

**From:** Carol Northern <cnorthern@earthcon.com>  
**Sent:** Monday, April 26, 2021 11:05 AM  
**To:** Kuhn, Kimberly M. <kuhnkm@dhec.sc.gov>  
**Cc:** Berresford, James <berresjl@dhec.sc.gov>; Campbell, Christi <Christi.Campbell@LennoxInd.com>;  
steve.bachellor@lennoxintl.com <steve.bachellor@lennoxintl.com>; Tim Goist <tgoist@earthcon.com>; Mary Ann  
Brookshire <mbrookshire@earthcon.com>  
**Subject:** Former Ducane Site; Voluntary Cleanup Contract 16-5848-RP; File #401356 - Work Plan for Additional  
Assessment

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Hi Kim,

I hope you are doing well.

Attached is the revised Work Plan for Additional Assessment for the former Ducane (Lennox) facility in Blackville, SC. The Work Plan, originally submitted on January 29, 2021, was revised to address DHEC's comments provided in a letter dated March 30, 2021.

Please let me know if you have any questions or concerns regarding the attached revised Work Plan and if you require a paper copy in addition to the attached electronic version.

We look forward to receiving your approval.

Thanks,

Carol

Carol D. Northern, PG (GA, KY, LA, MS, NC, TN, TX)  
Principal Geologist  
EarthCon Consultants, Inc. (EarthCon)  
1880 West Oak Parkway, Bldg. 100, Suite 106  
Marietta, Georgia 30062  
**Office:** 770-973-2100  
**Direct:** 678-569-2869  
**Cell:** 770-367-2918  
Fax: 770-973-7395  
[cnorthern@earthcon.com](mailto:cnorthern@earthcon.com)  
[www.earthcon.com](http://www.earthcon.com)



EarthCon Consultants, Inc.  
1880 West Oak Parkway  
Building 100, Suite 106  
Marietta, Georgia 30062

P: 770-973-2100  
F: 770-973-7395  
www.earthcon.com

April 26, 2021

Ms. Kimberly Kuhn  
South Carolina Department of Health and Environmental Control  
Bureau of Land and Waste Management  
2600 Bull Street  
Columbia, South Carolina 29201

Subject: **Revised Work Plan for Additional Assessment Activities – 2021**  
Former Ducane Company Site  
Blackville, Barnwell County, South Carolina  
BLWM File #401356  
EarthCon Project No. 02.20160378.21

Dear Ms. Kuhn:

On behalf of our client Lennox International Inc. (Lennox), EarthCon Consultants, Inc. (EarthCon) proposes conducting additional assessment activities, including groundwater monitoring and a targeted delineation of volatile organic compounds (VOCs) and 1,4-dioxane, at the former Ducane Company Site located in Blackville, Barnwell County, South Carolina (BLWM File # 401356) (the Site). This Revised Work Plan, prepared in accordance with the requirements of Voluntary Cleanup Contract 16-5848-RP (the Contract) executed on November 17, 2016, addresses comments received from the South Carolina Department of Health and Environmental Control (DHEC) dated March 30, 2021.

## **BACKGROUND**

The Site is located at 118 West Main Street in Blackville, South Carolina (Figure 1). The Site consists of approximately 105 acres with approximately 19 acres developed with a production building and a research and development building. The Site is identified by Barnwell County as consisting of three parcels. One parcel is owned by the Barnwell County Economic Development Corporation. The other two parcels, which include the Site buildings, were owned by NK Newlook, Inc. and were formerly used for production of wooden commercial display cabinets. These parcels are currently owned by the Barnwell County Economic Development Corporation. Assessment and remediation activities have been ongoing at the Site since 1999. Constituents detected in site soils and groundwater included chlorinated volatile organic compounds (CVOCs) and petroleum hydrocarbons. Approximately nine in-situ chemical oxidation/bio-remediation injection events were performed at the Site from July 2003 to April 2008.

To satisfy the requirements the Contract, EarthCon conducted groundwater sampling and a Groundwater Plume Analytics<sup>®</sup> study as described in the DHEC approved Work Plan dated December 9, 2016. The results of these activities, along with recommendations for future activities, were provided to DHEC in the *Assessment Report*, dated March 24, 2017 and discussed during a May 31, 2017 meeting. The recommended additional activities were conducted, and the results presented to DHEC in the *Updated Assessment Report*, dated July 26, 2019 and discussed during an August 28, 2019 meeting. Additional assessment activities were recommended during the August 28, 2019 meeting.

