Proposed Plan
Former Whiteman
Communications Transmitter Site
Knob Noster, Missouri

FUDS Property No. B07MO0005

DATES TO REMEMBER:

PUBLIC COMMENT PERIOD

- July 26, 2021 – August 27, 2021

USACE will accept written comments on the Proposed Plan during the public comment period. Comments should be in writing and submitted to Mr. Justin Shoemaker at the following mailing or email address:

601 East 12th Street
Kansas City, Missouri 64106
Justin.A.Shoemaker@usace.army.mil

PUBLIC MEETING

- August 10, 2021 at 6:00pm

During the public comment period, USACE will hold a public meeting to explain the Proposed Plan. Written comments will be accepted during the public meeting as well as during the public comment period. Due to safety concerns related to COVID-19, USACE will host a virtual public meeting. The Public Meeting may be rescheduled due to unforeseen circumstances.

ADMINISTRATIVE RECORD

The former Whiteman Communications Transmitter Site Information Repository is located at:

Trails Regional Library
Knob Noster Branch
202 North Adams Avenue
Knob Noster, Missouri
(660) 563-2997

1.0 INTRODUCTION

This **Proposed Plan** (PP) describes the remedial alternatives considered for the contaminated media at the former Whiteman Communications Transmitter Site (the Site) and identifies the **preferred alternative** for remediation. The **U.S. Army Corps of Engineers** (USACE) has conducted environmental activities on behalf of the Army, pursuant to the **Defense Environmental Restoration Program**. This PP was developed by USACE with support from the Missouri Department of Natural Resources (MDNR) and the U. S. Environmental Protection Agency (EPA) Region 7.

USACE, as the lead agency under the **Formerly-Used Defense Sites** (FUDS) Program, on behalf of the Department of Defense (DoD), is issuing this PP to solicit public participation as required under Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA), as amended in 1986 by the Superfund Amendments and Reauthorization Act, and Section 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan** (NCP). The public participation process, as required by CERCLA and the NCP, offers the public a reasonable opportunity to submit written or oral comments and to participate in a public meeting during the public comment period.

This PP is based on data obtained during the **Remedial Investigation** (RI) where a **plume** of **trichloroethene** (TCE) and *cis*-1,2-dichloroethene (*cis*-1,2-DCE) was identified in **groundwater** within the fractured bedrock zone in the south-central portion of the Site. The plume is delineated to the north and south. The upgradient edge of the plume is near the eastern property boundary. The downgradient leading edge of the plume is located near the southwest property boundary.

Additional information can be found in the RI Report (USACE, 2016a), the **Feasibility Study** (FS) (USACE, 2020). These documents, and other supporting documents listed in the References section on page 12, can be found in the project **Administrative Record**.

Investigations and evaluation of **remedial action** alternatives support targeted ***in-situ*** treatment of contaminated groundwater in the portion of the plume with

the highest contaminant concentrations, combined with **monitored natural attenuation** (MNA) and informational **Institutional Controls** (ICs) to notify and educate the landowner regarding the groundwater contamination to ensure protection of human health and the environment. Although the final decision will not be made until the public comment period closes, the remedy described in this PP is the preferred alternative for remediation of groundwater at the Site. USACE will make a final decision after reviewing and considering all information submitted during the public comment period. USACE may modify the preferred alternative or select another action based on new information, including comments from MDNR or from the public. Opportunities for public participation are detailed in Community Participation section on page 14 of this PP. The final remedy will be presented in a **Decision Document.**

Documents summarizing the investigations to date are contained in the Administrative Record for this Site, located at the Trails Regional Library, Knob Noster Branch, at 202 North Adams Avenue in Knob Noster, Missouri. USACE and MDNR encourage the public to review these documents to gain a more comprehensive understanding of the Site.

Figures showing the location of the Site and other details are provided in Section 13 beginning on page 12. A list of abbreviations and acronyms used in this document can be found on page 13. A glossary of terms used in the document can be found on page 14; terms defined in the glossary are depicted in bold in their first use in the text.

Site Location

The Site is located in Johnson County, Missouri, approximately 4 miles southeast of Knob Noster, Missouri, and 1 mile south of present-day Whiteman Air Force Base (Figure 1).

2.0 SITE BACKGROUND

History

The Site, previously used for agricultural purposes, was acquired by the DoD in 1953 and used as a communications transmitter site until 1975 by the 1991st Communications Squadron of the U.S. Air Force at Whiteman Air Force Base. Improvements constructed by the DoD included a road, perimeter fencing, the communications transmitter building, a gravel driveway, parking lot, a septic system, and three underground storage tanks (USTs). The Site was reported as excess to the U.S. General Services Administration in 1978. In 1979, the U.S. General Services Administration conveyed the land to a private citizen, and from 1979 to 1987 the land was reportedly used for agricultural purposes. In 1987, the land was conveyed to the present owner, who used for auto salvage from 2002 to 2008, the salvage operation has been cleaned up and it is now under the control of the present owner's heirs.

The owner initially resided in the transmitter building, and formerly used the area immediately south of the transmitter building as a vehicle salvage area. The Site is now used as a private residence and currently contains three mobile homes and a newer permanent residence with a crawl space. The transmitter building is unoccupied.

Due to the concern that polychlorinated biphenyl transformers may have been used on the site, and the knowledge that USTs had been used on the site, USACE initiated an investigation. The groundwater was found to be contaminated with volatile organic compounds (VOCs) as a result of DoD activities. No PCBs were discovered.

Site Characteristics

The Site consists of 20 acres mostly covered by vegetation. The transmitter building is located in the central portion of the Site (Figure 2). One home, three mobile homes, several smaller sheds, and one residential well that provides potable water are also on-site. A perimeter fence surrounds the Site and a small manmade pond is located in the northwestern portion.

According to the U.S. Department of Agriculture, soils at the Site are silt loams. Below these developed soils is residuum derived from the in-place weathering of the underlying bedrock. The majority of the materials found above bedrock at the Site are intermixed clay and very fine sandy to silty clay. Intervals of water loss during well drilling suggest the presence of open fractures within the bedrock, although some fractures were also noted as being filled with carbonate material. For more detailed information on the Site geology see the RI Report (USACE, 2016) in the Administrative Record.

The residuum at the site is approximately 11 to 21 feet thick and consists primarily of clay or a mixture of silty sandy clay. The underlying bedrock is representative of the Cherokee Group which consists primarily of shale with some interbedded limestone and sandstone, and stringers of coal. As observed in drilling activities, the uppermost bedrock at the Site consists primarily of shale or sandy shale, interbedded with some siltstone or claystone layers. In several borings, fractures within the bedrock were observed from a depth of 16 feet bgs, and typically extended across two to three feet. In some boreholes multiple intervals of fractures were noted. Intervals of water loss during well drilling suggest the presence of open fractures within the bedrock (Figure 3).

Shallow bedrock groundwater **monitoring well** depths range from 35 to 43 feet below ground surface (bgs), and one deep well was installed to a depth of 95 feet bgs. In May 2015, the depth to the water table in the shallow bedrock wells ranged from 10 to 16 feet bgs. Groundwater in the northwest half of the Site flows to the northwest while groundwater in central portion of the Site flows to the west-southwest, and in the southeast half of the property groundwater flows to the south and southwest (Figure 4). The groundwater flow rate at the Site is estimated to be relatively slow. For more detailed information on the Site groundwater see the RI Report (USACE, 2016) in the Administrative Record.

