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Permit Number 03439

Project Manager Erin Jezek

Name of Contractor BLE

Description CAP

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CORRECTIVE ACTION PLAN

Highway 11 Grocery
13527 North Highway 11
Salem, Oconee County, South Carolina
UST Permit #03439

Prepared For:
Mr. Steve Smith
180 Shallow Ford Road
Salem, South Carolina 29676

SCDES Certified Contractor No. UCC-0010
BLE Project Number J24-10768-09

May 2, 2025

BUNNELL LAMMONS ENGINEERING
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BUNNELL LAMMONS ENGINEERING

May 2, 2025

South Carolina Department of Environmental Services
Bureau of Land and Waste Management
Underground Storage Tank Management Division
2600 Bull Street
Columbia, South Carolina 29201-1708

Attention: Ms. Stephanie Briney, Manager

Subject: **Corrective Action Plan**
Highway 11 Grocery
13527 North Highway 11
Salem, Oconee County, South Carolina
UST Permit #03439
BLE Project No. J24-10768-09

Dear Ms. Briney:

Bunnell-Lammons Engineering, Inc. (BLE) is pleased to submit this Corrective Action Plan (CAP) for remediation services at the subject site. The purpose of this CAP is to present corrective action methodologies for reduction of the free-product and dissolved-phase chemicals of concern (CoC) to calculated Site-Specific Target Levels (SSTLs). Additionally, the CAP provides details for contaminant monitoring and site restoration upon completion. Provided herein is our understanding of the project information, proposed scope of services, and appropriate schedule.

Please do not hesitate to contact us if you have any questions concerning this CAP.

Sincerely,

BUNNELL-LAMMONS ENGINEERING, INC.

Olivia L. Marker, P.G.
Project Hydrogeologist

Trevor J. Benton, P.G.
Manager – Environmental Services
Registered, South Carolina #2395

TREVOR J. BENTON REGISTERED No. 2395 SOUTH CAROLINA PROFESSIONAL GEOLOGIST

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1.0 PROJECT INFORMATION

The subject property is located at 13527 North Highway 11 in Salem, Oconee County, South Carolina (**Figure 1**). The site is currently utilized for residential and commercial office purposes; however, a convenience store/petroleum retail facility formerly operated on the property. According to the South Carolina Department of Environmental Services (SCDES) Underground Storage Tank (UST) Registry, four (4) USTs have historically been associated with the subject site, including two (2) 6,000-gallon gasoline tanks, one (1) 3,000-gallon gasoline tank, and one (1) 2,000-gallon diesel tank. These tanks were abandoned by removal on September 15, 2009. A release at the subject site was reported and confirmed to the SCDES on November 28, 2000.

In response to the reported release, various environmental assessment activities have been conducted, including the installation of 18 groundwater monitoring wells and 17 groundwater recovery wells (**Figure 2**). The most recent environmental activities include the performance of a comprehensive groundwater sampling event at the subject site in May 2022, and a pre-CAP sampling event that was completed in March 2024.

As requested by the SCDES, the release must undergo active corrective action in order to reduce free-phase and dissolved-phase chemicals of concern (CoC) to concentrations below calculated Site-Specific Target Levels (SSTLs). CAP details are provided herein.

2.0 PROPOSED REMEDIAL ACTIVITIES

2.1 Active Remediation

- Install up to fifteen (15) surfactant injection/recovery wells on the adjacent property to the east of the source area where free-product and high-levels of dissolved-phase CoCs are present. The surfactant injection wells will be constructed with a 4-inch inner diameter (ID), schedule 40 polyvinyl chloride (PVC) casing with flush-threaded joints. The bottom 20-foot section of the wells will be a manufactured well screen with 0.020-inch wide machined slots and will be installed to bracket the water table. The wells will be installed to the top of bedrock, or approximately 30-feet below ground surface (bgs). Drill cuttings generated during the installation of the wells will be contained in a 10-yard dump trailer and transported off-site for disposal at a permitted facility. Proposed surfactant injection/recovery wells are shown on **Figure 3**.