The recommended additional activities were conducted, and the results of those activities were presented to DHEC in the *Updated Assessment Report*, dated September 2020 and discussed during a September 25, 2020 meeting. Recommendations for future activities were discussed during the September 25, 2020 meeting and the following Scope of Work was presented to and discussed with DHEC in a meeting held on December 10, 2020. This Work Plan is being submitted per those discussions.

## **SCOPE OF WORK**

The proposed Scope of Work will involve further evaluation of the distribution of concentrations of VOCs in the vicinity of well MW-03 and to the north and east of the on-site building, evaluation of the vertical distribution of VOCs in wells MW-1D and MW-4D, acquisition of soil samples proximal to MW-03 and the former drum storage area, collection of one round of groundwater samples from existing/accessible Site monitoring wells, updates to the Groundwater Plume Analytics<sup>®</sup> study, and reporting.

Prior to initiation of the boring installation and sampling activities, EarthCon will coordinate with Lennox to obtain access to the Site and to clear utilities. The assessment activities described below will be conducted in general accordance with the United States Environmental Protection Agency (USEPA) Region 4 Laboratory Services and Applied Science Division (LSASD) Operating Procedures (OPs) for soil and groundwater. The field activities to be conducted as part of the additional assessment are described below:

### **Task A: Additional Soil and Groundwater Delineation**

Twenty-two (22) direct-push borings will be advanced at the site to provide additional delineation of soil and groundwater at the facility (Figure 2). Fourteen (14) of the direct-push borings (DP-1 through DP-14) will be advanced for the collection of soil and groundwater samples. Eight (8) of the direct-push borings (SB-101 through SB-108) will be advanced for the collection of soil samples only.

### **Groundwater Sampling: DP-1 through DP-14**

Borings DP-1 through DP-14 will be advanced to a depth of 20 feet below ground surface (bgs). Soil samples will be collected continuously from ground surface to boring termination, logged for lithologic descriptions, and screened using a photoionization detector (PID). Groundwater samples will be collected from each of these 14 borings at depths of 10 and 20 feet bgs. If elevated PID readings are noted in the saturated zone at an alternate depth, one additional groundwater sample will be collected from that boring at the location of the highest PID reading. In addition, quality assurance/quality control (QA/QC) samples (2 field duplicates, 2 trip blanks and 1 rinse blank) will be collected.

Groundwater samples will be collected from the direct-push borings by advancing the rods to the desired depth, retracting the sheath and rod, and collecting a groundwater sample from the screen. A peristaltic pump and polyethylene tubing will be used to collect the groundwater samples. The groundwater samples will be collected from the intake end of the dedicated polyethylene discharge tubing after the peristaltic pump is stopped and the tubing is removed from the borehole. The groundwater samples will be placed in laboratory-supplied containers and transported, under chain-of-custody protocols, to a South Carolina-certified analytical laboratory where they will be analyzed for VOCs using EPA Method 8260D and 1,4-dioxane using EPA Method 8260D SIM. The samples will also be analyzed for dissolved gases (methane, ethane, and ethane) using Method RSK-175.

On behalf of Lennox, EarthCon is requesting DHEC Monitoring Well Approval for these 14 direct push groundwater sampling locations. The borings will be installed by a South Carolina Certified Well Driller and installation and abandonment of the borings will be in accordance with South Carolina Regulation 61-71. A DHEC Monitoring Well Application form for these 14 borings is included as Attachment B.

### **Soil Sampling: DP-1 through DP-14**

Soil samples for laboratory analyses will be collected from the previously described groundwater sampling locations as follows:

- **Locations DP-4 through DP-9** – For the groundwater sampling locations that are located proximal to the former drum storage area and well MW-03 (DP-4 to DP-9), one soil sample will be collected from 1 to 3 feet bgs. If elevated PID readings are observed in the unsaturated zone beneath 3 feet bgs, an additional soil sample will be collected for laboratory analyses.
- **Locations DP-1 to DP-3 and DP-10 to DP-14** – For groundwater sampling locations DP-1 to DP-3 and DP-10 to DP-14, if elevated PID readings are noted in the

unsaturated zone, one soil sample will be collected from the boring. If elevated PID readings are not noted, soil samples will not be collected from these borings.

