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SCDES

RECORD OF DECISION

CSXT BRAMLETT ROAD SITE
Operable Units – 1 and 2

Greenville County, South Carolina
VCC 16-5857-RP

Prepared by

South Carolina Department of Environmental Services

Bureau of Land and Waste Management

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1.0 Site Name and Location

The CSXT Bramlett Road Site (Site) is located in Greenville, South Carolina (Greenville County) in a predominantly commercial and industrial area. 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.

2.0 Statement of Basis and Purpose

This Decision Document presents the Selected Remedy for Operable Units 1 and 2 at the CSXT Bramlett Road Site. This remedy was selected by the South Carolina Department of Environmental Services (SCDES) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and to the extent practicable the National Contingency Plan (NCP). The decision is based on the Administrative Record for the Site.

3.0 Assessment of the Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health and welfare or the environment from actual or threatened releases of hazardous substances into the environment.

4.0 Description of the Selected Remedy

SCDES has selected Excavation and Removal of the Vaughn Landfill, Monitoring, and Land Use Controls (LUCs) as the remedy for Operable Units 1 and 2.

This remedy includes the excavation of the entire Vaughn Landfill; excavation of the impacted sediments on Parcels 3, 4, 5, and the LECE School property; monitoring of groundwater; and implementation of LUCs for long-term effectiveness. Additionally, a small area of impacted soil on Parcels 1 and 2 will be removed.

On Parcel 3, the remedy will include the excavation of the non-aqueous phase liquid (NAPL) and the entire Vaughn Construction and Demolition (C&D) Landfill (Vaughn Landfill). The areal extent of excavation includes the impacted wetlands areas, the areas underlain by NAPL, and the Vaughn Landfill. The excavations will be backfilled with clean soil and sediment and wetland vegetation will be restored. During restoration, the Vaughn Landfill footprint will be backfilled to match the existing contours of the surrounding wetlands. Best Management Practices (e.g. silt fences, sediment tubes, rock

ditch check dams, and turbidity curtains) will be utilized 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 depth of sediment excavation will be based on the Remedial Investigation and by visual observation. Best Management Practices (e.g., silt fences, sediment tubes, rock ditch check dams, and turbidity curtains) will be placed to prevent sediment from migrating off-Site during construction.

On the LECE School Property, the excavation will remove sediments within the wetlands and uplands that are visibly stained with NAPL. This will include a portion of the turnaround and parking area to a depth of up to 16 feet. To excavate to this depth, it is expected that a 1000-foot long temporary, sheet pile wall will 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. Excavation will require the implementation of an Air, Noise, and Fugitive Emissions Monitoring and Mitigation Plan. Additionally, the use of a temporary sprung structure, if needed, will be used over the excavation area to further reduce potential impacts during the excavation. Dewatering and surface water management will likely be required during the excavation. The excavation will be backfilled with clean soil to match the existing elevations and restored to its preconstruction condition.

With the footprint of the Vaughn Landfill being returned to wetlands, the monitoring well network will need to be focused on the Site periphery. Following the removal of NAPL-impacted soil and sediments, shallow and transition zone groundwater quality will be evaluated as part of Operable Unit 3. LUCs will be required to prevent or limit the use of groundwater until the groundwater reaches remedial goals and to maintain current property zoning.

The remedy protects human health and the environment by removing NAPL-impacted material and C&D material from the Site. LUCs will provide an additional layer of protection. Alternative 5 is the best alternative in terms of its long-term effectiveness and permanence. Alternative 5 reduces the toxicity, mobility, and volume of contaminants through the excavation of tar-like material and the treatment of water that infiltrates the excavation. 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 manufactured gas plant (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 will be required.

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

The estimated construction costs plus 30 years of operation and maintenance costs for the implementation of the remedy is $39,500,000.

5.0 Statutory Determinations

The selected remedy attains the mandates of CERCLA Section 121, and to the extent practicable, the NCP.

This remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions.

To the extent practicable, the selected remedy also satisfies the statutory preference for treatment as a principal element of the remedy by permanently and significantly reducing the toxicity, mobility, and volume of hazardous substances, pollutants, or contaminants through the excavation and offsite disposal of tar-like material and the treatment of groundwater that infiltrates the excavations.

Land use controls will prohibit the use of groundwater for drinking or irrigation. A Statement of Maintenance detailing that the covenants and restrictions are being upheld will be required annually.

6.0 Authorizing Signature

This ROD documents SCDES's selected remedy for Operable Units 1 and 2 at the CSXT Bramlett Road Site.

Juli E. Blalock, Chief
Bureau of Land and Waste Management
South Carolina Department of Environmental Services

5/1/2025
Date

PART II - THE DECISION SUMMARY

1.0 Site Name, Location, and Description

The CSXT Bramlett Road Site (Site) is located in Greenville, South Carolina (Greenville County) in a predominantly commercial and industrial area. 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.

The topography of the area generally slopes south-southwest toward the Reedy River. Parcel 1, which includes the former Bramlett Manufactured Gas Plant (MGP) east of the Reedy River, ranges in elevation from 932 to 944 feet above mean sea level (ft amsl) and slopes to the southwest. Parcel 2 elevations vary and slope generally to the west, but the surface drainage is also controlled by drainage ditches that flow from the north to the south under East Bramlett Road. These ditches continue through Parcel 3 and eventually to Parcels 4 and 5, until ultimately joining the Reedy River near Willard Street to the south. The topography of Parcel 3 is altered by the Vaughn Landfill. Historically, however, this parcel ranged in elevation from 925 to 930 ft amsl and included low-lying wetlands, with the general slope being toward the south-southeast. Parcels 4 and 5 are dominated by low-lying wetlands and waters associated with the United States Army Corps of Engineers (USACE) jurisdictional wetlands and waters of the United States. Water from these parcels flow to the southeast, where it enters a lined drainage channel and then drains to the Reedy River.

2.0 Site History and Enforcement Activities

2.1 Site History

Southern Public Utilities built the 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).

Beginning in 1988, Vaughn Construction created an unpermitted construction and demolition (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, the South Carolina Department of Health and Environmental Control (DHEC) advised Mr. Vaughn that landfilling activities were improper. In 1994, the USACE notified 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.

2.2 Previous Investigations

Duke implemented an interim removal action in 2001, focusing on the 3.8 acres where the MGP plant operated (Parcel 1). 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 into a Voluntary Cleanup Contract with DHEC in 2016 to determine the extent of coal tar impact remaining and evaluate remedial alternatives. The 2020 Remedial Investigation Report (RIR) and the 2021 Remedial Investigation Report Addendum (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 like coal tar and chlorinated solvents that do not mix with water. The extent of MGP-related residual contamination in sediment, soil, and groundwater 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; concentrations in ditches upgradient of the site were consistent with background concentrations attributable to urban runoff; and PAHs detected in the Reedy River and off-site sediment samples can be attributed to urban runoff unrelated to the former MGP.

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

2.3 Recent Activities

In 2021, Best Management Practices (BMP) were implemented to reduce the potential migration of coal tar residuals, biofilm, and sediment. A turbidity curtain was installed along the bank of the Parcel 3 incised ditch. Two rock check dams were installed within the primary ditch on Parcel 5. This work involved the removal of approximately 62 tons of impacted sediment material which was properly disposed of at an offsite facility.

Additionally, concrete cloth was used to replace rip rap in the ditch south of the Transflo property and north of Willard Street. Approximately 257 tons of existing rip rap within the ditch and an approximate 1-foot lift of sediment from the base were removed and properly disposed of. The existing culvert pipe was extended approximately 8 feet with an additional 30-inch diameter reinforced concrete pipe to prepare the slope face. Concrete cloth was installed across an approximately 35' by 85' area.