- Upon installation of the injection/recovery wells, up to twelve (12), 96-hour (minimum) Aggressive-Fluid Vapor Recovery (AFVR) events will be performed at the site. This technology will be beneficial in removing free-phase product as well as high levels of dissolved-phase petroleum contaminants at the site. Additionally, these initial events will provide critical site data for future remedial activities such as: radius of influence, free-product recovery rates, total liquids recovery rates, product recovered via off-gas emissions, etc.

  AFVR is a technology that uses high vacuum for rapid recovery of liquid phase hydrocarbons from monitoring or extraction wells. AFVR recovers both fluid (groundwater and liquid phase hydrocarbons) and vapor phase hydrocarbons from the affected areas and can help stimulate aerobic activity in the vadose zone by improving oxygen flow through the subsurface.

  The events will be performed in intervals on select grouping of injection/recovery wells. The groupings will be determined in the field based on the presence of free-product and may change during the events based on observed results. Appropriate documentation will be recorded during each AFVR event noting personnel, site conditions, dates, times, weather conditions, and the estimated volumes of petroleum product recovered in liquid and vapor phase. Off-gas treatment of the air emissions will be performed using a trailer-mounted granular activated carbon (GAC) system. Vapor concentrations will be evaluated throughout the AFVR events to monitor for breakthrough. Effluent water will be containerized onsite in a frac-tank and properly disposed of at a permitted wastewater treatment facility. Disposal records for the effluent water will be provided in the corresponding reports associated with the AFVR event(s).

- Surfactant enhanced free-phase product recovery will be utilized to accelerate the removal of free-product at the site. Surfactants are designed to change the interfacial tension between the groundwater and free-phase product and to desorb the residual free-product from the soil matrix. Surfactants also decrease the viscosity of the free-product, which can result in an increase of the removal efficiency.

  Upon completion of two (2) non-surfactant enhanced AFVR events, BLE proposes to inject a non-flammable, non-toxic, water-based proprietary blend of non-ionic ethoxylated octylphenolic surfactants into the injection/recovery wells over up to ten (10) separate events. Based on the known NAPL source, a 3%-4% solution of the surfactant will be gravity injected into the applicable wells specified for each AFVR event. The schedule/action plan for injection of the surfactants is as follows:

1. Up to 11,000 gallons of a 3%-4% surfactant solution will be gravity injected into specified injection/recovery wells approximately 48-72 hours prior to performance of an AFVR event. The well groupings will be based on the presence of free-product and will change based on observed results.

2. Approximately 48-72 hours post surfactant injection activities, a 96-hour (minimum) AFVR event will be performed on applicable wells to recover free-product and high levels of dissolved phase CoCs.

3. Upon completion of the post-surfactant/AFVR event, absorbent socks will be placed in the wells to recover free-phase product as an interim remedial measure. The socks are constructed from hydrophobic material that selectively absorbs hydrocarbons while repelling water. The socks will be suspended in the wells to bracket the groundwater interface and will be retrieved prior to initiating the next surfactant injection/AFVR event, or every 30 days, whichever comes first.

- In conjunction with the AFVR events and surfactant injections, a PetroFix™ liquid activated carbon solution will be applied in the vicinity of the downgradient creek. The primary objective of the activated carbon solution is to adsorb and stimulate the biodegradation of petroleum contaminants migrating from the upgradient source area. When injected into the subsurface, the liquid carbon solution forms a permeable reactive barrier that captures contaminants as they migrate through the soil, preventing further movement toward the creek. Additionally, the activated carbon promotes microbial activity, aiding in the biodegradation of the contaminants. The primary goal of this solution is to reduce contaminant concentrations before they discharge into the creek. This approach is intended to provide an additional layer of treatment to mitigate the environmental impact on the creek while enhancing the overall effectiveness of the remediation strategy.

    1. Up to 10,000 gallons of PetroFix™ Remediation Fluid will be injected on 6-foot spacings in the area along Fall Creek (**Figure 4**).

