INTERIM MEASURES REMEDIATION WORK PLAN
Frankfort Indiana Site
555 North Hoke Avenue
EPA ID No. IND001647460

Montrose Project No. 20204123

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List of Acronyms and Abbreviations

AOC	Area of Concern
amsl	Above Mean Sea Level
BTEX	Benzene, Toluene, Ethyl Benzene, and xylenes
CA	Corrective Action
cis-1,2-DCE	cis-1,2-Dichloroethene
CSM	Conceptual Site Model
CVOCs	Chlorinated Volatile Organic Compounds
DQO	Data Quality Objective
DO	Dissolved Oxygen
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatograph
HASP	Health and Safety Plan
HQ	Hazard Quotient
IDEM	Indiana Department of Environmental Management
IMIR	Interim Measures Investigation Report
ICM	Interim Corrective Measures
IMI	Interim Measures Investigation
IMWP	Interim Measures Work Plan
IMRWP	Interim Measures Remediation Work Plan
L	Liter
MCL	Maximum Contaminant Limit
MDL	Method Detection Limit
mg/L	Milligrams per Liter
ml	Milliliter
m	Meter
PCE	Perchloroethylene
PRT	Geoprobe's Post Run Tubing
RFI	RCRA Facility Investigation
RISC	Risk Integrated System of Closure
SOP	Standard Operating Procedure
SLVE	Screening Level Vapor Exposure
SSI	Supplemental Site Investigation
TCE	Trichloroethene
ug	Microgram
UIC	Underground Injection Control
USGS	U.S. Geological Survey
VISL	Vapor Intrusion Screening Level
VOCs	Volatile Organic Compounds
VI	Vapor Intrusion
VC	Vinyl Chloride

Executive Summary

Montrose Environmental Solutions, Inc. (Montrose - formerly known as Advanced GeoServices Corp.), on behalf of the Exide Environmental Response Trust (EERT or Trust), performed an Interim Measures Investigation (IMI) to address impacts to groundwater from volatile organic compounds (VOCs) and chlorinated VOCs (CVOCs) at the former Exide Technologies (Exide) facility located at 555 North Hoke Avenue in Frankfort, Indiana (EPA ID# IND 001 647 460) (hereafter, the Site). The 2021 investigation work was performed during September and December 2021 in accordance with the Interim Measures Work Plan (IMWP or Work Plan) issued by Montrose on August 30, 2021. The Interim Measures Investigation Report (IMIR) was submitted to EPA on April 29, 2022. EPA provided comments on the IMIR on June 2, 2022 and the Revised IMIR was submitted to EPA on July 29, 2022. EPA approved the Revised IMIR on August 29, 2022.

Groundwater in on-Site monitoring wells is impacted with VOCs and CVOCs. During the Interim Measures Investigation, the trichloroethene (TCE) concentrations detected were 49.1 ug/L at MW-1, and 187,000 ug/L at MW-4. Off-Site monitoring well MW-9 contained 1.8 ug/L TCE, 3,210 ug/L of cis-1,2-dichloroethene (cis-1,2-DCE), and 957 ug/L vinyl chloride (VC). The CVOC concentrations decrease quickly with distance away from MW-4. The previous In Situ Microcosm study suggests there is a strong potential for the complete anaerobic reductive dechlorination of PCE and TCE under both bioaugmentation (SDC-9) and Slow Release Substrate (SRS) amendment at this Site provided that the subsurface can adequately transmit amendments through the area of impact given the low-permeability subsurface soil.

The proposed supplemental investigation will precede the Interim Measures Remediation activities and includes installation of three (3) additional monitoring wells around MW-1, well gaging and surveying, developing groundwater elevation contour maps, sampling groundwater for CVOCs and bio parameters, off-site sanitary sewer camera studies, and assessment and sampling of Outfall Z.

The Interim Measures Remediation activities will include excavation of approximately 1,000 tons of CVOC impacted soils from the area adjacent to monitoring well MW-4, construction of an infiltration gallery to allow injection of organic substrate to stimulate native microorganisms to degrade the chlorinated solvents to innocuous end products such as ethene and ethane. The City of Frankfort will be contacted to inform them of the planned Site activity and obtain any local construction permits that may be needed. Montrose will also complete an Underground Injection Control (UIC) Permit Application for submission to EPA (if required). The geology of the Site has been extensively discussed in Section 3.0 of the 2019 RFI report and in Section 1.0 of the IMIR. Based on the local site geology, the area of CVOC impact has been limited by the low permeability of the subsurface combined with the low rate of groundwater flow. Excavation has been selected as the most effective way to remove the mass of CVOCs from the subsurface.

Without the mass removal achieved by excavation, the subsurface does not appear to be able to adequately transmit amendments through the area of impact given the low permeability subsurface soil. The available Site geological and hydrogeological data indicate that using amendment injections as the sole means to remediate contamination would be an unacceptably long process. Therefore, the primary remediation activity is source removal via excavation and proper disposal in an off-site disposal facility. The injections proposed are considered a polishing step to address residual, unexcavated CVOCs in the subsurface near MW-4. Given the geology, injection of amendment without excavation would not be effective as the sole remedy for the high CVOCs observed in the area of MW-4. Injections are appropriate for the low level CVOCs in the area of MW-1 since there does not appear to be a known source or large mass of CVOCs.

Anaerobic bioremediation of chlorinated solvents using an in situ reductive dehalogenation process is a relatively proven technology that has been well documented on numerous properties. Abiotic reductive dechlorination is a chemical degradation reaction where a chlorinated hydrocarbon is degraded (i.e., reduced) by reactive compounds. The injection material is planned to be a slowly-biodegradable food-grade soy bean oil with proprietary additives named SRS™ (Slow Release Substrate), or equivalent. The budget and schedule assumes that two injection events will be completed in the areas proximal to MW-1 and MW-4.

In addition to VOCs via EPA Method 8260, select wells (downgradient of MW-4 and MW-1) will be sampled for baseline bio parameters to evaluate the effects of the injected amendment to create conditions conducive for reductive dechlorination, such as dissolved oxygen, methane, sulfate, carbon dioxide, methane, ethane, ethene, chloride, nitrate, sulfate, alkalinity, pH, total organic carbon (TOC), total plate count, phosphate, ferrous iron, and ammonia nitrogen. Information from the bio parameters analysis will allow evaluation of the effects of the injected amendment to create conditions conducive for reductive dechlorination.

Performance criteria will be evaluated by assessing the specific performance issues such as 1) ability to uniformly distribute substrate, 2) achieving optimal geochemical conditions, 3) reduction of dissolved CVOCs in monitoring wells, 4) secondary water quality parameters, and 5) substrate longevity. The working hypothesis is that the decaying biomass may sustain anaerobic degradation processes for a period of months to perhaps a year or more. TCE, cis-1,2 DCE, and vinyl chloride concentrations should show a reduction in nearby monitoring wells. The reductions should correlate with increased concentrations of total organic carbon (TOC), ethane, and ethene.

At the completion of the construction of the project and the first injection event, Montrose will prepare and submit an Interim Measures Report to EPA. The IM Report shall document that the project is consistent with the information in this work plan and that the interim measures are performing adequately. The IM Report will suggest an outline of the expected path forward in the RCRA process.

Two rounds of performance monitoring are anticipated 90 days after each of the two injection events that are conducted during the first year of the Interim Measures remediation. After two rounds of performance monitoring, annual sampling of all monitoring wells for CVOCs is anticipated to be conducted for an additional four years. The four-year period was selected to establish the Probabilistic Cost Scenario presented in Appendix A and future results will be evaluated to determine if further performance monitoring is necessary. The scope, duration, and necessity of future groundwater monitoring will be established in consultation with the EPA.

Montrose's opinion of probable cost for the supplemental investigation and proposed remediation is approximately $790,000.00. This budget includes two injections and two performance monitoring sampling events the first year, and an additional annual monitoring for four more years.

If the 1,000 tons of soil to be disposed of is determined to be hazardous waste, then the total costs increases to approximately $1,100,000. To manage this risk in advance, the soil will be sampled in-place by soil borings and be pre-characterized prior to initiating the excavation. If the soil is classified as hazardous waste, then the width and depth of the excavation may be adjusted downward in consultation with the Trust and the EPA. This will reduce the amount of source material that is removed, while preserving as much of the infiltration gallery size as possible.

1.0 Introduction

1.1 Overview

Montrose Environmental Solutions, Inc. (Montrose – formerly known as Advanced GeoServices Corp., or AGC), on behalf of the Exide Environmental Response Trust (EERT or Trust), performed an Interim Measures Investigation (IMI) during September and December 2021 to address impacts to groundwater from volatile organic compounds (VOCs) and chlorinated VOCs (CVOCs) at the former Exide Technologies (Exide) facility located at 555 North Hoke Avenue in Frankfort, Indiana (EPA ID# IND 001 647 460) (i.e., the Site). The investigation work was performed in accordance with the Interim Measures Work Plan (IMWP or Work Plan) issued by Montrose on August 30, 2021. Montrose performed fieldwork in the fall of 2021 to collect information on current environmental conditions near a solvent impacted area on the east side of the Site along Kelley Avenue. The work included the collection of groundwater, surface water, soil, sediment, soil vapor, and sewer line vapor samples.

The Interim Measures Investigation Report (IMIR) was submitted to EPA on April 29, 2022. EPA provided comments on the IMIR on June 2, 2022 and the Revised IMIR was submitted to EPA on July 29, 2022. EPA approved the Revised IMIR on August 29, 2022. The data is being used to develop an interim remedy to clean up the solvent impacted area as described herein.

The Interim Measures Remediation Work Plan (IMRWP) was initially submitted to the EPA on November 28, 2022. EPA provided comments on the IMRWP on February 24, 2023. This revised IMRWP has been updated to address the EPA comments, as well as several follow-up comments sent by an EPA email dated June 14, 2023.