3.0 Community Participation

Public participation activities prior to the issuance of this ROD included community meetings (RI/FS kickoff, several RI Updates, and Proposed Plan), maintenance of a website including site-specific information, and the publication of notices in the local newspaper. All reports and documents that formed the basis for the selection of the response action are contained in the Administrative Record. The Administrative Record is available at the SCDES's Bureau of Land and Waste Management office in Columbia, South Carolina and the SCDES website. The notice of the availability of these documents was published in the Greenville News on May 26, 2024, and June 2, 2024.

On June 6, 2024, a Proposed Plan public meeting was held at the Mountain View Baptist Church. Representatives of SCDES presented the results of recent investigation work, explained the remedial alternatives evaluated in the Focused Feasibility Study (FFS), and presented SCDES's preferred alternative (the Proposed Plan). This meeting initiated the official public comment period, which concluded on August 6, 2024. Many formal comments were submitted during the comment period and many questions were asked during the public meeting. A transcript of the public meeting along with written comments and responses are included in the Responsiveness Summary of this ROD.

4.0 Scope and Role of Response Action

This action will be the final cleanup action for Operable Units 1 and 2 for the Site. The remedial action objectives will prevent exposure to contaminated media through the removal of tar-like material at the Site.

5.0 Site Characteristics

5.1 Overview of Site Characteristics

Impacted groundwater is not discharging into the Reedy River. As part of Remedial Investigation (RI) activities, five monitoring well nests (each nest consisting of monitoring wells constructed in the shallow and deeper transition zone) were installed along the Swamp Rabbit Trail, immediately upgradient of the Reedy River. Groundwater samples collected from these monitoring wells do not contain MGP-related compounds at concentrations exceeding groundwater maximum contaminant levels (MCLs). Groundwater quality monitoring is ongoing.

Impacted groundwater is present beneath Parcels 1, 2, and 3. However, the extent of impacted groundwater on Parcel 1 is limited both laterally and vertically in extent. Groundwater impacts beneath Parcels 2 and 3 are greater in magnitude and in lateral and vertical extent with respect to Parcel 1. Groundwater impacts on Parcel 3 extend into fractured bedrock underlying the site. Municipal water is provided to businesses and residences in the area and groundwater is not being used as a source of drinking water.

Impacted sediment is not being discharged into the Reedy River. As part of RI activities, sediment samples were collected from the Reedy River beginning at the outfall at Willard Street to approximately 4,700 feet downstream. Relatively low concentrations of polycyclic aromatic hydrocarbons (PAHs) were detected in the samples (generally 1 ppm or less). A forensics evaluation of the samples indicate that the PAHs are not related to historic MGP operations but are consistent with background concentrations (due to industrial use and urbanization). PAHs not associated with historic MGP operations were also detected along the ditch system which flow parallel to Willard Street from West Washington Street.

Impacted sediment is present in the wetlands west of Legacy Charter Elementary School, at the Vaughn Landfill, and in the historic ditch system. As part of RI activities, sediment samples were collected in the wetlands west of Legacy Charter Elementary School, on Parcel 3 (on and adjacent to the Vaughn Landfill), and in the ditch system located between the Vaughn Landfill and Willard Street. Impacted sediment exceeding regulatory screening criteria were detected within the wetlands west of Legacy Charter Elementary school, at and immediately adjacent to the Vaughn Landfill, and extending the length of Ditch 4.

Surface water quality in the Reedy River is not being impacted. Surface water samples collected from the Reedy River do not contain MGP related compounds at concentrations greater than analytical laboratory reporting limits and/or surface water quality standards. Other sources of impacts were detected in surface water samples collected 3,400 feet downstream of the Bramlett Site. Surface water quality monitoring is ongoing.

5.2 Geology/Hydrogeology

The Site's regional geology is located within the Piedmont Physiographic Province, which is bound to the west by the Blue Ridge Mountains and to the east by the Sandhills and Coastal Plain. The Site is north of the Reedy River fault zone and within the Sixmile thrust sheet. Bedrock geology in this region consists of granite gneiss and sillimanite-mica schist.

In general, the geology of the Piedmont is composed of a regolith-fractured rock system that includes regolith, a transition zone, and bedrock. The transition zone is described as a zone of weathered rock fragments, residual boulders, and lesser amounts of saprolite. This zone can serve as a preferential zone of groundwater flow because it is more permeable than the overburden or underlying bedrock.

The Site geology is within the Reedy River floodplain. Shallow soils include fill overlying alluvial soils consisting of lean clay and sands. Where fill is present, it varies in depth but extends to as deep as 8 ft bls on Parcel 1 where the former MGP was situated and where previous remedial excavation activities took place and on Parcel 2 to support various buildings and structures. On Parcel 3, the fill thickness varies based on the amounts of C&D debris that were landfilled and extends to depths of 10 feet in the south-central portion of the parcel. Fill material is generally absent on Parcel 4 and Parcel 5. Below the fill is alluvium, which is approximately 11 feet thick on average. The alluvium is underlain by saprolite, which ranges in thickness from approximately 1 to 21 feet. The transition zone, which consists of weathered bedrock present from 25 to 30 ft bls, is underlain by bedrock. The top of the bedrock ranges in depth from 30 to 50 ft bls. Bedrock under the Site consists of interbedded granite and sillimanite-mica schist. The varying depths to the

upper bedrock contact appear to represent areas where MGP residuals have accumulated and resulted in transport of contaminant mass vertically through and into bedrock fractures, which have resulted in deep groundwater bedrock impacts.

The regional hydrogeology can be defined by an unconfined, interconnected aquifer system, which is characteristic of the Piedmont, and consists of a regolith-fractured rock network. Groundwater is recharged by drainage and rainfall infiltration in the upland areas, which discharges to the perennial stream system. Groundwater flow in the regolith is typical and consistent with porous media, while flow in the bedrock is primarily within the secondary porosity features (e.g., fractures).

Site hydrogeology is generally controlled by the Reedy River, other drainages (on Parcels 4 and 5), and variations in the top of bedrock elevation. Groundwater flow direction is generally southwest toward the Reedy River from Parcel 1. Groundwater is encountered within the alluvial and unconsolidated deposits from less than 1 ft bls up to approximately 12-14 ft bls. Groundwater occurs closer to the surface in the low-lying drainage that transects Parcel 1 and in and around the wetland environments (i.e., Parcel 3, Parcel 4, and Parcel 5). Groundwater occurs deeper where fill has been placed at the Vaughn Landfill and along the banks of the Reedy River. Seasonal groundwater level fluctuation causes the shallow-zone groundwater table to intercept the land surface within the wetland areas during wet months of the year.

Groundwater flow velocity through the shallow and transition zones is derived from the horizontal hydraulic conductivity, the hydraulic gradient, and the effective porosities for each zone. Groundwater hydraulic conductivity for the shallow zone is calculated as 5.4 feet per day (ft/day) and 1.53 ft/day for the transition zone. Horizontal hydraulic gradients for the shallow groundwater zone and transition zone were calculated to be 0.03 ft/ft and 0.01 ft/ft, respectively. The mean groundwater seepage velocity for the shallow groundwater zone has been calculated to be 0.44 ft/day, and 0.07 ft/day for the transition zone.

Vertical groundwater gradients between flow zones are generally neutral. Long-term pressure transducer monitoring shows that groundwater levels in all flow zones correlate to precipitation events, which indicates a groundwater recharge response. The wells along the Swamp Rabbit Trail appear to correlate with Reedy River staff gauge level changes, indicating connectivity between the shallow flow system and the Reedy River.