    2. Injection pressures will range from 20 to 100 pounds per square inch (psi) and volumes will range from 2 to 7 gallons per minute (gpm). A multi-port retractable injection tool or top-down injection tool will be utilized, depending on site conditions encountered in the field. Up to 300 gallons of PetroFix™ (44% dilution factor) will be injected into each boring location from 2 to 10 feet bgs.

    3. Pre and post-injection soil cores will be collected from the remediation zone to confirm that the PetroFix™ was successfully distributed. All injection and boring locations will be properly abandoned to accordance with South Carolina Well Standards (R. 61-71).

2.2 Contaminant Monitoring and Report

- As required, a *Pre-Corrective Action Plan Monitoring Report* was submitted to the SCDES on April 16, 2024. This report documents the current free-phase and dissolved-phase CoC concentrations and site-wide potentiometric surface conditions. Additionally, as required, color photographs of the facility and surrounding properties documenting the condition of the site prior to implementation of corrective action activities are included in this report.

- Within 75 days of the CAP Notice to Proceed from the SCDES, a CAP Implementation Report will be submitted. The CAP Implementation Report will outline corrective action activities conducted at the site to date.

- After implementation of corrective action, a corrective action system evaluation (CASE) report will be submitted on a quarterly basis. The CASE report will document current site conditions, discuss the CAP implementation process and the effectiveness of the free-product and dissolved-phase remediation, report updated free-product gauging measurements for each applicable monitoring/recovery/injection well at the site, report updated groundwater analytical data for each monitoring well at the site, calculate CoC concentration reductions, and include any further recommendations pertinent to the site. The first CASE report is due within 90 days of the CAP Implementation Report.

- As required in the Corrective Action Solicitation, specific monitoring wells, surface water receptors, and water-supply well associated with the release (MW-01, MW-02, MW-04, MW-06, MW-08, MW-10, MW-11, MW-13, MW-14, RW-07, RW-11, RW-14, RW-16, CK-1 through CK-4, and WSW-01) will be sampled quarterly and analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), naphthalene, methyl-tertiary butyl ether (MTBE), 1,2-Dichloroethane (1,2-DCA) and 8-Oxygenates by EPA Method 8260D. Wells containing measurable free-product (>0.01 feet) will not be sampled. Sampling will be conducted quarterly in accordance with applicable portions of the SCDES QAPP Revision 4.0. After one year, and upon SCDES's approval, the number of monitoring wells sampled may be reduced and/or the sampling schedule may be modified.

- Once the sampling data indicates that 100% of the CoC concentration reduction goals have been reached, corrective action will be suspended and the SCDES will be notified. Approximately 30 days after notification, the applicable monitoring wells will be sampled to verify that the 100% CoC concentration reduction goal has been achieved. If the goal has been maintained, up to six verification groundwater monitoring wells may be installed at the direction of SCDES. This will begin the four-quarter, post-corrective action verification period.

  During the post-corrective action verification period (four quarters), samples will be collected from the wells associated with the release for the analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), naphthalene, methyl-tertiary butyl ether (MTBE), 1,2-Dichloroethane (1,2-DCA), and 8-Oxygenates by EPA Method 8260D. If sample results indicate that the CoC reduction goals are not sustained, corrective action activities will be resumed and the post-corrective action period will be suspended until the final (100%) CoC concentration goal is again achieved. The verification process will then be repeated until CoC concentrations remain at or below calculated SSTLs for four consecutive quarters.

- If monitoring data demonstrates that the CoC concentration reduction goals have been sustained and these results have been confirmed by SCDES, all associated monitoring/recovery/injection wells will be properly abandoned within 75 days of a written Notice to Proceed from SCDES. Properties will be restored to their original surficial condition (i.e. grassed areas, asphalt parking, etc.). SCDES will be notified at least two weeks in advance of completion of site restoration, so that a joint site inspection may be scheduled.

- A Site-Specific Work Plan (SSWP) for the Corrective Action Plan activities is provided as an attachment.

2.3 Permitting

Required permits for active remediation are listed below:

- Surfactant Injection/Recovery Well Installation Approvals;
- Underground Injection Control Permit for injection of proprietary surfactant solution and PetroFix™ Remediation Fluid into the subsurface.