**Soil Sampling: SB-101 through SB-108**

Eight soil borings (SB-101 to SB-108) will be advanced, for the collection of soil samples only, around the former drum storage area and existing well MW-03 using direct-push equipment. The borings will be advanced to the top of the water table and soil samples will be collected continuously for lithologic descriptions and screened using a PID. One soil sample will be collected at 1 to 3 feet bgs for laboratory analyses. If elevated PID reading are observed in the unsaturated zone beneath 3 feet bgs, an additional soil sample will be collected for laboratory analyses.

**Soil Sampling/Analysis, VOCs** – The soil samples described above will be placed in laboratory-supplied containers and transported, under chain-of-custody protocols, to a South Carolina-certified analytical laboratory. The soil samples will be analyzed for VOCs using EPA Method 8260D.

**Soil Sampling/Analysis, NOD** – To evaluate potential in-situ chemical oxidation remedial technologies, three (3) soil samples will be collected from presumed unimpacted areas of the site at various depths representative of different lithologies. The samples will be analyzed for natural oxidant demand (NOD) by PeroxyChem, an Evonik Company laboratory.

**Surveying** – The boring locations will be surveyed for horizontal location and elevation by a South Carolina licensed surveyor.

**IDW Management/Disposal** – Investigation derived waste (IDW) generated during boring installation and sampling will be managed in general accordance with the USEPA Region 4 LSASD OP for Management of Investigation Derived Waste (SESDPROC-202-R3, July 3, 2014). Initially, IDW will be containerized, labeled, and stored onsite. Upon receipt of sampling results, the IDW will be properly disposed in accordance with the USEPA guidance.

**Task B: Vertical Evaluation – Wells MW-01D and MW-04D**

To evaluate the vertical distribution of contaminants in wells MW-01D and MW-04D and assess the integrity of these wells, the following activities will be conducted:

**Groundwater Sampling/Analysis** – Dual membrane passive diffusion samplers (PDS) will be installed in well MW-01D at depths of 20 and 40 feet bgs and in well MW-04D at depths of 20, 40, 60 and 80 feet bgs. The PDS will be allowed to equilibrate for a minimum of 3 weeks.



The PDS will then be retrieved and groundwater samples collected. In addition to these 6 groundwater samples, 1 field duplicate will also be collected.

The groundwater samples will be placed in laboratory-supplied containers and transported, under chain-of-custody protocols, to a South Carolina-certified analytical laboratory where they will be analyzed for VOCs using EPA Method 8260D and 1,4-dioxane using EPA Method 8260D SIM. The samples will also be analyzed for dissolved gases (methane, ethane, ethane) using Method RSK-175.

**IDW Management/Disposal** – As previously described, IDW generated during the sampling event will be properly disposed offsite in accordance with USEPA guidance.

### **Task C: Comprehensive Groundwater Sampling Event**

In conjunction with the field activities described above, one round of groundwater sampling will be conducted from the existing/accessible Site monitoring wells. There are 21 groundwater monitoring wells located at the Site. It is anticipated that only 18 of the wells will be sampled as permission to access well MW-9, which is located on the adjacent private property, has not been granted and monitoring wells MW-12 and MW-13 cannot be located. The field activities to be conducted during the groundwater sampling event are described below:

**Groundwater-Level Measurements** – Prior to sampling, depth to groundwater measurements will be collected from each accessible well. The groundwater-level elevations will be used to prepare a potentiometric surface map for the Site.

**Groundwater Sampling/Analysis** – Prior to sampling, each well will be purged using low-flow techniques. The field parameters temperature, pH, specific conductance, dissolved oxygen (DO), oxidation reduction potential (ORP), ferrous iron, and turbidity will be measured. When the pH and specific conductance of the water have stabilized, and the turbidity has either stabilized or is below 10 NTU the groundwater sample will be collected using low flow techniques. In addition to the 18 groundwater samples, QA/QC samples (1 field duplicate, 2 trip blanks and 1 rinse blank) will be collected.