Groundwater samples collected at the site indicate a plume of TCE and *cis*-1,2-DCE in groundwater within the shallow fractured bedrock between 35 and 43 feet bgs in the southern portion of the site. No contaminants were detected in the deep monitoring well that was installed to a depth of 95 feet bgs. The upgradient edge of the plume is near the property boundary near MW-17 as shown on Figure 5. The downgradient edge of the plume is located near MW-14 and MW-15 as shown on Figure 5. Minimal concentrations of TCE degradation products such as *cis*-1,2-DCE and vinyl chloride, have been detected in groundwater, suggesting limited natural degradation of TCE in the subsurface.

Development of groundwater supplies in the shallow bedrock for potable water use is not likely due to the shale bedrock and poor yield. Domestic water for Site residents is supplied by a deep well that was installed in 2016. This well is approximately 555 feet deep and provides groundwater from highly productive formations within the Ozark Aquifer. The highly productive formations are separated from the shallow bedrock contamination by a shale unit that is approximately 220 feet thick at this well location.

Previous Investigations

The following studies have been conducted at the Site:

2000 MDNR Initial Site Screening

In 2000, MDNR conducted a Pre-Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Initial Site Screening. The Pre-CERCLIS Initial Site Screening determined that the Site was eligible for entry into CERCLIS, and also recommended UST removal and environmental sampling.

2003 MDNR Preliminary Assessment

In 2003, MDNR completed a Preliminary Assessment Report, which identified the presence of TCE at 6.56 **micrograms per liter** (µg/L) and 1,1-dichloroethene at 11.7 µg/L in drinking water in the original on-site residential water well (MDNR, 2003). These concentrations exceed the respective **maximum contaminant levels** (MCLs) of 5 µg/L for TCE and 7 µg/L for 1,1-dichloroethene. TCE degradation product *cis*-1,2-DCE was also detected at 6.04 µg/L, which is less than the MCL of 70 µg/L.

2003 USACE Preliminary Investigations

In 2003, USACE conducted preliminary sampling and determined that the property was eligible for remediation under the Defense Environmental Restoration Program through theFUDS program. Recommendations included sampling and analysis of the contents of the diesel UST, sampling and analysis of soils surrounding the UST, and removal of the diesel storage tank and any contaminated soil. In addition, it was also recommended that soils surrounding the fuel oil UST be tested, and that groundwater samples also be collected.

In March 2003, USACE conducted confirmation sampling of drinking water from the original on-site residential water well. Results confirmed the MDNR Preliminary Assessment Report determination that TCE and 1,1-dichloroethene were present at concentrations greater than their respective MCLs. In October 2003, USACE installed a treatment system to remove the chlorinated solvents from the drinking water. Based on the detection

of VOCs in the private drinking water well, quarterly sampling of the well water (both before and after treatment) was initiated in December 2003. No contaminants were detected in the treated water.

2005 USACE Site Inspection

In 2004 and 2005, USACE conducted a Site Inspection (SI) to determine the source of chlorinated VOCs in the residential well and confirm presence or removal of the USTs on the Site. It was confirmed that the fuel oil UST had been removed, but the diesel and fresh water USTs remained in place. Field screening and offsite analysis indicated the presence of TCE in soil and groundwater. The initial field screening analysis reported tetrachloroethene in soil; however, the presence of tetrachloroethene in soil was not confirmed by further offsite laboratory analysis.

2009 USACE Supplemental Site Inspection

USACE performed the SSI beginning in 2006 to confirm the detections of chlorinated VOCs in soil, locate potential source areas, and characterize the groundwater contamination. The SSI report was completed in 2009. TCE was the only VOC detected in soil above established screening values. Field screening tetrachloroethene soil detections from the SI were not confirmed. One round of groundwater samples was collected, and TCE was detected in all five wells at a concentration range of 2.34 µg/L to 1480 µg/L. Four of five detections exceeded the TCE MCL of 5 µg/L. TCE degradation product *cis*-1,2-DCE was detected in two wells, at concentrations of 5.1 µg/L and 8.83 µg/L, which are less than the MCL of 70 µg/L.

2007 USACE UST Removal

In 2007, USACE removed the 1,200-gallon diesel UST system. The UST was found to be intact and subsurface sampling did not indicate that the UST system leaked. A UST Closure Report documented that there was no evidence of leakage or compromise of the tank and lines. MDNR concurred with USACE's recommendation for clean closure.

2010 USACE Soil Gas Survey

In 2010, USACE preformed a soil gas survey of the property to characterize the extent of VOC contamination in soils, delineate areas of elevated soil gas anomalies for further investigation, and locate potential soil source areas. Results indicated the detection of TCE in one soil gas sample. No other chlorinated VOCs were detected and a source area for chlorinated solvents in groundwater was not identified.

2016 USACE Remedial Investigation

USACE conducted the RI in two phases, between 2012 and 2015, with reporting completed in 2016. Findings incorporated sampling conducted during the RI as well as historical data, and were as follows:

- **Soil.** In the area near and to the north of the entrance drive, TCE and its degradation products were not detected at elevated concentrations, and a possible source for TCE contamination in groundwater was not identified. No TCE or its degradation products were detected in soil samples along the northern perimeter.

  The area south of the entrance drive and south of the transmitter building is the area where the TCE plume in groundwater is located. TCE and its degradation products were not detected at elevated concentrations in soil samples collected from this area during the RI, and a possible source for TCE contamination in groundwater was not identified.

- **Groundwater.** A plume of TCE was identified in groundwater within the fractured bedrock in the south-central portion of the Site. Within the plume, TCE concentrations ranged from 0.32 J (estimated) µg/L to 840 µg/L, and exceeded the MCL of 5 µg/L in samples from four wells. Concentrations of degradation product *cis*-1,2-DCE ranged from 0.20 J µg/L to 5.2 µg/L, with all detections less than the MCL of 70 µg/L. Vinyl chloride was not detected. The plume is delineated to the north and south. The upgradient edge of the plume is near the eastern property boundary. The downgradient edge of the plume is located near the property's southwestern corner. See Figure 5 for a depiction of the TCE plume in groundwater.

  For more detailed information on the RI findings, please see the RI Report (USACE, 2016).

Risk assessment findings are found in the Summary of Site Risks section on page 10.

2016 USACE Time-Critical Removal Action

In 2016, USACE performed a Time-Critical Removal Action to provide a new water source for the property, including abandonment of the existing drinking water well and installation of a new residential drinking water supply well approximately 200 feet north of the transmitter building. USACE connected the new well to the inhabited structures on the property. The new well draws water from a depth of 475 to 555 feet bgs and is located outside the footprint of the shallow contaminated groundwater plume.

3.0 SCOPE AND ROLE OF RESPONSE ACTION

Before selecting the preferred alternative, USACE carefully considered the results of investigation conducted at the Site. The response action will be the final action for the entire Site. The objective is to prevent the potential for human exposure to TCE and *cis*-1,2-DCE in groundwater above acceptable risk levels.

4.0 SUMMARY OF SITE RISKS

As part of the RI, USACE conducted a baseline risk assessment to determine the current and future effects of contaminants on human health and the environment. The reasonably anticipated future land use for the Site and immediate vicinity is residential usage. There is a potential future use of shallow groundwater beneath the Site as a drinking water source.

Major **chemicals of concern** in groundwater beneath the Site were determined to be TCE and *cis*-1,2-dichlorothene. No chemicals of concern were identified in other media at the Site.