Permits for the installation of injection wells and use of the surfactant solution are necessary for implementation of the CAP. We understand that issuance of these permits is the responsibility of the SCDES Bureau of Water. A completed Underground Injection Control (UIC) Permit Application will be submitted separately to the UIC Program within the Bureau of Water. A copy will be submitted to the UST Division for their records.

3.0 SCHEDULE

A conservative estimate of our completion schedule is provided below. Since many of the tasks can be conducted concurrently, it is likely that actual times may vary.

1) Corrective Action Plan Approval and Public Notice[1] ..... 4 weeks
2) Install up to 15 surfactant injection/recovery wells..... 2 weeks
3) Perform two non-surfactant enhanced 96-hour (minimum) AFVR events..... 2 weeks
4) Perform up to 10 surfactant enhanced 96-hour AFVR (minimum) events... 20 weeks
5) Absorbent sock deployment and retrieval……1 week*
6) PetroFix injections and distribution verification……2 weeks*
7) Free-product gauging and/or groundwater sampling and analysis[2] ..... 2 weeks*
8) CASE monitoring reports – quarterly..... 156 weeks*
9) Install up to six verification monitoring wells ..... 1 week*
10) Post-corrective action verification sampling – 4 quarters..... 48 weeks*
11) Site Restoration..... 2 weeks

PROJECT TOTAL: Approximately 240 weeks = 4 years 8 months

* - task performed in conjunction with other task(s)

Notes:

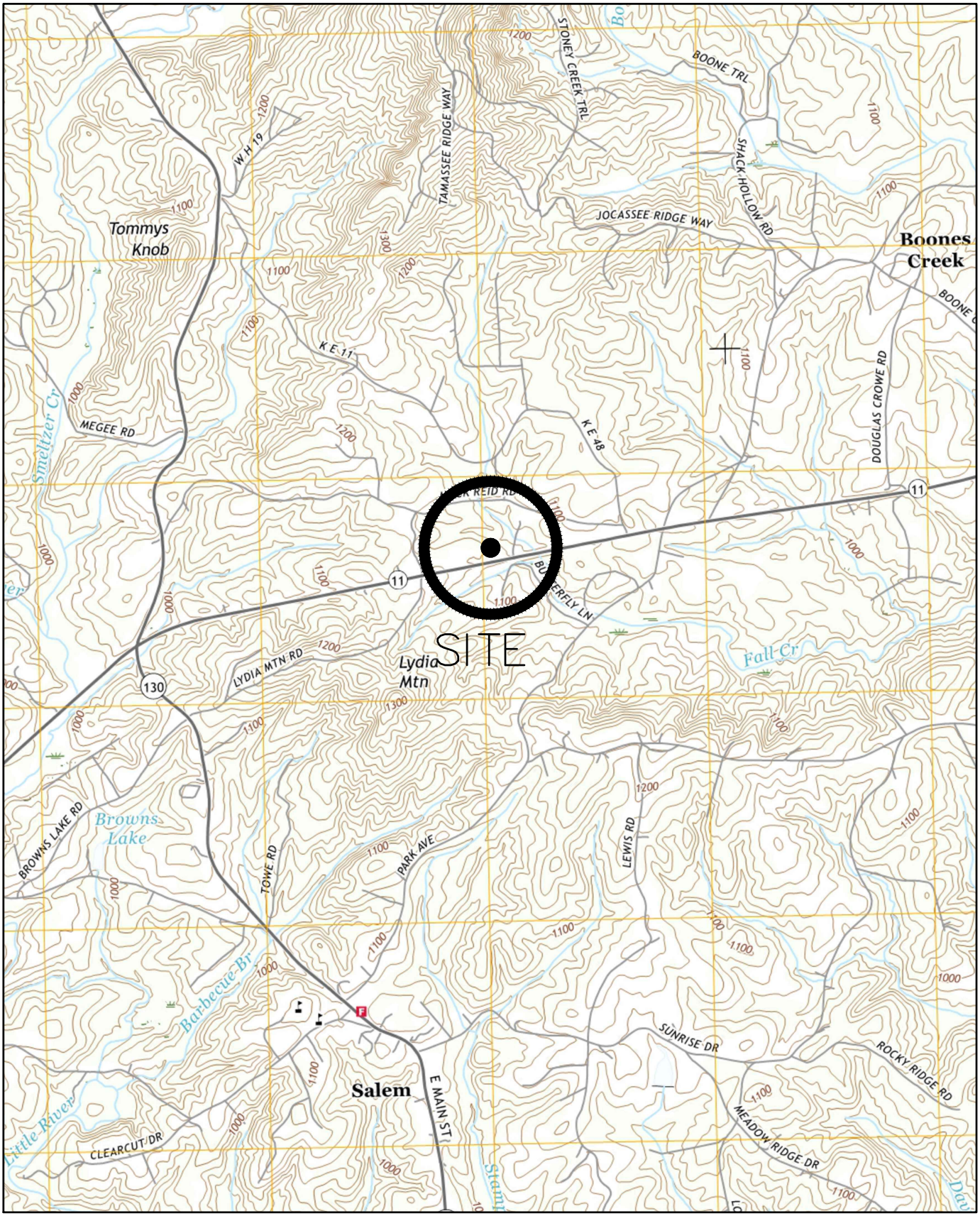
[1] SCDES response and approvals are required for several tasks which will have an impact on initiating work efforts and ultimate completion timeframes.

