Draft Remedial Action Plan
East Wake County LF – Zone C
Knightdale, Wake County, NC
NCDEQ ID No. NONCD0000614
S&ME Project No. 22050404
NCDEQ Task Order 614RA-2

PREPARED FOR:

North Carolina Department of Environmental Quality
Division of Waste Management – Inactive Hazardous Sites Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

PREPARED BY:

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March 3, 2026

March 3, 2026

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

Attention: Mr. Kevin Kelt, P.G
Hydrogeologist
Email: kevin.kelt@deq.nc.gov

Reference: **Draft Remedial Action Plan**
East Wake County LF – Zone C
Knightdale, Wake County, North Carolina
NCDEQ ID NONCD0000614
Task Order 614RA-2
S&ME Project No. 22050404

Dear Mr. Kelt:

S&ME, Inc. (S&ME) is submitting this Draft Remedial Action Plan to the North Carolina Department of Environmental Quality (NCDEQ), Pre-Regulatory Landfill Unit (Unit) for the above-referenced facility in Knightdale, North Carolina. S&ME completed this Draft Remedial Action Plan in general conformance with our approved proposal dated July 28, 2025, for Task Order 614RA-2 under state contract N42621-B.

Please call us at 919-872-2660 with any questions or comments.

Sincerely,
S&ME, Inc.

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Attachment: Draft Remedial Action Plan

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BGS -	BELOW GROUND SURFACE
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DWM -	DIVISION OF WASTE MANAGEMENT
DWR -	DIVISION OF WATER RESOURCES
E&SC -	EROSION & SEDIMENT CONTROL
EPA -	ENVIRONMENTAL PROTECTION AGENCY
FT-BGS -	FEET BELOW GROUND SURFACE
FT. BTOC -	FEET BELOW TOP OF CASING
GP -	GAS PROBE
GPS -	GLOBAL POSITIONING SYSTEM
IHSB -	INACTIVE HAZARDOUS SITES BRANCH
LEL	LOWER EXPLOSIVE LEVEL
MG/KG -	MILLIGRAMS PER KILOGRAM
MG/L -	MILLIGRAMS PER LITER
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NCAC 2B -	NORTH CAROLINA 15A NCAC 2B. 0200 (SURFACE WATER) STANDARDS
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NCDEQ -	NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
NC DEMLR -	NORTH CAROLINA DEPARTMENT OF ENERGY, MINERAL AND LAND QUALITY
ND -	ANALYTE NOT DETECTED ABOVE METHOD DETECTION LIMIT
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RCRA-	RESOURCE CONSERVATION AND RECOVERY ACT
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SVOC -	SEMI-VOLATILE ORGANIC COMPOUNDS
µG/L -	MICROGRAM PER LITER (PARTS PER BILLION)
TMW -	TEMPORARY MONITORING WELL
USGS -	UNITED STATES GEOLOGICAL SURVEY
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VISL -	VAPOR INTRUSION SCREENING LEVEL
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WDA -	WASTE DISPOSAL AREA
WSW -	WATER SUPPLY WELL

1.0 INTRODUCTION

This Draft Remedial Action Plan (Draft RAP) presents the engineering design for the proposed remedy for the East Wake County LF (the Property or Site) located in Knightdale, Wake County, North Carolina. The subject Property has been assigned incident #NONCD0000614 by the North Carolina Department of Environmental Quality (NCDEQ). The subject Property comprises a portion of the East Wake County LF, a multi-parcel facility located southwest of the intersection of US 64 and Interstate 87. The greater East Wake Cty LF consists of a total of three waste disposal areas (WDAs) that were previously investigated for existing cover soil characteristics, and have been assigned the designations Area A, Area B, and Area C by previous assessors. According to the Wake County Tax real estate/GIS parcel map website, Area C (the subject Property) consists of an approximately 307.91 acre parcel with the Wake County Parcel Identification Number (PIN): 1764568472. Parcel 1764568472, is registered under the ownership of James Erwin Rigsbee, is located westward of Three Sisters Road, and occupies the southwestern portion of the greater East Wake County LF facility property.

1.1 Background and Vicinity Characteristics

1.1.1 ATC-Reported Information published prior to 2016:

ATC Associates of North Carolina, P.C. (ATC) published a Remedial Investigation Summary Report for the greater East Wake County LF on June 21, 2016 under Task Order 614SUM-A (included in the **Appendix A** of this Draft RAP). The ATC report describes the three separate WDAs; with Area A and B occupying the majority of the 56.59 acre parcel; and, waste disposal Area C occupying a portion of the 307.91 acre parcel. The northern portion of Area A was reported to contain one metal building and random debris (storage containers, trailers, old vehicles, machinery) associated with current and former businesses. The southern portion was a mix of vegetation, debris and open areas, and the majority of Area B was grassed field with a portion covered in woods. Areas A and B were separated by the runway for the East Raleigh Airport. Area C was a grassed field containing storage containers used for storing explosives; with the outer portions of Area C being wooded. The terrain in Areas A and B had a general slope to the south and west. The terrain in Area C was reported as rolling, and sloping to the south and west towards Mark's Creek; with a small portion sloped to the north towards a drainage feature. Historically the site could be accessed from Three Sisters Road at several points along the north and east sides of the commercial properties (however, current access is to Area C is limited to one gated access point adjacent to the Austin Powder office structure). The areas adjacent to the Site were reported as industrial and agricultural; with the landfill having operated from the late 1960's, and ceasing to receive waste prior to January 1983. The attached ATC Figure 1 illustrates the location of the Site. ATC

performed a background analyses of published concentrations of naturally occurring inorganics at the Site. Based upon their review, the observed inorganics were indicative of natural background conditions rather than contamination.

ATC performed a geophysical survey to identify the waste disposal areas. ATC determined that Area A covered approximately 20.66 acres and Area B covered approximately 9.52 acres of the property having PIN 1764750977; and, that Area C covered approximately 24.02 acres of PIN 1764568472. Subsequent borings indicated that buried

waste included scrap metal, concrete, asphalt, glass, paper, plastic, electrical wire, brick, rubber, and fabric within a matrix of soils of variable composition.

ATC reported that Area A also contained varying amounts of surface debris including old machinery, boats, vehicles, concrete, storage containers, and other debris associated with the current and former businesses in this area. There was also a former composting area that still contained compost material located within Area A. Area C contained several containers and/or structures that were used for the storage of explosives; and, an explosives firm was the property tenant at the time of the ATC evaluation. It should be noted that property conditions have remained relatively stable since that time.

The surface cover overlying the waste was assessed by ATC, and waste was encountered at depths ranging from 8 inches to over 4 feet below ground surface (bgs). Surface cover above the waste consisted primarily of fill and silt to clayey silt. Portions of Area A and B had less than 2 feet of cover, and waste thickness in Areas A and B ranged from 1.5 to 14.5 feet. ATC concluded that more than half of Area C had less than 2 feet of surface cover.

ATC reported that groundwater may be encountered at depths ranging from approximately 1 to 25 feet bgs. Groundwater flow direction was inferred as primarily to the southwest towards Mark's Creek, with localized flow to the east-southeast toward an unnamed tributary.

It should be understood that the ATC report does not distinguish between project areas, and thus much of the background verbiage and media descriptions, to include soil, water, and landfill gas (LFG), descriptions in this Draft RAP will not be specific to the subject zone, "Area C."

1.1.2 S&ME-Reported Information published post 2016:

The owner of the property containing Zone C (e.g., the Austin Powder managed property) is actively engaged in armory / explosives storage throughout the WDA footprint. It is important to note that scheduling for, and final construction efforts will require the participation of the owner or armory contractor (currently understood to be Austin Powder and/or animal husbandry contractor to the owner) with regard to Zone C. In addition, the owner is actively engaged in free-ranging cattle upon the entirety of this WDA footprint, as well as adjacent areas around the proposed cover soil placement work. The installation of temporary fencing which would isolate the work zone would likely alleviate much of the interference that onsite construction might impose to current property utilization.

1.2 Site Geology & Hydrogeology

ATC reported that the East Wake County LF is situated in the Raleigh Belt Physiographic Province, within bedrock classified as granite. Bedrock was not encountered during the investigations. A diabase dike is inferred in the area, but no evidence of diabase was observed during the site investigation. Overburden sediments overlying the bedrock surface included a mixture of sand, silt, and clay coarsening with depth to partially weathered rock.

ATC utilized three primary sources were used to evaluate background concentrations of naturally occurring inorganics at the site. These sources included: (1) the United States Geological Survey (USGS) publication Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States (1984); (2) the National Uranium Resource Evaluation (NURE) Database reported on the USGS website; and, (3) the water well contaminant map for Wake County reported on the North Carolina Department of Health & Human Services, Epidemiology

Section Website. Based on these references, arsenic, iron, and manganese naturally occur in subsurface media in the region. Arsenic concentrations in sediment ranged from 5 to 10 parts per million (ppm) and in groundwater from 0.5 to 237 parts per billion (ppb). Iron concentrations in sediment ranged from 7,200 to 17,700 ppm and in groundwater from 25 to 197,000 ppb. Manganese concentrations in sediment ranged from 290 to 470 ppm and in groundwater from 15 to 27,710 ppb. Lead concentrations in sediment ranged from 10 to 2500 ppm and in groundwater from 0.5 to 21,000 ppb. Zinc concentrations in sediment ranged from 10 to 700 ppm and in groundwater from 15 to 121,960 ppb. Cadmium concentrations in groundwater ranged from 0.5 to 51 ppb. Note that background concentrations of thallium were not referenced in these published sources; however, according to the USGS website, thallium is commonly found and associated with clays and other potassium based minerals. Based on a review of background inorganic concentration ranges reported in these publications as well as review of the distribution of inorganic concentrations detected at the Site, inorganics detected at the Site are indicative of natural background conditions rather than contamination.

ATC reported that inorganic constituents are naturally occurring in geologic materials; and, that these constituents are commonly found in bedrock formations and in surficial soils derived from weathering of the underlying bedrock. The constituents are also commonly found in surface water and groundwater due to rainfall run-off and leaching as rainfall percolates through the subsurface. As such, it is often necessary to distinguish between inorganics that are indicative of natural background conditions versus contamination. ATC concluded their determinations were made based on published references.

1.3 Topographic and Boundary Survey

A topographic and boundary survey of the East Wake County LF was completed in April of 2025. That effort was somewhat complicated by multiple property boundaries situated distal to the WDA having inconsistencies in historical boundary identifiers associated with streams (i.e., Marks Creek and "USGS Stream"). As such, these questionable boundaries have been assigned a dashed line indicating non-surveyed conditions. The resulting boundary & topographic information was utilized to create the attached Notice of Environmental Contamination Plat and the (Draft) Engineering Plan, both attached within the **Appendix** of this Draft RAP. The Notice Plat is attached as **Appendix B**, and the Engineering Plan is attached as **Appendix C**.

1.4 Jurisdictional Wetland Evaluation

It is the understanding of S&ME that no wetland evaluation or jurisdictional request has been pursued with the U.S. Army Corps of Engineers. However, an apparent surface seep, or tributary to Marks Creek was presented in ATC's June 2016 Summary Report which began approximately 450 feet inside the Zone C WDA, and extended outward and beyond the waste boundary. In addition, portions of the Property beyond the southern, eastern, and northern boundaries of the Area C WDA were observed as having conditions consistent with wetlands. Appropriate care must be taken during the proposed work to avoid area(s) of apparent wetlands during landfill cover construction. It is the assumption of S&ME that entrance into areas containing seeps or wetland-type characteristics will require erosion and sediment control (E&SC) oriented engineering effort not included in the attached Engineering Plan documents.

1.5 Waste Disposal Area Delineation

As introduced previously in Section 1.1. the Zone C WDA was identified by Marshall Miller & Associates via geophysical methods in January of 2014. In April of 2025, S&ME followed up with an additional waste boundary evaluation via borings that reported the underlying waste as consistent with mixed municipal solid waste (MSW) and construction & demolition (C&D) type waste materials.

2.0 MEDIA CHARACTERIZATION

The following media details were obtained from two assessors, ATC and S&ME. Where applicable, the source of the information has been denoted within the text of this Draft RAP.

2.1 Above-Ground Vapor Survey

According to ATC an above ground vapor survey was conducted at 259 locations; with resulting trace VOC levels reported below 0.7 parts per million (ppm).

2.2 Soil Cover Investigation

2.2.1 ATC-Reported Information published prior to 2016:

ATC reported that 24 soil samples were collected from 35 borings for cover soil evaluation. The following were detected in one sample at concentrations exceeding the PSRG: ethylbenzene, trichloroethene, bis-(2-ethylhexal)phthalate, and arsenic. The presence of arsenic was attributed to background concentrations. To evaluate cover soils, 23 samples were collected and the analytical results were compared to the Preliminary Industrial SRGs. Sample locations were selected by gridding off the waste disposal areas and collecting a representative sample from each grid. ATC identified no concerns in the foregoing samples.

2.2.2 S&ME-Reported Information published post 2016:

(Task RI-5) Remedial Investigation Report – Soil Cover Evaluation, December 6, 2022:
According to S&ME's December 6, 2022 *Soil Cover Evaluation* the soil cover across the WDAs (it should be noted that the evaluation included Zone A through Zone C) range in thickness from approximately one inch to greater than twelve inches; and, the soil cover material primarily consists of black-gray organic sandy topsoil, and a layer of orange-tan/orange-gray silty sand.

The laboratory reported detections of the following constituents above the NCDEQ DWM Residential Preliminary Soil Remediation Goals (PSRGs): pentachlorophenol, arsenic, cobalt, thallium, and hexavalent chromium. However, no reported detections exceeded the NCDEQ DWM Industrial PSRGs. A portion of S&ME's Task RI-5 Report is included in the **Appendix D** of this Draft RAP for both constituent discussion and reference figures.

NCDEQ's Risk Calculator:

Within the December 2022 Report, NCDEQ's Risk Calculator was used to evaluate environmental exposure risks of multiple contaminants and exposure pathways associated with the Landfill Cover Soil Samples. The highest concentration of each constituent was input into the NCDEQ Risk Calculator. The risk calculator uses the analytical results and generates a Carcinogenic Risk and Hazard Index value. The Area C outputs from the Risk Calculator indicated that:

- The Carcinogenic Risk was not exceeded for resident, non-residential worker, construction worker, and recreator/trespasser receptors.
- The Hazard Index Risk was exceeded for resident, construction worker, and recreator/trespasser receptors. The non-residential worker receptor did not exceed the Hazard Index Risk.

(Task RI-10) Remedial Investigation Report – Soil Cover Evaluation, October 20, 2023:
According to S&ME's October 2023 *Soil Cover Evaluation* the soil cover across the WDAs (it should be noted that the evaluation included Zone A through Zone C) range in thickness from approximately one inch to greater than twelve inches; and, the soil cover material primarily consists of black-gray organic sandy topsoil, and/or a layer of orange-tan/orange-gray silty sand.

The laboratory reported detections of the following constituents above the NCDEQ DWM Residential Preliminary Soil Remediation Goals (PSRGs): arsenic, cobalt, manganese, thallium, vanadium, and hexavalent chromium. However, no reported detections exceeded the NCDEQ DWM Industrial PSRGs. A portion of S&ME's Task RI-10 Report is included in the **Appendix D** of this Draft RAP for both constituent discussion and reference figures.

NCDEQ's Risk Calculator:

Within the October 2023 Report, NCDEQ's Risk Calculator was used to evaluate environmental exposure risks of multiple contaminants and exposure pathways associated with the Landfill Cover Soil Samples.

The highest concentration of each constituent was input into the NCDEQ Risk Calculator. The risk calculator uses the analytical results and generates a Carcinogenic Risk and Hazard Index value. The Area C outputs from the Risk Calculator indicated that:

- The Carcinogenic Risk was not exceeded for resident, non-residential worker, construction worker, and recreator/trespasser receptors.
- The Hazard Index Risk was exceeded for resident, construction worker, and recreator/trespasser receptors. The non-residential worker receptor did not exceed the Hazard Index Risk.

It should be noted that subsequent Risk Calculator manipulation protocol directed by the PRLF Unit did identify one sample grid (SC-76) with toxicological characteristics indicative of contamination. This finding resulted in grid SC-76's inclusion in the planned soil infill remediation effort to a depth of 12-inches of cover soil. See attached Engineering Plan within the **Appendix C** of this Draft RAP for location and planned infill details.

2.3 Surface Water & Sediment Sampling

2.3.1 Surface Water

ATC-Reported Information published prior to 2016:

As previously mentioned, Mark's Creek flows to the southeast and is located southwest of Area C. An unidentified drainage, located east of Three Sisters Road, flows from north to south and discharges into Mark's Creek. An upstream surface water sample was collected from the unidentified creek, and the downstream sample were collected from Mark's Creek. An additional surface water sample was collected from a seep located the eastern side of Area A. In the downstream sample, iron concentration exceeded the North Carolina's 15A NCAC 2B .200 Standard (2B Standard) for freshwater aquatic life. The following constituents were detected above the 2B Standards in the seep sample: iron, manganese, and zinc.

S&ME-Reported Information published post 2016:

(Task RI-6) According to S&ME's December 2022 *Surface Water, Soil Gas, Groundwater and Water Supply Well Sampling* a surface water feature on the subject property (identified as Marks Creek by the NC DWR Surface Water Classifications Map) was sampled on October 10, 2022. A total of ten surface water locations (plus one duplicate sample) were collected and sent for laboratory analysis of VOCs by EPA Method 8260, 1,4-Dioxane by EPA Method 8270SIM, and Total Lead by EPA Method 6020. The laboratory reported detections of 1,4-Dioxane in SW-1, SW-4, and SW-7 above its respective standard. Portions of S&ME's Task RI-6 Report is included in the **Appendix D** of this Draft RAP for both constituent discussion and reference figures.

2.3.2 Sediment

Three sediment samples were collected and reported by ATC. Arsenic and manganese concentrations were observed and attributed to background concentrations.

2.4 Groundwater Investigation

2.4.1 ATC-Reported Information published prior to 2016:

Seventeen permanent groundwater monitoring wells and eight temporary groundwater wells were installed within the greater East Wake County LF. The following analytes were detected in one or more samples at concentrations above the North Carolina's 15A NCAC 02L .0202 Standards (2L Standards): 1,1-dichloroethane, 1,2-dichloroethane, 1,2-dichloropropane,1,4-dichlorobenzene, benzene, trichloroethylene, vinyl chloride, 1,4-dioxane, 4-naphthalene, cadmium, iron, lead, manganese, thallium, thallium, and zinc. According to ATC, the observed cadmium, iron, lead, manganese, thallium, and zinc results were within the concentration range for naturally occurring metals. Elevated concentrations of lead, zinc, and cadmium were found only in samples collected from temporary wells, and were not reproduced in samples collected from the permanent monitoring wells installed in those areas.

2.4.2 S&ME-Reported Information published post 2016:

(Task RI-6) S&ME's December 2022 *Surface Water, Soil Gas, Groundwater and Water Supply Well Sampling Report* was primarily focused upon Zone A; however, several groundwater monitoring wells (MW-6, MW-8, MW-9, MW-10, MW-11, MW-12, MW-30, MW-31, and MW-34) were installed and sampled within reasonable proximity to the Zone C WDA Property. The laboratory reported detections of the following constituents above their respective 2L Standards: Benzene (in MW-6, MW-12, MW-30, and MW-31), Chloroethane (in MW-8), 1,4-Dichlorobenzene (in MW-9), and 1,4-Dioxane (in MW-6, MW-30, and MW-31). See the **Appendix D** of this Draft RAP for both constituent discussion and reference figures.

2.5 Potable Water Supply Well Sampling

(Task RI-6) S&ME's December 2022 Report describes water supply well sampling for wells located within the southern portion of Area A, and proximal to the East Wake County LF. The water supply wells were sampled for VOCs by EPA Method 6200, 1,4-Dioxane by EPA Method 8720SIM, and Total Lead by EPA Method 6020. The laboratory reported detections of 1,4-Dioxane in potable wells 512A and 512B above the 2L standard. See the **Appendix D** of this Draft RAP for both constituent discussion and reference figures.

2.6 Landfill Gas Investigation

2.6.1 ATC-Reported Information published prior to 2016:

ATC reported that 15 landfill gas (LFG) probes and one flux chamber were installed and repeatedly sampled using field instrumentation for VOCs, methane, carbon dioxide, hydrogen sulfide, and oxygen. Methane was detected in the gas probes ranging from 0.1% to 64.3% by volume and VOCs were detected in concentrations ranging from 0.1 to 68.7 ppm.

Samples for laboratory analysis of mercury were collected from two of the gas probes within the waste boundary, but mercury was not detected. Mercury was evaluated in both the above ground vapor survey and in the subsurface work, and determined to not be a concern by ATC.

LFG samples were collected for analysis of VOCs from selected gas probes, and the results were compared to the NCDEQ IHSB Non-Residential Vapor Intrusion Screening Levels (VISL), June 2014. The following were detected in one or more samples at concentrations above the standard: 1,2,4-trimethylbenzene and m,p-xylene. Concentrations of 1,3,5-trimethylbenzene, 2,2,4-trimethylpentane, 3-dichlorobenzene, cis-1,2,-dichloroethylene, trans-1,2-dichloroethene, ethanol, 4-ethyltoluene, freon 114, and heptane were also detected; however, VISLs had not been established for those constituents.

2.6.2 S&ME-Reported Information published post 2016:

(Task RI-8 & 8A) S&ME's June 2023 *Additional Soil Gas Sampling* was specific to Zone A; however, three background soil probes (SGP-31R, SGP-32, and SGP-33) were installed and sampled within the Zone C WDA Property. The laboratory reported detections of the following constituents above the NCDEQ DWM Residential Preliminary Soil Remediation Goals (PSRGs): Bromodichloromethane (in SGP-31R), and Chloroform in SGP-31R and SGP-32. However, no reported detections exceeded the NCDEQ DWM Industrial PSRGs. A portion of S&ME's

Task RI-8 & 8A Report (i.e., the sampling results figure) is included in the **Appendix D** of this Draft RAP for reference.

It should be noted that S&ME did conduct and report additional LFG testing in December of 2023. However, that screening and sampling activity was conducted entirely within Zone A of the greater project area; and, as such those results are not considered germane to this Draft RAP effort due to physical separation from Zone C.

3.0 FEASIBILITY STUDY

S&ME prepared a Feasibility & Costs Estimation for Cover Remediation via Limited Soil Infill dated March 2025 presenting the potential feasibility of a vegetated soil cover system to be constructed over the East Wake County LF's WDA. The overall feasibility of potential remediation (i.e., placement of limited soil cover over an approximately 3 to 4 acre portion of the WDA) to include an implementation cost estimate and work schedule was developed to support that effort. The following general categories comprise the feasibility discussion:

- Protection of Human Health and the Environment;
- Compliance with Applicable Federal, State and Local Regulations;
- Long-Term Effectiveness and Permanence;
- Reduction of Toxicity, Mobility, and Volume;
- Short-Term Effectiveness;
- Implementability;
- Cost; and
- Community and Industry Acceptance.

S&ME's 2025 Feasibility Study pointed out the following considerations:

Construction Entrances and Access Roads:

S&ME anticipates that the existing paved roadway (i.e. along Three Sisters Road) will be utilized for access during construction. The existing entrance into Area C WDA will be utilized during construction, and repaired as necessary at the cessation of construction activity.

Clearing, Grubbing & Root Balls:

Existing vegetation surrounding the WDAs will be removed according to need. Vegetative debris will likely be temporarily stockpiled onsite, and ultimately removed from the site entirely. The choice of transporting vegetative debris intact or grinding onsite would be left to the Contractor; however, disposal will ultimately be within a permitted facility. Although stumps will be ground in place, root ball debris generated during construction will be disposed of within a Class D landfill facility.

Imported Fill:

Borrow material will be necessary, and is anticipated to be obtained locally from a pre-approved source. Borrow soil acquisition is premised upon initial toxicity testing results, and ultimate acceptance of the source under the Guidance.

Schedule:

Project schedules generally vary with complexity and equipment resources, and are expected to reach completion in approximately 12 weeks. It should be noted that this schedule does not consider holidays or estimated inclement weather days.

4.0 REMEDY

4.1 Remedial Action Plan Goals

This Draft RAP presents the project outline and engineering design for a risk-based remedy. The goal of this remediation effort is to establish a dermal barrier between underlying waste, and human or other activity that might reasonably be expected to occur at the surface of the WDA. In situations where existing soil is not present or the East Wake County LF WDA is covered in thick woody vegetation, the WDA must be cleared of woody vegetation and covered with imported soil to achieve the dermal barrier goal. The NCDEQ PRLF Unit's Guidelines For Addressing Pre-Regulatory Landfills And Dumps (the Guidance) stipulates that the WDA must be covered with a minimum of 12 inches of soil, aggregate, or a soil/aggregate mixture suitable for unrestricted use and which supports vegetative growth. Infilling with a clean soil barrier meets the risk based criterion established in the Guidance, while providing a fiscally responsible remedy.

4.2 Remedy Summary and Anticipated Construction Sequence

The following step-wise phased work summary is anticipated:

- An E&SC Plan will be generated, and stormwater retention measures will be employed.
- A temporary fence will be constructed around those grid areas to be infilled for the purpose of precluding cattle entering construction area (this process includes clearing, temporary seeding, and gate installation).
- Certain portions of the site will be cleared of trees & dense vegetation, and grubbed. Resulting vegetative debris will ultimately be removed, and transported offsite to a facility permitted to receive such wastes.
- A temporary construction access road (including surge-stone construction entrance) will be constructed to facilitate entrance into the Area C WDA area, and removed at the completion of work.
- All stumps located in the footprint of the E&SC features, construction entrance, or planned soil infill grids will be ground in place to avoid disturbing the associated cover material and/or underlying waste.
- Surface waste will be removed & transported offsite, if encountered.
- Limited compactive effort will be expended upon the WDA surface prior to placement of planned cover soils (grading of the LF surface which might alter the documented, existing cover thickness will be avoided).

- Areas of insufficient soil cover (gridded testing areas) will be augmented with imported & compacted structural fill.
- Disturbed soil cover will be amended (with organics, lime, and/or fertilizer) to a depth of approximately 4-inches via a combination of drilling, punching, and/or disking.
- Entirety of the new soil cover & adjacent disturbed areas will be hydroseeded/hydromulched to facilitate rapid vegetative stability.
- The existing front entrance access road and those portions of the site access roads utilized for the purpose of soil transport will receive an approximately 2-inch thick ABC stone dressing upon completion of the construction implementation process.
- Upon reaching vegetative stabilization, temporary E&SC measures will be removed under direction of the NC DEMLR.

4.3 Erosion and Sediment Control Plan & Permitting

An E&SC Plan will be prepared in general accordance with the applicable provisions of the North Carolina Sedimentation Pollution Control Act of 1973, Title 15A, Chapter 4 of the North Carolina Administrative Code, and the North Carolina Erosion and Sediment Control (E&SC) Planning and Design Manual for a total disturbed area of approximately 2.5 acres. The E&SC Plan will be comprised of engineering drawings and a narrative that describes the construction, operation, and maintenance of erosion control measures for this project; both temporary and/or permanent in nature. A phased deconstruction of temporary measures and/or construction of appropriate permanent measures will be necessary, and conducted under DEMLR review. Temporary measures include the placement peripheral silt fence and silt fence outlets (Subcontractor will be encouraged to utilize additional wattles (i.e., composite filter socks), drainage swales, and check dams as deemed necessary in vulnerable areas. Permanent measures are not anticipated at this time; however, the Engineer will address requirements introduced by the NC DEMLR during preparation of the final Engineering Plans. It is the intention of S&ME to prepare and submit the initial E&SC Permit Application package. Upon acceptance, the resulting E&SC Permit will be transferred to the primary Subcontractor following subcontractor selection. The Subcontractor will be required to warrant full, timely, and formal acceptance of the E&SC Permit transfer as a condition of the Subcontractor's terms of work.

The property is currently served by a single driveway off the asphalt-paved, Three Sisters Road surface. This access point appears to be administered by the Austin Powder Company; whose offices are situated southward of this ABC-stone-paved access leading into the interior of the Zone C WDA. Some security measures are apparent at this gate which appear to be related to the use of the site for explosives storage and animal husbandry. Although this access appears to be available for use, S&ME suggests that the property owner and primary tenants be contacted early in the subcontractor acquisition process to confirm any utilization and/or security protocol that might be required during construction. No DOT driveway construction permitting is anticipated; however, use of the property-owner's existing driveway facilities should be monitored by the remediating subcontractor, and damage to that facility must be repaired at the conclusion of the project as necessary. An ABC pavement repair line item has been included in the project budget for this potential condition.

4.4 Asbestos Management & OSHA Certification

It is the understanding of S&ME that waste materials with the potential for containing asbestos may be encountered at the Site. An Asbestos Management Plan (AMP) will be prepared to meet requirements set forth in the National Emissions Standards for Hazardous Air Pollutants (NESHAP) during waste excavation, and/or if asbestos-containing material (ACM) is identified or suspected to be present during the RAP construction and other associated processes. The AMP should be produced and/or reviewed by an Asbestos Abatement Project Designer who is accredited with the North Carolina Department of Health and Human Services. The AMP should describe methods required to prevent the airborne release of asbestos fibers during the excavation, loading, and potential transportation and disposal of suspect ACM. Current expectations are that the AMP will require wetting of the suspect ACM prior to and during excavation and/or stockpiling. If suspect ACM is encountered, the AMP may require air monitoring of the excavation work area and nearby areas for asbestos fibers to meet NESHAP regulations. Finally, it is likewise the understanding of S&ME that in most cases suspect ACM will be collected, temporarily containerized, and ultimately transported offsite to a facility permitted to receive such wastes.

The remediation effort will be conducted by personnel who have been formally trained to conduct the work under project conditions. According to the Guidelines, the existence of waste within the property necessitates the need for field personnel to be currently and consistently certified under OSHA HAZWOPER standards. In addition, construction management personnel will be certified under OSHA Competent Person requirements with respect to excavation and trenching. These training and experience standards are anticipated to result in protocol which enhance both the construction implementation process, and the resulting cover system upon completion.

4.5 Site Preparation and Clearing

Security fencing consisting of six-foot-tall chain-link fencing and swinging gate will be placed along the alignment directed in the Engineering Plans. The Site will require limited clearing and grubbing prior to, and concurrently with implementation of remedial activities. Only those areas necessary to install erosion and sedimentation control devices, and construction entrance inward from the existing interior access road will be initially grubbed. All stumps encountered within the grubbed areas will be ground in place to limit initial disturbance. Once the temporary erosion and sedimentation control measures have been installed, the remainder of the work will be completed in the general sequence presented in the Engineering Plans. S&ME anticipates that vegetative debris will be removed, and temporarily stockpiled or immediately removed from the Site. Although ultimate removal of all vegetative debris from the Site is mandatory, means and methods for disposal at a facility permitted to receive vegetative wastes, are at the Subcontractor's discretion. Initial mulching of vegetative materials onsite, or transporting vegetative debris offsite intact are both acceptable. Throughout the project, the Subcontractor shall control the offsite migration of sediment and sediment-rich water at all times and in all instances. Burning of stumps, vegetation and/or waste is not permitted.

As previously introduced, animal husbandry is currently occurring within Area C which will require protective efforts be undertaken for the protection of a significant number of free-ranging cattle; as well as protection of the cover system from that activity. Animal protection protocol would likely involve choices of soil amendments and choice of vegetive cover / planting selections. Work will need to be coordinated closely with the property owner concerning protection of armory personnel and animals involved in free-ranging activity. Area C is also utilized for several active armory / explosives storage facilities, as well as parking areas for personal and company vehicles of those persons working in the field on any given day. As such, LUR documents will need to be promulgated that

accurately describe current utilization of the various WDA-containing portions of the subject property, as well as specifically stipulate those future activities that might be of concern to an engineered cover system.

4.6 Land Grading

Areas will be cleared/grubbed and graded as presented in the Engineering Plan, and receive a portion of the planned cover system in turn, and in general compliance with the estimated construction schedule. Cover construction will be limited to the LOD, with the possible exception of borrow soil stockpiling efforts. Remediation will be conducted in four phases aligning with:

- Onsite mobilization and initial E&SC construction;
- Placement, grading, and soil compaction efforts within the construction area presented in the Engineering Plans (e.g., Area C);
- Deconstruction of temporary and construction of permanent E&SC measures; and
- Cleanup, demobilization and post-construction efforts.

Placement of the planned cover system components will be initiated promptly upon achieving the intermediate subgrade presented in the Engineering Plans. The cover system will be constructed as indicated in the Engineering Plans. Where necessary to promote vegetative growth, the final grade will be amended per results of formal soils testing (administered through Wake County Soil & Water Conservation District or the NC Department of Agriculture and Consumer Services Soils Lab), and permanently stabilized via hydroseed/Hydromulch methods as outlined in the Engineering Plans. After vegetation is established, the temporary E&SC measures will be removed, and those areas will be stabilized. Conversion of temporary E&SC measures to permanent status will be coordinated with the NC DEMLR. Pavement materials comprising temporary access roads and contractor laydown areas will be removed, and either transported from project areas or utilized by the property owner as appropriate. These disturbed areas will be restored via grading and seeding as necessary to promote permanent stabilization.

4.7 Sampling and Analysis of Imported Soil

Imported soils will be required during construction of the remedial cover system. Borrow soils will be pre-sampled for toxicological and geotechnical parameters. If additional soil source(s) become necessary during the implementation of this remediation effort, supplementary soils will be obtained in accordance with DEQ Guidelines, and/or PRLF unit directives; inclusive of testing outlined herein.

4.7.1 Structural Fill Soil Acquisition

S&ME anticipates importing soils from one of the following soil acquisition facilities, both are located within a reasonable distance to the project area, and remain unapproved:

- Wake Stone, 6811 Knightdale Blvd, Knightdale, NC (a 9 mile, approximately 25 min turn-around); and
- Martin Marietta, 111 East Garner Road, Garner NC (a 32 mile, approximately 45 min turn-around).

S&ME further anticipates that the history of the selected borrow soil facility will be formally investigated under sperate task authorization. If/when an alternate soil source is utilized to provide soils for the Site, soil samples will be collected at the approximate rate(s) outlined in Appendix G of the most recent version of the DEQ Guidelines. At a minimum, soil samples will be analyzed for the following analytical parameters via EPA Methods:

- Volatile Organic Compounds (VOCs) by 8260B;
- Semi-volatile Organic Compounds (SVOCs) by 8270D;
- 1,4-Dioxane by 8270 SIM;
- 16 Priority pollutant Metals by 6020;
- Mercury by 7471B; and
- Hexavalent Chromium by 7199.

Structural fill soils from the selected facility will also be evaluated for geotechnical parameters. If/when an alternate borrow source is utilized for cover system construction, those soils will be tested for geotechnical parameters as soil classification and density by the following test methods:

- Natural Moisture Content by Method ASTM D-2216;
- Laboratory Compaction Test (Standard Proctor) by Method ASTM D-698;
- Grain Size with Hydrometer by Method ASTM D-422; and,
- Atterberg Limits by Method ASTM D-4318.

Following placement and compaction, structural fill soils will be evaluated for compaction requirements in the field by the following test method:

- Field Compaction Test (by selected ASTM Methods).

4.8 Protective Cover & Backfill Soil

Protective structural fill soils will be placed to the depth and areal extent(s) directed in the Engineering Plans. No intervening/underlying/overlying demarcation fabric has been specified. S&ME anticipates that the Subcontractor will obtain structural fill soil from one of the two quarry facilities described above. S&ME estimates that approximately 1,850 cubic yards of structural fill and vegetative soil will be necessary to construct the protective cover system.

4.8.1 General Construction Notes:

The nearest known residential property is more than 1,500 feet from the eastern perimeter of WDA Zone C; as such, impacts to neighboring residences should be minimal. Clearing efforts, transportation, soil placement, and topsoil amendment will be conducted to minimize dust and limit impacts to the adjacent commercial areas. Heavy vehicular traffic is common-place with regard to the adjacent commercial entities; as such, should have little effect that increased road signage cannot ameliorate. Never-the-less, soil transport through Knightdale should be managed. It can be reasonably assumed that congestion along US 64 Business and associated inconvenience will need to be addressed through the imposition of truck scheduling protocol imposed during the early morning and afternoon time-periods. The typical 9:00 am to 4:00 pm trucking regime for active construction sites should be placed in project documentation to promote community acceptance of the project. Use of primary roads for the transport of both fill soils into the site, and vegetative debris away from the site should be confined to primary roadways, and the use of secondary roadways should be limited to the degree possible.

Limited thin spot soil infill of targeted grids will require significantly less fill soil importation than certain other remediation methods requiring greater volumes of soil. Thin spot remediation is anticipated to utilize approximately 2,200 cubic yards or approximately 150 truckloads in total. As such, community acceptance can be assumed to be positive; particularly in recognition of the overall commercial nature of the surrounding community. As with any grading project, truck schedule limits (i.e., project protocols that govern the trucking ingress and egress) should be implemented and enforced. The need to repair the parking area and driveway will be evaluated at the conclusion of site remediation efforts, as such minimal repair through the application of an ABC stone dressing is covered herein.

