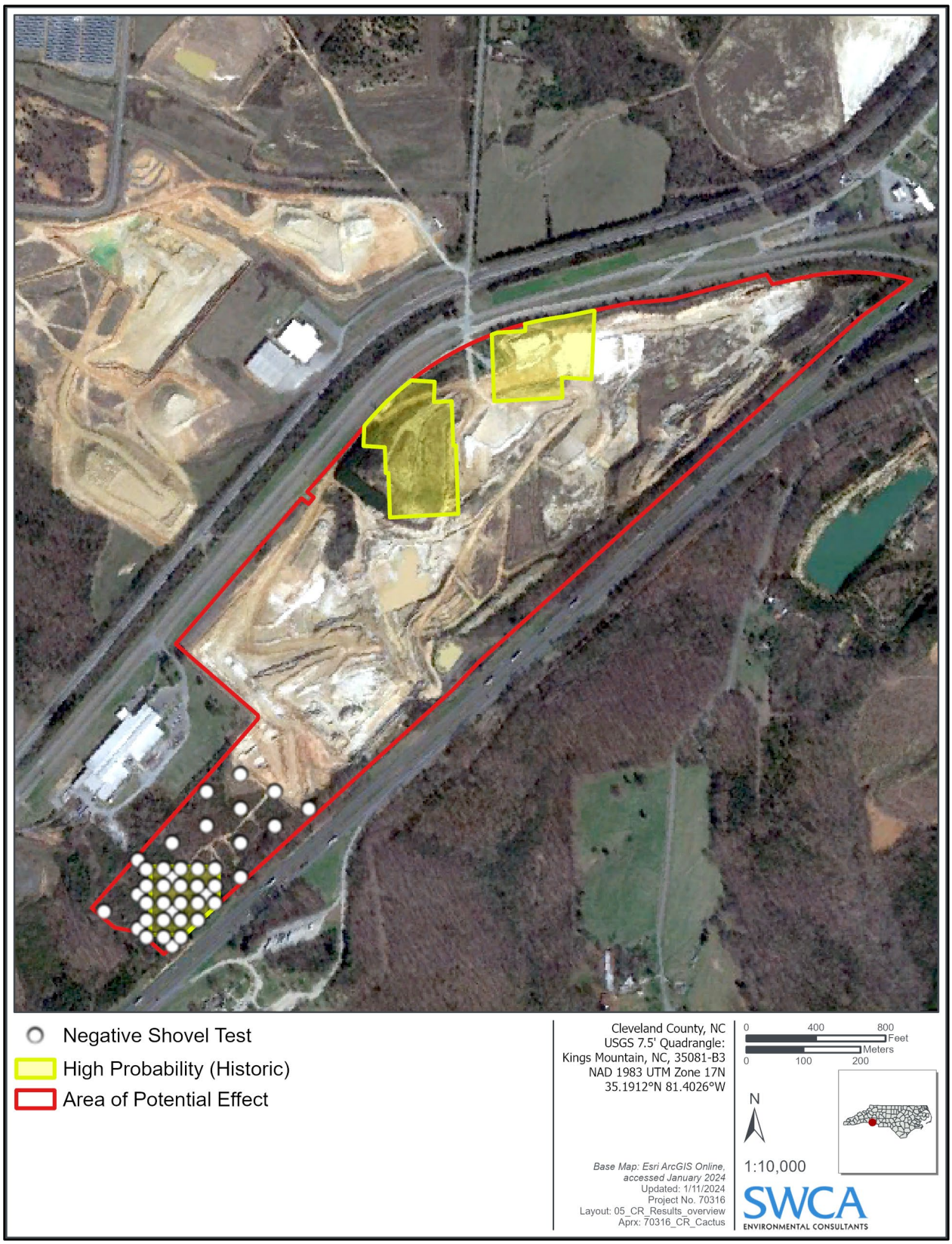

Figure 5-7. Overview of survey results with aerial imagery from 2012.

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CHAPTER 6. CONCLUSION

This report details the background research, methodology, and results of the Phase I archaeological survey and geoarchaeological investigation conducted on behalf of Albemarle in support of the Kings Mountain Mining Project.

The project area was surveyed using a combination of shovel testing and pedestrian survey. In total, 40 shovel tests were excavated. The majority of the project area has been previously disturbed due to past mining activities. Shovel testing was limited to the southwestern portion of the project area where no past mining activities occurred, and all were negative for cultural materials.