[2] SCDES requires quarterly free-product gauging and/or groundwater monitoring under this contract. The number of monitoring wells sampled may be reduced at the contractors request and at the discretion of the SCDES. Monitoring field efforts require two days each.

4.0 CERTIFICATION BY A SOUTH CAROLINA ENGINEER OR GEOLOGIST

Pursuant to SCDES regulations, all corrective action monitoring reports and associated submittals will be sealed by a Professional Engineer or Geologist registered in the State of South Carolina.

FIGURES

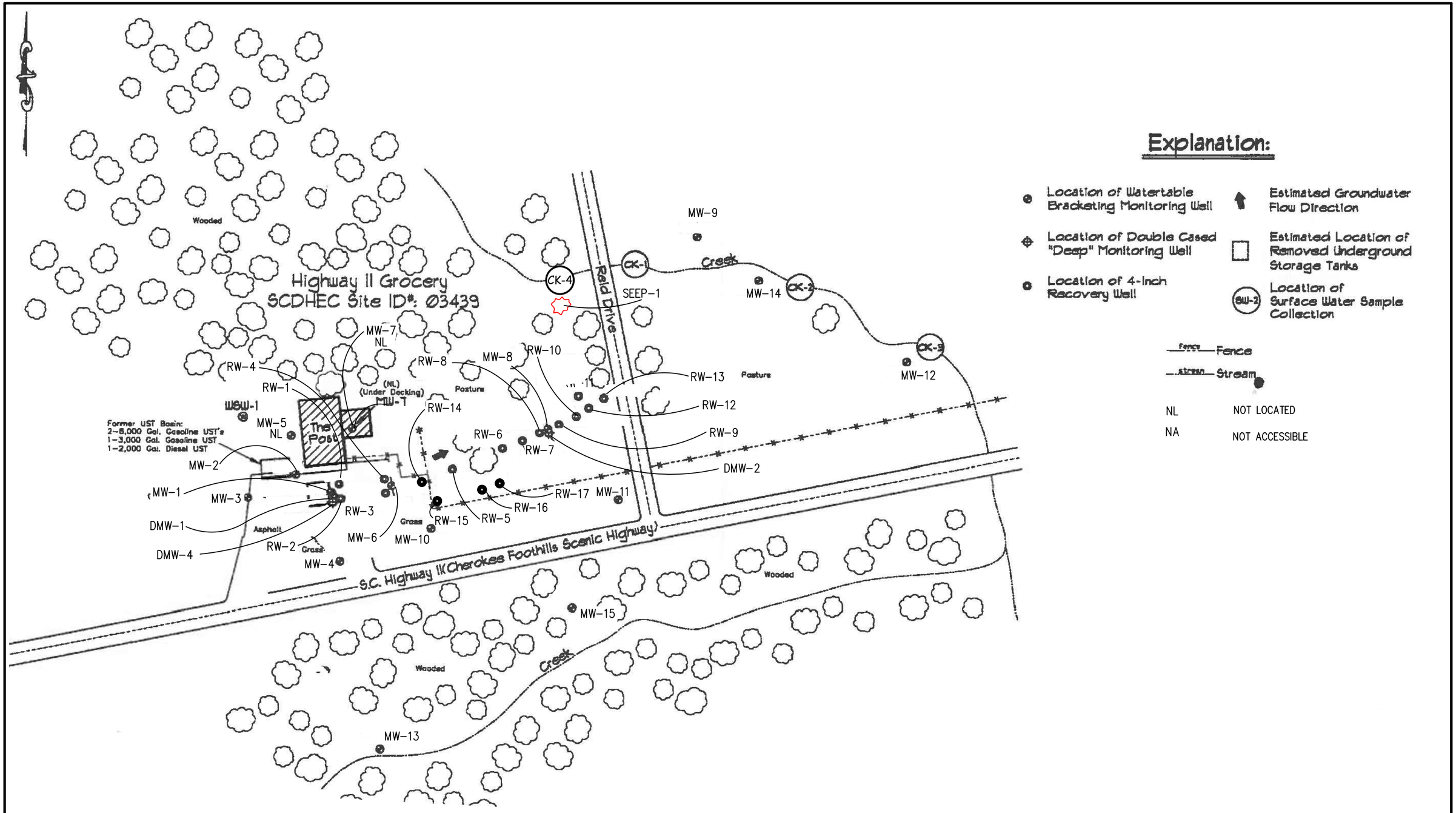


2000 1000 0 2000 4000

APPROXIMATE SCALE IN FEET

REFERENCE:
USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES,
SALEM, S.C. QUADRANGLE, PHOTOREVISED 1980.

DRAWN: ACE	DATE: 12-19-23	BUNNELL LAMMONS ENGINEERING	FIGURE