4.9 Topsoil Production (Vegetative Cover Soil Amendment)

Following limited thin spot soil infill resulting in a consistent 12 inch cover, in-place amendment of the existing soil cover will be necessary. Following placement the resulting surface will be tracked. Amendment will likely include introduction of organic material, lime, and fertilizer in proportions directed by the Wake County extension service. Organic material (i.e., finely ground compost) will be used to increase the nutrient capacity of the topsoil. Compost has a high moisture retention and slow-release nutrients that will reduce the need for additional fertilization to establish vegetative growth. Amendments will be drilled, punched, or disked into the existing soil cover to a depth of approximately 4 inches. Seeding and mulching will be conducted; however, the extent of application will be limited to the areas of new infill, and along those equipment access paths that may require additional vegetative effort. Where necessary, the compacted access paths will be disked to an appropriate depth prior to hydro application(s). Soil placement and amendment will result in a disturbance area of greater than one acre, and will require the E&SC design and permit package. Promptly following amendment, the entirety of soil cover & disturbed areas in the vicinity of the WDA will be hydroseeded/hydromulched to achieve vegetative stability.

5.0 PERPETUAL LAND USE RESTRICTIONS

As part of the containment remedy, Perpetual Land Use Restrictions (PLURs) will be enacted for the East Wake County LF Property. This permanent documentation will be necessary because waste, and associated contaminant impacts, will remain onsite following completion of remediation efforts; as such, a Declaration of PLURS and a Notice of Contamination Plat will be completed by the Unit for the parcel in which the WDA is situated. The Notice Plat may require amendment at a later date, following completion of the proposed cover system construction, and establishment of the ultimate bounds of the WDA. The Declaration of PLURS and Notice Plat will ultimately be recorded on the chain of title for each parcel to address the risk identified during the remedial investigation. The property owner will be responsible for maintaining the affected properties in compliance with the PLURS. A copy of the Perpetual Land use restrictions are included in **Appendix B.**

6.0 POST CONSTRUCTION MONITORING PLAN

Following completion of remedial construction, E&SC site inspections will be necessary at regular intervals over a period of approximately 12-months to assure surface stabilization has occurred. It is the understanding of S&ME that additional observations will be conducted following significant rain events, and corrective action may be deemed necessary by the Engineer within the warranty period. Site inspections will continue until deemed

unnecessary by the Engineer. Upon establishment of the vegetative cover and authorization by the Engineer in writing, the remaining temporary E&SC measures will be removed.

7.0 ANTICPATED SCHEDULE

A proposed remedial action schedule is presented below, subject to authorization to proceed and acceptance by the PRLF Unit:

Remedial Action Schedule	
Task	**Approximate Schedule**
RAP Preparation Submit Draft RAP & Begin Public Comment (P.C.) Period by the Unit	2 Weeks from Draft RAP Receipt by PRLF
Submit Final RAP and Draft Engineering Plans	4 Weeks from End of P.C. period
Record Declaration Perpetual Land Use Restrictions	4 Weeks from Acceptance of Final RAP
Prepare Bid Specifications and Finalize Engineering Plans	6 Weeks from Acceptance of Final RAP by PRLF
Construction Procurement and Secure Contract, Submit Pre-Construction Notification	12 Weeks from Final RAP Acceptance by PRLF
Pre-Construction Meetings	16 Weeks from Final RAP Acceptance by PRLF
RAP Implementation Contractor Mobilization & Install E&SC Measures	20 Weeks from Final RAP Acceptance by PRLF
Complete Site Clearing, Relocation of Surface Waste, Placement and Grading of Limited Cover, and Vegetative Stabilization; Ends with Initial S&ME Engineer's Inspection / Declaration of Substantial Completion	~12 Weeks from Contractor Mobilization
Prepare Construction Completion Report	4 Weeks from Substantial Completion
Permanent Site Stabilization (Subject to Growing Season); Ends with Final S&ME Engineer's Inspection / Removal of Remaining E&SC Measures / Declaration of Final Completion	6 Weeks from Substantial Completion
One Year Warranty Period (Conduct Post Construction ES&C Inspections): Ends with Inspection Meeting concerning E&SC Stabilization Requirements	12 Months from Final Completion

8.0 BUDGET ESTIMATE

See the attached engineering drawings for the work phases. The remedial action (Contractor) implementation costs are estimated below:

- Contractor Submittals, Initial Clearing, ESC & Laydown Construction: **$165,000**.
- Clearing, Compaction, & Cover System Construction: **$324,000.**
- Final Construction Activities & Cleanup: **$79,000**.
- Post Construction Activities and E&SC Removals: **$17,000**.

- **Estimated Total for Remedial Construction Implementation Activities**: **$585,000.**

The remedial action (S&ME) construction management, quality control, and reporting costs are estimated below:

- Final Planning & Estimating Budget (for Bidding): **$17,000.**
- Estimated Total for Field Oversight & Project Management Activities: **$217,000.**

- **The estimated construction grand total is**: **$819,000.**
  The actual fees will be in accordance with the contract conditions established at the time of execution.

9.0 REFERENCES

This report summarizes remedial investigation activities performed at the East Wake County LF facility. Information contained in the following reports was incorporated into the remedial action planning effort:

- ATC Associates of North Carolina, P.C. (ATC), *Remedial Investigation Summary Report*, Task Order No. 614SUM-A, dated June 21, 2016.
- S&ME, Inc (S&ME), *Remedial Investigation – Soil Cover Evaluation*, Task Order No. 614RI-5 dated December 6, 2022.
- S&ME, Inc (S&ME), *Remedial Investigation – Waste Delineation Assessment Report*, Task Order No. 614RI-6 dated December 9, 2022.
- S&ME, Inc (S&ME), *Remedial Investigation – Additional Soil Gas Sampling*, Task Orders No. 614RI-8 and 614RI-8A dated June 12, 2023.
- S&ME, Inc (S&ME), *Remedial Investigation – Soil Cover Evaluation*, Task Order No. 614RI-10 dated October 20, 2023.
- S&ME, Inc (S&ME), *Remedial Investigation – Feasibility & Costs Estimation for Cover Remediation via Limited Soil Infill Report*, Task Order No. 614RI-12 dated March 14, 2025.
- S&ME, Inc (S&ME), *Remedial Investigation – Topographic and Boundary Survey*, Task Order No. 614RI-15 dated April 30, 2025.
- S&ME, Inc (S&ME), *Remedial Investigation – Waste Delineation Assessment Report*, Task Order No. 614RI-19 dated June 18, 2025.

10.0 SOLE USE STATEMENT

This report is solely intended for use by the NCDEQ for the services that were performed in accordance with S&ME's proposal dated July 28, 2025, as authorized by the NCDEQ PRLF.

11.0 CERTIFICATION

"I certify that to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete."

John Palmer / S&ME, Inc.
Name of Environmental Consultant / Company

Signature of Environmental Consultant

March 3, 2026
Date

I, Wilma Craft, a Notary Public of said County and State, do hereby certify that John Palmer did personally appear and sign before me this day, produced proper identification in the form of A North Carolina Driver's License was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 3rd day of March, 2026.

(OFFICIAL SEAL)

WILMA CRAFT
Notary Public, North Carolina
Wake County
My Commission Expires
March 12, 2028

Wilma Craft
Notary Public (signature)

My commission expires: March 12, 2028

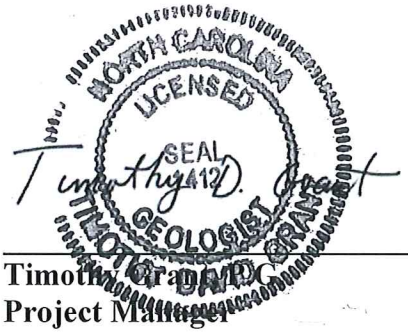
Appendices

Appendix A – ATC's Remedial Investigation Summary Report dated June 21, 2016

REMEDIAL INVESTIGATION SUMMARY REPORT
East Wake County LF
Knightdale, Wake County, North Carolina
ID No. NONCD0000614
State Contract No. N13003S
Task Order 614SUM-A

Prepared By:

Chris Hanley
Staff Geologist



Timothy Grant, P.G.
Project Manager

ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

Submitted To:

North Carolina Department of Environmental Quality
Division of Waste Management
Inactive Hazardous Sites Branch
Superfund Section
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Prepared By:
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June 21, 2016

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ACRONYMS

ATC	ATC Associates of North Carolina, PC
bgs	below ground surface
ft	feet
IHSB	Inactive Hazardous Sites Branch
mg/kg	milligrams per kilogram
MCL	Maximum Contaminant Level
NCDEQ	North Carolina Department of Environmental Quality
PIN	Wake County Property Identification Number
PSRG	Preliminary Soil Remediation Goal
RI	Remedial Investigation
SRG	Soil Remediation Goal
SVOC	Semivolatile Organic Compound
Unit	Pre Regulatory Landfill Unit
EPA	Environmental Protection Agency
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound
2B Standard	Title 15A NCAC 2B .0200 Surface Water Standard
2L Standard	Title 15A NCAC 2L .0202 Groundwater Standard
ppb	parts per billion
ppm	parts per million

1.0 INTRODUCTION

ATC Associates of North Carolina, P.C. (ATC) has prepared this Remedial Investigation Summary Report for the East Wake County LF (NONCD0000614) located in Knightdale, Wake County, North Carolina, herein after referred to as the "Site." This report provides an executive summary of risks identified during the remedial investigation at the Site.

The site is located on Three Sisters Road in Knightdale, North Carolina, as shown on ***Figure 1***. There are three separate waste disposal areas over two parcels of land. Waste Disposal Areas A and B occupy the majority of a 56.59 acre parcel (Wake County Property Identification Number [PIN] 1764750977). To the south, Waste Disposal Area C occupies the southeastern portion of a 307.91acre parcel (PIN 1764568472). This parcel also includes a regulated disposal area that is not included in the Pre-Regulatory Landfill program. The total area of all three waste disposal areas is 54.2 acres. More detail is provided in Section 4.0. Site maps are included as ***Figures 2A and 2B***.

The northern portion of Area A contains one metal building and random debris (storage containers, trailers, old vehicles, machinery) associated with current and former businesses. The southern portion is a mix of vegetation, debris and open areas. Most of Area B is grassed field with a portion covered in woods. Areas A and B are separated by the runway for the East Raleigh Airport. Area C is a grassed field with some storage containers used for storing explosives. The outer edges of Area C are wooded. The terrain in Areas A and B has a general slope to the south and west. The terrain in Area C is more rolling that slopes to the south and west towards Mark's Creek. A small portion slopes to the north towards a drainage feature. The site may be accessed from Three Sisters Road from several locations along the north and east sides of the Site. The areas adjacent to the Site are industrial and agricultural. Areas A, B, and C operated from the late 1960's and stopped receiving waste prior to January 1983.

2.0 SENSITIVE ENVIRONMENTS

The Marks Creek floodplain is reported as a "Significant Natural Heritage Area". The Least Brook Lamprey is listed as "threatened" within a 1-mile radius of the Site. A field survey was conducted during the optimum season for the species and, while habitat conditions did exist that could support the least brook lamprey, none were observed. The preferred habitat for the immature lamprey is

mostly slow moving creeks with sandy bottoms, while adults prefer faster moving water with sand and gravel bottoms for spawning.

3.0 SITE GEOLOGY AND HYDROGEOLOGY

The site is located in the Raleigh Belt physiographic province and bedrock is classified as granite. Bedrock was not encountered during the investigations. A diabase dike is inferred in the area, but no evidence of diabase was observed during site investigation. Overburden sediments overlying the bedrock surface include a mixture of sand, silt, and clay coarsening with depth to partially weathered rock.

Three primary sources were used to evaluate background concentrations of naturally occurring inorganics at the subject site. These sources included: (1) the United States Geological Survey (USGS) publication *Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States* (1984); (2) the National Uranium Resource Evaluation (NURE) Database reported on the USGS website; and (3) the water well contaminant map for Wake County reported on the North Carolina Department of Health & Human Services, Epidemiology Section Website. Based on these references, arsenic, iron, and manganese naturally occur in subsurface media in the region. Arsenic concentrations in sediment ranged from 5 to 10 parts per million (ppm) and in groundwater from 0.5 to 237 parts per billion (ppb). Iron concentrations in sediment ranged from 7,200 to 17,700 ppm and in groundwater from 25 to 197,000 ppb. Manganese concentrations in sediment ranged from 290 to 470 ppm and in groundwater from 15 to 27,710 ppb. Lead concentrations in sediment ranged from 10 to 2500 ppm and in groundwater from 0.5 to 21,000 ppb. Zinc concentrations in sediment ranged from 10 to 700 ppm and in groundwater from 15 to 121,960 ppb. Cadmium concentrations in groundwater ranged from 0.5 to 51 ppb. Note that background concentrations of thallium were not referenced in these published sources. However, according to the USGS website, thallium is commonly found and associated with clays and other potassium based minerals. Based on a review of background inorganic concentration ranges reported in these publications as well as review of the distribution of inorganic concentrations detected at the Site, inorganics detected at the Site are indicative of natural background conditions rather than contamination.

Inorganic constituents are naturally occurring in geologic materials. They are commonly found in bedrock formations and in surficial soils derived from weathering of the underlying bedrock. They

are also commonly found in surface water and groundwater due to rainfall run-off and leaching as rainfall percolates through the subsurface. As such, it is often necessary to distinguish between inorganics that are indicative of natural background conditions versus contamination. At the subject site, this determination was made based on published references

4.0 WASTE DISPOSAL AREA

A geophysical survey was conducted to identify the waste disposal area. Borings were advanced over several phases to confirm the edge of the waste. Area A covers approximately 20.66 acres and Area B covers approximately 9.52 acres on PIN 1764750977. Area C covers approximately 24.02 acres on PIN 1764568472. Buried waste includes scrap metal, concrete, asphalt, glass, paper, plastic, electrical wire, brick, rubber, and fabric within a matrix of soils of variable composition. ***Figure 3*** shows the waste disposal boundary.

Area A also contains varying amounts of surface debris including old machinery, boats, vehicles, concrete, storage containers, and other debris associated with the current and former businesses in this area. There was also a former composting area that still contains compost material. There are several containers located throughout Area C that are used for the storage of explosives. These locations are shown on ***Figure 2B***. The explosives firm is currently still a tenant.

A total of 211 borings were advanced to characterize the surface cover overlying the waste. Waste was encountered at depths ranging from 8 inches to over 4 feet below ground surface (bgs). Surface cover above the waste consists primarily of fill and silt to clayey silt. Portions of Area A and B have less than 2 feet of cover. Waste thickness in Areas A and B ranged from 1.5 to 14.5 feet. More than half of Area C has less than 2 feet of surface cover. A cover thickness map is included as ***Figure 4***.

5.0 MEDIA CHARACTERIZATION

5.1 Soil and Sediment Characterization

5.1.1 Soil and Sediment Remedial Goals

Soil and sediment analytical results were initially compared to the Preliminary Soil Remediation Goals (PSRGs) established by the North Carolina Inactive Hazardous Site Branch (IHSB) and

protection of groundwater. An evaluation of analytical results for soil and sediment was completed that meet remedial goals for a containment remedy.

5.1.2 Soil Sampling

Twenty-four soil samples were collected from 35 borings. The following were detected in one sample at concentrations exceeding the PSRG: ethylbenzene, trichloroethene, bis-(2-ethylhexal)phthalate, and arsenic. As discussed in Section 3.0, the presence of arsenic is attributed to background concentrations. Soil analytical data exceeding the PSRGs are included in ***Table 1*** and a soil exceedances map is included as ***Figure 5***.

To evaluate cover soils, 23 samples were collected and the analytical results were compared to the Preliminary Industrial SRGs. Sample locations were selected by gridding off the waste disposal areas and collecting a representative sample from each grid. No concerns were identified in these samples.

5.1.3 Sediment Sampling

Three sediment samples were collected. The arsenic and manganese concentrations are attributed to background concentrations.

5.2 Water Characterization

Groundwater analytical results were compared to North Carolina's 15A NCAC 02L .0202 Standards. Surface water results were compared to North Carolina's 15A NCAC 2B .200 Standards.

5.2.1 Groundwater Wells

Groundwater was encountered at depths ranging from approximately 1 to 25 bgs. Groundwater flow direction is primarily to the southwest towards Mark's Creek with localized influence with flow to the east-southeast toward the unnamed tributary. A groundwater flow map is shown in ***Figure 6***.

Seventeen permanent groundwater monitoring wells and eight temporary groundwater wells were installed at the site. The following analytes were detected in one or more samples at concentrations above the 2L Standards: 1,1-dichloroethane, 1,2-dichloroethane, 1,2-dichloropropane, 1,4-

dichlorobenzene, benzene, trichloroethylene, vinyl chloride, 1,4-dioxane, 4-naphthalene, cadmium, iron, lead, manganese, thallium, and zinc. As discussed in Section 3.0, cadmium, iron, lead, manganese, thallium, and zinc were within the concentration range for naturally occurring metals. Elevated concentrations of lead, zinc, and cadmium were found only in samples collected from temporary wells, and were not reproduced in samples collected from the permanent monitoring wells installed in those areas. Groundwater analytical data exceeding 2L Standards are included in ***Table 2*** and a groundwater exceedances map is included as ***Figure 7***.

5.2.2 Surface Water and Seep

Mark's Creek flows to the southeast and is located southwest of Area C. An unidentified creek, located east of Three Sisters Road, flows from north to south and discharges into Mark's Creek. Creeks in the site vicinity are shown on the topographic map included as ***Figure 1*** and ***Figures 2A*** and ***2B.***

An upstream surface water sample was collected from the unidentified creek and the downstream sample were collected from Mark's Creek. An additional surface water sample was collected from a seep located the eastern side of Area A. In the downstream sample, iron concentration exceeded the 2B Standard for freshwater aquatic life. The following constituents were detected above the 2B Standards in the seep sample: iron, manganese, and zinc. Analytical data is shown in ***Table 3*** and a surface water exceedances map is included as ***Figure 8***.

5.2.3 Potable Water Supply Wells

No water supply wells were sampled.

5.3 Landfill Gas Characterization

An above ground vapor survey was conducted at 259 locations. The detected concentrations of volatile organic compounds (VOCs) are summarized in ***Table 4*** and presented in ***Figure 9***.

Fifteen landfill gas probes and one flux chamber were installed and sampled using field instrumentation for VOCs, methane, carbon dioxide, hydrogen sulfide, and oxygen. There were up to eight field readings events completed. Methane was detected in the gas probes ranging from 0.1% to 64.3% by volume and VOCs were detected in concentrations ranging from 0.1 to 68.7

ppm. The highest recorded landfill gas readings for each point, except for oxygen which is the lowest recorded reading, are summarized in the table shown on ***Figure 10***.

Samples for laboratory analysis of mercury were collected from 2 of the gas probes within the waste boundary of Area A, but mercury was not was detected. Mercury was evaluated in both the above ground vapor survey and in the subsurface and was determined not a concern at the Site.

Air samples were collected for analysis of VOCs from selected gas probes and the results were compared to the NCDEQ IHSB Non-Residential Vapor Intrusion Screening Levels (VISL), June 2014. The following were detected in one or more samples at a concentrations above the standard: 1,2,4-trimethylbenzene and m,p-xylene. Concentrations of 1,3,5-trimethylbenzene, 2,2,4-trimethylpentane, 3-dichlorobenzene, cis-1,2,-dichloroethylene, trans-1,2-dichloroethene, ethanol, 4-ethyltoluene, freon 114, and heptane were also detected; however, standards have not been established for these constituents. Landfill gas analytical data is summarized in ***Table 5*** and a landfill gas exceedances map is included as ***Figure 11***.

6.0 REFERENCES

HDR Engineering, Inc., *Contamination Delineation Phase Report*, July 2011.

North Carolina Department of Health & Human Services, Epidemiology Section Website. *Water Well Contaminant Maps by County, Wake County*. 2014.

Marshall Miller & Associates, *Remedial Investigation – Delineation Phase (Media Sampling and Landfill Gas) Report*, October 12, 2012

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Sole Use Statement

This report was prepared solely for the intended use of NCDENR Inactive Hazardous Sites Branch performed in the scope of work for Task Order 9276SUMA. Use of this document for other purposes is at the sole risk of the user.

REPORT CERTIFICATION

Document Name: Remedial Investigation Summary Report
Site Name: East Wake County LF
Site ID: NONCD0000614
Task Order: 614SUM-A

I certify that, to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete.

Timothy D. Grant, P.G.
Project Manager

Timothy Grant
Signature

6-21-16
Date

Before me personally appeared Timothy Grant to me known and known to me to be the person described in and who executed the foregoing instrument, and acknowledge to and before me that Timothy Grant executed said instrument for the purposes therein expressed.

Witness my hand and official seal this 21st day of June, 2016.

Irene A Byers
Notary Public

August 27, 2017
My commission Expires on

North Carolina
State of

Wake
County of

Official Seal

IRENE A BYERS
NOTARY PUBLIC
WAKE COUNTY
STATE OF NORTH CAROLINA

TABLES

Table 1
Soil Analytical Data
East Wake County LF - NONCD0000614
Knightdale, Wake County,North Carolina

Sample ID	Preliminary Industrial Health-Based SRG[1]	TW-5A 4-6'	TW-5A 6-8'	TW-5A 8-10'	TW-5B 8-10'	TW-5B 10-12'
Volatile Organic Compounds by EPA Method 8260B (mg/kg)						
Ethylbenzene	25	**7,260**	0.0025	ND	0.0012	0.00066
Trichloroethene	3.8	**150**	ND	ND	ND	ND
Semi-Volatile Organic Compounds by EPA Method 8270D (mg/kg)						
Bis(2-ethylhexyl) phthalate	160	2.6	0.31	ND	**770**	0.096

Notes:

[1]NCDEQ IHSB Soil Remediation Goal table (April 2016).

ND = The analyte was analyzed but not detected to the respective level for the analytical methods.

Bold indicates the analyte was detected at a concentration exceeding one or more of the criteria, or no standards exist for the analyte.

Table 2
Groundwater Analytical Data
East Wake County LF - NONCD0000614
Knightdale, Wake County, North Carolina

Sample ID	Water Quality Standards	PRLMW-2	PRLMW-4	PRLMW-5	MW-6	MW-8	MW-9	MW-10	MW-11	MW-12	MW-14	MW-15	MW-16	TW-2	TW-4	TW-8
Sample Date	2L[1]	1/14/2015	1/13/2015	1/13/2015	1/16/2015	1/16/2015	1/16/2015	1/16/2015	1/15/2015	1/14/2015	1/14/2015	1/15/2015	1/14/2015	3/25/2011	3/29/2011	3/22/2011
Volatile Organic Compounds by EPA Method 8260B (µg/L)																
1,1-Dichloroethane	6	ND	0.38	ND	2	0.27	0.33	0.24	ND	4.7	0.52	ND	ND	ND	**47**	ND
1,2-Dichloroethane	0.4	**1.3**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.6	ND	ND	0.4	ND	ND	ND	ND	ND	**0.69**	0.32	**1.8**	ND	ND	ND	ND
1,4-Dichlorobenzene	6	2.1	0.92	**6.4**	3	3.1	**10**	5	4.3	**6.7**	**7.6**	1.9	5.9	ND	ND	ND
Benzene	1	**3.7**	**1.4**	**2.6**	ND	**1.5**	**3.3**	**1.6**	**1.6**	**6**	**7.5**	**2.1**	**3.1**	**1.9**	**12**	ND
Trichloroethylene	3	0.12	ND	ND	0.46	ND	ND	ND	ND	0.13	ND	ND	ND	ND	**3**	ND
Vinyl chloride	0.03	ND	ND	**0.86**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**19**	ND
Volatile Organic Compounds by EPA Method 8260B SIM (µg/L)																
1,4-Dioxane	3	ND	ND	2.6	**16**	ND	**3.1**	1.9	ND	**25**	ND	**3.9**	ND	NA	NA	NA
Semi-Volatile Organic Compounds by EPA Method 8270D (µg/L)																
Naphthalene	6	**11*** **	1.5 J***	2.5***	0.2 ***	0.83 **	ND***	ND***	0.72 ***	**8.8*** **	2.2***	0.14***	**6*** **	ND	**8.7**	**27**

Notes:

[1]NC Administrative Code Title 15A, Subchapter 2L: Classifications and Water Quality Standards Applicable to The Groundwaters of North Carolina as of April 1, 2013.

***Naphthalene analyzed by 8260.

ND = The concentrations of the targeted analytes were below the respective MDL or RL for the analytical methods.

NA = Not analyzed

Bold indicates the analyte was detected at a concentration exceeding one or both of the applicable water quality standards, or no standards exist.

µg/L = micrograms/liter

Table 3
Surface Water Analytical Data
East Wake County LF
NONCD0000614
Knightdale, Wake County, North Carolina

Sample ID	**Freshwater Aquatic Life[1]**	**SW-2**	**SW-3 Seep**
Sample Date		**4/7/2011**	**4/7/2011**
Metals by Method 200.7 (ug/L)			
Iron	1,000	**1,350**	**28,800**
Manganese	200*	179	**745**
Zinc	50	4.3	**127**

Notes:

[1]The standards were adopted from Title 15A of North Carolina Administrative Code 2B dated May 1, 2007

*Water Supply standard.

ND = The analyte was analyzed but not detected to the respective level for the analytical methods. See the complete analytical laboratory report for more detail.

NES = No Established Standard.

Bold indicates the analyte was detected at a concentration exceeding one or more of the criteria.

µg/L = micrograms/liter

Ta**ble 4**
Above-Ground Landfill Gas Survey
East Wake County LF
NONCD0000614
Knightdale, Wake County, North Carolina

SAMPLE LOCATION	DATE	VOCs ppm
AGLG22	11/16/2012	0.2
AGLG24	11/16/2012	0.7
AGLG55	11/16/2012	0.2
AGLG57	11/16/2012	0.3

Notes:
ppm = parts per million

Table 5
Landfill Gas Analytical Data
East Wake County LF
Knightdale, Wake County, North Carolina

Sample ID:	Non-Residential Exterior Soil Gas Screening Level (SGSL)[1]	GP-1	GP-2	GP-3	GP-4A	GP-5A	GP-7	GP-9	GP-10	GP-15
Sample Date:		**1/22/2015**	**7/2/2014**	**1/22/2015**	**1/22/2015**	**7/2/2014**	**7/1/2014**	**1/22/2015**	**1/22/2015**	**1/22/2015**
GC/MS Volatiles (TO-15) - ug/m3										
1,2,4-Trimethylbenzene	613	ND	32.4	**646**	9.92	78	ND	148	**792**	31.0
1,3,5-Trimethylbenzene	NES	**860**	**12**	**338**	**23.9**	**28**	ND	**111**	**410**	**16.1**
2,2,4-Trimethylpentane	NES	**111**	ND	**755**	**1,509**	**43.7**	ND	**1,256**	**27.2**	**440**
1,3-Dichlorobenzene	NES	**8.84**	ND	**10.1**	**11.2**	ND	ND	**0.183**	ND	**2.42**
cis-1,2-Dichloroethylene	NES	**22.3**	ND	**17.3**	**9.28**	ND	ND	**9.85**	**24.1**	ND
trans-1,2-Dichloroethylene	NES	ND	ND	ND	**1.20**	ND	ND	ND	**0.609**	ND
4-Ethyltoluene	NES	**113**	ND	**29.2**	**2.44**	**11**	ND	**8.08**	**74.6**	**4.06**
Ethanol	NES	ND	**80.8**	**2.71**	ND	**43.2**	**22.1**	**2.74**	**1.40**	**4.19**
Freon 114 (C2Cl2F4)	NES	**78.9**	ND	**340**	**92.5**	**91**	ND	**140**	**12.1**	**135**
Heptane	NES	**60.8**	ND	**1,136**	**20.0**	ND	ND	**170**	**180**	**297**
m,p-Xylene	8,760	**3,611**	362	**27,306**	40.3	631	ND	554	**11,651**	135

Notes:

[1]NCDEQ IHSB Non-Residential Vapor Intrusion Screening Levels, March 2016

SGSL = Soil Gas Screening Level.

NES = No established standard.

ND = The analyte was analyzed but not detected to the respective level for the analytical methods. See the complete analytical laboratory report in appendices for more detail.

Other data qualifiers are included in laboratory report.

Bold indicates the analyte was detected at a concentration exceeding the Non-Residential Exterior Soil Gas Screening Level standard.

ug/m³ = microgram per cubic meter of air

FIGURES

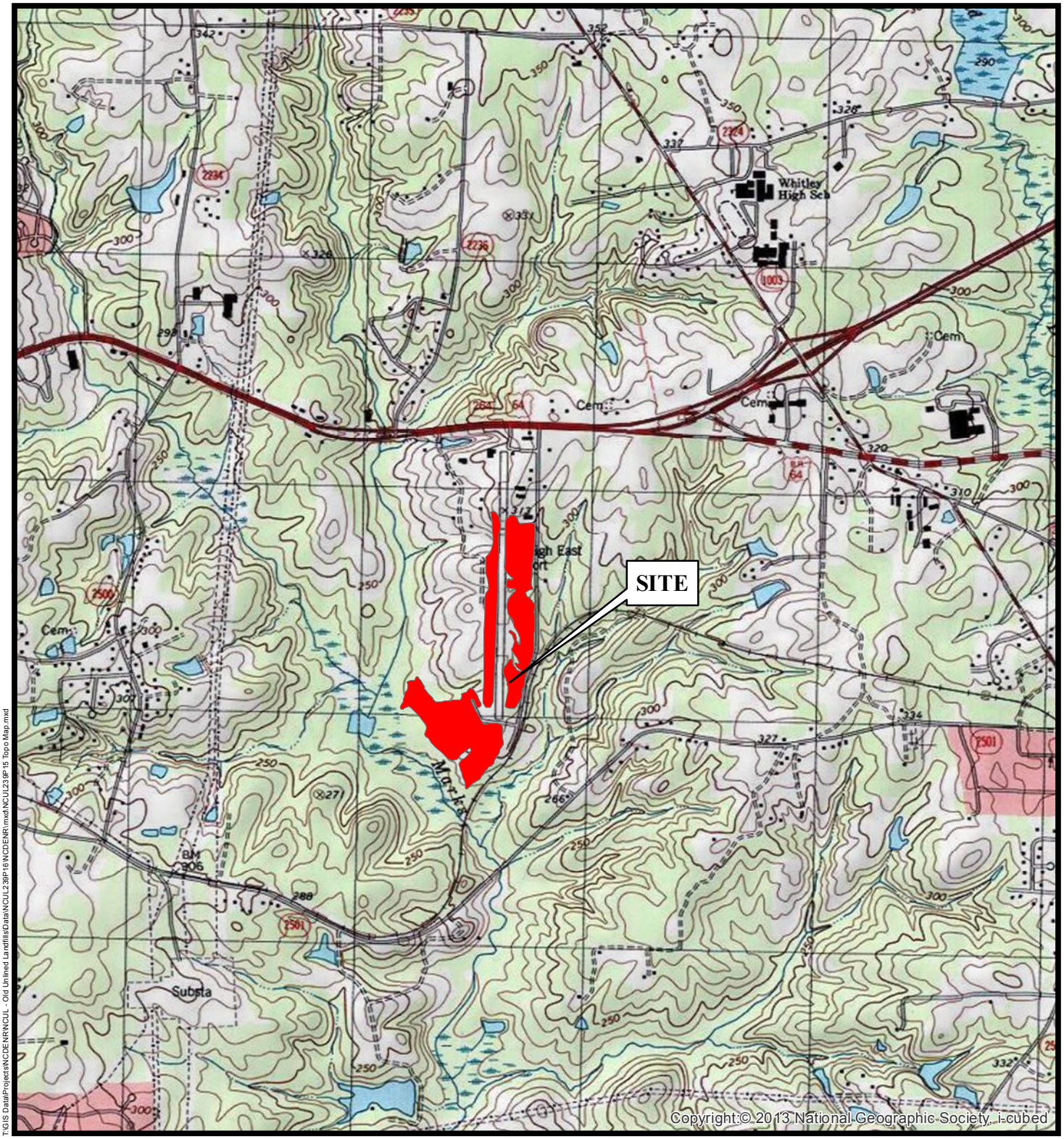

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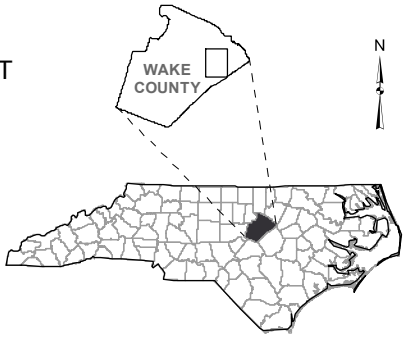
FIGURE 1

REMEDIAL INVESTIGATION SUMMARY REPORT
EAST WAKE COUNTY LF
STATE ID NONCD0000614
KNIGHTDALE, WAKE COUNTY
NORTH CAROLINA

2,000 ' 0 2,000 '
1:24,000



NORTH CAROLINA
QUADRANGLE LOCATION

SOURCE:
- ESRI World Imagery internet map service layer

PROJECT NO.: PRLU0614A
DATE: 1/10/2016

TOPOGRAPHIC LOCATION MAP

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURE
- WASTE DISPOSAL AREA
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- EXISTING RAILROAD
- HYDROLOGIC LINES
- Cover Soil Borings
- SOIL BORING
- SURFACE WATER SAMPLING POINT/SEDIMENT SAMPLE
- EXISTING MONITORING WELL (INSTALLED BY OTHERS)
- PERMANENT MONITORING WELL (INSTALLED BY MM&A)
- TEMPORARY MONITORING WELL ELEVATION (INSTALLED BY OTHERS)
- GAS PROBE
- FLUX CHAMBER
- POST-RUN TUBING

N

SW-1 (UPSTREAM)

GP-7
PRLMW-1
TW-1
TW-2
TW-3
TW-4
SW-3
GP-4A
TW-5
SB-212
GP-1
GP-2
MW-13
A
SB-216
MW-12
GP-10
TW-6
GP-10A
SB-215
GP-3
SB-213
PRLMW-2
GP-6C
SB-14
PRLMW-5
MW-14
SB-217
MW-11
TW-7
GP-5A
GP-11
GP-12
TW-9
SB-15C
SB-16A
GP-9
MW-3
SB-214B
TW-8
PRLMW-4
B
MW-15
GP-13
MW-16
GP-15
MW-6
GP-16

0 250 500 Feet

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FIGURE 2A - SITE PLAN-AREA A AND B
REMEDIAL INVESTIGATION-DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

PROJECT NO.	DATE:	SCALE:	REV:	PREP:
PRLU0614A	6/21/2016	1 " = 250 '	TG	AK

TASK ORDER: 614SUM-A

NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\NCUL239P15 Area A & B.mxd

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURE
- WASTE DISPOSAL AREA
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- EXISTING RAILROAD
- HYDROLOGIC LINES
- Cover Soil Borings
- SURFACE WATER SAMPLING POINT/SEDIMENT SAMPLE
- EXISTING MONITORING WELL (INSTALLED BY OTHERS)
- PERMANENT MONITORING WELL (INSTALLED BY MM&A)
- TEMPORARY MONITORING WELL ELEVATION (INSTALLED BY OTHERS)
- GAS PROBE
- FLUX CHAMBER
- POST-RUN TUBING

GP-10
GP-10A
TW-6
MW-11
TW-7
GP-5A
GP-12
OFFICE TRAILER
MW-10
GP-13
GP-14
MW-16
C
GP-15
MW-9
EXPLOSIVE STORAGE
MW-6
GP-16
MW-8
EXPLOSIVE STORAGE
EXPLOSIVE STORAGE
MW-5

N

0 200 400 Feet

NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

FIGURE 2B - SITE PLAN-AREA C
REMEDIAL INVESTIGATION-DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

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PREP:	REV:	SCALE:	DATE:	PROJECT NO.
AK	TG	1 " = 200 '	6/21/2016	PRLU0614A

TASK ORDER: 614SUM-A

Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\Area Section C.mxd

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURE
- WASTE DISPOSAL AREA
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- EXISTING RAILROAD
- HYDROLOGIC LINES

N

THREE SISTERS RD

RALEIGH EAST AIRSTRIP

A

GP-3

B

C

0 200 400 Feet

NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

FIGURE 3 - WASTE DISPOSAL AREA BOUNDARY
REMEDIAL INVESTIGATION - DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

TASK ORDER: 614SUM-A

PREP: RB | **REV:** JB | **SCALE:** 1 " = 400 ' | **DATE:** 1/15/2016 | **PROJECT NO.** PRLU0614A

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Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\NCUL239P15 Waste Disposal Area Boundary Map.mxd

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURE
- AREA WHERE SOIL COVER THICKNESS <2 FEET
- WASTE DISPOSAL AREA
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- EXISTING RAILROAD
- SOIL BORING LOCATION

N

THREE SISTERS RD

RALEIGH EAST AIRSTRIP

A

B

C

0 200 400 Feet

NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

FIGURE 4 - COVER THICKNESS MAP
REMEDIAL INVESTIGATION-DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

TASK ORDER: 614.SUM-A

PREP: SMN | **REV:** TG | **SCALE:** 1 " = 400 ' | **DATE:** 1/15/2016 | **PROJECT NO.** PRLU0614A

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Raleigh, North Carolina, 27604
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Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\NCUL239P15 Cover Thickness Map.mxd

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURES
- WASTE DISPOSAL AREA
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- EXISTING RAILROAD
- SOIL BORING (INSTALLED BY OTHERS)
- SOIL BORING

N

TW-5A	mg/kg
4-6'	
ETHYBENZENE	7,260
TRICHLOROETHENE	150

TW-5B	mg/kg
8-10'	
BIS 2-ETHYLHEXYLPHTHALATE	770

TW-5

SB SB-212

SB-17D

SB-213

SB-14

SB-214A

SB-15C

SB-214C

SB-16A

SB-214B

SB-214A

SB-214C

SB-214B

SB-216 SB-216

SB-215 SB-215

SB-217 SB-217

A

B

0 200 400 Feet

NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

FIGURE 5 - SOIL EXCEEDANCES MAP
REMEDIAL INVESTIGATION-DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

ATC Associates of North Carolina, P.C.
Raleigh, North Carolina 27604
(919) 871-0999