During the survey, investigators identified no previously identified or previously undocumented archaeological sites. Based on the results of the survey, SWCA determined no historic properties will be affected by the proposed undertaking, and no further work is recommended.

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APPENDIX E-3 2024 STATE HISTORIC PRESERVATION OFFICE KINGS MOUNTAIN MINING PROJECT, KINGS MOUNTAIN, CLEVELAND COUNTY, ER 22-1248

North Carolina Department of Natural and Cultural Resources
State Historic Preservation Office
Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary D. Reid Wilson

Office of Archives and History
Deputy Secretary, Darin J. Waters, Ph.D.

October 11, 2024

Matthew Jorgenson
SWCA Environmental Consultants
113 Edinburgh South Drive, Suite 120
Cary, NC 27511

Matthew.Jorgenson@SWCA.com

Re: Kings Mountain Mining Project, Kings Mountain, Cleveland County, ER 22-1248

Dear Mr. Jorgenson:

Thank you for your email of September 20, 2024, regarding the above-referenced undertaking. We have reviewed the submission and offer the following comments:

We previously recommended further testing, including deed research and subsurface testing of cultural features, at sites 31CL180 and 31CL185 within the Kings Mountain Mining Project Area if avoidance was not possible. The submitted avoidance plans indicate that the property containing both sites will not be impacted by any mining-related activities as part of the proposed undertaking and both sites will be avoided. SWCA recommends that no further work at 31CL180 and 31CL185 be required as part of the proposed undertaking. We concur with this recommendation.

Additionally, construction plans in areas previously identified as floodplains have been modified and reassessed. The proposed rock storage facility will be situated in an area that was previously utilized as a mid-20th century tailings pond and will not have an impact on intact archaeological resources. The other areas with proposed impacts have also been previously heavily disturbed and/or are not in alluvial settings but in areas of steep slope which have a low potential for intact archaeological resources. SWCA recommends that there will be no adverse effect for significant archaeological resources in these areas. We concur with this recommendation.

We also note that the submitted avoidance plans pertain to archaeological resources only and that consultation concerning historic structures is ongoing.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@dncr.nc.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona Bartos, Deputy
State Historic Preservation Officer

cc: John Kuhn John.Kuhn@albemarle.com
Andrew Harley Andrew.Harley@swca.com
Heath Anderson heath.anderson@swca.com

APPENDIX E-4 2024 STATE HISTORIC PRESERVATION OFFICE KINGS MOUNTAIN MINING PROJECT, CLEVELAND COUNTY, ER 22-1248, DEPARTMENT OF ENERGY CONSULTATION

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary D. Reid Wilson

Office of Archives and History
Deputy Secretary, Darin J. Waters, Ph.D.

May 22, 2024

Harry E. Taylor harry.taylor@netl.doe.gov
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
Morganton, WV 26505

Re: Kings Mountain mining project, Cleveland County, ER 22-1248

Dear Mr. Taylor:

Thank you for your email of May 6, 2024, regarding the above-referenced undertaking. We have reviewed the submittal and offer the following comments.

We are interested in reviewing the draft environmental assessment and providing comments. The environmental assessment may be submitted to our email address at environmental.review@dncr.nc.gov.

If the environmental assessment documentation is a large file size, please use the share file service of your choice.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@dncr.nc.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona Bartos, Deputy
State Historic Preservation Officer

cc: Matthew Jorgenson, SWCA matthew.jorgenson@swca.com

APPENDIX E-5 2024 STATE HISTORIC PRESERVATION OFFICE HISTORIC STRUCTURE SURVEY REPORT, KINGS MOUNTAIN MINING PROJECT, CLEVELAND COUNTY, ER 22-1248, FINAL CONCURRENCE

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary D. Reid Wilson

Office of Archives and History
Deputy Secretary, Darin J. Waters, Ph.D.

February 27, 2024

Hannah Curry hannah.curry@swca.com
SWCA Environmental Consultants
113 Edinburgh South Drive
Cary, NC 27511

Re: Historic Structure Survey Report, Kings Mountain mining project, Cleveland County, ER 22-1248

Dear Ms. Curry:

Thank you for your email of December 7, 2023, transmitting the revised Historic Structure Survey Report (HSSR), "Historic Structures Survey for Kings Mountain, Cleveland County, North Carolina," prepared by SWCA for the Albemarle, U.S., Inc. We accepted the revised draft via an email of December 11, 2023, and all remaining revised deliverables were received on January 18, 2024. We have reviewed the revised HSSR and offer the following comments.