Bedrock fractures decrease in frequency and hydraulic aperture with depth. Fractures are predominantly shallow, dipping toward the northeast. The upper 10 feet of the bedrock system is the most transmissive; the largest hydraulic fracture apertures are observed within the upper 10 feet of bedrock, according to Site-specific borehole geophysical data.

The bedrock-zone groundwater underlies the transition-zone groundwater and is connected to the overlying aquifer through fractures that intercept the base of the alluvial deposits and/or transition-zone unit. Overall, the hydraulic conductivity of the bedrock decreases with depth. The hydraulic conductivity of the bedrock ranges from 0.01 ft/day at depths of 20 to 60 feet below the top of bedrock to hydraulic conductivities on the order of 1000 ft/day at a depth of approximately 10 feet below the top of bedrock. Flow volumes and patterns are dictated by the degree to which the fractures are connected to each other and the hydraulic aperture widths. The hydraulic aperture width varies with depth but is generally larger in the shallow bedrock. Apertures were measured at approximately 0.024 inches in the upper 10 foot of bedrock as compared to 0.002 inches at a depth of 60 feet below the top of bedrock. However, it should be noted that smaller hydraulic apertures ranging from approximately 0.002 to 0.004 inches were identified in some of the monitoring wells at depths less than 20 feet below the top of bedrock. These collective observations suggest that there are some locations where the NAPL transport through

shallow bedrock will be limited. The flow of groundwater and, more importantly, the transport of the contaminants of concern are controlled not only by groundwater forces but also by subsurface geology. Specifically, rises in the fractured bedrock surface elevation appear to limit transport of contaminants of concern west and south beyond Parcel 3.

There are multiple locations where the groundwater and surface water interface at ground level. Stormwater runoff from upgradient locations flows as surface water flows through a series of natural and manmade ditches, culverts, and wetland areas from upgradient locations. Two natural ditches leading from Parcels 1 and 2 transport surface waters generally to the west, where they then turn south under East Bramlett Road and on to Parcel 3. Surface water through Parcel 3 runs through wetlands and natural drainages that have been modified over the years because of the installation of the Vaughn Landfill. On Parcel 3, the surface water and groundwater interface frequently because of seasonal water level fluctuations. The course of surface water from Parcel 3 to parcels 4 and 5 is generally confined to one natural drainage channel that flows to the southeast before turning to the southwest and discharging into the Reedy River via a concrete cloth-lined ditch.

The Site's watershed is characterized by ephemeral or intermittent streams and wetlands that discharge rainfall from the surrounding areas to the Reedy River. Two ephemeral tributaries traverse Parcels 1 and 2 and run under East Bramlett Road to Parcel 3, where surface water flows through wetland areas. The two ephemeral streams eventually join in the middle of Parcel 3 and lead generally to the southeast as a single drainage flow through Parcels 4 and 5, ultimately discharging into the Reedy River.

5.3 Nature and Extent of Contamination

The RIR and the RIR-A evaluated the nature and distribution of MGP-related impacts detected in soil, sediment, groundwater, and surface water. The FFS 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. Operable unit three (OU-3) is defined as shallow zone groundwater, transition zone groundwater, and the deeper, fractured bedrock groundwater. This decision will only address impacts to OU-1 and OU-2.

5.3.1 OU-1: Soil and Sediments

OU-1 includes soil and sediment on Parcels 1 through 5 and a portion of the LECE School Property. A summary of the soil and sediment impacts on the various parcels is provided below. NAPL has been observed in shallow soil at various places throughout the Site, including within historical drainages, on the LECE School Property, and below portions of the Vaughn Landfill debris material.

In 2001-2002, Duke removed soils and debris impacted by MGP residuals on Parcels 1 and 2. The United States Environmental Protection Agency (USEPA) industrial and residential regional screening levels (RSLs) are used for screening soil. During the RI, NAPL was observed on Parcels 1 and 2, and PAHs were present at concentrations above residential screening criteria.

Parcels 1 and 2 are zoned as Industrial District (I-1). To evaluate the potential risk of industrial/commercial use of Parcels 1 and 2, Duke estimated the human health risk for a construction worker exposed to surface soil. Based on the construction worker exposure

scenario for Parcels 1 and 2, the total non-cancer hazard index is less than 1.0 and the cancer risk is $2.88x10^{-8}$, which is less than the cancer risk threshold of $1x10^{-6}$. Parcels 1 and 2 in their current condition, without remedial activities, meet the criteria for industrial/commercial use with LUCs to restrict groundwater use.

Furthermore, based on the residential risk estimation scenario, removal and replacement of surficial soil within a 40 by 40 foot area around SA-SB-46 and RI-SB-15 will result in a total non-cancer hazard index which is less than 1.0 and a cancer risk of $1.03x10^{-7}$, which is less than the cancer risk threshold of $1x10^{-6}$ for Parcels 1 and 2. This removal will be conducted as part of this ROD and Parcels 1 and 2 will meet residential use standards with LUCs to restrict groundwater use.

Sediments and soils present on Parcel 3 and the LECE School property contain MGP residuals which include sorbed COCs and NAPL. VOCs and SVOCs are present in sediment samples at concentrations above the USEPA Region 4 sediment Regional Screening Value (RSV) where NAPL is observed. NAPL was identified in sediments in these areas at thicknesses exceeding 4.5 feet.

The nature and extent of MGP-related impacts within and adjacent to the former drainage ditch system was investigated during the RIR and RIR-A. The RIR-A provided accumulated data to indicate that the former traces of the ditch system contain MGP-related residuals. The results of the RIR-A indicate that the former ditch system is located directly underneath portions of the Vaughn Landfill on Parcel 3 and ran through the wetland area of the LECE School property. As of 2001, it was reported that no MGP-related sheens or other signs of visible impacts had been noted or otherwise observed within the ditch system between the Vaughn Landfill and the railroad embankment to the west of Parcel 3. However, the RIR and RIR-A assessment work determined that sediments underneath and adjacent to the western edge of the Vaughn Landfill material do contain MGP-related residuals such as NAPL, clinker, and slag. These findings differ from observations made prior to the early 2000's.

The extent of the impacts on Parcels 4 and 5 are defined by the drainage ditch that enters Parcel 4 from Parcel 3 and exits Parcel 5 via the outfall to the Reedy River. Impacts from MGP residuals to the sediment within Parcels 4 and 5 are limited to CoCs exceeding the USEPA Region 4 sediment RSVs and to NAPL, which was identified only in the drainage ditch system at thicknesses up to 4.5 feet. The presence of the NAPL on Parcels 4 and 5 was not characterized in 2001 and represents a significant change to the conceptual site model with respect to the nature and extent of the MGP-related residuals since that time. This area was not part of characterization activities prior to the RI.

5.3.2 OU-2: Surface Water

Historically, surface water has not contained COCs at concentrations above their respective screening levels, with the exception of two samples at location SW-5. During the RI, benzo(a)pyrene was the only constituent detected above the drinking water MCLs

established by SC State Regulation R.61-68, Water Classifications & Standards, effective June 27, 2014. The most recent surface water sampling results (last three semiannual events) indicate no current COC exceedances.

5.3.3 OU-3: Shallow, Transition, and Bedrock Groundwater

COCs in the shallow and transition zone groundwater include benzene, naphthalene, benzo(a)pyrene, and toluene, which are detected in these groundwater zones at concentrations above the drinking water MCLs.