A Human Health Risk Assessment was performed during the RI to evaluate whether detected constituents in groundwater pose unacceptable excess lifetime cancer risks or non-cancer hazards to current and potential future human receptors. Risks and hazards were characterized for a series of receptor types. The human health risk assessment resulted in the following conclusions:

- Construction worker: The **cancer risk** was below $1x10^{-5}$ (1 in 100,000), but the total non-cancer **hazard index** (HI) was 65 primarily due to TCE in groundwater, which is above the protective threshold of 1 indicating adverse non-cancer health effects may occur.
- Current resident: Estimated risks for the current resident are hypothetical because the risks were calculated using pretreatment concentrations in the original residential well and not concentrations that represent actual exposures to residents. Estimated risks were 1×10^{-5} (1 in 100,000), for cancer and the non-cancer HI was 1 for non-cancer effects primarily due to TCE in groundwater. The calculated risk to current residents did not include vapor intrusion because the groundwater contamination plume is located south of the Site residents' homes. There is no contamination under the residential structures, and the transmitter building is currently not used for housing; it is used as storage only. The risk assessment is based on continual residential use for building occupancy; under current conditions an individual would be in the transmitter building for only sporadic use; therefore, under this exposure scenario there is no complete pathway for vapor intrusion.
- Future resident: Total risks for the hypothetical future resident were 3×10^{-3} (3 in 1,000), for cancer and the non-cancer HI was 524 for non-cancer effects. The cancer risk exceeds EPA's risk management range and the non-cancer HI exceeds the threshold of 1, indicating adverse non-cancer health effects may occur. Approximately 1×10^{-3} (1 in 1,000), of the cancer risk and 112 of the non-cancer HI were based on exposure via ingestion of TCE in groundwater. Most of the cancer risk and non-cancer hazard for the future resident is based on hypothetical future inhalation of TCE, including during domestic use and via vapor intrusion.

A Screening-Level **Ecological Risk Assessment** was performed during the RI to evaluate the likelihood that adverse ecological effects are occurring or could occur as a result of site-specific constituent concentrations in environmental media. The Screening-Level Ecological Risk Assessment concluded there was no likelihood of adverse ecological effects and no need for further investigation or remedial action since there is no potential for ecological risks.

5.0 REMEDIAL ACTION OBJECTIVES

Groundwater remediation will mitigate future potential risks. Only groundwater poses a potentially unacceptable risk to human health at the site, therefore **Remedial Action Objectives** (RAOs) were developed only for groundwater. The RAOs for groundwater are as follows, and will also address any future VI risk:

- Prevent direct human exposure to TCE in groundwater at concentrations above 5 µg/L (the Federal Safe Drinking Water Act MCL)
- Prevent direct human exposure to *cis*-1,2-DCE in groundwater at concentrations above 70 µg/L (the Federal Safe Drinking Water Act MCL)

The proposed cleanup levels were developed based on an evaluation of **Applicable or Relevant and Appropriate Requirements** (ARARs), which can be found in the FS. Federal Safe Drinking Water Act MCLs are considered to be ARARs for groundwater at this Site. The proposed cleanup levels are, therefore, equal to the MCLs for the Site chemicals of concern.

6.0 SUMMARY OF REMEDIAL ALTERNATIVES

Remedial alternatives considered for the Site are presented in this section based on the results of the FS Report (USACE, 2020). The FS process is based on a series of analytical steps that start with the RAO and a list of **general response actions** (broad classes of remedial actions that are potentially capable of achieving the RAO at the Site). The FS screened and evaluated various alternatives in detail.

Remedial Action Alternatives developed for the Site include:

- Alternative 1 – No Action
- Alternative 2 – Monitored Natural Attenuation with Institutional Controls
- Alternative 3 – In-situ Treatment by Injection, with Monitored Natural Attenuation and Institutional Controls

Alternative 1 – No Action

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $0

Alternative 1 is required by the NCP to be carried through the FS process as a baseline for comparison to other alternatives. For this alternative, no remedial action is conducted, no monitoring will be performed to observe the reduction of contaminant concentrations over time to confirm when the RAO is achieved or whether an unacceptable risk to human health exists, and there is no cost for implementation.

Alternative 2 – Monitored Natural Attenuation with Institutional Controls

Estimated Capital Cost: $172,000
Estimated Annual O&M Cost: $2,738,000
Estimated Present Worth Cost: $2,910,000

This alternative takes a passive treatment approach of MNA coupled with ICs. Actions include groundwater monitoring to track the vertical and lateral extent of the VOC plume and attenuation of the contaminants in groundwater. The alternative also includes informational devices such as periodic notifications to the landowner and educational awareness. While there is no current risk from vapor intrusion, notifications will include a statement listing the potential vapor intrusion risks for potential future structures constructed over the contaminant plume. Based on modeled natural attenuation of TCE, monitoring is assumed to continue for 240 years. Up to three additional deep and three shallow monitoring wells may be installed to monitor the attenuation of the plume, and some may be abandoned, as needed, subject to changes in the plume. The exact number of wells, well screen depths, and well locations will be determined during the pre-design investigation planning process. Landowner will be advised to consult with USACE if there is an intent for potable use of groundwater other than the current drinking water well. Based on modeled natural attenuation of TCE, monitoring is assumed to continue for 240 years, with semiannual monitoring during the first two years, to annual, to biennial, to once every five years. **Five-year reviews** of the remedy's protectiveness would be required for the duration of this alternative because this alternative does not allow for unlimited use and unrestricted exposure to the Site. USACE will provide notices and educational material to the property owners and MDNR for the duration of the

remedial action. The frequency and content of monitoring, reporting, and notifications will be described in the RD documents with coordination from MDNR in accordance to the Statewide Management Action Plan. The estimated cost for this alternative is approximately $2,910,000.

Alternative 3 – *In-Situ* Treatment by Injection, with Monitored Natural Attenuation and Institutional Controls

Estimated Capital Cost: $2,676,000
Estimated Annual O&M Cost: $4,478,000
Estimated Present Worth Cost: $7,154,000

This alternative includes *in-situ* treatment of groundwater in the portion of the plume with the highest contaminant concentrations, followed by MNA. The specific technology, including substance to be injected, for the *in-situ* treatment would be selected during the remedial design phase. Pre-design investigations would include evaluations of the vertical and lateral extent of the plume and the bedrock fracture patterns for their ability to optimize treatment. Up to three additional deep and three shallow monitoring wells may be installed to monitor the attenuation of the plume, and some may be abandoned, as needed, subject to changes in the plume. The exact number of wells, well screen depths, and well locations will be determined during the pre-design investigation planning process. These wells can also be used for monitoring cleanup progress. Potential amendments to be injected include chemical oxidizers, chemical reducers, and biostimulation amendments which will be determined during the remedial design. Injection would target the portion of the plume with highest concentrations of groundwater contamination—identified roughly as the area within the 100 µg/L contour (Figure 6). During remedial design the specific area to be targeted for injection, and the number of injection events to be performed, will be refined for highest effectiveness and cost-efficiency. Injection point spacing would depend on the observed radius of influence. Spacing between rows would depend on groundwater seepage velocity and would be selected during the remedial design phase. Performance monitoring after each injection event would provide data to evaluate treatment progress. Performance monitoring after each injection event would include quarterly monitoring for the first year and semiannual monitoring for the next three years. Monitoring for natural attenuation would follow the last round of performance monitoring and would include a smaller subset of wells sampled semiannually for four years and would progress gradually to biennial sampling, then to sampling once every five years. Groundwater monitoring would include collection of field parameters (especially dissolved oxygen and oxidation-reduction potential) and ferrous iron as well as analytical laboratory measurements for VOCs and MNA parameters. Additional monitoring wells may be installed, and some may be abandoned, as needed, subject to changes in the plume. To ensure protection of residents, the remedy will include groundwater monitoring that demonstrates that the contamination plume is not moving toward the buildings.