We note that our recommended revisions have been addressed. All eligible property boundary maps and periods of significance are appropriate. We do not recommend additional changes to the HSSR and accept this version as final. This survey resulted in a final total of four (4) eligible and fifty-five (55) ineligible properties.

In addition to the determinations of our September 27, 2023 letter, we concur that the following properties are eligible for listing in the National Register of Historic Places for the reasons listed in the report.

- CL1717, Macedonia Baptist Church – Property is eligible under Criterion C and meets Criterion Consideration A as an individual resource; also eligible as a complex or district under Criteria A and C and meets Criterion Consideration A.
- CL1723, Galilee United Methodist Church – Property is eligible under Criterion C and meets Criterion Consideration A

Additionally, we concur that the following properties are not eligible for listing in the National Register.

- CL0240, Hostetler House
- CL1716, Commercial Building
- CL1725, Adams Chapel AME Zion Church
- CL1728, House
- CL1729, House
- CL1742, House

- CL1751, House
- CL1754, House
- CL1769, House
- CL1744, House
- CL1745, House

The proposed mine expansion has the potential to adversely affect the four National Register-eligible properties identified by this survey as well as the Margrace Mill Historic District (CL0350). Additional consultation is required to determine the level of impact and to discuss alternatives that may avoid or minimize the effects. Please contact Katie Harville, katie.harville@dncr.nc.gov, to schedule a formal consultation meeting.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@dncr.nc.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

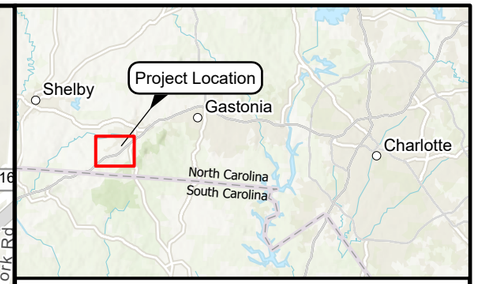
Renee Gledhill-Earley

for Ramona Bartos, Deputy
State Historic Preservation Officer

cc Katie Harville, NC HPO katie.harville@dncr.nc.gov
Hannah Beckman-Black, NC HPO/WO hannah.beckman@dncr.nc.gov

APPENDIX E-6 CULTURAL, HISTORICAL, AND ARCHAEOLOGICAL RESOURCES

DRAFT: 12/20/2023



- Project Boundary
- Archeological Survey Locations (SWCA)

Cultural Heritage and Historic Sites

- Blockface
- Surveyed Only
- Surveyed, Gone
- Surveyed in NRHD
- Surveyed in NRHD, Gone
- NR Historic District center point
- Site Boundary

Notes:
- Note 1: Project Features are provisional and incomplete at this time.
- Note 2: Cultural Data Source: NC SHPO - October 2022

N

0 0.35 0.7
Miles

1 inch = 0.3 mi when printed 11x17

Cultural, Historical, and Archaeological Resources

Kings Mountain Lithium Mine

Albemarle
Kings Mountain
Cleveland County,
North Carolina

APPENDIX E-7 2024 STATE HISTORIC PRESERVATION OFFICE KINGS MOUNTAIN MINING PROJECT, SWCA PROJECT NO. 70316, CLEVELAND COUNTY, ER 22-1248

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper | Secretary D. Reid Wilson

May 1, 2024

Matthew Jorgenson matthew.jorgenson@swca.com
SWCA Environmental Consultants
113 Edinburgh South Drive, Suite 120
Cary, NC 27511

Re: Kings Mountain mining project, SWCA Project No. 70316, Cleveland County, ER 22-1248

Dear Mr. Jorgenson:

Thank you for your letter of April 11, 2024, transmitting the hard copy of the archaeological addendum report for the above-referenced undertaking.

We concur that the following properties are not eligible for the National Register of Historic Places for the reasons outlined in the report:

Sites 31CL199 and 31CL204 do not have the potential to contain information pertinent to prehistoric or historic research questions.