NAPL is considered as a COC because NAPL (from the coal gas and carburetor water gas processes) contains VOCs and SVOCs that may partition into groundwater as aqueous phase compounds. These aqueous phase constituents include benzene and naphthalene (among other VOCs and SVOCs), which have been measured at concentrations exceeding regulatory standards. NAPL has been visually observed in monitoring wells; and measurable amounts have accumulated in two monitoring wells; dense nonaqueous-phase liquid (DNAPL) has been observed in shallow zone well MW-03 and transition zone well MW-20. DNAPL has a propensity to sink below the water table because it is heavier than water. The DNAPL will migrate vertically through the unsaturated zone until it encounters the water table. Once the DNAPL has accumulated enough mass for gravitational pressure to overcome the entry pressure of the underlying capillary fringe, migration vertically through the water column will continue until an impermeable or less permeable matrix is encountered. This is evident with the NAPL present within the coarse sand atop the saprolite on Parcels 2 and 3 and the distribution of dissolved COCs within groundwater. Visual observations of NAPL have been identified within the clay deposits near historical ditch traces and within the sandy deposits that directly overlie the saprolite on Parcels 1, 2, and 3. Coarse sand deposits provide a relatively porous overburden matrix for the accumulation of residual NAPL while the less permeable saprolite matrix inhibits additional downward migration. These MGP residual impacts have resulted in the elevated benzene and naphthalene concentrations in groundwater at wells MW-01, MW-02TZ, MW-20, MW-29TZ, and MW-36S.

The RIR and RIR-A provide data and evidence that NAPL is present in soils, saprolite, and bedrock media underlying all or a portion of the Vaughn Landfill. Monitoring wells MW-30, MW-3, and MW-49BR, all located within the footprint of the Vaughn Landfill on Parcel 3, have contained NAPL in measurable thicknesses. Multiple rounds of groundwater sampling since 2019 have provided data to delineate the extent of impacted shallow zone groundwater to Parcels 1 and 3 and a small portion of the LECE School property.

The COC's within the bedrock groundwater are consistent with those observed in the shallow and transition zone groundwater. Bedrock groundwater included benzene and naphthalene at concentrations that exceed MCLs. NAPL is also considered a COC as it has been observed in monitoring wells screened in the bedrock groundwater zone. Remedial evaluation for bedrock zone groundwater is not included in the FFS Report. Additional semiannual groundwater monitoring to gather long-term concentration trends

will be conducted for a detailed analysis of bedrock zone remedial technologies. A separate FFS for OU-3 will be developed in the future to address bedrock groundwater.

6.0 Current and Potential Future Site and Resource Uses

The Site is in Greenville, Greenville County, South Carolina and is comprised of five parcels and a portion of the LECE School property that total approximately 35 acres in area. Most of the Site is zoned for industrial use, except for LECE School property and two parcels that are jurisdictional wetlands. Parcel 1 is currently zoned Industrial I-1 and is a vacant lot which is the location of the former MGP operations. Parcel 2 is currently zoned Industrial I-1 and is used for active railroad operations, the location of a former asphalt manufacturing plant, and a debris pile. Parcel 3 is currently zoned Industrial I-1. It is used for active railroad operations including a CSXT field office, contains the Vaughn Landfill, and numerous sewer lines and access manways. Parcel 4 is currently zoned Residential R-6, is a jurisdictional wetland, and is not suitable for development. Parcel 5 is currently zoned as a Service District/Light Industrial S-1, is also a jurisdictional wetland, and not suitable for development. The LECE School property is currently zoned Residential R-6 and operates as an elementary school with a portion that is a wetland area approximately 100 to 150 feet west of the school buildings.

Parcels 1 – 5 are currently owned by CSXT. Excavation activities in the early 2000s on Parcels 1 and 2 reduced human health risk to acceptable levels for their current land use (industrial and/or commercial). There is interest within the community to obtain Parcels 1 and 2 and utilize them for development beneficial to the community. Human health risks for Parcels 1 and 2 could be reduced to acceptable levels for residential use with a limited excavation of contaminated material. This action is being included within this Record of Decision. Land use on Parcels 3, 4, and 5 and the LECE School property will likely not change expected use following this remedy.

Until a final groundwater remedy is implemented, risks from exposure to groundwater contamination Groundwater will be mitigated by a Declaration of Covenants and Restrictions (DCR) which will prohibit the use of groundwater for drinking or irrigation purposes without the approval of SCDES. Following implementation of the selected remedial alternative, the potential for human receptors to be in contact with COCs is unlikely based on the depth at which groundwater is present.

Historically, surface water has not contained COCs at concentrations above their respective screening levels, except for two samples at one sample location. At this sample location (SW-5), benzo(a)pyrene was the only constituent detected above established drinking water MCLs in surface water during RI sampling. The most recent surface water sampling results (last three semiannual events) indicate no current COC exceedances.

7.0 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. Dermal contact was identified as a potential exposure route for cancer risks in a construction worker exposure scenario. Inhalation of vapors from contaminated groundwater have a potential for cancer and non-cancer risks. Additionally, cumulative risks, associated with incidental ingestion, dermal contact, and inhalation of vapors from groundwater exposure, have cancer and non-cancer risks in a construction worker exposure scenario. 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, the primary risks are located on 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 will need to be addressed with some form of treatment, cover, or removal that will limit exposure.

8.0 Remedial Action Objectives

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 remedial alternatives that can be developed. For the Site, RAOs were developed for the two operable units being addressed in this ROD. OU-1 addresses soil and sediment at the Site. OU-2 addresses surface water.

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 conceptional site model for Parcels 3, 4, 5, and the 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: Prevent dermal exposure and inhalation of vapors. 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. Additionally, this ROD includes a small removal on Parcels 1 and 2 and they will meet residential use standards with LUCs to restrict groundwater use.

RAO 2: Sediment

Parcels 3, 4, 5 and the 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 surface water containing COCs at concentrations exceeding applicable MCLs or site-specific remediation standards.

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

9.0 Remedial Alternatives

Based on information collected during the previous investigations, a FFS was conducted to identify, develop, and evaluate cleanup options and remedial alternatives. The FFS process used the information on the nature and extent of contamination and associated potential human health risks developed during the remedial investigation and associated studies to develop and evaluate potential remedial alternatives and their overall protection of human health and the environment. Each remedial alternative evaluated by SCDES is listed below.

- Alternative 1: No Action
- Alternative 2: Monitored Natural Attenuation (MNA) and Land Use Controls (LUCs)
- Alternative 3: Selective Excavation
- Alternative 4: Excavation and Partial Vaughn landfill Removal, Monitoring, and LUCs
- Alternative 5: Excavation and Complete Vaughn landfill Removal, Monitoring, and LUCs

A Final Remedial Design will be developed prior to implementation.

9.1 Description of Remedial Alternatives

9.1.1 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 will 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 will be left uncontrolled. Alternative 1 will not be protective of human health or the environment and will likely not reach RAOs in less than 30 years. The estimated present worth cost for this alternative is $22,000.

9.1.2 Alternative 2: MNA and 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 will be implemented to protect human health and the environment by restricting development and groundwater use. MNA will likely not reach RAOs in less than 30 years and have an estimated present worth cost of $1,350,000.

9.1.3 Active Remedies

Alternatives 3 through 5 are the active remedies for the Site. This means that these alternatives will utilize a treatment process or 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 would all utilize monitoring 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 wetlands sediments that have visible NAPL. This 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 will be installed to an estimated depth of 25 feet. The estimated volume of excavated sediment is 26,300 cubic yards. Measures would be taken to limit dust, odor, and noise during excavation activities.