PREP:	REV:	SCALE:	DATE:	PROJECT NO.
AK	TG	1 " = 200 '	6/3/2016	PRLU0614A

TASK ORDER: 614SUM-A

Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\Soil Exceedances Map.mxd

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURE
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- EXISTING RAILROAD
- HYDROLOGIC LINES
- WASTE DISPOSAL AREA
- SURFACE WATER/SEDIMENT SAMPLE LOCATION

N

THREE SISTERS RD

RALEIGH EAST AIRSTRIP

A

B

C

GP-3

SW-3 (SEEP)	ug/L
Iron	28,800
Manganese	745
Zinc	127

SW-2	ug/L
Iron	1,350

0 200 400 Feet

NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

FIGURE 6 - SURFACE WATER & SEEP EXCEEDANCES MAP

REMEDIAL INVESTIGATION-DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

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Raleigh, North Carolina, 27604
(919) 871-0999

PREP:	REV:	SCALE:	DATE:	PROJECT NO.
AK	TG	1 " = 400 '	6/21/2016	PRLU0602A

TASK ORDER: 614SUM-A

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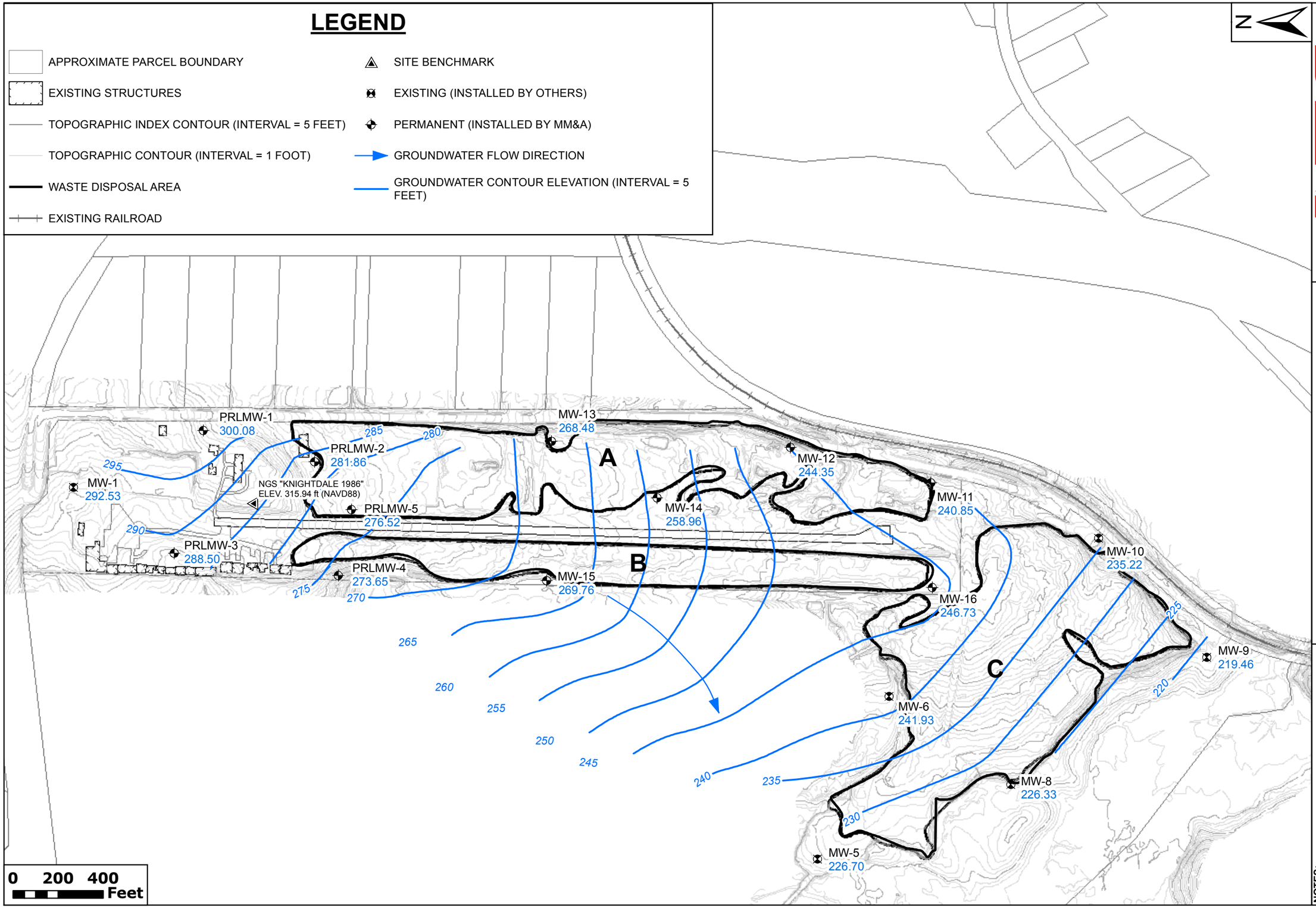
LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURES
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- WASTE DISPOSAL AREA
- EXISTING RAILROAD
- SITE BENCHMARK
- EXISTING (INSTALLED BY OTHERS)
- PERMANENT (INSTALLED BY MM&A)
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER CONTOUR ELEVATION (INTERVAL = 5 FEET)



NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

FIGURE 7 - GROUNDWATER FLOW MAP
REMEDIAL INVESTIGATION - DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

TASK ORDER: 614SUM-A
PREP: HMS
REV: TG
SCALE: 1 " = 400 '
DATE: 6/21/2016
PROJECT NO. PRLU0614A

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(919) 871-0999

Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\NCUL239P15 GW FlowMap.mxd

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURE
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- WASTE DISPOSAL AREA
- EXISTING RAILROAD
- EXISTING MONITORING WELL (INSTALLED BY OTHERS)
- PERMANENT MONITORING WELL (INSTALLED BY MM&A)
- TEMPORARY MONITORING WELL ELEVATION (INSTALLED BY OTHERS)

**Naphthalene analyzed by 8260.

N

TW-4	ug/L
1,1-Dichloroethane	47
Benzene	12
Trichloroethylene	3
Vinyl chloride	19
Naphthalene	8.7

MW-12	ug/L
Benzene	6
1,4-Dichlorobenzene	6.7
1,2-Dichloropropane	0.69
1,4-Dioxane	44
Naphthalene	8.8**

MW-11	ug/L
Benzene	1.6

MW-9	ug/L
Benzene	3.3
1,4-Dichlorobenzene	10
1,4-Dioxane	3.1

TW-1
TW-3
MW-13
TW-6
TW-7
THREE SISTERS RD
PRLMW-1
MW-1
A
RALEIGH EAST AIRSTRIP
B
C
PRLMW-3
TW-9
TW-8
MW-5

TW-2	ug/L
Benzene	2

MW-14	ug/L
Benzene	8
1,4-Dichlorobenzene	8

MW-6	ug/L
Benzene	5
1,4-Dioxane	16

PRLMW-2	ug/L
Benzene	3.7
1,2-Dichloroethane	1
Naphthalene	11

MW-15	ug/L
Benzene	2.1
1,2-Dichloropropane	2
1,4-Dioxane	3.9

MW-10	ug/L
Benzene	2
Iron	50,000*

PRLMW-4	ug/L
Benzene	1
Iron	32,000

PRLMW-5	ug/L
1,4-Dichlorobenzene	6.4
Benzene	3
Vinyl Chloride	0.86

MW-16	ug/L
Benzene	3
naphthalene	6**

MW-8	ug/L
Benzene	2

0 200 400 Feet

NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

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Raleigh, North Carolina, 27604
(919) 871-0999

FIGURE 8 - GROUNDWATER EXCEEDANCES MAP
REMEDIAL INVESTIGATION-DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

PROJECT NO.	DATE:	SCALE:	REV:	PREP:
PRLU0614A	6/21/2016	1 " = 400 '	TG	AK

TASK ORDER: 614SUM-A

Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\GW Exceedances Map.mxd

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURE
- WASTE DISPOSAL AREA
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- EXISTING RAILROAD
- VOC DETECTION (ppm - parts per million)

N

C

AGLG22
PID: 0.2ppm

AGLG24
PID: 0.7ppm

AGLG57
PID: 0.3ppm

AGLG55
PID: 0.2ppm

0 200 400 Feet

NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

FIGURE 9 - ABOVE GROUND VAPOR SURVEY MAP

REMEDIAL INVESTIGATION-DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

TASK ORDER: 614SUM-A

ATC Associates of North Carolina, P.C.
Raleigh, North Carolina, 27604
(919) 871-0999

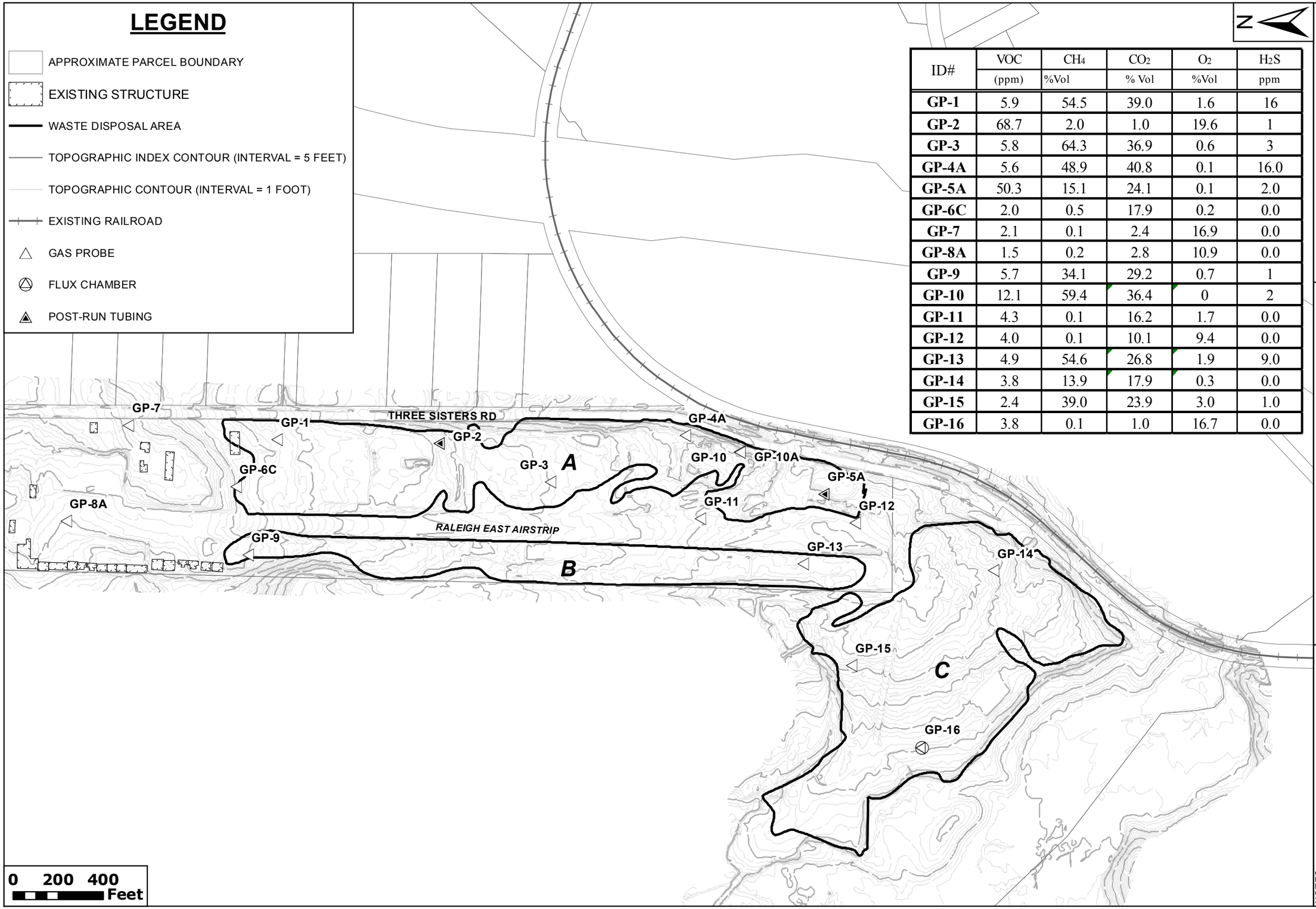
PREP:	REV:	SCALE:	DATE:	PROJECT NO.
AK	TG	1 " = 200 '	6/7/2016	PRLU0614A

Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\Above Ground Vapor Survey Map.mxd

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURE
- WASTE DISPOSAL AREA
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- EXISTING RAILROAD
- GAS PROBE
- FLUX CHAMBER
- POST-RUN TUBING

ID#	VOC (ppm)	CH_4 %Vol	CO_2 % Vol	O_2 %Vol	H_2S ppm
GP-1	5.9	54.5	39.0	1.6	16
GP-2	68.7	2.0	1.0	19.6	1
GP-3	5.8	64.3	36.9	0.6	3
GP-4A	5.6	48.9	40.8	0.1	16.0
GP-5A	50.3	15.1	24.1	0.1	2.0
GP-6C	2.0	0.5	17.9	0.2	0.0
GP-7	2.1	0.1	2.4	16.9	0.0
GP-8A	1.5	0.2	2.8	10.9	0.0
GP-9	5.7	34.1	29.2	0.7	1
GP-10	12.1	59.4	36.4	0	2
GP-11	4.3	0.1	16.2	1.7	0.0
GP-12	4.0	0.1	10.1	9.4	0.0
GP-13	4.9	54.6	26.8	1.9	9.0
GP-14	3.8	13.9	17.9	0.3	0.0
GP-15	2.4	39.0	23.9	3.0	1.0
GP-16	3.8	0.1	1.0	16.7	0.0



NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

FIGURE 10 - LANDFILL GAS EXCEEDANCES MAP
REMEDIAL INVESTIGATION-DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

TASK ORDER: 614SUM-A

PREP: AK | **REV:** TG | **SCALE:** 1 " = 400 ' | **DATE:** 1/15/2016 | **PROJECT NO.** PRLU0614A

ATC Associates of North Carolina, P.C.
Raleigh, North Carolina, 27604
(919) 871-0999

Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\NCUL239P15 Landfill Gas Exceedances Map.mxd

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- EXISTING STRUCTURE
- WASTE DISPOSAL AREA
- TOPOGRAPHIC INDEX CONTOUR (INTERVAL = 5 FEET)
- TOPOGRAPHIC CONTOUR (INTERVAL = 1 FOOT)
- EXISTING RAILROAD
- GAS PROBE
- FLUX CHAMBER
- POST-RUN TUBING

N

GP-4A	ug/m³
1,3-Dichlorobenzene	11.2
4-Ethyltoluene	2.44
1,3,5-Trimethylbenzene	23.9
2,2,4-Trimethylpentane	1,509
cis-1,2-Dichloroethylene	9.28
trans-1,2-Dichloroethene	1.2
Freon 114	92.5
Heptane	20
Isopropyl alcohol	22.4

GP-3	ug/m³
1,3-Dichlorobenzene	10.1
4-Ethyltoluene	29.2
Ethanol	2.71
1,2,4-Trimethylbenzene	646
1,3,5-Trimethylbenzene	338
2,2,4-Trimethylpentane	755
cis-1,2-Dichloroethylene	17.3
Freon 114	340
Heptane	1,136
m,p-Xylene	27,306

GP-10	ug/m³
4-Ethyltoluene	74.6
Ethanol	1.4
1,2,4-Trimethylbenzene	792
1,3,5-Trimethylbenzene	410
2,2,4-Trimethylpentane	27.2
cis-1,2-Dichloroethylene	24.1
trans-1,2-Dichloroethene	0.609
Freon 114	12.1
Heptane	180
m,p-Xylene	11,651

GP-2	ug/m³
Ethanol	80.8
1,3,5-Trimethylbenzene	12

GP-5A	ug/m³
4-Ethyltoluene	11
Ethanol	43.2
Freon 114	91
Isopropyl alcohol	65.1
1,2,4-Trimethylbenzene	78
1,3,5-Trimethylbenzene	28
2,2,4-Trimethylpentane	43.7

THREE SISTERS RD

A

GP-6C

GP-8

RALEIGH EAST AIRSTRIP

B

GP-11

GP-12

GP-13

GP-14

C

GP-16

GP-7	ug/m³
Ethanol	22.1

GP-1	ug/m³
1,3-Dichlorobenzene	8.84
4-Ethyltoluene	113
1,3,5-Trimethylbenzene	860
2,2,4-Trimethylpentane	111
cis-1,2-Dichloroethylene	22.3
Freon 114	78.9
Heptane	60.8
m,p-Xylene	3,611

GP-9	ug/m³
1,3-Dichlorobenzene	0.183
4-Ethyltoluene	8.08
Ethanol	2.74
1,2,4-Trimethylbenzene	148
1,3,5-Trimethylbenzene	111
2,2,4-Trimethylpentane	1,256
cis-1,2-Dichloroethylene	9.85
Freon 114	140
Heptane	170

GP-15	ug/m³
1,3-Dichlorobenzene	2.42
4-Ethyltoluene	4.06
Ethanol	4.19
1,3,5-Trimethylbenzene	16.1
2,2,4-Trimethylpentane	440
Freon 114	135
Heptane	297

0 500 1,000 Feet

ATC Associates of North Carolina, P.C.
Raleigh, North Carolina 27604
(919) 871-0999

PROJECT NO. PRLU0614A
DATE: 1/13/2016
SCALE: 1 " = 500 '
REV: TG
PREP: AK
TASK ORDER: 614.SUM-A

FIGURE 11 - LANDFILL AIR EXCEENDANCES MAP
REMEDIAL INVESTIGATION-DELINEATION
EAST WAKE COUNTY LF
NONCD0000614
KNIGHTDALE, WAKE COUNTY, NC

NOTES:
Features shown are not an authoritive location, nor are they presented to a stated accuracy.

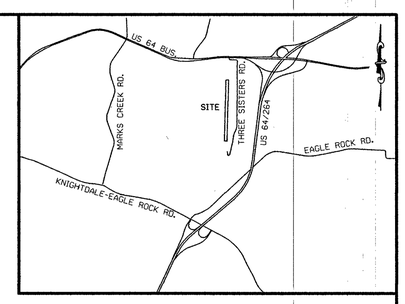
DATA SOURCES:
Wake County GIS Department

COORDINATE SYSTEM:
NAD 1983 North Carolina State Plane FIPS 3200, US Survey Feet

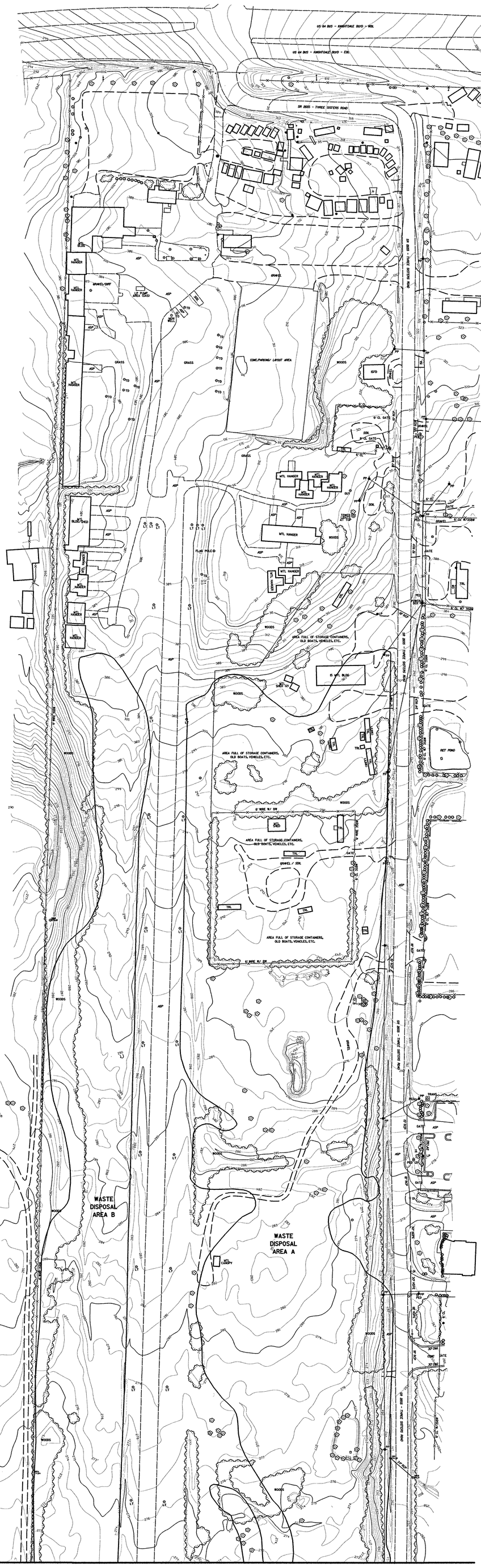
Path: T:\GIS Data\Projects\NCDENR\NCUL - Old Unlined Landfills\Data\NCUL239P16\NCDENR\mxd\NCUL239P15 Landfill Air Exceendances.mxd

APPENDIX A

SITE SURVEY



SITE MAP



MATCHLINE - SEE SHEET 2

NC GRID NAD 83/ NA 2011

THE FOLLOWING CONTROL POINTS WERE USED TO CONTROL THE AERIAL PHOTOGRAPHY AND THE SUPPLEMENTAL SURVEYS.

THE COORDINATES AND ELEVATIONS OF THE CONTROL POINTS SHOWN ARE GROUND COORDINATES LOCALIZED ABOUT CONTROL POINT607 (NAD 83/2011 - GEOID 12A), COMPINED SCALE FACTOR (0.99991035) AS OBTAINED FROM THE NORTH CAROLINA RTN NETWORK.

ALL CONTROL POINTS ARE 12" BRIDGE SPIKES

CONTROL POINTS

601 2166478.612 748132.255 286.936
602 2167689.677 748060.224 325.226
603 2166189.534 742164.869 243.754
604 2164648.305 742154.251 267.458
605 2167327.202 742229.986 235.119
606 2164658.277 744494.587 230.428
607 2165965.346 744820.481 259.428
608 2167449.141 745395.011 263.140
609 2166024.710 746031.912 265.454

MAP LEGEND

PP	***POWER POLE***
LT	***LIGHT***
TD	***TIE DOWN (ANCHOR)***
——x——	***FENCE***
CL	***CHAIN LINK***
SBW	***STRANDS OF BARBED WIRE***
TRL	***TRAILOR - MOBILE OFFICE***
ISFD	***1 STORY FRAMED DWELLING***
MTL	***METAL METAL***
RCP	***REINFORCED CONCRETE PIPE***
MSC	***METAL STORAGE CONTAINER***
WD	***WOOD***
ASP	***ASPHALT***

FEMA FLOOD ZONE:

A PORTION OF THE SUBJECT AREA SHOWN IS LOCATED IN A SPECIAL FLOOD HAZARS AREA (ZONE AE) PER FLOOD INSURANCE RATE MAP 3720176400J, LAST REVISED 05/02/06.

SURVEYOR'S CERTIFICATION

TOPOGRAPHIC AND PLANIMETRIC MAPPING
I, C. ANDREW HEATH, JR., PLS, CERTIFY THAT THIS MAP WAS COMPILED UNDER MY DIRECT AND RESPONSIBLE CHARGE UTILIZING AN AERIAL SURVEY PERFORMED BY GEODATA CORPORATION, DATED APRIL 24, 2015. THAT THE AERIAL MAPPING WAS SUPPLEMENTED STORM SYSTEMS, OBSCURED AREAS AND OTHER OBSCURED FEATURES LOCATED BY AN ACTUAL SURVEY MADE UNDER MY SUPERVISION, AND COMPLETED ON MAY 5, 2015; THAT THE GROUND SURVEY WAS PERFORMED TO MEET THE TOPOGRAPHIC (21NCAC 56.1606) ACCURACY STANDARDS OF HORIZONTAL CLASS AA AND VERTICAL CLASS C; AND THAT ALL COORDINATES ARE BASED ON NAD 83/2011 AND ALL ELEVATIONS ARE BASED ON NGVD 88 (GEOID 12A). WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 12th DAY OF MAY, A.D. 2015.

C. ANDREW HEATH, JR., PLS
NC L-3281

NORTH CAROLINA PROFESSIONAL SEAL L-3281 LAND SURVEYOR C. ANDREW HEATH, JR.

100' 0' 100' 200'
GRAPHIC SCALE:
1"= 100'

PROJECT NO:	2015042.00
DRAWN BY:	CAH
DWG. CHECKED BY:	CAH
SCALE:	1" = 100'
DATE:	MAY 7, 2015
	TOPOGRAPHIC SURVEY
SHEET	1 OF 2

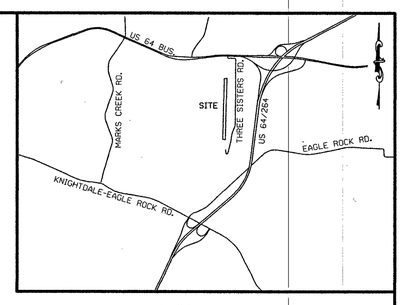
REVISIONS

NO.	DATE	REMARKS

TOPOGRAPHIC SURVEY OF EAST WAKE LANDFILL

MARKS CREEK TOWNSHIP - WAKE COUNTY - NORTH CAROLINA

MULKEY
ENGINEERS & CONSULTANTS
PO Box 33127
RALEIGH, N.C. 27636
(919) 851-1912
(919) 851-1918 (FAX)
WWW.MULKEYINC.COM



SITE MAP

MATCHLINE - SEE SHEET 1

NC GRID NAD 83/ NA 2011

WASTE DISPOSAL AREA C

100' 0' 100' 200'

GRAPHIC SCALE:
1"= 100'

PROJECT NO: 2015042.00	REVISIONS		
	NO.	DATE	REMARKS
DRAWN BY: CAH			
DWG. CHECKED BY: CAH			
SCALE: 1" = 100'			
DATE: MAY 7, 2015			
TOPOGRAPHIC SURVEY			
SHEET 2 OF 2			

TOPOGRAPHIC SURVEY OF
EAST WAKE LANDFILL

MARKS CREEK TOWNSHIP - WAKE COUNTY - NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL L-3281 LAND SURVEYOR C. ANDREW HEATH, JR.

C. Andrew Heath
5/12/2015

MULKEY
ENGINEERS & CONSULTANTS
PO Box 33127
RALEIGH, N.C. 27636
(919) 851-1912
(919) 851-1918 (FAX)
WWW.MULKEYINC.COM

Appendix B – (Preliminary) Notice of Contamination Plat and Perpetual Land Use Restrictions

PLAT BOOK _____ PAGE ___

DEQ ACKNOWLEDGEMENT:

APPROVED FOR THE PURPOSES OF N.C.G.S. 130A-310.8

_____
WILLIAM F. HUNNEKE
CHIEF, SUPERFUND SECTION
DIVISION OF WASTE MANAGEMENT

STATE OF NORTH CAROLINA
COUNTY OF WAKE
I, _____, A NOTARY PUBLIC OF SAID COUNTY

AND STATE, DO HEREBY CERTIFY THAT _____

DID PERSONALLY APPEAR AND SIGN BEFORE ME THIS THE _____

DAY OF _____, 2025

_____
NOTARY PUBLIC (SIGNATURE)

_____
MY COMMISSION EXPIRES

REVIEW OFFICER CERTIFICATION:

STATE OF NORTH CAROLINA
COUNTY OF WAKE

I,_____, REVIEW OFFICER OF WAKE COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

_____ _____
REVIEW OFFICER DATE

PRELIMINARY
NOT FOR RECORDATION, CONVEYANCE OR SALES

OWNERS ACKNOWLEDGEMENT:

I (WE) ACKNOWLEDGE THAT I (WE) HAVE FULL AUTHORITY TO LEGALLY EXECUTE A DEED FOR THIS PROPERTY.

_____
OWNER OR OWNER'S REPRESENTATIVE SIGNATURE

_____
OWNER OR OWNER'S REPRESENTATIVE NAME

_____
OWNER OR OWNER'S REPRESENTATIVE TITLE AND ORGANIZATION

STATE OF NORTH CAROLINA
COUNTY OF WAKE
I, _____, A NOTARY PUBLIC OF SAID COUNTY

AND STATE, DO HEREBY CERTIFY THAT _____ DID

PERSONALLY APPEAR AND SIGN BEFORE ME THIS THE _____ DAY OF

_____, 2025

_____
NOTARY PUBLIC (SIGNATURE)

_____
MY COMMISSION EXPIRES

LINE TABLE		
LINE	BEARING	LENGTH
L1	S69°28'04"E	139.81'
L2	S63°25'17"E	60.34'
L3	S57°35'28"E	60.05'
L4	S52°05'29"E	64.25'
L5	S00°44'50"E	159.51'
L6	S12°07'42"W	83.45'
L7	S32°27'43"W	64.45'
L8	S17°24'27"W	95.24'
L9	S49°37'28"W	47.88'
L10	S49°20'55"W	96.60'
L11	S56°35'17"W	44.99'
L12	S53°33'20"W	122.30'
L13	S60°12'22"W	92.40'
L14	S56°08'14"W	80.41'
L15	S68°51'19"W	53.44'
L16	N72°57'48"W	56.60'
L17	N18°24'39"W	69.74'
L18	N02°16'47"E	68.52'
L19	N03°03'01"W	89.70'
L20	N77°45'56"W	51.70'
L21	N77°09'47"W	95.78'
L22	N45°23'48"W	179.74'
L23	N44°12'28"W	79.86'
L24	N44°27'56"W	97.11'
L25	N22°48'01"W	61.42'
L26	N26°27'01"W	113.64'
L27	N16°05'42"W	55.09'
L28	N08°01'43"W	139.20'

LINE TABLE		
LINE	BEARING	LENGTH
L29	N51°49'07"W	107.72'
L30	N58°36'56"W	87.61'
L31	N74°25'56"W	67.46'
L32	N71°04'52"W	78.29'
L33	N02°02'24"E	29.15'
L34	N04°12'59"W	104.50'
L35	N36°22'59"E	89.02'
L36	N32°02'40"W	57.04'
L37	N37°52'05"W	85.74'
L38	N08°36'08"E	75.41'
L39	N79°27'57"E	87.24'
L40	S43°33'52"E	176.42'
L41	S50°55'44"E	75.96'
L42	S45°52'33"E	86.77'
L43	S27°34'45"E	70.03'

SURVEYOR CERTIFICATE

"I, JEFFERY S. SMITH, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION, FROM DEED BOOK 11721, 1278, DEED BOOK 2225, PAGE 652, DEED BOOK 10368, PAGE 793, DEED BOOK 10784, PAGE 61; THAT THE RATIO OF PRECISION AS CALCULATED IS GREATER THAN 1:10,000; AND THAT THIS MAP MEETS THE REQUIREMENTS OF THE STANDARDS OF PRACTICE FOR LAND SURVEYING IN NORTH CAROLINA (21 NCAC 56.1600). WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 22ND DAY OF JULY, 2025, A.D.

C.1) THIS SURVEY IS OF AN EXISTING PARCEL OR PARCELS OF LAND AND DOES NOT CREATE A NEW STREET OR CHANGE AN EXISTING STREET.
C.2) THAT THE SURVEY IS OF AN EXISTING FEATURE.

PRELIMINARY

NORTH CAROLINA PROFESSIONAL SEAL L-4464 LAND SURVEYOR JEFFERY S. SMITH

_____
PROFESSIONAL LAND SURVEYOR L-4464

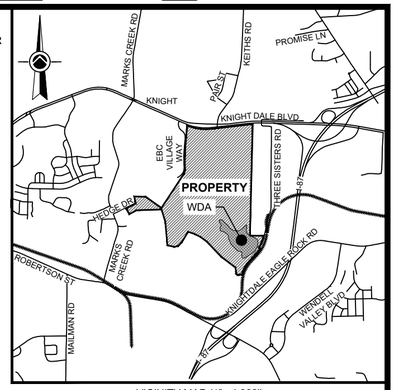
_____
DATE

I, JEFFERY S. SMITH , FURTHER CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THE SURVEY:

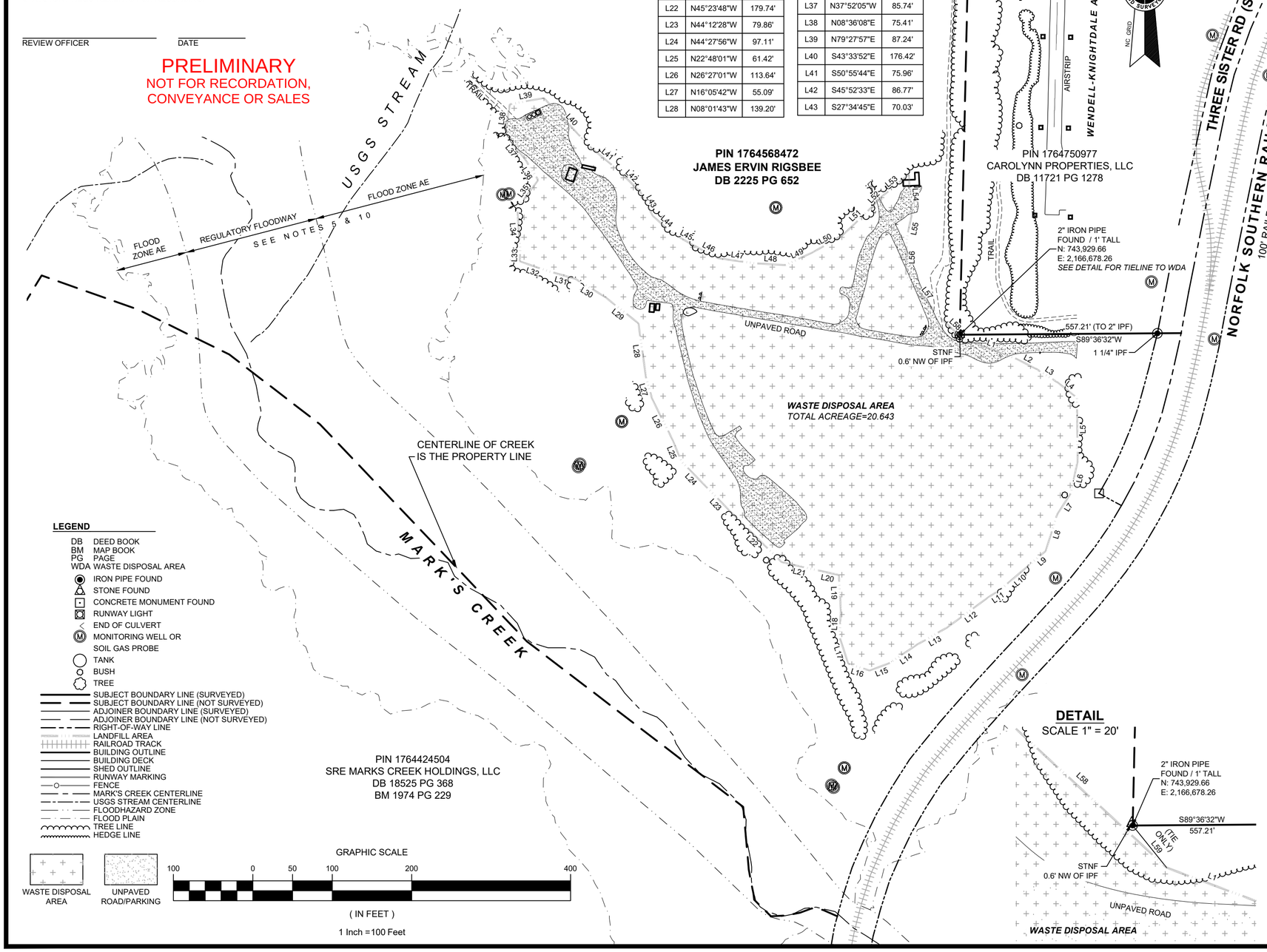
CLASS OF SURVEY: URBAN LAND SURVEY (CLASS A)
POSITIONAL ACCURACY: (H) 0.0526 (V) 0.1009
TYPE OF GPS FIELD PROCEDURE: BASELINE & NETWORK RTK
DATES OF SURVEY: MARCH 17, 19 , 21 & 24, 2025.
DATUM/EPOCH: NAD 83 (NSRS 2011)
PUBLISHED/FIXED-CONTROL USE: NONE
GEOID MODEL: GEOID 12B
COMBINED GRID FACTOR(S): 0.999909615
UNITS: US FEET

_____
PROFESSIONAL LAND SURVEYOR L-4464

_____
DATE



VICINITY MAP (1"= 4,000')



LEGEND

DB DEED BOOK
BM MAP BOOK
PG PAGE
WDA WASTE DISPOSAL AREA
IRON PIPE FOUND
STONE FOUND
CONCRETE MONUMENT FOUND
RUNWAY LIGHT
END OF CULVERT
MONITORING WELL OR SOIL GAS PROBE
TANK
BUSH
TREE
SUBJECT BOUNDARY LINE (SURVEYED)
SUBJECT BOUNDARY LINE (NOT SURVEYED)
ADJOINER BOUNDARY LINE (SURVEYED)
ADJOINER BOUNDARY LINE (NOT SURVEYED)
RIGHT-OF-WAY LINE
LANDFILL AREA
RAILROAD TRACK
BUILDING OUTLINE
BUILDING DECK
SHED OUTLINE
RUNWAY MARKING
FENCE
MARK'S CREEK CENTERLINE
USGS STREAM CENTERLINE
FLOODHAZARD ZONE
FLOOD PLAIN
TREE LINE
HEDGE LINE

WASTE DISPOSAL AREA
UNPAVED ROAD/PARKING

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 Inch =100 Feet

DETAIL
SCALE 1" = 20'

LINE TABLE		
LINE	BEARING	LENGTH
L44	S49°07'21"E	69.12'
L45	S60°53'30"E	58.59'
L46	S62°22'07"E	68.84'
L47	S82°15'19"E	93.84'
L48	S86°47'31"E	76.01'
L49	N64°51'17"E	77.58'
L50	N60°11'48"E	85.59'
L51	N45°57'02"E	110.56'
L52	N42°00'13"E	25.40'
L53	N50°34'12"E	89.83'
L54	S03°50'28"E	103.66'
L55	S11°24'46"W	61.76'
L56	S01°08'30"W	89.75'
L57	S38°46'16"E	137.86'
L58	S47°20'32"E	78.44'
L59	S38°51'11"E	13.64'

NOTES

1. SITE: JAMES ERVIN RIGSBEE; PIN 1764568472; DEED BOOK 2225, PAGE AS RECORDED IN THE REGISTER OF DEEDS OF WAKE COUNTY, NORTH CAROLINA.
2. ALL DISTANCES ARE HORIZONTAL GROUND, UNLESS OTHERWISE NOTED.
3. WAKE COUNTY ZONING: JAMES ERVIN RIGSBEE IS ZONED HEAVY COMMERCIAL (HD), INDUSTRIAL-II (I-2) AND RESIDENTIAL-30 (R-30).
4. INFORMATION SHOWN HEREON IS FROM DIRECT FIELD DATA COLLECTED FROM JULY TO NOVEMBER, 2022, FROM MARCH 4 TO 25, 2025 AND ON JULY 1, 2025.
5. THE SOUTHWESTERN PORTION OF RIGSBEE PARCEL ALONG MARK'S CREEK IS LOCATED IN A SPECIAL FLOOD HAZARD AREA AS DETERMINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (NORTH CAROLINA FLOOD MAPPING) AS ILLUSTRATED BY THE FOLLOWING FLOOD INSURANCE RATE MAP COMMUNITY PANELS NUMBER 3720176400K, DATED JULY 19, 2022.
6. SUBJECT TO ANY AND ALL EASEMENTS, RIGHTS-OF-WAY, STREETS AND ASSESSMENTS, AS THE SAME MAY APPEAR OF RECORD IN THE GUILFORD COUNTY REGISTER OF DEEDS.
7. THE SURVEYOR MAKES NO GUARANTEE THAT THE UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.
8. NORTH CAROLINA GRID COORDINATES AS SHOWN HEREON WERE DERIVED FROM DIRECT GPS OBSERVATIONS UTILIZING THE NORTH CAROLINA GEODETIC SURVEY'S NETWORK RTK SYSTEM AND ARE REFERENCED TO THE NC GRID NAD 83(2011) DATUM. GPS OBSERVATION PERFORMED ON MARCH 17, 2025.
9. THE BOUNDARY AND CONTROL SURVEYS WAS PERFORMED BY RLS FROM MARCH 17 TO 24, 2025. THE LOCATION OF THE MONITORING WELLS AND SOIL GAS PROBES WAS PERFORMED BY RLS FROM JULY TO NOVEMBER, 2022. THE TOPOGRAPHIC MAP SHOWN ARE FROM ON AN AERIAL SURVEY CONDUCTED BY SPATIAL DATA CONSULTANTS, INC. FROM MARCH 4 TO 25, 2025. THE CONTAMINATED AREA WAS SURVEYED BY RLS ON JULY 1, 2025.
10. THE RAILROAD TRACKS DEPICTED ON THE MAP IS FROM NC ONE MAP GIS, AND THE FLOOD HAZARD ZONE, FLOOD PLAIN, MARK'S CREEK CENTERLINE AND USGS STREAMS ARE FROM WAKE COUNTY'S GIS.