We have accepted the submitted document as the final compliance report for the archaeological survey of these additional areas.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

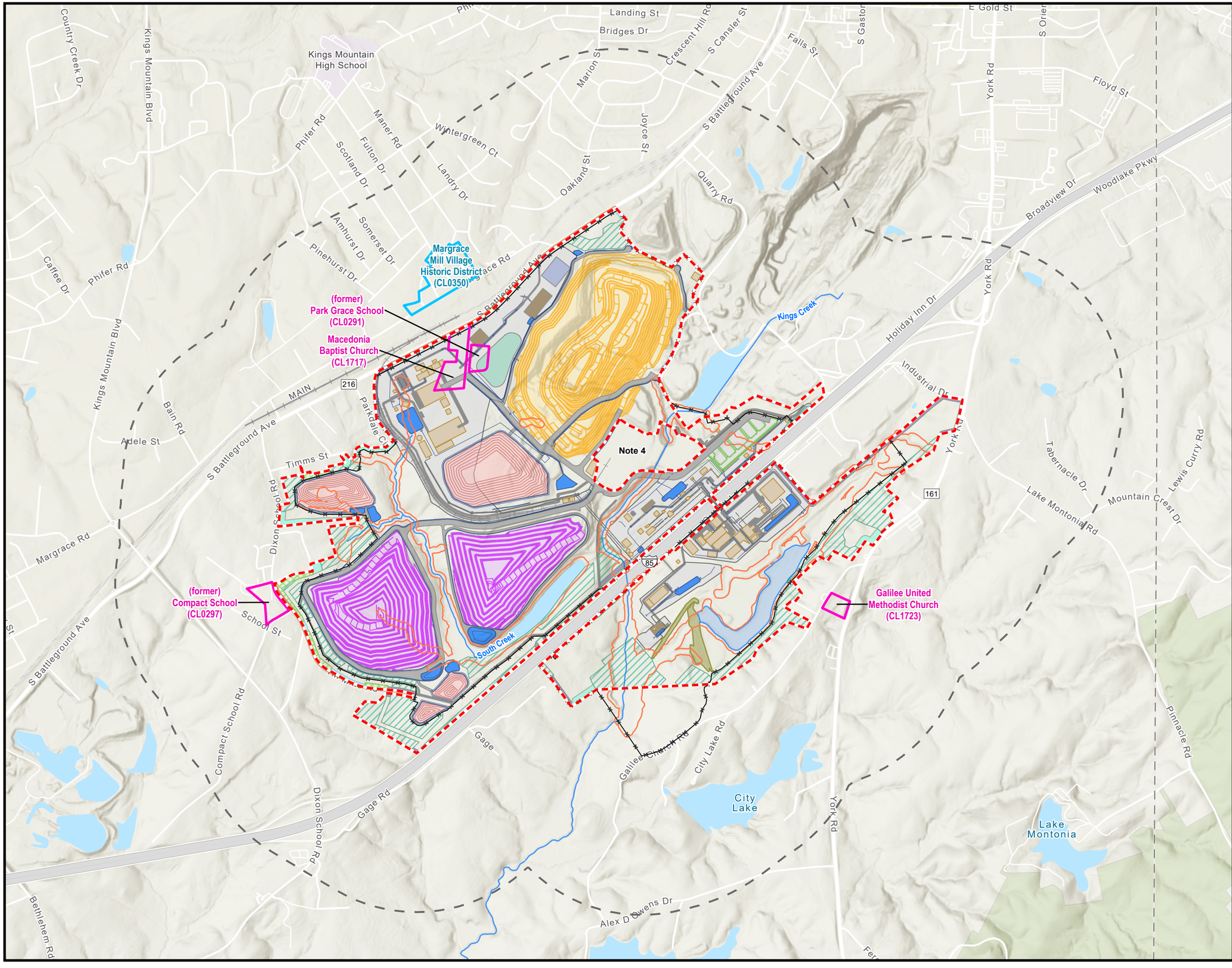
Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

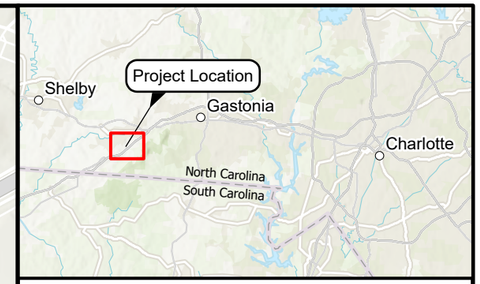
Sincerely,

Renee Gledhill-Earley

for Ramona Bartos, Deputy
State Historic Preservation Officer

APPENDIX E-8 NRHP LISTED OR ELIGIBLE SITES





- Project Boundary
- Area of Potential Effects (0.5 Mile Buffer)
- National Register Historic District
- Determined Eligible Historic District
- NC Jurisdictional Waters 50 Foot Buffer