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

Monitoring would be utilized to evaluate groundwater quality until it is evaluated as part of Operable Unit-3. LUCs will be required to prevent or limit the use of groundwater; protect and maintain the barrier, cap, and hydraulic control (Alternative 3 only); and to ensure the property is safe for its intended use.

9.1.4 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 will 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 will remain in place, from migrating from beneath the Vaughn Landfill, an approximately 1,425-foot-long permanent barrier wall will be installed in the northwestern portion of the Vaughn Landfill. The barrier wall will 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 will be installed inside of the barrier wall. A groundwater extraction system will 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 will consist of approximately 100 TreeWell phytoremediation installations and two groundwater extraction wells which will be utilized until the trees are established.

Alternative 3 will take about 2-3 years to install but will take greater than 30 years to reach remedial goals. The biggest advantage to this alternative is that it will 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 has an estimated present worth cost of $18,600,000.

9.1.5 Alternative 4: Excavation and Partial Vaughn landfill Removal, monitoring, and LUCs

Alternative 4 (Figure 4) will 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; monitoring of groundwater; and implementation of LUCs for long-term effectiveness.

Alternative 4 will include the excavation of NAPL impacted areas on Parcel 3. This alternative is likely to leave some previously undetected NAPL-impacted material in place within or beneath the approximately 30,000 cubic yards of the Vaughn Landfill that would remain 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 be expected to take 5-6 years to complete. The estimated present worth cost of this alternative is $33,300,000.

9.1.6 Alternative 5: Excavation and Complete Removal of Vaughn landfill, monitoring, and LUCs

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

Alternative 5 will 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 will be 7.92 acres. It is estimated that the excavation volume for Parcel 3 will be 150,000 cubic yards. This alternative will ensure that all NAPL-impacted material is removed, including any currently undetected material within or beneath the Vaughn Landfill.

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

10.0 Comparative Analysis of Alternatives

The NCP establishes specific criteria to evaluate the different remediation alternatives individually and against each other in order to select an appropriate remedy. Two of these criteria, overall protection of human health and the environment and compliance with State and Federal requirements that are applicable or relevant and appropriate (ARARs), are threshold criteria. If an alternative does not meet these two criteria, it cannot be considered as the Site remedy unless a waiver is justified.

Five of the criteria are balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume of contaminants through treatment; short-term effectiveness; implementability; and cost. These criteria are used to weigh the relative strengths and weaknesses of the alternatives. Community response to the preferred alternative and the other considered alternatives is a modifying criterion that was carefully considered by SCDES prior to the final remedy selection.

The following section of the ROD profiles the relative performance of each alternative against the criteria, noting how it compares to the other options under consideration.

10.1 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 will not achieve the RAOs and provides the least protection of all the alternatives. Alternative 1 will provide no reduction in risks to human health and the environment because no measures will be implemented to eliminate potential pathways for human exposure. Alternative 2 will provide limited protection of human health and the environment using MNA and LUCs to minimize the potential for contact with NAPL. Alternative 3 will provide several layers (selective excavation, capping, and LUCs) of protection for human health and the environment but will leave NAPL-impacted sediments in place within the containment area on the Vaughn Landfill. Alternative 4 will provide the complete removal of currently 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 or any currently unknown NAPL-impacted material beneath the Vaughn Landfill. Alternative 5 will provide for the complete removal of NAPL-impacted sediments and the complete removal of the Vaughn C&D Landfill material and all NAPL-impacted material within or beneath the Vaughn Landfill. In terms of overall protection of human health and the environment, the Alternatives ranked from most protective to least: Alternative 5, Alternatives 4, Alternative 3, Alternative 2, Alternative 1.

10.2 Compliance with ARARs

The assessment for this criterion describes how each alternative complies with potential federal and state applicable or relevant and appropriate requirements (ARARs). Alternative 1 will not comply with chemical specific ARARs because no action will be taken to reduce contaminant concentrations. Alternative 2 will not comply with chemical specific ARARs because no action will be taken to remove NAPL. Alternatives 3 through 5 will meet the location and action specific ARARs. Alternative 3 will take longer to meet chemical specific ARARs than Alternatives 4 and 5 since NAPL will be left in place. Alternatives 4 and 5 will meet chemical-specific ARARS for soil and sediment by removing NAPL and that should contribute to reduced concentrations in groundwater. 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 will comply with the ARARs.

10.3 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 will have minimal long-term effectiveness since NAPL will not be removed, monitored, or contained. Alternative 2 will have minimal long-term effectiveness since NAPL will not be removed or contained but will have the capability of monitoring natural reduction effectiveness. With Alternative 3, while a majority of NAPL will be excavated, there is a limited area of NAPL that will be contained within the barrier wall and visually observed trace NAPL will be left under a portion of the Vaughn Landfill. Alternative 3 will have a barrier wall, cap, and hydraulic control systems that will require operation and maintenance for many years. In Alternative 4 the excavations will permanently remove the NAPL on Parcels 3, 4, 5, and the LECE School

property. Alternative 4 will leave a portion of the Vaughn C&D Debris Landfill which will limit its ability to return to a natural wetland area and likely leave some undiscovered amount of NAPL-impacted material in place. Alternative 5 will permanently remove the NAPL on Parcels 3, 4, 5, and the LECE Property as well as completely remove NAPL-impacted material and 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) will require some level of long-term management until RAOs are achieved.

10.4 Reduction of Toxicity, Mobility, or Volume of Contaminants 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 through treatment. Alternatives 1 and 2 will not reduce toxicity, mobility, or volume through treatment. In Alternative 3, the toxicity, mobility, and volume will be reduced at the Site through selective excavation and groundwater extraction and treatment within the capped area. In Alternative 3, the mobility of the NAPL-impacted material would be reduced due to its removal and 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 provide some degree of reduction of toxicity and volume in groundwater through the collection and treatment of water that infiltrates the excavations and natural attenuation processes over time. Alternative 5 removes additional material from the Vaughn Landfill that will 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.

10.5 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 will have no risk to the community or workers due to implementation. Alternative 2 will 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 will 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.

10.6 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 active alternatives will be implementable. Alternatives 3 through 5 would require some specialized wetlands terrain equipment, sheet-piling, dewatering and treatment systems, and the use of a sprung structure for work 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. All of the material and services required discussed are common applications, have been historically used in the environmental industry, and have specifically been used at former MGP sites.

10.7 Cost

The following table presents the probable range of costs for each alternative:

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

10.8 Community Acceptance

This criterion evaluates the issues and concerns the public may have regarding each of the alternatives. Comments received on the Proposed Plan are important indicators of community acceptance.

SCDES presented its Proposed Plan at the June 6, 2024, public meeting. During this meeting, SCDES addressed questions from the local community and received oral comments. During the public comment period, a wide range of written comments were received. Public response to the SCDES's preferred alternative was overall favorable. Many comments expressed a desire to see a remedy in place as quickly as possible. Additionally, there were comments that expressed a desire to expand SCDES's preferred alternative with a groundwater remedy and additional monitoring. A remedy for groundwater will be assessed following the implementation of SCDES's preferred alternative and a sufficient time to study how the excavation of impacted material affects groundwater quality. There were comments that looked at requiring the soil removal on Parcels 1 and 2 that would bring those Parcels to meet residential health standards for soil with land use restrictions for groundwater. That requirement has been added to the selected remedy. The public comment period ended on August 6, 2024.

The Responsiveness Summary (Appendix A) includes a summary of community comments received during the public meeting and SCDES's responses.