A peristaltic pump and polyethylene tubing will be used to collect the groundwater samples. The groundwater samples will be collected from the intake end of the dedicated polyethylene discharge tubing after the peristaltic pump is stopped and the tubing is removed from the borehole. The groundwater samples will be placed in laboratory-supplied containers and transported, under chain-of-custody protocols, to a South Carolina-certified analytical laboratory where they will be analyzed for VOCs using EPA Method 8260D and 1,4-dioxane

using EPA Method 8260D SIM. The samples will also be analyzed for the MNA parameters nitrate, sulfate, sulfide, chloride, alkalinity, TOC, and dissolved gases (methane, ethane, ethane).

**IDW Management/Disposal** – As previously described, IDW generated during the sampling event will be properly disposed offsite in accordance with USEPA guidance.

### **Task D: Groundwater Plume Analytics<sup>®</sup> Update**

EarthCon will update the most recent Ricker Method<sup>®</sup> Plume Stability Analysis, current through April 2020, with data collected during the 2021 MW-03 Area Assessment and the comprehensive groundwater sampling event. The Ricker Method<sup>®</sup> analysis will be updated for chloroethene compounds, chloroethane compounds, and BTEX constituents. EarthCon will also update the following additional Groundwater Plume Analytics<sup>®</sup> elements:

- Groundwater elevation correlation analysis for both total chloroethenes and total chloroethanes in the Upper Shallow hydrogeologic zone,
- Deep zone well-by-well chloroethenes molar mass and ratio charts, and
- Geochemical isopleth maps from the most recent sampling event, which may include DO, ORP, ferrous iron, dissolved gasses (methane, ethane and ethene), and TOC.

The updated analysis will be documented in a PowerPoint presentation and preliminary findings will be presented via webinar. Written documentation of the work, consisting of the methodology, findings, explanations, potential data gaps, conclusions, and recommendations, will be updated for inclusion in the revised *Updated Assessment Report* and presentation to DHEC.

### **Task E: Reporting**

**Semi-Annual Progress Reports** - Section 6 of the Voluntary Cleanup Contract requires six-month progress reports. The first progress report will be submitted by May 3, 2021 and the second progress report will be submitted in Oct/Nov 2021. Additional progress reports may be submitted to DHEC monthly during implementation of the field events to justify a schedule extension, if necessary, due to the COVID-19 pandemic or other unforeseen circumstances.

**Revised Updated Assessment Report** – After receipt of the laboratory analytical data from the MW-03 Area Assessment, MW-01D/MW-04D evaluation, and the comprehensive groundwater sampling event, EarthCon will incorporate the data into the existing *Updated Assessment Report*, dated September 2020. The revised *Updated Assessment Report* will be submitted to DHEC within 90 days of Work Plan approval.

## SCHEDULE

Pending regulatory approval, the scope of work will be implemented as described herein. Field activities will require approximately thirty (30) days to complete. The laboratory analyses will require approximately 7 business days. The revised *Updated Assessment Report* will be submitted to DHEC within 90 days of approval of the Work Plan.

## REQUEST

Upon completing review of this document, we are requesting DHEC to approve the Work Plan and Monitoring Well Permit request. Please feel free to call us at (770) 973-2100 should you have any questions or if we can provide any additional information.