1.2 Background

1.2.1 RCRA Facility Investigation

Montrose conducted a Comprehensive RCRA Facility Investigation (RFI) at the Site and presented the results of the RFI and Interim Corrective Measures (ICM) activities in an AGC report titled Comprehensive RFI Report dated February 24, 2021 (RFI Report). The RFI was completed as part of the RCRA Corrective Action (CA) process. Investigation of groundwater in May and July 2018 showed impact to groundwater in on-site monitoring wells from volatile organic compounds (VOCs) and chlorinated VOCs (CVOCs). The RFI Report recommended conducting focused investigation activities to define the movement of groundwater and groundwater contamination in the area north and east of MW-4, for the ultimate purpose of proceeding with interim measures for chlorinated VOCs.

1.2.2 Interim Measures Investigation Report

As presented in the Revised IMIR, the focused investigation activities included additional groundwater sampling and analysis for VOCs and CVOCs. The investigation also included the collection of representative soil gas samples using permanent soil gas sampling points and probes and direct push methods from select locations. Vapor samples were collected from sanitary and storm water manholes for analysis for VOCs and CVOCs.

Groundwater in on-Site monitoring wells is impacted with VOCs and CVOCs. During the Interim Measures Investigation, the TCE concentrations detected were 49.1 ug/L at MW-1, and 187,000 ug/L at MW-4. Off-Site monitoring well MW-9 contained 1.8 ug/L TCE, 3,210 ug/L cis-1,2-DCE, and 957 ug/L vinyl chloride. The TCE impact at MW-1 is over 500 feet from MW-4. The CVOC concentrations decrease quickly with distance away from MW-4. The source of CVOCs is suspected to be associated with AOC-

3/UST-2 because CVOC impacts were within 20 feet of UST-2. The In Situ Microcosm study suggests there is a strong potential for the complete anaerobic reductive dechlorination of PCE and TCE under both bioaugmentation (SDC-9) and Slow Release Substrate (SRS) amendment at this Site provided that the subsurface can adequately transmit amendments through the area of impact given the low-permeability subsurface soil.

EPA approved the IMI Report with the following comments (see Appendix A):

1. “The IMI Report includes recommendations for additional investigation of the MW-1 area to define the extent of contamination. As part of that forthcoming work, the EERT should attempt to identify the source of the contamination. Additionally, Section 3.12 (Microbial Insights Results) of the IMI Report states that the microbial and functional gene data indicate high potential for the complete reductive of tetrachloroethene (PCE) and trichloroethene (TCE) to ethene at well MW-1 using the Bioaugmentation Bio-Trap Unit. As part of the Interim Measures Work Plan (IMWP), include the MW-1 area in scoping and implementation of the interim measures at MW-4 to determine if reductive would provide a meaningful and cost-effective reduction in contamination at MW-1.
2. As part of the IMWP development, include a plan to collect an additional round(s) of soil gas samples as part of IM fieldwork.
3. As part of the IMWP, the EERT should proceed with including assessment and mitigation of any facility contamination that is infiltrating into sanitary sewer piping.
4. The EERT should develop an Interim Measure to cease the stormwater discharges to the creek at Outfall Z and to stormwater infrastructure on Washington Avenue.”

1.2.3 Facility Location and Description

The Site is located in central Indiana within Clinton County, approximately 50 miles northwest of Indianapolis (Figure 1). The Site is bounded by North Hoke Avenue to the west, Kelley Avenue to the east, Michigantown Road to the north (also referred to as Washington Street on some maps), and Norfolk Southern railroad tracks to the south (see Figure 2). The Site consists of eighteen (18) contiguous parcels now owned by the Trust which encompass approximately 13.7 acres. All but three of the parcels are located within a perimeter security fence. The majority of the area (12.1 acres) lies within the perimeter security fence, and with the exception of grass and a few shrubs along North Hoke Avenue is covered with former building pads, pavement or crushed stone. The facility was formerly a manufacturing plant that produced lead-acid automotive batteries. The plant was closed and the aboveground infrastructure was decontaminated and demolished January 2013.

1.2.4 Local Geology

The soil and unconsolidated materials in the subsurface of the Site consist of glacial till which is unsorted glacial sediment that washes off of retreating glaciers. The soil has been mapped as the Fincastle-Crosby soils. This is a silty loam with slow infiltration rates and is somewhat poorly drained. The area is characterized by swell and swale topography. Fincastle soils are typically observed on rises and have a brown silt loam surface layer, and yellowish brown, mottled silty clay loam to clay loam subsoil. Crosby soils are found on high rises and have a brown silt loam surface layer, and yellowish brown, mottled silty clay loam, clay loam, and loam subsoil. The hydraulic conductivity (K) in these regional silt and clay deposits is low which makes these deposits semi-pervious. Slug testing of select monitoring wells has indicated that vertical hydraulic conductivities range from 0.0004 to 0.0088 feet/day, values that are consistent with glacial till. As stated, the area of CVOC impact has been limited by the low permeability of the subsurface combined with the low rate of groundwater flow. Excavation has been selected as the most effective way to remove the mass of CVOCs from the subsurface.

Without the mass removal achieved by excavation, the subsurface does not appear to be able to adequately transmit amendments through the area of impact given the low permeability subsurface soil. The available site geological and hydrogeological data indicate that using amendment injections as the sole means to remediate contamination would be an unacceptably long process. Therefore, the primary remediation activity is source removal via excavation and proper disposal in an off-site disposal facility. Figure 3 shows the target excavation area. The injections proposed are considered a polishing step to address residual, unexcavated CVOCs in the subsurface near MW-4. Given the geology, injection of amendment without excavation would not be effective as the sole remedy for the high CVOCs observed in the area of MW-4. Injections are appropriate for the low level CVOCs in the area of MW-1 since there does not appear to be a known source or large mass of CVOCs. Previous falling head slug tests performed at the Site indicated that injecting water into monitoring well bores would induce some localized flow away from the well bore along localized zones of preferred migration, such as sand stringers.

1.2.5 Local Hydrogeology

Shallow groundwater is present in the glacial till cap that is 65 to 195 feet thick and overlays the layers of sand and gravel. Shallow groundwater is present as local perched zones of saturation in clay and small local sand and silt layers. The depth and thickness of the saturated layers varied from four to ten feet below ground surface, and appear to be laterally discontinuous. Montrose has prepared several cross-sections shown on Figure 4 – Cross Section Map View

Cross Section A – A’ along Kelley Avenue: MW-3, MW-14, MW-4, MW-12, MW-6 (Figure 5);

Cross Section B- B’ from east to west: MW-11, MW-9, MW-4, MW-8 (Figure 6);

Cross Section C – C’ on the facility southern end: MW-6 to MW-5 (Figure 7);

Cross Section D-D’ facility north side: MW-7, MW-1, MW2 (Figure 8);

Cross Section E-E’ facility north side: MW-10 to MW-1 (Figure 8); and

Cross Section F-F’ facility western side: MW-7, MW-8, MW-5 (Figure 9)

The cross sections show the proposed area of soil to be excavated as well as the elevation of groundwater, groundwater sample collection locations, groundwater sample results, sample dates and the geologic material logged during the RI and subsequent investigations.

The depth to the water table measured in the 14 monitoring wells at the Site range from 1.89 to 8.83 feet below top of casing. The underlining aquiclude was encountered in all of the groundwater monitoring well locations and consisted of a very stiff to hard gray clayey Silt to silty Clay with trace amounts of sand and/or gravel. The perched groundwater near MW-4 was 4.43 feet below top of casing in December 2021 and groundwater flows very slowly generally towards the north.

The groundwater flow rate calculated in the Revised IMIR is extremely slow (0.02409 foot per year at MW-4) due to laterally extensive low-permeability glacial tills combined with a low groundwater gradient. Data indicates that it can take years or even decades for groundwater to flow 1.0 foot horizontally at the Site under natural hydraulic gradients. During slug testing of monitoring wells, water added to a well bore relatively quickly infiltrated to the subsurface.

The excavation activity also provides an opportunity to increase the hydraulic conductivity in a limited backfilled area, and increase the hydraulic gradient in order to address residual CVOCs in the subsurface. Under natural conditions, low hydraulic conductivity combined with low hydraulic gradient results in low horizontal groundwater flow velocity. As stated, the falling head slug tests performed at the Site indicated that injecting water into monitoring well bores would induce some localized flow away from the well bore along localized zones of preferred migration, such as sand stringers. With the exception of monitoring well MW-7, it was observed in monitoring wells at the Site (MW-1, MW-3, MW-4, MW-7, MW-9, and MW-10) that the water level in the well bore had regained 80% of its initial static within three hours. This indicates that some flow can be induced by increasing hydraulic gradient via injecting water or aqueous solutions. Such injections are intended as a polishing step to address residual CVOCs that have migrated down hydraulic gradient. Post-injection monitoring of downgradient monitoring wells will provide data that can be used to base future decisions and actions at the Site.

EPA has suggested that contingency plans for injecting amendments may have to be developed to help offset potential challenges caused by the low permeability subsurface soil. This could include injection of amendments directly into well MW-9. While this is certainly a possibility, Montrose would like to assess the effectiveness of the current IMRWP and not make contingency plans, which could include a host of future actions, such as increasing injection pressures or the use of a Hornet Tool^{TM}. Injecting into MW-9 is a viable option, but seeing a reduction in the elevated concentrations of CVOCs at MW-9 from on-site source removal and amendment injections is also possible.

1.2.6 Local Hydrology

A small unnamed drainage ditch (which receives flow from Outfall Z) is present 250 feet north of the northeastern most corner of the Site. This drainage ditch flows north to Prairie Creek, which flows to the South Fork of Wildcat Creek approximately 1.2 miles north of the Site.

The South Fork of Wildcat Creek and its tributaries, including Kilmore Creek, drain the middle part of the county. The Wildcat Creek watershed and the Sugar Creek watershed. Both of these flow into the Wabash River watershed, which is the largest watershed in Indiana. The Wabash River flows into the Ohio River, which flows into the Mississippi River.