Under this alternative USACE will use the same ICs as previously identified in Alternative 2 (provide notices and educational material to the property owner). Based on modeled degradation of TCE following treatment, monitoring is assumed to continue for 140 years. Five-year reviews of the remedy's protectiveness would be required until groundwater remediation goals are reached. The estimated cost for this alternative is approximately $7,154,000.

7.0 EVALUATION OF ALTERNATIVES

The alternatives have been evaluated against the nine criteria, found in the NCP at 40 Code of Federal Regulations 300.430(e)(9) prior to selection of the preferred alternative. Selected alternatives must meet the first two "**threshold criteria**", including: (1) Overall Protection of Human Health and the Environment, and (2) Compliance with ARARs. Criteria 3 through 7 below are considered **primary balancing criteria** and are used to comparatively evaluate the alternatives against each other. Criteria 8 and 9 are **modifying criteria** that may modify the proposed alternative. Table 1 below provides a description of the evaluation criteria. All alternatives were evaluated against these nine criteria to select the alternative that best addresses the identified RAOs.

Table 1: Evaluation Criteria for Remedial Alternatives

Overall Protection of Human Health and the Environment Determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through removal of contaminants, containment, institutional controls, engineering controls, or treatment.

Compliance with ARARs Evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that are used to set cleanup levels for the contamination and/or determine the remedial action at the Site or whether a waiver is justified. No waivers have been identified for the Site.
Long-term Effectiveness and Permanence Considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume through Treatment Evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness Considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
Implementability Considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost Includes estimated capital and annual operation and maintenance costs, as well as **present worth** cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of ±30-50 percent.
State Acceptance Considers whether the state concurs with the lead agency's remedy selection decision.
Community Acceptance Considers whether the community agrees with the lead agency's recommendations.

1. **Overall Protection of Human Health and the Environment.** Alternatives 2 and 3 would be protective of human health and the environment by reducing contaminant concentrations to acceptable levels. Alternative 3 would achieve the RAOs more quickly than Alternative 2. Alternative 1 would not be protective of human health and the environment and was not evaluated for the remaining criteria.

2. **Compliance with ARARs.** ARARs are divided into three categories: chemical-, location-, and action-specific.

   Chemical-specific ARARs are generally health- or risk-based numerical values applied to site-specific conditions that result in establishment of cleanup levels. Alternatives 2 and 3 would comply with chemical-specific ARARs. Alternative 3 would achieve the chemical-specific ARARs more quickly than Alternative 2.

   Location-specific ARARs are restrictions or requirements placed on protected locations, including historic places, wetlands, and sensitive ecosystems or habitats. There are no location-specific ARARs for this Site.

   Action-specific ARARs are requirements triggered by a remedial action; therefore, they do not apply to Alternative 1, but do apply to Alternatives 2 and 3. Only one ARAR was considered relevant and appropriate: Missouri Code of State Regulations, 10 Code of State Regulations 23-4.060, which are relevant and appropriate to the well installation activities associated with Alternatives 2 and 3 at the Site. Alternatives 2 and 3 will both be conducted in compliance with ARARs.

3. **Long-Term Effectiveness and Permanence.** Alternative 2 would provide a good level of long-term effectiveness by using institutional controls to discourage any future development or site use that could result in a health risk to any future construction worker, current resident, or hypothetical future resident who might otherwise come in contact with groundwater. Alternative 3 would provide a very good degree of long-term effectiveness and permanence because contaminates of potential concern are permanently transformed to nontoxic end products.

4. **Reduction of Toxicity, Mobility, or Volume Through Treatment.** Alternative 2 does not include active treatment processes to decrease contamination within groundwater. Therefore, there would

be no reduction in toxicity, mobility, or volume. Alternative 3 would provide a high level of reduction in toxicity and volume through treatment of groundwater by directly degrading contaminants to nontoxic end products.

5. **Short-Term Effectiveness.** Implementing Alternatives 2 or 3 would protect on-site residents, the community, workers, and the environment during remedial action through application of industry standard safe work practices. Both Alternatives 2 and 3 involve installation of groundwater monitoring wells and long-term groundwater monitoring; however, risks to workers during these events could be minimized by personal protective equipment and health and safety protocols. ICs associated with Alternative 2 would likely be implemented in less than six months, while active remediation activities under Alternative 3 require more time to accomplish and pose greater risks during implementation.
6. **Implementability.** Alternative 2 would be the easier alternative to implement because no active remediation is required. Alternative 3 would involve two injection events, each taking approximately two months to complete. Though both Alternatives 2 and 3 require drilling for new wells and long-term groundwater monitoring; resources for drilling and monitoring are readily available.
7. **Cost.** When considering today's money for future costs, those future costs are adjusted to show the present worth of those costs, or, the net present worth. The net present worth for Alternative 2 is estimated at approximately $2,910,000. The net present worth for Alternative 3 is estimated at approximately $7,154,000.
8. **State Acceptance.** State acceptance will be evaluated after receipt of public comments.
9. **Community Acceptance.** Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be addressed in the Responsiveness Summary included with the Decision Document for the Site.

8.0 THE PREFERRED ALTERNATIVE

Based on the existing data, USACE proposes Alternative 3, *In-Situ* Treatment by Injection with Monitored Natural Attenuation and Institutional Controls as the preferred alternative. This alternative was selected because it met the threshold criteria and provides an appropriate balance among the primary balancing criteria. In addition, Alternative 3 will achieve the RAO of preventing potential exposure to Site contaminants above acceptable levels by reducing the toxicity and volume through treatment of groundwater. USACE expects the preferred alternative to satisfy the statutory requirements of CERCLA. It should be noted, though not anticipated, that Alternative 3 can change in response to public comment or new information.

Alternative 3 is practical and the only active alternative that will shorten the remedial timeframe. ICs will be in place to control exposure while remediation and natural attenuation are occurring. Monitoring of MNA parameters will be used to evaluate the effectiveness of the remedy.

9.0 COMMUNITY PARTICIPATION

USACE provides information regarding the investigation of the Site to the public through public meetings, the Administrative Record for the Site, and public notices published in the Daily Star-Journal (a local Warrensburg, Missouri paper). USACE encourages the public to gain a more comprehensive understanding of the Site and the evaluations and assessments that have been conducted.

All pertinent information on the investigation of the Site has been placed in the Administrative Record at the Knob Noster Branch of the Trails Regional Library located at 202 North Adams Avenue in Knob Noster, Missouri. Additionally, public notices for public meetings and public comment periods will be provided in the Daily Star-Journal. The dates for the public comment period; the date, location, and time of the public meeting; and the location of the Administrative Record are provided on the front page of this PP.

Public Comment Period

The public comment period begins on July 26, 2021, and ends on August 27, 2021. The purpose of the public comment period is to offer members of the public an opportunity to provide their views on this PP and the

preferred alternatives to USACE. A final decision on a remedial action will not be made until a review of all comments received during the comment period has been undertaken. After the 30-day public comment period on this PP, a Responsiveness Summary will be prepared documenting the responses to public comment. A Decision Document that includes the Responsiveness Summary and that documents the selection of the Remedial Action will be prepared, signed, and added to the Administrative Record.

As a reminder, all comments must be submitted in writing to Mr. Justin Shoemaker, either at the public meeting or afterwards, but must be postmarked by the end of the public comment period provided on the first page of this PP.