Respectfully submitted,  
**EARTHCON CONSULTANTS, INC.**



Mary Ann Brookshire, CHMM  
Project Manager



Carol D. Northern  
Principal



Timothy O. Goist, P.G. (SC#1121)  
Principal Geologist

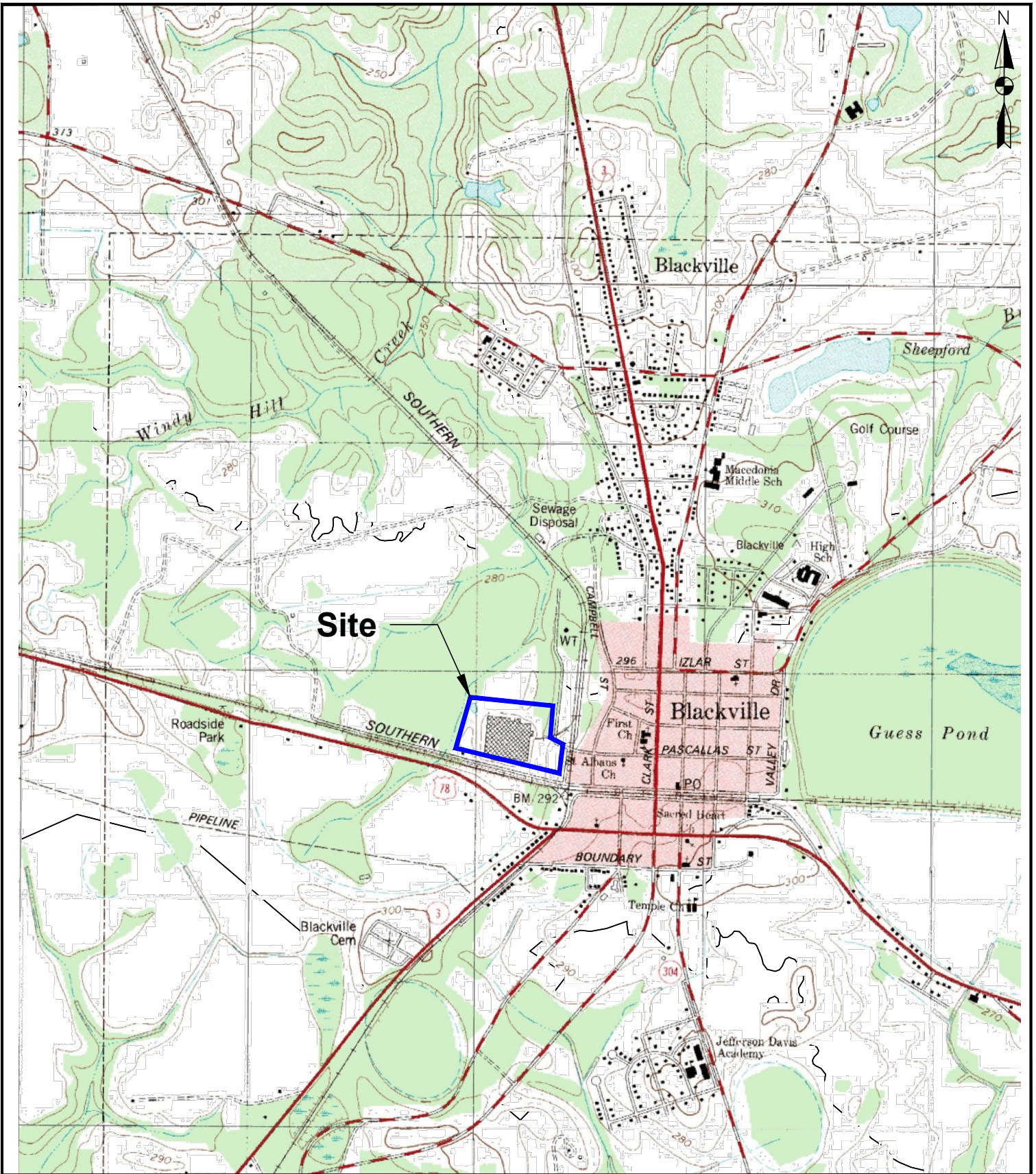
Attachment A – Figures 1 and 2  
Attachment B – DHEC Monitoring Well Application form (14 borings)

Cc: Ms. Christi Campbell  
Environmental Affairs Director  
Lennox International, Inc.  
2140 Lake Park Boulevard  
Richardson, TX 75080



**ATTACHMENT A**  
**FIGURES 1 and 2**

FILE NAME: S:\Premier\Projects\Lennox International\Blackville, SC\Drawings\Lennox\_Main\_2017.dwg (Site Location) 01/26/21 20:56 - hpham



FORMER DUCANE COMPANY SITE  
 BLACKVILLE, BARNWELL COUNTY, SOUTH CAROLINA  
 BLWM FILE # 401356



EarthCon Consultants, Inc.