1.3 Scope of Work Outline

The following outline lists the work steps to be conducted under this interim measures work plan:

1. **Supplemental Interim Investigation**
    a. Well gauging the monitoring well network (currently 14 monitoring wells) to measure groundwater elevation.

    b. Inspect Outfall Z and conduct confirmatory sampling of surface water from the outfall to be sent to Pace Analytical for analysis for VOC using EPA Method 8260 and lead analysis.

    c. Visually walk the stormwater drainage feature that receives Outfall Z and confirm it connects with the unnamed tributary that eventually connects with Prairie Creek.

    d. To inspect the sanitary sewer piping along North Kelly Avenue, a sewer video camera head connected to a flexible cable will be inserted into Manholes B and C (see Figure 2) and the sewer will be inspected for potential evidence of piping connections between the sanitary sewer and the Frankfort Site.

e. The sanitary sewer along Washington Avenue will be inspected by inserting the sewer video camera in Manhole L and run in either direction (NE and SW) along the road. The sewer will be inspected for potential evidence of piping connections between the sanitary sewer and the Frankfort Site.

f. The previously installed vapor point locations will be inspected for whether they are dry or in a saturated condition. If the vapor points are not saturated, they will be sampled for TCE, PCE, cis-1,2-DCE, VC, and BTEX at Pace Analytical Laboratory.

g. Five new monitoring wells will be installed around MW-1. One upgradient and two down gradient wells will be installed within approximately 20 to 25 feet of MW-1 using a Geoprobe and pre-packed well screens. Two additional wells will be installed; one to the southeast of MIP-5 and one to the south of the MIP-4 location (See Figure 11). The five new wells will be designated MW-15 through MW-19. The five new wells, together with MW-1, MW-7 and MW-10 will be sampled for VOCs. The wells will also be sampled for baseline bio parameters to evaluate the effects of the injected amendment to create conditions conducive for reductive dechlorination, such as dissolved oxygen, methane, sulfate, carbon dioxide, methane, ethane, ethene, chloride, nitrate and other compounds described herein.

2. Interim Remediation

a. **MW-4 Excavation:** There are impacts to groundwater from VOCs and CVOCs in the area of MW-4. Laboratory data from the Site indicate that most of the CVOC concentrations decrease quickly with distance away from MW-4. This was confirmed with supplemental sampling. The remedial approach consists of partial source removal by excavating the on-site soil from a roughly 25 foot by 65-foot excavation down to approximately 12 feet. This will remove a volume of roughly 667 cubic yards (1,000 tons) of source contaminated material for transportation to permitted off-site treatment and/or disposal facilities as either non-hazardous or hazardous waste. MW-4 may be abandoned and subsequently removed during the excavation process, and be replaced by three standpipes (MW-4A, MW-4B, and MW-4C) to be used as injection locations during bioremediation. If piping connecting to the sewer is indicated by the sewer video camera, the excavation may be adjusted to cut and cap any piping leaving the Site. If pre-characterization of the soil indicates that it will have to be disposed of as hazardous waste, the dimensions of the excavation may be modified to reduce disposal costs as discussed in Section 2.2.6.

b. **MW-4 Infiltration Gallery Installation:** This task includes installation of the infiltration gallery network of piping, the proper gravel backfill to aid in distribution of the injected media, a geotextile geofabric to limit fines from the emplaced fill from degrading the gravel backfill placed above the completed infiltration gallery, and pavement restoration in the rectangle excavation boundary shown on Figure 3.

c. **MW-4 Bioremediation:** The excavation will be backfilled with drainage piping and stone to allow subsequent injection of the amendments to stimulate bioremediation at the remaining source area and downgradient locations. An organic substrate must be added to the groundwater via the infiltration gallery to generate the reducing conditions and provide the necessary carbon to support biodegradation of the chlorinated solvents. The injected product is anticipated to be SRS™ (Slow Release Substrate), a product patented by Terra Systems of Wilmington, Delaware, or equivalent. The amendment is a slowly-biodegradable food-grade soy bean oil, with proprietary additives. The bioremediation process stimulates in situ reductive dehalogenation of the chlorinated solvents.

d. **MW-1 Bioremediation:** The groundwater sampling results from sampling MW-1 and MW-10, and the newly installed MW-15, MW-16, and MW-17 are expected to aid in the understanding of the previously detected TCE concentration of 49.1 ug/L in MW-1. After consultation with the EPA, the well with the highest concentration will have amendment injected directly into the well to stimulate bioremediation in this area, if warranted. The other four wells will be monitored.

e. **Outfall Z Evaluation:** Based on a conversation with EPA on April 4, 2023, Montrose will collect additional information, photo documentation, and sampling data from the Site, including surface water and sediment sampling in upgradient and down gradient locations (as shown on Figure 10), and complete a Screening Level Ecological Risk Assessment for the Site as described in the revised IMRWP. The risk assessment checklist and analytical testing data will be forwarded to the EPA in a separate concise report that will have an evaluation of the need to conduct further investigations at the Site with respect to ecological evaluation.

3. **Remediation Performance Monitoring**

   a. Approximately 90 days after injecting the amendment, sampling will be conducted in the areas of MW-4 and MW-1. The MW-1 area includes MW-1, MW-10, and proposed wells MW-15, MW-16, and MW-17. The MW-4 area includes MW-3, MW-4, MW-9, MW-11, MW-12, MW-13, and MW-14. In addition to VOCs, the sampling will test groundwater for various bio parameters to allow evaluation of the effects of the injected amendment to create conditions conducive for reductive dechlorination.

   b. Two rounds of performance monitoring are anticipated 90 days after two injection events are conducted during the first year of Interim Measures remediation activity.

   c. After two rounds of performance monitoring, annual sampling of all monitoring wells for CVOCs is anticipated to be conducted for an additional four years. The four-year period was selected to establish the Probabilistic Cost Scenario presented in Appendix A and future results will be evaluated to determine if further performance monitoring is necessary. It should be noted that the scope, duration, and necessity of future groundwater monitoring will be established in consultation with the EPA. A detailed groundwater monitoring plan will be proposed in the forthcoming Completion Report discussed in Section 2.3.

1.4 Community Relations Activities

Community involvement and outreach will consist of the following efforts:

1. Contacting the Municipal Utilities Department of the City of Frankfort to arrange access to the sanitary sewer line along North Kelley Avenue;
2. Interaction with the City of Frankfort’s Building Services/ Planning/ Zoning Department to provide notice of the excavation that will occur at the Site;
3. Updating language on the website (https://www.exidefrankfortclosure.com/);

4. Potentially updating signage on the fence of the Site will be based on consultation with the EPA, and if deemed necessary by the EPA. Updates to signage would be accomplished 20 to 30 days before starting the excavation work**; and**
5. A direct mailer informing the local community of the pending work will be prepared using previously established mailing lists.

1.5 Reference Documents

The investigation and remediation activities described herein will be performed under the framework of the following Site documents:

1. *RCRA Facility Investigation (RFI) Work Plan for the Former Exide Manufacturing Facility, Frankfort, Indiana,* prepared for Exide Technologies by Advanced GeoServices Corp. dated December 21, 2018
2. *Quality Assurance Project Plan (QAPP) for the RCRA Facility Investigation, Exide Technologies Former Manufacturing Facility, Frankfort, Indiana,* prepared for Exide Technologies by Advanced GeoServices Corp. dated October 12, 2017
3. *Sampling and Analysis Plan (SAP) for the RCRA Facility Investigation, Former Exide Manufacturing Facility, Frankfort, Indiana,* prepared for Exide Technologies by Advanced GeoServices Corp. dated October 12, 2017
4. Supplemental Site Investigation Work Plan prepared for Exide Technologies by Advanced GeoServices Corp. dated December 21, 2018
5. *CVOC Remediation Evaluation* prepared by Advanced GeoServices / Montrose Environmental Group, dated January 19, 2021
6. *Interim Measure Work Plan, Frankfort Indiana Site,* prepared for Exide Environmental Response Trust by Montrose dated August 30, 2021
7. *Revised Interim Measures Investigation Report*, Frankfort Indiana Site, prepared for Exide Environmental Response Trust by Montrose dated July 29, 2022

2.0 Remediation and Investigation Activities

The following sections discuss the anticipated field activities associated with the proposed remedial activities. Field activities will follow the operating procedures presented in either the Sampling and Analysis Plan (SAP), or as discussed below. Analytical requirements and quality assurance procedures for the analysis of the samples are presented in the Quality Assurance Project Plan (QAPP). The SAP and QAPP documents apply to the necessary tasks related to collection of environmental (e.g., soil, groundwater, etc.) samples and include the quality assurance/quality control procedures (QA/QC) and associated quality control sample collection procedures, equipment decontamination procedures, investigative-derived waste management procedures, chain-of-custody and sample handling procedures, field documentation procedures, etc. Excavation equipment decontamination is discussed in Section 2.2.1.2.

2.1 Supplemental Interim Investigation

2.1.1 Monitoring Well Gauging

There are 14 monitoring wells at the Site and five additional monitoring wells are planned to be installed around well MW-1. Depth-to-water will be measured by Montrose on the Site using an electronic water level indicator after allowing wells appropriate time to stabilize after opening the locking cap. The groundwater monitoring wells will be allowed to equilibrate to atmospheric pressure for 30 minutes prior to any measurements. Each measurement will be collected at least three times in succession, or until two consecutive measurements are the same. For the purpose of creating equipotential maps, water levels will be collected from the wells within a few hours and prior to any groundwater sampling extraction efforts. The synoptic measurements will include the measurement of water levels and well depths in the monitoring wells. The field personnel will measure the water levels in the wells to the nearest 0.01 foot using the surveyed point at the top of the inner well casing for reference. The goal of the well gauging event will be to assess water table conditions and prepare a groundwater contour map.

2.1.2 Outfall Z Assessment and Resampling

Outfall Z is the where the stormwater drainage on the eastern portion of the Site drains to a small unnamed drainage ditch present 250 feet north of the northeastern most corner of the Site. This ditch is believed to flow north to join Prairie creek approximately 1.2 miles north of the Site. Montrose plans to inspect and photo document Outfall Z and also conduct confirmatory sampling of water flow, if any, from the outfall. The aqueous sample will be sent to Pace Analytical for analysis for VOCs using EPA Method 8260 and also for lead and total hardness analysis. Montrose will also sample the sediment adjacent to the outfall. Additional samples of surface water samples and sediment (upper six inches) will be collected up flow and down flow of the drainage ditch in the locations shown on Figure 10 as describe below. To the extent possible without entering private properties, Montrose will visually examine and walk the stormwater drainage that receives Outfall Z and attempt to trace its path to Prairie Creek. During surveying of the monitoring wells installed on the Site, the elevation of the bottom of the Outfall Z pipe has been measured as 838.627 feet above mean sea level.

