REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORK PLAN

for the

American Thermostat Site
South Cairo, Town of Catskill, New York

Contract No. W912DQ-21-D-3007
Task Order No. W912DQ23F3020

FINAL

Prepared for:
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REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORK PLAN

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LIST OF ACRONYMS

ACM	Asbestos Containing Material
ANSETS	Analytical Services Tracking System
APP	Accident Prevention Plan
ARAR	Applicable or Relevant and Appropriate Requirements
ARF	Analytical Request Form
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
CIP	Community Involvement Plan
CLP	Contract Laboratory Program
COC	Contaminant of Concern
COD	Chemical Oxygen Demand
CQCP	Contractor Quality Control Plan
CSM	Conceptual Site Model
DCE	Dichloroethene
DO	Dissolved Oxygen
DOD	United States Department of Defense
DPT	Direct Push Technology
DQO	Data Quality Objectives
EBASCO	Electric Bond and Share Company
EC	Electron Capture
EDD	Electronic Data Deliverable
EM	Electromagnetic
EPA	United States Environmental Protection Agency
ESAT	Environmental Services Assistance Team
FAR	Federal Acquisition Regulation
FASTAC	Field and Analytical Services Technical Advisory Committee
FID	Flame Ionization Detector
FOL	Field Operations Lead
FS	Feasibility Study
FSP	Field Sampling Plan
ft.	feet
GAC	Granular Activated Carbon
gpd/ft^2	gallons per day per square foot
gpm	gallons per minute
GPR	Ground-Penetrating Radar
GWETS	Groundwater Extraction and Treatment System
HHRA	Human Health Risk Assessment
IDW	Investigation Derived Waste

LIST OF ACRONYMS (cont'd)

ISCO	In-Situ Chemical Oxidation
ISCR	In-Situ Chemical Reduction
ITR	Independent Technical Review
LSASD	Laboratory Services and Applied Sciences Division
MCL	Maximum Contaminant Level
mg/kg	milligram per kilogram
mg/L	milligram per liter
MiHPT	Membrane Interface Hydraulic Profiling Tool
msl	mean sea level
NAD	North American Datum
NAVD	North American Vertical Datum
NOB	Non-friable Organically Bound
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOL	New York State Department of Labor
ORP	Oxidation-Reduction Potential
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PFAS	Per- & Polyfluoroalkyl Substances
PHSM	Program Health and Safety Manager
PID	Photoionization Detector
PLM	Polarized Light Microscopy
PM	Project Manager
POET	Point of Entry Treatment
ppb	parts per billion
PPE	Personal Protective Equipment
psi	pounds per square inch
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RAGS	Risk Assessment Guidance for Superfund
RAO	Remedial Action Objective
RAS	Routine Analytical Services
RI	Remedial Investigation
ROD	Record of Decision
RSCC	Regional Sample Control Center

LIST OF ACRONYMS (cont'd)

SAS	Specific Analytical Services
SMO	Sample management Office
SOP	Standard Operating Procedure
SOW	Scope of Work
SSHP	Site Safety and Health Plan
STR	Sample Trip Report
SVI	Soil Vapor Intrusion
TCE	Trichloroethene
TCL	Target Compound List
Tetra Tech	Tetra Tech, Inc.
TO	Task Order
UFP	Uniform Federal Policy
µg/L	micrograms per liter
USACE	United States Army Corps of Engineers
USCS	United Soil Classification System
USDA	United States Department of Agriculture
VC	Vinyl Chloride
VOC	Volatile Organic Compound
XSD	Halogen Specific

EXECUTIVE SUMMARY

This Executive Summary provides an introduction to, and an overview of, the Remedial Investigation and Feasibility Study Work Plan (RI/FS WP) prepared under Task Order W912DQ23R3012 issued by the Kansas City District of the United States Army Corps of Engineers (USACE) under Contract Number W912DQ-21-D-3007 for a Remedial Investigation and Feasibility Study (RI/FS) at the American Thermostat Site, Site ID NYD002066330 (the Site). The Site, a former assembly plant, is located in a rural residential area in the Town of Catskill, Greene County, New York. There are two buildings located on-Site; one building is the unoccupied former assembly building, the other building houses a groundwater extraction and treatment system for the Site and is also unoccupied except during routine maintenance and sampling activities.

During the 1960's and 1970's, waste trichloroethene (TCE) and tetrachloroethene (PCE) sludge were poured down drains inside the American Thermostat building and dumped outside on the plant grounds for dust control. In March 1981, two American Thermostat employees were observed dumping solvents on plant property.

American Thermostat was placed on the United States Environmental Protection Agency's (EPA's) National Priorities List (NPL) on September 8, 1983, resulting in Site cleanup being broken into two separate operable units (OU):

- OU-1 – provision of an alternate water supply via connection to the municipal water supply
- OU-2 – A final remedy to address sitewide contaminated groundwater, including the associated off-Site groundwater plume and contaminated soil.

Following the EPA NPL listing, the property owner, Amro Realty Corporation, set to clean up the property and its surroundings; provide, monitor, and maintain carbon filtration systems for the affected private wells, and supply bottled water for consumption by the affected residents. However, when the company went out of business in 1985, it stopped providing bottled water and abandoned the maintenance of the carbon filtration systems at the affected homes. New York State (State) requested that EPA sample other private wells near the site; provide bottled water and carbon filtration systems where necessary and take over the maintenance of the water treatment systems at the originally affected homes. In addition to undertaking the work requested by the State, EPA also installed three air stripping systems at the facility. Air stripping involves pumping contaminated ground water into a pressurized vessel and then forcing a high-pressure stream of air through the ground water, causing the pollutants to evaporate.

The EBASCO Remediation Investigation Report (1989) discussed the nature and extent of contamination, identifying the primary chemicals of concern (COCs) at the Site as trichloroethene, chloroform, 1,2-dichloroethane, 1,1-dichloroethene, methylene chloride, 1,1,2,2-tetrachloroethane, vinyl chloride, arsenic, vinyl chloride, lead, chromium, and cadmium. In 1988, EPA signed a Record of Decision (ROD) calling for a clean water supply for residents near the Site. A system of seven extraction and reinjection wells and a soil vacuum extraction system were installed at the site in 1989 for the purpose of accelerating the treatment of the ground water. The ROD also called for extending the existing Catskill water district pipeline to the affected and potentially affected areas. The construction of the water pipeline was completed in 1992.

Additional actions according to the ROD included decontamination of the building located on the site, thermal treatment of the contaminated soil and air stripping and carbon adsorption for the treatment of the contaminated ground water. Carbon adsorption is a treatment system that removes contaminants by forcing water through tanks containing carbon, which attracts and retains contaminants. The decontamination of the building was completed in 1992, the soil cleanup was completed in 1996 and the construction of the groundwater extraction and treatment system (GWETS) was completed in 1998 to ensure protection of groundwater from site contaminants in soil, restore groundwater to drinking water standards, and reduce risk to human health and environment. In 2008, following 10 years of site management by EPA, the Site was transferred to the New York State Department of Environmental Conservation (NYSDEC).

Under Superfund, EPA conducts reviews every five years to ensure that the implemented clean up remedies at sites are functioning as intended and continue to be protective of human health and the environment. The 2019 five-year review concluded that a protectiveness determination could not be made until additional information is obtained. Specifically, "reconfirmation that the south south-west portion of the bedrock plume is contained by the GWETS is needed, a determination as to whether the groundwater contaminant plume is impacting the creek's surface water and/or sediments needs to be made, and because of increased groundwater contaminant concentrations in the vicinity of the residence with an SVI issue in the past, this residence should be reevaluated to assess if additional actions are needed to mitigate exposure via SVI". It should be noted that obtaining this additional information is not part of the scope of this task order and will be done by others.

Some residual source material has been identified, and the additional residual source material is believed to be affecting the efficiency of the extraction and treatment system. A remedial investigation to identify the extent of the residual source material and an FS to identify and evaluate measures to address the residual source material are needed.

Upon EPA and USACE approval of the final RI/FS WP, work will begin as laid out to implement the activities described in this RI/FS WP. It is anticipated that the RI field work will be conducted with approximately six field mobilizations: one for asbestos containing material (ACM) survey of parts of the former assembly building, one for high resolution site characterization of the overburden, one for groundwater profiling of the overburden, one for focused soil sampling/collection, and two follow-on events for groundwater well installation and sampling.

The following summary of tasks will be performed as presented in this WP:

Asbestos-Containing Material (ACM) Survey

- Conduct an ACM survey of the floor tile, mastic, and concrete in the interior of the American Thermostat building in areas of proposed borings.
- Samples will be collected by a certified Asbestos Inspector licensed by the New York State Department of Labor (NYSDOL).
- All "friable" building materials will be analyzed by polarized light microscopy (PLM) by EPA Method 600/R-93/116 and all "non-friable" building materials (e.g., floor tile, asphaltic materials, mastics) will be analyzed by PLM using EPA non-friable organically bound (NOB) preparation Method 600/R-93/116.

Remedial Investigation

- Conduct direct push subsurface drilling using a membrane interface probe and hydraulic profiling tool (MiHPT) combined in a single tool string, driven by a DPT rig to characterize residual contamination near and below the former manufacturing building.
- Continuous MiHPT logging of the flow rate and pressure of injection water along with electrical conductivity, gas flow rate, pressure, temperature, rate of penetration, and maximum values of all sensors will be observed in real time and will be recorded electronically throughout the entire borehole depth.
- MiHPT data will be presented to USACE with recommendations for groundwater profiling locations.
- Collect groundwater samples from boreholes based on data collected from MiHPT activities.
- Conduct direct push subsurface drilling for the collection of soil samples, based on data collected

from MiHPT and groundwater profiling activities.

- Conduct borehole geophysical logging of new and existing open borehole bedrock wells, review of existing monitoring well drilling logs to identify lithology, stratigraphy, and water bearing features within the boreholes.

- Once results from the MiHPT data and geophysical logging of bedrock wells are evaluated, up to 8 monitoring wells will be installed (4 overburden, 4 bedrock).

- Conduct two quarterly groundwater sampling events at all accessible Site monitoring wells, injection wells, and extraction wells (overburden and bedrock); and groundwater samples will be analyzed for volatile organic compounds (VOCs) (specific site COCs), per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane.

- Multi-level groundwater profile sampling (straddle packer sampling), based on identified fracture zones from geophysical logging, will be conducted to determine preferential contaminant transport pathways in existing and new bedrock wells.

- Hydraulic testing and evaluation of select overburden monitoring wells will be used to support evaluation of remedial alternatives in the FS.

- A topographic survey of the Site, including all new monitoring wells will be completed to aid in development of FS remedial alternatives. Groundwater plume and elevation maps will also be produced.

- As part of intrusive activities at the Site, a Community Air Monitoring Program (CAMP) will be implemented at the Site.

Risk Assessment

- Conduct Focused Screening Level Human Health Risk Assessment (HHRA): Using the most current available data collected as part of this focused remedial investigation for the Site, a focused screening level HHRA will be performed in accordance with EPA Risk Assessment Guidance for Superfund (RAGS).

Feasibility Study

- Conduct remedial alternatives development activities.
- Conduct detailed analysis and estimated costs of remedial alternatives.
- Conduct bench-scale testing of preferred remedial alternative(s) (if appropriate).

1.0 INTRODUCTION

This Remedial Investigation and Feasibility Study Work Plan has been prepared by Tetra Tech, Inc. (Tetra Tech) in response to Task Order 0002 (TO W912DQ23F3020) issued by the Kansas City District of the United States Army Corps of Engineers (USACE) under Contract Number W912DQ-21-D-3007 for work at the American Thermostat Site, Site ID: NYD002066330 (the Site). The purpose of this RI/FS WP is to describe the remedial investigation (RI) activities to be performed to determine the extent of residual contamination on-Site and to evaluate remedial alternatives to address the residual contamination. This RI/FS WP is based on USACE's Revised Scope of Work dated 01 August 2023, Revised Request for Proposal dated 16 August 2023; Tetra Tech's Revised Technical Proposal dated 14 September 2023; the site visits performed on 24 May 2023 and 06 June 2023; and the technical scoping meeting conducted on 27 June 2023. A Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) and Accident Prevention Plan (APP) are included as Appendices A and B, respectively, to this RI/FS WP.

1.1 Site Description

The Site (Site ID: NYD002066330) is an approximately eight-acre former assembly plant, one storage building and a water treatment building located in the predominantly rural Town of Catskill, Greene County, New York. The Site is approximately 30 miles southwest of Albany, New York and 5 miles west of Catskill, New York. Figures 1 and 2 are the site location map and site map, respectively. The Site is bounded on the north and south by Routes 23B and 23, respectively. On-Site ground surface elevations are relatively uniform but fall quickly to the Catskill Creek to the north and to two small tributaries on the east and west. Surface drainage follows the ground surface elevations with drainage from the site to the east, west and north.

1.2 Site History

The information provided in the following section is generally summarized from EBASCO, 1989 and MACTEC, 2022:

In March 1981, two American Thermostat employees were observed dumping solvents on plant property.

American Thermostat was placed on EPA's National Priorities List on September 8, 1983, resulting in Site clean-up being broken into two separate operable units (OU):

- OU-1 – provision of an alternate water supply via connection to the municipal water supply
- OU-2 – A final remedy to address sitewide contaminated groundwater, including the associated off-Site groundwater plume and contaminated soil.

In 1981, the New York State Department of Health (NYSDOH) advised five surrounding residential homes to not use their water for cooking or drinking after analysis of water samples indicated that trichloroethene (TCE) and tetrachloroethene (PCE) were present. Contamination in these residential wells resulted came from the disposal of TCE and PCE waste sludge poured down drains inside the American Thermostat building and dumped outside on the plant grounds for dust control.

Following the United States Environmental Protection Administration (EPA) National Priorities List (NPL) listing in 1983, the property owner, Amro Realty Corporation, agreed to clean up the property and its surroundings; provide, monitor, and maintain carbon filtration systems for the affected private wells, and supply bottled water for consumption by the affected residents. However, when the company went out of business in 1985, it stopped providing bottled water and abandoned the maintenance of the carbon filtration systems at the affected homes. New York State (State) requested that EPA sample other private wells near the site; provide bottled water and carbon filtration systems where necessary and take over the maintenance of the water treatment systems at the originally affected homes. In addition to undertaking the

work requested by the State, EPA also installed three air stripping systems at the facility. Air stripping involves pumping contaminated ground water into a pressurized vessel and then forcing a high-pressure stream of air through the ground water, causing the pollutants to evaporate.