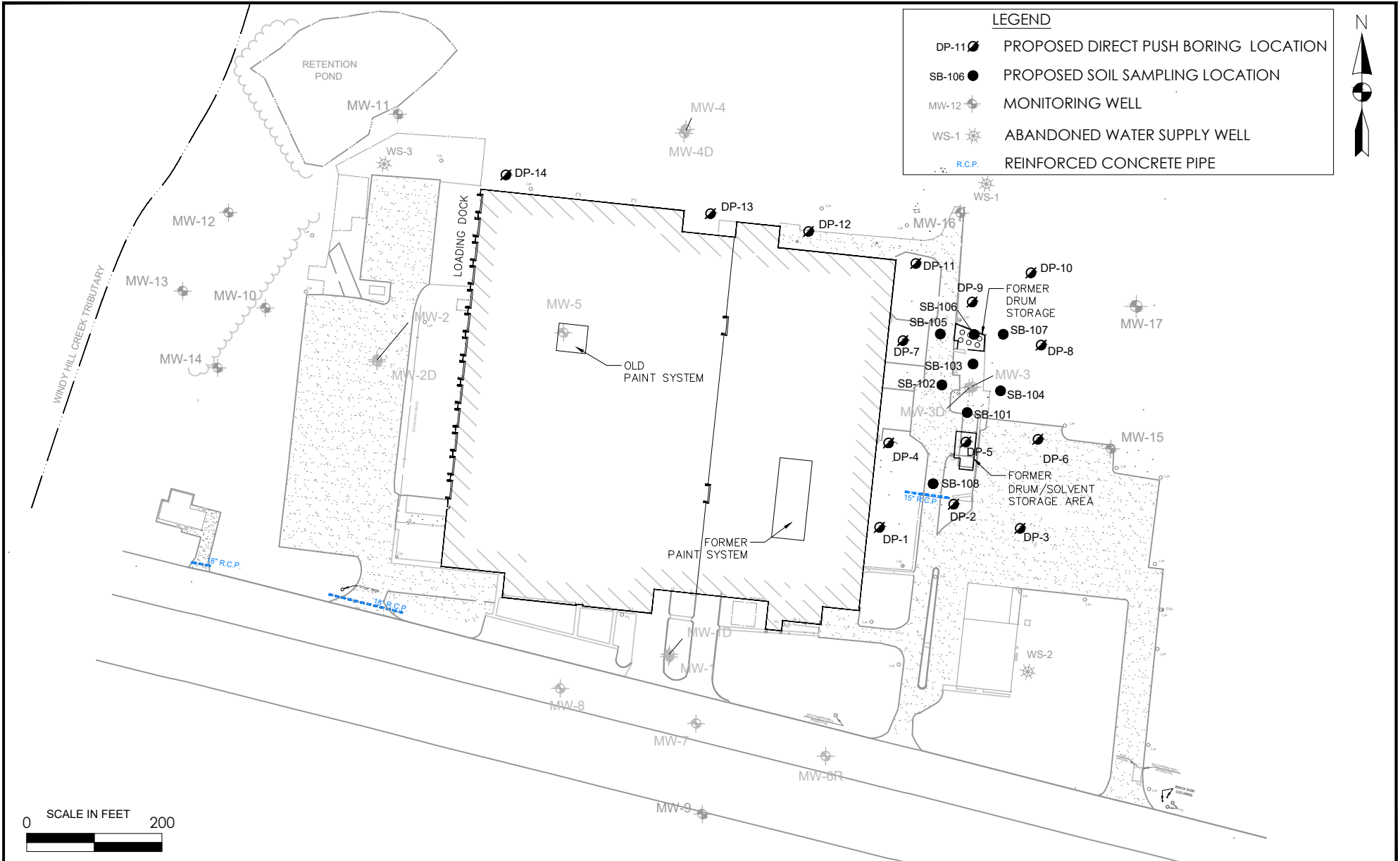
1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

SITE LOCATION MAP

PROJECT NO. 02.20160378.00

DRAWN: HVP	CHECKED: RLA	DATE: 06/22/2018	FIGURE: 1
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FORMER DUCANE COMPANY SITE  
BLACKVILLE, BARNWELL COUNTY, SOUTH CAROLINA  
BLWM FILE # 401356

PROJECT NO. 02.20160378.00



EarthCon Consultants, Inc.