On October 19, 2021, a sample of water from Outfall Z was collected and analyzed for VOCs and lead.

Montrose proposes to resample the water from Outfall Z and submit the samples to Pace Analytical of Indianapolis for analysis for VOCs using EPA Method 8260, lead, and total hardness.

In the event that no water is flowing at the time of sampling Outfall Z, an aqueous sample will not be collected during that visit. Montrose does not have any local representation at the Site and mobilizing personnel to the Site for the sole purpose of confirming flow would be costly and ineffective. However, Montrose is planning to mobilize to the Site several times during the Interim Measures Remediation activities. Montrose will have field personnel on the Site during the Supplemental Interim Investigation activities that will consist of installing five new monitoring wells, sampling the monitoring wells, conducting the supplemental sewer investigations (see Section 2.1.3), and assessing and potentially sampling vapor point locations. Montrose will also be on the Site to conduct the soil characterization sampling, soil excavation, Site restoration and subsequent injection of amendments. Hence, we are confident that a sample from the Outfall Z will be collected during implementation of this work plan.

Outfall Z was flowing on October 19, 2021, and a sample of the water was collected and sent to Pace Analytical for analysis for volatile organic compounds (VOCs) using EPA Method 8260 and lead analysis. The lead result was 3.4 ug/L. Two VOCs were detected: cis-1,2-Dichlorethene and Vinyl Chloride at concentrations of 5.3 and 2.1 ug/L, respectively. The Vinyl Chloride result is just above the screening level of 2 ug/L.

The screening criteria that were used during the Revised Interim Measures Investigation Report, Frankfort Indiana Site, dated July 29, 2022, were the Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) dated May 2023. The lead screening level of 15 ug/L was evaluated by the EPA. The EPA has suggested using the EPA Region 4 chronic ecological risk screening level for lead in freshwater, which is 1.25 ug/L.

Based on a conversation with EPA on April 4, 2023, Montrose will collect additional information and sampling data from the Site and complete a Screening Level Ecological Risk Assessment for the Site.

Screening Level Ecological Risk Assessment (SLERA)

Montrose plans to photo document the drainage ditch to which Outfall Z discharges to the extent practical without trespassing. On April 4, 2023, a conference call was held with EPA, EERT, and Montrose to discuss ecological risk assessment of the drainage ditch containing Outfall Z. The conclusion of the call was that Montrose will complete the Checklist for Ecological Assessment/Sampling (Appendix B of the document *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA 540-R-97-006, June 1997, aka ERAGS). The checklist has the following sections:

I. Site Description
IA. Summary of Observations and Site Setting
II. Terrestrial Habitat Checklist
IIA. Wooded
IIB. Shrub/Scrub
IIC. Open Field
IID. Miscellaneous
III. Aquatic Habitat Checklist -- Non-Flowing Systems
IV. Aquatic Habitat Checklist -- Flowing Systems
V. Wetlands Habitat Checklist

In addition, Montrose will resample the flow from Outfall Z and also the sediment adjacent to the outfall. Additional samples of surface water samples and sediment (upper six inches) will be collected up flow and down flow of the drainage ditch in the locations shown on Figure 10. The samples will be sent to Pace Analytical for analysis for VOCs using EPA Method 8260 and lead analysis.

The maximum concentrations of VOCs and lead in each sample will be compared to ecological screening values (ESVs) to determine preliminary chemicals of potential concern (PCOPCs). The results will be screened against *EPA Region 4 Ecological Risk Assessment Supplemental Guidance* (March 2018 Update) Tables 1a – 1e and Tables 2a – 2c which list chemical ESVs in surface water and sediment, respectively. Since the ESVs are based on conservative endpoints and sensitive ecological effects data, they represent a preliminary screening of PCOPCs and are not recommended as remedial action levels.

The checklist and analytical testing data will be forwarded to the EPA in a separate concise technical memorandum that will have an evaluation of the need to conduct further investigations at the Site.

2.1.3 Sewer Video Camera Inspection

To inspect the sanitary sewer piping along North Kelly Avenue, a sewer video camera connected to a flexible cable will be inserted into Manholes B and C and the sewer will be inspected for potential evidence of piping connections between the sanitary sewer and the Frankfort Site. The camera work will investigate to the south along Kelley Avenue as well as to the north in the sanitary sewers from Manholes B and C. The sanitary sewer along Washington Avenue will be inspected by inserting the sewer video camera in Manhole L and run in either direction (NE and SW) along the road.

Montrose will subcontract with an Indiana company to perform this inspection. The camera expected for use during this inspection has a minimum resolution of 720p and a maximum distance of 800 feet. Note that bends in the sewer piping may stop the camera’s progress prior to the camera reaching the full extent of its cable.

During a Site visit on December 13, 2021, The EPA observed a partially buried manhole along Hoke Avenue and has provided a photograph of the manhole to Montrose. Montrose will seek to identify this buried manhole.

The 2018 camera work related to storm sewers noted a connection to Hoke Avenue MH-11 from the east and an 8” clay inlet pipe from the south. Montrose will collect a water and sediment sample for lead and VOC analysis from MH-11 as part of the scope of this IMRWP to assess whether this could be a discharge pathway from the Site into the Washington Avenue storm sewer.

2.1.4 Vapor Point Sampling

On October 13 to 14, 2021, Montrose installed 12 soil vapor ports at the Site in the following locations:

- Six (6) along North Kelley Ave (L1 through L6),
- One (1) along Goder Drive (L13),
- One (1) along East McClurg Street (L14)
- One (1) west of North Kelly Ave. (L15).
- Three (3) within the sewer utility bedding along the east side of Kelley Avenue (locations L16, L17, and L18).

The locations were hand-augured until groundwater was encountered. The 8-inch long, stainless-steel screen of the port was positioned approximately one foot above the encountered groundwater in the borehole. Teflon tubing was connected to the screen and extended to the surface to allow sampling. The screen area was filled with sand, bentonite was placed and hydrated to the surface grade, and a bolted flush mount well vault was installed at the surface.

Leak testing and soil vapor sampling of these permanent vapor port locations was performed on October 18, 2021. Locations L1, L3, L14, L15, and L18 were the only locations that could be sampled for soil gas using this procedure. The other seven (7) locations were discovered to be saturated and produce only groundwater so these locations (L2, L4, L5, L6, L13, L16, and 17) were sampled using Geoprobe's Post Run Tubing (PRT) system. The PRT system is a EPA-approved method of collecting soil gas. The results indicated no exceedances of the Target Sub-Slab and Near Source Soil Gas Concentration VISL.

Montrose will collect an additional round of soil gas samples from the 12 permanent vapor port locations. If the vapor ports locations are not saturated, a soil vapor sample can be collected using a new Tedlar bag and a hand operated pump (or Summa-like canister) for analysis for the following parameters:

- Trichloroethene (TCE);
- Perchloroethylene (PCE);
- cis-1,2-Dichloroethene (cis-1,2-DCE);
- Vinyl Chloride (VC)
- Benzene, Toluene, Ethyl Benzene, and xylenes (BTEX);

The samples will be submitted to Pace Analytical of Indianapolis for analysis for the above parameters. If the location is saturated with groundwater, a sample will not be collected from that location. Montrose does not plan on repeating the sampling using the Geoprobe PRT sampling system at this time.

2.1.5 Monitoring Well Installation

Five (5) new monitoring wells will be installed around MW-1 as shown on Figure 11. The wells will be installed and developed in general accordance with the RFI Work Plan and SAP. The only difference is that the five new wells will be installed using a Geoprobe and pre-packed well screens. Prepacked screens consist of a standard, slotted PVC well screen pipe surrounded by a stainless steel mesh. Sand is packed between the slotted PVC and the stainless steel mesh. The five new wells will be designated MW-15 through MW-19 and will be installed up to a depth of 15 feet below grade. The wells will be surveyed by a professional surveyor licensed in Indiana.

The EPA deemed that that additional investigation is warranted in the area of groundwater monitoring well MW-1 to define the extent of trichloroethene (TCE) contamination (or identify the source of contamination). The source of TCE in MW-1 is unknown. MW-1 is approximately 50 feet down hydraulic gradient form the former building that contained SWMU-1 (Former Waste Pile), SWMU-2 (Sludge Storage Tank), SWMU-5 (WWTP and Sump), and SWMU-7 (Roll-Off Container).

There are three existing monitoring wells in the northwest corner of the Site: MW-1, MW-7, and MW-10. MW-1 has been sampled four times with the following results for TCE, cis-1,2-Dichloroethene (cis-1,2-DCE), and Vinyl Chloride (VC).

Table 2-1 MW-1 Select CVOC Data

Sample Location	IDEM 2020 Screening Levels Ground Water Tap Residential Limit, 2009 RISC TPH Closure Limits (ug/L)	IDEM 2020 Screening Levels Vapor Exposure Groundwater Indoor Air Residential Limit (ug/L)	**MW-1**	**MW-1**	**MW-1**	**MW-1**
Sample Date			5/24/2018	7/8/2018	11/9/2019	12/8/2021
Parameter			ug/L	ug/L	ug/L	ug/L
Volatiles						
TCE	5.0	9.1	15.8	19.8	18.7	49.1
cis-1,2-DCE	70	No Criteria	6.6	8.9	7.4	9.8
Vinyl chloride	2.0	2.1	ND	ND	ND	ND

ND= Not Detected

MW-1 is screened from a depth of 8 to 18 feet below grade and the depth to water is approximately 8 feet from the top of casing. Monitoring well MW-7 has been sampled four times with the following results for TCE, cis-1,2-DCE, and VC.

Table 2-1 MW-7 Select CVOC Data

Sample Location	IDEM 2020 Screening Levels Ground Water Tap Residential Limit, 2009 RISC TPH Closure Limits (ug/L)	IDEM 2020 Screening Levels Vapor Exposure Groundwater Indoor Air Residential Limit (ug/L)	**MW-7**	**MW-7**	**MW-7**	**MW-7**
Sample Date			5/24/2018	7/8/2018	11/9/2019	12/8/2021
Parameter			ug/L	ug/L	ug/L	ug/L
Volatiles						
TCE	5.0	9.1	16	9.9	ND	ND
cis-1,2-DCE	70	No Criteria	0.68	2.6	4.1	0.72
Vinyl chloride	2.0	2.1	ND	ND	ND	ND

ND= Not Detected

MW-7 is screened from a depth of 12 to 22 feet below grade and the depth to water ranges from approximately 4.5 to 7 feet from the top of casing.