The EBASCO Remediation Investigation Report (1989) discussed the nature and extent of contamination, identifying the primary COCs at the Site as 1,1,2,2-tetrachloroethene, arsenic, vinyl chloride, lead, chromium, and cadmium. In 1988, EPA signed a Record of Decision (ROD) calling for a clean water supply for residents near the Site. A system of seven extraction and reinjection wells and a soil vacuum extraction system were installed at the site in 1989 for the purpose of accelerating the treatment of the ground water. The ROD also called for extending the existing Catskill water district pipeline to the affected and potentially affected areas. The construction of the water pipeline was completed in 1992.

Additional actions mandated in the ROD included decontamination of the building located on the site, thermal treatment of the contaminated soil and air stripping and carbon adsorption for the treatment of the contaminated ground water. Carbon adsorption is a treatment system that removes contaminants by forcing water through tanks containing carbon, which attracts and retains contaminants. The decontamination of the building was completed in 1992, the soil cleanup was completed in 1996 and the construction of the groundwater extraction and treatment system (GWETS) was completed in 1998 to ensure protection of groundwater from site contaminants in soil, restore groundwater to drinking water standard, and reduce risk to human health and environment. In 2008, following 10 years of site management by EPA, the Site was transferred to the New York State Department of Environmental Conservation (NYSDEC).

Current remedial goals at the site since 2012 include maintaining hydraulic gradients toward the site and monitoring and maintenance of residential treatment systems. as well as long-term monitoring of the on and off-Site well network. The residential POET systems are no longer maintained by DEC. Maintenance of two residential POET systems was carried out by NYSDEC until May 2022 at which time responsibility for maintenance was transferred to the owners of the respective properties. One residential POET system was decommissioned by NYSDEC.

Under Superfund, EPA conducts reviews every five years to ensure that the implemented clean up remedies at sites are functioning as intended and continue to be protective of human health and the environment. EPA issued five-year review reports for the American Thermostat site in September 2003, August 2008, December 2013, and June 2019. The 2019 five-year review concluded that a protectiveness determination could not be made until additional information is obtained. Specifically, “reconfirmation that the south south-west portion of the bedrock plume is contained by the groundwater management system is needed, a determination as to whether the groundwater contaminant plume is impacting the creek’s surface water and/or sediments needs to be made, and because of increased groundwater contaminant concentrations in the vicinity of a residence with a soil vapor intrusion (SVI) issue in the past, this residence needs to be reevaluated to assess if additional actions are needed to mitigate exposure via SVI”. The 2019 Report also recommended that effectiveness of the GWETS (current groundwater concentrations) be assessed relative to potential residual contamination on-Site, and ultimately, if RAOs could be met.

The most recent report on the American Thermostat Site (MACTEC, 2022) details current site management requirements for monitoring the performance and effectiveness of the remedial measures completed. The report includes:

- Remedial measure of groundwater extraction and treatment system operation to maintain hydraulic control of the bedrock source area (PCE concentrations greater than 5,000 micrograms per liter [µg/L]), routine inspection, sampling, and reporting. In 2021, the GWETS processed 1.8 million gallons of groundwater at an average flow rate of 26 gallons per minute (gpm) and removed 277 pounds of total VOCs.

- The three residential POET systems were removed from service, based on a long analytical history of no exceedances of groundwater quality criteria. Monitoring of the POET systems ceased in 2022 with the transfer of two of the systems to residents and the decommissioning of the third by

NYSDEC. The process of decommissioning all wells (injection and monitoring) on-Site.

- Long-term groundwater monitoring. Notably, observations state that off-Site plume continues to migrate to the northeast towards Catskill Creek away from historical receptors (private water supply wells).

- Semiannual hydraulic monitoring in which water measurements are typically collected during the spring and fall seasons.

1.3 Physical Setting

1.3.1 Topography and Surface Features

On-site ground surface elevations are relatively uniform (approximately 258 feet above sea level [amsl]) but fall quickly to the Catskill Creek to the north and to two small tributaries on the east (Tributary "A") and west (Tributary "B"). Surface drainage follows the ground surface elevations with drainage from the site to the east, west and north. Catskill Creek and the two associated tributaries (A & B) leading to Catskill Creek are classified by NYSDEC as Class B(T) water bodies which are waters supporting fisheries and suitable for contact activities. The water bodies are listed as being "impaired" for fishing and secondary contact recreation (boating).

1.3.2 Soils

The soils in the Site area are predominantly the reworking of glacial deposits. Classification by the United States Department of Agriculture (USDA) in the USDA Web Soil Survey (https://websoilsurvey.nrcs.usda.gov/app/) indicated the following:

- The largest portion of the Site (>90%) is classed as "Udorthents, loamy" comprised of gravelly silt loam, excessively drained.

- The next largest portion of the Site (~ 4%) is classified as "Lordstown channery silt loam", having 3-8% slopes, well drained with bedrock 30-40 inches below ground surface.

- The smallest portion for the Site (~ 3%) is classified as "Arnot-Lordstown channery silt loams, rolling, rocky", well drained with bedrock 17-30 inches below ground surface.

1.3.3 Geology

The Site is situated within the Appalachian Plateaus Physiographic Province. This Province is composed of sedimentary rocks including sandstones, conglomerates, and shales deposited during the late Paleozoic. These rocks exist largely as horizontal beds that have been cut by streams to form the mountainous terrain that is distinctive today.

1.3.4 Overburden Geology

Unconsolidated glacial deposits overlie bedrock throughout most of the region. During the Pleistocene epoch, a layer of poorly sorted till (silty sands) was deposited over upland mountainous areas, and thick, well-sorted, and stratified drift consisting of gravel, silt and clay was deposited by meltwater in lower valley areas (Berdan, 1954). The surficial till soils at the Site exhibit significant variations in permeability. Reportedly, the soil thickness varies across the Site and can range from three to over 100 feet thick overlying significantly permeable and fractured upper bedrock surface (Amter, 1981). Alluvium is found in stream bed areas.

1.3.5 Bedrock Geology

Regionally, the bedrock within Greene County consists of interbedded shales and sandstones of Devonian age known as the Catskill Formation (Amter, 1981). The Catskill Formation is made up of four distinct bedrock groups. From oldest to youngest, these groups are the Hamilton, Genessee, Sonyea and West Falls. The AT facility lies within the Hamilton Group which consists of Moscow Formation, Panther Mountain Formation, Marcellus Formation, Plattekill Formation and Ashokan Formation. Only Plattekill Formation and Ashokan Formation underlay the site.

The Plattekill Formation consists of alternating bed of gray arkosic sandstones, siltstones and reddish gray, green mottled shales. These sediments have been uplifted and folded resulting in a bedding plane dip to the west. This bedrock structure controls the topography of the area which in turn influences the surface arid subsurface hydrology (Amter, 1981). Sandstone bedding is massive and coarsely jointed, irregularly laminated sandstone beds were also observed. Shales are closely fractured. Bedding planes are typically oriented in a northwest direction with dips varying from 3-7° to southwest. Sandstone is typically well sorted, fine grained and mud cemented. Shales are typically mud cemented.

Predominant joints strike to the northeast, are high angle with observed widths of several millimeters. A secondary joint set was observed striking to the northwest and was discontinuous throughout the bedrock mass.

1.3.6 Hydrogeology

Groundwater is found almost exclusively in bedrock fracture zones and joints throughout upland areas where the AT facility is located. The Plattekill Formation is reported to have very low primary permeability, but due to the presence of numerous fractures and joints, its secondary permeability is much higher. Yields of 20 gallons per minute (gpm) are documented for wells completed in sandstone; and well yields of 14-15 gpm are documented for the more tightly cemented siltstones and shales (Berdan, 1954).

Regionally, depth to groundwater ranges from less than one foot in swampy areas to almost 300 feet, with the average depth about 30 to 40 feet (Berdan, 1954). The flow of groundwater is influenced by several factors. Because bedrock dips gently to the west or northwest (Amter, 1981), groundwater may tend to flow along bedding planes in the same direction, especially when there is an underlying unit of lower permeability. Joint sets have been observed trending approximately N63°E and N47°W, (Berdan, 1954). These joints will also act as groundwater conduits. Immediately west of the facility is a small valley which includes Tributary "B", a tributary to Catskill Creek. East of the facility is Tributary "A" which also flows into Catskill Creek. Reportedly, perched groundwater is found in this localized valley area (Amter, 1981). However, as mentioned, bedrock bedding planes dip in a westerly direction. Accordingly, regional groundwater appears to flow at depth towards the west.

During the advancement of the building foundation borings, groundwater was encountered at depths ranging from 4-6 feet below the floor slab. The average saturated thickness of the unconsolidated aquifer is approximately 30 feet. Near surface, the unconsolidated aquifer is unconfined and bounded by the water table at a depth of 5 to 8 feet below existing ground surface elevations. Boundary conditions at depth are not well defined. Observations made during the drilling program noted the presence of discrete water bearing zones within the unconsolidated aquifer indicating the possibility of confined zones within the unconsolidated aquifer. Layers restricting flow within the unconsolidated aquifer may have developed as the result of partial cementation of the glacial till.

An average hydraulic conductivity of 1.4 ft./day was calculated for the monitoring wells completed in the overburden. Individual hydraulic conductivities ranged from 0.695 ft./day in glacial till to 1.58 ft./day in alluvial sediments downgradient of the Site near Catskill Creek. Groundwater levels within the unconsolidated aquifer range from 5 to 8 feet below existing ground surface elevations. An average gradient

was calculated using the unconsolidated groundwater level data equal to $1.8xl0^{-2}$ ft./ft. Individual gradients varied from $2.4xl0^{-3}$ ft./ft. to $3.10x10^{-2}$ ft./ft. throughout the unconsolidated aquifer flow system. Groundwater flow direction in the unconsolidated aquifer is variable and follows topography with an estimated velocity of 10^{-2} ft./day.

Piezometric head within the bedrock aquifer is controlled by the bedrock fracture system, or the secondary porosity mechanism. The net range in piezometric head throughout the study area is on the order of 60.2 feet. This net piezometric head differential suggests that the bedrock aquifer is composed of a series of discrete fracture systems which define discrete groundwater flow units. Flow within the bedrock aquifer is complicated by intra-borehole circulation. Intra-borehole circulation is the result of flow driven by pressure head differentials within a specific well. Intra-borehole circulation represents an important groundwater transport mechanism within the project site.

Hydraulic connection between the unconsolidated aquifer and the bedrock aquifer is suspected in the vicinity of Tributary B. Hydraulic conductivity values of the non-producing zones are estimated within the range of 10^{-4} through 10^{-6} gpd/ft^2. As a result, the non-producing bedrock intervals represent relatively impermeable boundary conditions between discrete bedrock aquifer flow units in which groundwater flow occurs through bedrock fractures (secondary porosity).

Bedrock intervals, representing discrete bedrock flow units of low to moderate hydraulic conductivity and transmissivity, have hydraulic conductivity values in the range of 10^{-3} to 10^{-1} gpd/ft^2. The hydraulic conductivity geometric mean of moderately transmissive flow units is $3.52x10^{-2}$ gpd/ft^2. Groundwater flow within these units is controlled by secondary porosity or through the interconnected bedrock fracture system.

Bedrock intervals, representing discrete bedrock flow units described as highly transmissive report estimated hydraulic conductivity values derived from transmissivity data range from 1 to 10^2 gpd/ft^2. The hydraulic conductivity geometric mean for the population of highly transmissive flow units is 19.9 gpd/ft^2. Groundwater flow within the highly transmissive flow units is controlled by secondary porosity.

An average groundwater flow velocity within the bedrock aquifer is estimated at 10^{-4} ft./day within range of 10^1 to 10^{-5} ft./day.

2.0 TASK ORDER OBJECTIVES

The objectives of this Task Order (TO) are to perform the necessary RI activities and FS for soil and groundwater at the American Thermostat Superfund Site (Site), Operable Unit 3 (OU-3). The objective is to determine the extent of residual contamination on-Site and identify and evaluate remedial alternatives to address the residual contamination.

The following list provides a brief summary of some of the key scope of work (SOW) tasks Tetra Tech will perform to achieve the TO objectives:

Asbestos-Containing Material (ACM) Survey

- Conduct an ACM survey of the floor tile and mastic in the interior of the on-Site building in areas of proposed boring locations.

- Samples will be collected by a certified Asbestos Inspector licensed by the NYSDOL.

- All "friable" building materials will be analyzed by polarized light microscopy (PLM) by EPA Method 600/R-93/116 and all "non-friable" building materials (e.g., floor tile, asphaltic materials, mastics) will be analyzed by PLM using EPA non-friable organically bound (NOB) preparation Method 600/R-93/116.

Remedial Investigation

- 73 direct push technology (DPT) boreholes will be drilled to either refusal or bedrock, whichever is encountered first, to characterize residual contamination near and below the former manufacturing building. Based on available information depths to bedrock across the Site vary from 0 to 118 feet bgs with bedrock estimated at approximately 25-60 feet bgs beneath the building (from south to north). A direct push rig of sufficient size to reach these depths will be used. Another 12 DPT boreholes are to be advanced to further delineate residual contamination southwest of the Site between monitoring wells M-8 and M-9, along Route 23 immediately south of the Site. The locations of the proposed borings are shown on Figure 3.

- The 85 DPT boreholes will use a membrane interface probe and hydraulic profiling tool (MiHPT) combined in a single tool string, driven by a direct-push rig. The MiHPT will be equipped with four uphole detectors: photoionization (PID), flame ionization (FID), electron capture (EC), and halogen specific (XSD). Both XSD and EC respond to halogenated compounds. The EC is more sensitive to compounds that are more highly halogenated such as PCE, TCE and cis-1,2-DCE than the XSD.

- Continuous MiHPT logging of the flow rate and pressure of injection water along with electrical conductivity, gas flow rate, pressure, temperature, rate of penetration, and maximum values of all sensors shall be observed in real time and shall be recorded electronically throughout the entire borehole depth. This information shall be included with the data summary report along with the Contractor's interpretation of the results in relation to inferred lithological changes. These data shall be used together to assess how detector responses (as a proxy for COC concentrations) are related to hydraulic conductivity distributions. The data will be provided to Tetra Tech and USACE daily for review to maintain an understanding of site conditions and/or determining if there were any potential issues with the data that would require a re-test. Daily MiHPT data may be used to guide future MiHPT locations within the confines of the proposed grid if the data indicates a potential need for a deviation from plan. Any proposed deviation from the proposed MiHPT investigation will be considered in consultation with USACE and EPA.