Public Meeting

Due to safety concerns related to COVID-19, USACE will host a virtual public meeting. The public meeting will be held as part of the public comment period on August 10, 2021 to provide and discuss the information in this PP. At the meeting, the public can submit written and oral comments on this PP. Substantive oral and written comments as well as USACE's responses to substantive comments will be recorded and included in the Responsiveness Summary of the Decision Document, and will be considered in the remedy selection.

Public meeting information is provided on the first page of this PP.

For further information on the former Whiteman Communications Transmitter Site, please contact:

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10.0 REFERENCES

Department of Defense, 2018, Defense Environmental Restoration Program Management: Washington, DC, Department of Defense Manual no. 4715.20, 95p.

Missouri Department of Natural Resources (MDNR), 2000, Initial Site Screening, Whiteman Communications Transmitter, Johnson County, Missouri, 0703313, B07MO0005: Jefferson City, MO, MDNR, 18p. September 18.

MDNR, 2003, Preliminary Assessment Report, Whiteman (EX) Comms Trans Site, Johnson County, Missouri, MON0007003313: Jefferson City, MO, MDNR Air and Land Protection Division, Hazardous Waste Program, 41p. February 3.

U.S. Army Corps of Engineers (USACE), 2003, Quality Control Report for Whiteman Communications Transmitter Site Preliminary Sampling, March 2003: Kansas City, MO, USACE-KCD, 2p.

USACE, 2005. Letter Report. Former Whiteman Communications Transmitter Site, Knob Noster, Missouri: Kansas City, MO, USACE-KCD, 31p. July 12.

USACE, 2009, Revised Final Supplemental Site Inspection for Former Whiteman Communications Transmitter Site, Knob Noster, Missouri, FUDS Project No. B07MO000502: Kansas City, MO, USACE-KCD, 370p. June.

USACE, 2016a, Final Remedial Investigation Report, Former Whiteman Communications Transmitter Site, Knob Noster, Missouri. FUDS Project No. B07MO000502: Kansas City, MO, USACE-KCD, 543p. July.

USACE, 2016b, Construction Completion Report, Former Whiteman Air Force Base Communication Transmitter, Installation of New Domestic Water Supply Well, Connection to Homes on the Property, and Abandonment of Existing Water Well, Knob Noster, Missouri: Kansas City, MO, prepared for USACE-KCD by Prudent Technologies Inc., var. pg. July.

USACE, 2020, Final Feasibility Study, Former Whiteman Communications Transmitter Site, Knob Noster, Missouri: Kansas City, MO, prepared for USACE-KCD by TriEco TT, 124p. April.

U.S. Environmental Protection Agency (EPA), 1986, Guidelines for Carcinogen Risk Assessment, Risk Assessment Forum: Washington, DC, Office of Research and Development, EPA/630/R-00/004, 40p. September.

EPA, 1999, A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents: Washington, DC, Office of Solid Waste and Emergency Response, EPA 540-R-98-031, OSWER 9200.1-23P, PB98-963241, 182p. July.

EPA, 2000, A Guide to Developing and Documenting Cost Estimates During the Feasibility Study: Washington, DC, Office of Emergency and Remedial Response,, EPA 540-R-00-002, OSWER 9355.0-75, 108p. July.

11.0 LIST OF ABBREVIATIONS AND ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
cis-1,2-DCE	*cis*-1,2-dichloroethene
DoD	Department of Defense
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
FUDS	Formerly Used Defense Sites
HHRA	Human Health Risk Assessment
HI	hazard index
IC	institutional control
MCL	maximum contaminant level
µg/L	microgram per liter
MDNR	Missouri Department of Natural Resources
MNA	monitored natural attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PP	Proposed Plan
RAO	remedial action objective
RI	Remedial Investigation
SI	Site Inspection
TCE	trichloroethene
USACE	U.S. Army Corps of Engineers
UST	underground storage tank
VOC	volatile organic compound

12.0 GLOSSARY OF TERMS

Administrative Record - The body of documents that forms the basis for the selection of a particular response at a site.

Applicable or Relevant and Appropriate Requirement - The federal and state environmental cleanup standards and other substantive requirements that a selected remedy will meet. These requirements may vary among sites and alternatives.

Cancer Risk - Incremental probability of an individual developing cancer over a lifetime as a result of site-related exposure to potential carcinogens. EPA's acceptable cancer risk range for site-related exposures is 1 x 10-6 to 1 x 10-4 (1 in 1,000,000 to 1 in 10,000).

Chemical of Concern - A chemical that presents an unacceptable threat to human health or the environment and requires a response action at a site.

cis-1,2-dichloroethene - A breakdown product of TCE produced by biologically-mediated reductive dechlorination.

Comprehensive Environmental Response, Compensation, and Liability Act - A federal law passed in 1980, also known as Superfund, that created a trust fund to investigate and cleanup abandoned or uncontrolled hazardous waste sites.

Decision Document - A legally binding public document that explains the cleanup alternative that will be used at a site.

Defense Environmental Restoration Program - Established by law in 1986, the Defense Environmental Restoration Program promotes and coordinates efforts for the evaluation and cleanup of contamination resulting from DoD activities at installations and Formerly Used Defense Sites (see definition below.) (10 U.S.C. 2701).

Ecological Risk Assessment - A study of the actual or potential danger to the environment from hazardous substances at a specific site. The study estimates nonhuman health risks at a site, as it exists with no response action taken.

Feasibility Study - comprehensive evaluation of potential alternatives for remediating contamination. The Feasibility Study identifies general response actions, screens potentially applicable technologies and process options, assembles alternatives, and evaluates alternatives in detail.

Five-Year Reviews - Five-year reviews are required by CERCLA or program policy when hazardous substances remain on site above levels which permit unlimited use and unrestricted exposure. Five-year reviews evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. They are performed five years following the initiation of a remedial action, and are repeated every five years so long as future uses remain restricted.

Formerly Used Defense Sites - FUDS are defined as real property that was under the jurisdiction of the Secretary of Defense and owned by, leased by, or otherwise possessed by the United States. It also includes real properties where accountability rested with DoD but where the activities at the property were conducted by contractors. The FUDS program was established by Section 211 of the Superfund Amendments and Reauthorization Act (SARA) of 1986 by establishing the Defense Environmental Restoration Program . A property must have been transferred from DoD control prior to October 17, 1986 to be addressed under the Defense Environmental Restoration Program as a FUDS.

General Response Actions - Broad classes of remedial actions potentially capable of achieving RAOs at a site.

Groundwater - Underground water that fills pores in soil or openings in soil or rock to the point of saturation. Groundwater is often used as a source of drinking water via municipal or domestic wells.

Hazard Index - A measure of the adverse health effects associated with exposure to chemicals that are not known to cause cancer. A Hazard Index of 1.0 or less is considered highly unlikely to cause non-cancer adverse effects even if exposure continues for a lifetime.

In-situ – *In-situ* means in place, and it refers to where remediation or testing is performed. As opposed to *ex-situ* where contaminated soil or groundwater is removed for treatment or testing.

Institutional Controls - Non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Institutional controls play an important role in site remedies because they reduce exposure to contamination by limiting land or resource use and guide human behavior. Institutional controls are used when cleanups are ongoing and when residual contamination remains on site at a level that does not allow for unlimited use and unrestricted exposure after cleanup.

Maximum Contaminant Level - MCLs are standards that are set by the EPA for drinking water quality. An MCL is the legal threshold limit on the amount of a substance that is allowed in public water systems under the Safe Drinking Water Act. The limit is usually expressed as a concentration in milligrams or micrograms per liter of water.