11.0 Selected Remedy

SCDES has selected Alternative #5: Excavation with Complete Vaughn Landfill Removal; monitoring, and Land Use Controls as the selected remedy.

11.1 Description of Selected Remedy

Alternative 5 includes the excavation of the entire Vaughn Landfill; excavation of the impacted sediments on Parcels 3, 4, 5, and the LECE School property; monitoring of groundwater until it is further evaluated as Operable Unit 3; and implementation of LUCs for long-term effectiveness.

On Parcels 1 and 2, the remedy includes a limited excavation of contaminated soil that will allow for those parcels to meet residential standards for reuse with land use restrictions for the use of groundwater.

On Parcel 3, the remedy includes 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 will be backfilled and graded with clean soil and sediment along with the restoration of the wetland vegetation. During restoration, the Vaughn Landfill footprint will be backfilled and graded 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) will be utilized to prevent sediment from migrating off-Site during excavation and backfilling activities.

The total areal extent of the excavation for Parcels 4 and 5 encompasses 0.44 acres. Sediment excavation will 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) will be utilized to prevent sediment from migrating off-Site during excavation and backfilling activities.

On the LECE School Property, the remedy will remove sediments within the wetlands and uplands that are visibly stained with NAPL. This will 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 will 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 will 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, will be used over the excavation area to further reduce potential impacts during the excavation. Dewatering and surface water management will

likely be required during the excavation. The excavation will be backfilled with clean soil to match the existing elevations and restored to its preconstruction condition.

Groundwater monitoring will be utilized to evaluate groundwater quality following the removal of the coal tar, coal tar impacted sediments, and the landfill material. With the footprint of the Vaughn Landfill being returned to wetlands, the monitoring well network will need to be repositioned on the Site periphery. The removal of NAPL-impacted soil and sediments is expected to have a positive impact on groundwater quality. Shallow zone groundwater, transition zone groundwater, and deeper, bedrock zone groundwater will be evaluated in an OU-3 Feasibility Study once sufficient time following this remedy has taken place to evaluate the impacts this remedy has had on groundwater conditions. LUCs will be required to prevent or limit the use of groundwater until the groundwater reaches remedial goals.

Alternative 5 protects human health and the environment by removing known NAPL-impacted material and potentially impacted material beneath the C&D material. LUCs will provide an additional layer of protection. Alternative 5 is best in terms of its long-term effectiveness and permanence and its reduction of toxicity, mobility, and volume. Removing the NAPL-impacted 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 will be required.

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

The estimated present worth cost for the implementation of the remedy is $39,500,000.

12.0 Statutory Determinations

Based on information currently available, SCDES believes the selected remedy meets the mandatory threshold criteria required by the NCP and provides the best balance of trade-offs among the other alternatives. SCDES expects the selected remedy to satisfy the following statutory requirements: be protective of human health and the environment; comply with applicable or relevant and appropriate requirements; be cost-effective; utilize permanent solutions to the maximum extent practicable; and
satisfy the preference for treatment as a principal element of the remedy to the extent practicable.

PART III - RESPONSIVENESS SUMMARY

SCDES's Proposed Plan was presented to local residents and other interested parties at a public meeting that was held on June 6, 2024. At this meeting, representatives of SCDES presented the results of past investigations, explained the remedial alternatives evaluated in the Focused Feasibility Study, presented SCDES's preferred alternative, and received comments from the public.

This meeting initiated the official 60-day public comment period for SCDES to accept comment on the Proposed Plan. No requests for an extension of the comment period were received, and therefore, the comment period ended on August 6, 2024.

Public response to SCDES's preferred alternative was overall favorable. A large number expressed a desire to see a remedy in place as quickly as possible. There were also comments that the remedy should be expanded to include groundwater treatment. After reviewing all comments on the Proposed Plan, SCDES made several changes to the selected remedy which are included in the ROD. These changes include 1) Shallow and transition zone groundwater are no longer part of Operable Unit 2. This groundwater will be evaluated as part of Operable Unit 3. Operable Unit 3 will now include all groundwater and will be evaluated following the completion of the selected remedy; 2) Along with that change, language regarding monitored natural attenuation has been removed from the remedy and replaced by a period of groundwater monitoring to determine the effects of removing the source material. Based on our experience at similar sites, SCDES expects the removal of source material to have a very positive impact on groundwater quality. SCDES will continue to evaluate potential groundwater remedies as part of Operable Unit 3; and 3) The selected remedy includes limited excavation of contaminated soil on Parcels 1 and 2 that will allow these parcels to meet residential standards for reuse with land use restrictions on the use of groundwater. Comments received and SCDES's responses to those comments can be found in Appendix B.

The following are some of the key issues and SCDES's responses that were brought up during the public meeting. The full question and answer session from the public meeting can be found in Appendix A in the Public Meeting Transcript.

1. Timeframe

Question: How long will it take to get to completion of this project?

Response: The cleanup will take about 6-7 years to complete. This is due to wetland conditions, limited seasonal timeframes that work can be conducted, water management, and limited areas where removed material can be staged. The selected remedy will address soil, sediment, and to an extent shallow groundwater. Groundwater will be addressed under Operable Unit 3, after removal is complete and adequate monitoring has been conducted. The process going forward from this ROD will be to get an agreement from responsible parties to conduct the work, receive and approve a Remedial Design for the

work that will be performed, conduct the Remedial Action, and then conduct groundwater monitoring.

2. Groundwater

Question: Why can't active groundwater treatment be a part of this remedy?

Response: This remedy will be very invasive with a large portion of the Site undergoing removal actions. Groundwater monitoring will be utilized to evaluate groundwater quality following the removal of the coal tar, coal tar impacted sediments, and the landfill material. With the footprint of the Vaughn Landfill being returned to wetlands, the monitoring well network will need to be repositioned on the Site periphery. The removal of NAPL-impacted soil and sediments is expected to have a positive impact on groundwater quality. Shallow zone groundwater, transition zone groundwater, and deeper, bedrock zone groundwater will be evaluated in an OU-3 Feasibility Study once sufficient time following this remedy has taken place to evaluate the impacts this remedy has had on groundwater conditions. LUCs will be required to prevent or limit the use of groundwater until the groundwater reaches remedial goals.

3. Additional Alternative Options

Question: Many comments were made suggesting adding an Alternative 5+. This would include the addition of a groundwater treatment component.

Response: Creating a new remedy or substantially adding to a remedy would require us to start the Feasibility Study process over and substantially delay the remedy. Most of the comments received indicated a desire to see a remedy in place as soon as possible. Creating these delays would add substantial time to an already lengthy process.

As discussed in the previous response above, the effects of removal need to be evaluated before determining the extent of groundwater treatment needed. Groundwater will be included in Operable Unit 3 and evaluated following a sufficient amount of monitoring after the removal is completed.

4. Community Plans for the Property

Question: Have you been working with the Newtown Community on their master plan, do you see and have you discussed with them how these land use controls might influence the realization of that vision?

Response: SCDES has been working with the Newtown Community and Pastor Mills. Ultimately, the goal of the remediation is to do so in a way that facilitates that vision and leaves the property in a position where that vision could be a reality.

5. Operable Unit 3 Process

Question: You said Operable Unit 3 would be evaluated at a later time. Can you speak to that?