Property Setback

- No Buffer
- Proposed Walking Path
- Undisturbed Enhanced Evergreen Buffer
- Undisturbed Naturally Vegetated Property Buffer
- Undisturbed Planted Vegetated Buffer
- Vegetated Berm

Mine Design Feature

- Open Pit Contour
- Overburden Storage Facility Contour
- Rock Storage Facility Contour
- Open Pit
- Overburden Storage Facility
- Rock Storage Facility

Mine Stockpile Area

- Run-of-Mine Pad
- Dewatering Storage
- Growth Media Storage
- Laydown Area

Infrastructure

- Fence Line
- Processing Features and Infrastructure
- Proposed Building
- Proposed Dam
- Ground Disturbance Areas and Pads

Transportation

- Railroad
- Haul Road
- Site Road

Hydrology

- Drainage
- Named Flowline
- Pond
- Water Storage Basin 1

Notes:

- Note 1: Project Boundary updated by ERM on September 3 2024.
- Note 2: Project Features are based on Draft Site Layout Rev K provided by Hatch on July 18 2024.
- Note 3: Historic district data downloaded from the NC Historic Preservation Office on August 1 2024.
- Note 4: Area excluded from the permit boundary, existing facilities are not related to mining activity in North Carolina.

N

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Miles

1 inch = 0.3 mile when printed at 11"x17"

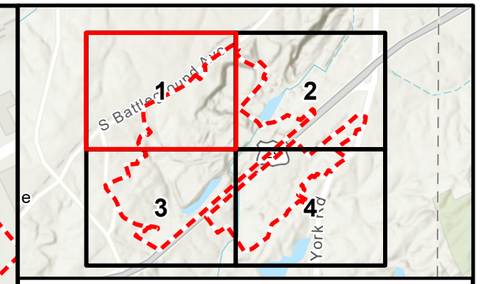
NRHP Listed or Eligible Sites
Kings Mountain Lithium Mine

Albemarle
Kings Mountain
Cleveland County,
North Carolina

APPENDIX F WETLANDS

APPENDIX F-1 WETLAND DELINEATIONS AT MINE SITE

DRAFT: 12/20/2023



Project Boundary - Mine
USACE Jurisdictional Wetland
USACE Non-Jurisdictional Wetland

Notes:
- Note 1: Project Features are provisional and incomplete at this time.

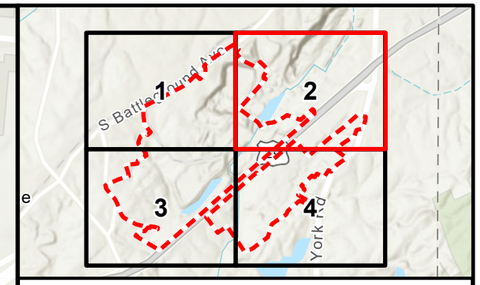
N

0 0.1 0.2
Miles

1 inch = 0.1 mi when printed 11x17

Wetland Delineations at Mine Site
Page 1 of 4
Kings Mountain Lithium Mine
Albemarle
Kings Mountain
Cleveland County,
North Carolina

DRAFT: 12/20/2023



Project Boundary - Mine
USACE Jurisdictional Wetland
USACE Non-Jurisdictional Wetland

Notes:
- Note 1: Project Features are provisional and incomplete at this time.

N

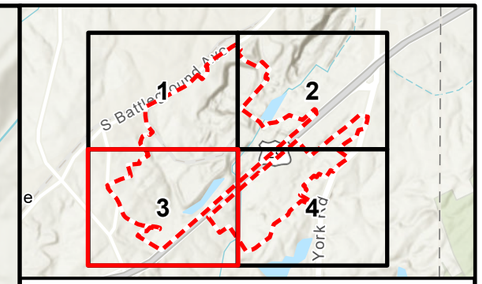
0 0.1 0.2
Miles

1 inch = 0.1 mi when printed 11x17

Wetland Delineations at Mine Site
Page 2 of 4
Kings Mountain Lithium Mine
Albemarle
Kings Mountain
Cleveland County,
North Carolina

Quarry Rd
989 ft
1076 ft
WB-A10
929 ft
Kings Creek
Holiday Inn Dr
Quality Ln
Woodlake Pkwy
161
Industrial Dr
949 ft
Lake Montonia Rd
85
W-B12
W-B11
W-B13
W-B05
W-B06
W-B10
W-B07
W-C04
W-A16
W-B14
WB-C01
909 ft

DRAFT: 12/20/2023



Project Boundary - Mine
USACE Jurisdictional Wetland
USACE Non-Jurisdictional Wetland

Notes:
- Note 1: Project Features are provisional and incomplete at this time.