Off-site monitoring well MW-10 is approximately 80 feet downgradient from MW-9 based on overall gradient to the north-northwest direction (~340°). No TCE, cis-1.2-DCE, or VC was detected in MW-10 when sampled on November 10, 2019 and on December 8, 2021. MW-10 is screened from a depth of 8 to 18 feet below grade and the depth to water ranges from approximately 2.5 to 3 feet from the top of casing.

Note that the groundwater gradient appears to turn to the north-northeast in the area of MW-1 (see Figure 4 – Potentiometric Surface Map for Shallow Groundwater December 2021 of the IMIR). In order to investigate the extent (or identify the source) of TCE in MW-1, five additional on-site monitoring wells are proposed to be installed (See Figure 11 of this Work Plan) as follows:

> MW-15 will be installed upgradient of MW-1 to the south of MW-1 toward the location of the former infrastructure associated with SWMU-1, SWMU-2, SWMU-5, and SWMU-7.
>
> MW-16 will be installed closer to MW-1 on the property line downgradient in the north-northwest direction.
>
> MW-17 will be installed on the property line downgradient in the northeast direction.
>
> MW-18 will be installed roughly between MW-1 and MW-7 but moved upgradient close to Former (UST-3) 20,000-gallon Heating Oil Tank (Closed-in-Place) to form a triangle with MW-1 and MW-7 (southeast of MIP-5)
>
> MW-19 will be installed to the south of the MIP4 location in the upgradient direction towards the SWMU-9 area.

The locations of MW-18 and MW-19 were discussed via email with USEPA dated March 24, 2023. Proposed well MW-15 is near a boring designated MiHPT-08 that was conducted in June 2019 during the RFI. At that time, Cascade Technical Services (Cascade) was retained to conduct an investigation consisting of Membrane Interface Probe – Hydraulic Profiling Tool (MiHPT) borings. MiHPT borings provide a relative response from various detectors and that data is processed to provide visualization images of potential impact in the subsurface. For the RFI investigation, Cascade's MiHPT boring tool was equipped with an Electrical Conductivity probe, a Photo Ionization Detector (PID), a Flame Ionization Detector (FID) and a Halogenated Specific Detector (XSD) and Electron Capture Detector (ECD). No concentrations or numerical measurement that can infer a contaminant concentration in groundwater are provided by Cascade's investigation methodology. Rather, the data is processed as images (or "data renderings") that allow one to "see" or visualize the extent of contamination in the subsurface.

Cascade provided a report titled "*Final Data Visualization Package for Membrane Interface Probe – Hydraulic Profiling Tool Services*" dated July 11, 2019 which was included in the 2019 RFI Report as Appendix N. Cascade's report included a 3D PDF of the Model that depicted two separate areas of impact:

1. A small, limited, area surrounding MW-7 based on responses at MiHPT-05, which had PID and FID start to spike at depth of 12 feet where refusal was encountered.

2. A relatively larger area centered around MW-4 area

No response was significant enough to show graphically in the boring done around MW-1. As stated in the IMIR dated April 29, 2022, revised July 22, 2022, the TCE impacts at MW-1 are several orders of magnitude lower than those observed at MW-4 and there is no obvious/direct connection between the two areas of impact. As seen on Table 2-2, the groundwater concentrations of TCE in MW-7 detected during 2018 are no longer above regulatory criterion based on sampling performed in 2019 and 2021.

Boring MiHPT-08 exhibited a small FID spike at approximately 15 feet below grade and no other spikes or notable responses down to 29.4 feet. Sampling at proposed monitoring well MW-15 will provide contaminant concentration in groundwater in this upgradient location.

Boring MiHPT-07 exhibited an XSD response at a depth of eight feet and relatively small PID/FID responses at depths of 8, 11, 15 and 23 feet below grade and no other responses down to 26 feet. Sampling at proposed monitoring well MW-16 will provide additional contaminant concentration in groundwater information downgradient from MW-1.

Boring MiHPT-09 exhibited relatively small PID/FID spikes near the surface and also at depths of 8 and 13 feet below grade. No other responses were evident down to a depth of 25 feet below grade. Sampling at proposed monitoring well MW-17 will provide contaminant concentration in groundwater in this downgradient location. MW-18 will be upgradient of MIHPT-6 and MiHPT-7 and will provide groundwater quality information closer to the former facility.

Soil Sampling

The five new wells will be installed up to a depth of 15 feet below grade. As directed via email from the USEPA dated March 24, 2023, soil samples will be collected for VOC analysis from the MW installation locations using the procedures described in the RFI Work Plan. A Geoprobe direct push sampler with disposable acetate sleeves will be used for soil sampling. The specific samples selected for VOC analysis will be chosen based on the highest observed field screening result measured utilizing a Photo-ionization detector (PID). When no PID hits are observed in the monitoring wells, soil samples will be taken from within the saturated zone at a depth of 10 feet below grade because chlorinated solvents (e.g., TCE, PCE) are heavier than water and sink through the groundwater column toward the bottom of the aquifer. In addition, 10 feet below grade is approximately the midpoint of the proposed well screens. During soil sampling, the acetate sleeve will be cut open and immediately screened using a photo-ionization detector (PID). Following PID screening, discrete samples for VOC analysis will be retrieved from the acetate sleeve using Terra-core, or equivalent, samplers. The samples will be placed on ice and submitted to Pace Analytical to be analyzed for VOCs/CVOCs.

As discussed in Section 2.4, soil sample results from the five new wells will be compared to:

- IDEM 2023 Risk-Based Closure Guide (R2) Published Level Tables effective March 1, 2023
- USEPA Regional Screening Level (RSL) Summary Table (Target Risk=1E-06, Hazard Quotient=1) dated May 2023 for residential and industrial soil.

Soil vapor screening levels will be based on:

- IDEM 2023 Risk-Based Closure Guide (R2) Published Level Tables effective March 1, 2023 for Soil Gas Subslab Residential levels
- EPA VISL Target Sub-Slab and Near-source Soil Gas Concentration (HQ=1.0 and Target Risk 1x10-5) https://epa-visl.ornl.gov/cgi-bin/visl_search

2.1.6 Monitoring Well Sampling

The five new wells MW-15 through MW-19 together with MW-1, MW-7, and MW-10, will be sampled for VOCs. This will be done to provide an understanding of the extent and magnitude of TCE near MW-1. In addition, monitoring wells MW-3, MW-4, MW-9, MW-11, MW-12, MW-13, and MW-14 will be sampled for

VOCs to assess the current horizontal extent of the observed groundwater VOC plume located at MW-4.

Monitoring wells will be purged and sampled starting from the least contaminated well to the most contaminated well to minimize the potential for cross-contamination. The wells will be purged using a stainless-steel low-flow bladder pump placed at the midpoint of the screen in each well. A flow-through cell will be used to measure pH, temperature, conductivity, redox potential, and dissolved oxygen prior to contact with oxygen at three to five-minute intervals during purging. Turbidity will also be measured at the same interval. The wells will be purged until the field parameters stabilize to within 10% over three readings and pH readings differ by less than 0.1 standard unit.

Once the field parameters have stabilized, the flow rate will be reduced to 100 ml/min. or less to collect volatile organic compounds (VOC) samples. Samples will be collected directly from the pump discharge line with the flow-through cell disconnected into laboratory-supplied bottles containing the necessary preservatives.

An equipment blank sample will be collected from the sampling equipment each day of the sampling event. Purged groundwater will be contained in 55-gallon drums for off-site disposal as discussed in Section 2.3.

Select wells (downgradient of MW-4 and MW-1; see Section 2.3) will be sampled for baseline bio parameters to evaluate the effects of the injected amendment to create conditions conducive for reductive dechlorination, such as dissolved oxygen, methane, sulfate, carbon dioxide, methane, ethane, ethene, chloride, nitrate, sulfate, alkalinity, pH, total organic carbon (TOC), total plate count, phosphate, ferrous iron, and ammonia nitrogen.

2.2 Interim Remediation

Excavation has been selected as the most effective way to remove the mass of CVOCs from the subsurface. Without the mass removal achieved by excavation, the subsurface does not appear to be able to adequately transmit amendments through the area of impact given the low permeability subsurface soil. The available Site geological and hydrogeological data indicate that using amendment injections as the sole means to remediate contamination would be an unacceptably long process. Therefore, the primary remediation activity is source removal via excavation and proper disposal in an off-site disposal facility. The injections proposed are considered a polishing step to address residual, unexcavated CVOCs in the subsurface near MW-4.

Given the geology, injection of amendment without excavation would not be effective as the sole remedy for the high CVOCs observed in the area of MW-4. Injections are appropriate for the low level CVOCs in the area of MW-1 since there does not appear to be a known source or large mass of CVOCs. The most frequently used in situ bioremediation technique for chlorinated solvents is enhanced reductive dechlorination that consists of the addition of organic substrates (electron donors) to ensure highly reducing conditions and to provide the hydrogen needed by dechlorinating organisms to reduce dissolved phase CVOCs. The challenge is to get the substrate in contact with the source areas. To facilitate the introduction of the substrate into the subsurface, and also remove a portion of the CVOC mass, an infiltration gallery will be constructed as described below.

2.2.1 MW-4 Excavation

2.2.1.1 Site Preparation

The City of Frankfort will be contacted to inform them of the planned Site activity and obtain any local construction permits that may be needed. Montrose will also complete an Underground Injection Control (UIC) Permit Application for submission to EPA (if required) that will include

- Project Location and facility map
- Contacts
- Description of Injection Well (Gallery) with schematic
- Location of Injection Well (Gallery)
- Contaminants Being Treated:
- Extent of Contamination
- Remediation Materials Proposed
- Method of Introduction into Groundwater (batch injections into the infiltration gallery)
- Identification and location of Drinking Wells within 1/4 miles
- Plugging and Abandonment (P&A) Plan and cost estimate
- Financial assurance mechanism, if needed

Montrose will retain a qualified contactor to conduct the Site work to complete the remedial excavation, dewatering and Infiltration gallery construction. A Utility One-Call notification will be made at least 72 hours prior to mobilization to the Site. Approximately 200 linear feet of 12-inch silt sock will be deployed to manage sediment during the excavation. Approximately 300 linear feet of temporary, 8-foot high, fence will be erected on stands with sand bags around the open excavation for worker protection.

A ~20,000-gallon frac tank with spill guards will be utilized to store groundwater from the excavated area. A 3-inch diaphragm pump, or equivalent, rated at a maximum of 630 gallons per minute (gpm) to convey the ground water to the 21,000 gallon frac tank for temporary storage. During excavation as described in Section 2.2.1.2, a temporary sump will be constructed in the excavation with a section of perforated 12-inch pipe wrapped in non-woven geotextile fabric and clean aggregate.

A temporary stockpile area will be constructed reasonably close to the excavation using straw bales and poly sheeting to channel both stormwater and drainage from the potentially saturated soil. The sheeting will be draped up and over the straw bales to create a berm and prevent any drained liquids from leaving the staging area.

Excess Groundwater Characterization

Any accumulated liquid runoff will be pumped into the frac tank using an electric pump for storage until the water is approved, transported, and disposed or recycled at the off-Site disposal facility (Section 2.2.5). Previous aqueous waste streams such as “Drilling Water” were characterized and disposed of as nonhazardous wastes at the US Ecology ("USE") Facility named EQ Detroit, Inc. with the Facility ID No. MID980991566 under EERT as generator with EPA ID No. IND001647460. Montrose is assuming that the excess groundwater generated by the excavation in the MW-4 area will be recharacterized and disposed of in consultation with EERT and with the selected remediation contractor.

The excess groundwater will be stored on Site in a frac tank. Prior to disposal, a representative sample will be obtained from the opening in the frac tank using a clean bailer. The water from the tank will be transferred into laboratory supplied glassware, labeled, and stored on ice in a cooler for transport to the analyzing laboratory (currently planned to be Pace Analytical) under chain-of-custody procedure. Montrose anticipates that the disposal facilities will require an aqueous representative sample be analyzed in accordance with the most current version of the EPA Manual, SW-846 (*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Office of Solid Waste and Emergency Response*).

Site-specific Health and Safety Plan

A Site-specific Health and Safety Plan (HASP) will be prepared specifically for the construction phase of this work plan by the contractor for Montrose’s review. The HASP shall be prepared in accordance with applicable Occupational Safety and Health Administration (OSHA) requirements and 29 CFR 1910.120. The HASP will define personnel monitoring and personal protective equipment (PPE) requirements. Level “D” PPE will be utilized. The HASP will identify air monitoring requirements, procedures, and dust suppression methodologies. Dust suppression will be implemented with the use of a 500-gallon water buffalo equipped with a powered pump able to apply potable water using a fine mist if necessary. Dust suppression will be implemented during Site activities that involve movement of soil when monitoring levels are exceeded.

While the HASP will be developed by the selected contractor, Montrose will require that the HASP have a Perimeter Air Monitoring Plan (PAMP) with the requirements described below.

During excavation activities, there is a potential for emissions of VOC vapors and particulate matter (dust). A PAMP will be implemented by field personnel that have the ability to respond should action levels be exceeded. Proper implementation of the PAMP will help minimize the risk of potential exposure of VOCs and dust within the surrounding community during the remedial activities.

To monitor for VOC exposure, continuous real time screening will be conducted with a photoionization detector (PID). The PID will be calibrated daily and capable of measuring VOCs at parts per million (ppm(v)). As a method of collecting background readings for the Site, upwind readings will be collected each day prior to the start of remedial activities as well as periodically throughout the day. During Site activities the PID will be set-up on a stationary platform along the property boundary between the excavation area and the neighboring community. The exact location of the stationary platform will be biased based on wind direction in relation to the neighboring community.

If the 15 minute average reading of the perimeter ambient air exceeds 10 ppm(v) greater than background levels, excavation activities will be temporarily postponed. The vapor source will be evaluated and potential corrective actions (fans, plastic sheeting, or covering) will need to take place. Monitoring will continue at the property boundary until vapor levels are below 5 ppm(v) greater than background levels. At that point, excavation activities will continue.

Dust will be visually monitored for nuisance issues. If dust is visually observed moving offsite in the direction of the surrounding community, dust suppression measures (cease work or add water) will commence until dust is no longer leaving the property.

For confirmatory purposes, a dust monitoring device, (DustTrak II, or similar equivalent) will be used to track real-time dust particle readings at the Site boundary. The dust monitoring device will be set-up in the same location with the PID on the property boundary. If the 15-mintue average exceeds OSHA's Permissible Exposure Limit (PEL) industry standard of 15 mg/m^3, work will temporarily be stopped, and dust suppression measures will be considered for implementation. Work will commence when the 15-mintue average is below 15 mg/m^3.

Measures (cleaning, tire decontaminations) will be taken to ensure that all heavy equipment will be free of dirt and debris prior to leaving Site. We will have a contingency plan to retain a street cleaner, as well.

2.2.1.2 Excavation

In-Place Soil Sampling

Prior to removing asphalt or excavating soil, a Geoprobe direct push sampler with disposable acetate sleeves will be used to conduct soil sampling to pre-characterize the soil and obtain approval from the Treatment, Storage, and Disposal Facility (TSDF). Soil samples will be collected using the procedures described in the RFI Work Plan. Disposal facilities typically require representative samples be analyzed in accordance with the most current version of the EPA Manual, SW-846 (*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Office of Solid Waste and Emergency Response*).

It is anticipated that 12 Geoprobe borings will be conducted in the area to be excavated shown on Figure 3. Based on disposal of ~667 cubic yards or ~ 1,000 tons of impacted soil, Montrose anticipates that 12 soil samples will be collected and analyzed as follows:

- For analysis of all substances other than VOCs, three composite samples shall be made from four samples each and submitted for laboratory analysis.
- Eight discrete samples shall be selected from the 12 samples for analysis of VOCs. The samples shall be based on field screening of the 12 samples via a photoionization detector (PID) to select those samples that are most likely to contain the highest concentration of VOCs.

After mobilizing to the Site, a containment/staging area for the excavated material will be constructed in a location adjacent to the work area. The containment area will consist of multiple layers of 10-mil polyethylene sheeting installed on the ground surface with straw bales placed around the perimeter. The sheeting will be draped up and over the straw bales to create a berm and prevent any drained liquids from leaving the staging area. Any accumulated liquid runoff will be pumped into the frac tank.

Prior to excavation, four to eight-inches of asphalt or concrete pavement will be removed from an open area 25 feet by 65 feet, or 1,500 square feet (166 square yards). Figure 3 shows the location of the planned excavation. Asphalt and concrete removed from surface must be disposed of off-site estimated at ten cubic yards or 19 tons of asphalt at a density of 1.9 tons per cubic yard and 10 cubic yards or 20 tons of concrete at a density of two tons per cubic yard.

Following preparation of the containment/staging area, crews will mobilize an excavator, rubber tire loader, or equivalent, and haul trucks to the Site to complete the trench excavation, backfilling, soil movement/staging and waste loading. The excavator will be utilized to begin excavating to the specified trench depth (12 feet relative to the surrounding ground surface) in the 25 by 65 foot area. The excavated soil will be directly loaded into the containment/staging area. The material will be placed into the containment/staging area where the pile will be managed using the rubber tire loader and any excess liquids will be allowed to drain into the containment/staging area where it will be pumped and routed to the frac tank.

The excavation of a portion of the area impacted with chlorinated volatile organic compounds will create a trench 65 feet long and 25 feet wide down to a maximum depth of 12 feet. As stated, the soil will be sampled in-place by soil borings and be pre-characterized prior to initiating the excavation. If the soil is classified as hazardous waste, then the width and depth of the excavation may be adjusted downward in consultation with the Trust and the EPA. The objective is to remove up to ~667 cubic yards or ~ 1,000 tons of impacted soil. The operation will use various equipment including a large excavator, a yard loader, skid steer with bucket and broom, site trucks, trench roller, hand tools, job trailer, equipment operators and field technicians. The excavation work is expected to be completed in two days.

Groundwater or rain accumulation at the bottom of the trench during or following excavation can remain in the opening as the trench is backfilled with clean crushed stone. Excessive amounts of water may have to be removed using the sump described in Section 2.2.1.1. If existing piping, such as old sewer piping, crosses the 65-foot length of the excavation, Montrose will direct the contractor will cut and cap such piping, if it can be done so safely.

Decontamination Procedures

Decontamination procedures will be followed for the reusable equipment (non-dedicated) used to collect and/or handle samples before coming into contact with any sampled media or personnel using the equipment. Decontamination procedures for sampling equipment is described in the SAP. During excavation, the bucket of the excavator will come into contact with soils and groundwater impacted with CVOCs. In addition, long-handled shovels will be used to recover any soil that may fall to the pavement between the excavation and the stockpile. For heavy equipment such as excavator buckets, the following general decontamination methodology will be followed:

1. Construct a decontamination area (e.g., using plastic sheeting with temporary hay bale or wood-bermed sides) that is large enough to fully contain the equipment to be cleaned.
2. With the heavy equipment in place, spray areas (e.g., bucket of the backhoe) exposed to contaminated media using a long-handle sprayer or pressure washer, spraying down the surfaces that contact soil.
3. Utilize brushes, soap, and potable water to remove soil and subsurface material from the bucket whenever necessary.
4. Move the decontaminated equipment from the decontamination pad area and allow it to air dry before returning it to the work Site.
5. Upon concluding decontamination activities, the contaminated wastewater, plastic sheeting, and disposable PPE will be placed in separate drums, containers or receptacles (i.e., separating solids and liquids). Containers will be properly labeled for disposal.

2.2.2 MW-4 Infiltration Gallery Installation

Once the trench excavation has reached a manageable distance, the excavator will then be used to begin backfilling the open trench with the staged clean fill material. Upon delivery, the clean fill material will be located close to the excavation for use as backfill. The excavation will be backfilled with clean crushed stone (AASHTO No. 57) to within four feet of the ground surface so that the trench can be safely entered.

The clean fill material will be staged near the excavation for use as trench backfill. The backfill will be compacted with the bucket of the excavator and/or trench roller. Figure 12 shows the details of the infiltration gallery construction.

Two 60-foot long sections of continuously perforated pipe will be placed within the top of the clean fill set at a minimum slope on the stone. The pipes will be manifolded together with piping near the center and at either ends of the perforated pipe. The pipe should will be perforated ADSN 12 HDPE piping, or equivalent. Figure 12 depicts the layout of the perforated piping.

Three standpipes will be installed with a “Tee” standpipe that will come up to the surface (center and either end of 60 feet run). During paving, the three standpipes will be finished at the surface with a locking well cap inside a 12-inch bolt-down monitoring well manhole or metal casing stick up and cap. After installing the piping, the trench will be backfilled with clean crushed stone (AASHTO No. 57) to within two feet of the surface. These standpipes are shown on Figure 12.

As stated, the trench will be backfilled with clean crushed stone (AASHTO No. 57) to within two feet of the surface (two feet over the horizontal perforated piping) and covered with a non-woven geotextile filter fabric. Twenty (20) inches of base stone (2A Modified) will be backfilled on top of the geotextile filter fabric and the excavation will be paved with 2.5 inches binder and 1.5 inches of wearing course (four-inches of asphalt). As stated, the three standpipes will be finished at the surface with a locking well cap inside a 12-inch bolt-down monitoring well manhole or metal casing stick up and cap. The standpipes that are connected to the manifolded perforated piping will serve as an injection port for the infiltration gallery.

2.2.3 MW-4 Bioremediation

Anaerobic bioremediation of chlorinated solvents is a relatively proven technology that has been well documented on numerous properties. The anaerobic bioremediation process planned for this Site will be to use native microorganisms to degrade chlorinated the chlorinated solvents to innocuous end products such as ethene and ethane. The bioremediation process will stimulate the in situ reductive dehalogenation of the chlorinated solvents. An organic substrate will be passively added in batches to the groundwater using the infiltration gallery to generate the reducing conditions and provide the necessary carbon to support biodegradation of the chlorinated solvents.

The injection material is planned to be a slowly-biodegradable food-grade soy bean oil with proprietary additives named SRS™ (Slow Release Substrate), a product patented by Terra Systems of Wilmington, Delaware, or equivalent. The organic substrate will be added to the groundwater via the infiltration gallery to generate the reducing conditions and provide the necessary carbon to support biodegradation of the chlorinated solvents. The budget and schedule described in Section 3.0 assumes that two injection events will be completed.

Before injection, field readings of conductivity, dissolved oxygen, oxidation-reduction potential (ORP), pH, turbidity, and temperature will be collected from the ports on the infiltration gallery, as well as monitoring wells MW-4, MW-14, MW-9, and MW-12.

SRS is an oil-in-water emulsion diluted to a concentration of five to seven percent oil in water and injected directly into the subsurface.

Assuming that the infiltration gallery can accept one foot of pore volume of dilute amendment, a foot print of 65 feet by 25 feet, and a 30 percent porosity for clean crushed stone indicates that approximately

3,656 gallons of dilute SRS may be injected per injection event. Injection events will be completed by preparing the dilute SRS injectate in a centralized mixing area (i.e., in a 5,000 gallon frac tank). When the required total volume of injectate is prepared, injection will begin. Injections will be accomplished by slowly adding the required volume of dilute solution to each of the three injection ports using low pressure injection (i.e., gravity feed, <25 psi). The flow rate will be regulated so as not to over fill the injection port. If needed, five-feet of header piping will be added to the injection ports to add head pressure. If pumping is required to introduce the injectate, it will be done as low pressure injection. The injection pressure will be maintained below a maximum pressure of 25 psi. If pumped, injection pressure and volume will be measured using a manifold equipped with a flow-meter and back-pressure gauge. The flow and pressure measurements will identify the rate of injection fluid.

After the SRS solution injection is complete, the tank will be filled again with 500-gallons of potable water. SRS will not be added to this second tank volume as this volume will be used to flush the SRS solution into the subsurface. Flushing will be accomplished using the same procedures as the SRS injections, but using only 500 gallons of water without SRS added.

A smaller amount of SRS solution will be injected into MW-1 or an alternative proximal monitoring well, depending on Site data results (see Section 2.2.4). The amount to be injected is on the order of several gallons of SRS solution followed by one to two gallons to flush the SRS solution into the subsurface.

Currently, two injection events are planned based on economic considerations given the finite limit of funds available for the EERT to complete this Project. The injections are intended as a polishing step with source removal via excavation and disposal at an off-Site facility as the primary remediator method. A future assessment will be conducted to determine effectiveness of the injections and whether there will be a need for any future injections or an alternative remedial action.

2.2.4 MW-1 Bioremediation

The five new wells MW-15 through MW-19 together with MW-1, MW-7, and MW-10, will be sampled for VOCs. The groundwater sampling results are expected to aid in the understanding of the previously detected TCE concentration of 49.1 ug/L in MW-1. After consultation with the Trust and EPA, a well may be selected to have the substrate amendment injected directly into the well to stimulate bioremediation in this area, if warranted. The decision for which well to inject will be based on multiple lines of evidence such as subsurface conditions, encountered geology, geochemical parameter data, CVOC distribution, groundwater gradient, etc. Substrate will be injected into the selected well and the other seven wells will be monitored.

2.2.5 Waste Management

The following are guidelines for disposing of wastes:

- Wash water, rinse water, and decontamination solutions that have come in contact with contaminated equipment are to be handled, packaged (55-gallon drums), labeled, marked, stored, and disposed of as investigation-derived waste.
- Unless otherwise required, plastic sheeting and disposable protective clothing may be treated as solid, nonhazardous waste and placed in trash bags for disposal.
- Waste liquids shall be sampled, analyzed for contaminants of concern in accordance with established disposal practices and regulations, and disposed of accordingly

Previous waste streams from the Site consisted of “Drill Cuttings and PPE”, “Non Haz Soil”, and “Drilling Water” and were characterized and disposed of as nonhazardous wastes at the US Ecology ("USE") Facility named EQ Detroit, Inc. with the Facility ID No. MID980991566 under EERT as generator with EPA ID No. IND001647460. Montrose is assuming that these waste streams will not be used to dispose of the soil and water generated by the excavation in the MW-4 area and that they will be recharacterized and disposed of in consultation EERT and with the selected remediation contractor.

Soil to be disposed of off-site will be stockpiled in such a manner to minimize potential for contact with rainfall and surface water flow, i.e., be stored on and securely covered with plastic sheeting as described in Section 2.2.1.1 until disposal off of the Site. Groundwater generated during excavation and monitoring well drilling and sampling will be stored in the frac tank until disposal off Site. After the frac tank is removed from the Site, 55-gallon drums will be used to store groundwater generated during subsequent performance monitoring events until off Site disposal is arranged.

As discussed in Section 2.2.1.2, representative discrete and composite soil samples from soil borings in the impacted area will be collected and analyzed at a laboratory in accordance with disposal facility requirements. Disposal facilities typically require representative solid and aqueous samples be analyzed in accordance with the most current version of the EPA Manual, SW-846 (*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Office of Solid Waste and Emergency Response*). Disposal documentation such as characterization data, disposal facility approval, manifest, or bills of laden will be provided in the Completion Report described in Section 2.3.

Approval will be sought from the Treatment, Storage, and Disposal Facility (TSDF) after receipt of the analytical reports necessary for characterization. Direct loading of soils as they are excavated is not proposed because potential delays associated with simultaneous truck load out/truck coordination The availability or trucks and drainage from the potentially saturated soil can create inefficiencies with a direct loading approach. Stockpiled soils will be removed from the Site as soon as the approval is received from the disposal facility. In-place soil sampling will be conducted as described in Section 2.2.1.2. Approval will be sought from the TSDF after receipt of the analytical reports necessary for characterization. Direct loading of soil as they are excavated is not proposed because the excavation and infiltration gallery construction work will be completed without delays associated with simultaneous truck load out/truck coordination. If the soil is classified as hazardous waste, it will be removed in less than 90 days. Our goal is to transport the soil to the TSDF within a month.

A plan for vapor monitoring and mechanisms that will be in place to ensure the health and safety of remediation workers and the surrounding community during the excavation is discussed in Section 2.2.1.1.

2.2.6 Contingency

Off-site disposal of the excavated waste soil is a significant cost driver for the IMR work. If the cost for the IMR field work escalates significantly based on disposal costs for excavated soils (or other reasons) a method for reducing the cost to remain within the approved budget will be to reduce the size of the excavation and infiltration gallery). To manage this risk in advance, the soil will be sampled in-place by soil borings and be pre-characterized prior to initiating the excavation. If the soil is classified as hazardous waste, then the width and depth of the excavation may be adjusted downward in consultation with the Trust and the EPA. In general the dimensions of the excavation will be reduced in this order:

Width, Depth, Length; as needed to remain within an acceptable cost range. This will reduce the amount of source material that is removed, while preserving as much of the infiltration gallery size as possible.

2.3 Remediation Performance Monitoring

2.3.1 Groundwater Monitoring

Approximately 90 days after injecting the amendment, sampling will be conducted at both the MW-4 area and the MW-1 area. The MW-1 area includes MW-1, MW-7 MW-10, MW-15, MW-16, MW-17, MW-18, and MW-19. The MW-4 area includes MW-3, MW-4, MW-9, MW-11, MW-12, MW-13, MW-14. In addition to VOCs via EPA Method 8260, the sampling will test groundwater from selected wells, which will be approved by EPA, for various bio parameters to allow evaluation of the effects of the injected amendment to create conditions conducive for reductive dechlorination. TCE, cis-1,2 DCE, and vinyl chloride concentrations should show a reduction in nearby monitoring wells. The reductions should correlate with increased concentrations of total organic carbon (TOC), ethane, and ethene. The bio parameters to be monitored are:

CAS No.	Compound
124-38-9	Carbon Dioxide
74-82-8	Methane
74-84-0	Ethane
74-85-1	Ethene
16887-00-6	Chloride 250 mg/L
14797-55-8	Nitrate as N
14797-65-0	Nitrite as N
NO3NO2N	Nitrogen, Nitrate + Nitrite mg/L
14808-79-8	Sulfate 250 mg/L
ALK Total	Alkalinity mg/L
PH	pH (su)
TOC	Total Organic Carbon mg/L
TOT PLATE COUNT	Plate Count, Total (cfu/ml)
14265-44-2	Phosphate mg/L
15438-31-0	Ferrous Iron mg/L
7664-41-7	Ammonia Nitrogen
7439-96-5	Manganese
7783-06-4	Sulfide

While it is possible that one injection of organic substrate will be sufficient to “polish” the remaining subsurface CVOCs in groundwater, the budget and schedule assume that two injection will be completed.

Two events of performance monitoring will be conducted in the MW-1 area by testing seven of the eight wells MW-1, MW-7, MW-10, MW-15, MW-16, MW-17, MW-18, and MW-19 for VOCs and bio parameters (one of the wells will be used for injection of substrate and will not be sampled).

Two events of performance monitoring will be performed in the MW-4 area by testing monitoring wells MW-3, MW-4, MW-9, MW-11, MW-12, MW-13, and MW-14 for VOCs and bio parameters.

2.3.2 Performance Criteria

Performance criteria will be evaluated by assessing the specific performance issues such as 1) ability to uniformly distribute substrate; 2) achieving optimal geochemical conditions; 3) reduction of dissolved CVOCs in monitoring wells; 4) secondary water quality parameters; and 5) substrate longevity. The working hypothesis is that the decaying biomass may sustain anaerobic degradation processes for a period of months to perhaps a year or more. TCE, cis-1,2 DCE, and vinyl chloride concentrations should show a reduction in nearby monitoring wells. The reductions should correlate with increased concentrations of total organic carbon (TOC), ethane, and ethene.

At the completion of the construction of the project and the first injection event, Montrose will prepare and submit an Interim Measures Report to EPA. The IM Report shall document that the project is consistent with the information in this work plan and that the interim measures are performing adequately. The IM Report will suggest an outline of the expected path forward in the RCRA process.

Two rounds of performance monitoring are anticipated 90 days after two injection events are conducted during the first year of Interim Measures remediation activity. After two round of performance monitoring, annual sampling of all monitoring wells for CVOCs is anticipated to be conducted for an additional four years. The four-year period was selected to establish the Probabilistic Cost Scenario presented in Appendix A and future results will be evaluated to determine if further performance monitoring is necessary. The scope, duration, and necessity of future groundwater monitoring will be established in consultation with the EPA. Performance criteria will be evaluated by assessing the specific performance issues listed below.

2.3.2.1 Ability to Uniformly Distribute Substrate

The ability to uniformly distribute the substrate is a primary operational objective for injection into the infiltration gallery. The application will be considered successful for this objective if the concentrations of soluble organic carbon are increased in nearby monitoring well locations. The TOC should range from 20 to 100 mg/L with concentrations over 100 mg/L deemed to be highly effective to sustain dechlorination.

2.3.2.2 Achieving Optimal Geochemical Conditions

Achieving optimal geochemical conditions will be evaluated by analyzing indicator parameters of anaerobic conditions, including dissolved oxygen (DO), oxidation-reduction potential (ORP) nitrate, manganese, ferrous iron, sulfate, methane, pH, and alkalinity. Target conditions include:

- A highly anaerobic groundwater environment with DO less than 0.5 mg/L;
- ORP less than -200 mV;
- Sulfate reduced by more than 50 percent relative to background; and
- Methane greater than 1.0 mg/L.

These criteria may not apply or change based on the initial results from the baseline sampling conducted.

2.3.2.3 Reduction of dissolved CVOCs in Monitoring Wells

Sampling for CVOCs will be conducted at the MW-4 and MW-1 areas. The MW-1 area includes MW-1, MW-7, MW-10, MW-15, MW-16, MW-17, MW-18, and MW-19. The MW-4 area includes MW-3, MW-4, MW-9, MW-11, MW-12, MW-13, MW-14. Groundwater data will be assessed by comparison to both screening criteria and historical data. Groundwater screening levels will be based on:

- Indiana Department of Environmental Management (IDEM) 2023 Risk-Based Closure Guide (R2) Published Level Tables effective March 1, 2023 for long term residential groundwater.
- Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) dated May 2023.
- USEPA Vapor Intrusion Screening Level (VISL) Target Groundwater Concentration (Near Source Soil Screening" HQ=1.0 and Target Risk 1x10-5)

Trend Plots will be developed using historical data and recent data for CVOCs.

2.3.2.4 Secondary Water Quality Parameters

Potential secondary water quality issues will be monitored by sampling the wells for dissolved manganese, dissolved iron, pH, and sulfide (hydrogen sulfide) and comparing the parameters to the pre-bioremediation concentrations. Baseline sampling will be done to establish the natural concentrations of secondary water quality. Secondary water quality parameters will be compared to background conditions determined by baseline sampling, as well as Tap Water or MCLs Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) dated May 2023. Groundwater at this Site is not used for drinking water and secondary water quality criteria may not be an exposure issue. Results will be compared to background concentrations and to applicable regulatory criteria to determine whether secondary water quality has been adversely impacted. Secondary water quality parameters should below applicable regulatory criteria downgradient of the infiltration gallery.

Increases in dissolved iron and manganese in groundwater are not uncommon in SRS solution injection projects. Sites with glacial sediments may have natural levels of manganese be above regulatory criteria. Dissolved iron typically precipitates or sorbs out of solution within a short distance of migrating out of the anaerobic reaction zone.

Secondary parameters will be assessed for any potential adjustments to the injections. DO, ORP, sulfate, and methane will be assessed as to whether target geotechnical conditions are achieved as discussed in Section 2.3.2.2.

With minimal exceptions, pH should remain above 6.5 so that no adverse pH conditions are observed. Increases in pH may trigger the need for a buffering agent, decreases in SRS solution injected, or increases in flush water or time between injections. Sodium bicarbonate is a common buffering compound used to control pH.

2.3.2.5 Substrate Longevity

Substrate longevity for the slow-release substrates is difficult to estimate. The working hypothesis is that the decaying biomass may sustain anaerobic degradation processes for a period of months to perhaps a year or more.

2.4 Completion Report

At the completion of the construction of the project, Montrose will prepare and submit an Interim Measures Report to EPA. The Report shall document that the project is consistent with the information in this work plan and that the interim measures are being implemented adequately.

The Report shall include, but not be limited to, the following elements:

- Synopsis of the interim measures and documentation of the design and construction.
- Explanation of any modifications or changes to the plans and why these were necessary for the project.
- Results of the supplemental groundwater and soil vapor sampling described in Section 2.1.
- A plan for facility monitoring to determine if the interim measures will meet or exceed the performance goal of reducing the CVOC plume in groundwater.
- Explanation of the anticipated operation and maintenance (including monitoring) to be undertaken at the facility.
- An outline of the expected path forward in the RCRA process.

This report shall include the inspection summary reports, photographs, well logs, field notes, data sheets, chemical sample results for groundwater and soil vapor, waste (soil and IDW) disposal characterization and documentation, and photographs, as-built maps and drawings.

Groundwater data will be assessed by comparison to both screening criteria and historical data. Groundwater screening levels will be based on:

- Indiana Department of Environmental Management (IDEM) 2023 Risk-Based Closure Guide (R2) Published Level Tables effective March 1, 2023 for long term residential groundwater.
- Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) dated May 2023.
- EPA Vapor Intrusion Screening Level (VISL) Target Groundwater Concentration (Near Source Soil Screening” HQ=1.0 and Target Risk $1x10^{-5}$)

Trend Plots will be developed using historical groundwater data and recent data for CVOCs.

Soil sample results will be compared to:

- IDEM 2023 Risk-Based Closure Guide (R2) Published Level Tables effective March 1, 2023
- USEPA Regional Screening Level (RSL) Summary Table (Target Risk=1E-06, Hazard Quotient=1) dated May 2023 for residential and industrial soil.

Soil vapor data will be assessed by comparison to both screening criteria and historical data. Soil vapor screening levels will be based on:

- IDEM 2023 Risk-Based Closure Guide (R2) Published Level Tables effective March 1, 2023 for Soil Gas Subslab Residential levels
- EPA VISL Target Sub-Slab and Near-source Soil Gas Concentration (HQ=1.0 and Target Risk $1x10^{-5}$) https://epa-visl.ornl.gov/cgi-bin/visl_search

2.5 Performance Monitoring Interim Data Reporting

At the completion of the construction of the project, the first injection will take place at the Site, presumably in both the infiltration gallery and in or near MW-1. After approximately 90 days or three months, performance monitoring will be conducted in:

- The MW-1 area by testing seven of the eight wells MW-1, MW-7, MW-10, MW-15, MW-16, MW-17, MW-18, and MW-19 for VOCs and bio parameters (one of the wells will be used for injection of substrate and will not be sampled).
- In the MW-4 area by testing monitoring wells MW-3, MW-4, MW-9, MW-11, MW-12, MW-13, and MW-14 for VOCs and bio parameters.

Shortly after the first performance monitoring sampling, it is anticipated that a second injection event will take place. After approximately 90 days or three months, the second performance monitoring sampling event will be conducted. When laboratory data is received for each of the performance monitoring events, the data will be tabulated and forwarded to the EPA together with information on the injection event (% solution, volume, injection rate) with initial observations. Formal analysis of the performance monitoring data will be completed and presented in the Bioremediation Evaluation Report.

2.6 Remediation Evaluation Report

After the two injections and two performance monitoring events are completed, a report assessing the effectiveness of the source removal and SRS solution polishing injections to reduce CVOCs in groundwater will be issued. Groundwater data will be assessed by comparison to both screening criteria and historical data. The performance criteria discussed in Section 2.3 will be summarized and conclusions and recommendation will be presented. The goal of the report is to identify the effectiveness of the injections and whether there will be a need for any future injections or an alternative remedial action.

3.0 Interim Remediation Cost and Schedule

3.1 Cost Estimate

Experience with similar projects and interaction with potential remedial contractors allowed us to prepare a probabilistic scenario and associated cost opinion for the supplemental investigation and proposed remediation for budgetary and planning purposes. The attached Table 1 outlines the probabilistic costs for the supplemental assessment and remediation efforts discussed herein. