SC DEPARTMENT of ENVIRONMENTAL SERVICES

Proposed Plan for Site Remediation
Former Shakespeare Composite Structures Site

19845 US 76 Highway, Newberry, South Carolina 29108

March 2025

ANNOUNCEMENT OF PROPOSED PLAN

The South Carolina Department of Environmental Services (SCDES, formerly the South Carolina Department of Health and Environmental Control or DHEC) has completed an evaluation of cleanup alternatives to address contamination at the Former Shakespeare Composite Structures Site (Site). SCDES entered into a Voluntary Cleanup Contract with Philips Electric of North America (now Signify North America) on September 8, 2014. This Proposed Plan identifies SCDES's Preferred Alternative for cleanup and provides the reasoning for this preference. In addition, the Proposed Plan includes summaries of the other cleanup alternatives evaluated during the process. These alternatives were identified based on information gathered during environmental investigations conducted at the Site since 2014.

SCDES is presenting this Proposed Plan to inform the public of activities conducted at the Site, gain public input, and fulfill the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan or NCP). This Proposed Plan summarizes information that can be found in greater detail in the Feasibility Study (April 2024) and other documents contained in the Administrative Record. SCDES encourages the public to review these documents to gain a better understanding of the Site and the activities that have been completed.

SCDES will select a final cleanup remedy after reviewing and considering comments submitted during the public comment period.

SCDES may modify the Preferred Alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

SCDES's Preferred Cleanup Summary

Alternative 5:
ISCO, ISCR, ISA, MNA, ICs and Containment via Cover

SCDES's preferred remedial option is:

- In-Situ Chemical Oxidation (ISCO), In Situ Chemical Reduction (ISCR), and In Situ Adsorption (ISA) into the groundwater to promote oxidation, reduction and natural biodegradation of contaminants.
- Monitored Natural Attenuation (MNA) with Institutional Controls (IC) and Containment via cover.
- This alternative would reduce potential exposure to chemicals of concern (CoCs) and controls potential migration of contamination by treating the groundwater with a chemical oxidation agent, a chemical reducing agent and enhancing biological degradation.

MARK YOUR CALENDAR

❑ PUBLIC MEETING:

SCDES will hold an in person public meeting to further explain the Proposed Plan and all the alternatives presented in the Remedial Alternatives Evaluation and answer questions.

Public Meeting will be held on March 11, 2025 at 6pm at
Edward Kyzer Newberry Firehouse Conference Center
1227 McKibben Street
Newberry, South Carolina

Link to Site's Webpage:

www.des.sc.gov/shakespeare

❑ PUBLIC COMMENT PERIOD:

March 11, 2025 through April 14, 2025

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

Genevieve Keller-Milliken, Project Manager
SCDES Bureau of Land & Waste Management
2600 Bull Street
Columbia, SC 29201
genevieve.kellermilliken@des.sc.gov

❑ FOR MORE INFORMATION:

Call: Genevieve Keller-Milliken
Project Manager, 803-898-0722

See: SCDES's website at:
www.des.sc.gov/shakespeare

View: The Administrative Record on the SCDES website and at the following locations:

SCDES's Freedom of Information Office
2600 Bull Street, Columbia, SC
(803) 898-3817
Monday - Friday: 8:30 am - 5:00 pm

SITE HISTORY

The Shakespeare Composite Structure Site (the Site) is located at 19845 US Highway 76, approximately 1 mile northwest of Newberry, Newberry County, South Carolina. The Site includes approximately 24 acres. The land surrounding the Site includes agricultural, residential, undeveloped, and commercial/light industrial properties.

Prior to purchase by Shakespeare Composite Structures, LLC (Shakespeare) in 1965, the property was an undeveloped wooded land. The facility has operated for fiberglass product production that continues to this day. The facility has two main structures, the Main production building (Main Building) built in 1966, and the Pole Winder building constructed in the late 1970s. These two buildings total approximately 250,000 square feet. Several smaller outlying structures located on the west end of the property, includes a hazardous waste storage building, a residual resin curing building, and other smaller storage buildings have been built over the years. Operations at the facility include the design and manufacture of large fiberglass utility poles and cross arms, and a variety of other products such as posts, signs, and sheet piling. The manufacturing processes include the following categories: materials received, formulation of resin mixes, pultrusion of fiberglass products, extrusion of plastic products, winding of fiberglass poles, painting, heat curing of poles, testing of materials, warehouse/storage of finished goods, and packaging/shipping. The finishing process for the products is conducted on site.

In December 2013, Shakespeare Composite Structures, LLC (Shakespeare), a division of Philips Electronics North America Corporation (PENAC), initiated a series of environmental assessments to investigate the Site. The results showed elevated concentrations of chlorinated volatile organic compounds (CVOCs) in soil and groundwater. PENAC entered into a responsible party voluntary cleanup contract (VCC-14-6271-RP) with the DHEC to further assess and evaluate cleanup alternatives at the Site. PENAC has since been reorganized and is now known as Signify North America Corporation (Signify). The facility has since been purchased by Valmont Composite Structures and continues with the fiberglass production.

AREAS OF CONCERN

Since construction, the facility has been used to produce fiberglass products. During initial assessments at the Site beginning in 2014, CVOCs were detected in the groundwater, soil, and sub-slab vapors. The chemicals of concern (CoCs) at the Site that have exceeded their United States Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCLs) in the groundwater are tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2 DCE), and vinyl chloride (VC). MCLs for these compounds are 5 µg/L (PCE, TCE), 70 µg/L (cis-1,2 DCE) and 2 µg/L (VC). Based on relative concentrations and abundance, TCE is considered the primary driver for groundwater contamination. Soil concentrations only exceeded MCL-based soil screening levels (SSLs) for methylene chloride, styrene and TCE. The first two compounds are currently in use on site, and none on of the soil CoCs exceed the industrial regional screening levels (RSLs). The only sub-slab vapors that exceed their RSLs are TCE and cis-1,2 DCE.

During the Remedial Investigation, it was determined that the source areas for the CVOCs originated from historical operation practices that impacted groundwater beneath the western portions of the Main and Pole Winder Buildings. Groundwater contamination has migrated off-site to adjacent properties in the shallow, intermediate, and bedrock zones of the aquifer, and water supply wells have been impacted. The impacted water supply wells have been removed from service and water is being supplied through municipal sources. CVOCs have been detected below the MCLs in two intermittent streams located to the north and south of the investigation area.

SUMMARY OF SITE RISKS

Contamination from historic operations at the Site has been detected in the soil on-site, in sub-slab vapors beneath the buildings on the Valmont property, and has migrated into the groundwater both on-site and further off-site above regulatory limits. Contaminated groundwater is considered to be the primary risk factor of the Site.

The primary risk from the Site to the public is from direct ingestion or exposure to contaminated groundwater. Workers at the facility could come into direct contact with the contaminated soil and/or groundwater. Off-site residents could be exposed through direct contact (bodies of water, such as streams) or from contaminated water supply wells. The primary risk to the environment is contaminated groundwater migrating to nearby water supply wells used in agriculture or irrigation, as well as continued migration to surface waters. The alternatives identified in this Proposal Plan and evaluated in the Feasibility Study are necessary to protect public health and the environment from actual or threatened releases of hazardous substances to the environment and to prevent further migration of contaminated groundwater.

CLEANUP GOALS

Remedial Action Objectives (RAOs) are developed to set goals for protecting human health and the environment. The goals should be as specific as possible but should not unduly limit the range of remedial alternatives that can be developed. Accordingly, the following RAOs were developed for the Site:

- Control, reduce, or eliminate incidental ingestion and direct contact of groundwater with VOCs at concentrations exceeding MCLs by human receptors.
- Control, reduce, or eliminate leaching of VOCs from soil to groundwater which would result in exceedance of groundwater MCLs.
- Control, reduce, or eliminate inhalation of soil vapor containing VOCs at concentrations exceeding the USEPA Industrial RSLs by human receptors.
- Restore groundwater to drinking level standards at areas not under land use restrictions.

Contaminant of Concern	Maximum Contaminant Level (MCL) - Groundwater
Tetrachloroethene (PCE)	5 µg/L (5 parts per billion)
Trichloroethene (TCE),	5 µg/L (5 parts per billion)
Cis-1,2-dichloroethene (cis-1,2 DCE)	70 µg/L (70 parts per billion)
Vinyl chloride (VC)	2 µg/L (2 parts per billion)

SCOPE AND ROLE OF THE ACTION

The selection of one of the alternatives found in this Proposed Plan will be the final cleanup action for the Site. The RAOs for these proposed actions include preventing ingestion of groundwater with concentrations of CoCs above applicable drinking water standards, restoring groundwater to drinking water standards at areas not under land use controls, reducing the potential for soil and vapor exposure, and reducing further migration of contaminated groundwater.

SUMMARY OF REMEDIAL ALTERNATIVES

Based on information collected during previous investigations, *a Feasibility Study* (AECOM, April 2024) was developed to identify, develop, and evaluate cleanup options to address the contamination at the Site. This evaluation considered the nature and extent of contamination and associated potential risks developed during the Remedial Investigation (AECOM, November 2018), additional assessments, and the Pilot Study (AECOM, May 2023) to determine and evaluate potential remedial alternatives and their overall protection of human health and the environment. Each remedial alternative evaluated by SCDES is described briefly below. Note: A final Remedial Design will be developed prior to implementation of any alternative once a remedy has been selected.