- At each boring location, QC response testing of each sensor on the probe shall occur before and after each log to validate proper performance of equipment.

- MiHPT data shall be presented to USACE with recommendations for groundwater profiling locations.

- Up to 30 vertical groundwater profiles will be advanced using DPT and the Geoprobe® SP16 groundwater sampler/temporary monitoring well. The locations of these profiles will be at locations approved by USACE and based on a review of the MiHPT data. Three groundwater samples per location will be collected for analysis of VOCs including: PCE, TCE, cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC). Analytical Method 8260D will be used for the analysis of VOCs. All VOC results will be reported as part of the investigation.

- Soil samples will be collected from a number of locations, based on the results of the MiHPT and groundwater profiling. Multiple soil samples will be collected for analysis of VOCs. Details regarding soil sample collection are further explained in Section 2.5.1.

- The borehole geophysical logging and existing monitoring well drilling logs will be used to identify lithology, stratigraphy, and water bearing features within the boreholes. The geophysical logging will be completed in existing open borehole bedrock wells. The data collected will also be utilized to identify any fracture zones and to determine locations and depths for new monitoring wells. Borehole geophysical logging methods will include caliper, gamma ray, temperature, fluid resistivity, heat pulse flowmeter and acoustic televiewer.

- Once results from the MiHPT data and geophysical logging of existing open borehole bedrock wells are evaluated, up to eight monitoring wells will be installed (four overburden, four bedrock) to a depth of no deeper than 100 feet as requested by USEPA and USACE. If the results of the preceding tasks suggest that an alternate depth be considered, it will be discussed with USEPA and USACE and revised accordingly. Monitoring wells will be standard completion (e.g., one screened interval per well and borehole). For new monitoring wells located in the source area bedrock, double-cased wells will be installed.

- New overburden and bedrock wells will be developed using a combination of surge block and pumping no sooner than 48 hours after completion and no later than two weeks after completion. Well development will continue until there is less than a 10 percent variance between successive measurements of pH, temperature, turbidity, and conductivity, and/or turbidity is less than 50 NTUs or three well volumes of groundwater has been removed.

- Two quarterly groundwater sampling events will be conducted at new and existing Site monitoring wells and injections wells (34), and overburden and bedrock extraction wells (12). Groundwater samples will be analyzed for VOCs (including specific site COCs) and per- & polyfluoroalkyl Substances (PFAS) and 1,-4-dioxane. Multi-level groundwater profile sampling (straddle packer sampling) will be conducted in new and existing bedrock monitoring wells to determine preferential contaminant transport pathways, based on identified fracture zones from geophysical logging. Groundwater samples will be analyzed for VOCs. Up to five intervals per boring will be straddle packer sampled.

- Hydraulic testing and evaluation will be conducted to support evaluation of remedial alternatives in the FS. Rising/falling slug tests will be conducted at 12 monitoring wells (to be determined).

- A topographic survey of the Site, including all new monitoring wells will be completed to aid in development of FS remedial alternatives. Groundwater plume and elevation maps will also be produced.

- A Community Air Monitoring Program (CAMP) will be implemented at the Site when any intrusive (subsurface) activities are taking place. The CAMP is provided in Appendix C.

Screening Level Human Health Risk Assessment

- Focused Screening Level Human Health Risk Assessment (HHRA): A focused screening level HHRA will be performed for the Site using the most current available data collected as part of this focused remedial investigation for the Site. The HHRA will be performed in accordance with USEPA Risk Assessment Guidance for Superfund (RAGS). Published guidance from the NYSDEC will also be considered.

- As part of the screening level HHRA, the conceptual site model (CSM) will be updated to reflect information and data collected during the RI to assess existing on-Site exposure routes, pathways, and potential receptors and associated uncertainties in the evaluation. The risk assessment will not include an evaluation of the potential ACM exposure pathway.

Feasibility Study

- Conduct remedial alternatives development activities.
- Conduct detailed analysis and estimated costs of remedial alternatives.
- PRG Development
- Conduct bench-scale testing of preferred remedial alternative(s).

2.1 WAD-01 Project Administration

The Project Administration task includes project management, conducting a site visit(s), administration support and monthly reporting and monthly project progress calls. Each of the Work Orders included in this task are presented below.

2.1.1 WBS 1.1 Project Management

The project administration activities in support of this TO include preparing the technical monthly reports, reviewing, and updating the project schedule, providing technical resource management, responding to questions from the USACE and EPA, preparing and submitting monthly invoices, and monitoring the budget. This task includes the efforts for overall management to oversee the implementation of the RI and FS tasks to be performed. This Work Order will be performed throughout the period of performance of the TO.

2.1.2 WBS 1.2 Site Visit & Kick Off Meeting

USACE, EPA, NYSDEC, and Tetra Tech representatives attended a one-day site visit on 24 May 2023 to develop a conceptual understanding of the Site and discuss the scope and requirements. A second site visit was conducted on 06 June 2023 with EPA, NYSDEC, and Tetra Tech representatives attending the Site meeting along with the property owner to discuss proposed work at the Site and Site access issues.

2.1.3 WBS 1.3 Administrative Support and Monthly Reporting

Tetra Tech will prepare monthly reports, review, and update the project schedule and prepare and submit invoices as part of WBS 1.3.

2.1.4 WBS 1.4 Project Progress Calls

Tetra Tech will conduct monthly project progress calls with the USACE, EPA and NYSDEC to keep all parties apprised of project progress.

2.2 WAD-02 Project Planning and Scoping

2.2.1 WBS 2.1 Review Existing Data and Reports

Review and evaluation of existing Site background documents and previously obtained data were performed prior to the site visit, technical scoping meeting, and preparation of this WP. Documents reviewed included:

- Final Work Plan for Remedial Investigation/Feasibility (EBASCO Services, 1988)
- Final Revised Community Relations Plan (EBASCO Services, 1988)
- Draft Final Remedial Investigation Report (EBASCO Services, 1989
- Draft Final Feasibility Study Report (EBASCO Services, 1990)
- Explanation of Significant Differences (USEPA, 1997)
- Record of Decision (Alternate Water Supply) (USEPA, 1988)
- Record of Decision (USEPA, 1990)
- First Five-Year Review (USEPA, 2003)
- Second Five-Year Review (USEPA, 2008)
- Third Five-Year Review (USEPA, 2013)
- Fourth Five Year-Review (USEPA, 2019)
- Fourth Five Year-Review Addendum (USEPA, 2021)
- Final 2021 Annual Report – American Thermostat Site, NYSDEC Site No. 420006 (MACTEC, 2022).

Additionally, maps and boring logs were also reviewed as part of this task.

2.2.2 WBS 2.2 Technical Scoping Meeting and Conceptual Site Model

A technical scoping meeting attended by USACE, EPA, and Tetra Tech representatives was conducted on 27 June 2023 at the Tetra Tech office in Parsippany, NJ. During the meeting, the Project Team discussed:

- The Scope of Work (SOW);
- Preliminary CSM;
- Data gap analysis findings;
- Recommendations for proposed investigation and analytical activities;
- Feasibility Study (FS);
- Schedule; and
- Communication plan.

2.3 WAD-03 Community Relations

Tetra Tech will assist EPA throughout the RI/FS in accordance with EPA's Superfund Community Involvement Handbook, March 2020. Tasks will include developing the Site's Community Involvement Plan (CIP), providing public notice support during the RI and support activities, and supporting public meetings. The goal is to work with EPA to provide meaningful community involvement.

2.3.1 WBS 3.1 Develop Community Involvement Plan

Tetra Tech will prepare the Site's CIP to present an overview of the community's concerns. The CIP will include the following elements: 1) Site background including location, description, and history; 2) community overview including a community profile, summary of concerns, and preferred channels for community involvement; 3) community involvement objectives and planned activities with a schedule to accomplish those objectives; 4) a mailing list of contacts; 5) the names and addresses of the information repositories where documents may be reviewed by the public, and the locations where public meetings will be hosted by EPA; 6) list of acronyms; and 7) a glossary. Tetra Tech will submit the final updated CIP in accordance with final comments.

2.3.2 WBS 3.2 Community Relations Support

WBS 3.2.1 Public Notice Support

Tetra Tech will support preparation, copying and distribution of public notices. Two public notices will be prepared , one for the public comment period associated with the draft RI report and one associated with the draft Feasibility Study which will present EPA's selected remedy. The public notices will summarize the results of the documents that are ready for review and will announce the times and locations of upcoming public meetings.

WBS 3.2.2 Public Meeting Support

The EPA Community Involvement Coordinator will lead the Project's public meetings and Tetra Tech will provide support. Tetra Tech will attend the public meetings and availability sessions, prepare draft and final meeting summaries, and prepare presentation materials and handouts. Tetra Tech will also make arrangements for a court reporter to be present at the public meetings. Up to two meetings are anticipated as part of this task, one following the availability of the draft RI and one following the availability of the Feasibility Study which will discuss EPA's selected remediation tasks.

2.4 WAD-04 Planning Documents and Work Plans

2.4.1 WBS 4.1 Contractor Quality Control Plan (CQCP)

Tetra Tech will prepare a Contractor Quality Control Plan (CQCP) in conformance with Sections 2.4.1.3 and 2.5 of the A/E Contract. The CQCP will describe the quality assurance/quality control (QA/QC) procedures that will be implemented to ensure the RI work and FS are completed and documented in accordance with project objectives and applicable requirements and standards. This CQCP will identify the key project elements, high risk project elements, required end products, critical stages of product development, acceptability criteria, corrective action processes, and present the specific staff members who will execute the project and perform the Quality Control reviews. This CQCP will be developed in accordance with USACE Engineering Regulation (ER) 1110-3-12, Military Engineering and Design Quality Management (USACE, March 2021). The CQCP will be provided as draft and final versions. The CQCP will require an independent technical review (ITR) for all major written deliverables. ITR will be conducted

by technically qualified professionals for key disciplines, who have not been directly involved with product development.

2.4.2 WBS 4.2 Remedial Investigation and Feasibility Study Work Plan

Tetra Tech has prepared (this document) an RI/FS WP that takes into consideration the information that has already been compiled. The RI/FS WP includes a comprehensive description of the work to be performed, including the methodologies to be utilized, Data Quality Objectives (DQOs), as well as a corresponding schedule for completion. Specifically, the RI/FS WP must present an evaluation of Site characteristics, a statement of the problem, plans to identify the vertical and lateral extent of residual soil contamination, and conduct remedial alternatives identification and evaluation activities. Remedial alternatives must consider active in-situ remedies for residual soil and groundwater contamination.

In addition, the RI/FS WP must include the following:

- *Standard Operating Procedures* – These procedures shall identify measures to prevent field investigation activities from causing releases of hazardous substances.

- *Residual Soil Contamination Characterization* – to determine the nature and extent of the residual contamination in the soil on-Site.

The RI/FS WP includes a Field Sampling Plan (FSP), Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP), and Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP), although each plan may be delivered under separate cover. The RI/FS WP was developed in conjunction with the FSP, UFP-QAPP, and APP/SSHP.

2.4.3 WBS 4.3 Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP)

In conformance with Section 2.4.1.2 of the A/E Contract, Tetra Tech has prepared a UFP-QAPP in accordance with:

- EPA- 505-B-04-900A Uniform Federal Policy for Quality Assurance Project Plans, Final Version 1, March 2005.
- Intergovernmental Data Quality Task Force Optimized UFP-QAPP Worksheets (March 2012).
- U.S. Environmental Protection Agency (EPA) Guidance on Systematic Planning Using the DQOs Process (February 2006).
- Other applicable EPA and U.S. Department of Defense (DoD) guidance documents which will incorporate field sampling procedures.

The UFP-QAPP describes how environmental data collection operations are planned, carried out, and assessed. The UFP-QAPP documents in detail all aspects of the project's field and laboratory activities, including QA and QC activities executed to evaluate them including sufficient information regarding sample design, sample types, sample locations, interpretation scenarios, any field contingencies, sampling methodologies, and other sample handling techniques to collect data that meets the project objectives.

2.4.4 WBS 4.4 Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP)

In conformance with Section 2.4.1.4 and 2.6 of the A/E Contract, prior to the start of field work, Tetra Tech has developed an APP/SSHP that meets the requirements of EM 385-1-1, ER 385-1- 92, and Federal,

State, and local laws and regulations. Tetra Tech personnel, suppliers, and support personnel will be required to follow all safety provisions established in the approved plan. The APP/SSHP has been developed, reviewed, and signed by a Certified Industrial Hygienist.

The APP/SSHP contains the following types of information: site description and contaminant characterization, safety and health hazard(s) assessment and risk analysis, safety and health staff organization and responsibilities, site specific training and medical surveillance parameters, personal protective equipment (PPE), decontamination facilities and procedures to be used, monitoring and sampling required, safety and health work precautions and procedures, site control measures, on-Site first aid and emergency equipment, emergency response plans and contingency procedures (on-Site and off-Site), and logs, reports, and record keeping in accordance with USACE EM 385-1-1, part 01.D.

The APP/SSHP covers each SSHP element in section 28.B of EM 385-1-1 and each APP element in Appendix A of EM 385-1-1. SSHP appendix elements that overlap with APP elements need not be duplicated in the APP/SSHP, provided each safety and occupational health issue receives adequate attention and detail and is documented in the APP/SSHP.

2.5 WAD-05 Remedial Investigation and Feasibility Study

2.5.1 WBS 5.1 Remedial Investigation and Feasibility Study Work Plan Implementation

Upon EPA and USACE approval of the final RI/FS WP, Tetra Tech will implement the tasks in the RI/FS WP. It is anticipated that the RI field work will be conducted with approximately five field mobilizations: one for high resolution site characterization (MiHPT), one for groundwater profiling, one for soil sampling and two follow-on events for groundwater well installation and sampling. If cost effective and technically feasible, a phased approach will be utilized to better inform samples locations and analysis for follow on phases of field work. Task-specific calls will be held with the EPA project manager (PM) and the USACE PM. Tetra Tech has assumed two conference calls per document deliverable will be required. A schedule of deliverables is included in Table 2.

