S.C. Department of Health and Environmental Control

Proposed Plan for Operable Units 1 and 2
CSXT Bramlett Road Site

400 East Bramlett Road, Greenville, South Carolina

May 2024

ANNOUNCEMENT OF PROPOSED PLAN

The South Carolina Department of Health and Environmental Control (DHEC or the Department) has completed an evaluation of cleanup alternatives to address contamination at the CSXT Bramlett Road Site, Greenville, South Carolina (the Site). This Proposed Plan identifies DHEC's Preferred Alternative for cleaning up the contaminated areas and provides the rationale for this preference. In addition, this Plan includes summaries of the other cleanup alternatives evaluated.

The Department is presenting this Proposed Plan to inform the public of our activities, gain public input, and fulfill the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the 2020 Remedial Investigation Report (RIR), the 2020 Forensics Analysis of NAPL, Sediments, and Soil Samples, the 2021 Remedial Investigation Report Addendum (RIR-A), the 2022 Focused Feasibility Study Work Plan, the 2023 Focused Feasibility Study (FFS), and other documents contained in the Administrative Record. The Department encourages the public to review these documents to gain an understanding of the Site and the activities that have been completed.

The Department will select the final cleanup remedy after reviewing and considering comments submitted during the 60-day public comment period. The Department may modify the Preferred Alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the Alternatives presented in this Proposed Plan.

DHEC's Preferred Cleanup Alternative

Alternative 5: Excavation and Complete Removal of Vaughn Landfill, Monitored Natural Attenuation, and Land Use Controls

DHEC's preferred remedial option includes:

- Excavation of the Vaughn Construction and Debris (C&D) Landfill;
- Excavation of impacted sediments on Parcels 3, 4, 5, and the Legacy School Property;
- Monitored Natural Attenuation (MNA) and Land Use Controls (LUCs) will be utilized to restrict development and groundwater use.

MARK YOUR CALENDAR

❑ PUBLIC MEETING:

When: June 6, 2024 at 6:00 PM

Where: Mountain View Baptist Church
111 Cagle St
Greenville, SC 29601

DHEC will hold a meeting to discuss the Proposed Plan and all of the Alternatives presented in the FFS. After the Proposed Plan presentation, DHEC will respond to your questions. Oral and written comments will be accepted at the meeting.

❑ PUBLIC COMMENT PERIOD:

June 6, 2024 – August 6, 2024

DHEC will accept written comments on the Proposed Plan during the public comment period. Please submit your written comments to:

Greg Cassidy, Project Manager
DHEC's Bureau of Land & Waste Management
2600 Bull Street
Columbia, SC 29201
cassidga@dhec.sc.gov

❑ FOR MORE INFORMATION:

Call: Greg Cassidy, 803-898-0910

See: DHEC's website at:
http://www.scdhec.gov/publicnotices

View: The Administrative Record at the following locations:

DHEC website
https://scdhec.gov/Bramlett

DHEC Freedom of Information Office
2600 Bull Street, Columbia, SC
(803) 898-3817
Hours: Monday - Friday: 8:30 AM - 5:00 PM

SITE HISTORY

The Site is defined by five parcels (Figure 1) and a portion of the Legacy Early College Elementary School (LECE) property that total approximately 35 acres. The site is bounded by the CSX Transportation (CSXT) railroad corridor to the north, west, and south and by West Washington Street to the east. In addition to the railroad corridor, the Reedy River and the Swamp Rabbit Trail also define the western boundary.

Southern Public Utilities built the Manufactured Gas Plant (MGP) on East Bramlett Road in 1917. Duke Energy assumed ownership of the MGP in 1939 but then sold it to Piedmont Natural Gas in 1951. Between 1963 and 1967, ownership of Parcels 1-5 was transferred to Seaboard Coast Line Railroad, a predecessor of CSXT.

Gas was manufactured at the Bramlett MGP from 1917 to 1952, producing a total of 5.5 billion cubic feet of gas. Coal tar was a byproduct waste stream of the MGP process. Coal tar moved through historic ditch channels from the MGP to a wetland area across Bramlett Road. Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) associated with coal tar are the main constituents of concern (COCs) identified in the investigation.

Beginning in 1988, Vaughn Construction created an unpermitted construction and debris (C&D) landfill and spread waste (including concrete, brick, wood, plastic, roofing materials, insulation, and glass) up to 10 feet deep over 6.3 acres on Parcel 3. It is estimated around 84,000 cubic yards of C&D debris exist within the Vaughn landfill. In 1993, DHEC advised Mr. Vaughn that landfilling activities were improper. In 1994, the United State Army Corps of Engineers notified CSX Transportation (CSXT) that the landfill was located on a wetlands area and CSXT ordered Mr. Vaughn to cease operation and close the unpermitted landfill. Mr. Vaughn did not remove the C&D debris or remediate any environmental impacts.

An interim removal action was implemented in 2001, focusing on the 3.8 acres where the MGP plant operated. 61,000 tons of contaminated soil and debris were excavated, screened, and shipped off-site for treatment and/or disposal. 34,000 tons of this soil was sent for thermal treatment and returned to the site to use as clean backfill.

Duke Energy entered a Voluntary Cleanup Contract with DHEC in 2016 to determine the extent of coal tar impact remaining. The 2020 RIR and the 2021 RIR-A provided data which expanded the site characterization and focused on several important elements, including the location of the historic drainage ditch system and the extent and distribution of non-aqueous phase liquid (NAPL) impacts. NAPLs are organic liquid contaminants that do not mix with water like coal tar and chlorinated solvents. The extent of MGP-related residuals in sediment, soil, and groundwater media was not known at the time of the original removal action.

Data collected as part of the RIR-A included polycyclic aromatic hydrocarbon (PAH) forensics analysis. The forensic analysis found that MGP-related impacts were observed in some on-site sediments in ditch assessment samples from Parcels 3, 4, and 5; ditches upgradient of the site were consistent with urban background concentrations attributable to urban runoff; and PAHs detected in the Reedy River or off-site sediment samples can be attributed to urban runoff unrelated to the former MGP plant.

In 2021, DHEC addressed concerns about possible contamination in the community near Mountain View Baptist Church from the former MGP plant by sampling various properties in that area. The results indicate there has not been any impact from the MGP on surface soils.

AREAS OF CONCERN

The assessment separated the Site into three operable units. Operable unit one (OU-1) is defined as soil and sediments. Operable unit two (OU-2) is defined as surface water, shallow-zone groundwater, and transition-zone groundwater. Operable unit three (OU-3) is defined as the deeper, fractured bedrock groundwater. This remedy will only address impacts to OU-1 and OU-2.

OU-1 includes soil and sediment on Parcels 1 through 5 and a portion of the LECE School Property. NAPL (Figure 2) has been observed in shallow soil at various places throughout the Site, including within historical drainage ditches on the LECE School property and below the Vaughn Landfill debris material. Parcels 1 and 2 are currently zoned for industrial use and meet the risk-based thresholds for industrial/commercial use with LUCs. Parcels 4 and 5 are defined by impacts from MGP residuals to the sediment within a defined drainage ditch that runs from Parcel 3 to Parcel 4 to Parcel 5 to the outfall to the Reedy River.

OU-2 includes COCs in the shallow and transition zone groundwater which include benzene, naphthalene, benzo(a)pyrene, and toluene above drinking water maximum contaminant levels (MCLs). NAPL is also a COC because NAPL contains VOCs and SVOCs. NAPL has been visually observed in monitoring wells and measurable amounts have accumulated in two monitoring wells. NAPL is present in the soils, saprolite, and bedrock media underlying the Vaughn Landfill.

Groundwater sampling since 2019 has provided data to delineate the extent of impacted shallow-zone groundwater impacts to Parcels 1 and 3 and a small portion of the LECE School property. Transition zone groundwater has also been delineated and impacts a portion of Parcels 2 and 3.