Microgram per Liter - Unit of concentration corresponding to one microgram per liter of liquid or approximately one part per billion. Note that one microgram is equal to one millionth of a gram or 3.5 x 10-8 ounces.

Modifying Criteria - The last two of the nine CERCLA criteria used to evaluate remedial alternatives, namely state and community acceptance.

Monitored Natural Attenuation - The reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods.

Monitoring Well - A groundwater well installed for measuring the water-table elevations, collecting groundwater samples for detection of contaminants, and observing contaminant movement.

National Oil and Hazardous Substances Pollution Contingency Plan - Federal regulations specifying the methods and criteria for cleaning up sites under CERCLA, codified at 40 Code of Federal Regulations Part 300.

Plume - Refers to an area that has been impacted by a contaminant source. Frequently an elongated and mobile volume representing the extent of contaminated groundwater.

Preferred Alternative - The cleanup approach proposed by the lead agency based on the information contained in the FS. The preferred alternative is presented in this PP and subject to change and/or revision based on public comment.

Present Worth - The amount of money that would need to be invested today to fund a stream of expenditures at given points in time. O&M expenses are often calculated for their present worth, in order to compare different alternatives. Present worth is not just an addition of the yearly costs, but takes into account interest rates.

Primary Balancing Criteria - Five of the nine CERCLA criteria used to further evaluate remedial alternatives. They are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost.

Proposed Plan - A document that summarizes key information about the site, presents the preferred remedial action, and provides the rationale for the preferred action. The Proposed Plan is provided to solicit public review and comment on the preferred remedial action.

Remedial Action - The course of action taken at a CERCLA site to eliminate or reduce site contamination and protect human health and the environment.

Remedial Action Objectives - Statements describing the goals to be achieved in protecting human health and the environment.

Remedial Investigation - The first part of a two-part study that determines how much and what kind of contamination exists at a site. An RI generally involves collecting and analyzing samples of groundwater, surface water, soil, sediment, and air. The second part of the study is an FS.

Threshold Criteria - The first two of the nine CERCLA criteria: (1) overall protection of human health and the environment and (2) compliance with ARARs.

Trichloroethene - Trichloroethene is a VOC mainly used as a metal degreaser, but can also be used in paint remover and adhesives.

U.S. Army Corps of Engineers – U.S. Army Corps of Engineers, Northwest Division, Kansas City District.

Vapor Intrusion Pathway - The pathway by which volatile chemicals are released from contaminated soil or groundwater, migrate upwards, enter a building and potentially impact the quality of the indoor air.

Volatile Organic Compound - A group of organic compounds that tend to change from liquids to gas easily.