Remedial Alternatives	**Description**
1. No Action	• No remedial action for soil. • No remedial action for groundwater. • Cost $0
2. Monitored Natural Attenuation (MNA), Institutional Controls (IC), Containment via Cover (CvC)	• Monitoring the natural degradation of CoCs in groundwater with the existing monitoring network. • Implement restrictions on land and groundwater use. • The existing concrete floors in the building would remain in place to prevent vapor intrusion and any future contamination leakage. • Cost: Approximately $1,137,000
3. In Situ Chemical Oxidation (ISCO) Monitored Natural Attenuation (MNA), Institutional Controls (IC), and Containment via Cover (CvC)	• Injection of chemical oxidant “in-situ” to degrade CVOCs. • Monitoring the natural degradation of CoCs in groundwater with the existing monitoring network. • Implement restrictions on land and groundwater us. • The existing concrete floors in the building would remain in place to prevent vapor intrusion and any future contamination leakage. • Cost: Approximately $2,653,000
4. In Situ Chemical Oxidation (ISCO), In Situ Enhanced Reductive Dechlorination (ISERD), In Situ Adsorption (ISA), Monitored Natural Attenuation (MNA), and Containment via Cover (CvC)	• Injection of chemical oxidants and adsorption amendments “in situ” to degrade CVOCs and reduce contaminant migration. • Enhanced bioremediation would stimulate the naturally occurring subsurface microbial processes to degrade the COCs. • Monitoring the natural degradation of CoCs in groundwater with the existing monitoring network. • Implement restrictions on land and groundwater use. • The existing concrete floors in the building would remain in place to prevent vapor intrusion and any future contamination leakage. • Cost: Approximately $3,052,000
5. In Situ Chemical Oxidation (ISCO), In Situ Chemical Reduction (ISCR), In Situ Adsorption (ISA), Monitored Natural Attenuation (MNA), Institutional Control (IC), and Containment via Cover (CvC)	• Injection of chemical oxidant, reducing agents and adsorption amendments “in situ” to degrade CVOCs and reduce contaminant migration. • Monitoring the natural degradation of CoCs in groundwater with the existing monitoring network. • Implement restrictions on land and groundwater use. • The existing concrete floors in the building would remain in place to prevent vapor intrusion and any future contamination leakage. Cost: Approximately $2,393,000

DESCRITPTION OF ALTERNATIVES

Alternative 1 - No Action

The No Action Alternative is required by the National Contingency Plan to be included as a baseline for comparison with other alternatives. Under this remedial alternative, there would be no groundwater monitoring or any further active remedial treatment measures. There is no cost associated with implementing this alternative.

Alternative 2– Monitored Natural Attenuation (MNA), Institutional Controls (IC), and Containment via Cover (CvC)

Monitored Natural Attenuation (MNA) is a passive method that relies on natural processes to degrade the CVOCs to levels below regulatory limits. MNA is measured through a variety of sampling parameters and analysis of the existing CVOCs using the established well network. A monitoring plan is proposed through 30 years of remediation with 5-year remedy reviews. This technology does not address any source area treatment or active groundwater treatment.

Institutional controls (IC) would include restrictions on land use, development, and groundwater use both onsite and offsite.

Containment via Cover would maintain the existing concrete floors within the Main and Pole Winder buildings. This addresses the soil and sub-slab vapors exceedances and reduces direct human contact to these contaminated media.

The 30-year present worth cost of Alternative 2 is estimated to be $1,137,000.

Alternative 3– In Situ Chemical Oxidation (ISCO), Monitored Natural Attenuation (MNA), Institutional Controls (IC), and Containment via Cover (CvC)

Chemical oxidation uses chemicals called “oxidants” to help change harmful contaminants into less toxic ones. It is commonly described as “in situ” as it is conducted in place, without having to excavate soil or pump groundwater for aboveground cleanup. The selected oxidant would be introduced to the groundwater through injection points. ISCO is usually used to treat soil and groundwater contamination in the source area where contaminants were originally released. There are a variety of oxidizing agents that can be used for this technology, one of which was used in a Pilot Test on this site. In this case, ISCO would be used to treat groundwater in Areas 1, Areas 2A thru 2H, 3A, 3B, 4 and 5 (Figures 5-1, 5-2 and 2). Several of these ISCO injection events are proposed over a period of 10 years to be followed by MNA, IC, and CVC.

Monitored Natural Attenuation (MNA) is a passive method that relies on natural processes to degrade the CVOCs to levels below regulatory limits. MNA is measured through a variety of sampling parameters and analysis of the existing CVOCs using the established well network. A monitoring plan is proposed through 30 years of remediation, with 5-year remedy reviews, to determine the effectiveness of MNA after the active remediation.

Institutional controls would include restrictions on land use, development, and groundwater use both onsite and offsite.

Containment via Cover would maintain the existing concrete floors within the Main and Pole Winder buildings. This addresses the soil and sub-slab vapors exceedances and reduces direct human contact to these contaminated media.

The 30-year present worth cost of Alternative 3 is estimated to be $2,653,000.

Alternative 4 – In Situ Chemical Oxidation (ISCO), In Situ Enhanced Reductive Dechlorination (ISERD), In Situ Adsorption (ISA), Monitored Natural Attenuation (MNA), Institutional Controls (IC), and Containment via Cover (CvC)

Chemical oxidation uses chemicals called “oxidants” to help change harmful contaminants into less toxic ones. It is commonly described as “in situ” as it is conducted in place, without having to excavate soil or pump groundwater for aboveground cleanup. The agent would be introduced to the groundwater through injection points. ISCO is usually used to treat soil and groundwater contamination in the source area where contaminants were originally released. There are a variety of oxidizing agents that can be used for this technology, one of which was used in a Pilot Test on this site. In this case, ISCO would be used to treat groundwater in the eastern portion of the Main Building shown in Area 1 (Figures 5-2 and 2).

In Situ Enhanced Reductive Dechlorination (ISERD) is a combination of in situ anaerobic biodegradation (ISAB) and in situ chemical reduction (ISCR). ISAB entails the addition of agents, often a carbon source, to stimulate the naturally occurring breakdown of contaminants. ISCR uses reducing agents to help change contaminants into less toxic or less mobile forms. The agents would be introduced to the groundwater through injection points. Due to site conditions, introduction of a buffer compound to help balance the groundwater pH will be necessary. The combination of these two technologies were used in a Pilot Test for this site.

In Situ Adsorption (ISA) is the use of a binder, commonly colloidal or powder activated carbon, to further reduce mobility of many CoCs. The binder is introduced into the aquifer at specific injection points, oftentimes along with other amendments to help degrade the contaminants. It can provide a matrix for microorganisms to attach to while reductively dechlorinating CVOCs. A combination of ISERD and ISA is proposed in Areas 2A thru 2H, 3A, 3B, 4 and 5 (Figures 5-1, 5-2 and 2). Several ISCO, ISERD, and ISA injection events are proposed over a period of 7 years to be followed by MNA, IC, and CVC.

Monitored Natural Attenuation (MNA) is a passive method that relies on natural processes to degrade the CVOCs to levels below regulatory limits. MNA is measured through a variety of sampling parameters and analysis of the existing CVOCs using the established well network. A monitoring plan is proposed through 30 years of remediation, with 5-year remedy reviews, to determine the effectiveness of MNA after the active remediation. Institutional controls would include restrictions on land use, development, and groundwater use both onsite and offsite.

Containment via Cover would maintain the existing concrete floors within the Main and Pole Winder buildings. This addresses the soil and sub-slab vapors exceedances and reduces direct human contact to these contaminated media.

The 30-year present worth cost of Alternative 4 is estimated to be $3,052,000.

Alternative 5 – In Situ Chemical Oxidation (ISCO), In Situ Chemical Reduction (ISCR), In-Situ Adsorption (ISA), Monitored Natural Attenuation (MNA), Institutional Controls (IC), and Containment via Cover (CvC)

Chemical oxidation uses chemicals called “oxidants” to help change harmful contaminants into less toxic ones. It is commonly described as “in situ” as it is conducted in place, without having to excavate soil or pump groundwater for aboveground cleanup. The agent would be introduced to the groundwater through injection points. ISCO is usually used to treat soil and groundwater contamination in the source area where contaminants were originally released. There are a variety of oxidizing agents that can be used for this technology, one of which was used in a Pilot Test on this site. In this case, ISCO would be used to treat groundwater in the eastern portion of the Main Building shown in Area 1 (Figures 5-1 and 2).

In Situ Chemical Reduction (ISCR) uses reducing agents to help change contaminants into less toxic or less mobile forms. A common reducing agent is zero valent iron (ZVI) and has been proposed for this alternative. The ISCR agent would be introduced to the groundwater through injection points.

In Situ Adsorption (ISA) is the use of a binder, commonly colloidal or powder activated carbon, to further reduce mobility of many CoCs. The binder is introduced into the aquifer at specific injection points, oftentimes along with other amendments to help degrade the contaminants. It can provide a matrix for microorganisms to attach to while reductively dechlorinating CVOCs. A combination of ISERD and ISA is proposed in Areas 2A thru 2H, 3A, 3B, 4 and 5 (Figures 5-1, 5-2 and 2). Two ISCO, ISCR, and ISA injection events are proposed over a period of 6 years to be followed by MNA, IC, and CvC.

Monitored Natural Attenuation (MNA) is a passive method that relies on natural processes to degrade the CVOCs to levels below regulatory limits. MNA is measured through a variety of sampling parameters and analysis of the existing CVOCs using the established well network. A monitoring plan is proposed through 30 years of remediation, with 5-year remedy reviews, to determine the effectiveness of MNA after the active remediation. Institutional controls would include restrictions on land use, development, and groundwater use both onsite and offsite.