Remedial Investigation

The following provides a description of the various RI tasks to be implemented at the Site. Additional details regarding the procedures and methods to be used during field activities are presented in the UFP-QAPP and APP (Appendices A and B to this WP). The field investigation will consist of the following primary activities:

- Mobilization/Demobilization;
- ACM survey involving the collection of floor tile and mastic samples for analysis of asbestos;
- Site utility survey (geophysical);
- Drilling/Geoprobe activities including:
    - Advancement of up to 73 MiHPT DPT boreholes near and below the former manufacturing building. Eleven locations are planned to be completed below the slab inside the building. Appropriate health and safety measures, to include ventilation, will be used during indoor drilling activities;
    - Advancement of up to 12 MiHPT DPT boreholes southwest of the Site between monitoring wells M-8 and M-9, along Route 23 immediately south of the Site.;

  - Advancement of up to 30 groundwater profiling borings;
  - Advancement of up to 20 soil borings; and
  - Installation of up to eight monitoring wells (4 overburden, 4 bedrock).
- Borehole (geophysical) logging of select existing bedrock boreholes;
- Groundwater sampling
  - Groundwater profile boring sampling;
  - Straddle packer groundwater sampling; and
  - Conduct two quarterly groundwater sampling events at Site monitoring wells, injection wells, extraction wells (overburden and bedrock).
- Hydraulic testing and evaluation utilizing rising and falling head tests in 12 monitoring wells;
- Topographic survey will be completed to aid in development of FS remedial alternatives;
- Investigation-derived waste disposal; and
- Site restoration, equipment decontamination.

Additionally, a focused screening level HHRA and will evaluate newly collected data to compare corresponding human health screening values in a qualitative evaluation.

Associated activities, including subcontract procurement/management, mobilization/demobilization and IDW management, will also be conducted during the RI.

Subcontract Procurement / Management

Tetra Tech anticipates procuring seven subcontracts to perform the tasks required to implement the SOW. The following subcontractors are expected to be contracted during implementation of the TO:

- ACM Survey;
- Utility Location;
- Direct Push Drilling;
- Downhole Borehole Geophysics;
- Straddle Packer Sampling and Well Installation;
- Surveyor; and
- Investigation Derived Waste Management Services.

Subcontract procurement activities will be performed in accordance with Tetra Tech's Government Procurement Procedures. These procedures are based on the Federal Acquisition Regulations (FARs) and are the basis of Tetra Tech's Government-approved purchasing system.

This task also includes management, coordination, processing of invoices, and closeout of the seven field subcontracts.

Mobilization

Mobilization will be performed by under the direction of Tetra Tech's Field Operations Lead (FOL), prior to the initiation of site activities. During mobilization, setup of temporary facilities (i.e., on-Site office, etc.) will occur; rental and expendable equipment will be ordered; health and safety and field specific forms will be prepared; and setup of a temporary IDW storage area will be established. Mobilization activities will consist of the following:

Office tasks:

- Prepare list of required field equipment;
- Perform lease/purchase analyses, as necessary;
- Prepare requisitions, as necessary;
- Set up health and safety field files; and
- Arrange delivery and storage of equipment, as necessary.

Field tasks:

- Coordinate setup of temporary offices;
- Receive field activity and health and safety equipment;
- Arrange delivery, storage and set up of equipment (as necessary);
- Set up field computer equipment; and
- Conduct initial health and safety briefing for project personnel.

Field Reconnaissance in support of the HHRA

A one-day field reconnaissance will be performed of the Site to document the existing Site conditions for application in the HHRA. The field reconnaissance visit for the purposes of characterizing the environmental setting and assessing existing exposure routes to human health for application in the HHRA will be performed prior to completion of the risk assessment. No site-specific sampling of environmental media is proposed for this field reconnaissance visit.

Collection of Floor Tile and Mastic Samples

Tetra Tech and its contract small business team member, Credere Associates, LLC will collect up to 15 bulk samples of floor tile, mastic, and concrete samples from inside the American Thermostat building prior to beginning any coring/drilling operations within the building. Samples will be collected by a certified Asbestos Inspector licensed by the NYSDOL. All "friable" building materials will be analyzed by PLM by EPA Method 600/R-93/116 and all "non-friable" building materials (e.g., floor tile, asphaltic materials, mastics) will be analyzed by PLM using EPA NOB preparation Method 600/R-93/116. Based on the results of the sampling, appropriate measure will be taken (if needed) to protect workers and prevent a release of any asbestos containing material.

Underground Utility Location

The design and implementation of the field investigation and selected remedies will require detailed knowledge of underground utilities in the Site area. To this end, Tetra Tech will perform subsurface

geophysics survey of the anticipated work area. Multiple methodologies, including electromagnetic (EM) surveys and ground-penetrating radar (GPR), will be used in the field.

A request for a utility mark-out of the Site area will also be performed. Tetra Tech will contact "Dig Safely New York" at 811 or 1-800-272-4480 at least two (2) working days (not counting the day of the call) but not more than ten (10) working days before the start of field work.

In addition, a 10-foot radius around each proposed boring and well location will be cleared using the subsurface geophysical equipment prior to beginning drilling activities. If subsurface utilities are identified within this radius that prevent borehole advancement/well installation (e.g., the location and number of utilities does not allow for a clear 3-foot by 3-foot area), the location will be moved, and the revised location will be checked again for subsurface utilities.

Drilling/Geoprobe/Borehole Logging Activities

MiHPT DPT

Up to 73 MiHPT DPT borings will be advanced both inside and outside the American Thermostat building as proposed in Figure 3. Both the membrane interface probe and hydraulic profiling tool (MiHPT) are combined in a single tool string, driven by a direct-push rig. The MiHPT will be equipped with four uphole detectors: PID, FID, EC, and XSD. Both XSD and EC respond to halogenated compounds. The EC is more sensitive to compounds that are more highly halogenated such as PCE, TCE and cis-1,2-DCE than the XSD. The MiHPT will also be equipped with an electrical conductivity dipole array in addition to the heater plate and membrane compromising the MIP tip. The response from each detector will be recorded in real time, as well as the trip time (time necessary for the contaminant to pass from the membrane to the instrument). Continuous MiHPT logging of the flow rate and pressure of injection water along with electrical conductivity, gas flow rate, pressure, temperature, rate of penetration, and maximum values of all sensors will be observed in real time and will be recorded electronically throughout the entire borehole depth; this information will be included with the data summary report along with the Tetra Tech's interpretation of the results in relation to inferred lithological changes. Pore pressure will be recorded at each depth below the water table at which a rod is added. These data will be used together to assess how detector responses (as a proxy for COC concentrations) are related to hydraulic conductivity distributions. At each boring location, QC response testing of each sensor on the probe will occur before and after each log to validate proper performance of equipment. The data will be provided to Tetra Tech and USACE daily for review to maintain an understanding of site conditions and/or determining if there were any potential issues with the data that would require a re-test. Daily MiHPT data may be used to guide future MiHPT locations within the confines of the proposed grid if the data indicates a potential need for a deviation from plan. Any proposed deviation from the proposed MiHPT investigation will be considered in consultation with USACE and EPA.

An additional 12 MiHPT DPT boreholes are to be conducted to further delineate residual contamination southwest of the site; six along the fence line of the Site parallel to Route 23 and six immediately south of Route 23, between monitoring wells M-8 and M-9, as shown in Figure 3.

A survey of all MiHPT locations will be performed by a licensed New York state surveyor.

Tetra Tech will perform a geospatial evaluation of MiHPT data (HPT, PID, FID, EC, XSD, and electrical conductivity) using 3-dimensional visualization and analysis (3DVA) and submission of a data summary report to USACE with respect to the identification of residual contamination, understanding site lithology (based on HPT-relative hydraulic conductivity), and providing recommendations on locations to perform vertical profiling of site overburden groundwater and additional soil sampling activities.

MiHPT data will be presented to USACE with recommendations for groundwater profiling locations.

Groundwater Profiling

As part of a separate mobilization, up to 30 vertical groundwater profiles will be advanced using DPT and the Geoprobe® SP16 groundwater sampler. Alternatively, a small diameter (1-inch PVC) temporary monitoring wells may be installed if slow groundwater recharge rates prevents the efficient use of the Geoprobe® SP16 groundwater sampler. The temporary wells would be installed in the borehole with a sand filter pack around the screened interval (5-feet) and a bentonite seal at surface. The temporary well would be installed and let sit for a period of 24 hours before sampling activities. The locations of these profiles will be at locations approved by USACE and based on a review of the MiHPT data. Samples will be collected using a Geoprobe SP16 groundwater sampler/temporary monitoring well and a bladder pump employing an EPA low flow groundwater sampling technique. Groundwater parameters will be monitored during purging for convergence. If after one hour of purging or three well volumes, convergence criteria have not been met, particularly for turbidity or dissolved oxygen, a sample will be collected. Three groundwater samples per location will be collected for analysis of VOCs including: PCE, TCE, cis-1,2-DCE and VC. A survey of all 30 vertical groundwater profiling locations will be performed by a licensed New York state surveyor.

Using data from the 30 groundwater profiling locations the 3DVA will be updated to support the evaluation and selection of soil sampling locations and new monitoring well locations in the overburden.

Soil Sampling

As part of a separate mobilization, up to 20 locations, based on the results of MiHPT and groundwater profiling activities, will be identified for sampling of subsurface soil using DPT geoprobe macrocore and encore samplers. From each of the identified locations, soil cores will be logged by a Tetra Tech geologist and screened using a PID. Two discrete soil samples will be collected, one from the 0-2 ft. bgs interval and one from the 2.0-10.0 ft. bgs interval. The specific sample interval collected for analyses for risk assessment purposes will be based on PID readings and other observations such as staining and odors. Associated QA/QC samples will also be collected.

Up to 10 total additional soil samples (contingency samples) may be collected at depths greater than 10 ft. (to 25 ft. bgs max depth) if elevated PID readings or observations of impacted soil are noted in the borings. A survey of all 20 soil boring locations will be performed by a licensed New York state surveyor.

Borehole Logging

The borehole geophysical logging will be completed in new (up to 4) and existing (up to nine) bedrock monitoring wells. Borehole geophysical logging methods will include caliper, gamma ray, temperature, fluid resistivity, heat pulse flowmeter and acoustic televiewer.

The borehole geophysical logging and existing monitoring well drilling logs will be used to identify lithology, stratigraphy, and water bearing features within the boreholes. The data collected will also be utilized to identify any fracture zones and to determine locations and depths for new monitoring wells and for straddle packer sampling.

FLUTe Liner Installation

Upon completion of the borehole logging and multi-level straddle packer sampling of bedrock wells, up to four (4) blank Flexible Liner Underground Technologies (FLUTe) liners will be installed in the new bedrock monitoring wells. The liners would be installed, after downhole testing has been completed, to prevent the

potential vertical migration of contaminants between transmissive layers in the bedrock while borehole monitoring well data is analyzed and reviewed.

Monitoring Well Installation

Once results from the MiHPT data, geophysical logging of bedrock wells, groundwater profiling sample data and soil sampling data are evaluated, Tetra Tech will install up to 8 monitoring wells (4 overburden, 4 bedrock) at the Site. The locations of the proposed monitoring wells will be determined in consultation with USACE and EPA after evaluation of these data listed and existing monitoring well drilling logs. A survey of all new monitoring well locations will be performed by a licensed New York state surveyor.

Monitoring wells will be standard completion (e.g., one screened interval per well and borehole). For new monitoring wells located in the source area bedrock, wells will be double cased. Wells will be advanced no deeper than 100 feet bgs.

During installation, the subsurface lithology will be visually characterized and described by a Tetra Tech field geologist using the modified Burmeister method and assigned a Unified Soil Classification System (USCS) classification, as appropriate. Bedrock borings will be cored (NQ diameter) using 10-foot core runs and the subsequent core logged by a Tetra Tech field geologist. Core quality measurements such as rock quality designation (RQD) will be measured. Core will be described using formal state geological survey nomenclature when possible. Rock type, color, structure contacts, and other features will be noted before being photographed and placed in wooden core boxes for storage (if required). Borings will be screened using a PID.

Bedrock borings in the source area will be completed with 8-inch surface casing set a minimum of 5 feet into competent bedrock and borehole annulus pressure grouted to the surface. Following coring, the borehole will be reamed to a 6-inch nominal diameter to depth using air rotary drilling.

As noted previously, a mark-out will be requested from the local utility companies. The area around each well (approximately 10-foot radius) will be screened by the subsurface geophysical subcontractor to clear the proposed location for utilities prior to beginning the drilling activities.

Well Development

New overburden and bedrock wells will be developed using a combination of surge block and pumping no sooner than 48 hours after completion and no later than 2 weeks after completion. Well development will continue until there is less than a 10 percent variance between successive measurements of pH, temperature, turbidity, and conductivity, and/or turbidity is less than 50 NTUs or a maximum of three well volumes of groundwater has been removed. Development water will be containerized for treatment at the on-Site GWETS.

Groundwater Sampling

Groundwater profile samples will be collected from up to 30 soil borings at locations to be determined based on the results of the MiHPT borings analyses. These samples will be collected using either a Geoprobe® SP 16 sampler and pump with Teflon-lined tubing or from a temporary 1-inch diameter PVC monitoring well and a pump with Teflon-lined tubing.

For new bedrock monitoring wells, up to five discrete intervals (no more than ten (10) ft. in length) per new bedrock monitoring well (up to four new bedrock wells total) will be packer sampled for groundwater for determination of screened intervals for well installation. Intervals to be sampled will be based on the results

of the downhole geophysics results. Groundwater samples from each interval will be collected for analysis of VOCs. Samples will be collected using EPA Region 2 Low Stress Method (EPA R2, 1998) and USACE Standard Operating Procedure for Groundwater Low-Flow Purging (USACE, 2002), using an adjustable-rate bladder pump or submersible pump equipped with dedicated Teflon-lined tubing, a water-quality meter, and a flow-through cell. If convergence of parameters is not met within one hour of purging, samples will be collected after three "well volumes" (packer zone volumes) have been purged. Groundwater samples from each interval will be collected for analysis of VOCs.

For existing bedrock monitoring wells, up to five discrete intervals (no more than ten (10) ft. in length) per bedrock monitoring well (up to five existing bedrock wells total) will be packer sampled for groundwater to determine preferential contaminant transport pathways. The exact depths will be developed in consultation with USACE and EPA after downhole geophysics are conducted and analyzed. Groundwater samples from each interval will be collected for using a submersible pump for analysis of VOCs. Samples will be collected using EPA Region 2 Low Stress Method (EPA R2, 1998) and USACE Standard Operating Procedure for Groundwater Low-Flow Purging (USACE, 2002), using an adjustable-rate bladder pump or submersible pump equipped with dedicated Teflon-lined tubing, a water-quality meter, and a flow-through cell. If convergence of parameters is not met within one hour of purging, samples will be collected after three "well volumes" (packer zone volumes) have been purged. A separate instrument (e.g., Hach or equivalent) will be used to measure turbidity.