13.0 FIGURES

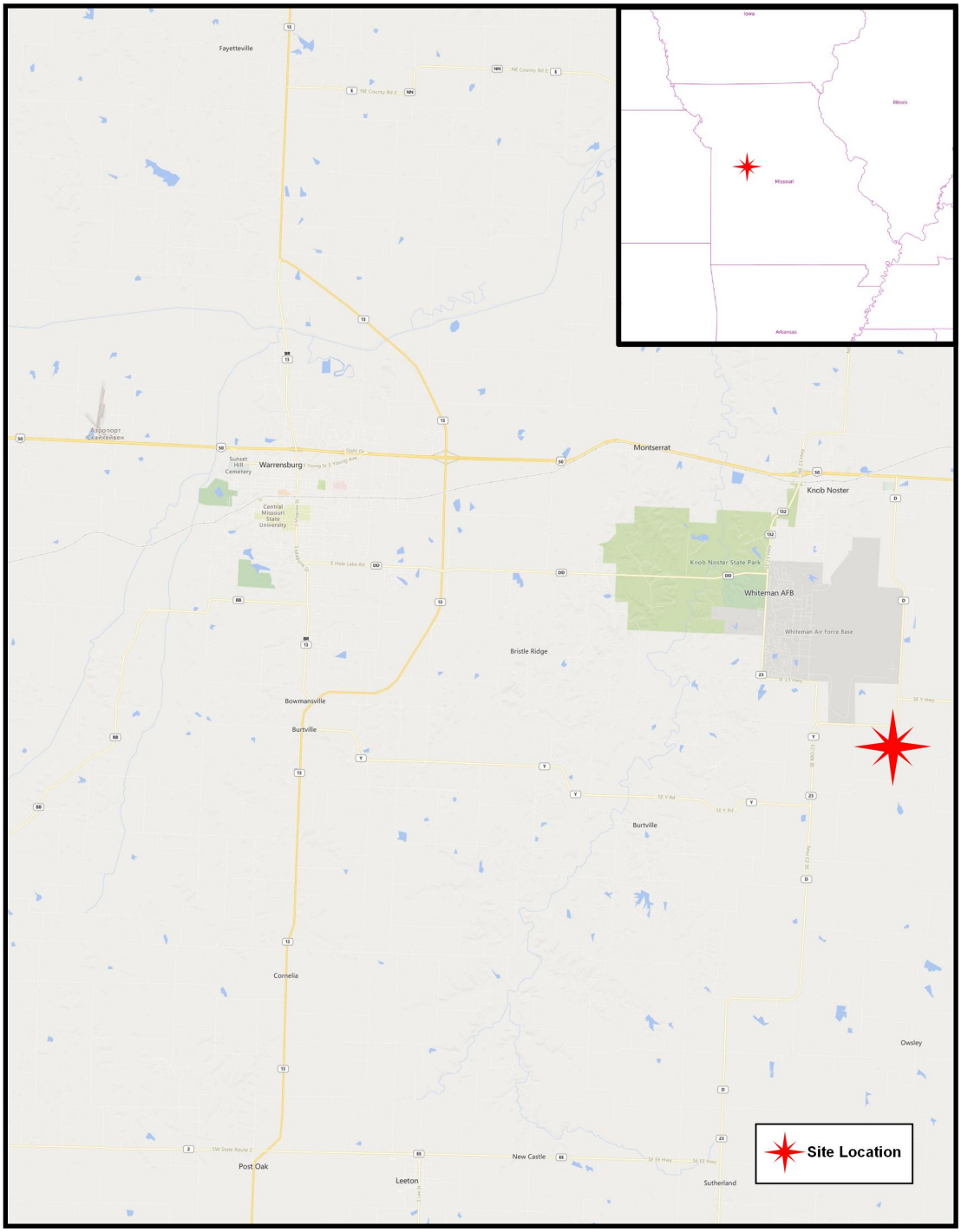

FIGURE 1 – SITE LOCATION

FIGURE 2 – SITE LAYOUT

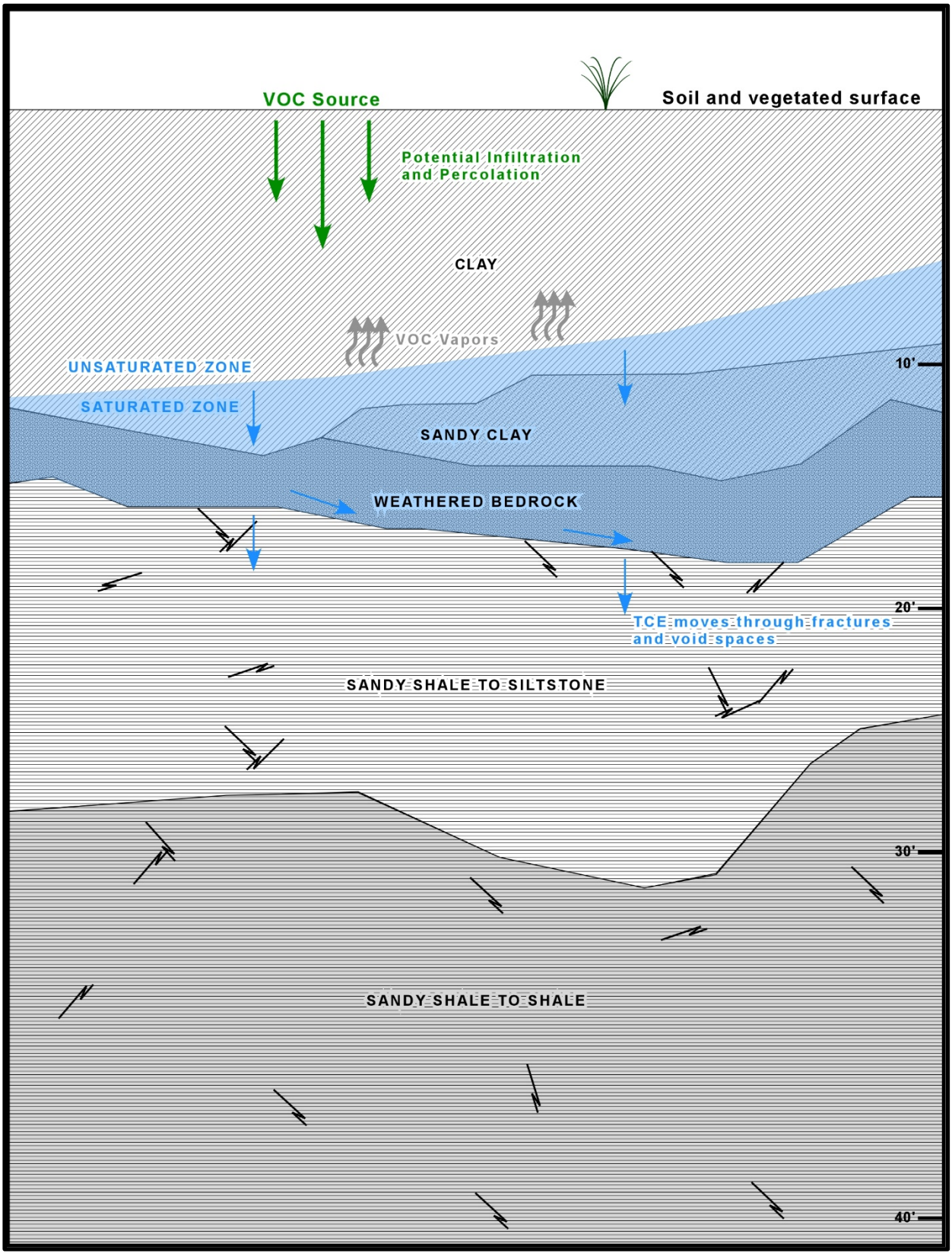

FIGURE 3 – GENERAL SITE CROSS-SECTION

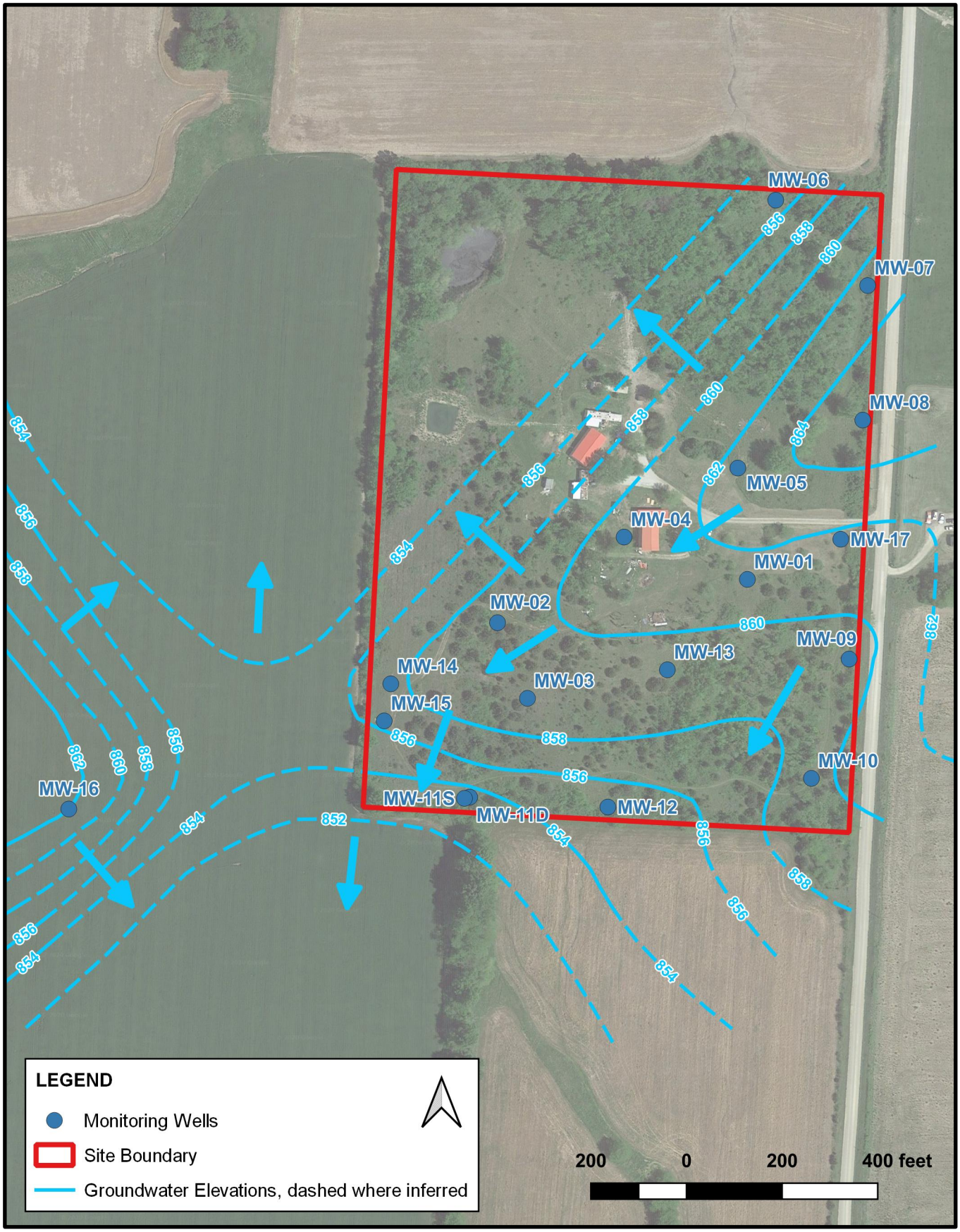

FIGURE 4 – GROUNDWATER FLOW

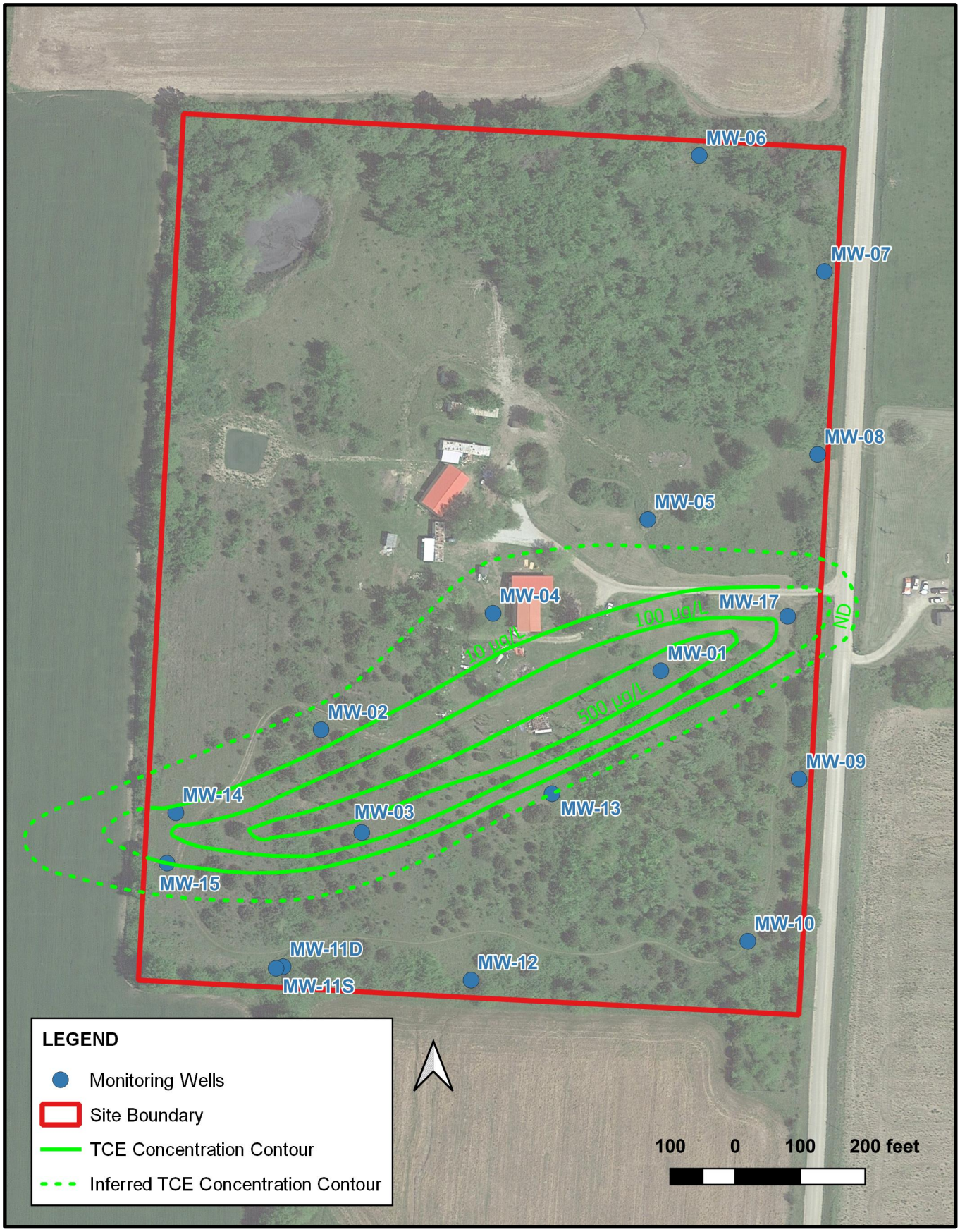

FIGURE 5 – GROUNDWATER PLUME

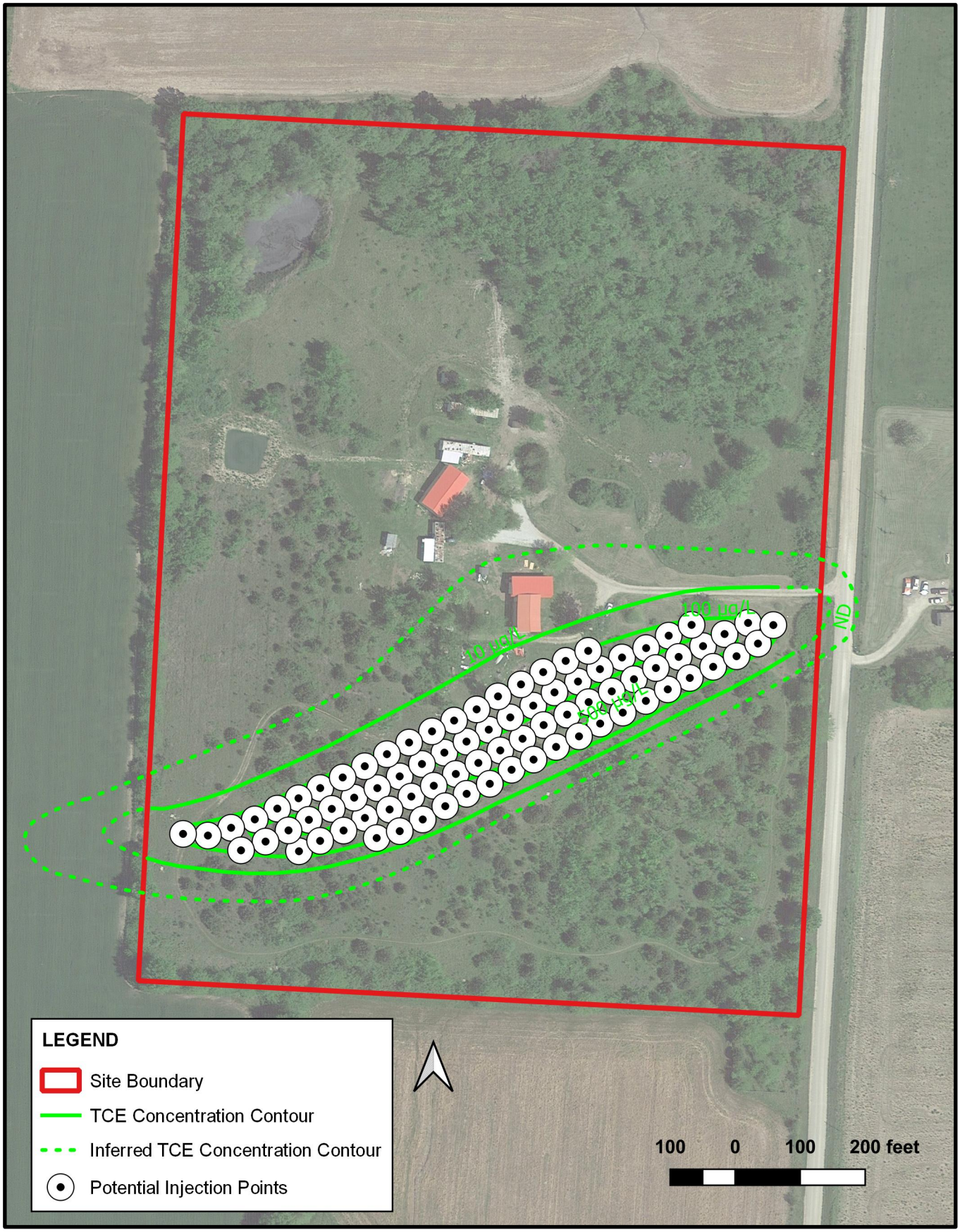

FIGURE 6 – POTENTIAL INJECTION POINTS

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for the former Whiteman Communications Transmitter Site is important to USACE. Comments provided by the public are valuable in helping USACE select a final remedy for the Site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by **August 27, 2021**. If you have questions about the comment period, please contact Justin Shoemaker, Project Manager, at (816) 389-3033. Those with access to email may submit their comments to USACE at the following address: Justin.A.Shoemaker@usace.army.mil

Name:_____

Address:_____

City:_____

State:_____ Zip: _____