CHECKED: OLM	CAD: FHWY11GROCERY-09SLM	6004 Ponders Court, Greenville, SC 29615 Phone: (864) 288-1265 Fax: (864) 288-4430	SITE LOCATION MAP FORMER HIGHWAY 11 GROCERY UST PERMIT #03439 13527 HIGHWAY 11 NORTH SALEM, SOUTH CAROLINA
APPROVED: TJB	JOB NO: J23-10769-09		1



Explanation:

- Location of Watertable Bracketing Monitoring Well
- Location of Double Cased "Deep" Monitoring Well
- Location of 4-inch Recovery Well
- Estimated Groundwater Flow Direction
- Estimated Location of Removed Underground Storage Tanks
- (SW-2) Location of Surface Water Sample Collection
- Fence — Fence
- Stream — Stream
- NL — NOT LOCATED
- NA — NOT ACCESSIBLE

REFERENCE:
DRAWING TITLED "SITE BASE MAP" BY MIDLANDS ENVIRONMENTAL CONSULTANS, INC. DATED 11-14-2012.

DRAWN BY: ACE	DATE: 12-19-23	REVISIONS	
CHECKED BY: OLM	FILE: FHWY11GROCERY-09SP	No. / DESCRIPTION / BY	
APPROVED BY: TJB	JOB NO: J23-10769-09		