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY NOTES

1. HAZARDOUS SUBSTANCES KNOWN TO BE PRESENT IN THE FOLLOWING ENVIRONMENTAL MEDIA ARE:
   GROUNDWATER: BENZENE, CHLOROETHANE, 1,4-DICHLOROBENZENE, 1,4-DIOXANE, IRON, NAPHTHALENE

   SOIL: ARSENIC, COBALT, MANGANESE, THALLIUM, VANADIUM AND HEXAVALENT CHROMIUM

   SOIL VAPOR: BROMODICHLOROMETHANE, CHLOROFORM, 1,3-DICHLOROBENZENE, 4-ETHYLTOLUENE, ETHANOL, 1,3,5-TRIMETHYLBENZENE, FREON 114, HEPTANE

2. THE CONTAMINANT INFORMATION IDENTIFIED ON THIS NOTICE PLAT IS BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME OF FILING.
3. THE QUANTITY OF HAZARDOUS SUBSTANCES ON THIS SITE IS NOT KNOWN.
4. PURSUANT TO 15A NORTH CAROLINA ADMINISTRATIVE CODE 02C .0107 (B)(1), THE SOURCE OF WATER FOR ANY WATER SUPPLY WELL SHALL NOT BE FROM A WATER BEARING ZONE OR AQUIFER THAT IS CONTAMINATED. THEREFORE, STATE LAW PROHIBITS CONSTRUCTION OF A WATER SUPPLY WELL ON THIS PROPERTY. FURTHER, PURSUANT TO NORTH CAROLINA GENERAL STATUTE 87-88(C) AND 15A NORTH CAROLINA ADMINISTRATIVE CODE 02C .0112(A), NO WELL MAY BE CONSTRUCTED OR MAINTAINED IN A MANNER WHEREBY IT COULD BE A SOURCE OR CHANNEL OF CONTAMINATION OF THE GROUNDWATER SUPPLY OR ANY AQUIFER.
5. THIS NOTICE SUPERSEDES ANY PREVIOUS NOTICE RECORDED FOR THIS PARCEL PURSUANT TO N.C.G.S. 130A-310.8
6. A LAND USE RESTRICTIONS DOCUMENT ENTITLED "DECLARATION OF PERPETUAL LAND-USE RESTRICTIONS", LIMITING THE USES OF THIS PROPERTY, IS BEING RECORDED CONCURRENTLY WITH THIS NOTICE PLAT.
7. WHEN THIS PROPERTY OR ANY PART OF IT IS SOLD, LEASED, CONVEYED OR TRANSFERRED, NORTH CAROLINA LAW REQUIRES THAT THE FOLLOWING LANGUAGE BE PLACED IN THE DESCRIPTION SECTION OF THE DEED OR OTHER INSTRUMENT OF TRANSFER IN NO SMALLER TYPE THAN THAT USED IN THE BODY OF THE DEED:

   "HAZARDOUS SUBSTANCES ARE PRESENT IN ENVIRONMENTAL MEDIA AT THIS PROPERTY. A NOTICE PLAT IS RECORDED AT THE WAKE COUNTY REGISTER OF DEED'S OFFICE IN MAP BOOK _____, PAGE ____ ____."

PRELIMINARY
NOT FOR RECORDATION, CONVEYANCE OR SALES

NOTICE OF
ENVIRONMENTAL CONTAMINATION

EAST WAKE COUNTY LANDFILL
A PORTION OF THE SITE:
NONCD0000614
JAMES ERVIN RIGSBEE

KNIGHTDALE BOULEVARD
MARK'S CREEK TOWNSHIP
WAKE COUNTY
KNIGHTDALE, NORTH CAROLINA

RLS SURVEYING & CONSULTING
REGIONAL LAND SURVEYORS, INC.
8642 WEST MARKET STREET, SUITE 100
GREENSBORO, NORTH CAROLINA 27409
NC FIRM LICENSE NO. C-1362

JOB#: 2265.01	DRAWN BY: JD	DATE: 07/10/2025	CREW CHIEF: SB

Geodetic Survey Plat Checklist:

Certifications/Signatures/Seal/General Information:

☐ General Statute (GS) 47-30 Certificate Board certification not 47-30 ☐ Signature

☑ GS 47-30 (f) 11 Certificate ☐ Signature

☑ Review Officer Certificate
☑ Seal
☑ Firm License Number ☐ Not/Applicable (N/A) – Government Agency

☑ Legend
☑ Metadata included
☑ Global Navigation Satellite Systems (GNSS) information (56.1607)
☐ All acronyms defined
☑ Line type designations labeled or defined in legend
☑ Bar graph
☑ Vicinity map
☑ Title block
☑ Borders correct
☑ North Arrow referenced (North American Datum (NAD) 83 or NAD 27 or Magnetic North)
☑ Units of Measure
☑ Names of adjacent landowners, lots, blocks, parcels etc. referenced
☑ External tie
☑ Accurately locate all visible and apparent right of ways and easements (56.1604 (d) (8)) that cross or form a boundary
☐ Map size ☐ 18"x 24" ☐ 21" x 30" ☐ 24"x 36"

East Wake County Landfill
Regional Land Surveyors
Jeffrey S. Smith L-4464

NORTH CAROLINA PROFESSIONAL SEAL L-2694 LAND SURVEYOR GARY WILLIAM THOMPSON

L-2694 11/26/2025

Gary W. Thompson L-2694 Date

G:/Surveyor (revised 1/10/17 to add metadata)
G:/Surveyor (revised 7/16/14 to add 56.1604)
G:/Surveyor (revised 6/29/17 to revise footer)
G:/Surveyor (revised 5/1/18 to add metadata)
G:/Surveyor (revised 5/27/21 to add metadata)
G:/Surveyor (revised 6/06/23 to revise address)

North Carolina Geodetic Survey
200 Offices Park Drive
Durham, North Carolina (NC) 27713
(919) 733-3836

DECLARATION OF PERPETUAL LAND USE RESTRICTIONS

For Property Owned by: James Ervin Rigsbee

The real property which is the subject of this Declaration of Perpetual Land Use Restrictions ("Declaration") is contaminated with hazardous substances, and is part of an INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE ("the Site") as defined by North Carolina's Inactive Hazardous Sites Response Act of 1987, which consists of Section 130A-310 through Section 130A-310.19 of the North Carolina General Statutes ("N.C.G.S."). This Declaration is part of a Remedial Action Plan for the Site that has been approved by the Secretary of the North Carolina Department of Environmental Quality, Division of Waste Management, Superfund Section or its successor in function, or his/her delegate, as authorized by N.C.G.S. Section 130A-310.3(f). The North Carolina Department of Environmental Quality shall hereafter be referred to as "DEQ". Hereafter, the Division of Waste Management, Superfund Section shall be referred to as "Superfund Section".

James Ervin Rigsbee is the owner in fee simple of the property ("the Property"), which is located at 8704 Knightdale Blvd, in the County of Wake, Township of Marks Creek, State of North Carolina, and is the real property legally described in Deed Book 2225, Page 652 in the Office of the Register of Deeds for Wake County. The Property is also shown on a Notice of Environmental Contamination, in the form of a survey plat ("Notice Plat"), which has been recorded prior to the recordation of this Declaration in Map Book ____ Page_____ in the Office of the Register of Deeds for Wake County.

For the purpose of protecting public health and the environment, James Ervin Rigsbee, hereby declares that all of the Property shall be held, sold and conveyed subject to the following perpetual land use restrictions, which shall run with the land; shall be binding on all parties having any right, title or interest in the Property or any part thereof, their heirs, successors and assigns; and shall, as provided in N.C.G.S. Section 130A-310.3(f), be enforceable without regard to lack of privity of estate or contract, lack of benefit to particular land, or lack of any property interest in particular land. These restrictions shall continue in perpetuity and cannot be amended or canceled unless and until the Wake County Register of Deeds receives and records the written concurrence of the Secretary of DEQ or its successor in function, or his/her delegate. If any provision of this Declaration is found to be unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions shall not in any way be affected or impaired.

PERPETUAL LAND USE RESTRICTIONS

The following restrictions shall apply to the entire Property *or* the Waste Disposal Area:

1. The Waste Disposal Area shown on the Notice Plat shall be used for open space only. "Open space" for purposes of this restriction means an undeveloped area where the sole human use shall be non-dermal recreational activities such as hiking, running, hunting, fishing and bird watching. All other uses at the Property are prohibited, except as approved in writing by the Superfund Section or its successor in function.

2. The existing buildings shown on the Notice Plat within the Waste Disposal Area shall not be modified or demolished without prior written approval by the Superfund Section or its successor in function.

3. The existing access roads shown on the Notice Plat within the Waste Disposal Area shall not be removed or altered without prior written approval by the Superfund Section or its successor in function.

4. The Waste Disposal Area shown on the Notice Plat shall not be used for the following:
    a) Horseback riding
    b) Bicycle riding
    c) Motorized vehicle or motorbike riding except for the use of the existing roads
    d) Farming
    e) Gardening
    f) Grazing of livestock
    g) Timber production
    h) Kennel or private animal pens
    i) Mining, extraction of coal, oil, gas or any other minerals or non-mineral substances
    j) Storage of any bulk materials except for the current bulk explosives storage

#. No surface or subsurface native or fill earthen materials may be removed from the Waste Disposal Area shown on the Notice Plat without prior written approval by the Superfund Section or its successor in function.

#. No above- or below-ground construction or improvements (including, but not limited to, utilities, roads, sidewalks, landscaping, asphalt, concrete, other impervious materials, temporary and permanent structures) and no alteration or disturbance of the existing soil and contours, other than erosion control measures, are allowed in the Waste Disposal Area shown on the Notice Plat without prior written approval by the Superfund Section or its successor in function.

#. No new trees or shrubs may be planted in the Waste Disposal Area shown on the Notice Plat.

#. The Waste Disposal Area, outside the existing access roads, shown on the Notice Plat shall not be accessed by any mobile heavy equipment including, but not limited to, cranes, tractors, and excavators without prior written approval by the Superfund Section or its successor in function.

#. Surface water shall not be used on the Property for any purpose without prior written approval by the Superfund Section or its successor in function.

#. No activities that would cause the exposure, removal, or use of groundwater, including but not limited to, installation of water supply wells, fountains, ponds, lakes, swimming pools or other features that use groundwater, or construction or excavation activities that would encounter or expose groundwater may occur on the Property without prior approval of the Superfund Section or its successor in function.

All monitoring wells located on the Waste Disposal Area associated with Site ID: 9202-MSWLF-1981 shall be maintained. This maintenance shall be for the duration of the required post-closure monitoring period, as determined by DEQ or its successor in function.

#. The Property Owner shall conduct and comply with the following maintenance activities:

A. No woody vegetation shall be allowed to grow on the Waste Disposal Area shown on the Notice Plat.

B. All grassed areas shall be properly maintained to ensure that a healthy vegetative cover is always present. Mowing or brush hogging of the Waste Disposal Area shown on the Notice Plat should be conducted at least twice a year.

C. Existing access roads shall be maintained across the Waste Disposal Area shown on the Notice Plat in good condition.

D. A soil cover of a thickness of 12 inches shall be maintained over the geotextile erosional marker, if applicable, covering the Waste Disposal Area shown on the Notice Plat. Erosion of the soil cover shall be repaired promptly upon discovery.

E. The wire strand fencing and signage shall be inspected at least annually and maintained in the specific location depicted on the Notice Plat, in original or like condition, and in a manner that secures the Waste Disposal Area.

F. Signs indicating the presence of contamination and restricting disturbance of soil *and/or* access shall be located at each corner and along the perimeter of fencing surrounding the Waste Disposal Area. The front of each sign shall face away from the Waste Disposal Area. Each sign shall be located at a maximum distance of 100 feet apart and in a manner such they are easily visible along the perimeter of

the Waste Disposal Area at all times. The signs shall state the following using similar font with a minimum of one-half (0.5) inch font size:

NOTICE
SUBSURFACE WASTE
Contact the Property Owner
Regarding Land Use Restrictions
Prior to Disturbing Soil

#. No person conducting environmental assessment or remediation at the Site or involved in determining compliance with applicable land use restrictions at the Property, at the direction of, or pursuant to a permit or order issued by the Superfund Section or its successor in function may be denied access to the Property for the purpose of conducting such activities.

#. Each person who owns any portion of the Property shall cause the instrument of any sale, lease, grant, or other transfer of any interest in the Property to include a provision expressly requiring the lessee, grantee, or transferee to comply with this Declaration. The failure to include such provision shall not affect the validity or applicability of any land use restriction in this Declaration.

#. Each person who owns any portion of the Property shall submit a letter, in January of each year on or before January 31st, to the Superfund Section or its successor in function, confirming the following:

a) This Declaration is still recorded in the Office of the Wake County Register of Deeds.
b) Activities and conditions at the Property remain in compliance with the land use restrictions herein.
c) The Property has not been subdivided since the last letter report submitted to the Superfund Section.
d) Erosion of the cover system has not occurred.
e) Fencing, bollards and signs are in good condition and remain in original location.

REPRESENTATIONS AND WARRANTIES

The Declarant hereby represents and warrants to the DEQ that the Declarant is the sole owner of the Property holding fee simple title to the Property free, clear and unencumbered except for utilities (including manhole covers, sewer, and water), easements, rights of way, conditions, covenants, and other matters recorded in the Wake County Registry; that Declarant has the power and authority to enter into this Declaration, to grant the rights and interests herein provided; that this Declaration will not materially violate or contravene or constitute a material default under any other agreement, document or instrument to which Declarant is a party or by which Declarant may be bound or affected.

ENFORCEMENT

Adherence to the above land use restrictions is necessary to protect public health and the environment. The restrictions are an integral part of the remedy for the contamination at the Site and shall be enforceable without regard to lack of privity of estate or contract, lack of benefit to particular land, or lack of any property interest in particular land. These land use restrictions shall be enforced by any owner, operator, or other party responsible for any part of the Site. The above land use restrictions may also be enforced by the Superfund Section through the remedies provided in N.C.G.S. Chapter 130A, Article 1, Part 2 or by means of a civil action, and may also be enforced by any unit of local government having jurisdiction over any part of the Site. Any attempt to cancel this Declaration without the approval of the Superfund Section or its successor in function shall constitute noncompliance with the Remedial Action Plan approved by the Superfund Section for the Site and shall be subject to enforcement by the Superfund Section to the full extent of the law. Failure by any party required or authorized to enforce any of the above restrictions shall in no event be deemed a waiver of the right to do so thereafter as to the same violation or as to one occurring prior or subsequent thereto.

FUTURE SALES, LEASES, CONVEYANCES AND TRANSFERS

When any portion of the Property is sold, leased, conveyed or transferred, pursuant to N.C.G.S. Section 130A-310.8(e) the deed or other instrument of transfer shall contain in the description section, in no smaller type than that used in the body of the deed or instrument, a statement that the real property being sold, leased, conveyed, or transferred has been used as a hazardous substance or waste disposal site and a reference by book and page to the recordation of the Notice of Environmental Contamination referenced in this Declaration.

OWNER SIGNATURE

IN WITNESS WHEREOF, I execute these presents on this ___ day of _____, 20___.

Signatory's name typed or printed: _____

Signature:_____

STATE OF NORTH CAROLINA
COUNTY OF _____

I, _____, a Notary Public, do hereby certify that _____ personally appeared before me this day, produced proper identification in the form of _____, and signed this Declaration

WITNESS my hand and official seal this ___ day of _____, 20___.

_____
Notary Public

My Commission expires: _____

[SEAL]

APPROVAL AND CERTIFICATION OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY

The foregoing Declaration of Perpetual Land Use Restrictions is hereby approved and certified.

By: _____

William F. Hunneke, Chief
Superfund Section
Division of Waste Management
North Carolina Department of Environmental Quality

STATE OF NORTH CAROLINA
COUNTY OF _____

I, _____, a Notary Public, do hereby certify that _____ personally appeared before me this day, produced proper identification in the form of _____, and signed this Declaration.

WITNESS my hand and official seal this ___ day of _____, 20___.

_____
Notary Public

My Commission expires: _____

[SEAL]

REGISTER OF DEEDS CERTIFICATION

The foregoing Declaration of Perpetual Land Use Restrictions is certified to be duly recorded at the date and time, and the Book and Page, shown on the first page hereof.

Register of Deeds for Wake County

By: _____
Signature

_____
Type or print name and title

Appendix C – S&ME (Draft) Engineering Plans

EROSION AND SEDIMENT CONTROL PLAN

EAST WAKE LANDFILL

KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

DECEMBER 3, 2025

SITE DATA

PROJECT LOCATION:

STREET ADDRESS:	705 THREE SISTERS ROAD
CITY OR TOWNSHIP:	KNIGHTDALE
COUNTY:	WAKE
STATE:	NORTH CAROLINA
ZIP CODE:	27545
LATITUDE:	35°47'30.38"N (35.792")
LONGITUDE:	78°26'18.67"W (-78.439")

REVIEWING AGENCY:

NCDEQ REGIONAL OFFICE:	RALEIGH REGIONAL OFFICE

PROJECT SCHEDULE:

DATE TO BEGIN:	11/30/2025
DATE TO END:	04/30/2026

DISTURBANCE:

PROJECT ACREAGE:	2.17 ACRES
PROPOSED IMPERVIOUS AREA:	0.00 ACRES

WATERBODY INFORMATION:

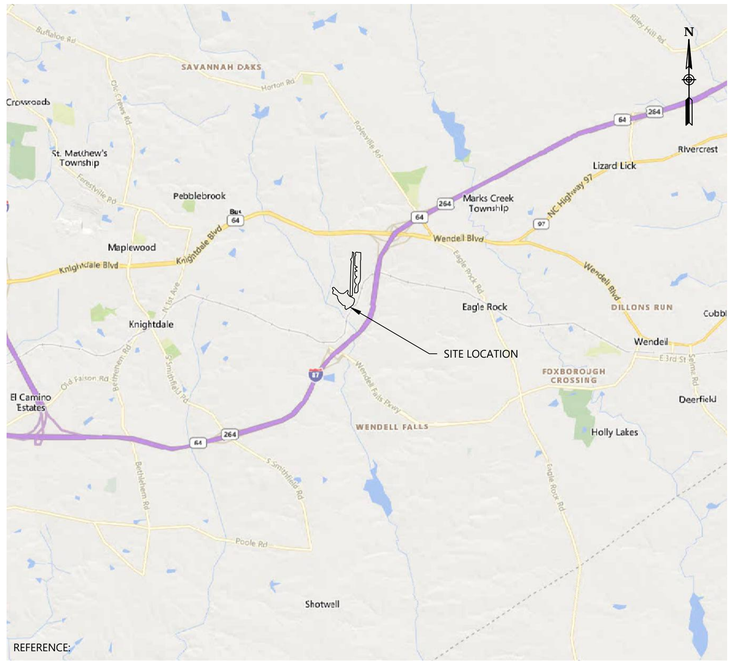
RIVER BASIN:	NEUSE
WATERSHED:	0302020111
RECEIVING WATERBODY:	MARKS CREEK
WATERBODY INDEX NUMBER:	27-38
CLASSIFICATION:	C;NSW
WATERS OF THE U.S./STATE:	NOT PRESENT
IMPACTS:	NOT APPLICABLE
USACE 404 PERMIT OR 401 CERTIFICATION:	NOT REQUIRED
NC NAVIGABLE WATERS (NCNW):	NOT PRESENT

FEMA FLOODPLAIN/FLOODWAY IMPACTS:

MAP NUMBER:	
FLOODWAY IMPACTS:	NOT APPLICABLE
100-YEAR FLOODPLAIN IMPACTS:	NOT APPLICABLE
WATERCOURSE ALTERATION OR RELOCATION:	NOT APPLICABLE

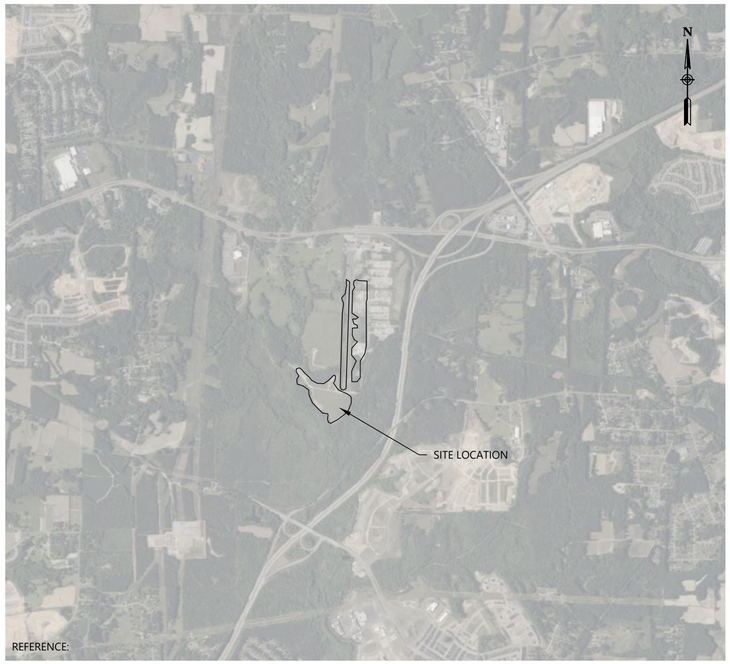
CONSULTANT INFORMATION

ENGINEERING FIRM:	S&ME, INC.
NC ENG. FIRM LICENSE NUMBER:	F-0176
PROJECT NUMBER:	22050404
E&SC PLAN PREPARER NAME:	JOSHUA M. BELL, PE, CFM
NC REGISTRATION NUMBER:	032667
PROJECT MANAGER:	
E-MAIL ADDRESS:	
TELEPHONE NUMBER:	



VICINITY MAP

SCALE: 1" = 5,000'



SITE LOCATION

SCALE: 1" = 2,000'

DRAWINGS	
NUMBER	TITLE
00	COVER SHEET
01	EXISTING CONDITIONS
02	GRADING PLAN - OVERALL
03	EROSION CONTROL - OVERALL
04	DETAILS 1 OF 2
05	DETAILS 2 OF 2

PREPARED FOR

NORTH CAROLINA *Environmental Quality*

DIVISION OF WASTE MANAGEMENT - SPECIAL REMEDIATION BRANCH
PRE-REGULATORY LANDFILL UNIT
1646 MAIL SERVICE CENTER
RALEIGH, NC 27699-1646

PREPARED BY

3201 SPRING FOREST ROAD
RALEIGH, NC 27616

CALL OR CLICK 811 BEFORE YOU DIG
811
SAFE DIGGING PARTNER

EXISTING FEATURES

- CONTOUR (1')
- CONTOUR (5')
- WASTE FILL BOUNDARY
- STREAM / TRIBUTARY
- WETLAND
- ROADWAY CENTERLINE
- ROADWAY EDGE OF PAVEMENT
- GRAVEL ROADWAY EDGE
- PROPERTY LINE
- TREELINE
- FENCE

0 40 80

GRAPHIC SCALE (IN FEET)

3201 SPRING FOREST ROAD
RALEIGH, NC 27616
(919) 872-2660

ENGINEERING FIRM
LICENSE NUMBER: F-0176

NO.	DATE	DESCRIPTION	BY	CHK	APV
1	12/3/2025	ISSUED FOR PERMITTING	GAT	CHK	APV

EXISTING CONDITIONS

EROSION AND SEDIMENT CONTROL PLAN
EAST WAKE LANDFILL
KNIGHTDALE,NORTH CAROLINA

PROJECT NUMBER
22050404

DRAWING NUMBER
1

5

CONSTRUCTION NOTES:

1. CONTRACTOR TO PLACE ADDITIONAL COVER SOILS TO THE MINIMUM DEPTH AS INDICATED ON THE PLAN VIEW NOTES TO ACHIEVE THE DESIRED 12 INCHES OF WASTE COVER.
2. PROPOSED TARGET GRADES ARE PROVIDED BASED ON THE EXISTING SURVEY GRADES AND THE ADDITIONAL COVER SOIL THICKNESS AS DETERMINED BY S&ME, INC. DURING FIELD ASSESSMENT.
3. CONTRACTOR SHALL CUT UPPER VEGETATION TO ALLOW FOR COVER SOIL PLACEMENT BY USE OF MOWER, WEED TRIMMER, BUSH HOG, OR OTHER VEGETATIVE MAINTENANCE EQUIPMENT.
4. CONTRACTOR SHALL NOT EXCAVATE TO REMOVE HUMMOCKS OR UNDULATIONS IN EXISTING SOIL COVER. ADDITIONAL SOIL MAY BE PLACED RESULTING IN A THICKNESS GREATER THAN THE TARGET 12 INCHES.
5. TEMPORARY ACCESS ROAD AND LAYDOWN AREAS WHERE PLACED WITHIN THE WASTE AREA SHALL BE CONSTRUCTED BY PLACEMENT OF SOIL AND STONE MATERIAL ABOVE THE EXISTING COVER SOIL GRADES SO AS NOT TO IMPACT EXISTING SOIL THICKNESS. STONE SHALL BE REMOVED FROM THESE AREAS ONCE CONSTRUCTION IS COMPLETE.

AREA 1
EXISTING SOIL DEPTH 2 INCHES
COVER SOIL PLACEMENT 10 INCHES

AREA 2
EXISTING SOIL DEPTH 4 INCHES
COVER SOIL PLACEMENT 8 INCHES

AREA 3
EXISTING SOIL DEPTH 8 INCHES
COVER SOIL PLACEMENT 4 INCHES

AREA 4
EXISTING SOIL DEPTH 8 INCHES
COVER SOIL PLACEMENT 4 INCHES

AREA 5
EXISTING SOIL DEPTH 8 INCHES
COVER SOIL PLACEMENT 4 INCHES

AREA 6
EXISTING SOIL DEPTH 6 INCHES
COVER SOIL PLACEMENT 6 INCHES

AREA 7
EXISTING SOIL DEPTH 0 INCHES
COVER SOIL PLACEMENT 12 INCHES

AREA 9
EXISTING SOIL DEPTH 10 INCHES
COVER SOIL PLACEMENT 2 INCHES

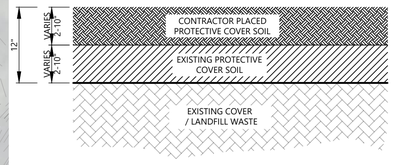
AREA 10
EXISTING SOIL DEPTH 10 INCHES
COVER SOIL PLACEMENT 2 INCHES

AREA 11
EXISTING SOIL DEPTH 6 INCHES
COVER SOIL PLACEMENT 6 INCHES

WASTE DISPOSAL AREA

THREE SISTERS ROAD

COVER SYSTEM PLAN



EXISTING FEATURES

- CONTOUR (1')
- CONTOUR (5')
- WASTE FILL BOUNDARY
- STREAM / TRIBUTARY
- WETLAND
- ROADWAY CENTERLINE
- ROADWAY EDGE OF PAVEMENT
- GRAVEL ROADWAY EDGE
- PROPERTY LINE
- TREELINE
- FENCE

PROPOSED FEATURES

- CONTOUR (1')
- CONTOUR (5')
- SECURITY FENCE
- LIMITS OF DISTURBANCE
- CONSTRUCTION ENTRANCE/EXIT
- SILT FENCE
- SILT FENCE OUTLET
- TEMPORARY ACCESS RD/LAYDOWN

0 40 80
GRAPHIC SCALE (IN FEET)

3201 SPRING FOREST ROAD
RALEIGH, NC 27616
(919) 872-2660

ENGINEERING FIRM
LICENSE NUMBER: F-0176

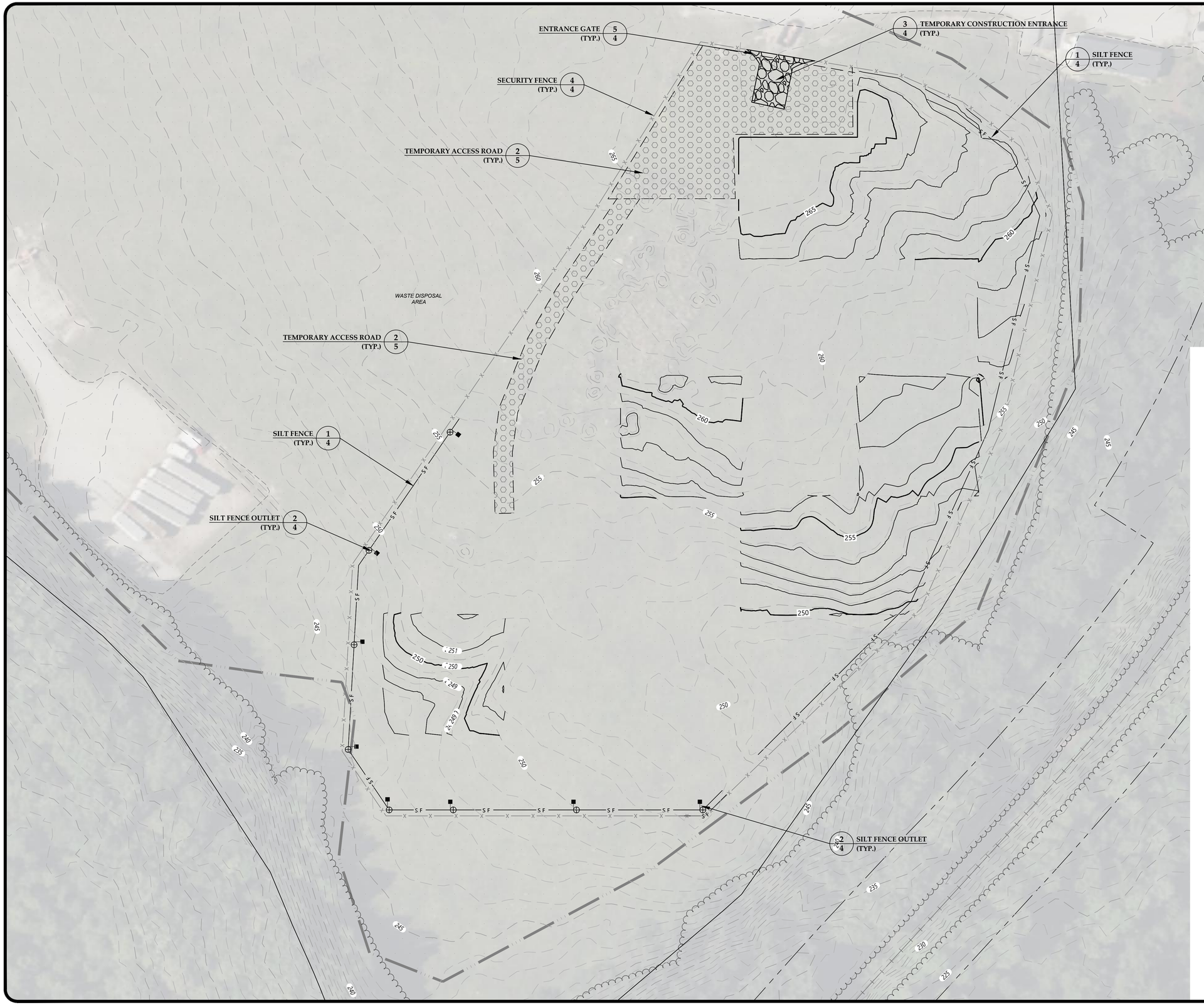
NO.	DATE	DESCRIPTION	BY	CHK	APV
1	12/3/2025	ISSUED FOR PERMITTING	GAT	CHK	APV

GRADING PLAN - OVERALL

EROSION AND SEDIMENT CONTROL PLAN
EAST WAKE LANDFILL
KNIGHTDALE,NORTH CAROLINA

PROJECT NUMBER
22050404

DRAWING NUMBER
2 5



CONSTRUCTION NOTES:

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2. PROPOSED TARGET GRADES ARE PROVIDED BASED ON THE EXISTING SURVEY GRADES AND THE ADDITIONAL COVER SOIL THICKNESS AS DETERMINED BY S&ME, INC. DURING FIELD ASSESSMENT.
3. CONTRACTOR SHALL CUT UPPER VEGETATION TO ALLOW FOR COVER SOIL PLACEMENT BY USE OF MOWER, WEED TRIMMER, BUSH HOG, OR OTHER VEGETATIVE MAINTENANCE EQUIPMENT.
4. CONTRACTOR SHALL NOT EXCAVATE TO REMOVE HUMMOCKS OR UNDULATIONS IN EXISTING SOIL COVER. ADDITIONAL SOIL MAY BE PLACED RESULTING IN A THICKNESS GREATER THAN THE TARGET 12 INCHES.
5. TEMPORARY ACCESS ROAD AND LAYDOWN AREAS WHERE PLACED WITHIN THE WASTE AREA SHALL BE CONSTRUCTED BY PLACEMENT OF SOIL AND STONE MATERIAL ABOVE THE EXISTING COVER SOIL GRADES SO AS NOT TO IMPACT EXISTING SOIL THICKNESS. STONE SHALL BE REMOVED FROM THESE AREAS ONCE CONSTRUCTION IS COMPLETE.