1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

PROPOSED BORING LOCATIONS

DRAWN: HVP	CHECKED: MAB	DATE: 04/08/2021	FIGURE: 2
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**ATTACHMENT B**  
**DHEC MONITORING WELL APPLICATION FORM**  
**(14 borings)**

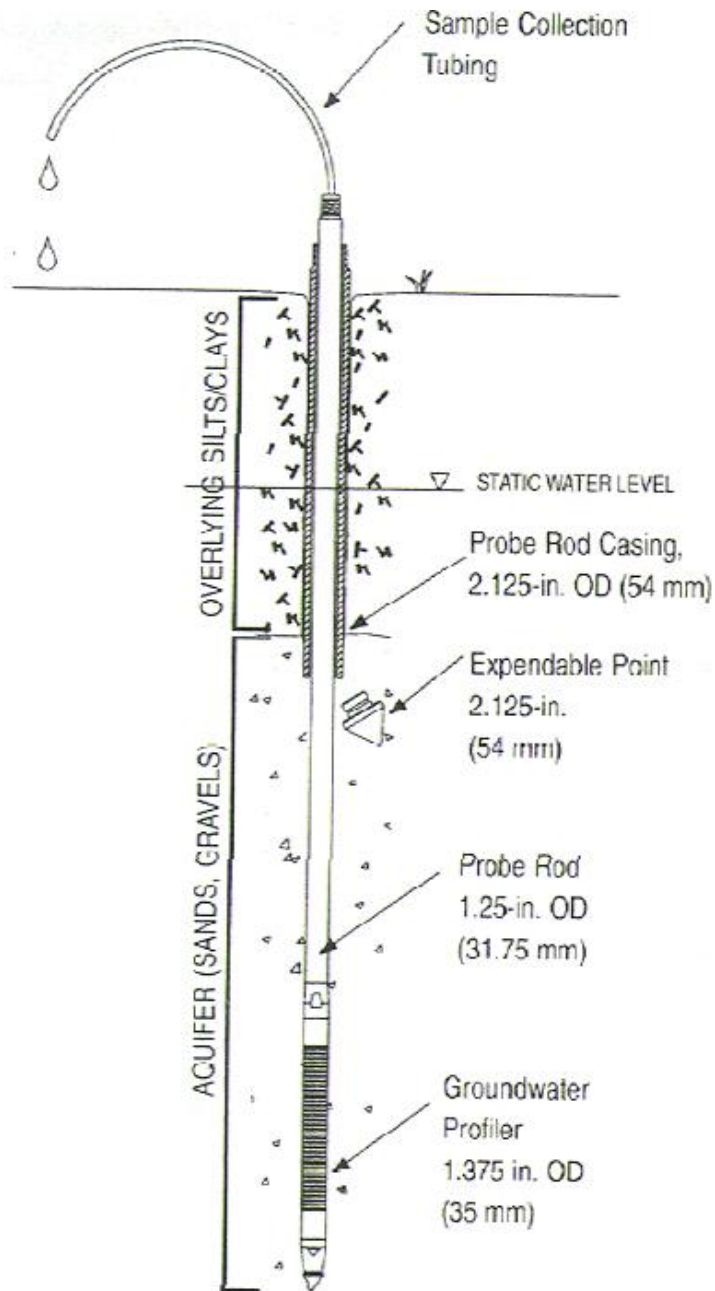




# Monitoring Well Application

<b>1. Proposed Location of Monitoring Well(s):</b>  Street Address:  City (including Zip):  County:  Please attach Scaled Map or Plat		<b>5. Intended Purpose of Well(s):</b>  Pre-Purchase  Investigation  Program Area: Project or Site ID #:	<b>NOTE:</b> If this request is for an existing DHEC project, please enter the Program area and ID number below.
<b>2. Well Owner's Information:</b>  Name (Last then First):  Company:  Complete Address:    Telephone Number:		<b>6. Proposed number of monitoring wells:</b>	
<b>3. Property Owner's Information:</b>  Check if same as Well Owner  Name (Last then First):  Company:  Address:    Telephone Number:		<b>7. Proposed parameters to be analyzed (check all that apply), please specify analytical method beside check box:</b>  VOCs BTEX MtBE Naphthalene PAHs Metals Nitrates Base, Neutral & Acid Ex. Pesticides/Herbicides Phenols Radionuclides PCBs Other ( <u>specify below</u> )	
<b>4. Proposed Drilling Date:</b>		<b>8. Proposed construction details (complete and attach proposed monitoring well schematics):</b>	





Typical ground water profiler assembly from Geoprobe® Systems, 2002

FORMER DUCANE COMPANY  
SITE  
Blackville, Barnwell County, S.C.  
BLWM File #401356  
PROJECT NO. 02.20260378.00



EarthCon Consultants, Inc.  
1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

Example  
Direct Push  
Groundwater Sampler

DRAWN:	CHECKED:	DATE:	FIGURE:
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