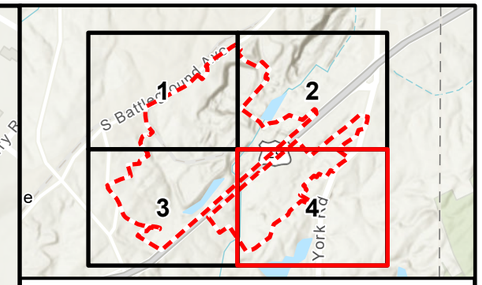
N

0 0.1 0.2
Miles

1 inch = 0.1 mi when printed 11x17

Wetland Delineations at Mine Site
Page 3 of 4
Kings Mountain Lithium Mine
Albemarle
Kings Mountain
Cleveland County,
North Carolina

DRAFT: 12/20/2023



Project Boundary - Mine
USACE Jurisdictional Wetland
USACE Non-Jurisdictional Wetland

Notes:
- Note 1: Project Features are provisional and incomplete at this time.

N

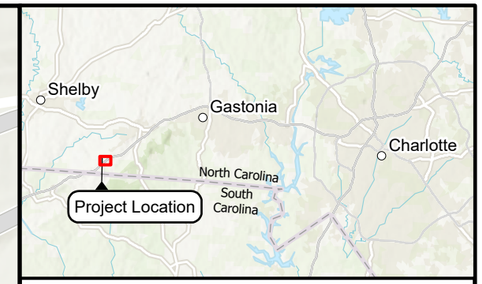
0 0.1 0.2
Miles

1 inch = 0.1 mi when printed 11x17

Wetland Delineations at Mine Site
Page 4 of 4
Kings Mountain Lithium Mine
Albemarle
Kings Mountain
Cleveland County,
North Carolina

APPENDIX F-2 WETLAND DELINEATIONS AT TSF

DRAFT: 12/18/2023



Project Boundary - TSF

Notes:
- Note 1: Project Features are provisional and incomplete at this time.

N

0 0.1 0.2
Miles

1 inch = 0.1 mi when printed 11x17

Wetland Delineations at TSF
Kings Mountain Lithium Mine
Albemarle
Kings Mountain
Cleveland County,
North Carolina

APPENDIX F-3 WETLAND DELINEATIONS AT MINE SITE OVERVIEW

DRAFT: 12/18/2023

Project Boundary - Mine

Waters Delineation (SWCA - September 2023)

- USACE Jurisdictional Wetland
- USACE Non-Jurisdictional Wetland

Notes:
- Note 1: Project Features are provisional and incomplete at this time.