During the assessment, surface water COC concentrations above respective screening levels were only identified at one location. The most recent surface water sampling results (March 2022, September 2022, and March 2023) indicate no current COC exceedances.

SUMMARY OF SITE RISKS

The primary risks identified are potential human exposure to MGP-related contaminants in soil, shallow and transition zone groundwater, surface water, sediment, and deep bedrock groundwater. Additionally, there are risks from the uncharacterized Vaughn Landfill material which could pose both a physical and chemical hazard. Except for a small area on Parcel 2 which can be addressed by a shallow soil excavation, most risk is within Parcels 3, 4, 5, and a portion of the LECE School Property. The risk to someone on those parcels is primarily from dermal exposure and vapor inhalation. While a

construction worker would likely be using protective equipment such as gloves, boots, and safety glasses, the trespasser to the site would not. These risks would need to be addressed with some form of treatment, cover, or removal that would limit exposure.

CLEANUP GOALS

Remedial Action Objectives (RAOs) are developed to set goals for protecting human health and the environment. The goals should be as specific as possible but should not unduly limit the range of Alternatives that can be developed. For the Bramlett Site, RAOs have been developed for the two operable units being addressed in this Proposed Plan. OU-1 addresses soil and sediment at the Site. OU-2 addresses shallow and transition zone groundwater and surface water.

For the FFS, soils are weathering profiles that develop in place and sediments are from depositional environments or locations where standing water was routinely observed. The Site's operational history and CSM for Parcels 3, 4, 5, and LECE School property indicate these areas have previously been formed by deposition and that the sorbed COCs and NAPL are in the vicinity of the historical ditch footprint that transported the COCs and NAPL. Therefore, the media contained within these areas is considered sediment rather than soil. For Parcels 1 and 2, the media present developed in place or was placed during backfilling of the remedial efforts on Parcel 1 and is considered soil.

The RAOs for OU-1 are:

RAO 1: Soils

Parcels 1 and 2: Prevention of construction worker human exposure through dermal exposure and inhalation of vapor will be achieved when LUCs are enacted. Parcels 1 and 2 in their current condition, without remedial activities, meet the criteria for Industrial/Commercial (I/C) use with LUCs. Based on the risk estimation, this RAO will be achieved with the formalization of LUCs.

RAO 2: Sediment

Parcels 3, 4, 5 and LECE School Property (Fig.1): Remediate sediment to US Environmental Protection Agency Region 4 sediment regional screening values and comply with current land use by removing sediment containing visual NAPL.

The RAOs for OU-2 are:

RAO 1: Prevent ingestion and/or contact with groundwater or surface water containing COCs at concentrations exceeding applicable MCLs or site-specific remediation standards and restore the groundwater to a standard for unrestricted use, where practicable.

RAO 2: Prevent groundwater containing COCs from impacting surface water at concentrations exceeding applicable MCLs or site-specific remediation standards.

SCOPE AND ROLE OF THE ACTION

The proposed action in this plan will be the final cleanup action for OU-1 and OU-2 for the Site. The remedial action objectives for this proposed action include removing sediment containing visual NAPL, preventing human ingestion of groundwater, minimizing the time required for groundwater COC concentrations to reduce below MCLs, and restoring shallow and transition zone groundwater to drinking water standards.

The risk estimate indicated that the surficial soils for the combined area of Parcels 1 and 2, have an acceptable total hazard index and cancer risk for the construction worker scenario. There are no preliminary remediation goals (PRGs) for soil on Parcels 1 and 2. Soils will meet I/C use standards once LUCs are enacted.

NAPL is visibly present in the drainage ditches and the wetlands on Parcels 3, 4, 5, and the LECE School Property. Based on sampling completed during the RIR-A, visible NAPL is an indicator that there may be USEPA Region 4 sediment RSVs exceedances in sediment. Therefore, removal of visual NAPL from sediment will achieve the RAO and is considered the PRG.

NAPL is visibly present within the shallow-zone, transition-zone, and bedrock groundwater systems. Groundwater is classified as Class GB, or suitable for drinking water without treatment. Unless site-specific remediation standards are developed utilizing South Carolina's Amendment to Section 44-56-200, Hazardous Waste Cleanup, the PRGs for Class GB groundwater for organic and inorganic chemicals are the drinking water MCLs as set forth in R.61-58, State Primary Drinking Water Regulations, R.61-68, Water Classifications and Standards, or concentration promulgated by DHEC, if no PRG is available.

The surface water is classified as freshwater in accordance with DHEC regulation document R.61-68, Water Classifications and Standards. Human health MCLs for freshwater are provided in R.61-68 E.14.b(1). Since 2019, only benzo(a)pyrene was detected at a concentration greater than the freshwater human health MCL, in one sampling location near the Vaughn Landfill. In the last two years, no analytes have been detected in the surface water at concentrations above the freshwater human health MCL. A PRG for benzo(a)pyrene of 0.2 micrograms per liter is proposed for surface water. Surface water currently meets this PRG.

Operable Unit 3, fractured bedrock groundwater, will be evaluated and addressed separately, if necessary.

SUMMARY OF REMEDIAL ALTERNATIVES

Based on information collected during site investigations, a FFS was conducted to identify, develop, and evaluate cleanup options and remedial alternatives. The FFS process used the information gathered during the previous investigations and other assessments to develop and evaluate potential remedial alternatives. Each remedial alternative evaluated by the Department is described briefly below. Note: A Final Remedial Design will be developed prior to implementation.

SUMMARY OF REMEDIAL ALTERNATIVES

Alternative	Description
1: No Action	• Site is left in its current condition • This is a baseline for comparison to other alternatives • Estimated Cost: $22,000
2: Monitored Natural Attenuation (MNA) and Land Use Controls (LUCs)	• Maintains the Site in its current condition with continued monitoring for a period of 30 years • LUCs will be implemented on soil, sediment, and groundwater • Estimated Cost: $1,350,000
3: Selective Excavation	• Selective excavation on Parcels 3, 4, 5, and LECE School Property • Installation of a barrier wall in combination with capping of a portion of the Vaughn Landfill • Hydraulic control of the shallow and transition zone groundwater via mechanical pumping (5 years) and engineered phytoremediation on the capped portion of the Vaughn Landfill • MNA of groundwater and implementation of LUCs for long-term effectiveness • Estimated Cost: $18,600,000
4: Excavation and Partial Vaughn Landfill Removal, MNA, and LUCs	• Excavation of the portion of the Vaughn Landfill with underlying NAPL • Excavation of the impacted sediments on Parcels 3, 4, and 5 and LECE School Property • MNA of groundwater and implementation of LUCs for long-term effectiveness • Estimated Cost: $33,300,000
5. Excavation and Complete Vaughn Landfill Removal, MNA and LUCs	• Excavation of the overall Vaughn Landfill (areas with and without underlying NAPL) • Excavation of the impacted sediments on Parcels 3, 4, 5 and LECE School Property • MNA of groundwater and implementation of LUCs for long-term effectiveness • Estimated Cost: $39,500,000

DESCRIPTION OF ALTERNATIVES

Alternative 1 - No Action

No Action is included as a baseline for comparison with other alternatives. Under Alternative 1, no action is taken to treat or prevent potential exposure to contaminated groundwater, soil, or sediments. There is also no reduction in volume, toxicity, or the mobility of contaminants. This alternative would rely on natural attenuation processes to reduce contaminant concentrations over time. This alternative does not include any institutional controls (e.g., deed restrictions) or monitoring to evaluate natural attenuation or COC extent. The Site would be left uncontrolled. Alternative 1 would not be protective of human health or the environment and would likely not reach RAOs in less than 30 years. The expected cost for this alternative is $22,000.