EXISTING FEATURES

- CONTOUR (1')
- CONTOUR (5')
- WASTE FILL BOUNDARY
- STREAM / TRIBUTARY
- WETLAND
- ROADWAY CENTERLINE
- ROADWAY EDGE OF PAVEMENT
- GRAVEL ROADWAY EDGE
- PROPERTY LINE
- TREELINE
- FENCE

PROPOSED FEATURES

- CONTOUR (1')
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- CONSTRUCTION ENTRANCE/EXIT
- SILT FENCE
- SILT FENCE OUTLET
- TEMPORARY ACCESS RD/LAYDOWN

0 40 80
GRAPHIC SCALE (IN FEET)

3201 SPRING FOREST ROAD
RALEIGH, NC 27616
(919) 872-2660

ENGINEERING FIRM
LICENSE NUMBER: F-0176

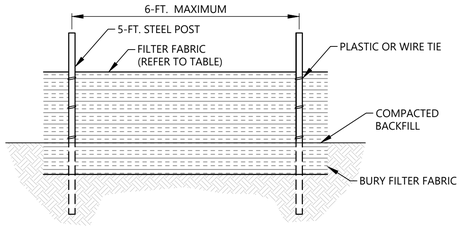
NO.	DATE	DESCRIPTION	BY	CHK	APV
1	12/3/2025	ISSUED FOR PERMITTING	GAT	CHK	APV

EROSION CONTROL - OVERALL

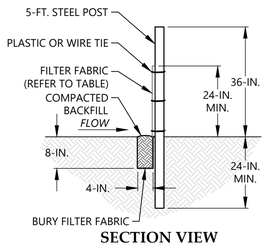
EROSION AND SEDIMENT CONTROL PLAN
EAST WAKE LANDFILL
KNIGHTDALE,NORTH CAROLINA

PROJECT NUMBER
22050404

DRAWING NUMBER
3 5



PROFILE VIEW



SECTION VIEW

GENERAL NOTES

1. SILT FENCE SHOULD BE INSTALLED PRIOR TO EARTH DISTURBING ACTIVITIES IN THE AREA.
2. CONSTRUCT THE FILTER FABRIC FROM A CONTINUOUS ROLL CUT TO THE LENGTH OF THE SILT FENCE TO AVOID JOINTS.
3. WHEN JOINTS ARE NECESSARY, SECURELY FASTEN THE FILTER FABRIC ONLY AT A SUPPORT POST WITH 4 FEET MINIMUM OVERLAP TO THE NEXT POST.
4. ATTACH FILTER FABRIC TO THE STEEL POSTS USING PLASTIC OR WIRE TIE (MIN. 50-LB. TENSILE STRENGTH) THAT ARE EVENLY SPACED WITHIN THE TOP 8-IN. OF THE FABRIC.
5. INSTALL THE SILT FENCE PERPENDICULAR TO THE DIRECTION OF THE STORMWATER FLOW AND PLACE THE SILT FENCE THE PROPER DISTANCE FROM THE TOE OF STEEP SLOPES TO PROVIDE SEDIMENT STORAGE AND ACCESS FOR MAINTENANCE AND CLEANOUT.
6. INSTALL SILT FENCE CHECKS (TIE-BACKS) EVERY 50-100-FT., DEPENDENT ON SLOPE, ALONG SILT FENCE THAT IS INSTALLED WITH SLOPE AND WHERE CONCENTRATED FLOWS ARE EXPECTED OR ARE DOCUMENTED ALONG THE PROPOSED/INSTALLED SILT FENCE.
7. DO NOT ATTACH FILTER FABRIC TO EXISTING TREES.
8. THE TRENCH SHOULD BE BACKFILLED AND COMPACTED ON BOTH SIDES OF THE FABRIC TO MINIMIZE WATER INFILTRATION WHICH COULD LEAD TO UNDERMINING.

POST REQUIREMENTS

1. SILT FENCE POSTS MUST BE 5-FT. LONG STEEL POSTS THAT MEET, AT A MINIMUM, THE FOLLOWING PHYSICAL CHARACTERISTICS.
   1.1. WEIGH 1.25 POUNDS PER FOOT
   1.2. 1-3/8-IN. WIDE MEASURED PARALLEL TO THE FENCE
2. POSTS SHALL BE EQUIPPED WITH PROJECTIONS TO AID IN FASTENING OF FILTER FABRIC.
3. STEEL POSTS MAY NEED TO HAVE A METAL SOIL STABILIZATION PLATE WELDED NEAR THE BOTTOM WHEN INSTALLED ALONG STEEP SLOPES OR INSTALLED IN LOOSE SOILS. THE PLATE SHOULD HAVE A MINIMUM CROSS SECTION OF 14-SQUARE -IN. AND BE COMPOSED OF 15 GAUGE STEEL, AT A MINIMUM. THE METAL SOIL STABILIZATION PLATE SHOULD BE COMPLETELY BURIED.
4. INSTALL POSTS TO A MINIMUM DEPTH OF 24-IN. A MINIMUM HEIGHT OF 1-IN. ABOVE THE FABRIC SHALL BE MAINTAINED, AND A MAXIMUM HEIGHT OF 36-IN. SHALL BE MAINTAINED ABOVE THE GROUND.
5. POST SPACING SHALL BE AT A MAXIMUM OF 6-FT. ON CENTER.
6. UTILITY LOCATES SHOULD BE COMPLETED PRIOR TO SILT FENCE INSTALLATION.
7. WOODEN POSTS ARE ALLOWED WHEN CROSSING UTILITIES. OWNER'S DESIGNATED ENVIRONMENTAL REPRESENTATIVE SHALL APPROVE LOCATIONS WHERE WOODEN POST ARE TO BE USED PRIOR TO INSTALLATION.

FABRIC REQUIREMENTS

1. SILT FENCE MUST BE COMPOSED OF WOVEN GEOTEXTILE FILTER FABRIC THAT CONSISTS OF THE FOLLOWING REQUIREMENTS:
   1.1. USE A SYNTHETIC FILTER FABRIC OF AT LEAST 95% BY WEIGHT OF POLYOLEFINS OR POLYESTER, WHICH IS CERTIFIED BY THE MANUFACTURER OR SUPPLIER AS CONFORMING TO THE REQUIREMENTS IN ASTM D 6461;
   1.2. SYNTHETIC FILTER FABRIC SHOULD CONTAIN ULTRAVIOLET RAY INHIBITORS AND STABILIZERS TO PROVIDE A MINIMUM OF 6 MONTHS OF EXPECTED USABLE CONSTRUCTION LIFE AT A TEMPERATURE OF 0 TO 120 DEGREES FAHRENHEIT;
   1.3. FREE OF ANY TREATMENT OR COATING WHICH MIGHT ADVERSELY ALTER ITS PHYSICAL PROPERTIES AFTER INSTALLATION;
   1.4. FREE OF ANY DEFECTS OR FLAWS THAT SIGNIFICANTLY AFFECT ITS PHYSICAL AND/OR FILTERING PROPERTIES; AND,
   1.5. HAVE A MINIMUM WIDTH OF 36-IN.
2. 12-IN. OF THE FABRIC SHOULD BE PLACED WITHIN EXCAVATED TRENCH AND SECURED WHEN THE TRENCH IS BACKFILLED.
3. FILTER FABRIC SHALL BE PURCHASED IN CONTINUOUS ROLLS AND CUT TO THE LENGTH OF THE BARRIER TO AVOID JOINTS.
4. FILTER FABRIC SHALL BE INSTALLED AT A MINIMUM OF 24-IN. ABOVE THE GROUND.

TABLE: EXTRA STRENGTH WOVEN FILTER FABRIC

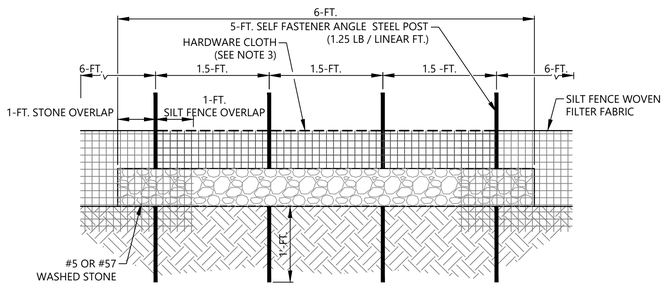
PROPERTY	TEST	VALUE
GRAB TENSILE STRENGTH	ASTM D4632	125-LBS. MARV
GRAB TENSILE ELONGATION	ASTM D4632	100-LBS. MARV
PERMITTIVITY	ASTM D4491	0.05 (SEC-1) MARV
APPARENT OPENING SIZE	ASTM D4751	US SIEVE #30
ULTRAVIOLET STABILITY AT 500 HR OF EXPOSURE	ASTM D4355	70% TYPICAL

MAINTENANCE NOTES

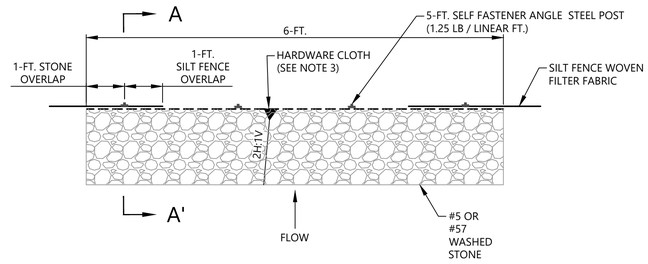
1. THE KEY TO FUNCTIONAL SILT FENCE IS INSPECTIONS, ROUTINE MAINTENANCE, AND REGULAR SEDIMENT REMOVAL.
2. INSPECT AT LEAST ONCE PER SEVEN (7) CALENDAR DAYS AND WITHIN 24 HOURS OF A RAIN EVENT GREATER THAN OR EQUAL TO 1.0-IN. IN 24 HOURS.
3. ATTENTION TO SEDIMENT ACCUMULATIONS ALONG THE SILT FENCE IS EXTREMELY IMPORTANT. ACCUMULATED SEDIMENT SHOULD BE CONTINUALLY MONITORED AND REMOVED WHEN NECESSARY.
4. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES 1/2 THE HEIGHT OF THE SILT FENCE.
5. REMOVED SEDIMENT SHALL BE PLACED IN STOCKPILE STORAGE AREAS OR SPREAD THINLY ACROSS DISTURBED AREA. STABILIZE THE REMOVED SEDIMENT AFTER IT IS RELOCATED.
6. CHECK FOR AREAS WHERE STORMWATER RUNOFF HAS ERODED A CHANNEL BENEATH THE SILT FENCE, OR WHERE THE FENCE HAS SAGGED OR COLLAPSED DUE TO RUNOFF OVERTOPPING THE SILT FENCE. INSTALL CHECKS/TIE-BACKS AND/OR REINSTALL SILT FENCE, AS NECESSARY.
7. CHECK FOR TEARS WITHIN THE SILT FENCE, AREAS WHERE SILT FENCE HAS BEGUN TO DECOMPOSE, AND FOR ANY OTHER CIRCUMSTANCE THAT MAY RENDER THE SILT FENCE INEFFECTIVE. REMOVE DAMAGED SILT FENCE AND REINSTALL NEW SILT FENCE IMMEDIATELY.
8. SILT FENCE SHOULD BE REMOVED WITHIN 30 DAYS AFTER FINAL STABILIZATION IS ACHIEVED AND ONCE IT IS REMOVED, THE RESULTING DISTURBED AREA SHALL BE PERMANENTLY STABILIZED.

REFERENCE: DETAIL BASED ON NCDEQ EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, CHAPTERS 6 AND 8 REVISED, MAY 2013.

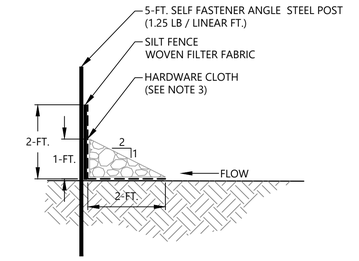
1/4 SILT FENCE
SCALE: N.T.S



SILT FENCE OUTLET SECTION VIEW



SILT FENCE OUTLET PLAN-VIEW



CROSS-SECTION A-A'

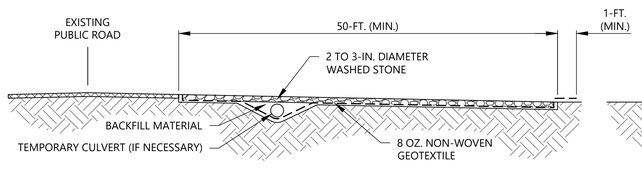
SILT FENCE OUTLET NOTES

1. SEDIMENT CONTROL STONE SHALL BE #5 OR #57 WASHED STONE.
2. INSTALL MINIMUM OF 1-FT. OVERLAP OF SILT FENCE, STONE, AND HARDWARE CLOTH.
3. USE HARDWARE CLOTH WITH A MINIMUM 19 GAUGE WITH MAXIMUM 1/4-IN. MESH OPENINGS.
4. SILT FENCE OUTLET LOCATIONS MAY VARY FROM THE APPROVED PLANS AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR OR OWNER'S REPRESENTATIVE, BASED UPON FIELD CONDITIONS.

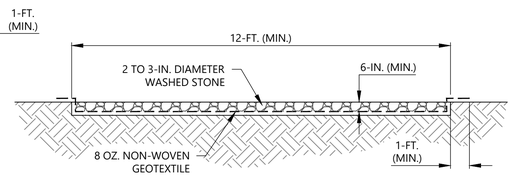
SILT FENCE OUTLET MAINTENANCE

1. INSPECT AT LEAST ONCE PER 7 CALENDAR DAYS AND WITHIN 24 HOURS OF A RAIN EVENT GREATER THAN OR EQUAL TO 1.0-IN. IN 24 HOURS.
2. MAKE ANY NECESSARY REPAIRS IMMEDIATELY.
3. REMOVE ACCUMULATED SEDIMENT AND ANY DEBRIS. THE STONE MUST BE REPLACED IF CLOGGED.
4. SHOULD THE SILT FENCE ADJACENT TO THE OUTLET COLLAPSE, TEAR, OR BECOME INEFFECTIVE, REPAIR OR REPLACE IT PROMPTLY.
5. REMOVE ALL FENCING AND OUTLET MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

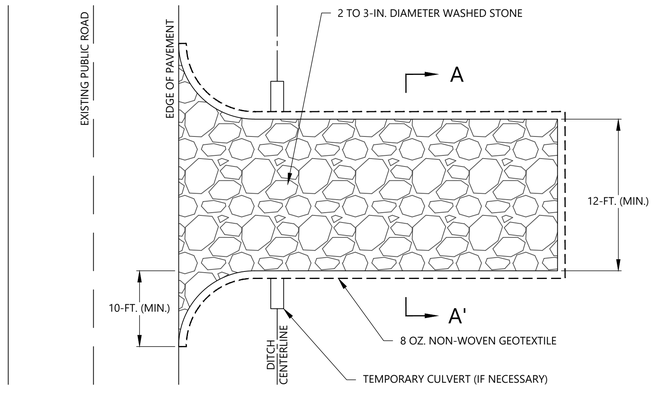
2/4 SILT FENCE OUTLET
SCALE: N.T.S



CONSTRUCTION ENTRANCE SECTION VIEW



CROSS-SECTION A-A'



CONSTRUCTION ENTRANCE PLAN VIEW

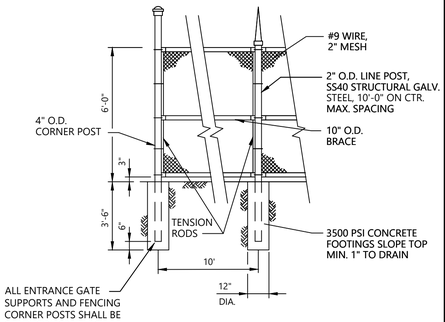
CONSTRUCTION ENTRANCE NOTES

1. DUE TO SITE CONSTRAINTS THE WIDTH AND LENGTH MAY BE ADJUSTED BASED ON CONDITIONS IN THE FIELD.
2. APPROPRIATE SIGNAGE WILL BE POSTED ALONG THE ROAD TO INFORM THE GENERAL PUBLIC OF POTENTIAL CONSTRUCTION TRAFFIC PER REQUIREMENTS.

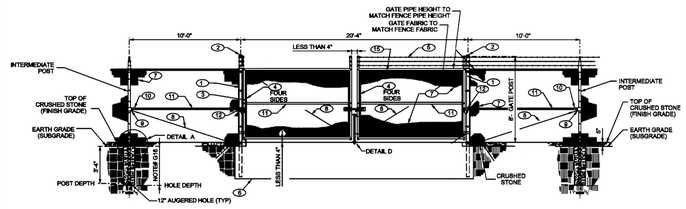
CONSTRUCTION ENTRANCE MAINTENANCE

1. INSPECT TEMPORARY CONSTRUCTION ENTRANCES AT LEAST ONCE PER 7 CALENDAR DAYS AND WITHIN 24 HOURS OF A RAIN EVENT GREATER THAN OR EQUAL TO 1.0-IN IN 24 HOURS. INSPECT MORE FREQUENTLY DURING PERIODS OF HEAVY USE.
2. THE ENTRANCE WILL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO EXISTING ROADWAYS. SEDIMENT TRACKED, SPILLED, DROPPED OR OTHERWISE DEPOSITED ONTO ROADWAYS WILL BE SWEPT UP AS SOON AS PRACTICAL AND PLACED BACK WITHIN THE APPROVED DISTURBED AREA.
3. IF EXCESS SEDIMENT HAS CLOGGED THE STONE, THE ENTRANCE WILL BE TOPDRESSED WITH NEW STONE AS NEEDED. REPLACEMENT OF THE STONE MAY BECOME NECESSARY WHEN THE STONE BECOMES ENTIRELY FILLED WITH SEDIMENT AND MUD.
4. THE CONSTRUCTION ENTRANCE AND CULVERT (IF PRESENT), WILL BE REMOVED WHEN CONSTRUCTION ACTIVITIES CEASE ON THE PROJECT. THE REMOVED STONE AND SEDIMENT FROM THE ENTRANCE WILL BE HAULED OFF-SITE AND DISPOSED OF PROPERLY.
5. UPON REMOVAL OF THE CONSTRUCTION ENTRANCE, THE CONTRACTOR SHALL BRING THE AREA TO ORIGINAL GRADE AND STABILIZE IT. IF A TEMPORARY CULVERT WAS UTILIZED IN CONJUNCTION WITH THE CONSTRUCTION ENTRANCE, THE CONTRACTOR SHALL INSTALL TEMPORARY MATTING AND/OR WATTLES WITHIN ROADSIDE SWALE/DITCH.

3/4 CONSTRUCTION ENTRANCE
SCALE: N.T.S



4/04 SECURITY FENCE
SCALE: N.T.S



NOTE:
1. CONCRETE AMOUNT IS USED FOR GATE SHOWN.

2. GATE POST & GATE BEAM NEED TO BE ONE CONTINUOUS POUR.

ITEM	QUAN.	MATERIAL
1.	2	GATE POST, PIPE 3 1/2 STD., 11'-2" LONG
2.	2	TOP CAP FOR PIPE 3 1/2 STD., GATE POSTS
3.	10	BAND, TENSION BAR, TRUSS AND BARBED WIRE TENSION BAR
4.	8	
6.	2.6 CY	CONCRETE, 4000 PSI MINIMUM
7.	1 LOT	7'-0" FENCE FABRIC
8.	2	TRUSS ROD WITH ADJUSTABLE LINK
9.	2	BAND WITH TWO ATTACHMENTS FOR BRACE RAIL AND TRUSS ROD
10.	2	SOCKET FITTING, PIPE 1 1/4 STD., OFFSET LUG
11.	2	BRACE RAIL, PIPE 1 1/4 STD.
12.	2	GATE FRAME, WELDED & INSTALLED
		OPTIONAL HINGING (CUSTOMER)
13.	4	INDUSTRIAL 90 DEGREE BOX HINGE, CI# 0710053669
14.	4	180 DEGREE ADAPTER, CI# 0710053650
15.	1	GATE ASSEMBLED WITH PIPE 1 1/2 STD

5/04 ENTRANCE GATE
SCALE: N.T.S

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ENGINEERING FIRM
LICENSE NUMBER: F-0176

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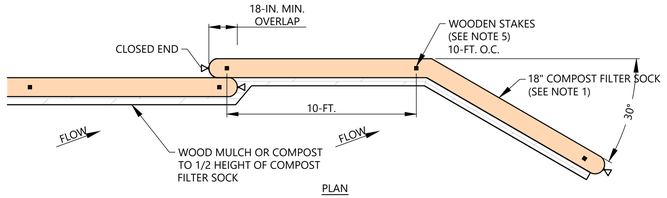
DETAILS 1 OF 2

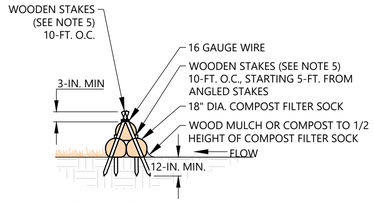
EROSION AND SEDIMENT CONTROL PLAN
EAST WAKE LANDFILL
KNIGHTDALE,NORTH CAROLINA

PROJECT NUMBER
22050404

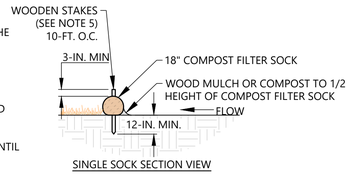
DRAWING NUMBER
4 5



PLAN



PYRAMID STACK SOCK SECTION VIEW



SINGLE SOCK SECTION VIEW

COMPOST FILTER SOCK PERIMETER NOTES

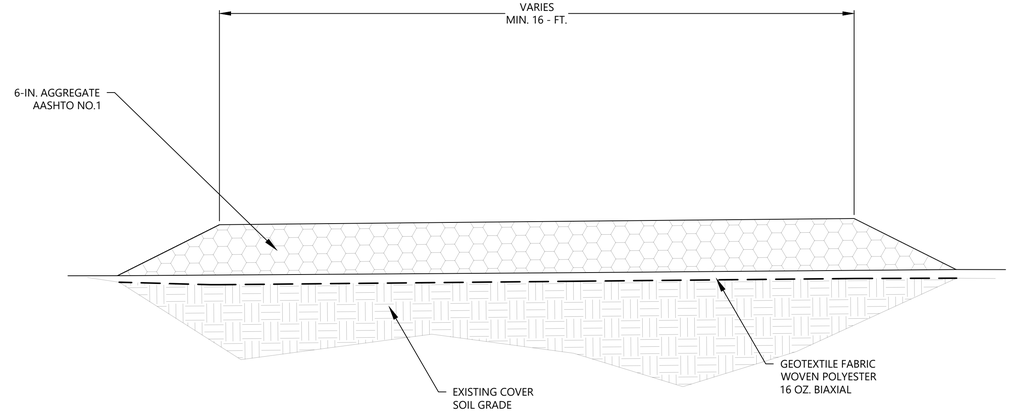
1. USE FILTREXX® COMPOST FILTER SOCK OR ENGINEER APPROVED EQUIVALENT. COMPOST FILTER SOCK DIAMETER VARIES, REFER TO PLAN VIEWS AND DETAILS FOR DIAMETER.
2. TO PREVENT WATER & SEDIMENT FROM FLOWING AROUND MEASURES A MINIMUM 10-FOOT LENGTH OF COMPOST FILTER SOCK MUST BE PLACED UPSLOPE AT A 30 DEGREE ANGLE FROM THE ENDS OF THE MEASURES.
3. MATERIALS USED IN THE COMPOST SOCK MUST MEET THE SPECIFICATIONS OUTLINED ON GENERAL NOTES SHEET.
4. COMPOST SOCKS SHOULD BE LOCATED AS SHOWN ON PLANS AND AS DIRECTED BY THE OWNER'S INSPECTOR OR DESIGNATED REPRESENTATIVE AS NEEDED BASED UPON FIELD CONDITIONS.
5. PRIOR TO INSTALLATION, CLEAR ALL OBSTRUCTIONS INCLUDING ROCKS, CLODS, AND OTHER DEBRIS GREATER THAN ONE INCH THAT MAY INTERFERE WITH PROPER FUNCTION OF THE COMPOST SOCK.
6. OAK OR OTHER DURABLE HARDWOOD STAKES 2-IN. X 2-IN. IN CROSS SECTION SHOULD BE DRIVEN VERTICALLY PLUMB, THROUGH THE CENTER OF THE COMPOST SOCK. STAKES SHOULD BE PLACED AT A MAXIMUM INTERVAL OF 10 FT. STAKES SHOULD BE DRIVEN TO A MINIMUM DEPTH OF 12 INCHES, WITH A MINIMUM OF 3 INCHES PROTRUDING ABOVE THE COMPOST SOCK.
7. IN THE EVENT STAKING IS NOT POSSIBLE (I.E., WHEN SOCKS ARE USED ON PAVEMENT) HEAVY CONCRETE BLOCKS SHALL BE USED BEHIND THE SOCK TO HOLD IT IN PLACE DURING RUNOFF EVENTS.
8. IF THE COMPOST SOCK IS TO BE LEFT AS PART OF THE NATURAL LANDSCAPE, IT MAY BESEEDED AT TIME OF INSTALLATION FOR ESTABLISHMENT OF PERMANENT VEGETATION USING THE SEEDING SPECIFICATION IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
9. COMPOST FILTER SOCKS ARE NOT TO BE USED IN PERENNIAL OR INTERMITTENT STREAMS.

COMPOST FILTER SOCK PERIMETER MAINTENANCE

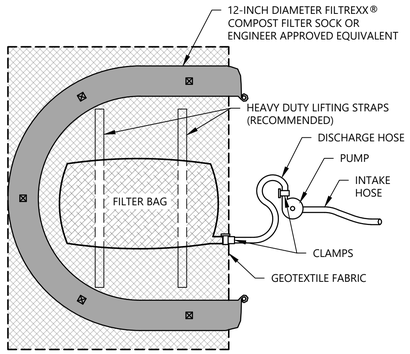
1. INSPECT AT LEAST ONCE PER 7 CALENDAR DAYS AND WITHIN 24 HOURS OF A RAIN EVENT GREATER THAN OR EQUAL TO 1-IN. IN 24 HOURS.
2. MAKE ANY NECESSARY REPAIRS IMMEDIATELY.
3. REMOVE ACCUMULATED SEDIMENT OVER 1/2 THE HEIGHT OF THE COMPOST FILTER SOCK AND ANY DEBRIS. THE COMPOST SOCK MUST BE REPLACED IF CLOGGED OR TORN.
4. IF PONDING BECOMES EXCESSIVE, THE SOCK MAY NEED TO BE REPLACED WITH ONE OF A LARGER DIAMETER OR A DIFFERENT MEASURE. THE SOCK NEEDS TO BE REINSTALLED IF UNDERMINED OR DISLODGED.
5. THE COMPOST FILTER SOCK SHALL BE REGULARLY INSPECTED UNTIL LAND DISTURBANCE IS COMPLETE AND THE AREA ABOVE THE MEASURE HAS BEEN PERMANENTLY STABILIZED.
6. REMOVE ALL COMPOST FILTER SOCK MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND RETURN THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
7. COMPOST MATERIAL DISPOSAL/RECYCLING HANDLING REQUIREMENTS OUTLINED ON GENERAL NOTES SHEET.

REF: BASED ON NCDEQ EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, CHAPTERS 6 REVISED, MAY 2013

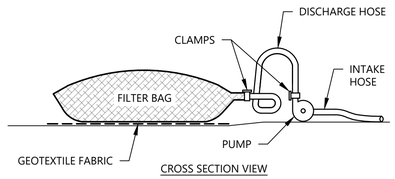
1/5 COMPOST FILTER SOCK PERIMETER
SCALE: N.T.S



2/5 TEMPORARY ACCESS ROAD
SCALE: N.T.S



PLAN VIEW



CROSS SECTION VIEW

FILTER BAG NOTES

1. LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

TABLE: FILTER BAG MATERIAL

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-4751	80 SIEVE

2. FILTER BAGS SHALL BE REPLACED WHEN THEY REACH CAPACITY. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. ALL BAGS SHALL BE WITHIN THE APPROVED LIMITS OF DISTURBANCE. DISCHARGE TO APPROPRIATE EROSION AND SEDIMENTATION CONTROL MEASURE.
3. FILTER BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5% WITHOUT APPROPRIATE STABILITY MEASURES. PLACE FILTER BAGS ON EXISTING WELL VEGETATED AREAS. IF DISCHARGE LOCATION IS BARE SOIL PLACE FILTER BAG ON GEOTEXTILE FABRIC.
4. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.
5. THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.
6. FILTER BAGS SHALL BE INSPECTED DAILY FOR CAPACITY AND RIPS. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.
7. WATER PUMPED OUT OF TRENCH SHALL NOT BE DISCHARGED INTO WATERWAYS. WATER SHALL BE DISCHARGED INTO A FILTER BAG OR DEWATERING STRUCTURE LOCATED IN A WELL VEGETATED AREA AT LEAST 50-FEET AWAY FROM A STREAM OR WETLAND.
8. INSTALL 12-INCH DIAMETER COMPOST FILTER SOCK ON THREE DOWNGRADIENT SIDES OF FILTER BAG.

REFERENCE: DETAIL BASED ON PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (PA DEP) STANDARD DETAILS.

3/5 FILTER BAG
SCALE: N.T.S

3201 SPRING FOREST ROAD
RALEIGH, NC 27616
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ENGINEERING FIRM
LICENSE NUMBER: F-0176

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DETAILS 2 OF 2

EROSION AND SEDIMENT CONTROL PLAN
EAST WAKE LANDFILL
KNIGHTDALE,NORTH CAROLINA

PROJECT NUMBER
22050404

DRAWING NUMBER
5 5

Appendix D – Portions of S&ME's Remedial Investigation Reports:

- Soil Cover Evaluation, Task Order No. 614RI-5 dated December 6, 2022
- Waste Delineation Assessment Report, Task Order No. 614RI-6 dated December 9, 2022
- Additional Soil Gas Sampling, Task Orders No. 614RI-8 and 614RI-8A dated June 12, 2023
- Soil Cover Evaluation, Task Order No. 614RI-10 dated October 20, 2023

Remedial Investigation Report
East Wake County LF – NONCD0000614
Knightdale, Wake County, North Carolina
Task Order 614RI-5
S&ME Project No. 22050404

PREPARED FOR:

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

PREPARED BY:

S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

December 6, 2022

December 6, 2022

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

Attention: Mr. Kevin Kelt, P.G. via email: kevin.kelt@ncdenr.gov
Hydrogeologist

Reference: **Remedial Investigation Report – Soil Cover Evaluation**
East Wake County LF
Knightdale, Wake County, North Carolina
NCDEQ ID No. NONCD0000614
NCDEQ Task Orders 614RI-5
S&ME Project No. 22050404

Dear Mr. Kelt:

S&ME, Inc. (S&ME) is submitting this report to NCDEQ summarizing the results of the soil cover evaluation phase remedial investigation activities conducted at the above-referenced site in Knightdale, North Carolina. S&ME completed this investigation in general conformance with S&ME Proposals No. 22050404D, dated September 30, 2022, between NCDEQ and S&ME. The attached report includes the results of the following tasks:

- Soil Cover Thickness Evaluation
- Soil Cover Sampling

We appreciate the opportunity to provide environmental consulting services to NCDEQ. Please contact us if you have any questions about the information included in this report.

Sincerely,

S&ME, Inc.

Gerald Paul
Senior Project Manager
jpaul@smeinc.com

Thomas Raymond, P. E., PMP
Senior Engineer
traymond@smeinc.com

Attachment: *Remedial Investigation Report*

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(continued)

List of Figures

List of Tables

Appendices

1.0 Summary of Current Investigation

S&ME completed the scope of services listed below for this investigation in general conformance with S&ME Proposal No. 22050404D, dated September 30, 2022, for Task Order 614RI-5:

- Evaluated thickness of soil cover via soil borings;
- Collected soil cover samples for analysis at locations with soil cover greater than twelve inches;
- Prepared this report.

S&ME's services were performed in general accordance with the North Carolina Department of Environmental Quality (NCDEQ), *Guidelines for Addressing Pre-Regulatory Landfills and Dumps* (March 2022) and S&ME's approved *Standard Operating Procedures and Quality Assurance (SOP/QA) Manual (July 2010)*, previously approved by NCDEQ.

2.0 Soil Cover Assessment

2.1 Soil Cover Thickness Evaluation

From October 25, 2022 through October 27, 2022, S&ME installed 63 soil cover borings (SB-1 thru SB-63) at the locations shown on **Figure 1**. Soil cover borings were installed using a stainless steel two inch hand auger, which was decontaminated with liquinox and deionized water between each use. Borings were installed to approximately one foot below ground surface (bgs) or until waste was encountered, whatever occurred first. Depth of waste and soil classifications for the 63 borings are located in the boring logs in **Appendix I**. Coordinates of the soil cover borings are included in **Appendix I**.

2.2 Soil Cover Thickness Results

In general, soil cover across the WDAs range in thickness from approximately one inch to greater than twelve inches. Shallow waste was encountered in 19 soil borings at depths ranging from one inch to eleven inches bgs. Waste was not encountered in 44 soil borings up to the boring termination depth of 12 inches bgs. The soil cover material mostly consists of black-gray organic sandy topsoil, and a layer of orange-tan/orange-gray silty sand. Boring logs for all 63 borings can be found in **Appendix II** and soil cover thickness results are shown in **Figure 2**

2.3 Soil Cover Sampling

At each location where soil cover was equal to twelve inches, S&ME collected one soil sample between six and twelve inches bgs. At locations where soil cover was less than 12 inches, no soil samples were collected. At each location, S&ME utilized a photo-ionization detector (PID) to field screen the soil cover samples for volatile organic compounds (VOCs). S&ME collected a total of 44 soil cover samples (plus QC duplicate samples and trip blanks, for each day of sampling) and submitted them under standard chain-of-custody protocol to SGS North America Inc. in Orlando, Florida. Samples were analyzed for VOCs by EPA Method 8260D, semi-volatile organic compounds (SVOCs) by EPA Method 8270E, Metals by EPA

Method 6020B/7471B, hexavalent chromium by EPA Method 7199, 1, 4 Dioxane by EPA Method 8270 SIM, Nitrate and Sulfate by EPA Method 300.0, and Ammonia by EPA Method 4500NH3.

2.4 Soil Sampling Results

Field Screened VOCs were measured from 0.0 parts per million (ppm) to 0.5 ppm.

The laboratory reported detections of the following constituents above the NCDEQ DWM Residential Preliminary Soil Remediation Goals (PSRGs):

- Pentachlorophenol in SB-16;
- Arsenic in 39 of the 44 locations sampled;
- Cobalt in SB-14, SB-15, SB-19, SB-20, SB-21, SB-43, SB-53, SB-DUP-3 (at SB-53);
- Thallium in 33 of the 44 locations sampled; and,
- Hexavalent Chromium in 43 of the 44 locations sampled.

All laboratory reported detections did not exceed the NCDEQ DWM Industrial PSRGs.

A summary of the laboratory results is included as **Table 1** and exceedances of Residential PSRGs are shown on **Figure 3**. The field notes are included in **Appendix II**. The laboratory reports and chain of custody forms are included in **Appendix IV**.

2.5 Risk Calculator

NCDEQ's Risk Calculator was used to evaluate environmental exposure risks of multiple contaminants and exposure pathways associated with the Landfill Cover Soil Samples. S&ME used the newest version (July 2022) of NCDEQ's Risk Calculator, downloaded from the NCDEQ website.

The samples were split into two categories based on which Waste Disposal Area (A or C) the sample was collected from. The highest concentration of each constituent was input into the NCDEQ Risk Calculator. The risk calculator uses the analytical results and generates a Carcinogenic Risk and Hazard Index value. The outputs from the Risk Calculator provided the following:

<u>Waste Disposal Area (A)</u>

- The Carcinogenic Risk was not exceeded for resident and non-residential worker receptors.
- The Hazard Index Risk was exceeded for residential soil direct contact with an index value of 1.6. Non-residential worker receptor did not exceed the hazard index risk.

<u>Waste Disposal Area (C)</u>

- The Carcinogenic Risk was not exceeded for resident and non-residential worker receptors.
- The Hazard Index Risk was exceeded for residential soil direct contact with an index value of 1.1. Non-residential worker receptor did not exceed the hazard index risk.

Risk Calculator Summary Reports for Waste Disposal Areas (A & C) can be found in **Appendix III**.

3.0 Quality Control

Quality control samples were collected and analyzed as follows:

Soil Sample Duplicates

- One duplicate sample was collected for each day of sampling. Duplicates were taken at SB-4, SB-35, and SB-53, and analyzed for the same parameters as the record sample. Analytical results of the duplicate samples agreed well with the record samples.

Trip Blank

- One trip blank sample of laboratory provided Deionized Water was kept with the laboratory samples throughout the sampling event and analyzed for VOCs by 8260D. No analytes were reported above the laboratory's minimum detection limit.

The laboratory conducted USEPA quality assurance and quality control procedures and reporting as required for laboratory analysis according to USEPA Level II Protocols. Reported laboratory analytical data met data quality objectives.

4.0 Deviation From Work Plan

There were no deviations from the work plan during this project.

5.0 Sole Use Statement

This report is solely intended for use by NCDEQ for the services that were performed in accordance with S&ME Proposal No. 22050404D, dated September 30, 2022, for Task Order 614RI-1, 614RI-5 as authorized by NCDEQ.

6.0 Certification Acknowledgement

"I certify that to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete."

Gerald Paul / S&ME, Inc.
Name of Environmental Consultant / Company

December 6, 2022

Signature of Environmental Consultant Date

I, Gail Kluever, a Notary Public of said County and State, do hereby certify that Gerald Paul did personally appear and sign before me this day, produced proper identification in the form of NCDL, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 6th day of December 2022.