N

0 0.2 0.4

Miles

1 inch = 0.2 mi when printed 11x17

Wetland Delineations at Mine Site

Kings Mountain Lithium Mine

Albemarle
Kings Mountain
Cleveland County,
North Carolina

APPENDIX F-4 NATIONAL WETLANDS INVENTORY: KINGS MOUNTAIN

U.S. Fish and Wildlife Service

National Wetlands Inventory

Kings Mountain

June 6, 2024

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

APPENDIX G PUBLIC COMMENTS AND RESPONSES

Albemarle Kings Mountain Lithium Mine Project Public Engagement

Date	Event Name	Type of Event	Stakeholders	Subject Categories/Topics
2022-03-28	Community Town Hall Meeting	Community Town Hall	General Public	Announcement of KM project exploration
2022-09-21	Community Town Hall Meeting	Community Town Hall	General Public	Feasibility study timeline, Expected life of the mine, Traffic, Mining activities affect on land and animals, Dust, Local Community Engagement Water End Land Use & Closure Social Investment
2022-10-13	Community Advisory Panel (CAP) Meeting	CAP Meeting	CAP members	Overview of Kings Mountain Mine Project
2022-11-17	CAP Meeting	CAP Meeting	CAP members	CAP Meeting Agenda: Item 1: Safety Moment Item 2: Introductions: CAP Members and Albemarle Representatives Item 3: Members Vote on Draft CAP Bylaws Item 4: Weighted Voting Exercise Item 5: Kings Mountain Site Overview Item 6: Mine Tour Safety Protocols
2022-11-19	CAP Mine Tour	Mine Tour	CAP members	Continental Breakfast & Mine Tour Meeting Information: The third meeting of the Albemarle Kings Mountain Community Advisory Panel (CAP) was held on November 19, 2022, at Albemarle Kings Mountain, NC. It began at 8:03 a.m. and was facilitated by Kristi Moore, Principal Consultant, ERM (third-party support).
2023-01-26	CAP Meeting	CAP Meeting	CAP members	Water Study, Concentrator Process
2023-02-02	Community Town Hall Meeting	Community Town Hall	General Public	Department of Energy Award, Water Study Updates, Concentrator Processing, Local Community Engagement Water
2023-02-14	NGO meeting	NGO meeting	Catawba Riverkeeper and Broad Riverkeeper	Mine tour and hydrology update
2023-02-23	CAP Meeting	CAP Meeting	CAP members	Mine Operations 101, End Land Use
2023-03-16	CAP Meeting	CAP Meeting	CAP members	Geochemistry, End Land Use Discussion
2023-03-30	End Land Use_Community Workshop #1	Workshop	General Public	End Land Use & Closure
2023-04-20	CAP Meeting	CAP Meeting	CAP Members	Environmental and Social Impact Assessment (ESIA) announcement, Socioeconomic Baseline Study, Economic and Workforce Development
2023-05-11	Lake Montonia Meeting	Community meeting	Lake Montonia Community members	Overview of Kings Mountain Mine Project
2023-05-17	End Land Use_Employee Workshop #1	Workshop	Albemarle Kings Mountain Employees	End Land Use & Closure
2023-05-18	CAP Meeting	CAP Meeting	CAP Members	Drilling, Water Study Update
2023-05-18	End Land Use_AM Student Workshop	Workshop	Kings Mountain High School Students	End Land Use & Closure
2023-05-18	End Land Use_PM Student Workshop	Workshop	Kings Mountain High School Students	End Land Use & Closure
2023-05-22	Community Town Hall Meeting	Community Town Hall	General Public	ESIA Announcement, Waste Rock, Land Acquisition

Albemarle Kings Mountain Lithium Mine Project Public Engagement

Date	Event Name	Type of Event	Stakeholders	Subject Categories/Topics
2023-06-05	Powering the Future at UNCC	In-person Meeting	Grey Mills - North Carolina General Assembly Melanie O'Connell Underwood - Economic Development Partnership of NC (EDPNC) (Existing Industry Expansions Manager, SW Region) Ray Pickett - North Carolina General Assembly (District 93 Representative) Solange Tricanowicz Thom Tillis - United States Senate (Senator)	Overview of Kings Mountain Mine Project
2023-06-14	End Land Use_AM Community Workshop #2	Workshop	General Public	End Land Use & Closure
2023-06-14	End Land Use_PM Community Workshop #2	Workshop	General Public	End Land Use & Closure
2023-06-15	CAP Meeting	CAP Meeting	CAP members	Social Investment Visioning Exercise
2023-08-17	CAP Meeting	CAP Meeting	CAP members	Pit Dewatering Progress, ESIA Update
2023-08-28	Meeting - Kings Mountain Woman's Club	In-person Meeting	General Public	Overview of Kings Mountain Mine Project
2023-08-31	Community Open House	Open House	General Public	Geology 101, Mining 101, Hydrology 101
2023-09-06	Meeting_Broad Riverkeeper	In-person Meeting	David Caldwell Broad Riverkeeper Mountain True	Pit dewatering permit update
2023-09-21	CAP Meeting	CAP Meeting	CAP Members	Permitting process, Environmental and Social Impact Assessment (ESIA), Waste Rock and Tailings
2023-09-28	Community Town Hall	Community Town Hall	General Public	Mining 101: Waste Rock and Tailings, Upcoming Project Activity: Pit dewatering and Permitting and ESIA. Permitting / Approvals, Local Community Engagement
2023-10-02	Mt Calvary Community Center	Community meeting	General Public/EJ Community	Overview of Kings Mountain Mine Project, ESIA
2023-10-26	CAP Meeting	CAP Meeting	CAP members	Year in Review, Mine design update
2023-11-16	CAP Meeting	CAP Meeting	CAP members	Lithium Ecosystem Discussion, Albemarle and Our Role in the Energy Transition
2023-11-29	Mine Tour_County & Tribal Leadership	Mine Tour	Brian (Bill) Harris - Catawba Indian Nation (Chief) Connie Wade - Catawba Indian Nation (At-Large Member) DeLesslin “Roo” George-Warren - Catawba Indian Nation (At-Large Member) Jason Falls - Cleveland County Government (Business Development Director) Johnny Hutchins - Cleveland County Board of Commissioners (Commissioner) Patricia Leach - Catawba Indian Nation (Assistant Chief) Phyllis Nowlen - Cleveland County Government (Soil & Water Conservation District Board) Roderick Beck - Catawba Indian Nation (Secretary/Treasurer) Tylee Tracer-Anderson - Catawba Indian Nation (Communications Director)	Overview of Kings Mountain Mine Project
2023-12-05	Mine Tour-Inaugural Media Day	Mine Tour	Local media outlets	Overview of Kings Mountain Mine Project
2024-01-18	CAP Meeting	CAP Meeting	CAP members	Operations Update