Tetra Tech will conduct two quarterly groundwater sampling events at Site monitoring wells, injection wells, extraction wells (overburden and bedrock). Groundwater samples will be analyzed for VOCs (including specific site COCs), PFAS and 1,4-dioxane. Prior to each quarterly groundwater sampling event, a synoptic round of water levels will be collected from all monitoring wells to be sampled and other monitoring wells that are available and accessible. Groundwater elevations will be measured from the surveyed inner casing measuring point using an electronic water level probe. All data will be recorded in a field logbook and/or on field forms (as described in the UFP-QAPP), and subsequently presented in tabular form.

Groundwater purging operations and subsequent groundwater sample collection will be conducted as noted above. well's static water level measurement will be recorded using an electronic water level indicator prior to sampling. After the water level is recorded, groundwater will be purged from each monitoring well to begin the sample collection process. The purged groundwater and well headspace will also be field screened using a PID prior to and during sampling.

During the purging operations, the pump speed will be adjusted to achieve minimal stabilized drawdown, to the extent practical. If drawdown cannot be stabilized sampling will take place after three well volumes has been removed and the well has recovered to 90% of its original water column height. Groundwater quality indicator parameters will be recorded approximately every five minutes during the groundwater purging process. The groundwater quality indicator parameters to be recorded include pH, temperature, specific conductivity, dissolved oxygen (DO), turbidity, and oxidation-reduction potential (ORP).

Once the groundwater quality indicator parameters are considered to be stabilized within the limits specified in the applicable SOP (found in the UFP-QAPP, Appendix A), a groundwater sample will be collected directly from the Teflon tubing into sample bottles. The groundwater samples will be analyzed for Site-specific VOC parameters ((tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC)) . The groundwater sample results will be compared to the federal (EPA Maximum Contaminant Levels [MCLs]) and state (NYSDEC Water Quality Standards/Guidance Values – Class GA) as outlined in the UFP-QAPP.

Tetra Tech will provide all bottles, coolers, associated sampling equipment, and shipping costs while the EPA provides analytical and data validation services. Tetra Tech will develop a data management system, including: the submittal of EPA Region 2 electronic data deliverables, field logs, sample management and tracking procedures, document and inventory controls for both laboratory data and field measurements. The data collected during the investigation will support the RI/FS. Collected data will be evaluated for usability against project DQOs to determine whether it is appropriate for its intended use.

Laboratory Services

Tetra Tech will follow the EPA Region 2 Field and Analytical Services Technical Advisory Committee (FASTAC) procedures when procuring analytical services. For all non-time critical data collection, EPA Region 2 requires that a sequential decision tree for procuring Superfund analytical services be followed, which include:

- Tier 1: EPA Region 2 Laboratory Services and Applied Sciences Division (LSASD) Laboratory (with Environmental Services Assistance Team [ESAT] support);
- Tier 2: National Analytical Services Contract laboratories (Contract Laboratory Program [CLP] Routine Analytical Service [RAS] and Non-RAS);
- Tier 3: Region Specific Analytical Services (SAS) Contract laboratories; and
- Tier 4: Subcontract laboratories.

Tetra Tech presumes that the TCL analyses will be performed by the LSASD Laboratory or through the EPA CLP RAS program. Details on analytical services are provided in the UFP-QAPP.

Prepare and Ship Samples

Tetra Tech will prepare and ship field environmental samples, and associated field QC samples, collected for off-Site laboratory analysis according to the procedures outlined in the UFP-QAPP and the EPA CLP Guidance for Field Samplers (EPA, 2007). Samples will be shipped to the applicable laboratory(ies) via priority overnight shipping.

- For samples to be analyzed by the LSASD Laboratory and/or CLP laboratories, Tetra Tech will procure and provide the sample containers. Arrangements will be made for sample shipment and delivery schedules with the Regional Sample Control Center (RSCC).
- If a subcontractor laboratory is required during the field investigation, the sample containers will be provided by the off-Site subcontractor laboratory. Arrangements for container delivery and shipment will be made directly with the subcontractor laboratory.

During the field sampling activities, EPA's Scribe program will be used to manage sample collection data and provide sample label and custody documentation. Completed custody seals will be placed on all shipping containers (i.e., cooler). The Tetra Tech CLP Authorized Requestor will review the proper packing and shipping techniques with Tetra Tech field personnel prior to field operations.

Sample Management

Tetra Tech will provide sample management support, including review of chain of custody procedures, information management, and data storage/retention, in accordance with the procedures outlined in this

WP and the UFP-QAPP. Communication will be maintained with the EPA RSCC office, the LSASD Laboratory, and/or the subcontract laboratory(ies) regarding the scheduling, tracking, and oversight of the sample analyses and validation. Tetra Tech will submit the following to the RSCC within one week after sampling is completed for a delivery group: a Sample Trip Report (STR) for any analyses completed by the CLP program and/or an Analytical Services Tracking System (ANSETS) Report for any analyses completed by a subcontractor laboratory.

The UFP-QAPP provides descriptions of laboratory oversight activities, including periodic performance evaluation sample analyses, sample label documentation, chain of custody forms, operational audits, and corrective action procedures.

Hydraulic Testing

Rising/falling slug tests will be conducted at 12 overburden monitoring wells – the four newly installed overburden wells and eight existing wells. This testing will be completed to support the evaluation of remedial alternatives. The eight existing wells will be selected in consultation with USACE and EPA based on the data generated during the preceding tasks. The water level in the monitoring well will be measured using a data logger placed in the monitoring well prior to testing activities. The data logger will be configured to collected data on a logarithmic schedule with emphasis placed on early time collection. A solid slug will be introduced into each monitoring well to be tested in as near an instantaneous fashion as possible. The water level will be allowed to recover to static conditions and the test terminated. A second test will be configured to measure water level changes in the monitoring well as the solid slug is removed.

Data will be reviewed in the field to ensure that valid and sufficient information is collected that would allow for the analysis of the slug test data. If recovery of water level to static appears to take some extended time (ten's of minutes to hours), it will be at the FOL's discretion how long to run the test before termination. All data will be analyzed using Aqtesolv®, a commercially available and widely used software program designed for the analysis of slug test data.

Topographic Survey

Tetra Tech will subcontract a surveyor to perform a topographic survey of the Site in support of the FS. Recent aerial surveys will be overlain with a topographic survey, updated property ownership and tax map information, and survey/verification of key features such as roadways, curbing, and maintenance holes. The tax map of the area will then be used as the base map to show ground surveying data of the areas within the public rights of way.

The ground survey will establish topographic contours at 2-foot intervals along the roadways, and will identify relevant surface features within the public rights of way, including but not limited to the following: limits of pavement/surfacing types, location and materials of curbs, sidewalks, and pads, limits of vegetated areas, wells (potable, monitoring, pumping, etc.), walls and structures, natural and manmade drainage ditches or channels, fencing, waterway features (i.e., top of bank, waterline, centerline, depth of water, etc.), and other relevant information.

The coordinate system utilized for the survey of the monitoring wells will be New York State Plane North American Datum 83/92 (NAD 83/92) for horizontal control and North American Vertical Datum 88 (NAVD 88) for vertical elevations (to 0.01 foot vertical). The surveyor will obtain horizontal location and vertical elevations for all boring/sample points installed as part of the RI program. Data for the wells will include the vertical elevation of the concrete pad, ground surface, outer casing, and innermost casing. Proposed site features will be identified in the field by reference marker (i.e., stakes, hubs, nails, ribbons, etc.).

The surveyor will prepare a Survey Control Report and the appropriate portion of the EPA Electronic Data Deliverable (EDD).

Investigation-Derived Waste Disposal

Investigation-derived wastes (IDW) generated during the field investigation activities will be containerized where necessary in steel DOT-approved 55-gallon drums or other suitable containers and staged at a secure location within the fencing of the groundwater treatment plant for subsequent characterization, transport, and disposal by Tetra Tech's IDW subcontractor. Tetra Tech and its subcontractors will ensure that IDW is properly containerized and labeled, and periodically inspected. Waste profiles and manifests, for subsequent transportation and disposal of IDW from the Site, will be reviewed by Tetra Tech's FOL and Program Health and Safety Manager (PHSM) to ensure proper transport and disposal.

Consumable material not impacted by Site contaminants or hazardous materials will be disposed as conventional municipal solid waste. IDW will include the following waste streams:

- Well purge/development water;
- Soil cuttings;
- Decontamination fluids containing wash/rinse water and decontamination chemicals; and
- Contaminated debris including but not limited to personal protective clothing, plastic sheeting, and consumable sampling equipment.

Tetra Tech anticipates disposing of the well purge/development water through the on-Site groundwater treatment system. Tetra Tech will obtain approval from the NYSDEC prior to any discharges.

The other IDW generated during field operations will be analyzed as applicable to obtain transport and disposal approval. IDW will be transported by an approved, licensed transporter to an approved treatment, storage, and disposal facility for disposal, as appropriate for the classification of the IDW (i.e., non-hazardous or hazardous). Tetra Tech will verify whether the proposed facilities are currently approved by EPA Region 2, and only an EPA-approved disposal facility will be used for disposal of the IDW.

The IDW management procedures contained in the APP (Appendix B) provide additional guidance on how the IDW generated during the field investigation will be managed during the project. This includes details regarding the staging pad, fencing, tarping, marking, and inspection requirements.

Site Restoration, Equipment Decontamination

Following implementation of the field investigation activities, Tetra Tech and its subcontractors will demobilize the temporary office. Rental equipment will be returned, and the related agreements will be closed. Demobilization will also consist of the following field tasks:

- Removal of temporary utilities and facilities;
- Clean out of Site office/storage, including removal of computer equipment;
- Demobilization of field equipment;
- Return of rental vehicles;
- Breakdown of sample and drilling equipment decontamination areas; and
- Return of non-expendable Tetra Tech equipment to inventory.

All subcontractor equipment leaving the Site will be properly decontaminated and all IDW generated will be handled as outlined above.

2.5.2 WBS 5.2 Sampling Analysis and Validation

At the direction of USACE and EPA, the Tetra Tech will coordinate with the EPA Sample Management Office (SMO), the RSCC, and/or the LSASD regarding analytical, data validation, and quality assurance issues. Tetra Tech will follow the Region 2 FASTAC strategy in accordance with EPA requirements. Under the FASTAC process, the contractor coordinates with the EPA RSCC regarding laboratory availability prior to sampling by submitting the analytical request form (ARF). For all non-time critical data collection projects, EPA Region 2 requires that a sequential decision tree for procuring Superfund analytical services be followed, which includes:

- Tier 1: EPA Region 2 LSASD Laboratory (with ESAT support);
- Tier 2: National Analytical Services Contract laboratories (CLP), RAS and Non-RAS);
- Tier 3: Region, SAS,) Contract laboratories; and
- Tier 4: Subcontract laboratories.

Tetra Tech will provide all bottles, coolers, associated sampling equipment, and shipping costs while the EPA provides analytical and data validation services. Tetra Tech will develop a data management system, including: the submittal of EPA Region 2 electronic data deliverables, field logs, sample management and tracking procedures, document and inventory controls for both laboratory data and field measurements. The data collected during the investigation must support the RI/FS. Collected data must be evaluated for usability against project DQOs to determine whether it is appropriate for its intended use. Guidelines and protocol for EPA R2 EDD submissions are found here: https://www.epa.gov/superfund/region-2-superfund-electronic-data-submission.

2.5.3 WBS 5.3 Data Evaluation and Meeting

Tetra Tech will analyze all RI data and present the results of the analyses in an organized and logical manner so that the relationships between RI results for each medium are apparent. Tetra Tech will prepare a summary that describes: (1) the quantities and concentrations of specific chemicals at the Site and the ambient levels surrounding the Site and (2) the potential transport mechanism(s) and the expected fate of the contaminant in the environment and the identification, if any, of any other possible source of contamination. Results of the data evaluation will be presented to the USACE and EPA during a meeting at an EPA or Tetra Tech's office near the Site. For samples analyzed by LSASD and EPA CLP laboratories, definitive level data will be validated by EPA Region 2 with data validation reports to be submitted to Tetra Tech. Data generated by the EPA Region 2 LSASD laboratory in Edison, New Jersey, are considered EPA-validated, and are useable as reported and no additional data validation will be performed for LSASD-generated data. For samples analyzed by an EPA CLP subcontract laboratory, data will be submitted to Tetra Tech in Region 2 EDD format and uploaded to EPA Region 2 site for further data validation by EPA. ACM data collected as part of this investigation will be validated by Tetra Tech.

2.5.4 WBS 5.4 Remedial Investigation and Focused Human Health Risk Assessment Report

Tetra Tech will prepare the RI report and the focused HHRA report in accordance with all applicable EPA guidance. The RI Report will analyze and consolidate data, analyze existing Site background information, assess the nature and the extent of the residual contamination, and identify potential exposure pathways and potential human receptors to this contamination. The RI report will describe the quantities and concentrations of specific residual chemicals in the study area and the ambient levels surrounding this area, and the potential transport mechanism and the expected fate of the contaminant in the environment.

The focused HHRA Report will contain the following sections: Introduction; Data Summary; Hazard Identification, which will include selection of contaminants of potential concern (COPCs) and a background assessment; Exposure Assessment, which will included updating the conceptual site model (CSM); Toxicity Assessment; Risk Characterization; and Uncertainty Analysis.

The RI and focused Risk Assessment Reports will be separate documents but follow the same schedule and be submitted concurrently. The RI and focused HHRA will be provided in Draft, Draft Final, and Final versions, as described in Table 2 of the 01 August 2023 Revised Scope of Work.

2.6 WAD 6.0 Feasibility Study

2.6.1 WBS 6.1 Development and Screening of Remedial Alternatives

Tetra Tech will conduct remedial alternatives development activities in accordance with Section 4.2 of the *Guidance for Conducting RI/FS Studies under CERCL*A (EPA, 1988 or more recent guidance). Tetra Tech will perform alternative screening activities in accordance with Section 4.3 of the above referenced guidance. Tetra Tech, USACE and EPA will meet at an EPA or Tetra Tech office near the Site to discuss the remedial action objectives and preliminary remediation goals for the study area. An additional component of the FS is to identify and evaluate applicable or relevant and appropriate requirements (ARARs)

2.6.2 WBS 6.2 Detailed Analysis of Alternatives

Tetra Tech will conduct a detailed analysis and estimated costs of alternatives consistent with Chapter 6 of the *EPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*. Tetra Tech, USACE and EPA must meet at an EPA or Tetra Tech office near the Site to discuss the detailed analysis of alternatives. Tetra Tech will prepare tables summarizing the remedial alternatives evaluation for the meeting.

2.6.3 WBS 6.3 Feasibility Study

Tetra Tech will present tasks 6.1 and 6.2 in an FS report. All supporting data, information, and calculations will be included as appendices to the FS report. Tetra Tech will provide the draft FS report after consultation with EPA and USACE regarding the scope of the report. The FS Report will be provided in Draft, Draft Final, and Final versions, as listed in Table 2 of the 01 August 2023 Revised Scope of Work.

2.6.4 WBS 6.4 Bench-Scale Treatability Studies

Tetra Tech will (if necessary) conduct bench-scale treatability studies to evaluate the effectiveness of promising remedial alternatives under consideration. Bench-scale studies are important pre-design steps in determining whether a remedial technology is an implementable, cost-effective, and scalable treatment

option. A treatability study will be performed following the development of remedial alternatives to confirm potential site remedies. A successful study implementation will provide the design information required for full-scale implementation for the selected remedy. Successful bench-scale studies can justify implementing a full-scale treatment system, while failure of bench tests may indicate that the design may not work for this site.

Bench testing will be performed on a sample of the site soil and groundwater and will be used to evaluate the performance of specific aspects of the selected remedy. The study's main objective will be to evaluate whether the proposed remedy will be successful under site specific conditions. The secondary objective will be to determine the feasibility of using the specific technology to create favorable conditions for successfully reaching the cleanup goals through the remedial technology. A treatability study allows for easier manipulation and testing of many variables. If site conditions are marginal, a bench test could be useful in evaluating whether the specific remediation technology can be applied at the site before additional investment is made. Following the treatability study's completion, a Technical Memorandum will be generated based on the testing activities' results.

2.7 WAD 7.0 Post Remedial Investigation/Feasibility Study Support

Tetra Tech will be available to assist EPA and USACE by providing technical expertise and support. This may include but is not limited to preparation of figures for a public meeting or Proposed Plan and responding to oral and/or written public comments on the Proposed Plan, and/or public comments on the Proposed Plan and RI/FS reports.

3.0 PROJECT ORGANIZATION

An organization structure has been developed to identify the roles and responsibilities of the various personnel involved with the project. The structure for this project includes USACE Kansas City District, EPA Region 2, Tetra Tech, and various subcontractors and laboratory service providers. A project organization chart is presented as Figure 4.

Tetra Tech is providing support to the USACE Kansas City District for the RI/FS at the Site and will receive technical and cost direction solely from USACE. Todd Daniels is the USACE Project Manager. USACE will be the direct liaison with EPA Region 2, and USACE will be copied on all correspondence with EPA personnel. Claudia Shuman is the Remedial Project Manager for EPA Region 2.

Tetra Tech will perform RI activities for the Site under the direction of the USACE Lead Project Manager, Lee Haymon, P.G. Management of the activities to ensure the quality of work associated with the TO (and the overall contract) is the responsibility of the Program QA/QC Manager, Mark Moese, Ph.D. The Health and Safety Manager, Phillip Bartley, CIH, provides support on health and safety issues. The PHSM oversees personnel training, medical surveillance, industrial hygiene concerns, and other safety related issues, as needed.

The TO Manager for Tetra Tech will be Robert Cantagallo, CHMM. He has the primary responsibility for implementation of the scope, management of the budget, and oversight of the proposed schedule of this TO, and is the main contact for all communication with USACE during the project. He also has primary oversight over the acquisition of scientific, engineering, or additional specialized technical support and other aspects of the day-to-day activities associated with the project. The TO Manager identifies staff requirements, directs, and monitors progress, ensures implementation of quality procedures and adherence to applicable codes and regulations, and is responsible for performance within the established budget and schedule.

Project task leads and key personnel from various technical disciplines will assist the TO Manager to perform the proposed scope of work. Tetra Tech leads/key personnel are as follows:

- FS Lead – John Scaramuzzo, PE
- Field Investigation Lead – Peter Lamont, PG, CHMM
- Field Operations Lead – Alex Valli, PG
- Hydrogeologist – Seth Pitkin
- Geologist – Jody Edwards, PG
- Risk Assessors – Ronald Marnicio, Ph.D., PE
- Community Relations – Sydne Marshal, Ph.D., RPA

Technical discipline leads will oversee activities related to their expertise and provide their input, as needed, to the TO Manager.

The services of subcontractors and laboratory service providers will also be necessary for the performance of the field investigation. The Tetra Tech FOL will be the primary liaison with the subcontractors, with assistance from the Field Investigation Lead, the Analytical Services Coordinator, and/or other personnel as necessary and appropriate. The following subcontractors are expected to be contracted during implementation of the TO:

- ACM Survey;
- Utility Location;
- Direct Push Drilling;
- Downhole Borehole Geophysics;
- Well Installation and Straddle Packer Sampling;
- Surveyor; and
- Investigation Derived Waste Management Services.

In addition, Tetra Tech anticipates using the EPA Region 2 LSASD Laboratory and/or laboratories within the EPA CLP RAS program.

4.0 PROJECT SCHEDULE

Figure 5 presents the overall baseline project schedule. The schedule provides a fixed time period for each deliverable. Tetra Tech will update the schedule on a monthly basis at a minimum.

5.0 REFERENCES

Amter,S.,1981. Memorandum Regarding Hydrogeology and Geology at American Thermostat. September 1981.

Berdan, J.M., 1954. The Ground-Water Resources of Green County, New York. United States Geological Survey Bulletin GW-34, Albany, NY.

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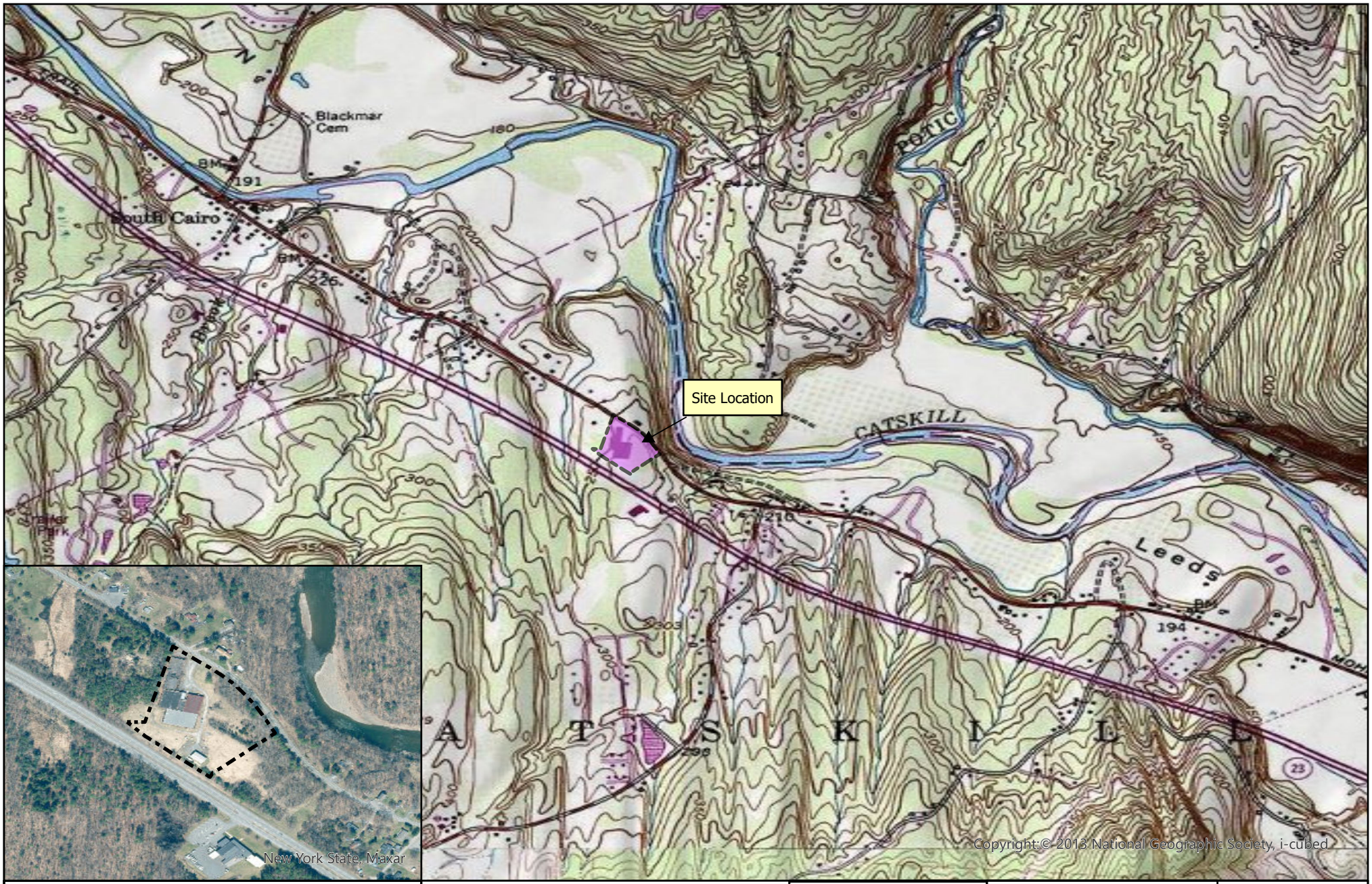
EPA, 2007. Contract Laboratory Program Guidance for Field Samples. OSWER 9240.0-44 / EPA 540-R-07-06. United States Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. Final, July 2007.

MACTEC Engineering and Geology, P.C., 2022. Final 2021 Annual Report – American Thermostat Site, NYSDEC Site No. 420006, MACTEC Engineering and Geology, P.C., Project No. 3616206098. November 2022.

USACE, 2002. Standard Operating Procedure for Groundwater Low-Flow Purging. Revised SOP for Low-flow Groundwater Purging and Sampling, Version 1.3. United States Army Corps of Engineers, Kansas City District. August 2002.

USDA, 1987. U.S. Department of Agriculture Soil Survey of Nassau County, New York. United States Department of Agriculture, Soil Conservation Service; in cooperation with Cornell University Agricultural Experiment Station.

FIGURES



Project:	American Thermostat
Location/Parcels:	2037 Co Rd 23B, South Cairo, NY 12482 Block/Lot: 119.00-12-17 & 119.00-13-18
Project Number:	194-1003-0046
Date:	August 16, 2023

BY: TETRA TECH

6 Century Drive, 3rd. Floor
Parsippany, NJ 0704
973-639-8165
www.tetratech.com

LEGEND

- Site Location
- Property Boundary

Figure ID:	Figure 1
Title:	Site Location Map
Drawn By:	S.Patel
Checked By:	P. Lamont

N

Feet

0 400 800 1,200 1,600 2,000

Project:	American Thermostat
Location/Parcels:	2037 Co Rd 23B, South Cairo, NY 12482 Block/Lot: 119.00-12-17 & 119.00-13-18
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BY:	TETRA TECH 6 Century Drive, 3rd. Floor Parsippany, NJ 0704 973-639-8165 www.tetratech.com

LEGEND

- Site Location
- Property Boundary

Figure ID:	Figure 2
Title:	Site Plan Map
Drawn By:	S.Patel
Checked By:	P. Lamont

N

Feet

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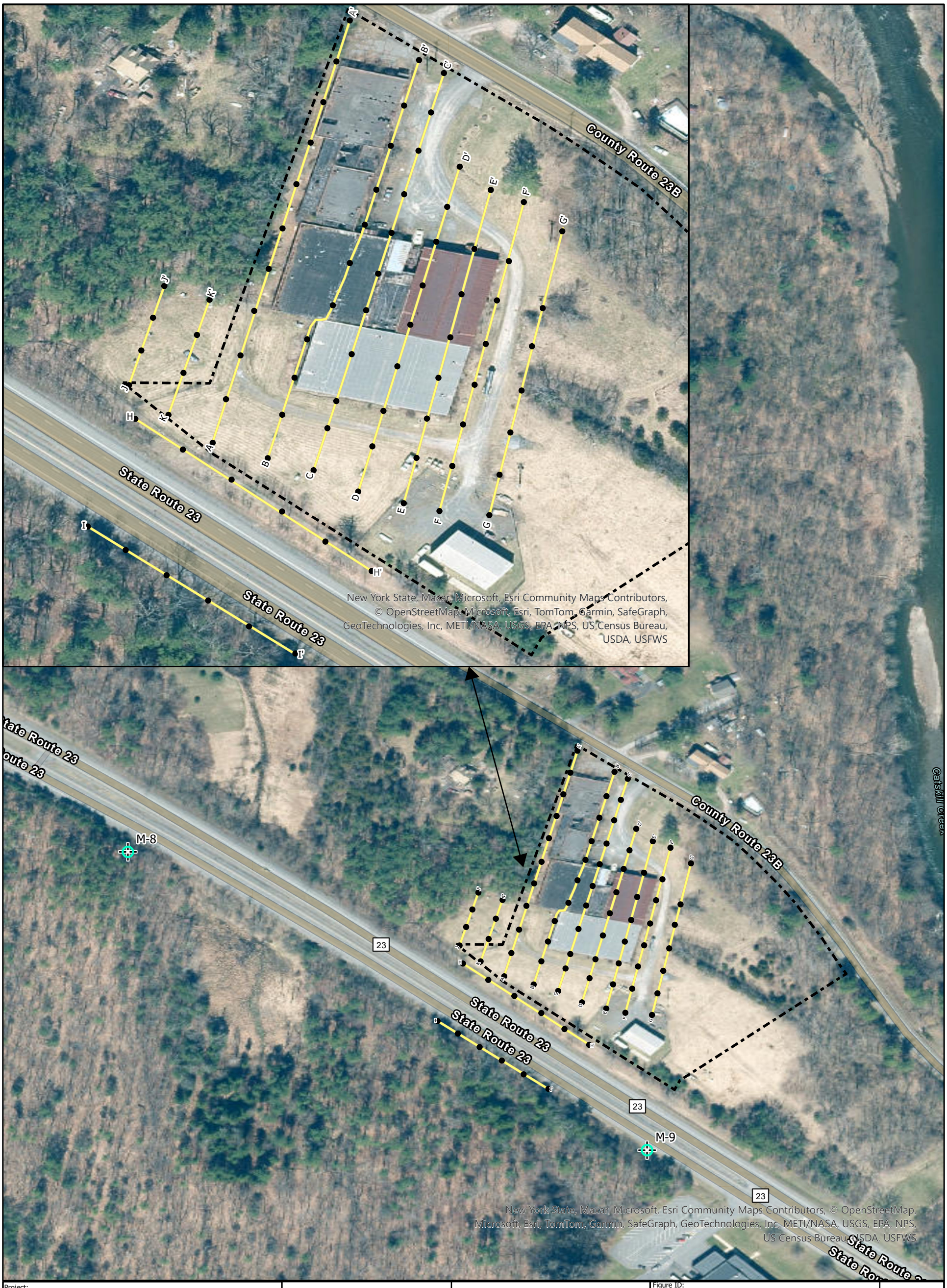

Project: American Thermostat

Location/Parcels: 2037 Co Rd 23B, South Cairo, NY 12482
Block/Lot: 119.00-12-17 & 119.00-13-18

Project Number: 194-0103-0046

Date: April 24, 2024

TETRA TECH
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Parsippany, NJ 0704
973-639-8165
www.tetratech.com

LEGEND

- Site Location
- Proposed Boring Location
- Monitoring Well
- Property Boundary
- Transcects

Figure ID: Figure 3

Title: Proposed MiHPT Borings Locations

Drawn By: S.Patel

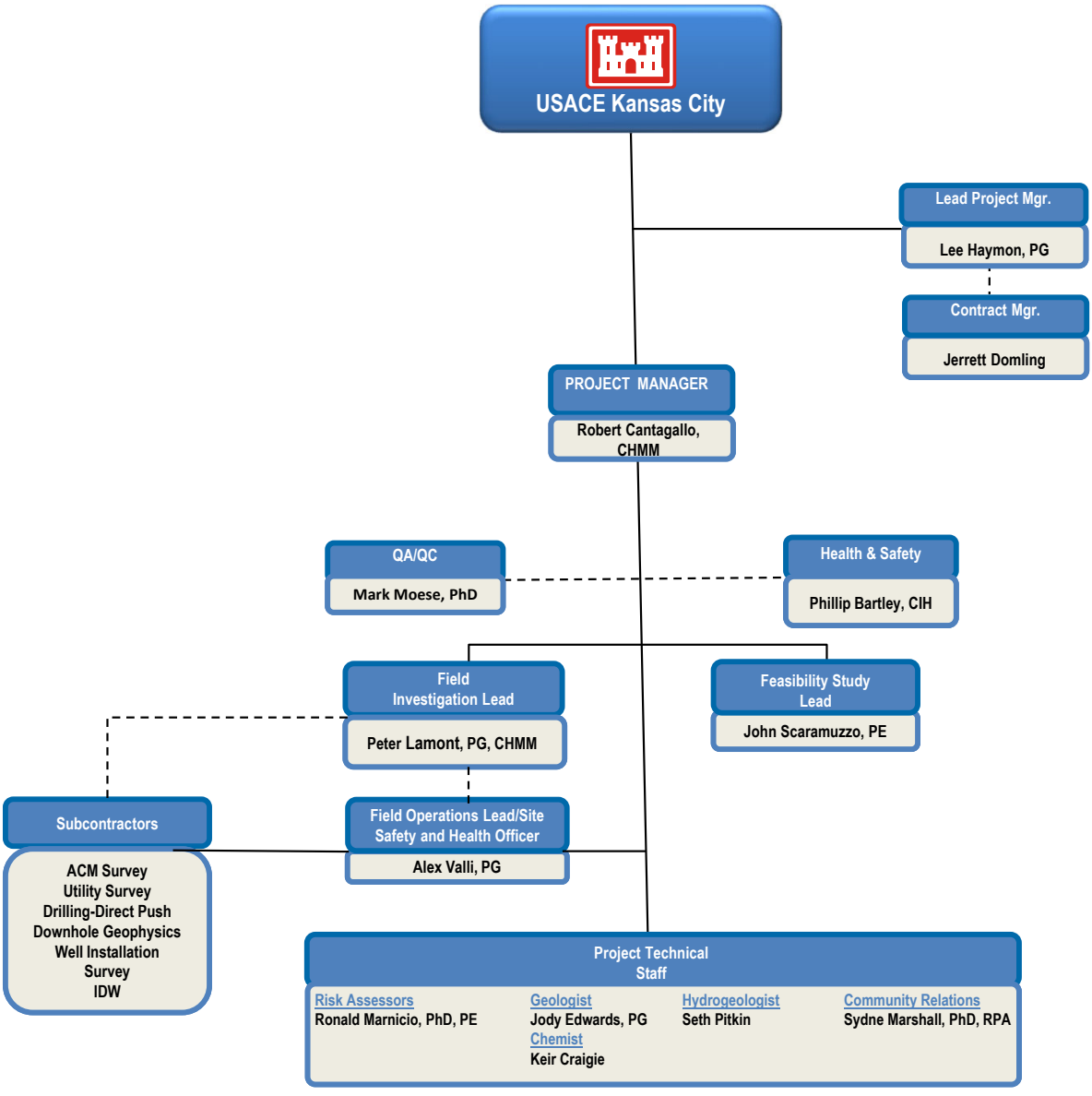
Checked By: P. Lamont

N

0 200 400

Feet

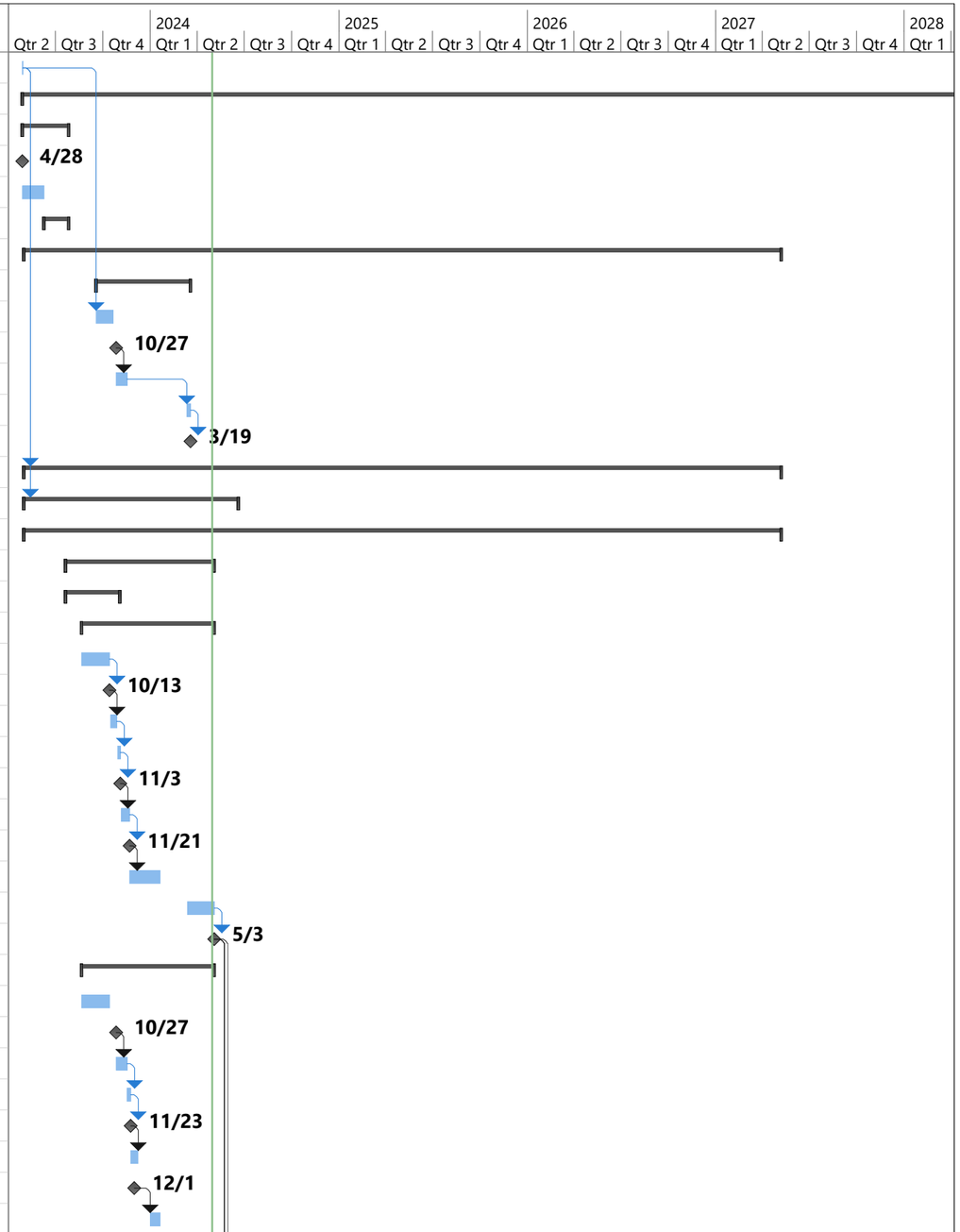
Figure 4-1
Organizational Chart



—————— Line of Authority

- - - - - - - - - - Line of Communication

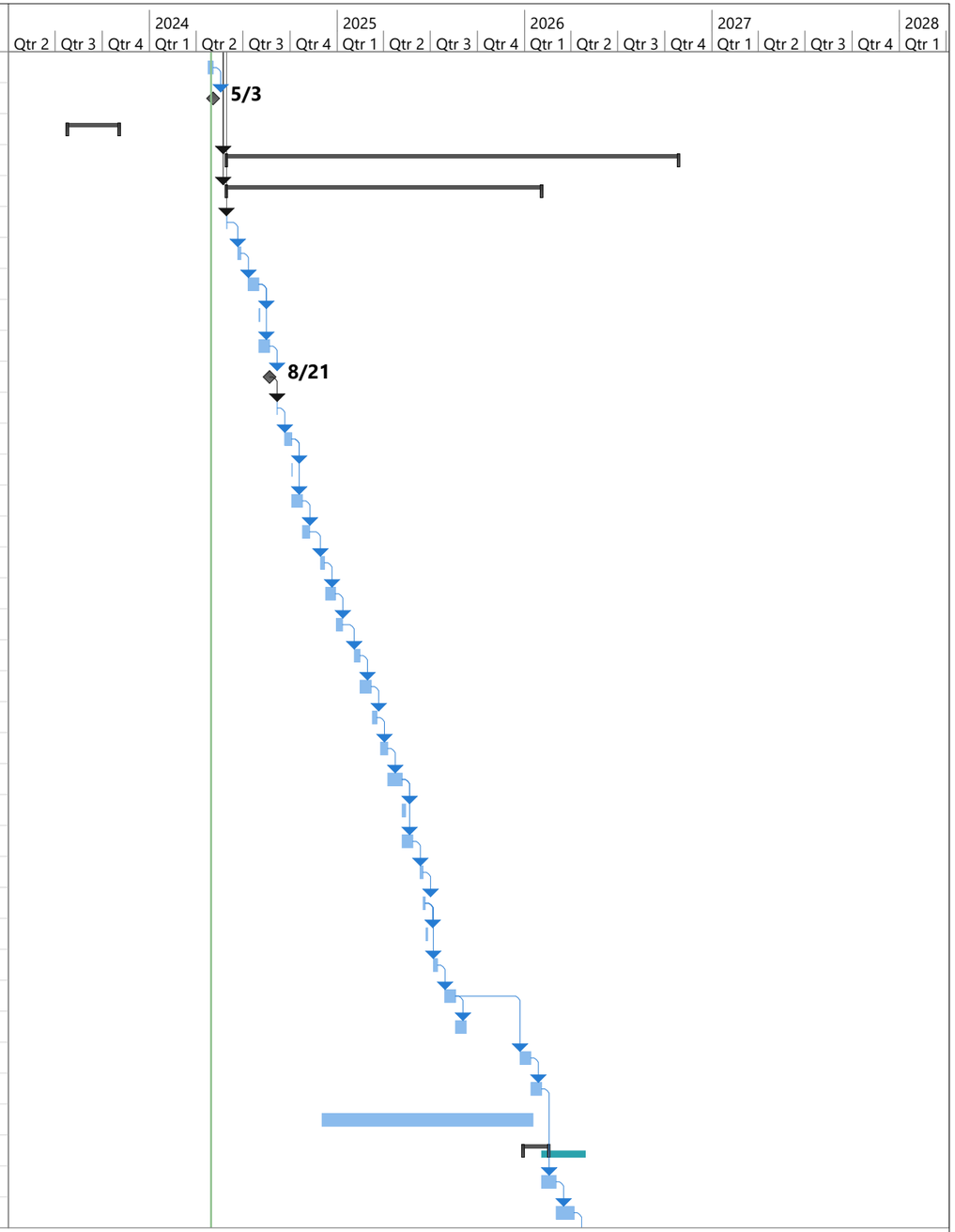
ID	Task Name	Duration	Start	Finish
1	**Notice to Proceed**	1 day	Fri 4/28/23	Fri 4/28/23
2	**WAD-01: Project Administration**	**1305 days?**	**Fri 4/28/23**	**Thu 4/27/28**
104	**WAD-02: Project Planning & Scoping**	**64 days?**	**Fri 4/28/23**	**Wed 7/26/23**
105	WAD-02: Project Planning & Scoping	0 days?	Fri 4/28/23	Fri 4/28/23
106	**WAD 02.01: Review Exisiting Data and Reports**	30 days	Fri 4/28/23	Thu 6/8/23
107	**WAD 02.02: Technical Scoping Meeting and CSM**	**34 days**	**Fri 6/9/23**	**Wed 7/26/23**
121	**WAD-03: Community Relations**	**1050 days**	**Mon 5/1/23**	**Fri 5/7/27**
122	**WAD 03.01: Develop Site's Community Involvment Plan (CIP)**	**131 days**	**Mon 9/18/23**	**Tue 3/19/24**
123	Prepare Community Involvement Plan - DRAFT	25 days	Mon 9/18/23	Fri 10/20/23
124	Community Involvement Plan - DRAFT Submittal	0 days	Fri 10/27/23	Fri 10/27/23
125	Review by USACE/USEPA	15 days	Fri 10/27/23	Thu 11/16/23
126	Prepare Community Involvement Plan - FINAL	5 days	Tue 3/12/24	Mon 3/18/24
127	Community Involvement Plan - FINAL Submittal	0 days	Tue 3/19/24	Tue 3/19/24
128	**WAD 03.02: Community Relations Support**	**1050 days**	**Mon 5/1/23**	**Fri 5/7/27**
129	**WAD 03.02.01: Public Notices Support**	**298 days**	**Mon 5/1/23**	**Thu 6/20/24**
132	**WAD 03.02.02: Public Meeting Support**	**1050 days**	**Mon 5/1/23**	**Fri 5/7/27**
154	**WAD-04: Planning Documents and Work Plans**	**206 days**	**Fri 7/21/23**	**Fri 5/3/24**
155	**WAD 04.01 Contractor Quality Control Plan**	**75 days**	**Fri 7/21/23**	**Thu 11/2/23**
163	**WAD 04.02: Remedial Investigation and Feasibility Study Work Plan**	**185 days**	**Mon 8/21/23**	**Fri 5/3/24**
164	Prepare RI/FS Work Plan - DRAFT	40 days	Mon 8/21/23	Fri 10/13/23
165	RI/FS Work Plan - DRAFT Submittal	0 days	Fri 10/13/23	Fri 10/13/23
166	USACE/USEPA Review	10 days	Mon 10/16/23	Fri 10/27/23
167	Prepare Response to Comments - DRAFT	5 days	Mon 10/30/23	Fri 11/3/23
168	Response to Comments - DRAFT Submittal	0 days	Fri 11/3/23	Fri 11/3/23
169	Prepare RI/FS Work Plan - DRAFT FINAL	12 days	Mon 11/6/23	Tue 11/21/23
170	RI/FS Work Plan - DRAFT FINAL Submittal	0 days	Tue 11/21/23	Tue 11/21/23
171	USACE/USEPA Review	43 days	Wed 11/22/23	Fri 1/19/24
172	Prepare RI/FS Work Plan - FINAL	38 days	Wed 3/13/24	Fri 5/3/24
173	RI/FS Work Plan - FINAL Submittal	0 days	Fri 5/3/24	Fri 5/3/24
174	**WAD 04.03: Uniform Federal Policy for Quality Assurance Plan**	**185 days**	**Mon 8/21/23**	**Fri 5/3/24**
175	Prepare Uniform Federal Policy for Quality Assurance Plan - DRAFT	40 days	Mon 8/21/23	Fri 10/13/23
176	Uniform Federal Policy for Quality Assurance Plan - DRAFT Submittal	0 days	Fri 10/27/23	Fri 10/27/23
177	USACE/USEPA Review	15 days	Fri 10/27/23	Thu 11/16/23
178	Prepare Response to Comments - DRAFT	5 days	Fri 11/17/23	Thu 11/23/23
179	Response to Comments - DRAFT Submittal	0 days	Thu 11/23/23	Thu 11/23/23
180	Prepare Uniform Federal Policy for Quality Assurance Plan - DRAFT FINAL	10 days	Fri 11/24/23	Thu 12/7/23
181	Uniform Federal Policy for Quality Assurance Plan - DRAFT FINAL Submittal	0 days	Fri 12/1/23	Fri 12/1/23
182	USACE/USEPA Review	15 days	Mon 1/1/24	Fri 1/19/24



Project: American Thermostat D
Date: Tue 4/30/24

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

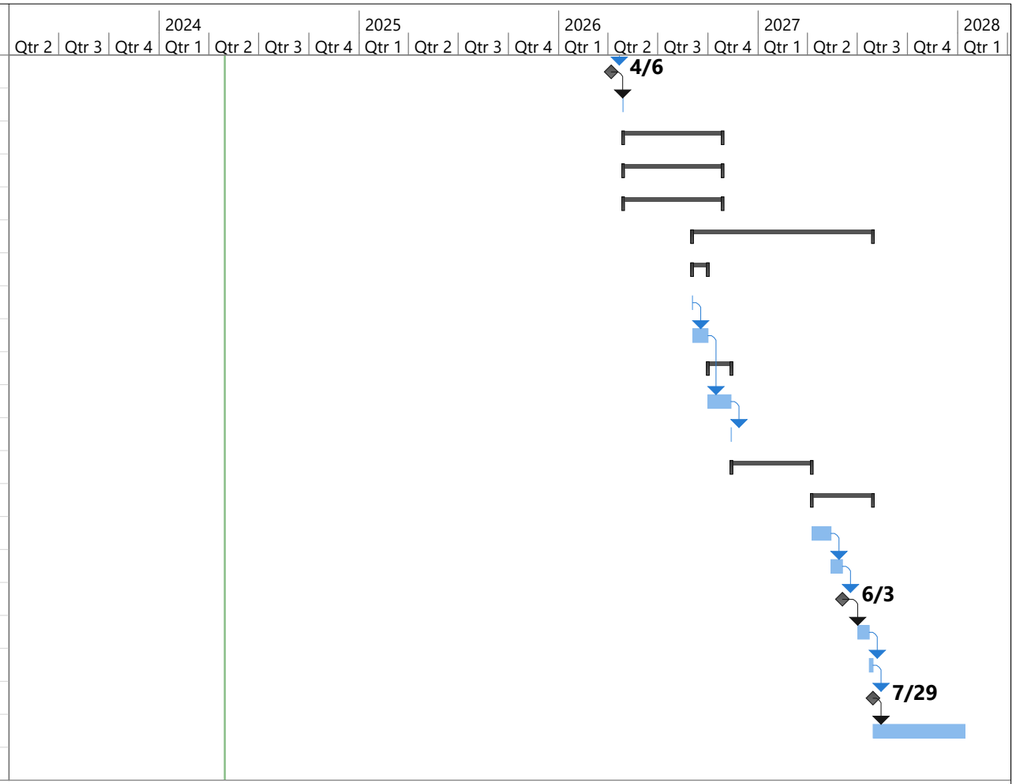
ID	Task Name	Duration	Start	Finish
183	Prepare Uniform Federal Policy for Quality Assurance Plan - FINAL	8 days	Wed 4/24/24	Fri 5/3/24
184	Uniform Federal Policy for Quality Assurance Plan - FINAL Submittal	0 days	Fri 5/3/24	Fri 5/3/24
185	**WAD 04.04: Accident Prevention Plan & Site Safety and Health Plan**	**73 days**	**Tue 7/25/23**	**Thu 11/2/23**
193	**WAD-05: Remedial Investigation**	**629 days**	**Thu 5/30/24**	**Tue 10/27/26**
194	**WAD 05.01: Remedial Investigation and Work Plan Implementation**	**438 days**	**Thu 5/30/24**	**Mon 2/2/26**
195	ACM Survey	1 day	Thu 5/30/24	Thu 5/30/24
196	Geophysical Survey/Clearance	4 days	Fri 6/21/24	Wed 6/26/24
197	HRSC MiHPT Drilling	15 days	Thu 7/11/24	Wed 7/31/24
198	Topographic Survey #1	2 days	Thu 8/1/24	Fri 8/2/24
199	HRSC MiHPT Drilling Data Evaluation	15 days	Thu 8/1/24	Wed 8/21/24
200	HRSC MiHPT Drilling Data Evaluation Submittal	0 days	Wed 8/21/24	Wed 8/21/24
201	HRSC MiHPT Drilling Data Presentation to USEPA/USACE	1 day	Thu 9/5/24	Thu 9/5/24
202	Groundwater Profiling	10 days	Fri 9/20/24	Thu 10/3/24
203	Topographic Survey #2	1 day	Fri 10/4/24	Fri 10/4/24
204	Groundwater Profiling Sample Analysis	15 days	Fri 10/4/24	Thu 10/24/24
205	Groundwater Profile Data Evaluation	10 days	Fri 10/25/24	Thu 11/7/24
206	Soil Borings	6 days	Fri 11/29/24	Fri 12/6/24
207	Soil Sample Analysis	15 days	Mon 12/9/24	Fri 12/27/24
208	Soil Sample Data Evaluation	10 days	Mon 12/30/24	Fri 1/10/25
209	Monitoring Well Drilling/Installation/Development - OVB	9 days	Mon 2/3/25	Thu 2/13/25
210	Monitoring Well Drilling/Development - Bedrock	16 days	Fri 2/14/25	Fri 3/7/25
211	Bedrock Geophysical Logging - New and Existing Bedrock MW's	7 days	Mon 3/10/25	Tue 3/18/25
212	Bedrock Borehole Groundwater Sampling	10 days	Wed 3/26/25	Tue 4/8/25
213	Bedrock Borehole Groundwater Sample Analysis	20 days	Wed 4/9/25	Tue 5/6/25
214	Install Blank FLUTe Liners	5 days	Wed 5/7/25	Tue 5/13/25
215	Bedrock Monitoring Well Data Evaluation	15 days	Wed 5/7/25	Tue 5/27/25
216	Remove Blank FLUTe Liners	4 days	Wed 6/11/25	Mon 6/16/25
217	Monitoring Well Installation - Bedrock	4 days	Tue 6/17/25	Fri 6/20/25
218	Topographic Survey #3	3 days	Mon 6/23/25	Wed 6/25/25
219	Hydraulic Testing	6 days	Mon 7/7/25	Mon 7/14/25
220	GW Sampling Event #1 (Qtr 1)	15 days	Tue 7/29/25	Mon 8/18/25
221	GW Sampling Event # 1 Sample Analysis	15 days	Tue 8/19/25	Mon 9/8/25
222	GW Sampling Event #2 (Qtr 2)	15 days	Tue 12/23/25	Mon 1/12/26
223	GW Sampling Event # 2 Sample Analysis	15 days	Tue 1/13/26	Mon 2/2/26
224	**WAD 05.02: Sampling Analysis and Validation**	295 days	Mon 12/2/24	Fri 1/16/26
225	**WAD 05.03: Data Evaluation and Meeting**	**36 days**	**Mon 12/29/25**	**Mon 2/16/26**
226	Data Analysis/Tabulation	20 days	Tue 2/3/26	Mon 3/2/26
227	Prepare Data Evaluation Summary	25 days	Tue 3/3/26	Mon 4/6/26



Project: American Thermostat D
Date: Tue 4/30/24

Task | Project Summary | Manual Task | Start-only | Deadline
Split | Inactive Task | Duration-only | Finish-only | Progress
Milestone | Inactive Milestone | Manual Summary Rollup | External Tasks | Manual Progress
Summary | Inactive Summary | Manual Summary | External Milestone

ID	Task Name	Duration	Start	Finish
228	Data Evaluation Summary - Submittal	0 days	Mon 4/6/26	Mon 4/6/26
229	Data Evaluation Summary Meeting (USACE/USEPA)	1 day	Tue 4/28/26	Tue 4/28/26
230	**WAD 05.04: Remedial Investigation, Focused HHRA Report**	**130 days**	**Wed 4/29/26**	**Tue 10/27/26**
231	**RI Report**	**130 days**	**Wed 4/29/26**	**Tue 10/27/26**
244	**Focused HHRA Report**	**130 days**	**Wed 4/29/26**	**Tue 10/27/26**
257	**WAD-06: Feasibility Study**	**237 days**	**Wed 9/2/26**	**Thu 7/29/27**
258	**WAD 06.01 Development & Screening of Remedial Alternatives & Meeting**	**21 days**	**Wed 9/2/26**	**Wed 9/30/26**
259	Development & Screening of Remedial Alternatives Meeting	1 day	Wed 9/2/26	Wed 9/2/26
260	Prepare Development & Screening of Remedial Alternatives	20 days	Thu 9/3/26	Wed 9/30/26
261	**WAD 06:02: Detailed Analysis of Alternatives and Meeting**	**31 days**	**Thu 10/1/26**	**Thu 11/12/26**
262	Prepare Detailed Analysis of Alternatives	30 days	Thu 10/1/26	Wed 11/11/26
263	Detailed Analysis of Alternatives Meeting	1 day	Thu 11/12/26	Thu 11/12/26
264	**WAD 06:03: Feasibility Study Report**	**105 days**	**Fri 11/13/26**	**Thu 4/8/27**
276	**WAD 06:04: Bench-Scale Treatability Testing**	**80 days**	**Fri 4/9/27**	**Thu 7/29/27**
277	Bench-Scale Treatability Testing	25 days	Fri 4/9/27	Thu 5/13/27
278	Prepare Bench-Scale Technical Memo - DRAFT	15 days	Fri 5/14/27	Thu 6/3/27
279	Bench-Scale Technical Memo - DRAFT Submittal	0 days	Thu 6/3/27	Thu 6/3/27
280	USACE/USEPA Review	15 days	Fri 7/2/27	Thu 7/22/27
281	Prepare Bench-Scale Technical Memo - FINAL	5 days	Fri 7/23/27	Thu 7/29/27
282	Bench-Scale Technical Memo - FINAL Submittal	0 days	Thu 7/29/27	Thu 7/29/27
283	**WAD-07: Post Remedial Investigation/Feasibility Study Support**	120 days	Fri 7/30/27	Thu 1/13/28
284	**WAD-08: Fixed Fee**	**0 days**	**Tue 11/8/22**	**Tue 11/8/22**



Project: American Thermostat D
Date: Tue 4/30/24

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

APPENDIX A

UNIFORM FEDERAL POLICY - QUALITY ASSURANCE PROJECT PLAN

APPENDIX B

ACCIDENT PREVENTION PLAN

APPENDIX C

COMMUNITY AIR MONITORING PLAN

APPENDIX C

COMMUNITY AIR MONITORING PLAN

Exclusion zones will be established at each area of subsurface investigation (e.g., borings, wells, etc.). Periodic monitoring will be conducted and recorded upwind and downwind of the exclusion zone. Real-time air monitoring for volatile compounds will be conducted at the perimeter of the exclusion zones..

Volatile organic compounds will be monitored using a PID with data logging capabilities.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

    - All readings will be recorded in the field logbook and be available for State (NYSDEC & NYSDOH) personnel to review.

<u>Vapor Emission Response Plan</u>

If the organic vapor level is above 50 ppm over background at the perimeter of the exclusion zone, work activities will halt and odor control contingencies will be implemented. When work shutdown occurs, downwind air monitoring as directed by the ESS will be implemented to ensure that vapor emissions do not impact the nearest residential or commercial structure.

If organic vapor levels greater than 25 ppm over background are identified 200 feet downwind from the investigation site, or half the distance to the nearest residential or commercial property line, whichever is less, all work must cease. If, following cessation of work activities and implementation of odor control contingencies, organic vapor levels persist above 25 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the exclusion zone, then air quality must be monitored within 20 feet of the perimeter of the nearest residential/commercial structure (the “20 foot zone”).

If organic vapor levels approach 25 ppm above background within the “20 foot zone” for a period of more than 30 minutes, or organic vapor levels greater than 50 ppm above background for any time period occur within the “20 foot zone”, then the following steps will be taken:

- The local police/authorities will immediately be contacted by the ESS and advised of the situation.

- Frequent air monitoring will be conducted at 30-minute intervals within the 20 foot zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the EL.
- All emergency contacts will go into effect as appropriate.
- If readings fail to drop below 25 ppm after 30 minutes the borehole will be sealed.