Alternative 2 – Monitored Natural Attenuation (MNA) and Land Use Controls (LUCs)

MNA is a passive approach that monitors the natural degradation or reductions of COCs in groundwater. Additionally, soil, sediment, and groundwater LUCs will be put in place on the parcels and the LECE School Property. A typical MNA approach centers on monitoring groundwater regularly to evaluate and confirm that site conditions are supportive of COC degradation. LUCs would be implemented to protect human health and the environment by restricting development and groundwater use. MNA would likely not reach RAOs in less than 30 years and have a cost of $1,350,000.

Active Remedies

Alternatives 3 through 5 are the active remedies for the Site. This means that these alternatives will utilize a treatment process or a source removal to remediate the Site. Alternatives 3 through 5 are identical in how they will remediate the LECE School Property, Parcel 4, and Parcel 5. They will all utilize MNA and LUCs as part of the alternative. The difference with alternatives 3 through 5 is how they approach the cleanup of Parcel 3 which includes the Vaughn Landfill. The following paragraphs will summarize the components in Alternatives 3 through 5 that will be the same for each followed by descriptions of how each of the active alternatives will address Parcel 3.

On the LECE School Property, each alternative includes the excavation of the sediments within the wetlands with visible NAPL which includes a portion of the turnaround/parking area to a depth of up to 16 feet. To excavate to this depth, it is likely that a 1,000 foot long temporary, sheet-pile wall would be installed to an estimated depth of 25 feet. The estimated volume of excavated sediment is 26,300 cubic yards. Measures will be taken to limit dust, odor, and noise during excavation activities.

The drainage ditches on Parcels 4 and 5 would be excavated. The removal volumes would be 2,800 and 2,300 cubic yards, respectively.

MNA would be used as an alternative for the remediation of the shallow and transition zone groundwater. LUCs would be required to prevent or limit the use of groundwater; protect and maintain the barrier, cap, and hydraulic control; and to ensure the property is safe for its intended use.

Alternative 3 – Selective Excavation/Capping

The primary components of Alternative 3 (Figure 3) are selective excavations on Parcels 3, 4, 5, and the LECE School Property; installation of a barrier wall in combination with capping of a portion of the Vaughn Landfill; hydraulic control of the shallow and transition zone groundwater via mechanical pumping (5 years); engineered phytoremediation on the capped portion of the Vaughn Landfill; and MNA of groundwater and implementation of LUCs for long-term effectiveness.

Parcel 3 would be divided into northern and southern excavation areas. The Southern excavation area includes approximately 0.3 acres of the Vaughn Landfill and includes 15,300 cubic yards of removal. The Northern excavation area includes approximately 5,700 cubic yards of removal.

To prevent remaining sorbed COCs and NAPL, which would remain in place, from migrating from beneath the Vaughn Landfill, an approximately 1,425-foot-long permanent barrier wall would be installed in the northwestern portion of the Vaughn Landfill. The barrier wall would be utilized for the installation of a groundwater hydraulic control system. To control infiltration of precipitation within the barrier wall, a low permeability engineered cap would be installed inside of the barrier wall. A groundwater extraction system would be installed to prevent the buildup of groundwater within the barrier wall and create an upward hydraulic head on the transition and bedrock zones of groundwater. This would consist of approximately 100 TreeWell phytoremediation installations and two groundwater extraction wells which would be utilized until the trees are established.

Alternative 3 would take about 2-3 years to install but would take greater than 30 years to reach remedial goals. The biggest advantage to this alternative is that it would be completed in less than half the time of the other active alternatives and have less than half of the number of truck trips needed to complete. The Selective Excavation alternative would cost about $18,600,000.

Alternative 4 – Excavation and Partial Vaughn Landfill Removal, MNA, and LUCs

Alternative 4 (Figure 4) would include the excavation of the portion of the Vaughn Landfill with underlying NAPL; excavation of the impacted sediments on Parcels 3, 4, 5, and the LECE School Property; MNA of groundwater; and implementation of LUCs for long-term effectiveness.

Alternative 4 would include the excavation of NAPL impacted areas on Parcel 3, including the portion of the Vaughn Landfill with underlying NAPL. Approximately 30,000 cubic yards of the Vaughn Landfill not over NAPL contaminated areas would stay in place. The areal extent of Parcel 3's excavation is approximately 4.8 acres. The estimated volume of excavated C&D Debris and NAPL is estimated to be 101,400 cubic yards.

Total excavation volume for Alternative 4 is approximately 153,900 cubic yards of material and it would take 5-6 years to complete. The cost of this alternative would be $33,300,000.

Alternative 5 – Excavation and Complete Removal of Vaughn Landfill, MNA, and LUCs

Alternative 5 (Figure 5) would include the excavation of the overall Vaughn Landfill; excavation of the impacted sediments on Parcels 3, 4, 5, and LECE School Property; MNA of groundwater; and implementation of LUCs for long-term effectiveness.

Alternative 5 would include the excavation of the NAPL on Parcel 3 along with the rest of the Vaughn Landfill C&D area. The areal extent of excavations would be 7.92 acres. It is estimated that the excavation volume for Parcel 3 would be 150,000 cubic yards.

Total excavation volume for Alternative 5 is approximately 183,800 cubic yards of material and it would take 6-7 years to complete. The cost of this alternative would be $39,500,000.

EVALUATION OF ALTERNATIVES

The National Contingency Plan requires the use of specific criteria to evaluate and compare the different remedial alternatives to select a remedy. The criteria are:

1. Overall protection of human health and the environment;
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs);

3. Long-term effectiveness and permanence;
4. Reduction of toxicity, mobility, or volume through treatment;
5. Short-term effectiveness;
6. Implementability;
7. Cost; and
8. Community acceptance

The main objectives for the preferred remedial action are to be protective of human health and the environment and to comply with State and Federal regulations. These two objectives are considered *threshold criteria*. For an alternative to be considered as final, these two threshold criteria must be met.

The following measures are considered *balancing criteria*: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. These criteria are used to weigh the major technical feasibility and cost advantages and disadvantages.

Community acceptance of the preferred Alternative and the other considered Alternatives is a *modifying criterion* that will be carefully considered by the Department prior to final remedy selection.

COMPARATIVE ANALYSIS OF ALTERNATIVES

A comparative analysis of each Alternative was performed. In this type of analysis, the Alternatives were evaluated in relation to one another for each of the evaluation criteria. The purpose of the analysis is to identify the relative advantages and disadvantages of each Alternative.

Overall Protection of Human Health and the Environment

The assessment for this criterion describes how each alternative achieves and maintains adequate protection of human health and the environment. The five alternatives provide varying levels of human health protection. Alternative 1 would not achieve the RAOs and provides the least protection of all the alternatives. Alternative 1 would provide no reduction in risks to human health and the environment because no measures would be implemented to eliminate potential pathways for human exposure. Alternative 2 would provide limited protection of human health and the environment using MNA and LUCs to minimize the potential for contact with NAPL. Alternative 3 would provide several layers (selective excavation, capping, and LUC) of protection for human health and the environment but would leave NAPL-impacted sediments in place within the containment area on the Vaughn Landfill. Alternative 4 would provide the complete removal of delineated NAPL-impacted sediments from the site but does not address any protections for human health and the environment from the remaining Vaughn C&D Landfill material. Alternative 5 would provide for the complete removal of NAPL-impacted sediments and the complete removal of the Vaughn C&D Landfill material. In terms of overall protection of human health and the environment, the Alternatives ranked from most protective to least: Alternative 5, Alternatives 4, Alternative3, Alternative 2, Alternative1.