BUNNELL LAMMONS ENGINEERING
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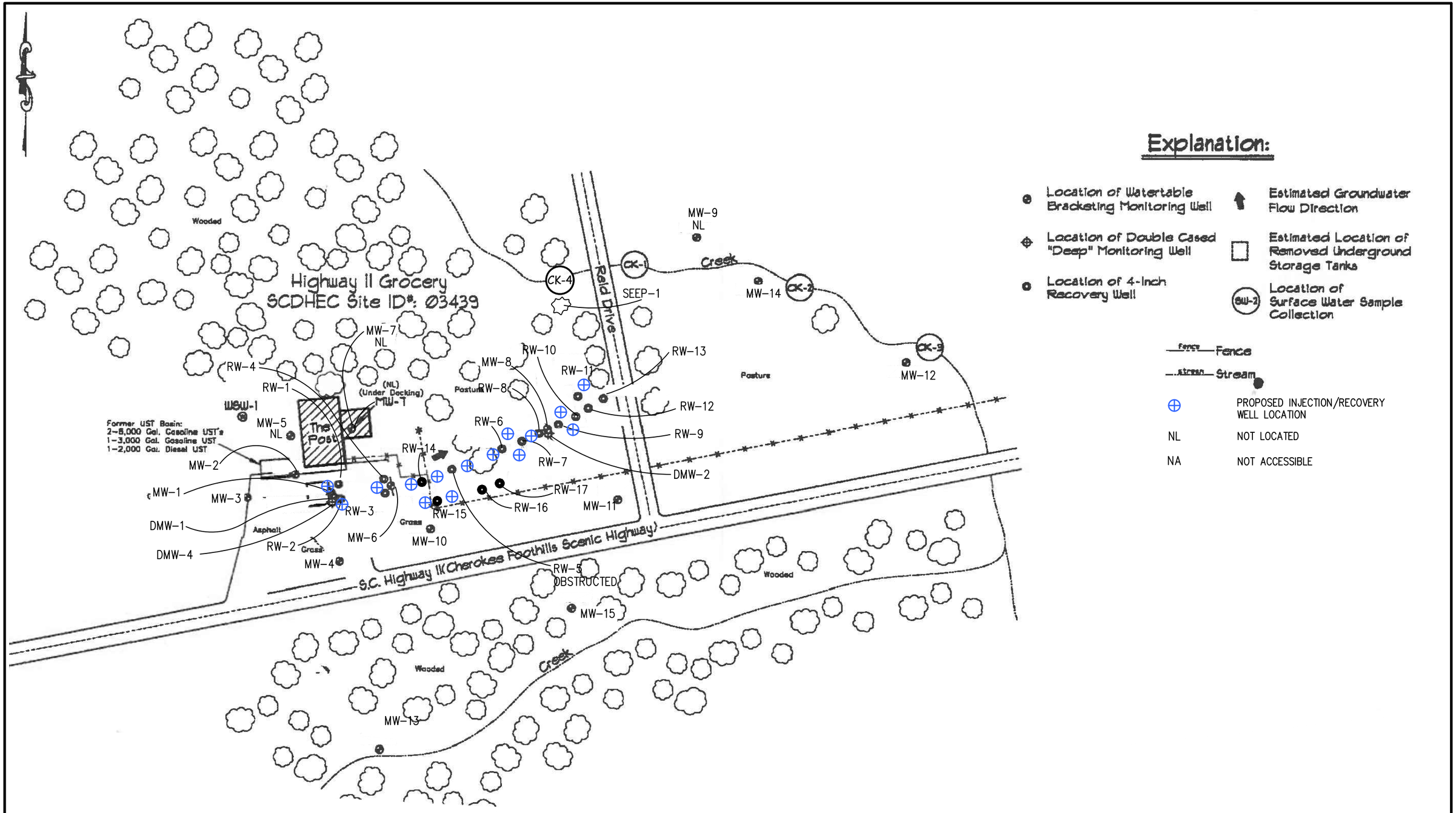
SITE PLAN
FORMER HIGHWAY 11 GROCERY
UST PERMIT #03439
13527 HIGHWAY 11 NORTH
SALEM, SOUTH CAROLINA

FIGURE
2



REFERENCE:
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CHECKED BY: OLM	FILE: FHWY11GROCERY-09PIWP	No. / DESCRIPTION / BY	
APPROVED BY: TJB	JOB NO: J23-10769-09		