Containment via Cover would maintain the existing concrete floors within the Main and Pole Winder buildings. This addresses the soil and sub-slab vapors exceedances and reduces direct human contact to these contaminated media.

The 30-year present worth cost of Alternative 4 is estimated to be $2,393,000.

EVALUATION OF ALTERNATIVES

The National Contingency Plan requires the Department to use specific criteria to evaluate and compare the different remediation alternatives individually and against each other to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the criteria, noting how it compares to the other options under consideration. The criteria are:

1. Overall protection of human health and the environment;
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs);
3. Long-term effectiveness and permanence;
4. Reduction of toxicity, mobility, or volume through treatment;
5. Short-term effectiveness;
6. Implementability;
7. Cost; and
8. Community acceptance.

The primary objective for the preferred remedial action is to be protective of human health and the environment and to comply with State and Federal regulations. These two objectives are considered *threshold criteria*. Threshold criteria are requirements each alternative must meet in order to be eligible for selection.

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

Community acceptance of the cleanup alternative is a *modifying criterion* that will be carefully considered by SCDES prior to final remedy selection.

COMPARATIVE ANALYSIS OF ALTERNATIVES

A comparative analysis of each alternative was performed and is illustrated in Comparison of Remedy Alternative to Evaluation Criteria Table within this document. The alternatives were evaluated in relation to one another for each of the evaluation criteria. The purpose of the analysis is to identify the relative advantages and disadvantages of each alternative.

Overall Protection of Human Health and the Environment

When evaluating alternatives in terms of overall protection of human health and the environment, consideration is given to the way site-related risks are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Alternative 1 (No Action) and Alternative 2 (MNA, IC, and CvC) do not provide adequate protection of Human Health and the Environment as they do not control or actively reduce the groundwater contamination at the Site. These alternatives are retained for comparison to active remedies. Alternative 3 (ISCO), Alternative 4 (ISCO, ISERD) and Alternative 5 (ISCO, ISCR) received a higher score for this criterion because they reduce the potential of exposure to and control down gradient migration of CoCs.

Compliance with ARARs (Applicable or Relevant and Appropriate Requirements)

This evaluation criterion evaluates whether an alternative meets federal and state environmental statutes and regulations that pertain to the site. Each alternative is evaluated with respect to its ability to comply with such requirements.

Alternative 1 does not meet regulatory limits for groundwater in an acceptable timeframe since no remediation would be conducted.
Alternatives 2 thru 5 would meet regulatory limits for groundwater in areas not under land use restrictions in various timeframes. Alternative 3 thru 5 are ranked higher due to their active remedies and treatment of the source areas.

Short-Term Effectiveness

The short-term effectiveness evaluation takes into consideration any risk the alternative poses to on-site workers, the surrounding community, or the environment during implementation, as well as the length of time needed to implement the alternative.

Alternative 1 received the lowest score, as it provides no short-term effectiveness. Alternative 2 received a low score as it will provide a small effectiveness with institutional controls, but there is no short-term reduction of CVOCs. Alternative 3 thru 5 received higher scores due to the immediate actions taken to reduce CVOCs; however, Alternatives 4 and 5 will take longer, while Alternative 3 will take the shortest time of the active remedies. Alternative 3 will require more injections, presenting more risk to on-site workers. Alternative 5 received the highest score due to the low number of injections and potentially least amount of risk to onsite workers.

Long-Term Effectiveness and Permanence

This criterion requires an evaluation of the potential long-term risks remaining after implementation of the remedy. Issues addressed for each alternative include the magnitude of long-term risks and the long-term reliability of the management controls.

Alternatives 1 and 2 are the least effective long term as these remedies do not involve any active remediation. This extends the length of time that the groundwater would remain contaminated and would not be considered effective in a realistic timeframe. These alternatives have been ranked lower.

Alternatives 3 thru 5 each have an active treatment and would provide a long-term effectiveness on the contaminated groundwater. These three alternatives rank higher due to each providing active treatment and would reach remedial goals in a shorter timeframe. Alternatives 3 and 5 would have a higher permanence ranking since a pH buffer is not needed for these treatments. Alternative 5 is ranked highest on the basis that Alternative 3 is more effective in smaller source areas, rather than entire site-wide remediation.

Reduction of Toxicity, Mobility, or Volume through Treatment (TMV)

This criterion measures the degree to which an alternative employs treatment to reduce the harmful effects of contaminants, their ability to move in the environment, and the amount of contamination present.

Alternatives 1 and 2 received the lowest ranking because these remedies would not reduce the toxicity, mobility, or volume of contamination in a timely manner. Alternatives 3 received a moderate score due to the reduction in toxicity, mobility, and volume with the types of treatment that would be implemented. Alternatives 4 and 5 received higher scores due to the addition of ISA to further reduce the mobility of remaining contamination and to provide a matrix for microorganisms to attach to while reductively dechlorinating CVOCs, thereby reducing toxicity.

Implementability

The analysis of implementability considers the technical and administrative feasibility of remedy implementation, as well as the availability of required materials and services needed.

Alternative 1 received the highest implementation score; it is easily implemented, and no changes need to be made to the Site. Alternative 2 received a moderately high score, as very few changes need to be made in order for this treatment to be implemented. Alternatives 3 and 5 have also received moderate scores, as the resources are readily available and facility owners seem ready to cooperate with institutional controls. Of the alternatives with active treatment, Alternative 4 received the lowest score due to the need for a pH buffer in the aquifer in order for the remedial technology to become effective.

Cost

The following list presents the probable cost for each alternative over a 30-year period:

Alternative 1 (No Action)	$0
Alternative 2 (MNA, IC, CvC)	$1,137,000
Alternative 3 (ISCO, MNA, IC, CvC)	$2,653,000
Alternative 4 (ISCO, ISERD, ISA, MNA, IC, CvC)	$3,052,000
Alternative 5 (ISCO, ISCR, ISA, MNA, IC, CvC)	$2,393,000

Community Acceptance

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

COMPARISON OF REMEDIAL ALTERNATIVES TO EVALUATION CRITERIA

Alternatives 1-5 are compared against each other for groundwater cleanup. The tables below rank the alternatives from 0-5 based off their effectiveness for each category with 1 being the lowest score and 5 being the highest score. The remedy with the highest total score is considered the best alternative.

Criterion	Alternative 1 No Action	Alternative 2 MNA, IC & CvC	Alternative 3 ISCO, MNA, IC & CvC	Alternative 4 ISCO, ISERD, MNA, IC & CvC	Alternative 5 ISCO, ISCR, MNA, IC & CvC
Protection Human Health and the Environment	Does not protect human health nor the environment.	ICs restrict use of land and groundwater. Human health is protected during monitoring efforts.	Treats source area contamination. Provides protection of human health and the environment throughout the remedial process.	Treats source area contamination. Provides protection of human health and the environment throughout the remedial process.	Treats source area contamination. Provides protection of human health and the environment throughout the remedial process.
	1	**3**	**4**	**4**	**4**
Compliance with ARARs	Does not comply with ARARs.	Complies with ARARs in a longer time frame in areas not under land use restrictions	Complies with ARARs in a reasonable timeframe in areas not under land use restrictions	Complies with ARARs in a reasonable timeframe in areas not under land use restrictions.	Complies with ARARs in a reasonable timeframe in areas not under land use restrictions.
	1	**2**	**3**	**3**	**3**
Short-Term Effectiveness	Do not provide short-term effectiveness.	Provides short-term effectiveness with IC, but with no active treatment on source area CVOCs	Provides short-term effectiveness with ISCO, ICs. ISCO works faster than ISERD and ISCR but will require more injections at the overall site.	Provides short-term effectiveness with ISCO, ICs. ISERD works slower than Alternatives 3 and 5.	Provides short-term effectiveness with ISCO, ICs. ISCR works slower than Alternative 3 but requires significantly fewer injections overall.
	1	**2**	**4**	**3**	**5**
Long-Term Effectiveness and Permanence	Does not provide long term effectiveness and permanence.	Provides some long-term effectiveness through monitoring and ICs.	Provides more long-term effectiveness through active treatment of source area. More effective than Alternative 4 since a pH buffer is not needed. Treatment by ISCO is irreversible.	Provides more long-term effectiveness through active treatment of source zone. Less effective than Alternatives 3 and 5 as since a pH buffer is needed. Treatment by ISCO, ISERD is irreversible.	Provides more long-term effectiveness through active treatment of source zone. More effective than Alternative 4 since a pH buffer is not needed. Treatment by ISCO, ISCR is irreversible.
	1	**2**	**3**	**3**	**4**
Reduction of toxicity, mobility, & volume through treatment	Does not actively reduce toxicity, mobility nor volume by active treatment.	Does not actively reduce toxicity, mobility nor volume by active treatment.	Reduction in toxicity and volume through ISCO treatment. Does not directly address mobility.	Reduction in toxicity and volume through ISCO, ISERD treatment. Reduction in mobility through ISA, though saprolite soils may cause some ineffectiveness.	Reduction in toxicity and volume through ISCO, ISCR treatment. Reduction in mobility through ISA, though saprolite soils may cause some ineffectiveness.
	2	**2**	**3**	**4**	**4**
Implementability	No issues to be implemented.	Resources are readily available. Facility owner appears to be amicable to ICs.	Resources are readily available. Facility owner appears to be amicable to ICs. Pilot study shows that the injections are feasible.	Resources are readily available. Facility owner appears to be amicable to ICs. Pilot study shows that the injections are feasible. A pH buffer will need to be introduced into the target aquifer.	Resources are readily available. Facility owner appears to be amicable to ICs. Pilot study shows that the injections are feasible.
	5	**4**	**4**	**3**	**4**
Costs	$0	$1,137,000	$2,653,000	$3,052,000	$2,393,000
	5	**4**	**3**	**3**	**3**
Total Score	**16**	**19**	**24**	**23**	**27**

SUMMARY OF SCDES'S PREFERRED ALTERNATIVE

SCDES has identified the preferred alternative to address the contamination at the Shakespeare Site. Community acceptance is a critical part of the final decision-making process, and the final selection could change based on input from the public. A final Remedial Design will be developed prior to implementation of the preferred remedial alternative. Alternative 5, which combines the use of in situ chemical oxidation (ISCO), in situ chemical reduction (ISCR), in situ adsorption (ISA), monitored natural attenuation (MNA), institutional controls (ICs), and containment via cover (CvC) has been chosen as SCDES's Preferred Alternative.