Compliance with ARARs

The assessment for this criterion describes how each alternative complies with potential federal and state ARARs. Alternative 1 would not comply with chemical specific ARARs because no action would be taken to reduce contaminant concentrations. Alternative 2 would not comply with chemical specific ARARs because no action would be taken to remove NAPL. Alternatives 3 through 5 would meet the location and action specific ARARs. Alternative 3 would take longer to meet chemical specific ARARs than Alternatives 4 and 5 since NAPL would be left in place. Alternatives 4 and 5 would meet chemical-specific ARARS for soil and sediment by removing NAPL and that should reduce concentrations in groundwater which would see continued reduction through MNA. In terms of compliance with ARARs, the alternatives ranked from most likely to least: Alternate 5, Alternative 4, Alternative 3, Alternative 2, and Alternative 1. All of the active treatments would comply with the ARARs.

Long-Term Effectiveness and Permanence

The assessment for this criterion evaluates the long-term effectiveness of alternatives in maintaining protection of human health and the environment after response objectives have been met. Alternative 1 would have minimal long-term effectiveness since NAPL would not be removed, monitored, or contained. Alternative 2 would have minimal long-term effectiveness since NAPL would not be removed or contained but would have the capability of monitoring natural reduction effectiveness. With Alternative 3, while a majority of NAPL would be excavated, there is a limited area of NAPL that would be contained within the barrier wall and visually observed trace NAPL would be left under a portion of the Vaughn Landfill. Alternative 3 would have a barrier wall, cap, and hydraulic control systems that would require operation and maintenance for many years. In Alternative 4 the excavations would permanently remove the NAPL on Parcels 3, 4, 5, and the LECE School property. Alternative 4 would leave a portion of the Vaughn C&D Debris Landfill which would limit its ability to return to a natural wetland area. Alternative 5 would permanently remove the NAPL on Parcels 3, 4, 5, and the LECE Property as well as completely remove the C&D debris material. In terms of long-term effectiveness and permanence, the alternatives ranked from most permanent to least: Alternative 5, Alternative 4, Alternative 3, Alternative 2, and Alternative 1. All three active alternatives (Alternatives 3 through 5) would require some level of long-term management until RAOs are achieved.

Reduction of Toxicity, Mobility, and Volume through Treatment

The assessment for this criterion evaluates the alternative with respect to how well it can permanently and significantly reduce toxicity, mobility, and volume of impacted media. Alternatives 1 and 2 would not reduce toxicity, mobility, or volume through treatment. In Alternative 3, the toxicity, mobility, and volume would be reduced at the Site through selective excavation and groundwater extraction and treatment within the capped area. In Alternative 3, the mobility would be reduced due to placement in an engineered waste containment cell at a permitted landfill and the reduction in mobility provided by the barrier wall and cap. Alternative 3 leaves a limited area of NAPL within the barrier wall and leaves trace NAPL under a portion of the Vaughn Landfill. Alternatives 4 and 5 reduce the toxicity, mobility, and volume of waste through excavation. Alternatives 4 and 5 would

allow for the reduction of toxicity and volume in groundwater through natural attenuation over an extended period. Alternative 5 removes the additional C&D debris from the Vaughn Landfill that would not be removed in Alternative 4. In terms of reducing toxicity, mobility, and volume, the alternatives ranked most reduction to least: Alternative 5, Alternative 4, Alternative 3, Alternative 2, and Alternative 1.

Short-Term Effectiveness

The assessment for this criterion evaluates the alternative with respect to its effects on human health and the environment during construction and implementation of the remedial action. Alternative 1 is not effective over a short-term period but would have no risk to the community or workers due to implementation. Alternative 2 would have some required routine groundwater monitoring but risk is minimal to the community or workers. Alternatives 3 through 5 pose higher risks to the community and workers during implementation due to the active remedial technologies (e.g., heavy equipment, trucking) being utilized. The active remedies each pose a slightly higher risk to the community or workers as you move from Alternatives 3 up to Alternative 5 due to each requiring a longer implementation time. However, these risks would be minimized through appropriate health and safety planning. In terms of short-term effectiveness, the Alternatives ranked from most to least: Alternative 3, Alternative 4, Alternative 5, Alternative 2, and Alternative 1.

Implementability

The assessment for this criterion evaluates the technical and administrative feasibility of each alternative and the availability of materials and services required during its implementation. All of the action alternatives would be implementable. The three action alternatives (Alternatives 3 through 5) would require some specialized wetlands terrain equipment, sheet-piling, dewatering and treatment systems, and the use of a sprung structure to work in on the LECE School Property. In the order of increasing difficulty, the Alternatives are ranked: Alternative 1, Alternative 2, Alternative 3, Alternative 4, and Alternative 5. Each of the alternatives discussed are common applications, have been historically used in the environmental industry, and have specifically been used at former MGP sites.

Cost

The following table presents the estimated cost for each Alternative:

Alternative	Cost
1. No Action	$0
2. MNA and LUCs	$22,000
3. Selective Excavation with MNA/LUCs	$18,600,000
4. Excavation with Partial Vaughn Landfill Removal; MNA; LUCs	$33,300,000
5. Excavation with Complete Vaughn Landfill Removal; MNA; LUCS	$39,500,000

Community Acceptance

Community acceptance of the preferred remedy will be evaluated after the public comment period. Public comments will be summarized and responses provided in the Responsiveness Summary Section of the Record of Decision document that will present the Department's final Alternative selection. The Department may choose to modify the preferred Alternative or select another remedy based on public comments or new information.

Alternative Criteria Scoring

The Table in Figure 6 shows how well each alternative would perform in meeting the evaluation criteria. The alternatives are rated from 1 to 6 on how well they complete the evaluation criteria. A rating of one would not meet the bare minimum requirements of the evaluation criteria. A rating of 6 would provide excellent performance in satisfying the evaluation criteria. Alternatives 4 and 5 achieved the highest scores of the alternatives evaluated.

SUMMARY OF THE DEPARTMENT'S PREFERRED ALTERNATIVE

The Department has identified Alternative 5 (Excavation and Removal of Vaughn Landfill, MNA, and LUCs) as the preferred remedy for the Site.

Alternative 5 would include the excavation of the entire Vaughn Landfill; excavation of the impacted sediments on Parcels 3, 4, 5, and the LECE School property; MNA of groundwater; and implementation of LUCs for long-term effectiveness.

On Parcel 3, Alternative 5 would include the excavation of the NAPL and the entire Vaughn C&D Landfill. The areal extent of excavation includes the impacted wetlands areas, the areas underlain by NAPL, and the Vaughn Landfill C&D debris area. The excavations would be backfilled with clean soil and sediment along with the restoration of the wetland vegetation. During restoration, the Vaughn Landfill footprint would be backfilled to match the existing contours of the surrounding wetlands area. Best Management Practices (e.g. silt fences, sediment tubes, rock ditch check dams, and turbidity curtains) would be placed to prevent sediment from migrating off-Site during construction.

The total areal extent of the excavation for Parcels 4 and 5 encompasses 0.44 acres. The proposed sediment excavation would be completed based on the estimated depth determined from work completed during the Remedial Investigation and by visual observation. Best Management Practices (e.g., silt fences, sediment tubes, rock ditch check dams, and turbidity curtains) would be placed to prevent sediment from migrating off-Site during construction.

On the LECE School Property, the excavation would remove sediments within the wetlands and uplands that are visibly stained with NAPL. This would include a portion of the turnaround and parking area to a depth of 16 feet on the LECE School property. To excavate to this depth, it is expected that a 1000-foot long temporary, sheet pile wall would be installed to an estimated depth of 25 feet. The total excavation is approximately 1.02 acres with an estimated volume of 26,400 cubic yards. The excavation would require the implementation of an Air, Noise, and Fugitive Emissions Monitoring and Mitigation Plan

to address noise, air, and fugitive dust emissions. Additionally, the use of a temporary sprung structure, if needed, would be used over the excavation area to further reduce potential impacts during the excavation. Dewatering and surface water management would likely be required during the excavation. The excavation would be backfilled with soil to match the existing elevations and restored to its preconstruction condition.