Albemarle Kings Mountain Lithium Mine Project Public Engagement

Date	Event Name	Type of Event	Stakeholders	Subject Categories/Topics
2024-01-18	Environmental NGO Summit	In-person Meeting	Environmental NGOs NRDC E2 Southern Alliance for Clean Energy Southern Environmental Law Center NC LCV	Kings Mountain Mine Project Overview
2024-01-25	Ellis_Community Group meeting	Community meeting	General Public	Overview of Kings Mountain Mine Project
2024-01-27	Community Meeting_Mt Olive Baptist Church	Community meeting	General Public/EJ Community	Overview of Kings Mountain Mine Project
2024-01-30	Community Meeting_Bethlehem Baptist Church	Community meeting	General Public/EJ Community	Overview of Kings Mountain Mine Project
2024-01-31	Community Meeting_KMHS	Community meeting	General Public/EJ Community	Overview of Kings Mountain Mine Project
2024-02-01	Community Meeting_Bethlehem Baptist Church	Community meeting	General Public/EJ Community	Overview of Kings Mountain Mine Project
2024-02-06	Community Meeting_KM YMCA	Community meeting	General Public/EJ Community	Overview of Kings Mountain Mine Project
2024-02-07	Community Meetings_KM YMCA	Community meeting	General Public/EJ Community	Overview of Kings Mountain Mine Project
2024-02-15	CAP Meeting	CAP Meeting	CAP members	Supplier Diversity, mine plan roll out feedback
2024-03-21	CAP Meeting	CAP Meeting	CAP members	Pit Dewatering, Federal Grant Funding
2024-04-25	CAP Meeting	CAP Meeting	CAP members	Open Pit Mine Design and Ore Processing, Mineral Processing Facility
2024-04-27	Community Meeting_Mt. Zion Baptist Church Community Meeting	Community meeting	General Public/EJ Community	Overview of Kings Mountain Mine Project
2024-05-23	CAP Meeting	CAP Meeting	CAP members	Rock and Material Storage Facilities, Tailings Storage Facility, Mine Reclamation & Closure
2024-06-11	Community Town Hall Meeting	Community meeting	General Public	Kings Mountain Mine Project- updated plans, ESIA
2024-06-15	Community Meeting_Mt. Olive Baptist Church	Community meeting	General Public/EJ Community	Kings Mountain Mine Project - updated plans, ESIA
2024-06-18	Community Meeting_Mt. Zion Baptist Church	Community meeting	General Public/EJ Community	Kings Mountain Mine Project - updated plans, ESIA
2024-06-20	CAP Meeting	CAP Meeting	CAP members	Environmental and Social Impact Assessment
2024-06-25	Community Meeting_Bethlehem Baptist Church	Community meeting	General Public/EJ Community	Kings Mountain Mine Project - updated plans, ESIA
2024-06-27	Community Meeting_Mauney Memorial Library	Community meeting	General Public/EJ Community	Kings Mountain Mine Project - updated plans, ESIA
2024-08-15	CAP Meeting	CAP Meeting	CAP members	Pit dewatering update, ESIA, Baseline Studies: Intangible Cultural Heritage

CAP = Community Advisory Panel