Alternative 5 initially begins treatment using ISCO in Area 1 and ISCR and ISA in Areas 2A thru 2 H, 3A, 3B, 4 and 5. ISCO in Area 1 would consist of a series of injection points used to inject chemical oxidant through the concrete floors and grassed surface to promote direct contact with contamination in the groundwater. ISCR and ISA would also use a series of injection points throughout the targeted areas. A chemical reductant, such as ZVI, would be injected into shallow and intermediate groundwater hot spot zones using either a geoprobe rig or a rotosonic drilling rig. Activated carbon (either colloidal or powdered) would be injected into shallow and intermediate groundwater zone hot spots in order to provide both a media to adsorb the targeted CoCs as well as provide a matrix for intrinsic microorganisms to attach to while reductively dechlorinating the target CVOCs. Only two events are planned for ISCR/ISA. Both the shallow and intermediate groundwater zones are being targeted for this treatment; deep groundwater zones and downgradient contamination are expected to reduce once the initial source area is addressed.

A Pilot Study (AECOM, May 2023) was completed in 2023 in which ISCO and to some extent ISCR (included as part of ISERD) saw initial reductions in concentrations.

Groundwater monitoring would be conducted throughout the treatment process and to monitoring post-remediation CoC concentrations at the Site to ensure the progress of the treatment. A transition to MNA would occur after the volume of source area contamination has been reduced. Institutional controls such as land and groundwater use restrictions would be implemented both onsite and offsite as part of the remedial plan. The floor of the Main Building and the Pole Winder Building will be maintained as part of the containment via cover operations.

This alternative would have a five-year review post treatment to demonstrate that cleanup goals are being achieved.

The total estimated net present worth of this alternative combination is approximately $2,393,000 over a 30-year period.

It is the judgment of SCDES that the Preferred Alternative identified in this Proposed Plan is necessary to protect public health and the environment.

USE THIS SPACE TO WRITE YOUR COMMENTS

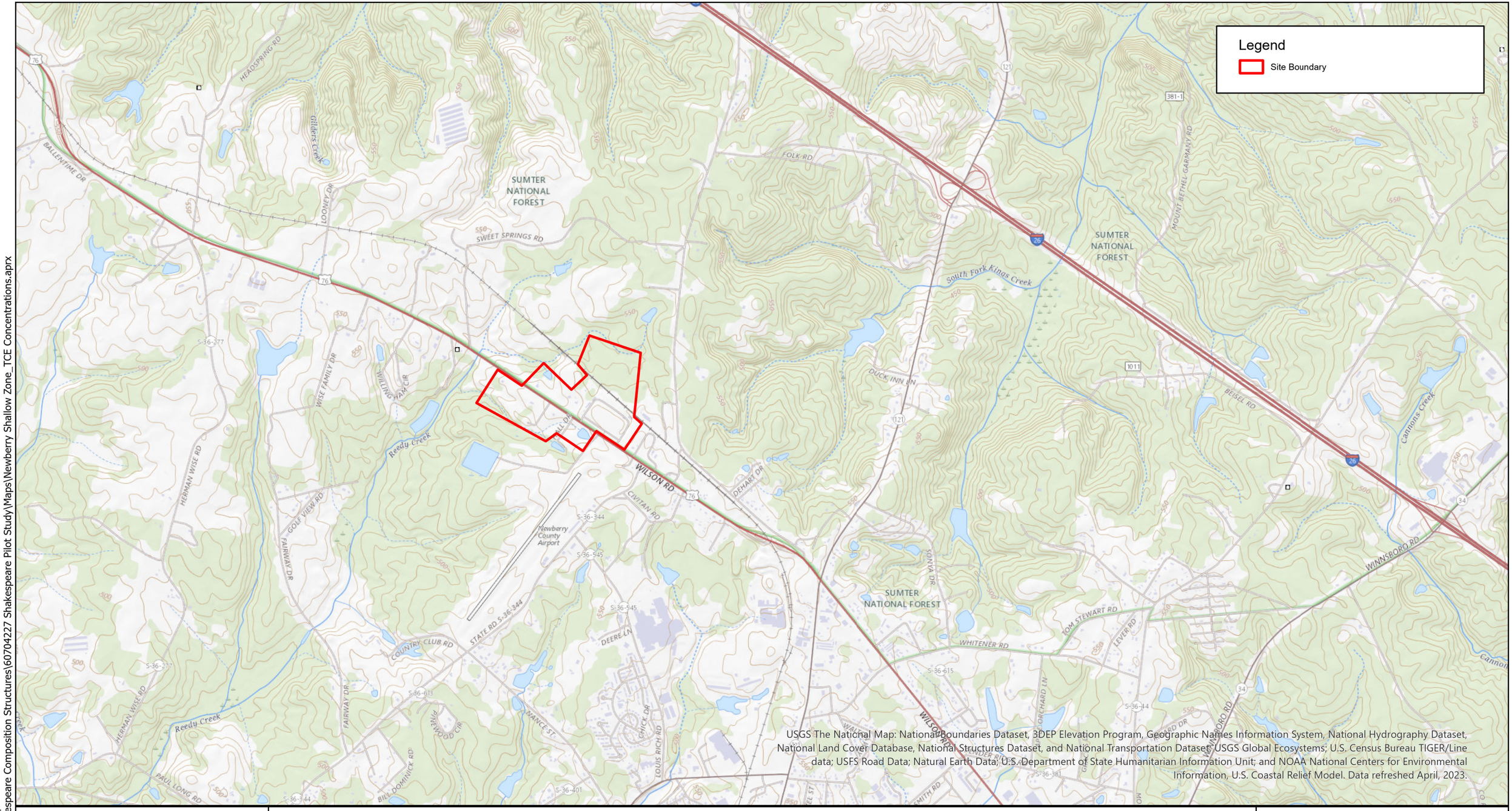
Your input on the Proposed Plan for the Former Shakespeare Composite Structures Site is important. Comments provided by the public are valuable in helping SCDES select a final cleanup remedy.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by April 14, 2025. If you have any questions, please contact Genevieve Keller-Milliken at 803-898-0722. You may also submit your questions and/or comments electronically to: genevieve.kellermilliken@des.sc.gov.