The remedy for the shallow and transition zone groundwater would be MNA; however, with the footprint of the Vaughn Landfill being returned to wetlands, the monitoring well network would need to be focused on the Site periphery. Based on the results of groundwater sampling and the proposed removal of NAPL-impacted soil and sediments, MNA is a viable alternative for groundwater remediation over the course of an extended period (likely greater than 30 years). LUCs would be required to prevent or limit the use of groundwater until the groundwater reaches remedial goals and to maintain current property zoning.

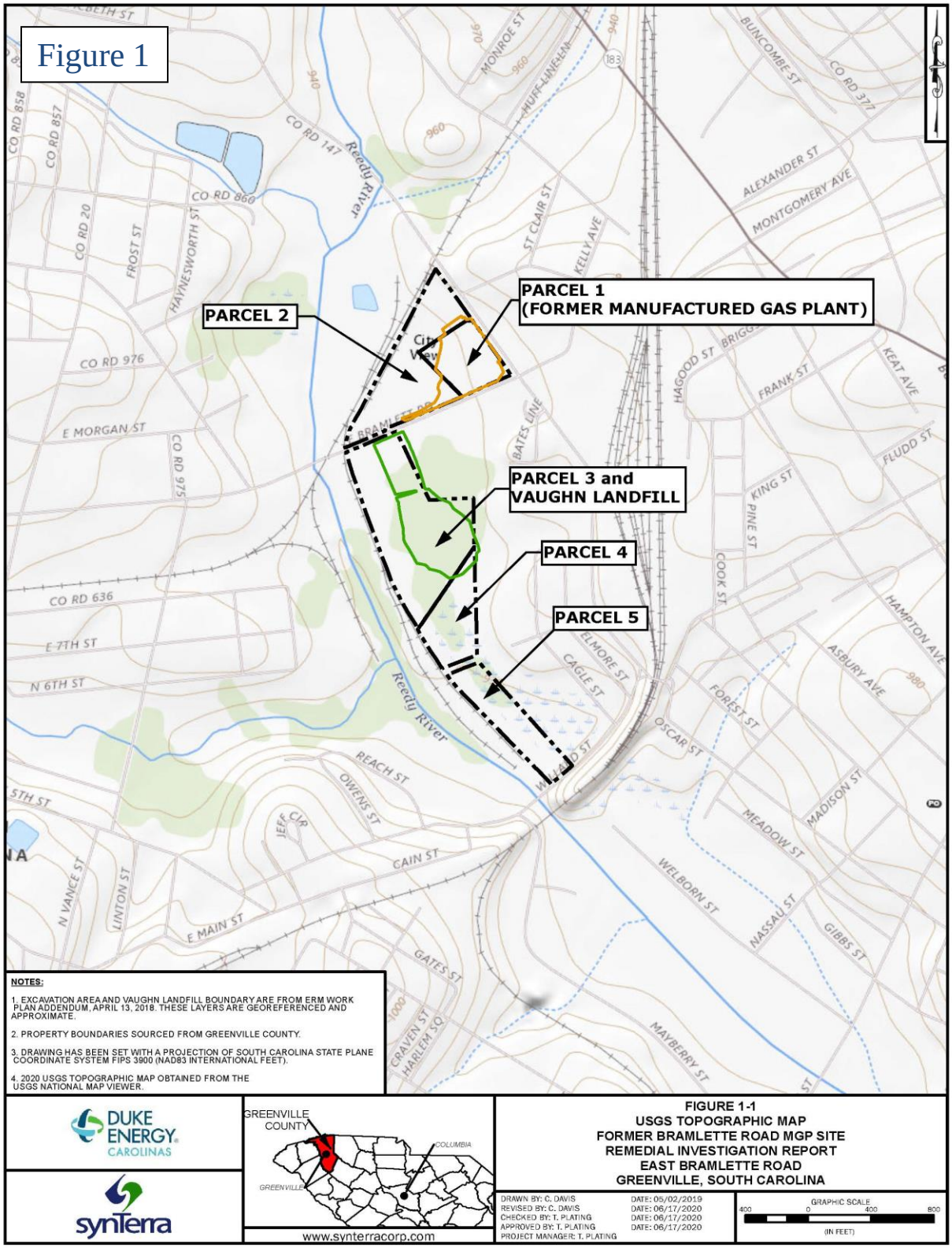
Alternative 5 protects human health and the environment by removing NAPL-impacted material and C&D material from the Site. LUCs would provide an additional layer of protection. It is best in terms of its long-term effectiveness and permanence and its reduction of toxicity, mobility, and volume. Removing the NAPL-impacted material and construction and debris material from the site is permanent and mitigates further groundwater impact.

The estimated volume of excavated material for this alternative is 183,800 cubic yards. Excavation, transportation, and disposal has been successfully implemented to remediate other MGP Sites. There are many qualified contractors capable of performing the work. Some specialized equipment for working in the wetlands, the installation of sheet piling, dewatering operations, and treatment systems would be required.

The schedule assumes that only approximately 8 months of each year would be available for alternative implementation due to seasonal weather and flooding conditions. This puts the full implementation timeframe at approximately 6 to 7 years. To complete this project, it is estimated that approximately 22,700 truck trips would be required.

The estimated capital construction costs for the implementation of the remedy is $39,500,000.

Figure 1



NOTES:

1. EXCAVATION AREA AND VAUGHN LANDFILL BOUNDARY ARE FROM ERM WORK PLAN ADDENDUM, APRIL 13, 2018. THESE LAYERS ARE GEOREFERENCED AND APPROXIMATE.
2. PROPERTY BOUNDARIES SOURCED FROM GREENVILLE COUNTY.
3. DRAWING HAS BEEN SET WITH A PROJECTION OF SOUTH CAROLINA STATE PLANE COORDINATE SYSTEM FIPS 3900 (NAD83 INTERNATIONAL FEET).
4. 2020 USGS TOPOGRAPHIC MAP OBTAINED FROM THE USGS NATIONAL MAP VIEWER.

DUKE ENERGY CAROLINAS

synTerra

www.synterracorp.com

FIGURE 1-1
USGS TOPOGRAPHIC MAP
FORMER BRAMLETTE ROAD MGP SITE
REMEDIAL INVESTIGATION REPORT
EAST BRAMLETTE ROAD
GREENVILLE, SOUTH CAROLINA

DRAWN BY: C. DAVIS	DATE: 05/02/2019
REVISED BY: C. DAVIS	DATE: 06/17/2020
CHECKED BY: T. PLATING	DATE: 06/17/2020
APPROVED BY: T. PLATING	DATE: 06/17/2020
PROJECT MANAGER: T. PLATING	

GRAPHIC SCALE
400 0 400 800
(IN FEET)