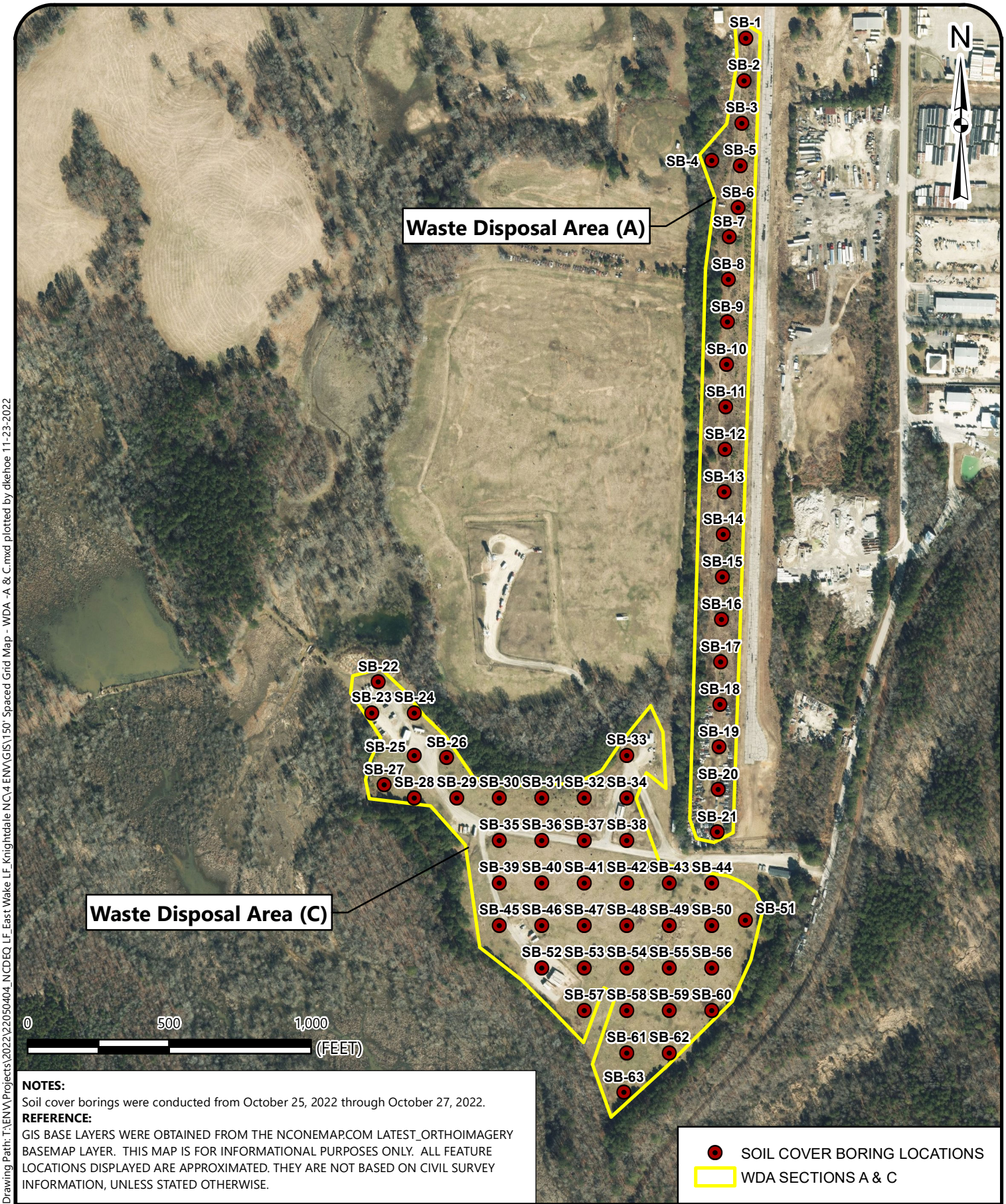
(OFFICIAL SEAL)

Gail L Kluever

Notary Public (signature)

My commission expires: 7/26/2026

Appendices



NOTES:
Soil cover borings were conducted from October 25, 2022 through October 27, 2022.
REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

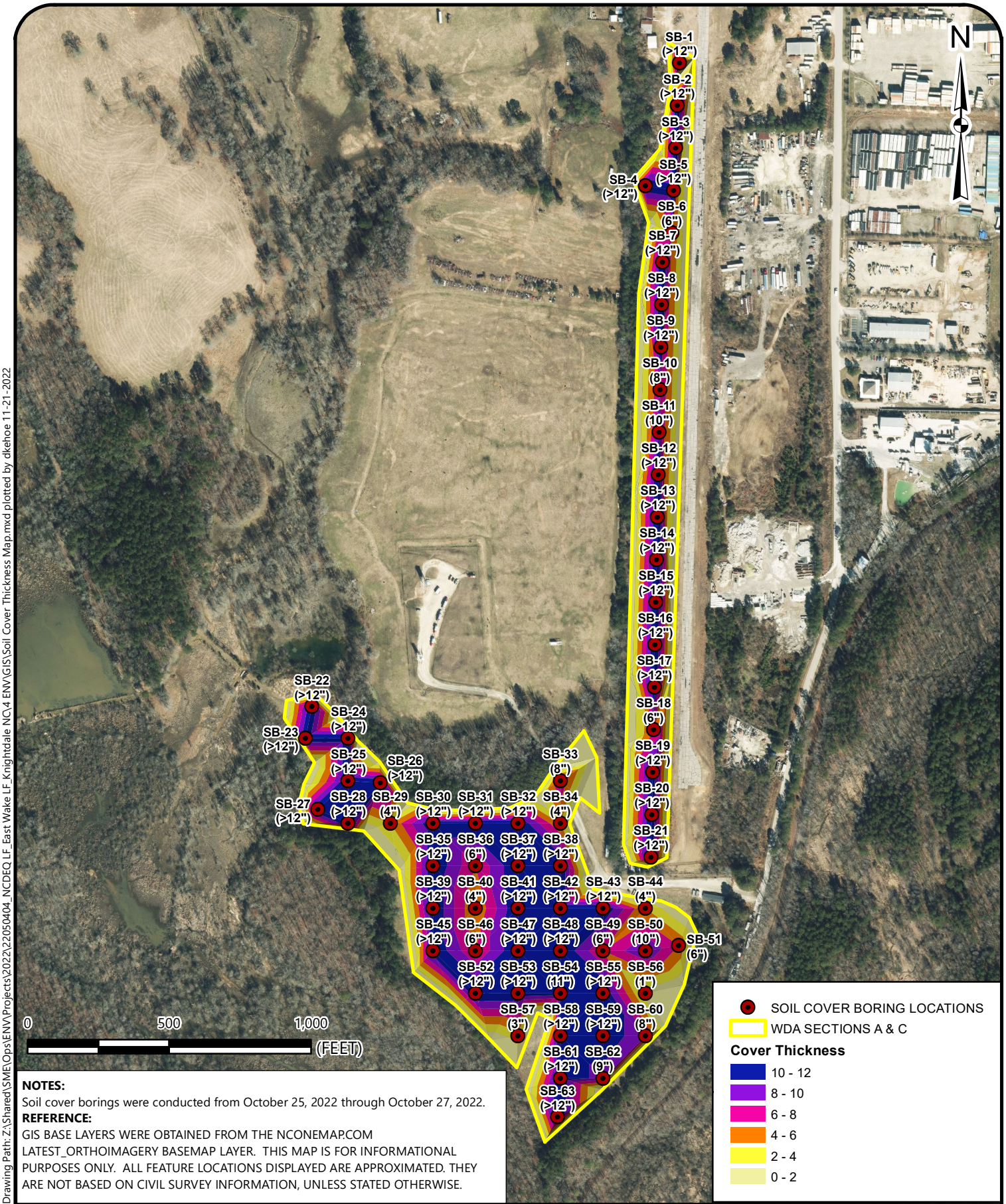
SOIL COVER BORING LOCATIONS
WDA SECTIONS A & C

Drawing Path: T:\ENV\Projects\2022\22050404_NCDEQ LF_East Wake LF_Knightdale NC\4 ENV\GIS\150' Spaced Grid Map - WDA -A & C.mxd plotted by dkehoe 11-23-2022

SOIL COVER BORING LOCATIONS

EAST WAKE COUNTY LF (NONCD0000614) - Task Order 614RI-5
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE:	FIGURE NO.
1 " = 450 '	1
DATE: 11-23-22	
PROJECT NUMBER 22050404	



NOTES:
Soil cover borings were conducted from October 25, 2022 through October 27, 2022.
REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

Drawing Path: Z:\Shared\SME\Ops\ENV\Projects\2022\22050404_NCDEQ LF_East Wake LF_Knightdale NC\4 ENV\GIS\Soil Cover Thickness Map.mxd plotted by dkehoe 11-21-2022

SOIL COVER THICKNESS RESULTS

EAST WAKE COUNTY LF (NONCD0000614) - Task Order 614RI-5
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE:	FIGURE NO.
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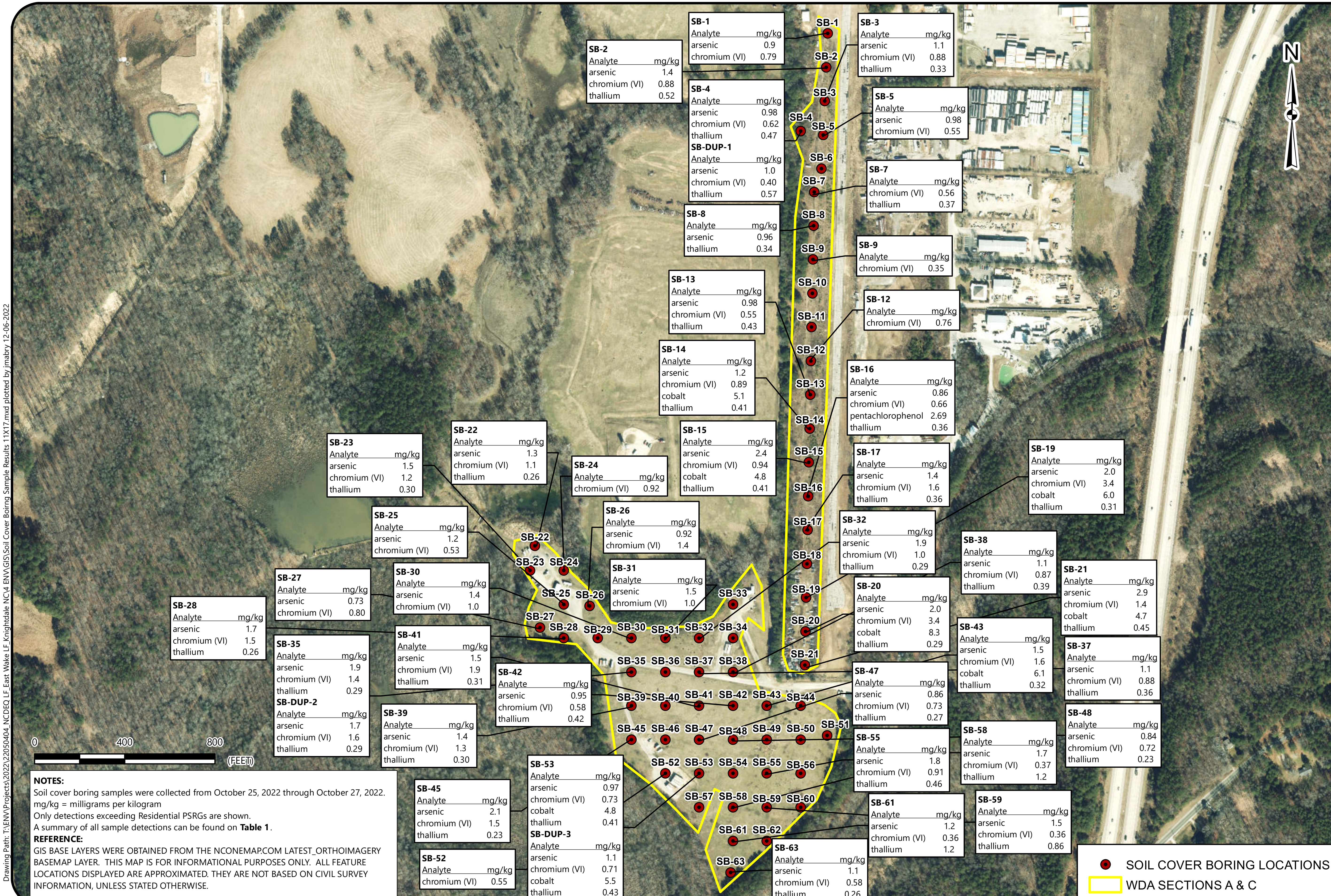
DATE: 11-21-22	
PROJECT NUMBER 22050404	



NOTES:
Soil cover boring samples were collected from October 25, 2022 through October 27, 2022.
mg/kg = milligrams per kilogram
Only detections exceeding Residential PSRGs are shown.
A summary of all sample detections can be found on **Table 1**.

REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

Drawing Path: T:\ENV\Projects\2022\22050404_NCDEQ LF_East Wake LF_Knightdale NC\4 ENV\GIS\Soil Cover Boring Sample Results 11X17.mxd plotted by jmabry 12-06-2022

SOIL COVER BORING SAMPLE RESULTS

EAST WAKE COUNTY LF (NONCD0000614) - Task Order 614RI-5
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 400 '
DATE: 12-6-22
PROJECT NUMBER 22050404
FIGURE NO. 3

Remedial Investigation Report
East Wake County LF - NONCD0000614
Knightdale, Wake County, North Carolina
Task Order 614RI-6
S&ME Project No. 22050404

PREPARED FOR:

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

PREPARED BY:

S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

December 9, 2022

December 9, 2022

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

Attention: Mr. Kevin Kelt, P.G. via email: kevin.kelt@ncdenr.gov
Hydrogeologist

Reference: **Remedial Investigation Report – Surface Water, Soil Gas, Groundwater and Water Supply Well Sampling**
East Wake County LF
SR 2655 / US 64, Knightdale, Wake County, North Carolina
NCDEQ ID No. NONCD0000614
NCDEQ Task Order 614RI-6
S&ME Project No. 22050404C

Dear Mr. Kelt:

S&ME, Inc. (S&ME) is submitting this report to NCDEQ summarizing the results of the remedial investigation (RI) activities conducted at the above-referenced site in Knightdale, North Carolina. S&ME completed this investigation in general conformance with S&ME Proposals No. 22050404C, dated September 22, 2022, for Task Orders 614RI-6 and 614WS-7, and 22050404D, dated November 10, 2022, for Task Order 614RI-7. The attached report includes the results of the following tasks:

- Surface Water sampling;
- Landfill gas probe sampling and screening;
- Monitor well installation and sampling; and
- Water supply well sampling.

We appreciate the opportunity to provide environmental consulting services to NCDEQ. Please contact us if you have any questions about the information included in this report.

Sincerely,

Logan Hester
Staff Professional
lhester@smeinc.com

Gerald Paul
Senior Project Manager
jpaul@smeinc.com

Senior Reviewed by: Thomas P. Raymond, P. E., P.M.P - Senior Engineer

Attachment: *Remedial Investigation Report*

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(continued)

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Appendices

1.0 Summary of Current Investigation

S&ME completed the scope of services listed below for this investigation in general conformance with S&ME Proposal No. 22050404C, dated September 22, 2022, for Task Orders 614RI-6 and 614WS-7, and 22050404D, dated November 10, 2022, for Task Order 614RI-7:

- Collected samples from 10 surface water locations (plus 1 duplicate) for laboratory analysis;
- Field-screened and sampled 14 landfill gas probes and 5 soil vapor implants (plus 3 duplicates) for laboratory analysis;
- Collected samples from 32 monitor wells (plus 2 duplicates) for laboratory analysis;
- Collected one full round of water level measurements at monitor well locations;
- Collected 11 water supply well samples (plus 1 duplicate) for laboratory analysis; and,
- Prepared this report.

Figure 1 shows the site map with sample locations.

S&ME's services were performed in general accordance with the North Carolina Department of Environmental Quality (NCDEQ), *Guidelines for Addressing Pre-Regulatory Landfills and Dumps* (March 2022) and S&ME's approved *Standard Operating Procedures and Quality Assurance (SOP/QA) Manual (July 2010)*, previously approved by NCDEQ.

2.0 Landfill Gas Assessment

2.1 Field Screening Methods

Table 1 presents the landfill gas probe construction details. **Appendix I** shows the coordinates of the landfill gas sample locations. The 14 landfill gas probes and 5 soil vapor implants were screened for landfill gas during field visits conducted on October 31, 2022 and November 1, 2022. **Figure 2** shows the data from the field screening event. Portable meters were used to collect the following parameters at each soil gas probe, soil gas implant and background screening location:

- Landfill Gas Meter – GEM5000 PLUS for the following:
  - methane: 0-100%, +/- 0.3% to 1.5% accuracy
  - hydrogen sulfide: 0-500 parts per million-volume (ppm-v), with +/- 2.0% accuracy
  - carbon dioxide: 0-100%, +/- 0.5% to 1.5% accuracy
  - oxygen: 0-25%, +/- 1.0% accuracy
  - barometric pressure: +/- 14.7 inches mercury from calibration pressure, +/- 1% inches mercury accuracy
- Photo-Ionization Detector (PID) MiniRAE 3000 for total VOCs: 0-15,000 ppm-v, with +/- 0.1 ppm-v resolution over range of 0 to 999.9 ppm-v and +/- 1 ppm-v resolution over range of 1,000 to 15,000 ppm-v.

Each of the meters listed above has an internal pump, which was used to draw air samples from the gas probe through the portable meters. New Teflon tubing was connected from the meters to the soil gas probe cap for sampling.

A thermohygrometer was used to measure ambient air for humidity and temperature. The landfill gas screening forms which summarize the results are included with the field documents in **Appendix II**.

2.2 Landfill Gas Screening Results (Oct. 31 & Nov. 1, 2022)

2.2.1 Volatile Organic Compounds

VOCs were detected in SGP-21, SGP-27, SGP-28, SGP-30, SGP-32, SGP-33, SGP-35, and SGP-36 during the screening events at concentrations ranging from 0.3 parts per million by volume (ppm-v) to 2.5 ppm-v.

2.2.2 Methane

During the screening events, methane was detected in SGP-22 and SGP-27 at concentrations of 11.5% and 16.5% (volume in air) respectively, which exceeds the lower explosive limit (LEL) for methane of 5%. The GEM5000 manufacturer specifies an approximate accuracy range of +/- 0.3% of the displayed reading for methane concentrations between 0 – 5%.

2.2.3 Hydrogen Sulfide

Hydrogen Sulfide was detected in SGP-17, SGP-19, and SGP-27 at concentrations of 1, 1, and 1 ppm-v respectively, during the screening events. The GEM5000 manufacturer specifies an approximate accuracy range of +/- 2.0% of the displayed reading for hydrogen sulfide concentrations between 0 – 500 ppm-v.

The landfill gas screening results are summarized on **Table 2**.

2.3 Landfill Gas Sampling

On October 31 through November 3, 2022, S&ME personnel used batch-certified sampling canisters to collect samples (including 3 duplicate samples) from 19 soil gas probes and soil gas implants for laboratory analysis of VOCs by EPA Method TO-15.

Prior to beginning sample collection, S&ME performed a leak test on each of the soil gas probe or soil gas implant and sampling arrays. The leak tests were performed by attaching a 1" PVC well cap fitted with a Swagelock® ball valve attached to a section of Teflon® tubing. A brass T-connector (with a ball valve attachment) was attached to the end of the Teflon® tubing extending from the cap. Another section of Teflon® tubing was used to attach the other end of the T-connector (with the ball valve attachment) to a regulator installed on a batch certified six-liter summa canister. A section of Teflon® tubing was then attached to the end of the ball valve attachment and fitted through a plastic shroud that was placed overtop the soil gas probe or soil gas implant and sampling array. S&ME then injected helium gas into the plastic shroud until the concentration reached at least 15% helium, as monitored with a helium detector. The gas probe and sampling array was monitored for leaks by using a calibrated personal pump to purge air from the sampling array into a Tedlar® bag.

The purged air from the sampling array in the Tedlar® bag was then monitored for the presence of helium gas concentration with a helium detector. Per the North Carolina Department of Environmental Quality (NCDEQ) Vapor Intrusion Guidance Document (March 2018), the helium concentrations detected during the leak test shall not exceed 10% of the helium concentration contained in the shroud. Each of the gas probes or soil gas implants and sampling arrays had a successful leak test. The field sampling forms are included in **Appendix II**.
After successfully passing the leak test, a minimum of three volumes of air were purged from the gas probes and sampling arrays. After purging the sampling array, the ball valve attachment on the T-connector leading to the purge point was closed and the valve on the regulator was opened to allow the collection of the sample.

Following the collection of landfill gas samples using the summa canisters, samples were collected for Hydrogen Sulfide by EPA Method D5504. Samples were collected by attaching a section of Teflon® tubing to a Tedlar® bag that was filled by utilizing a personal pump to purge air from the sampling array into the Tedlar® bag. A split sample was collected from seven sample locations (SGP-21, SGP-22, SGP-23, SGP-25, SGP-26, SGP-27, and SGP-28) that was sent to a separate laboratory for comparison of detections.

Samples were not collected from SGP-20 and SGP-34, due to shallow groundwater, and SGP-29, due to it being found destroyed by an unknown third party.

After collecting the gas samples, the summa canisters were shipped under standard chain-of-custody protocol to Eurofins Environmental Testing (Eurofins) for VOC analysis by EPA Method TO-15.

2.4 Landfill Gas Sampling Results

The laboratory reported detections of the following constituents above the NCDEQ DWM VI Residential Soil Gas Screening Levels (SGSLs):

- Bromodichloromethane in SGP-31R;
- Chloroform in SGP-17, SGP-23, SGP-24, SGP-28, SGP-30, SGP-31R, SGP-32, SGP-36 and SGP-38;
- Benzene in SGP-22;
- Ethyl Benzene in SGP-27; and
- Hydrogen Sulfide in SGP-22 (both laboratories) and SGP-23 (Air Technology only)

The laboratory reported the following methane detections above the LEL:

- SGP-22 and SGP-27

A summary of the laboratory results is included as **Table 3A and 3B** and exceedances of the Residential Vapor Intrusion Screening Levels and methane LEL are shown on **Figure 3**. The field notes are included in **Appendix II**. The laboratory reports and chain of custody forms are included in **Appendix III**.

3.0 Groundwater Assessment

3.1 Monitor Well Installation

S&ME personnel installed two temporary monitor wells, MW-39 and MW-40, on October 24, 2022. The monitor wells were installed via hand auger in general accordance with our approved proposals. S&ME personnel screened the soil for VOCs during the installation of each of the monitor wells. No visual indications of contamination or elevated organic vapors were noted during the installation of the monitor wells.

The monitor wells were installed to depths ranging from approximately 4 feet below the ground surface (ft. bgs) (MW-39) to 8 ft. bgs (MW-40). Once the total depth of each monitor well was determined, a 2-inch diameter section of PVC 0.010-inch slotted well screen (intervals ranging from 3-6.5 feet) was installed with PVC well riser casing installed from the top of the well screen up to ground surface. A sand pack of #2 filter sand was placed in the annulus between the borehole wall and the well screen up to approximately two feet above the top of the well screen. A bentonite seal was then installed up to the ground surface. The wells were developed with a submersible pump until turbidity was reduced to below 10 Nephelometric Turbidity Units (NTUs) or was representative of background conditions.

Field notes documenting the installation are included in **Appendix II**. The monitor well construction details are presented on **Table 4** and the locations of the monitor wells are shown on **Figure 4**. Location coordinates are listed in **Appendix I**.

3.2 Groundwater Elevations

The depth to groundwater in all wells were measured on October 11, 2022, ranged from 2.07 ft-bgs in MW-6 to 33.67 ft-bgs in MW-37, as shown on **Table 4**, as well as the groundwater construction details. The groundwater elevations, relative to mean sea level, were calculated by subtracting the depth to water measurement from the previously surveyed top of casing (TOC) for each well. Calculated groundwater elevations ranged from approximately 217.54 feet above mean sea level (ft-AMSL) in MW-32 to 301.33 ft-AMSL in MW-31 during the October 11, 2022, sampling event. Groundwater elevation measurements and the interpreted groundwater table surface expressed as a potentiometric map are shown on **Figure 4**. Based on the groundwater elevations, the groundwater potentiometric surface slopes downward across the site toward the south/southwest, and locally slopes downward toward the nearby surface water features.

3.3 Groundwater Sample Collection and Analysis

Prior to sample collection, each monitor well was purged using a peristaltic pump and new tubing and field parameter data (pH, temperature, conductivity, and turbidity) were recorded (**Table 5**). A copy of the low flow groundwater sampling field forms is included with the field documents in **Appendix II**. Once the field parameters stabilized, groundwater samples were collected, placed on ice, and sent under chain-of-custody protocol to Eurofins for laboratory analysis.

On October 12-14 and October 17, 2022, S&ME personnel collected samples from 32 monitor wells (plus 2 duplicates) for laboratory analysis of VOCs by EPA Method 8260, 1,4-Dioxane by EPA Method 8270SIM, and Total Lead by EPA Method 6020.

Monitor well MW-34 was not sampled during this sampling event, as it was discovered destroyed by an unknown third party during a previous sampling event by S&ME.

MW-39 and MW-40 were sampled separately on October 28, 2022, specifically for benzene, vinyl chloride, and 1,4-dioxane.

The concentrations of detected contaminants of concern were compared to the Groundwater quality protection standards promulgated by Title 15A of the North Carolina Administrative Code, Subchapter 2L (15A NCAC 2L), .0200 Groundwater Quality Standards, hereafter referred to as 2L Standards.
For the sampling events, the laboratory reported detections of the following constituents above 2L standards:

- Benzene in MW-6, MW-12, MW-14, MW-15, MW-27, MW-30, MW-31, and MW-38;
- Chloroethane in MW-8
- 1,4-Dichlorobenzene in MW-9 and MW-27;
- 1,2-dichloropropane in MW-15;
- Vinyl Chloride in MW-38; and
- 1,4-Dioxane in MW-6, MW-12, MW-15, MW-27, MW-30, MW-31, and MW-38.

The reported groundwater concentrations are summarized on **Table 6** and exceedances of the 2L standards are included on **Figure 5**. The laboratory reports and chains of custody are included in **Appendix III**.

4.0 Water Supply Well Sampling

Water supply wells located on properties around the pre-regulatory landfill were sampled on October 13, 2022. The water supply wells were sampled for VOCs by EPA Method 6200, 1,4-Dioxane by EPA Method 8720SIM, and Total Lead by EPA Method 6020.

The standards used to determine if the potable water is suitable for drinking and cooking are the federal drinking water standards (USEPA MCL), or when an MCL has not been established, the health-based North Carolina Groundwater Quality Standards (15A NCAC 2L) or the 2L Interim Maximum Allowable Concentrations (IMAC).

The following constituents were found to exceed 2L standards according to laboratory results:

- 1,4-Dioxane in 512A, and 512B and C

A full list of detections is included in this report as **Table 7**, and exceedances are shown in **Figure 6**. The laboratory reports and chain of custody forms are included in **Appendix III**.

5.0 Surface Water Sampling

A Surface water feature on the subject property (identified as Marks Creek by the NC DWR Surface Water Classifications Map) was sampled on October 10, 2022. A total of ten surface water locations (plus one duplicate sample) were collected and sent for laboratory analysis of VOCs by EPA Method 8260, 1,4-Dioxane by EPA Method 8270SIM, and Total Lead by EPA Method 6020.

The concentrations of detected contaminants of concern were compared to the 15A NCAC 02B Water Quality Standards for Surface Waters (02B Standards). Where an 02B Standard had not been established, detections were compared to In-Stream Target Values for Freshwater. Detections of lead were compared to an Acute Lead value calculated from the Equations for Hardness-Dependent Materials using the default water hardness of 25. For the sampling event, the laboratory reported detections of the following constituent above its respective standard:

- 1,4-Dioxane in SW-1, SW-4, and SW-7

All of the reported surface water concentrations are summarized on **Table 8** and exceedances of the 02B Standards are included on **Figure 7**. The laboratory reports and chains of custody are included in **Appendix III**. A copy of the surface water sampling form is included with the field notes in **Appendix II**.

6.0 Investigative Derived Waste

No impacted media (auger cuttings or groundwater) or other investigative derived wastes (IDW) were stored onsite during this investigation.

7.0 Quality Control

Quality control samples were collected and analyzed as follows:

- Duplicates: One duplicate sample was collected for each day for each media sampled and analyzed for the same parameter(s) as the record samples. Analytical results of the duplicate samples agreed well with the record samples.

Groundwater Sampling

- Trip Blanks: One trip blank water sample was used for each sampling day. The laboratory included trip blank VOC vials (filled with water at the laboratory) with the sample jars and coolers shipped to S&ME. The trip blank samples were kept with the sample coolers for the entire trip; from the laboratory to the field, and back to the laboratory. The trip blank samples were analyzed for VOCs. No contaminants of concern were detected.

The laboratory conducted USEPA quality assurance and quality control procedures and reporting as required for laboratory analysis according to USEPA Level II Protocols. Reported laboratory analytical data met data quality objectives.

8.0 Deviation From Work Plan

There were no deviations from the work plan during this project, with exception to the following:

- Destruction of MW-34 and SGP-29 by an unknown third party;
- Could not locate monitor wells MW-5, MW-16 and PRLMW-5; and,
- Not sampling MW-34, SGP-34 or SGP-20, as explained in previous sections.

9.0 Sole Use Statement

This report is solely intended for use by NCDEQ for the services that were performed in accordance with S&ME Proposals No. 22050404C, dated September 22, 2022, for Task Orders 614RI-6 and 614WS-7, and 22050404D, dated November 10, 2022, for Task Order 614RI-7.

10.0 Certification Acknowledgement

"I certify that to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete."

Gerald Paul / S&ME, Inc.
Name of Environmental Consultant / Company

_____ December 9, 2022

Signature of Environmental Consultant Date

I, _____, a Notary Public of said County and State, do hereby certify that _____ did personally appear and sign before me this day, produced proper identification in the form of _____, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this _____ day of _____, 2022.

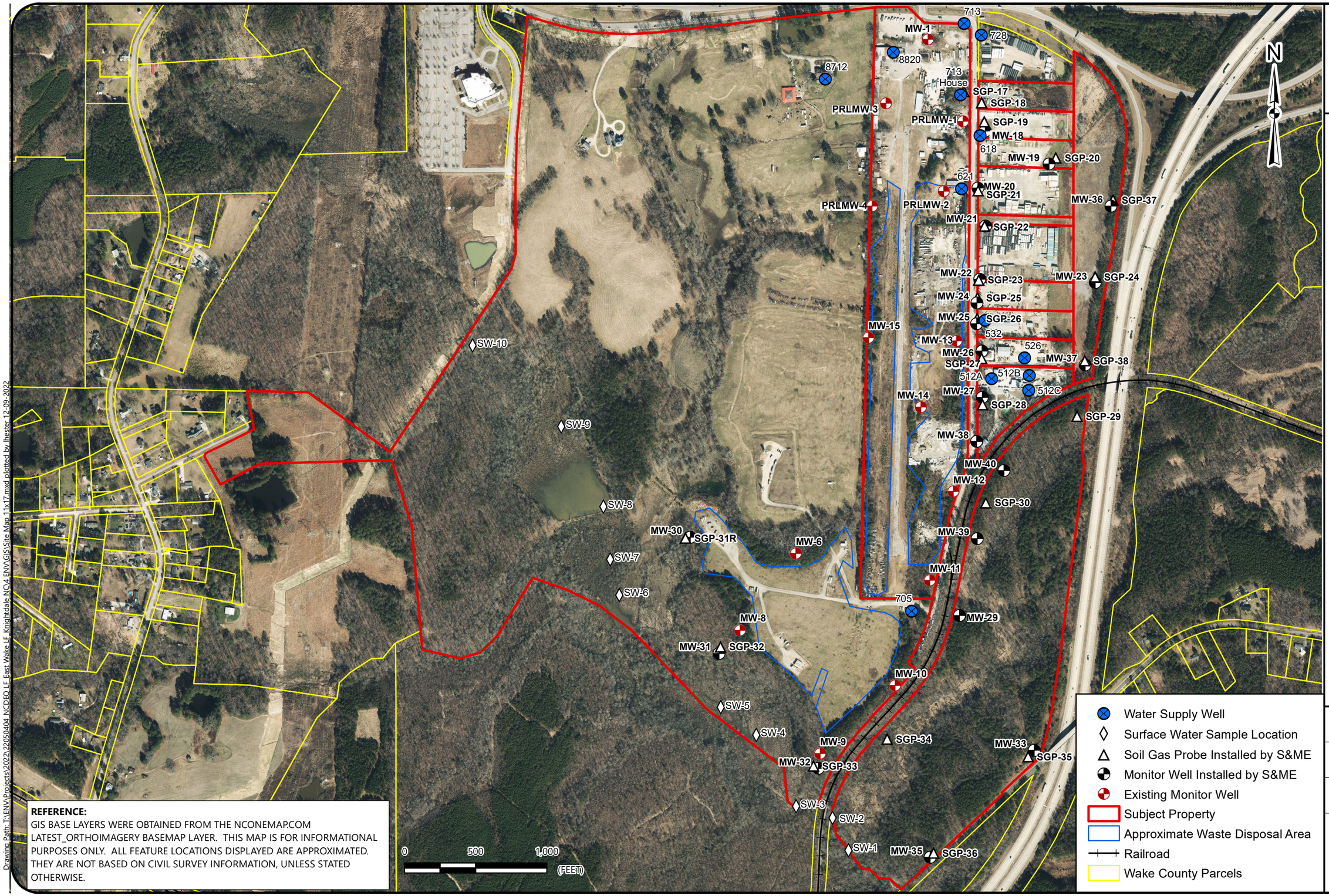
(OFFICIAL SEAL)

_____

Notary Public (signature)

My commission expires: _____.

Figures



REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

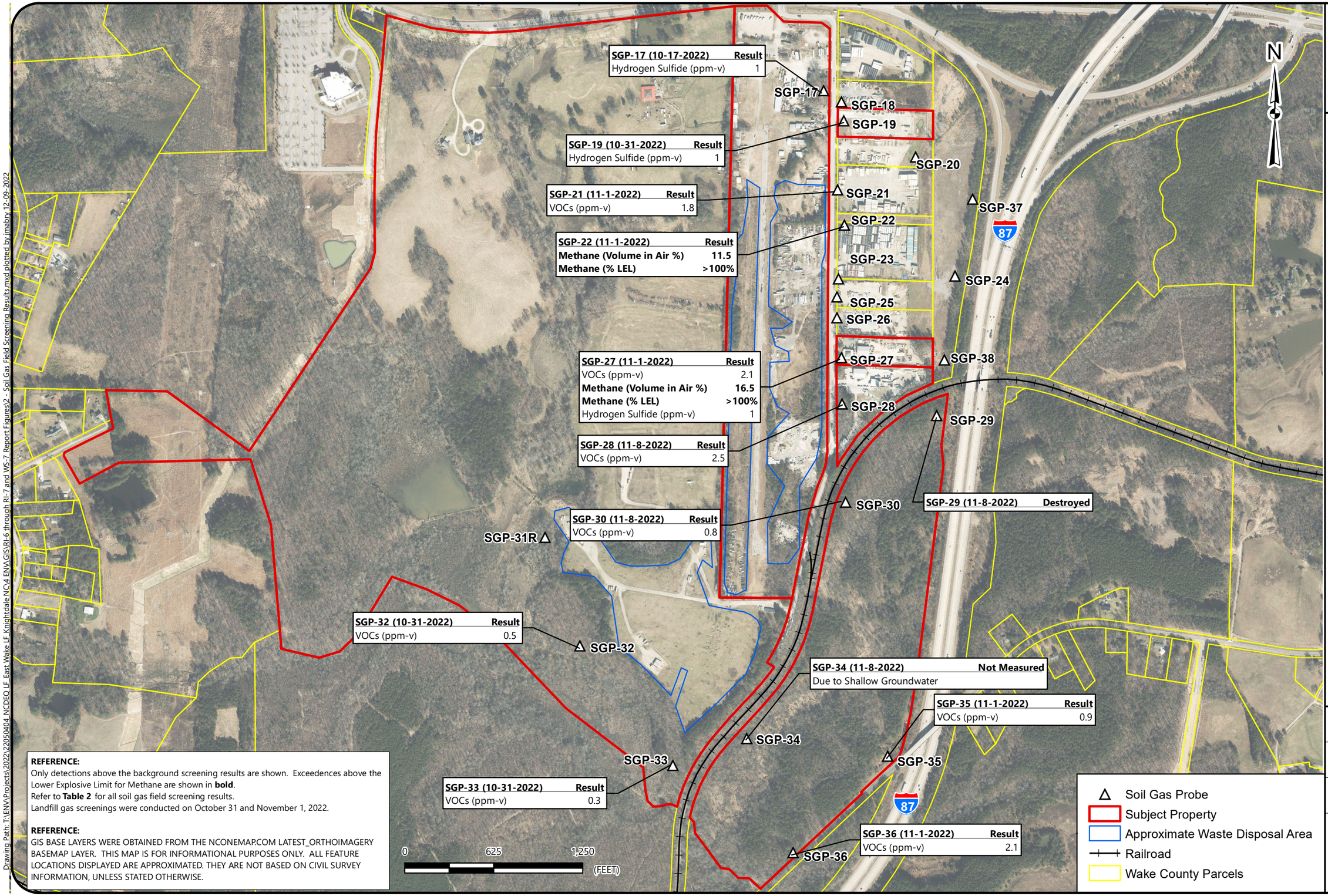
- Water Supply Well
- Surface Water Sample Location
- Soil Gas Probe Installed by S&ME
- Monitor Well Installed by S&ME
- Existing Monitor Well
- Subject Property
- Approximate Waste Disposal Area
- Railroad
- Wake County Parcels

SITE MAP

EAST WAKE COUNTY LF (NONCD0000614) - TASK 614RI-6
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 625 '
DATE: 12-9-22
PROJECT NUMBER: 22050404
FIGURE NO.: 1

Drawing Path: T:\ENV\Projects\2022\22050404_NCDEQ_LF East Wake LF_Knightdale NC\4 ENV\GIS\Site Map 11x17.mxd plotted by lhester 12-09-2022



REFERENCE:
Only detections above the background screening results are shown. Exceedences above the Lower Explosive Limit for Methane are shown in **bold**.
Refer to **Table 2** for all soil gas field screening results.
Landfill gas screenings were conducted on October 31 and November 1, 2022.

REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

LANDFILL GAS FIELD SCREENING RESULTS

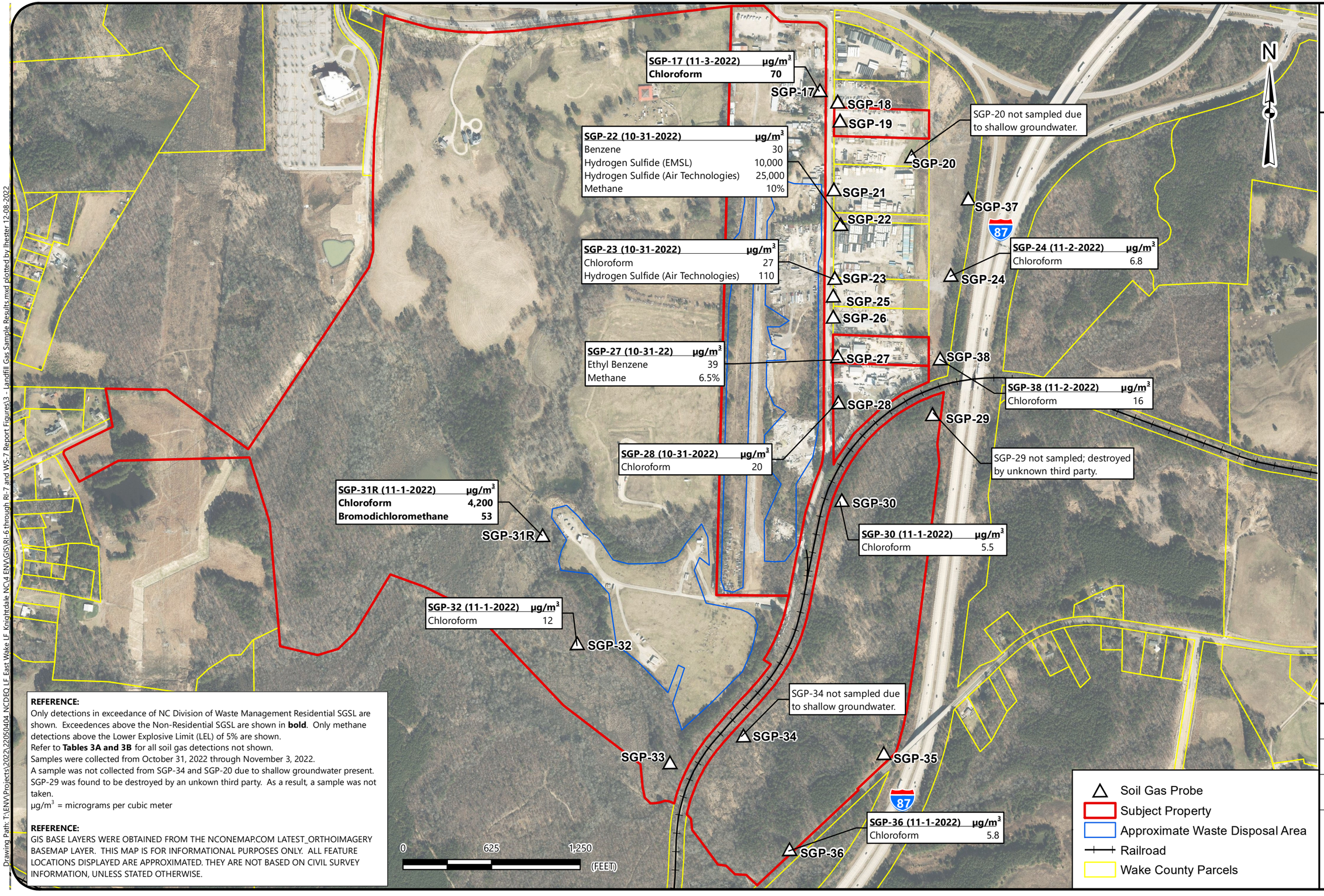
EAST WAKE COUNTY LF (NONCD0000614), Task Order 614RI-6
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE:
1 " = 625 '

DATE:
12-9-22

PROJECT NUMBER
22050404

FIGURE NO.
2



REFERENCE:
Only detections in exceedance of NC Division of Waste Management Residential SGSL are shown. Exceedences above the Non-Residential SGSL are shown in **bold**. Only methane detections above the Lower Explosive Limit (LEL) of 5% are shown.
Refer to **Tables 3A and 3B** for all soil gas detections not shown.
Samples were collected from October 31, 2022 through November 3, 2022.
A sample was not collected from SGP-34 and SGP-20 due to shallow groundwater present.
SGP-29 was found to be destroyed by an unkown third party. As a result, a sample was not taken.
µg/m³ = micrograms per cubic meter

REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

LANDFILL GAS SAMPLE RESULTS

EAST WAKE COUNTY LF (NONCD0000614), Task Order 614RI-6
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 625 '
DATE: 12-8-22
PROJECT NUMBER: 22050404
FIGURE NO.: 3

GROUNDWATER POTENTIOMETRIC MAP - OCTOBER 11, 2022

EAST WAKE COUNTY LF (NONCD0000614) - Task Order 614RI-6
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

MW-1 290.54
PRLMW-3 285.89
PRLMW-1 301.33
MW-18 297.93
MW-19 288.02
MW-20 283.46
PRLMW-2
PRLMW-4 272.52
287.57 MW-36
MW-21 281.41
278.71 MW-22
MW-23 277.14
267.73 MW-24
267.1 MW-25
MW-15 267.23
MW-13 266.17
MW-26 261.00
MW-37 251.82
MW-14 256.75
MW-27 254.45
246.28 MW-38
MW-40
MW-12 242.57
224.63 MW-30
MW-6 240.11
MW-39
MW-11 237.68
MW-29 232.28
MW-8 223.61
MW-31 220.91
MW-10 229.68
217.86 MW-9
MW-32 217.54
MW-33 235.92
219.33 MW-35

290 295 285 280 275 270 265 260 255 250 245 240 235 230 225 220

N

87

0 625 1,250 (FEET)

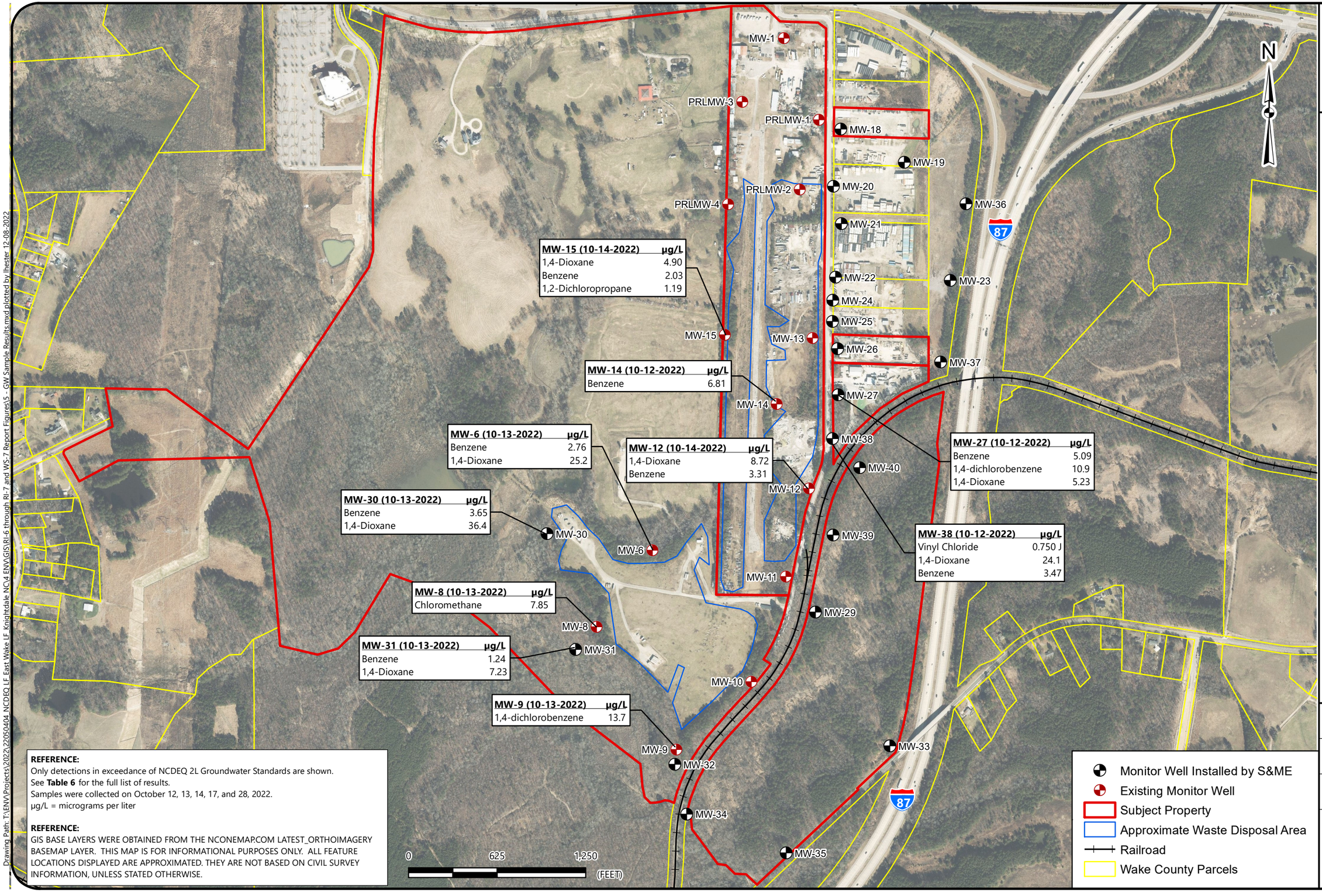
NOTES
Water levels measured on October 11, 2022.
Monitor Wells MW-39 and MW-40 are temporary monitor wells and were not surveyed, therefore they are not used in the calculation of the groundwater contours.
Well construction information and groundwater elevations can be found on **Table 4**.

REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAPCOM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

- Existing Monitor Wells
- Monitoring Well
- Groundwater Contour Lines
- Subject Property
- Approximate Waste Disposal Area
- Railroad
- Wake County Parcels

SCALE: 1 " = 625 '
DATE: 12-9-22
PROJECT NUMBER 22050404
FIGURE NO. 4

Drawing Path: T:\ENV\Projects\2022\22050404_NCDEQ LF_East Wake LF_Knightdale NC\4 ENV\GIS\RI-6 through RI-7 and WS-7 Report Figures\v4 - Groundwater Contour Map - October 2022.mxd plotted by lhester 12-09-2022



MW-15 (10-14-2022)	µg/L
1,4-Dioxane	4.90
Benzene	2.03
1,2-Dichloropropane	1.19

MW-14 (10-12-2022)	µg/L
Benzene	6.81

MW-6 (10-13-2022)	µg/L
Benzene	2.76
1,4-Dioxane	25.2

MW-12 (10-14-2022)	µg/L
1,4-Dioxane	8.72
Benzene	3.31

MW-27 (10-12-2022)	µg/L
Benzene	5.09
1,4-dichlorobenzene	10.9
1,4-Dioxane	5.23

MW-30 (10-13-2022)	µg/L
Benzene	3.65
1,4-Dioxane	36.4

MW-38 (10-12-2022)	µg/L
Vinyl Chloride	0.750 J
1,4-Dioxane	24.1
Benzene	3.47

MW-8 (10-13-2022)	µg/L
Chloromethane	7.85

MW-31 (10-13-2022)	µg/L
Benzene	1.24
1,4-Dioxane	7.23

MW-9 (10-13-2022)	µg/L
1,4-dichlorobenzene	13.7

REFERENCE:
Only detections in exceedance of NCDEQ 2L Groundwater Standards are shown.
See **Table 6** for the full list of results.
Samples were collected on October 12, 13, 14, 17, and 28, 2022.
µg/L = micrograms per liter

REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

Monitor Well Installed by S&ME
Existing Monitor Well
Subject Property
Approximate Waste Disposal Area
Railroad
Wake County Parcels

GROUNDWATER SAMPLE RESULTS - OCTOBER 2022

EAST WAKE COUNTY LF (NONCD0000614), Task Order 614RI-6
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 625 '
DATE: 12-8-22
PROJECT NUMBER: 22050404
FIGURE NO.: 5

Drawing Path: T:\ENV\Projects\2022\22050404 NCDEQ LF East Wake LF Knightdale NC\4 ENV\GIS\RI-6 through RI-7 and WS-7 Report Figures\5 - GW Sample Results mxd plotted by lhester 12-08-2022

WATER SUPPLY WELL SAMPLE RESULTS

EAST WAKE COUNTY LF (NONCDO0000614) - Task Order 614RI-6
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

N

705
8712
8820
621
713 House
713
618
728
532
512A
526
512C
512B

512A (October 13, 2022)	ug/L
1,4-Dioxane	4.13

512 B and C (October 13, 2022)	ug/L
1,4-Dioxane*	6.26

DUP-WSW (October 13, 2022)	ug/L
1,4-Dioxane*	4.08

0 500 1,000 (FEET)

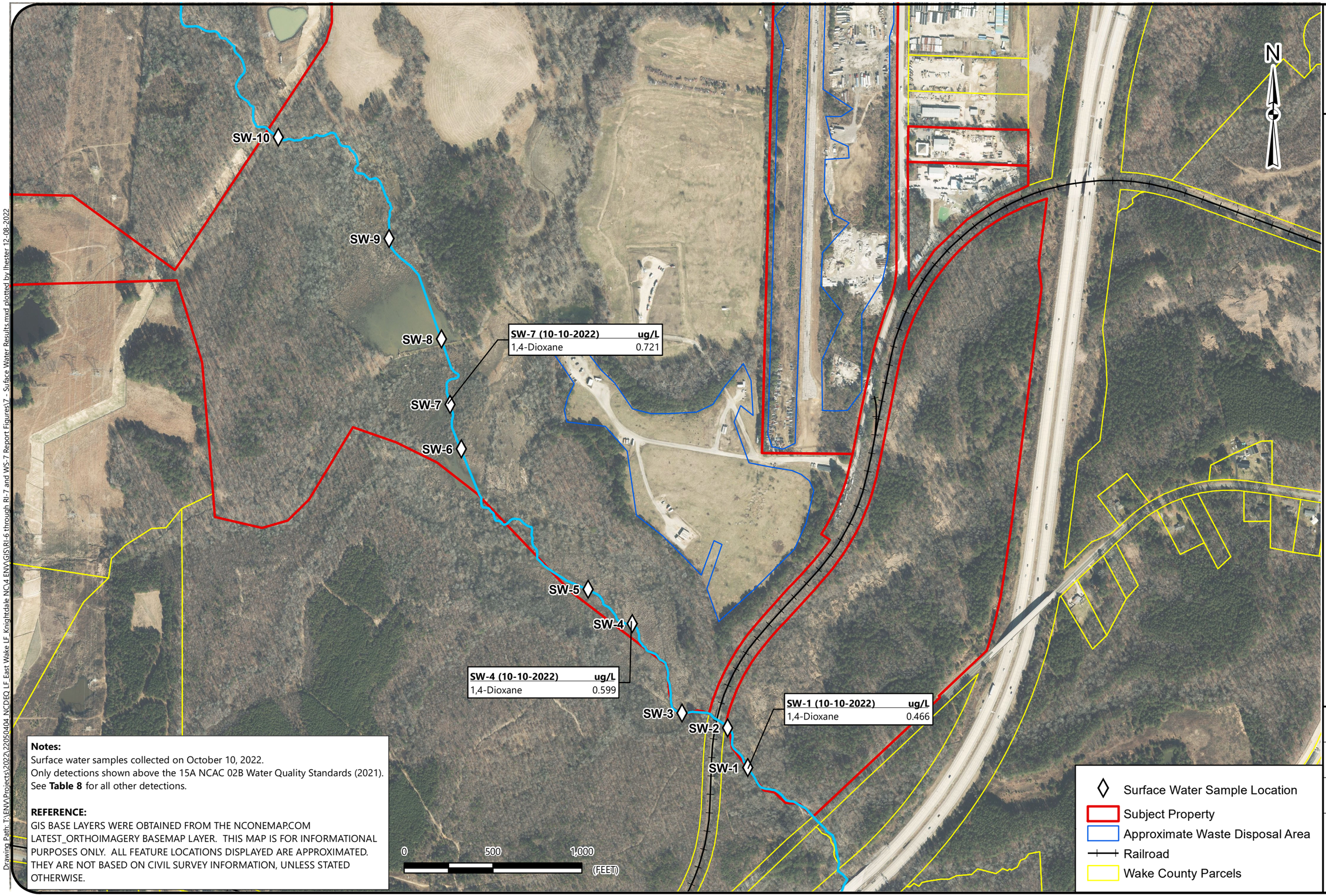
NOTES:
Samples collected on October 13, 2022.
WSW-621: Not sampled - owner advised there was no water supplied to the property.
WSW-512A: Sampled from the inlet side of the POE System.
WSW-512B and 512C: Sampled together at the discharge point for both wells.
Only detections above the US EPA Maximum Concentration Level (MCL) are shown.
1,4-dioxane has no established MCL, and concentrations are reported compared to the 15 NCAC 2L Standard.
See **Table 7** for all other detections.

REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

- Water Supply Well
- Subject Property
- Approximate Waste Disposal Area
- Railroad
- Wake County Parcels

SCALE: 1 " = 300 '
DATE: 12-9-22
PROJECT NUMBER 22050404
FIGURE NO. 6

Drawing Path: T:\ENV\Projects\2022\22050404_NCDEQ LF_East Wake LF_Knightdale NC\4 ENV\GIS\RI-6 through RI-7 and WS-7 Report Figures\6 - Water Supply Well Results.mxd plotted by jmabry 12-09-2022



Notes:
Surface water samples collected on October 10, 2022.
Only detections shown above the 15A NCAC 02B Water Quality Standards (2021).
See **Table 8** for all other detections.

REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

SURFACE WATER SAMPLE RESULTS

EAST WAKE COUNTY LF (NONCD0000614) - Task Order 614RI-6
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 500 '
DATE: 12-8-22
PROJECT NUMBER 22050404
FIGURE NO. 7

Drawing Path: T:\ENV\Projects\2022\22050404 NCDEQ LF East Wake LF Knightdale NC\4 ENV\GIS\RI-6 through RI-7 and WS-7 Report Figures\7 - Suface Water Results.mxd plotted by lhester 12-08-2022

Remedial Investigation Report
East Wake County LF - NONCD0000614
Knightdale, Wake County, North Carolina
Task Order 614RI-8
S&ME Project No. 22050404

PREPARED FOR:

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

PREPARED BY:

S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

June 12, 2023

June 12, 2023

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

Attention: Mr. Kevin Kelt, P.G. via email: kevin.kelt@ncdenr.gov
Hydrogeologist

Reference: **Remedial Investigation Report – Additional Soil Gas Sampling**
East Wake County LF
SR 2655 / US 64, Knightdale, Wake County, North Carolina
NCDEQ ID No. NONCD0000614
NCDEQ Task Orders 614RI-8 and 614RI-8A
S&ME Project No. 22050404C

Dear Mr. Kelt:

S&ME, Inc. (S&ME) is submitting this report to NCDEQ summarizing the results of the remedial investigation (RI) activities conducted at the above-referenced site in Knightdale, North Carolina. S&ME completed this investigation in general conformance with S&ME Proposals No. 22050404F, dated February 10, 2023, for Task Orders 614RI-8, and change order 22050404F, dated March 8, 2023, for Task Order 614RI-8A. The attached report includes the results of the following tasks:

- Landfill gas probe Installation, sampling and screening; and,
- Landfill Gas Probe (SGP-23 and SGP-25) and Groundwater Monitor Well (MW-22 and MW-24) abandonments.

We appreciate the opportunity to provide environmental consulting services to NCDEQ. Please contact us if you have any questions about the information included in this report.

Sincerely,

Gerald Paul
Senior Project Manager
jpaul@smeinc.com

Thomas Raymond, P.E., P.M.P.
Senior Engineer
traymond@smeinc.com

Attachment: *Remedial Investigation Report*

Table of Contents

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(continued)

List of Figures

List of Tables

Appendices

1.0 Summary of Current Investigation

S&ME completed the scope of services listed below for this investigation in general conformance with S&ME Proposal No. 22050404F, dated February 10, 2023 for Task Order 614RI-8, and 22050404F Change Order, dated March 8, 2023, for Task Order 614RI-8A:

- Installed, and sampled eleven landfill gas probes and four Soil Gas implants for laboratory analysis;
- Field Screened ?? new and existing landfill gas probes and ?? new and existing soil gas implants;
- Properly abandoned two Landfill Gas Probe/Implants (SGP-23 and SGP-25) and two Groundwater Monitor Well (MW-22 and MW-24); and,
- Prepared this report.

Figure 1 shows the site map with sample locations.

S&ME's services were performed in general accordance with the North Carolina Department of Environmental Quality (NCDEQ), *Guidelines for Addressing Pre-Regulatory Landfills and Dumps* (March 2022) and S&ME's approved *Standard Operating Procedures and Quality Assurance (SOP/QA) Manual (July 2010)*, previously approved by NCDEQ.

2.0 Landfill Gas Assessment

Between July 5, 2022 and August 23, 2022, S&ME subcontract drill crew (Quantex), installed 17 soil gas probes (SGP-18, SGP-19, SGP-20, SGP-21, SGP-22, SGP-24, SGP-25, SGP-26, SGP-27, SGP-28, SGP-31, SGP-32, SGP-33, SGP-35, SGP-36, SGP-37 and SGP-38) and 6 soil gas Implants (SGP-17, SGP-23, SGP-29, SGP-30, SGP-31R, SGP-34) at the locations shown on **Figure 1**. Due to a shallow water table at some of the proposed sample locations, six of the proposed soil gas probes were installed as soil gas implants. Details of the soil gas probe and soil gas implant construction are included as **Table 1**. One of the soil gas probes (SGP-31) was abandoned and replaced with soil gas implant SGP-31R due to the presence of water in the probe that was not indicated at the time of the installation. The replacement soil gas implant was installed approximately two feet above the observed water table. Soil gas probe SGP-34 was not sampled due to the shallow water table. Coordinates of the landfill gas probes are included in **Appendix I**. Field notes from the installation are included in **Appendix II**.

2.1 Field Screening Methods

Table 1 presents the landfill gas probe construction details. **Appendix I** shows the coordinates of the landfill gas sample locations. The 14 landfill gas probes and 5 soil vapor implants were screened for landfill gas during field visits conducted on October 31, 2022 and November 1, 2022. **Figure 2** shows the data from the field screening event. Portable meters were used to collect the following parameters at each soil gas probe, soil gas implant and background screening location:

- Landfill Gas Meter – GEM5000 PLUS for the following:
  - methane: 0-100%, +/- 0.3% to 1.5% accuracy

- hydrogen sulfide: 0-500 parts per million-volume (ppm-v), with +/- 2.0% accuracy
- carbon dioxide: 0-100%, +/- 0.5% to 1.5% accuracy
- oxygen: 0-25%, +/- 1.0% accuracy
- barometric pressure: +/- 14.7 inches mercury from calibration pressure, +/- 1% inches mercury accuracy

- Photo-Ionization Detector (PID) MiniRAE 3000 for total VOCs: 0-15,000 ppm-v, with +/- 0.1 ppm-v resolution over range of 0 to 999.9 ppm-v and +/- 1 ppm-v resolution over range of 1,000 to 15,000 ppm-v.

Each of the meters listed above has an internal pump, which was used to draw air samples from the gas probe through the portable meters. New Teflon tubing was connected from the meters to the soil gas probe cap for sampling.

A thermohygrometer was used to measure ambient air for humidity and temperature. The landfill gas screening forms which summarize the results are included with the field documents in **Appendix II**.

2.2 Landfill Gas Screening Results (Oct. 31 & Nov. 1, 2022)

2.2.1 Volatile Organic Compounds

VOCs were detected in SGP-21, SGP-27, SGP-28, SGP-30, SGP-32, SGP-33, SGP-35, and SGP-36 during the screening events at concentrations ranging from 0.3 parts per million by volume (ppm-v) to 2.5 ppm-v.

2.2.2 Methane

During the screening events, methane was detected in SGP-22 and SGP-27 at concentrations of 11.5% and 16.5% (volume in air) respectively, which exceeds the lower explosive limit (LEL) for methane of 5%. The GEM5000 manufacturer specifies an approximate accuracy range of +/- 0.3% of the displayed reading for methane concentrations between 0 – 5%.

2.2.3 Hydrogen Sulfide

Hydrogen Sulfide was detected in SGP-17, SGP-19, and SGP-27 at concentrations of 1, 1, and 1 ppm-v respectively, during the screening events. The GEM5000 manufacturer specifies an approximate accuracy range of +/- 2.0% of the displayed reading for hydrogen sulfide concentrations between 0 – 500 ppm-v.

The landfill gas screening results are summarized on **Table 2**.

2.3 Landfill Gas Sampling

On October 31 through November 3, 2022, S&ME personnel used batch-certified sampling canisters to collect samples (including 3 duplicate samples) from 19 soil gas probes and soil gas implants for laboratory analysis of VOCs by EPA Method TO-15.

Prior to beginning sample collection, S&ME performed a leak test on each of the soil gas probe or soil gas implant and sampling arrays. The leak tests were performed by attaching a 1" PVC well cap fitted with a Swagelock® ball valve attached to a section of Teflon® tubing. A brass T-connector (with a ball valve

attachment) was attached to the end of the Teflon® tubing extending from the cap. Another section of Teflon® tubing was used to attach the other end of the T-connector (with the ball valve attachment) to a regulator installed on a batch certified six-liter summa canister. A section of Teflon® tubing was then attached to the end of the ball valve attachment and fitted through a plastic shroud that was placed overtop the soil gas probe or soil gas implant and sampling array. S&ME then injected helium gas into the plastic shroud until the concentration reached at least 15% helium, as monitored with a helium detector. The gas probe and sampling array was monitored for leaks by using a calibrated personal pump to purge air from the sampling array into a Tedlar® bag.

The purged air from the sampling array in the Tedlar® bag was then monitored for the presence of helium gas concentration with a helium detector. Per the North Carolina Department of Environmental Quality (NCDEQ) Vapor Intrusion Guidance Document (March 2018), the helium concentrations detected during the leak test shall not exceed 10% of the helium concentration contained in the shroud. Each of the gas probes or soil gas implants and sampling arrays had a successful leak test. The field sampling forms are included in **Appendix II**.
After successfully passing the leak test, a minimum of three volumes of air were purged from the gas probes and sampling arrays. After purging the sampling array, the ball valve attachment on the T-connector leading to the purge point was closed and the valve on the regulator was opened to allow the collection of the sample.

Following the collection of landfill gas samples using the summa canisters, samples were collected for Hydrogen Sulfide by EPA Method D5504. Samples were collected by attaching a section of Teflon® tubing to a Tedlar® bag that was filled by utilizing a personal pump to purge air from the sampling array into the Tedlar® bag. A split sample was collected from seven sample locations (SGP-21, SGP-22, SGP-23, SGP-25, SGP-26, SGP-27, and SGP-28) that was sent to a separate laboratory for comparison of detections.

Samples were not collected from SGP-20 and SGP-34, due to shallow groundwater, and SGP-29, due to it being found destroyed by an unknown third party.

After collecting the gas samples, the summa canisters were shipped under standard chain-of-custody protocol to Eurofins Environmental Testing (Eurofins) for VOC analysis by EPA Method TO-15.

2.4 Landfill Gas Sampling Results

The laboratory reported detections of the following constituents above the NCDEQ DWM VI Residential Soil Gas Screening Levels (SGSLs):

- Bromodichloromethane in SGP-31R;
- Chloroform in SGP-17, SGP-23, SGP-24, SGP-28, SGP-30, SGP-31R, SGP-32, SGP-36 and SGP-38;
- Benzene in SGP-22;
- Ethyl Benzene in SGP-27; and
- Hydrogen Sulfide in SGP-22 (both laboratories) and SGP-23 (Air Technology only)

The laboratory reported the following methane detections above the LEL:

- SGP-22 and SGP-27

A summary of the laboratory results is included as **Table 3A and 3B** and exceedances of the Residential Vapor Intrusion Screening Levels and methane LEL are shown on **Figure 3**. The field notes are included in **Appendix II**. The laboratory reports and chain of custody forms are included in **Appendix III**.

3.0 Investigative Derived Waste

No impacted media (auger cuttings or groundwater) or other investigative derived wastes (IDW) were stored onsite during this investigation.

4.0 Quality Control

Quality control samples were collected and analyzed as follows:

- Duplicates: One duplicate sample was collected for each day for each media sampled and analyzed for the same parameter(s) as the record samples. Analytical results of the duplicate samples agreed well with the record samples.

Groundwater Sampling

- Trip Blanks: One trip blank water sample was used for each sampling day. The laboratory included trip blank VOC vials (filled with water at the laboratory) with the sample jars and coolers shipped to S&ME. The trip blank samples were kept with the sample coolers for the entire trip; from the laboratory to the field, and back to the laboratory. The trip blank samples were analyzed for VOCs. No contaminants of concern were detected.

The laboratory conducted USEPA quality assurance and quality control procedures and reporting as required for laboratory analysis according to USEPA Level II Protocols. Reported laboratory analytical data met data quality objectives.

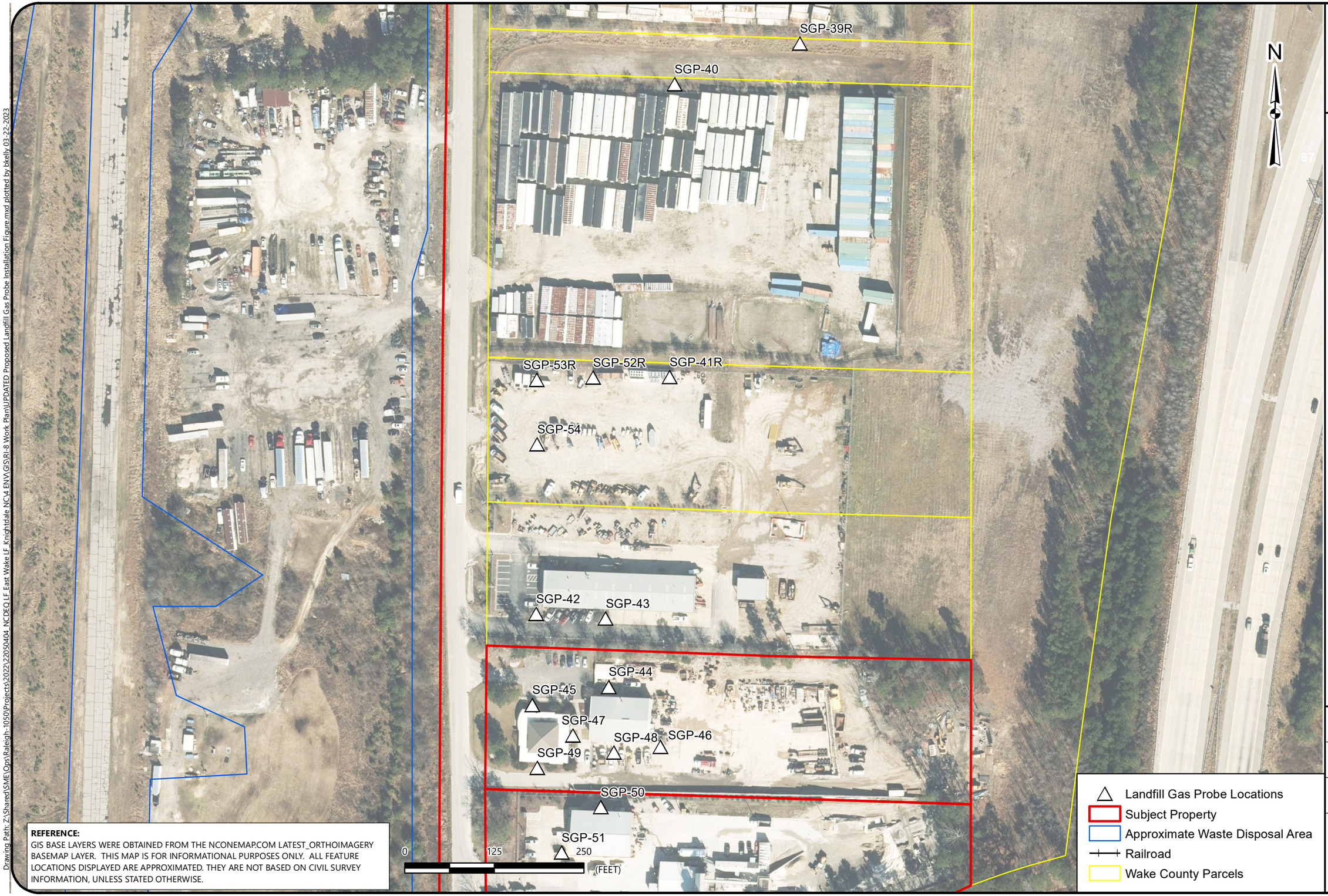
5.0 Deviation From Work Plan

There were no deviations from the work plan during this project, with exception to the following:

- Soil gas samples that were submitted to Air Technology Laboratories, Inc. for hydrogen sulfide analysis by ASTM D5504 were received past the 24 hr. hold time due to a FedEx delay. Only one sample was technically analyzed beyond the 24 hr. hold time by approximately 30 minutes.
- SGP-44 could not be installed at the proposed or off-set location due to access issues.
- Soil gas probes SGP-39, SGP-52 and SGP-53 were installed as soil gas implants due to a shallow observed water table.

6.0 Sole Use Statement

This report is solely intended for use by NCDEQ for the services that were performed in accordance with S&ME Proposals No. 22050404F, dated February 10, 2023, for Task Orders 614RI-8, and change order 22050404F, dated March 8, 2023, for Task Order 614RI-8A.



REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAPCOM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

SITE MAP WITH LANDFILL GAS PROBE LOCATIONS

EAST WAKE COUNTY LF (NONCD0000614), Task Order 614RI-8
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

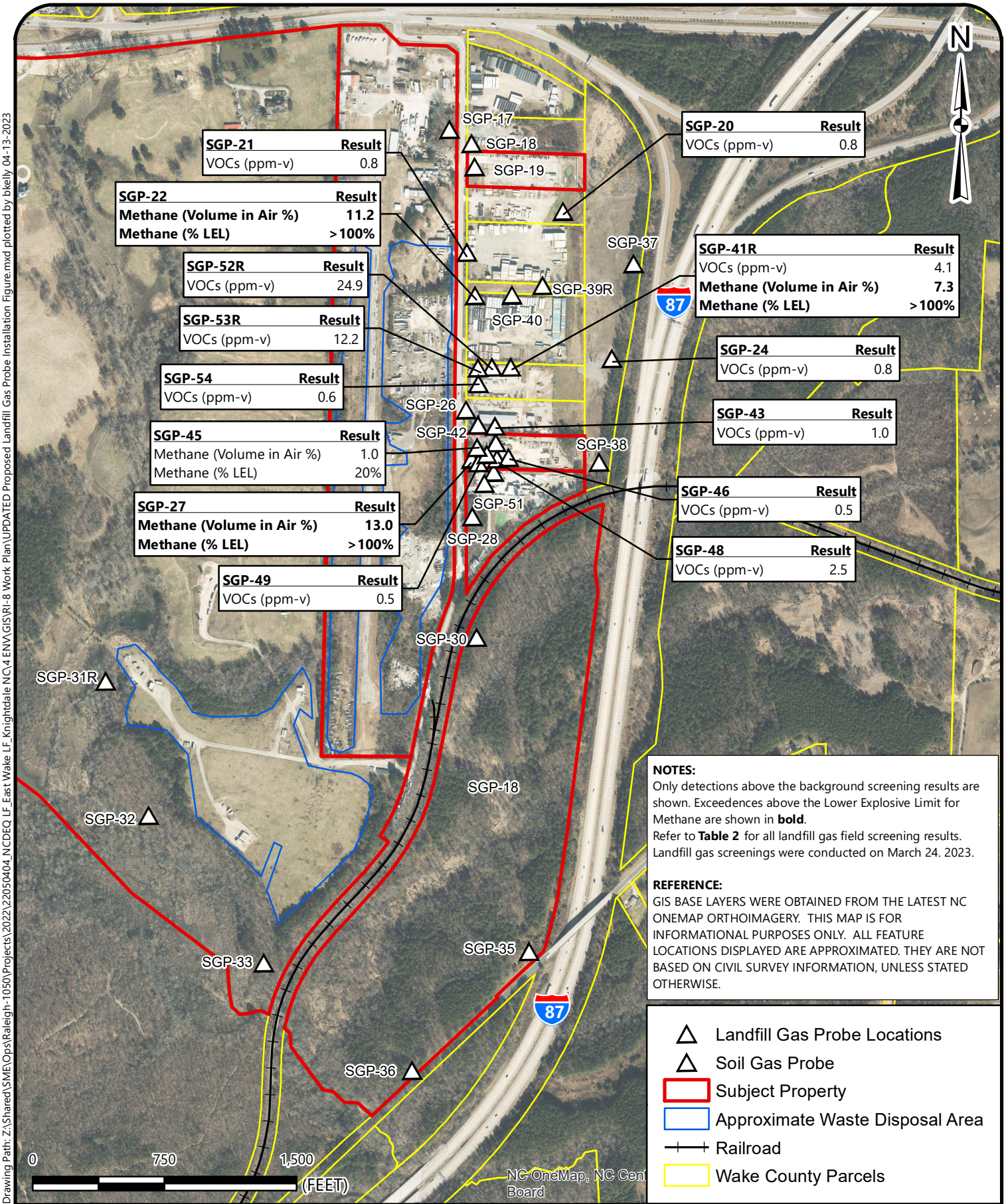
SCALE:
1 " = 124 '

DATE:
3-22-23

PROJECT NUMBER
22050404

FIGURE NO.
1

Drawing Path: Z:\Shared\SMEVOps\Raleigh-1050\Projects\2022\22050404_NCDEQ LF_East Wake LF_Knightdale NC\4 ENV\GIS\RI-8 Work Plan\UPDATED Proposed Landfill Gas Probe Installation Figure.mxd plotted by bkelly 03-22-2023



NOTES:
Only detections above the background screening results are shown. Exceedences above the Lower Explosive Limit for Methane are shown in **bold**.
Refer to **Table 2** for all landfill gas field screening results.
Landfill gas screenings were conducted on March 24. 2023.

REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE LATEST NC ONEMAP ORTHOIMAGERY. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

- Landfill Gas Probe Locations
- Soil Gas Probe
- Subject Property
- Approximate Waste Disposal Area
- Railroad
- Wake County Parcels

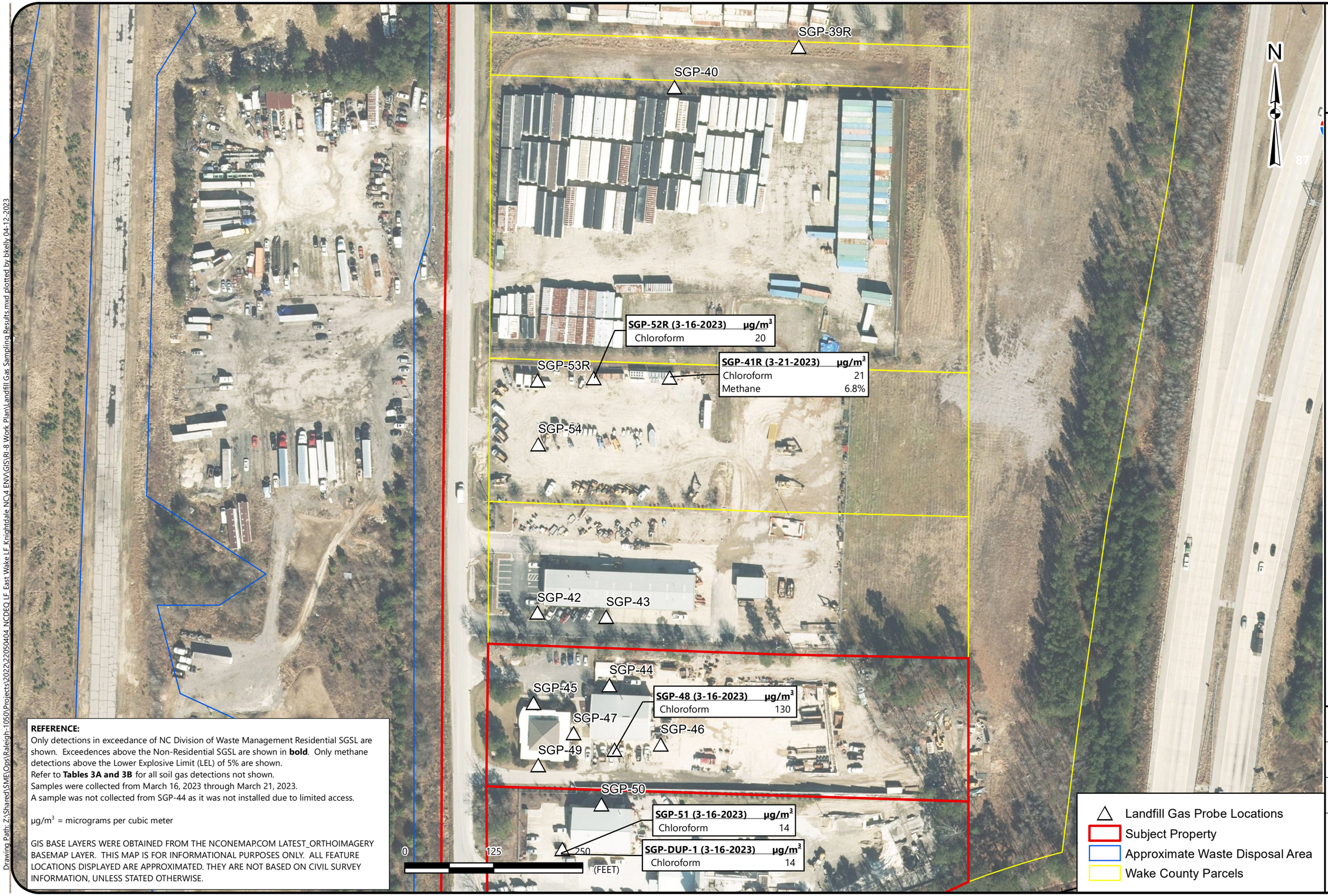
Drawing Path: Z:\Shared\SME\Ops\Raleigh-1050\Projects\2022\22050404_NCDEQ LF_East Wake LF_Knightdale NC\4 ENV\GIS\RI-8 Work Plan\UPDATED Proposed Landfill Gas Probe Installation Figure.mxd plotted by bkelly 04-13-2023

LANDFILL GAS SCREENING RESULTS

EAST WAKE LANDFILL (NONCD0000614), TASK ORDER 614RI-8
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 725 '
DATE: 4-13-23
PROJECT NUMBER 22050404

FIGURE NO. 2



REFERENCE:
Only detections in exceedance of NC Division of Waste Management Residential SGSL are shown. Exceedences above the Non-Residential SGSL are shown in **bold**. Only methane detections above the Lower Explosive Limit (LEL) of 5% are shown.
Refer to **Tables 3A and 3B** for all soil gas detections not shown.
Samples were collected from March 16, 2023 through March 21, 2023.
A sample was not collected from SGP-44 as it was not installed due to limited access.

µg/m³ = micrograms per cubic meter

GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

LANDFILL GAS SAMPLING RESULTS

EAST WAKE COUNTY LF (NONCDO0000614), Task Order 614RI-8
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 125 '

DATE: 4-12-23

PROJECT NUMBER 22050404

FIGURE NO. 3

Remedial Investigation Report
East Wake County LF – NONCD0000614
Knightdale, Wake County, North Carolina
Task Order 614RI-10
S&ME Project No. 22050404

PREPARED FOR:

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

PREPARED BY:

S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

October 18, 2023

October 18, 2023

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

Attention: Mr. Kevin Kelt, P.G. via email: kevin.kelt@deq.nc.gov
Hydrogeologist

Reference: **Remedial Investigation Report – Soil Cover Evaluation**
East Wake County LF
Knightdale, Wake County, North Carolina
NCDEQ ID No. NONCD0000614
NCDEQ Task Orders 614RI-10
S&ME Project No. 22050404

Dear Mr. Kelt:

S&ME, Inc. (S&ME) is submitting this report to NCDEQ summarizing the results of the soil cover evaluation phase remedial investigation activities conducted at the above-referenced site in Knightdale, North Carolina. S&ME completed this investigation in general conformance with S&ME Proposals No. 22050404D, dated September 30, 2022, between NCDEQ and S&ME. The attached report includes the results of the following tasks:

- Soil Cover Thickness Evaluation
- Soil Cover Sampling

We appreciate the opportunity to provide environmental consulting services to NCDEQ. Please contact us if you have any questions about the information included in this report.

Sincerely,

S&ME, Inc.

Gerald Paul
Senior Project Manager
jpaul@smeinc.com

Thomas Raymond, P. E., PMP
Senior Engineer
traymond@smeinc.com

Attachment: *Remedial Investigation Report*

Table of Contents

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Appendices

1.0 Summary of Current Investigation

S&ME completed the scope of services listed below for this investigation in general conformance with S&ME Proposal No. 22050404H, dated May 4, 2023, for Task Order 614RI-10:

- Evaluated thickness of soil cover via soil borings;
- Collected soil cover samples for analysis at locations with soil cover greater than twelve inches;
- Prepared this report.

S&ME's services were performed in general accordance with the North Carolina Department of Environmental Quality (NCDEQ), *Guidelines for Addressing Pre-Regulatory Landfills and Dumps* (March 2022) and S&ME's approved *Standard Operating Procedures and Quality Assurance (SOP/QA) Manual (July 2010)*, previously approved by NCDEQ.

2.0 Soil Cover Assessment

2.1 Soil Cover Thickness Evaluation

From June 19, 2023, through June 29, 2023, S&ME installed 144 composite soil cover borings (SC-6 thru SC-150). A Site Map is shown as **Figure 1**. The composite soil cover boring locations are shown on **Figures 2A and 2B.** Soil cover borings were installed using a stainless-steel two-inch hand auger, which was decontaminated with liquinox and deionized water between each use. Borings were installed to approximately one foot below ground surface (bgs) or until waste was encountered, whichever occurred first. Coordinates of the soil cover borings are included in **Appendix I**. Depth of waste and soil classifications for the 144 borings are located in the boring logs in **Appendix II**.

2.2 Soil Cover Thickness Results

In general, soil cover across the waste disposal areas (WDAs) range in thickness from approximately two inches to greater than twelve inches. Shallow waste was encountered in 13 soil composite grids at depths ranging from two inches to ten inches bgs. Waste was not encountered in 137 soil composite grids up to the boring termination depth of 12 inches bgs. The soil cover material mostly consists of black-gray organic sandy topsoil, and a layer of orange-tan/orange-gray silty sand. Boring logs for all 144 composite grids can be found in **Appendix II** and soil cover thickness results are shown on **Figures 3, 3A and 3B.**

2.3 Soil Cover Sampling

Within each composite grid, up to five soil borings were installed (center, north, south, east, and west), depending on total grid size and accessibility. At each location where soil cover was equal to twelve inches, S&ME collected one soil sample between six and twelve inches bgs. At locations where soil cover was less than 12 inches, no soil samples were collected. At each location, S&ME utilized a photo-ionization detector (PID) to field screen the soil cover samples for volatile organic compounds (VOCs). S&ME collected a total of 144 composite soil cover samples (plus QC duplicate samples and trip blanks,

for each day of sampling) and submitted them under standard chain-of-custody protocol to SGS North America Inc. in Orlando, Florida. Samples were analyzed for VOCs by EPA Method 8260D, semi-volatile organic compounds (SVOCs) by EPA Method 8270E, Metals by EPA Method 6020B/7471B, hexavalent chromium by EPA Method 7199, 1, 4 Dioxane by EPA Method 8270 SIM, Nitrate and Sulfate by EPA Method 300.0, and Ammonia by EPA Method 4500NH3.

2.4 Soil Sampling Results

Field Screened VOCs were measured from 0.0 parts per million (ppm) to 34.0 ppm.

The laboratory reported detections of the following constituents above the NCDEQ DWM Residential Preliminary Soil Remediation Goals (PSRGs): Arsenic, Cobalt, Manganese, Thallium, Vanadium, and Hexavalent Chromium.

None of the laboratory reported detections exceeded the NCDEQ DWM Industrial PSRGs.

A summary of the laboratory results is included as **Table 1**. The laboratory reports and chain of custody forms are included in **Appendix IV**.

2.5 Risk Calculator

NCDEQ's Risk Calculator was used to evaluate environmental exposure risks of multiple contaminants and exposure pathways associated with the Landfill Cover Soil Samples. S&ME used the July 2023 version of NCDEQ's Risk Calculator, downloaded from the NCDEQ website.

The highest concentration of each constituent was input into the NCDEQ Risk Calculator. The risk calculator uses the analytical results and generates a Carcinogenic Risk and Hazard Index value. A separate NCDEQ Risk Calculator was used for Zone A - Air Strip and for Zone C – Munitions Field. The outputs from the Risk Calculator provided the following:

- Zone A – Air Strip: The Carcinogenic Risk was not exceeded for resident, non-residential worker, construction worker, and recreator/trespasser receptors.
- Area A – Air Strip: The Hazard Index Risk was exceeded for resident and construction worker receptors. Non-residential worker and recreator trespasser receptors did not exceed the Hazard Index Risk.
- Zone C – Munitions Field: The Carcinogenic Risk was not exceeded for resident, non-residential worker, construction worker, and recreator/trespasser receptors.
- Zone C – Munitions Field: The Hazard Index Risk was exceeded for resident, construction worker, and recreator/trespasser receptors. The non-residential worker receptor did not exceed the Hazard Index Risk.

The Risk Calculator Summary Outputs are in **Appendix III**.

3.0 Quality Control

Quality control samples were collected and analyzed as follows:

Soil Sample Duplicates

- One duplicate sample was collected for each day of sampling. Duplicates were taken at SC-22, SC-28, SC-36, SC-41, SC-51, SC-71, SC-93, SC-115, and SC-145, and analyzed for the same parameters as the record sample. Analytical results of the duplicate samples agreed well with the record samples.

Trip Blank

- One trip blank sample of laboratory provided Deionized Water was kept with the laboratory samples throughout the sampling event and analyzed for VOCs by 8260D. No analytes were reported above the laboratory's minimum detection limit.

The laboratory conducted USEPA quality assurance and quality control procedures and reporting as required for laboratory analysis according to USEPA Level II Protocols. Reported laboratory analytical data met data quality objectives.

4.0 Deviation From Work Plan

Five sample grid locations (SC-1 through SC-5) were unable to be sampled due to a gravel parking lot. No other deviations from the work plan were noted.

5.0 Sole Use Statement

This report is solely intended for use by NCDEQ for the services that were performed in accordance with S&ME Proposal No. 22050404H, dated May 4, 2023, for Task Order 614RI-10 as authorized by NCDEQ.

6.0 Certification Acknowledgement

"I certify that to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete."

Gerald Paul / S&ME, Inc.
Name of Environmental Consultant / Company

October 18, 2023

Signature of Environmental Consultant Date

I, Gail L Kluever, a Notary Public of said County and State, do hereby certify that Gerald Paul did personally appear and sign before me this day, produced proper identification in the form of Personally Known, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 18th day of October, 2023.

(OFFICIAL SEAL)

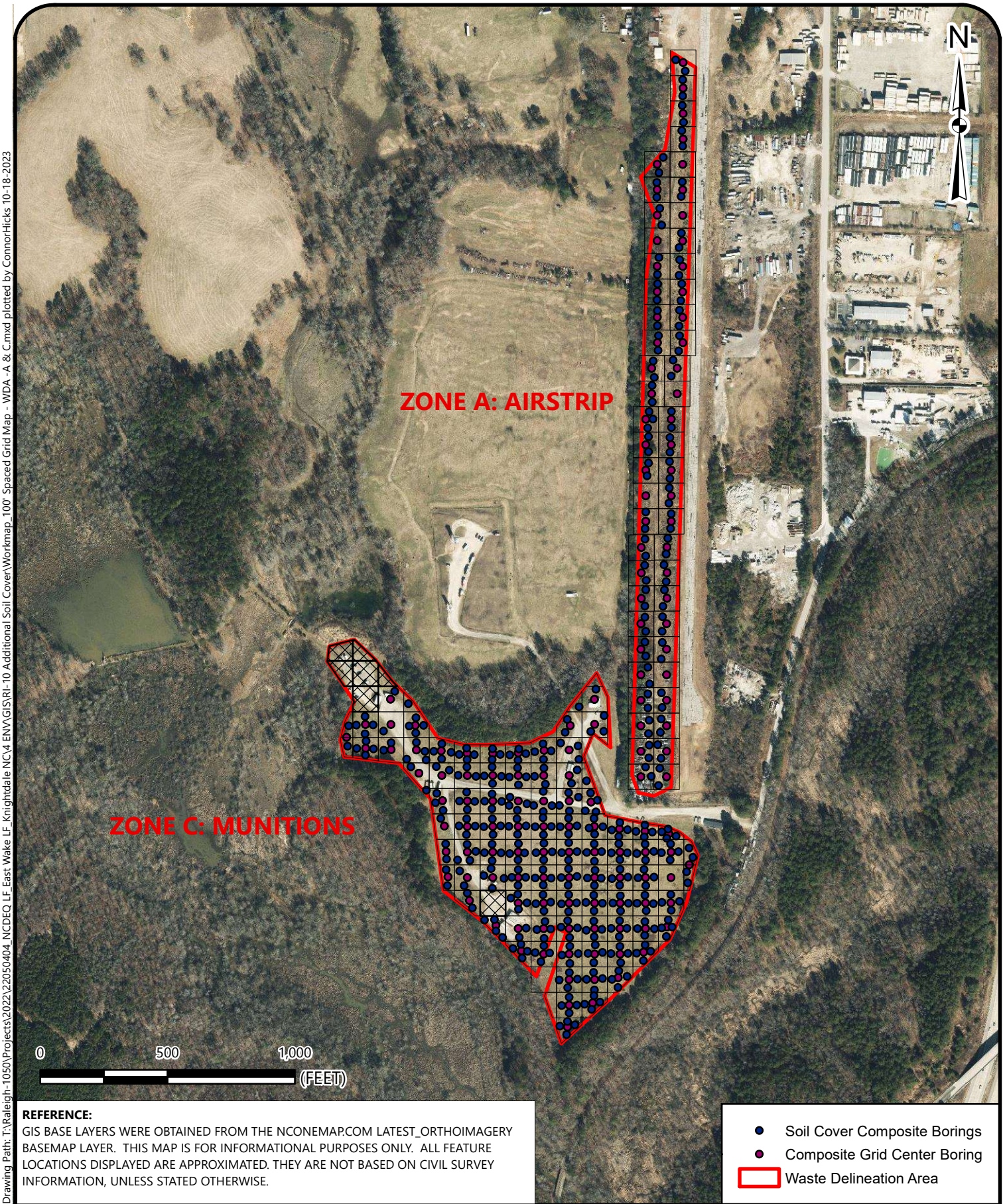
Gail L. Kluever

Notary Public (signature)

My commission expires: 7/26/2026

Appendices

Figures



REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

- Soil Cover Composite Borings
- Composite Grid Center Boring
- Waste Delineation Area

SITE MAP

EAST WAKE COUNTY LF (NONCD0000614)
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 500 '
DATE: 8-8-23
PROJECT NUMBER 22050404
FIGURE NO. 1

Drawing Path: T:\Raleigh-1050\Projects\2022\22050404_NCDEQ LF_East Wake LF_Knightdale NC\4 ENV\GIS\RI-10 Additional Soil Cover\Workmap_100' Spaced Grid Map - WDA -A & C.mxd plotted by ConnorHicks 10-18-2023

REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

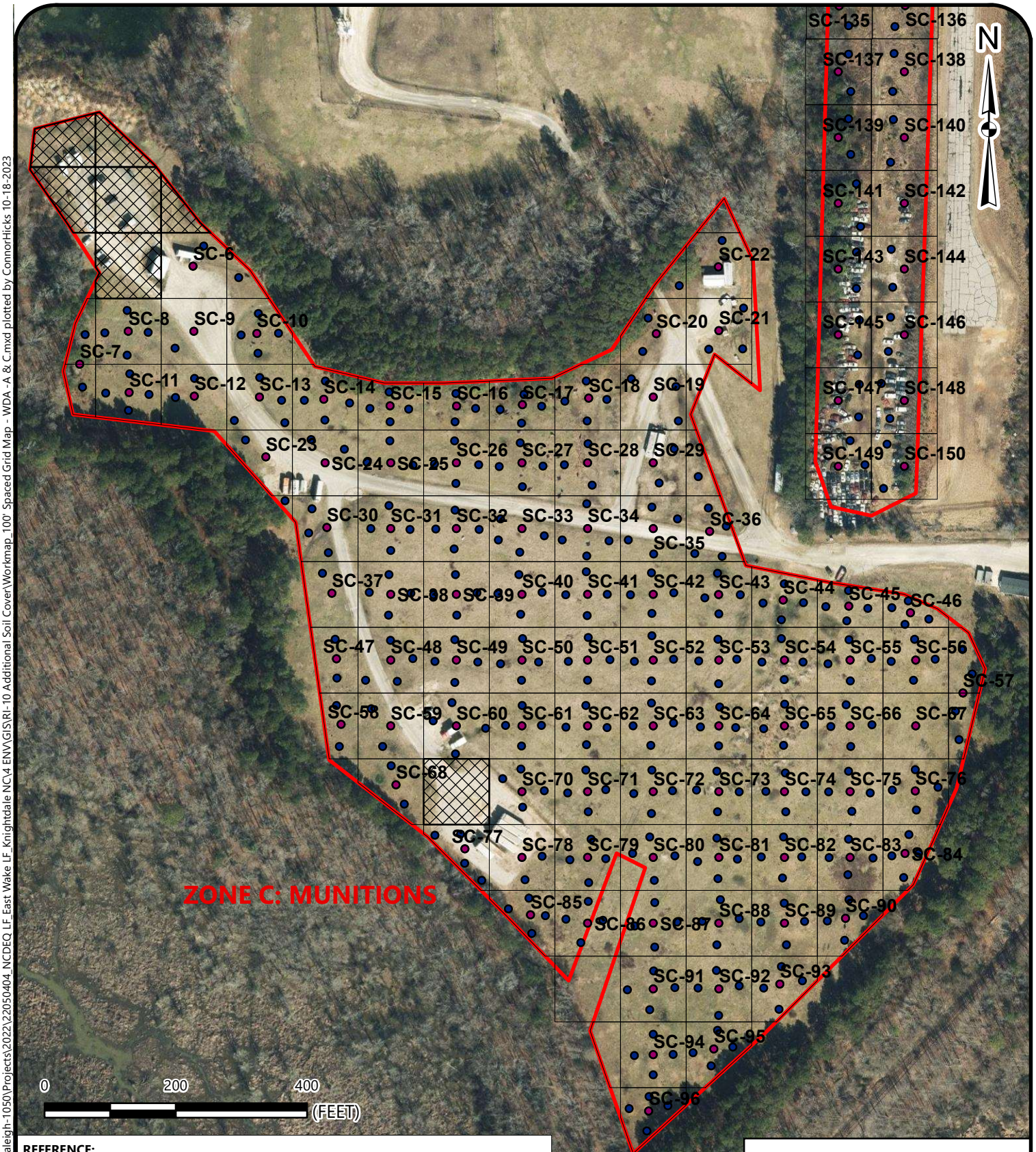
Drawing Path: T:\Raleigh-1050\Projects\2022\22050404_NCDEQ_LF_East Wake LF_Knightdale NC\4 ENV\GIS\RI-10 Additional Soil Cover\Workmap_100' Spaced Grid Map - WDA -A & C.mxd plotted by ConnorHicks 10-18-2023

ZONE A: SOIL BORING LOCATIONS

EAST WAKE COUNTY LF (NONCD0000614)
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 350 '
DATE: 8-8-23
PROJECT NUMBER 22050404

FIGURE NO. **2A**



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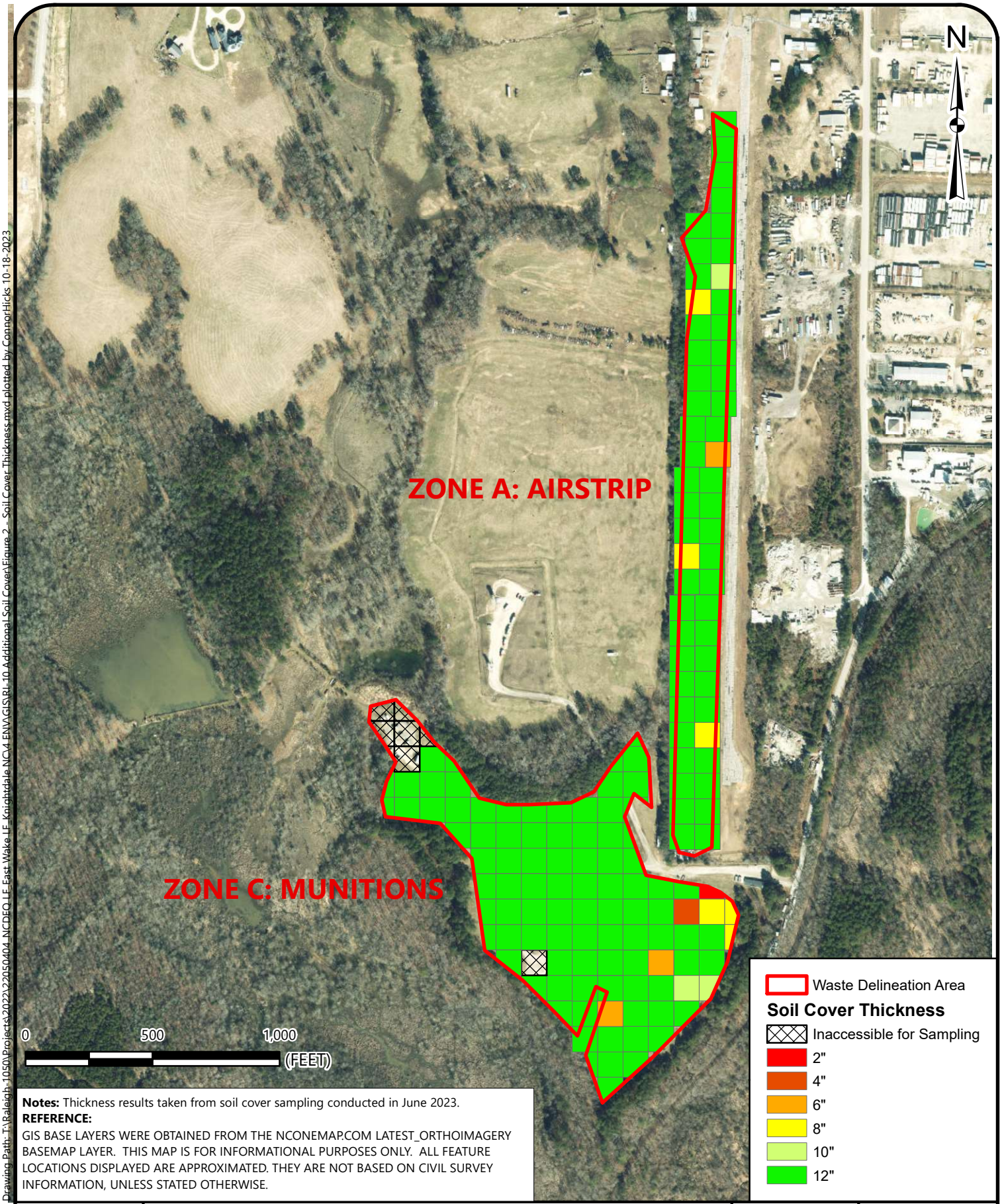
- Soil Cover Composite Borings
- Composite Grid Center Boring
- Waste Delineation Area

ZONE C: SOIL BORING LOCATIONS

EAST WAKE COUNTY LF (NONCD0000614)
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 200 '
DATE: 8-8-23
PROJECT NUMBER 22050404
FIGURE NO. 2B

Drawing Path: T:\Raleigh-1050\Projects\2022\22050404_NCDEQ LF_East Wake LF_Knightdale NC\4 ENV\GIS\RI-10 Additional Soil Cover\Workmap_100' Spaced Grid Map - WDA -A & C.mxd plotted by ConnorHicks 10-18-2023



Notes: Thickness results taken from soil cover sampling conducted in June 2023.

REFERENCE:

GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

Drawing Path: T:\Raleigh-1050\Projects\2022\22050404_NCDEQ_LF_East Wake LF_Knightdale NC\4 ENV\GIS\RI-10 Additional Soil Cover\Figure 2 - Soil Cover Thickness.mxd plotted by ConnorHicks 10-18-2023

SOIL COVER THICKNESS RESULTS

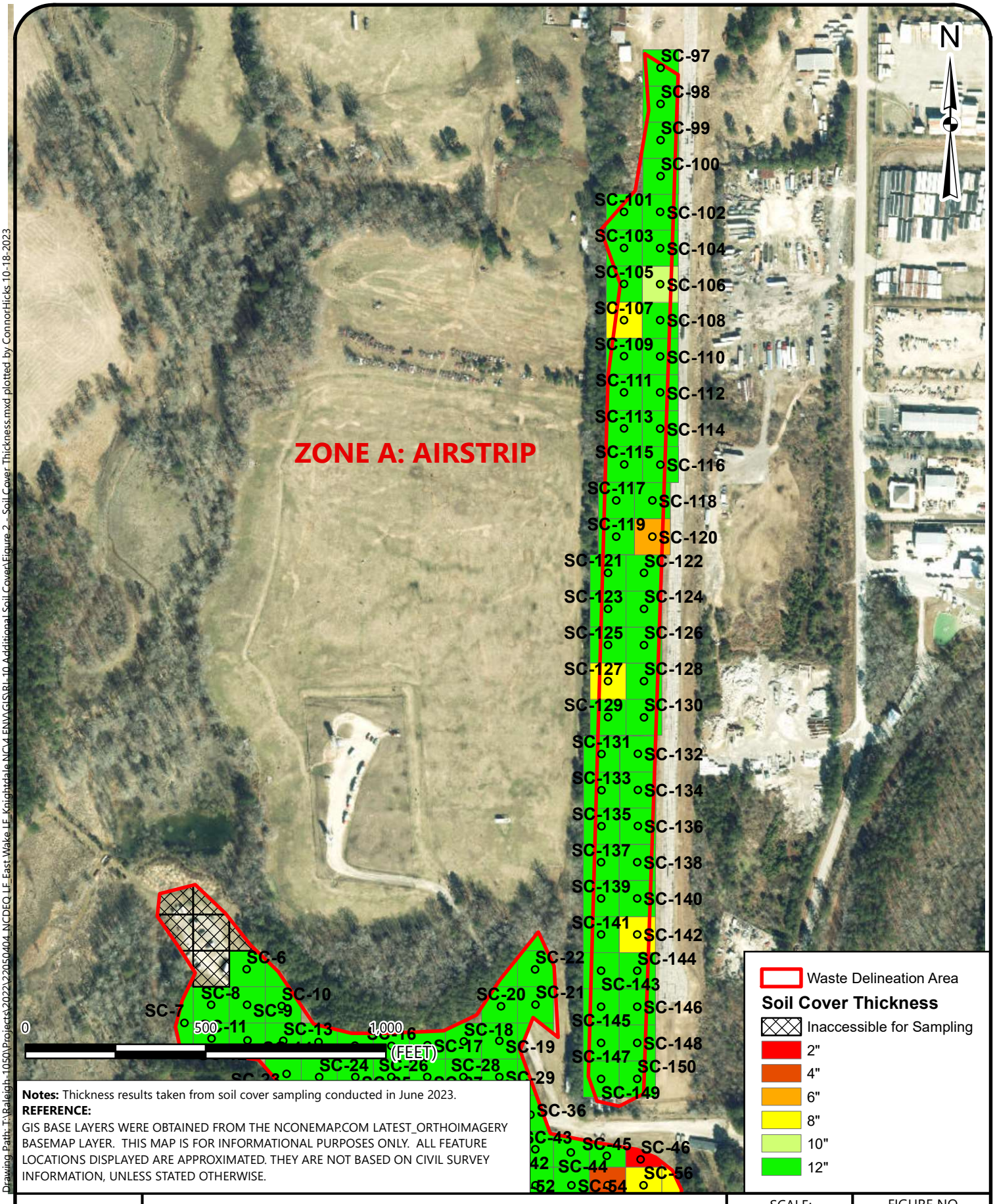
EAST WAKE COUNTY LF (NONCD0000614)
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 500 '

DATE: 8-8-23

PROJECT NUMBER 22050404

FIGURE NO. 3



Notes: Thickness results taken from soil cover sampling conducted in June 2023.

REFERENCE:

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Drawing Path: T:\Raleigh-1050\Projects\2022\22050404_NCDEQ_LF_East_Wake_LF_Knightdale_NCV4_ENV\GIS\RI-10 Additional Soil Cover\Figure 2 - Soil Cover Thickness.mxd plotted by ConnorHicks 10-18-2023

SOIL COVER THICKNESS RESULTS: ZONE A - AIRSTRIP

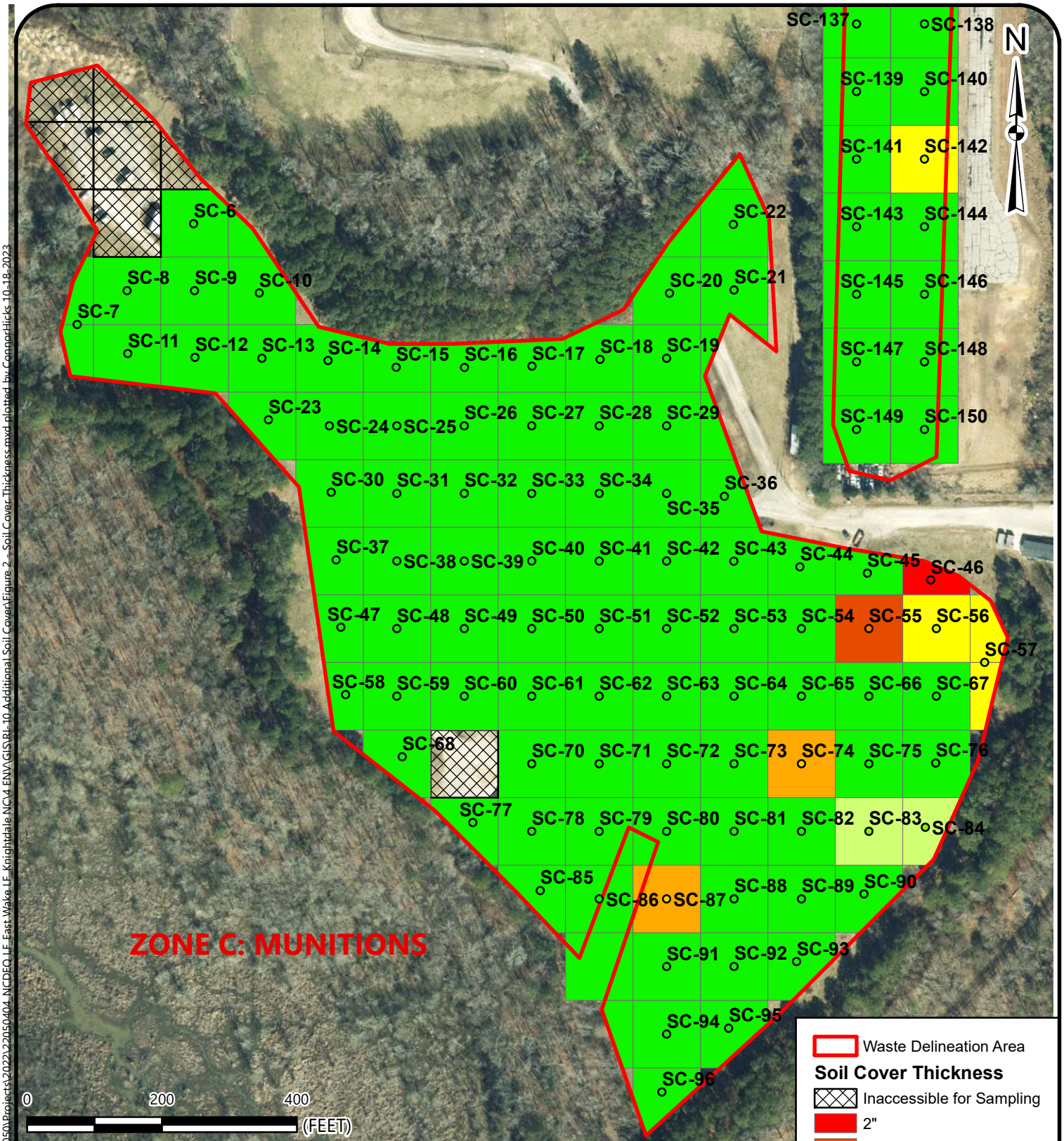
EAST WAKE COUNTY LF (NONCD0000614)
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 350 '

DATE: 8-8-23

PROJECT NUMBER 22050404

FIGURE NO. 3A



Notes: Thickness results taken from soil cover sampling conducted in June 2023.

REFERENCE:

GIS BASE LAYERS WERE OBTAINED FROM THE NCONEMAP.COM LATEST_ORTHOIMAGERY BASEMAP LAYER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

Drawing Path: T:\Raleigh-1050\Projects\2022\22050404 NCDEQ LF East Wake LF_Knightdale NC\4 ENV\GIS\RI-10 Additional Soil Cover\Figure 2 - Soil Cover Thickness.mxd plotted by ConnorHicks 10-18-2023

SOIL COVER THICKNESS RESULTS: ZONE C - MUNITIONS

EAST WAKE COUNTY LF (NONCD0000614)
THREE SISTERS ROAD
KNIGHTDALE, WAKE COUNTY, NORTH CAROLINA

SCALE: 1 " = 200 '

DATE: 8-8-23

PROJECT NUMBER 22050404

FIGURE NO. 3B