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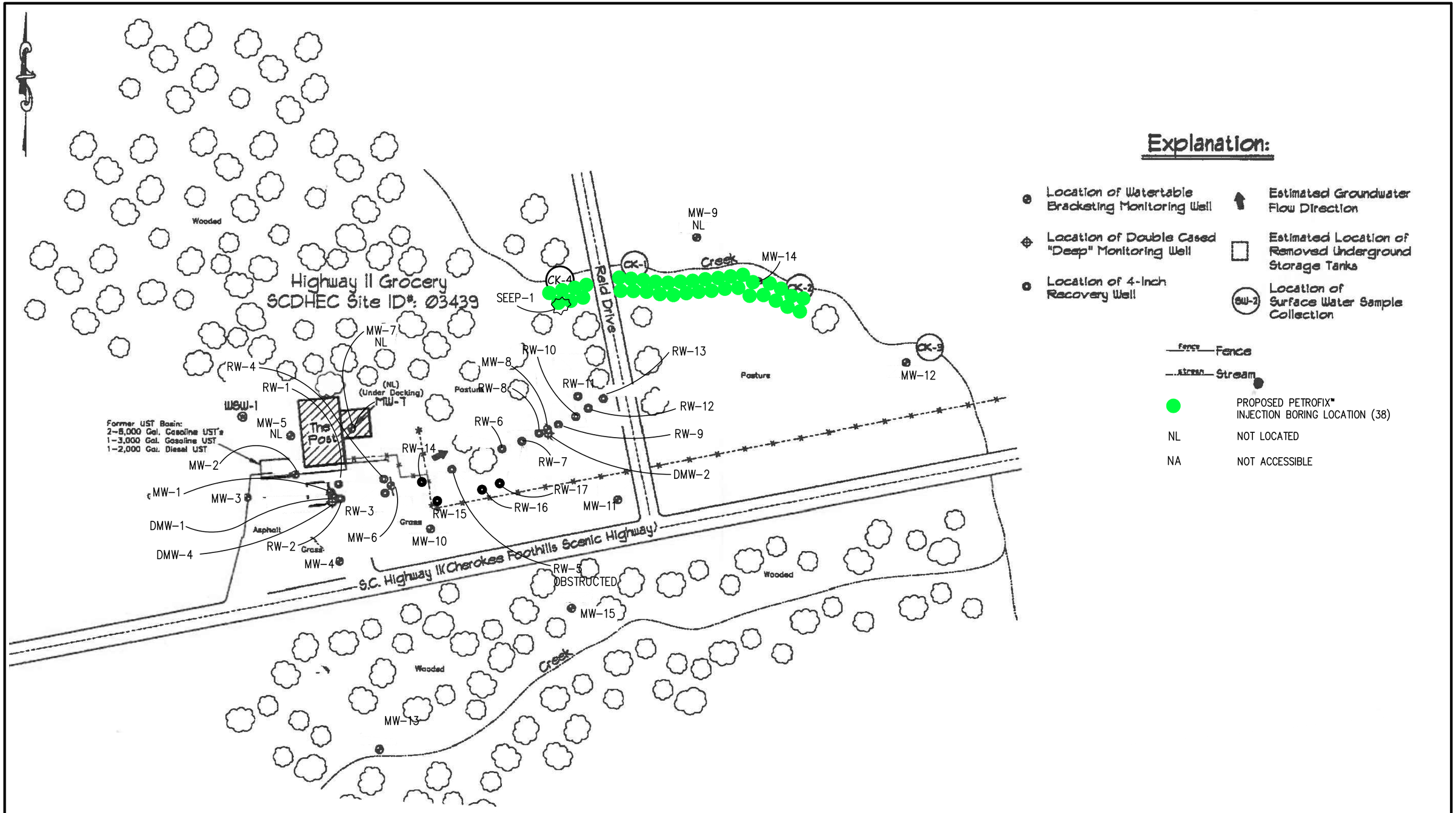
PROPOSED INJECTION/RECOVERY WELL PLAN
FORMER HIGHWAY 11 GROCERY
UST PERMIT #03439
13527 HIGHWAY 11 NORTH
SALEM, SOUTH CAROLINA

FIGURE 3



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APPROVED BY: TJB	JOB NO: J23-10769-09		

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PROPOSED PETROFIX INJECTION PLAN
FORMER HIGHWAY 11 GROCERY
UST PERMIT #03439
13527 HIGHWAY 11 NORTH
SALEM, SOUTH CAROLINA

FIGURE 4