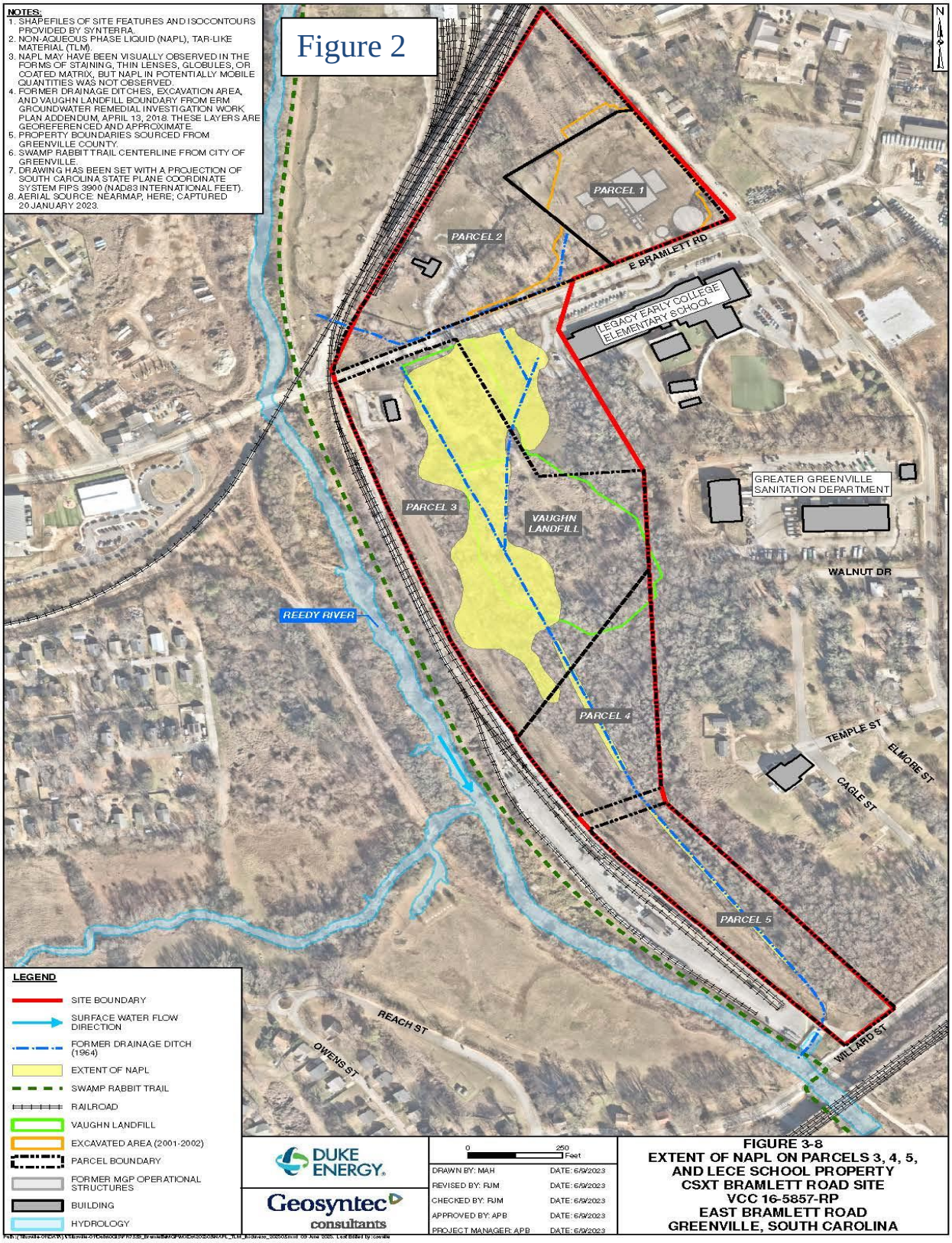
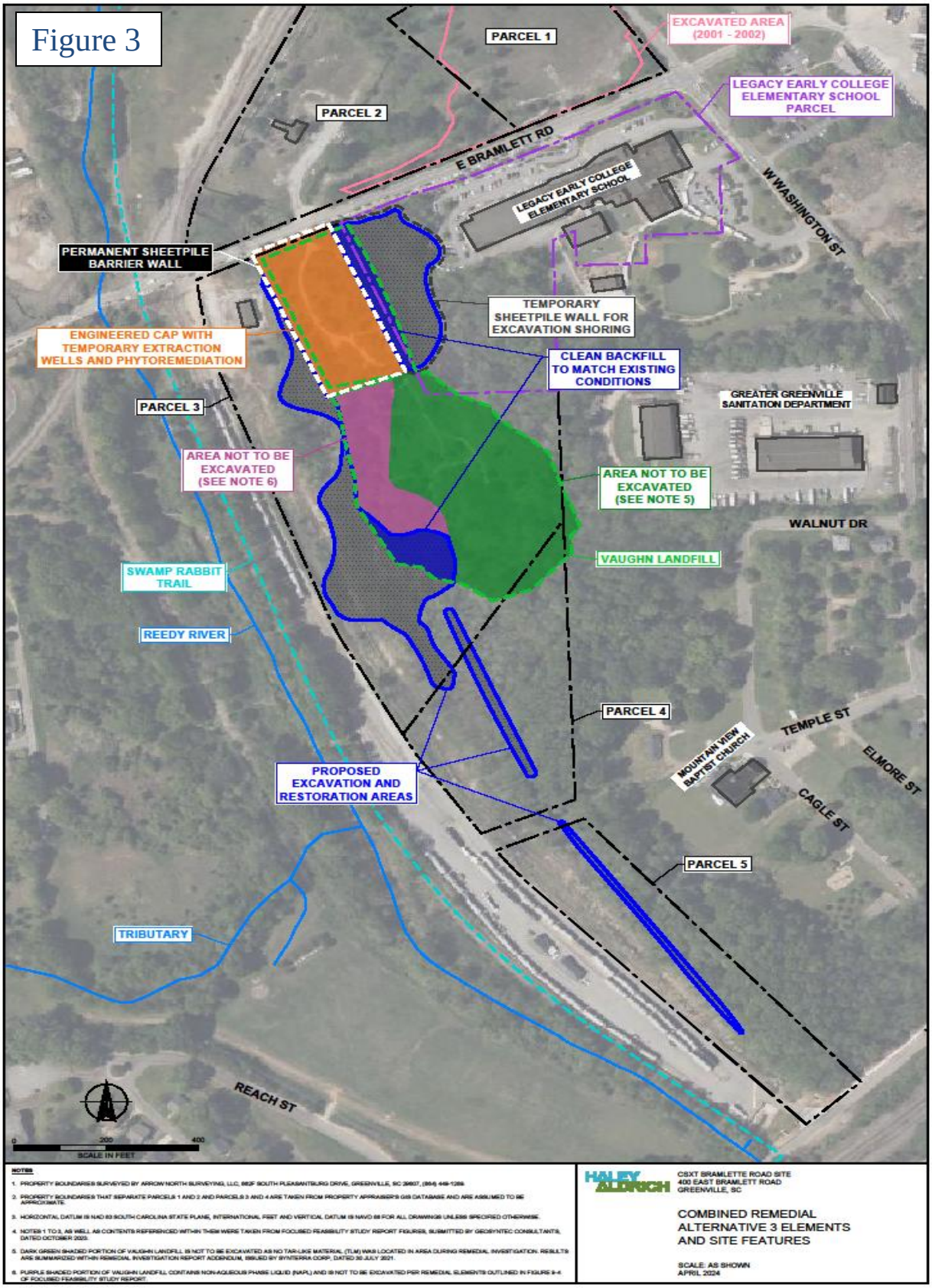


Figure 2
NOTES:
1. SHAPEFILES OF SITE FEATURES AND ISOCONTOURS PROVIDED BY SYNTERRA.
2. NON-AQUEOUS PHASE LIQUID (NAPL), TAR-LIKE MATERIAL (TLM).
3. NAPL MAY HAVE BEEN VISUALLY OBSERVED IN THE FORMS OF STAINING, THIN LENSES, GLOBULES, OR COATED MATRIX, BUT NAPL IN POTENTIALLY MOBILE QUANTITIES WAS NOT OBSERVED.
4. FORMER DRAINAGE DITCHES, EXCAVATION AREA, AND VAUGHN LANDFILL BOUNDARY FROM ERM GROUNDWATER REMEDIAL INVESTIGATION WORK PLAN ADDENDUM, APRIL 13, 2018. THESE LAYERS ARE GEOREFERENCED AND APPROXIMATE.
5. PROPERTY BOUNDARIES SOURCED FROM GREENVILLE COUNTY.
6. SWAMP RABBIT TRAIL CENTERLINE FROM CITY OF GREENVILLE.
7. DRAWING HAS BEEN SET WITH A PROJECTION OF SOUTH CAROLINA STATE PLANE COORDINATE SYSTEM FIPS 3900 (NAD83 INTERNATIONAL FEET).
8. AERIAL SOURCE: NEARMAP, HERE; CAPTURED 20 JANUARY 2023.
N
PARCEL 1
PARCEL 2
PARCEL 3
PARCEL 4
PARCEL 5
E BRAMLETT RD
LEGACY EARLY COLLEGE ELEMENTARY SCHOOL
GREATER GREENVILLE SANITATION DEPARTMENT
VAUGHN LANDFILL
WALNUT DR
REEDY RIVER
TEMPLE ST
ELMORE ST
CAGLE ST
REACH ST
OWENS ST
WILLARD ST
LEGEND
SITE BOUNDARY
SURFACE WATER FLOW DIRECTION
FORMER DRAINAGE DITCH (1964)
EXTENT OF NAPL
SWAMP RABBIT TRAIL
RAILROAD
VAUGHN LANDFILL
EXCAVATED AREA (2001-2002)
PARCEL BOUNDARY
FORMER MGP OPERATIONAL STRUCTURES
BUILDING
HYDROLOGY
DUKE ENERGY.
Geosyntec consultants
0
250
Feet
DRAWN BY: MAH DATE: 6/9/2023
REVISED BY: RJM DATE: 6/9/2023
CHECKED BY: RJM DATE: 6/9/2023
APPROVED BY: APB DATE: 6/9/2023
PROJECT MANAGER: APB DATE: 6/9/2023
FIGURE 3-8
EXTENT OF NAPL ON PARCELS 3, 4, 5, AND LECE SCHOOL PROPERTY
CSXT BRAMLETT ROAD SITE
VCC 16-5857-RP
EAST BRAMLETT ROAD
GREENVILLE, SOUTH CAROLINA

Figure 3



NOTES

1. PROPERTY BOUNDARIES SURVEYED BY ARROW NORTH SURVEYING, LLC, 882F SOUTH PLEASANTSBURG DRIVE, GREENVILLE, SC 29607, (864) 448-1289.
2. PROPERTY BOUNDARIES THAT SEPARATE PARCELS 1 AND 2 AND PARCELS 3 AND 4 ARE TAKEN FROM PROPERTY APPRAISER'S GIS DATABASE AND ARE ASSUMED TO BE APPROXIMATE.
3. HORIZONTAL DATUM IS NAD 83 SOUTH CAROLINA STATE PLANE, INTERNATIONAL FEET AND VERTICAL DATUM IS NAVD 88 FOR ALL DRAWINGS UNLESS SPECIFIED OTHERWISE.
4. NOTES 1 TO 3, AS WELL AS CONTENTS REFERENCED WITHIN THESE WERE TAKEN FROM FOCUSED FEASIBILITY STUDY REPORT FIGURES, SUBMITTED BY GEOSYNTEC CONSULTANTS, DATED OCTOBER 2023.
5. DARK GREEN SHADED PORTION OF VAUGHN LANDFILL IS NOT TO BE EXCAVATED AS NO TAR-LIKE MATERIAL (TLM) WAS LOCATED IN AREA DURING REMEDIAL INVESTIGATION. RESULTS ARE SUMMARIZED WITHIN REMEDIAL INVESTIGATION REPORT ADDENDUM, ISSUED BY SYNTERRA CORP, DATED 30 JULY 2021.
6. PURPLE SHADED PORTION OF VAUGHN LANDFILL CONTAINS NON-AQUEOUS PHASE LIQUID (NAPL) AND IS NOT TO BE EXCAVATED PER REMEDIAL ELEMENTS OUTLINED IN FIGURE 9-4 OF FOCUSED FEASIBILITY STUDY REPORT.

HALEY ALDRICH

CSXT BRAMLETTE ROAD SITE
400 EAST BRAMLETT ROAD
GREENVILLE, SC

COMBINED REMEDIAL ALTERNATIVE 3 ELEMENTS AND SITE FEATURES

SCALE: AS SHOWN
APRIL 2024

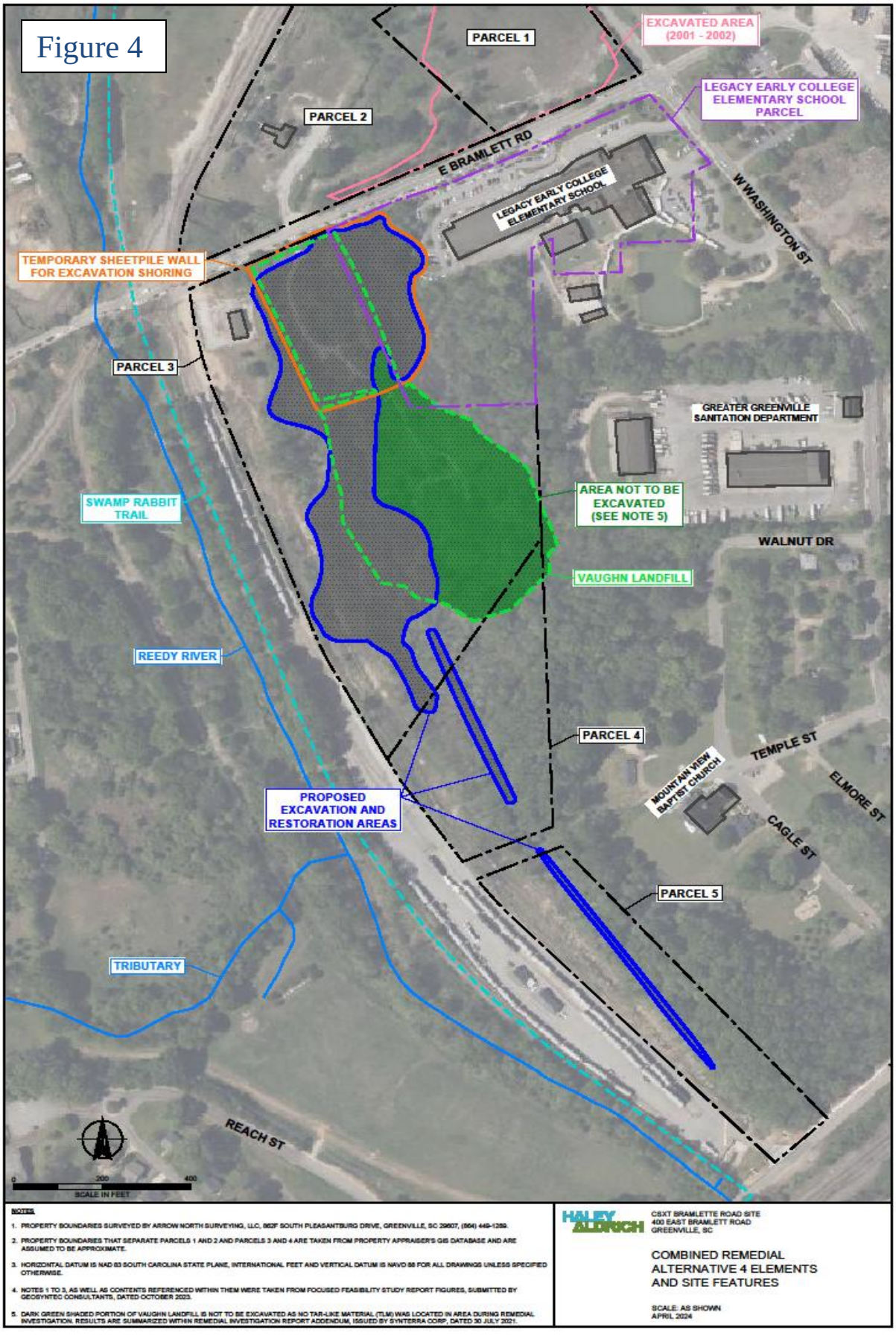


Figure 4
PARCEL 1
EXCAVATED AREA (2001 - 2002)
LEGACY EARLY COLLEGE ELEMENTARY SCHOOL PARCEL
PARCEL 2
E BRAMLETT RD
LEGACY EARLY COLLEGE ELEMENTARY SCHOOL
W WASHINGTON ST
TEMPORARY SHEETPILE WALL FOR EXCAVATION SHORING
PARCEL 3
GREATER GREENVILLE SANITATION DEPARTMENT
SWAMP RABBIT TRAIL
AREA NOT TO BE EXCAVATED (SEE NOTE 5)
WALNUT DR
VAUGHN LANDFILL
REEDY RIVER
PARCEL 4
TEMPLE ST
MOUNTAIN VIEW BAPTIST CHURCH
ELMORE ST
CAGLE ST
PROPOSED EXCAVATION AND RESTORATION AREAS
PARCEL 5
TRIBUTARY
REACH ST
0
200
400
SCALE IN FEET
NOTES:
1. PROPERTY BOUNDARIES SURVEYED BY ARROW NORTH SURVEYING, LLC, 862F SOUTH PLEASANTBURG DRIVE, GREENVILLE, SC 29607, (864) 449-1289.
2. PROPERTY BOUNDARIES THAT SEPARATE PARCELS 1 AND 2 AND PARCELS 3 AND 4 ARE TAKEN FROM PROPERTY APPRAISER'S GIS DATABASE AND ARE ASSUMED TO BE APPROXIMATE.
3. HORIZONTAL DATUM IS NAD 83 SOUTH CAROLINA STATE PLANE, INTERNATIONAL FEET AND VERTICAL DATUM IS NAVD 88 FOR ALL DRAWINGS UNLESS SPECIFIED OTHERWISE.
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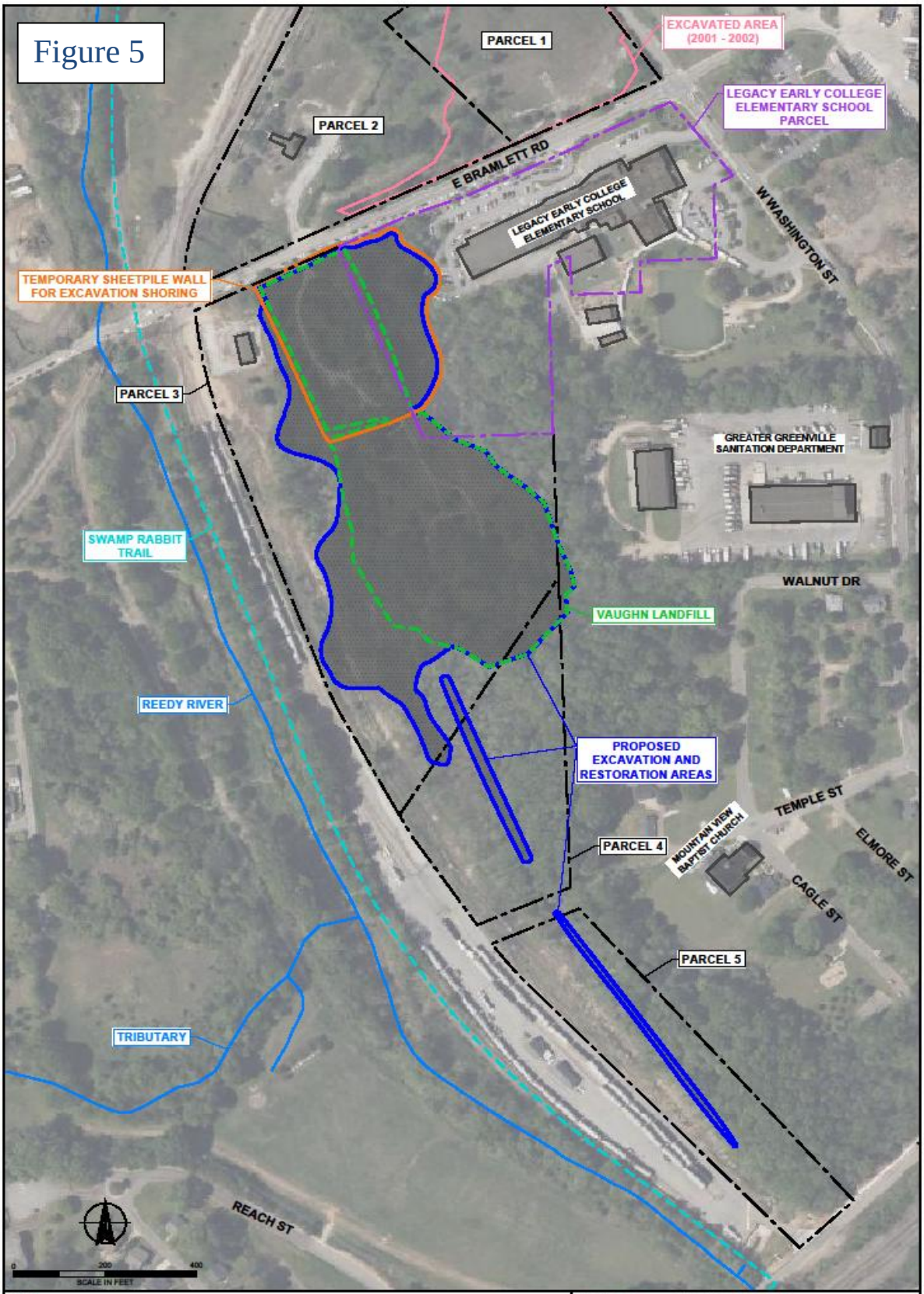
5. DARK GREEN SHADED PORTION OF VAUGHN LANDFILL IS NOT TO BE EXCAVATED AS NO TAR-LIKE MATERIAL (TLM) WAS LOCATED IN AREA DURING REMEDIAL INVESTIGATION. RESULTS ARE SUMMARIZED WITHIN REMEDIAL INVESTIGATION REPORT ADDENDUM, ISSUED BY SYNTERRA CORP, DATED 30 JULY 2021.
HALEY ALDRICH
CSXT BRAMLETTE ROAD SITE
400 EAST BRAMLETT ROAD
GREENVILLE, SC
COMBINED REMEDIAL ALTERNATIVE 4 ELEMENTS AND SITE FEATURES
SCALE: AS SHOWN
APRIL 2024

Figure 5



NOTES

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4. NOTES 1 TO 3, AS WELL AS CONTENTS REFERENCED WITHIN THEM WERE TAKEN FROM FOCUSED FEASIBILITY STUDY REPORT FIGURES, SUBMITTED BY GEOSYNTEC CONSULTANTS, DATED OCTOBER 2023.

HALEY ALDRICH

CSXT BRAMLETTE ROAD SITE
400 EAST BRAMLETT ROAD
GREENVILLE, SC

COMBINED REMEDIAL ALTERNATIVE 5 ELEMENTS AND SITE FEATURES

SCALE: AS SHOWN
APRIL 2024

Figure 6 Evaluation Criteria Scoring

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	No Action	MNA and LUCs	Selective Excavation/Capping, MNA, and LUCs	Excavation and Partial Vaughn Landfill Removal, MNA, and LUCs	Excavation and Complete Removal of Vaughn Landfill, MNA, and LUCs
Overall Protection of Human Health and the Environment	1	2	4	6	6
Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	1	1	5	6	6
Long-Term Effectiveness and Permanence	1	2	3	5	5
Reduction of Toxicity, Mobility, and Volume through Treatment	1	1	3	5	5
Short-Term Effectiveness	1	3	4	4	4
Implementability	6	6	4	4	4
Total Score	**11**	**15**	**23**	**30**	**30**

Scoring Scale (1 to 6)

1 – Would not meet criterion
2 – Low criterion performance
3 – Fair criterion performance
4 – Good criterion performance
5 – Very Good criterion performance
6 – Excellent criterion performance