Response: After reviewing all comments on the Proposed Plan, SCDES made several changes to the selected remedy which are included in the ROD. These changes include 1) Shallow and transition zone groundwater are no longer part of Operable Unit 2. This groundwater will be evaluated as part of Operable Unit 3. Operable Unit 3 will now include all groundwater and will be evaluated following the completion of the selected remedy; 2) Along with that change, language regarding monitored natural attenuation has been removed from the remedy and replaced by a period of groundwater monitoring to determine the effects of removing the source material. Based on our experience at similar sites, SCDES expects the removal of source material to have a very positive impact on groundwater quality. Once there has been enough groundwater monitoring data collected that the post-remedy extent of groundwater impacts can be determined and remaining groundwater impacts have stabilized, an Operable Unit 3 Feasibility Study will begin to evaluate remedial alternatives for groundwater.

6. Wetland Restoration

Question: This community has had to deal with a lot of flooding over the years. And some of that was probably aggravated by the rogue landfill, where the grades were increased, creating more runoff. Has there been thought given to when the soil is replaced after the cleanup, about bringing hydric soils in, restoring wetland, perhaps getting it back to its more natural, original grade to help mitigate some of that downstream flooding?

Response: The actual details of how the Site will look post-remedy completion will be worked out in the Remedial Design. The general concept is that most of this area will be returned to its more natural grade. Any wetlands that are damaged during the remedy will be restored back to wetlands. This should have a positive effect on drainage throughout the floodplain.

Figures

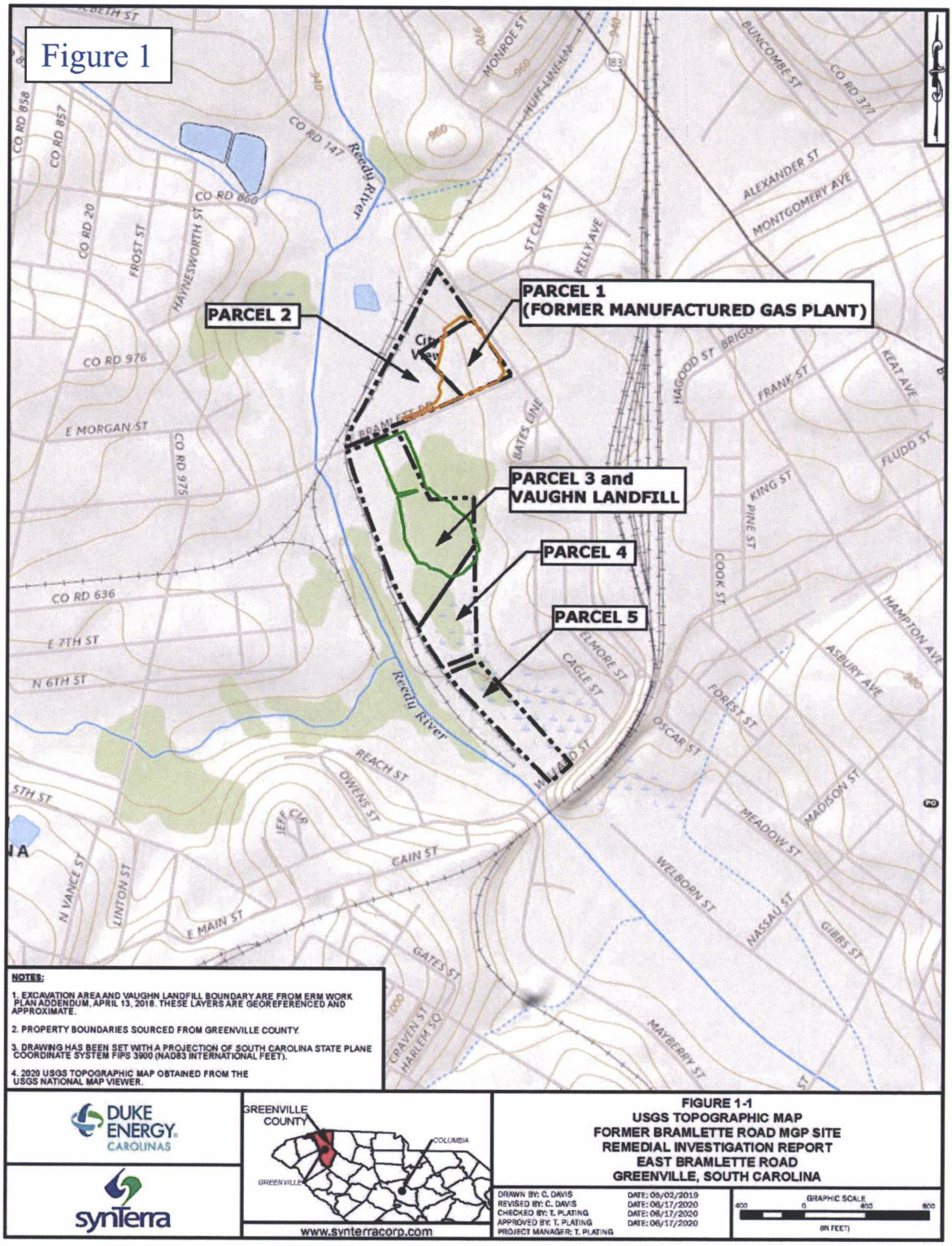
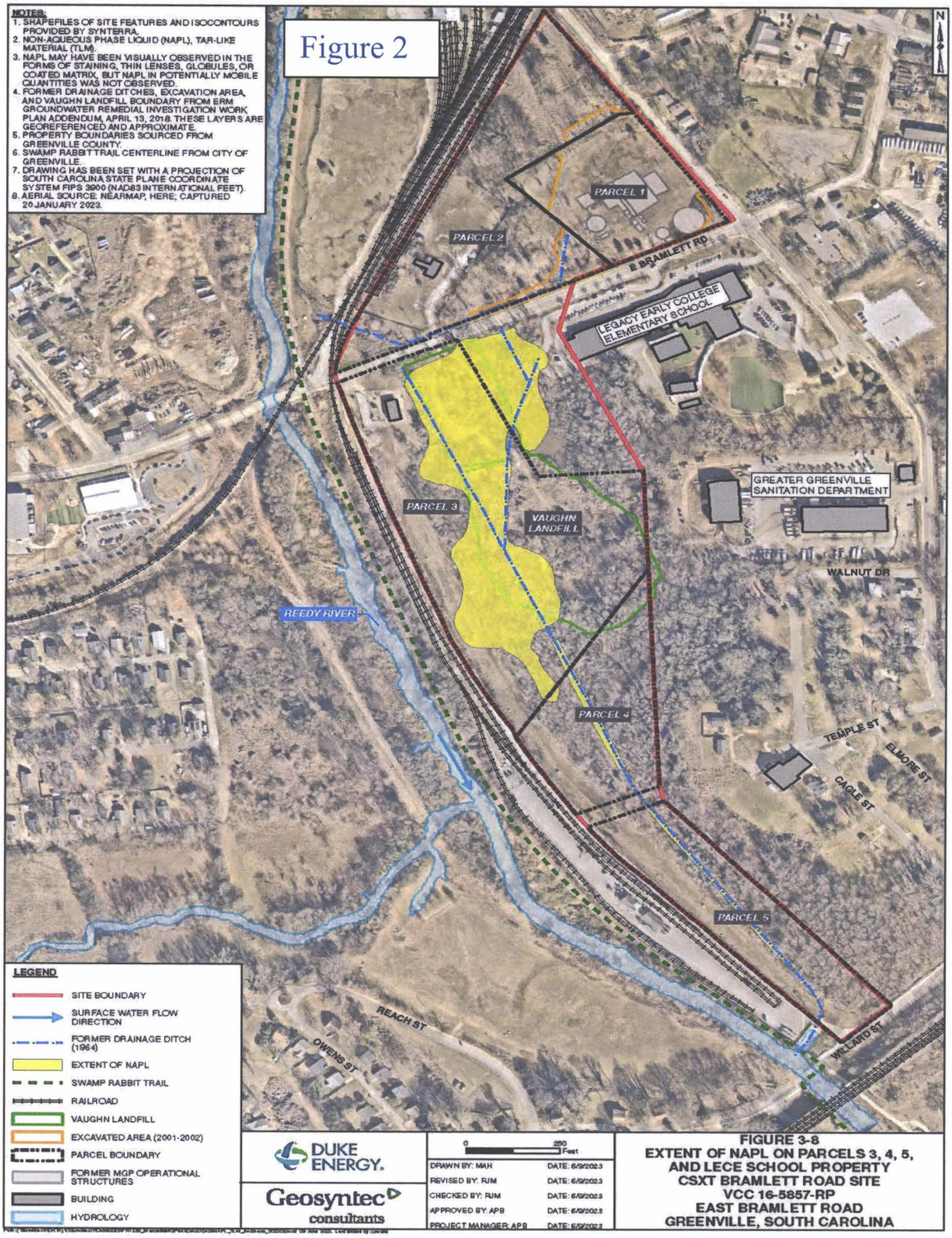


Figure 1
PARCEL 1
(FORMER MANUFACTURED GAS PLANT)
PARCEL 2
PARCEL 3 and
VAUGHN LANDFILL
PARCEL 4
PARCEL 5
NOTES:
1. EXCAVATION AREA AND VAUGHN LANDFILL BOUNDARY ARE FROM ERM WORK PLAN ADDENDUM, APRIL 13, 2018. THESE LAYERS ARE GEOREFERENCED AND APPROXIMATE.
2. PROPERTY BOUNDARIES SOURCED FROM GREENVILLE 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
GREENVILLE COUNTY
COLUMBIA
GREENVILLE
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: 06/02/2019
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 26 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

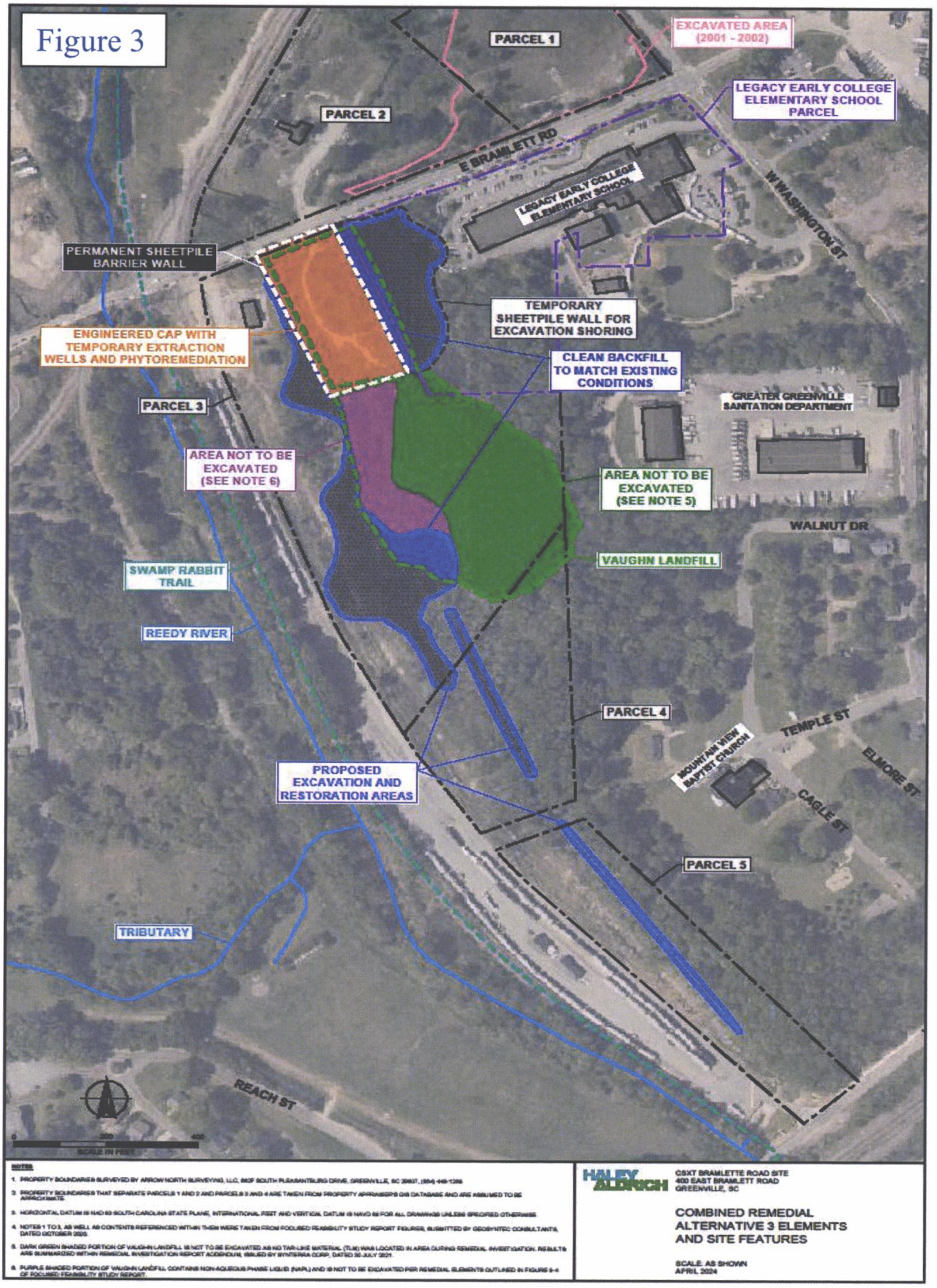


Figure 3
PARCEL 1
EXCAVATED AREA (2001 - 2002)
LEGACY EARLY COLLEGE ELEMENTARY SCHOOL PARCEL
PARCEL 2
E BRAMLETT RD
LEGACY EARLY COLLEGE ELEMENTARY SCHOOL
W WASHINGTON ST
PERMANENT SHEETPILE BARRIER WALL
TEMPORARY SHEETPILE WALL FOR EXCAVATION SHORING
ENGINEERED CAP WITH TEMPORARY EXTRACTION WELLS AND PHYTOREMEDIATION
CLEAN BACKFILL TO MATCH EXISTING CONDITIONS
PARCEL 3
GREATER GREENVILLE SANITATION DEPARTMENT
AREA NOT TO BE EXCAVATED (SEE NOTE 6)
AREA NOT TO BE EXCAVATED (SEE NOTE 5)
WALNUT DR
VAUGHN LANDFILL
SWAMP RABBIT TRAIL
REEDY RIVER
PARCEL 4
TEMPLE ST
MOUNTAIN VIEW BAPTIST CHURCH
ELMORE ST
CAGLE ST
PROPOSED EXCAVATION AND RESTORATION AREAS
PARCEL 5
TRIBUTARY
REACH ST
SCALE IN FEET
NOTES:
1. PROPERTY BOUNDARIES SURVEYED BY ARROW NORTH SURVEYING, LLC, 862F SOUTH PLEASANTBURG DRIVE, GREENVILLE, SC 29607, (864) 448-1268.
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 THEM WERE TAKEN FROM FOCUSED FEASIBILITY STUDY REPORT FIGURES, SUBMITTED BY GEOSYNTEC CONSULTANTS, DATED OCTOBER 2020.
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