Name _____ Telephone _____

Address _____ Email _____

City _____ State _____ Zip _____



AECOM

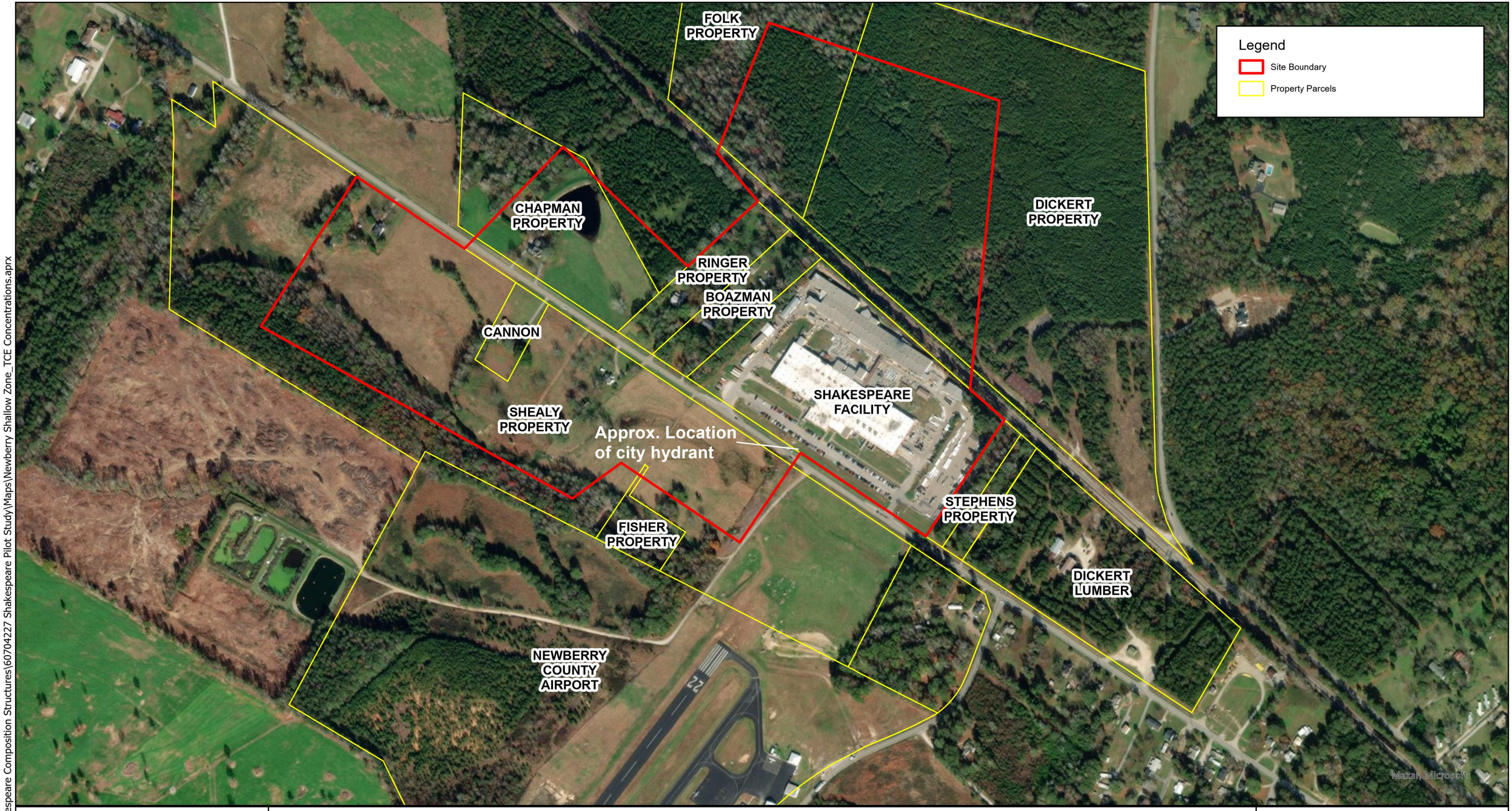
Figure 1-1
Site Location Map

Shakespeare Composite Structures
Newberry, South Carolina
Project Number: 60721186

N
W E
S

0 1,000 2,000 4,000 Feet

Name: Figure 1-1 Site Location Map
Path: L:\Legacy\Group\earth\Shakespeare Composition Structures\60704227 Shakespeare Pilot Study\Maps\Newberry Shallow Zone_TCE Concentrations.aprx



AECOM

Figure 1-2A
Site Plan

Shakespeare Composite Structures
Newberry, South Carolina
Project Number: 60721186

N
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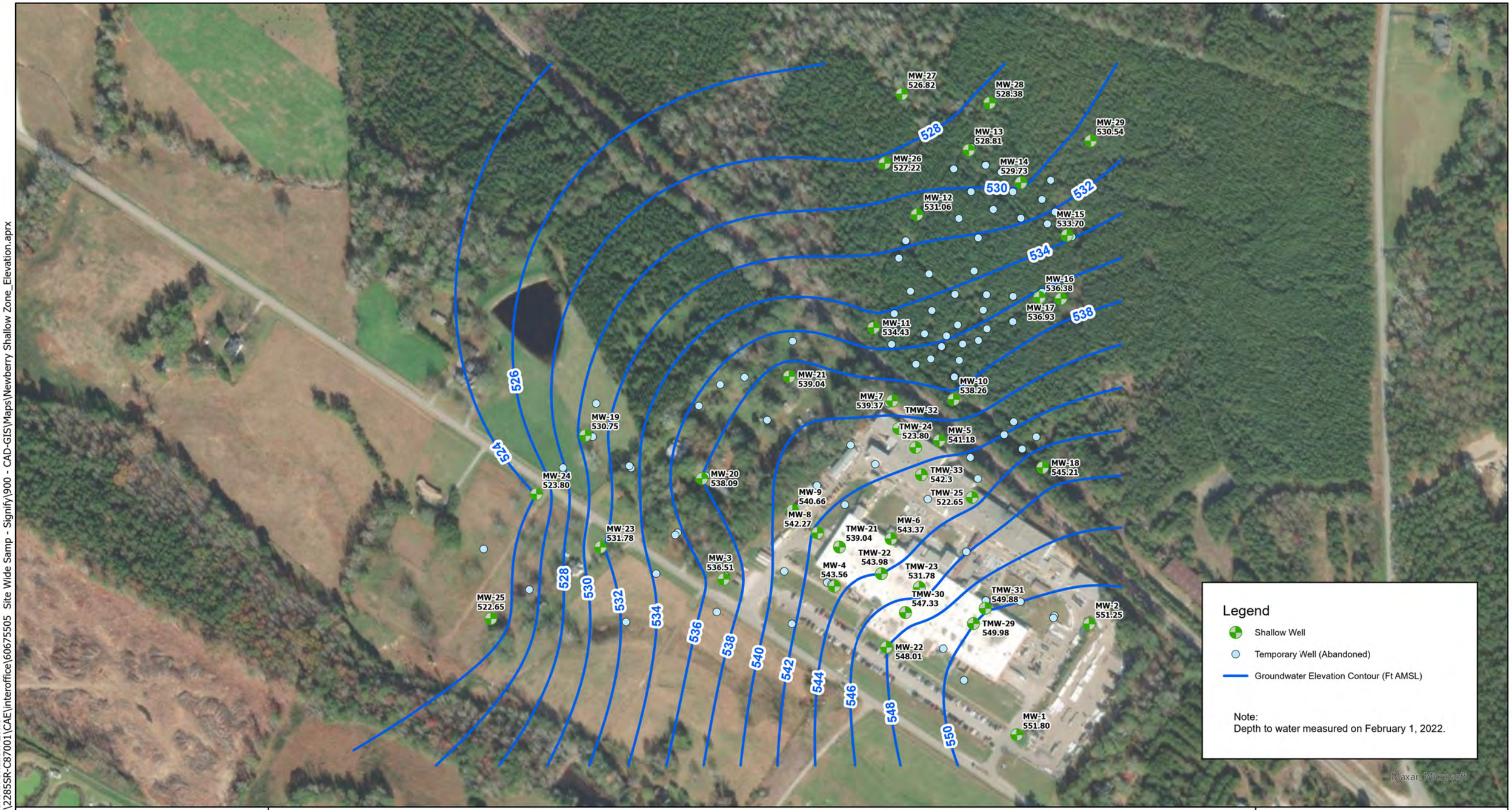
0 225 450 900 Feet

Name: Figure 1-2A Site Plan
Path: L:\Legacy\Group\earth\Shakespeare Composition Structures\60704227 Shakespeare Pilot Study\Maps\Newberry Shallow Zone_TCE Concentrations.aprx



AECOM

Figure 1-3
Wells and Elevation in Shallow Zone

Shakespeare Composition Structures
Newberry, South Carolina
Project Number: 60704227

N
W E
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0 150 300 600 Feet

Name: Figure 1-3 Wells and Elevations in Shallow Zone
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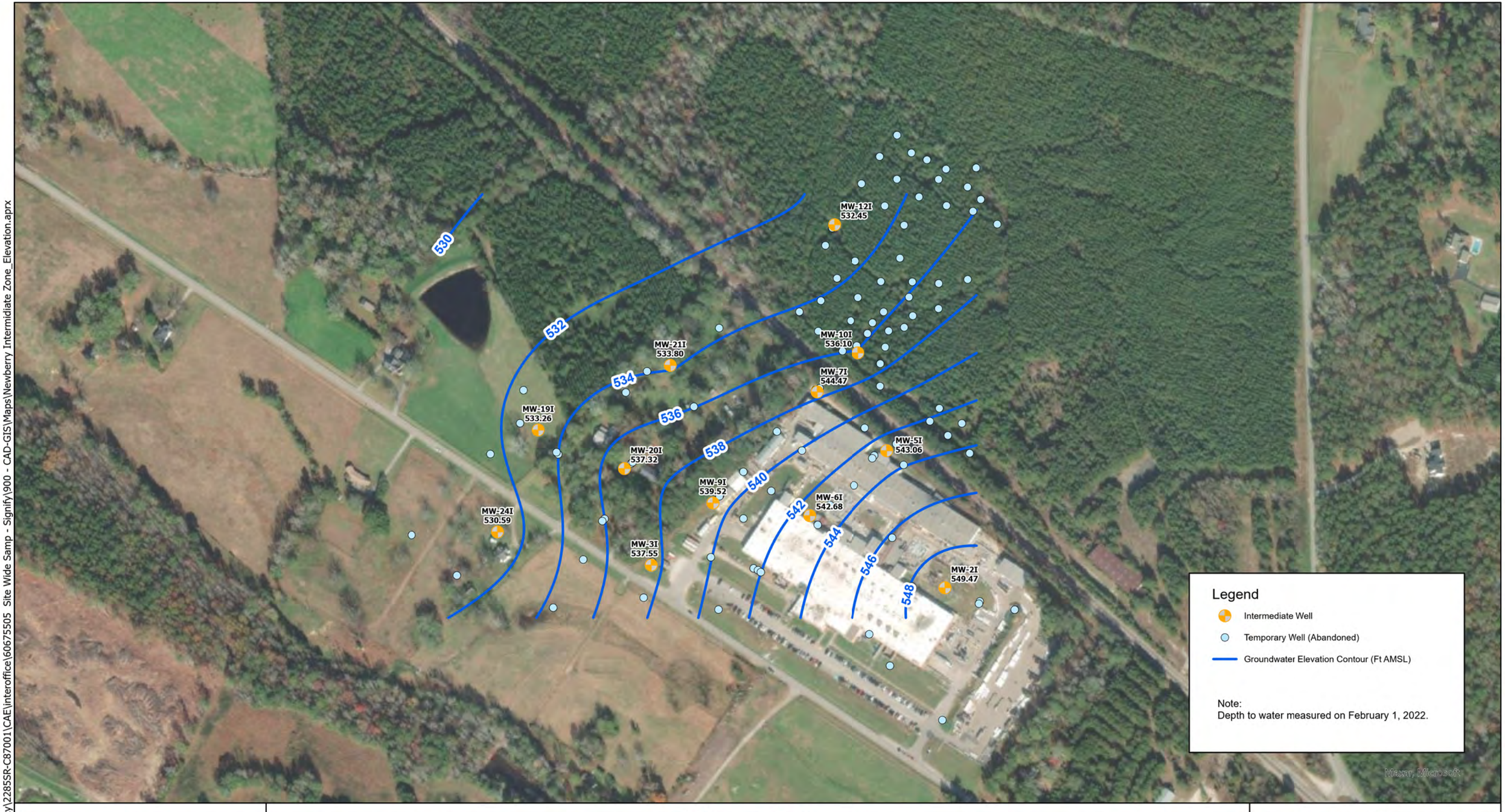

AECOM

Figure 1-4
Wells and Elevations in Intermediate Zone

Shakespeare Composition Structures
Newberry, South Carolina
Project Number: 60704227

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0 150 300 600 Feet

Name: Figure 1-4 Wells and Elevations in the Intermediate Zone
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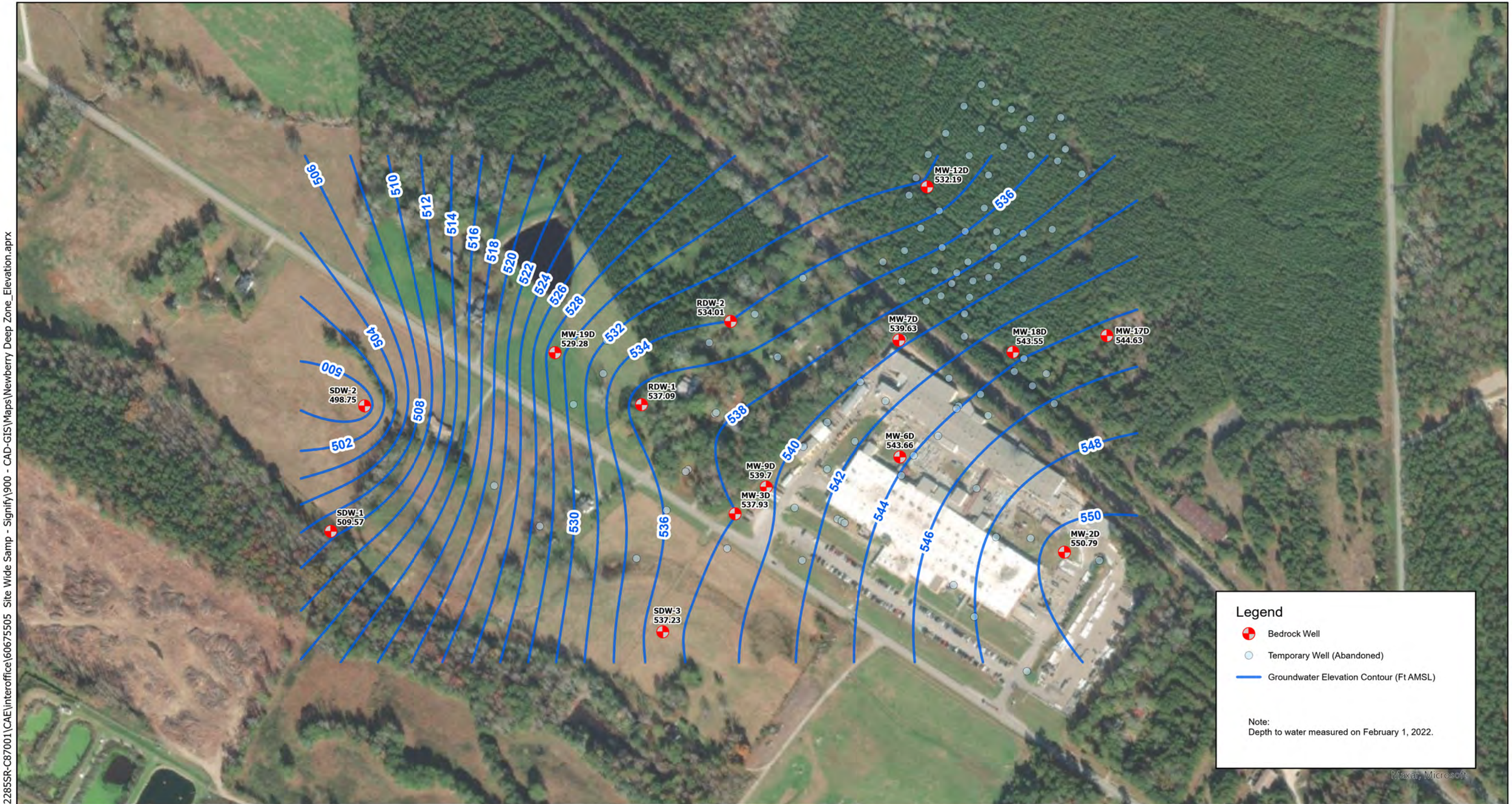

AECOM

Figure 1-5
Wells and Elevations in Bedrock Zone

Shakespeare Composition Structures
Newberry, South Carolina
Project Number: 60704227

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0 150 300 600 Feet

Name: Figure 1-5 Wells and Elevations in Bedrock Zone
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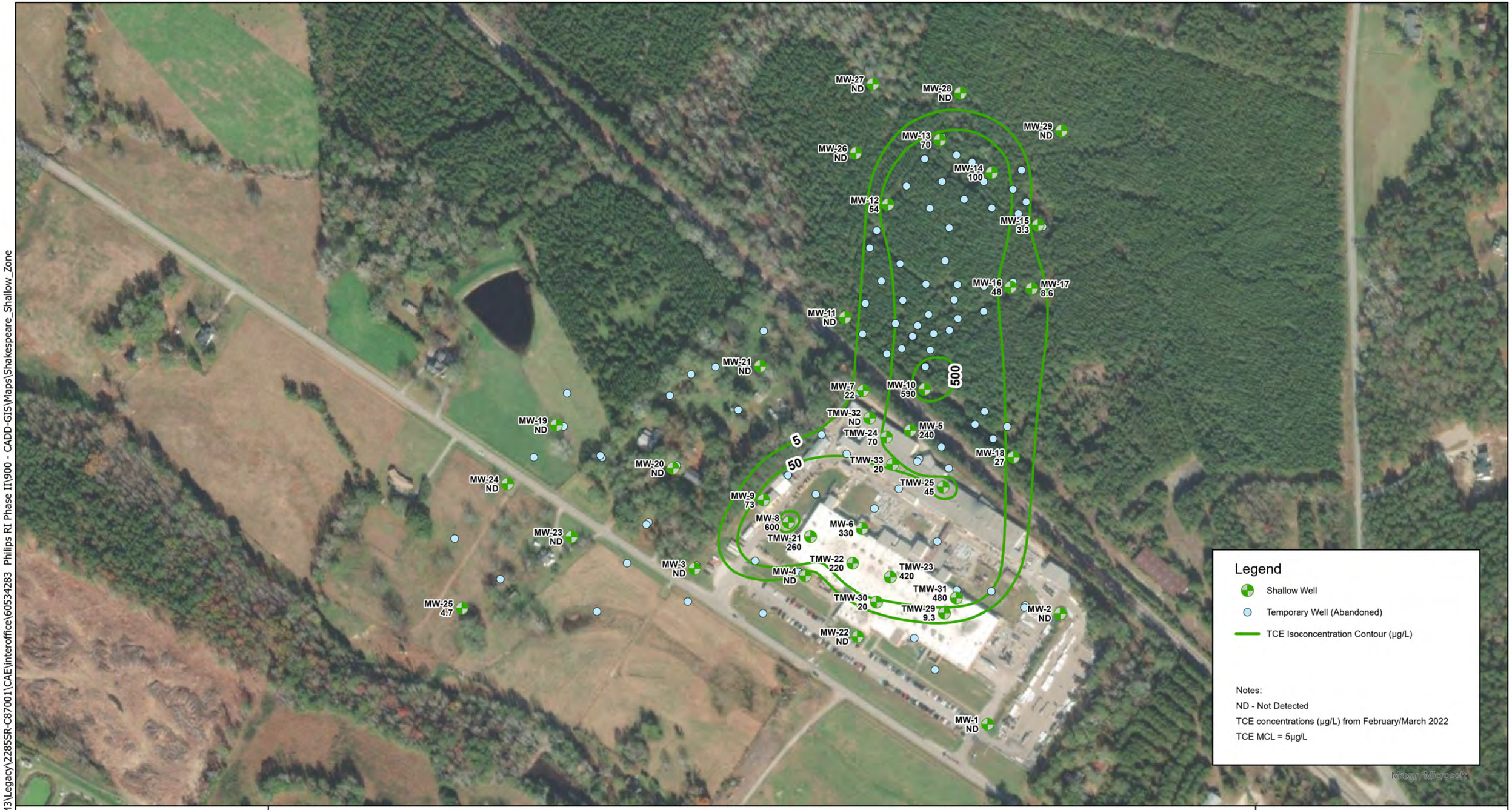

AECOM

Figure 1-6
TCE Concentrations in Shallow Zone

Shakespeare Composition Structures
Newberry, South Carolina
Project Number: 60704227

N
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0 150 300 600 Feet

Name: Figure 1-6 TCE Concentrations in Shallow Zone
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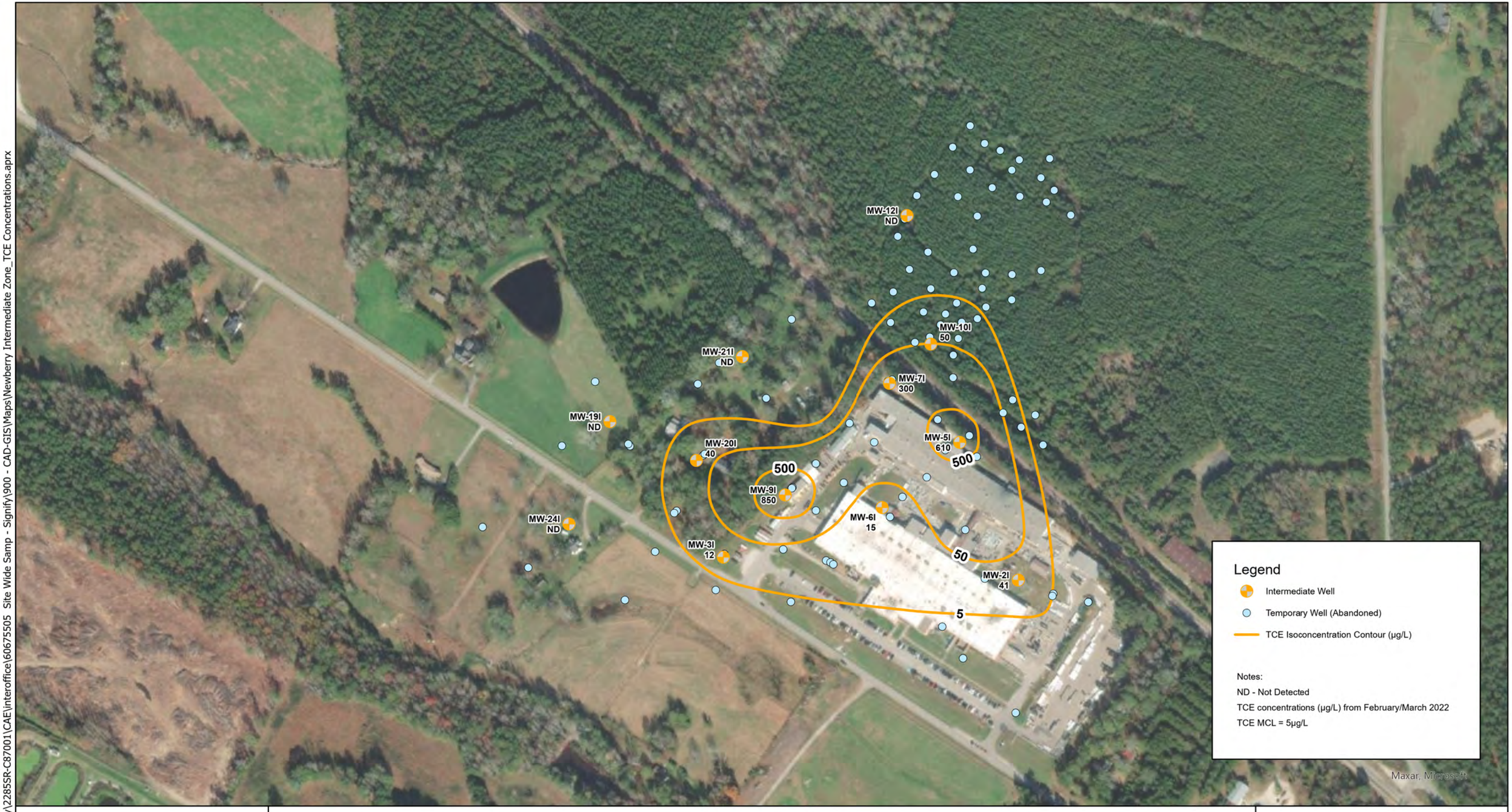

AECOM

Figure 1-7
TCE Concentrations in Intermediate Zone

Shakespeare Composition Structures
Newberry, South Carolina
Project Number: 60704227

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0 150 300 600 Feet

Name: Figure 1-7 TCE Concentrations in Intermediate Zone
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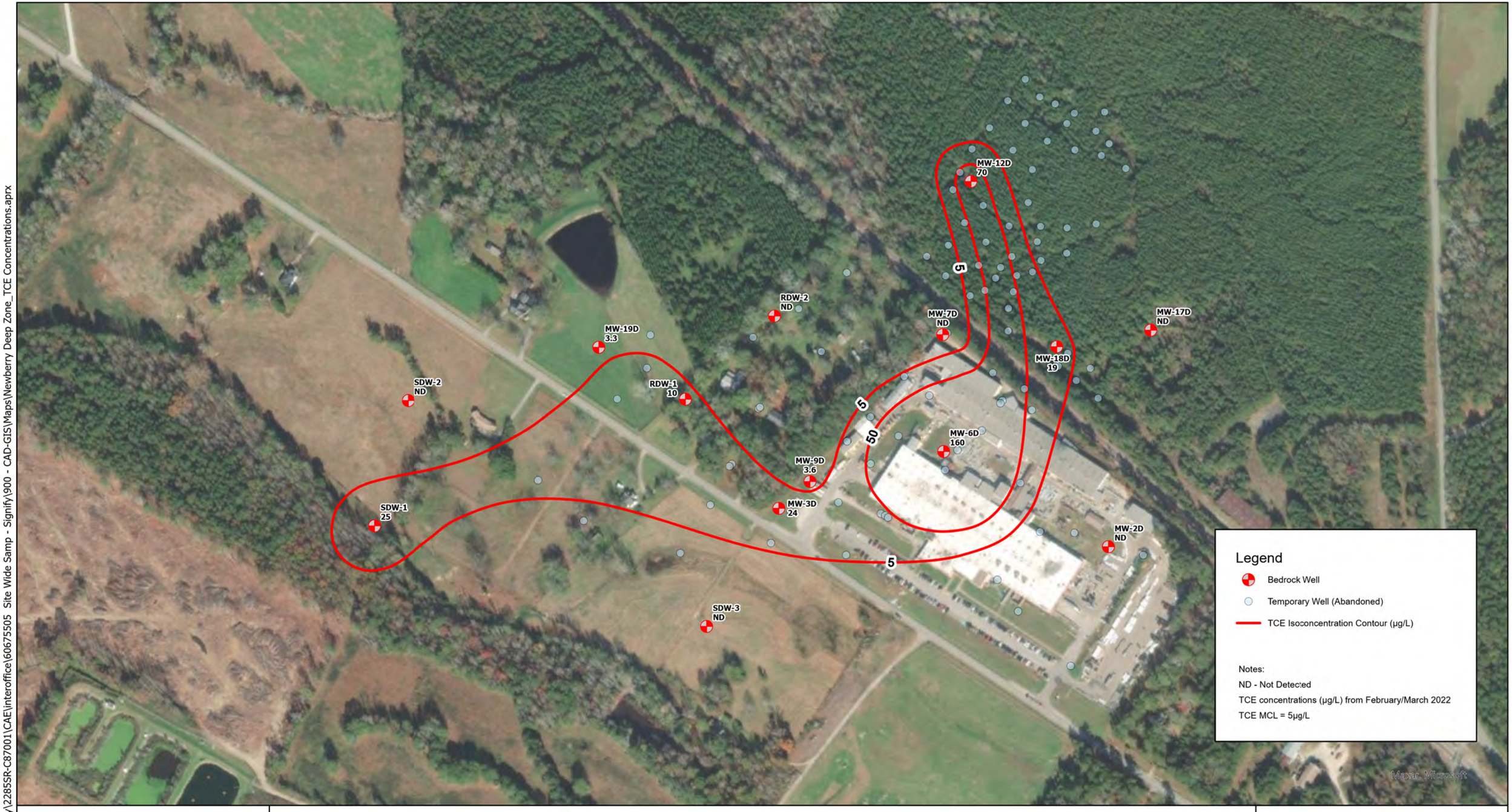

AECOM

Figure 1-8
TCE Concentrations in Bedrock Zone

Shakespeare Composition Structures
Newberry, South Carolina
Project Number: 60704227

N
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0 150 300 600 Feet

Name: Figure 1-8 TCE Concentrations in Bedrock Zone
Path: Z:\Columbia-USCLM3\Legacy\2285SR-C87001\CAE\interoffice\60675505 Site Wide Samp - Signify\900 - CAD-GIS\Maps\Newberry Deep Zone_TCE Concentrations.aprx

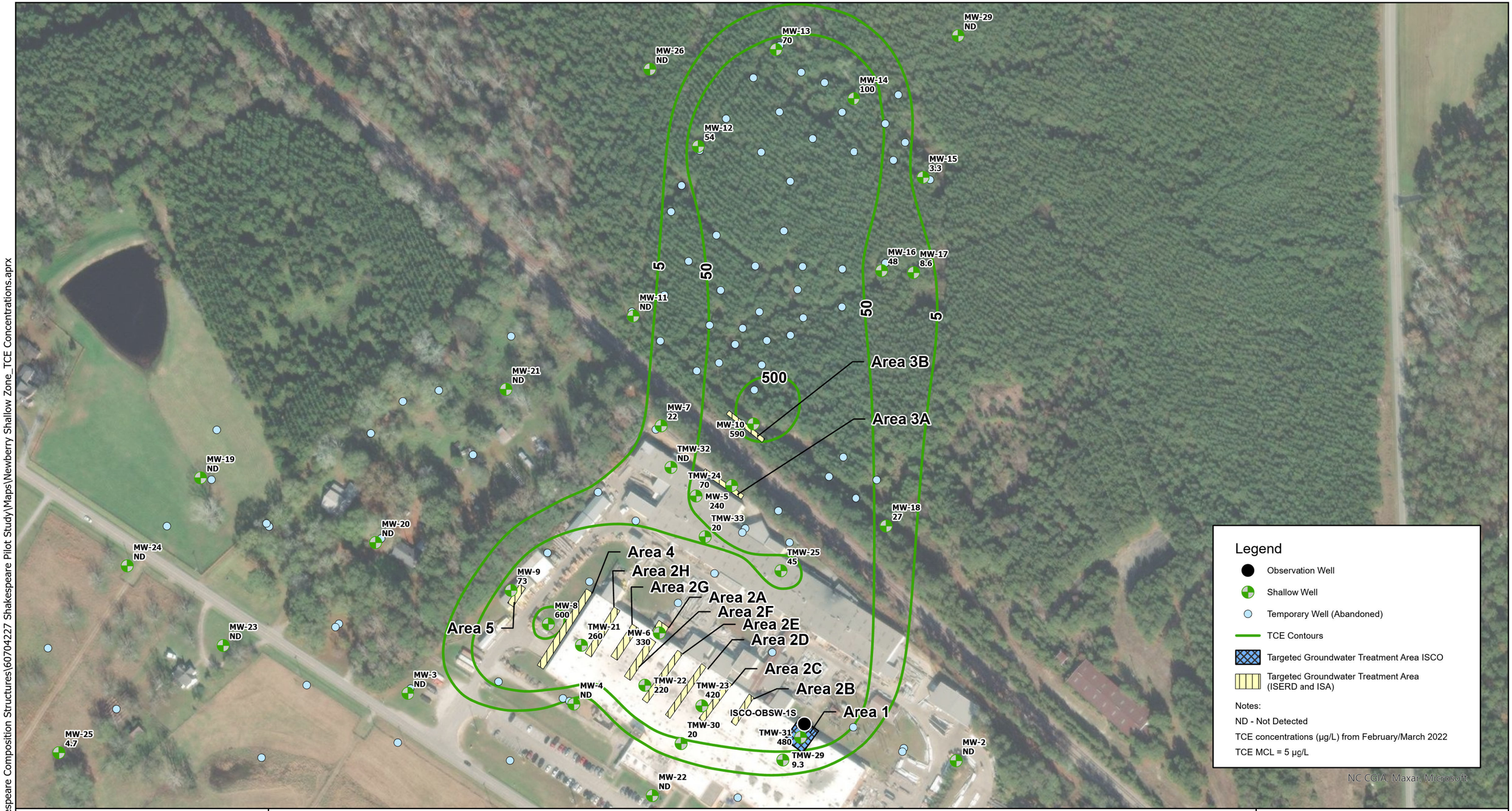

Figure 5-1
Targeted Groundwater Treatment Areas
Shallow Zone

Shakespeare Composite Structures
Newberry, South Carolina
Project Number: 60721186

N
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S

0 100 200 400 Feet

Name: Figure 5-1 Targeted Groundwater Treatment Areas - Shallow Zone
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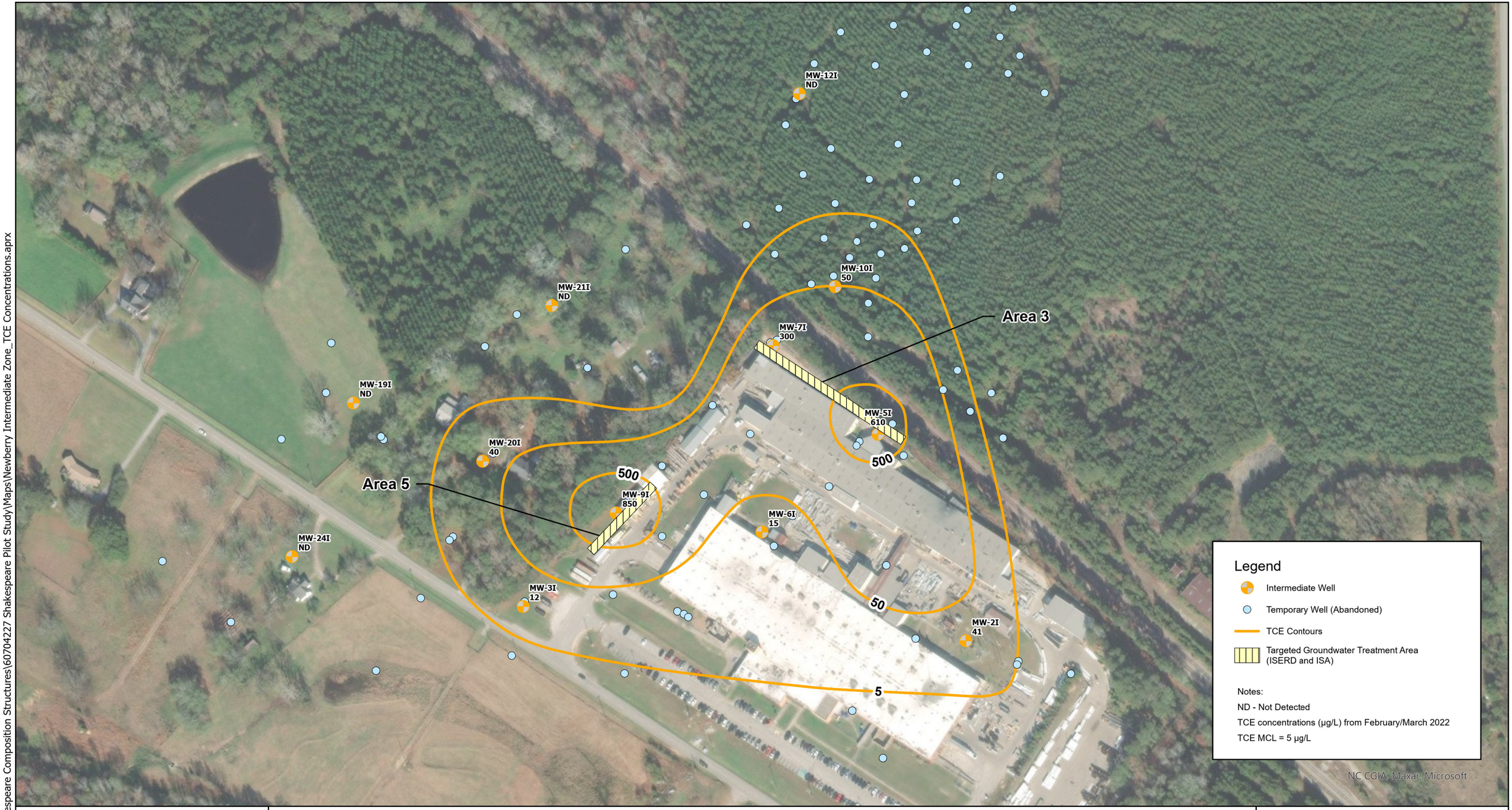

Name: Figure 5-2 Targeted Groundwater Greatment Areas - Intermediate Zone
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AECOM

Figure 5-2
Targeted Groundwater Treatment Areas
Intermediate Zone

Shakespeare Composite Structures
Newberry, South Carolina
Project Number: 60721186

N
W E
S

0 100 200 400 Feet

Area 4
(35 Points)

Area 2H
(13 Points)

Area 2G
(12 Points)

Area 2A
(4 Points)

Area 2F
(12 Points)

Area 2E
(13 Points)

Area 2D
(13 Points)

Area 2C
(11 Points)

Laboratory

Area 1
ISCO Area
(10 Points)

OBSW-1
OBSW-2
OBSW-3
OBSW-4
OBSW-5
OBSW-6
OBSW-7
OBSW-8
OBSW-9
OBSW-10
OBSW-11
ISCO-OBSW-1S

MW-4
MW-6
MW-8
MW-36
MW-37
MW-38

TMW-21
TMW-22
TMW-23
TMW-29
TMW-30
TMW-31
TMW-35

Legend

- Shallow Well
- Pilot Study Observation Well
- Actual DPT Injection Point (2021)
- Targeted Groundwater Treatment Area (ISCO)
- Targeted Groundwater Treatment Area (ISERD and ISA)
- Bollard
- Catch Basin
- Fire Hydrant
- Manhole
- Painted Electric
- Painted Sewer
- Painted Water
- Post Indicator Valve
- Underground Electrical
- Underground Sewer
- Undergroun Water
- Rock Outcrop

NC CGIA, Maxar, Microsoft

Figure 2
Pilot Study Observation Wells - Main Building for ISCO, ISERD, and ISA Remedy

Shakespeare Composite Structures
Newberry, South Carolina
Project Number: 60721186

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0 25 50 100 Feet

Name: Figure 2 Pilot Study Observation Wells_Main Bldg for ISCO ISERD and ISA Remedy_SCDES
Path: L:\Legacy\Group\earth\Shakespeare Composition Structures\60704227 Shakespeare Pilot Study\Maps\Newberry Shallow Zone_TCE Concentrations.aprx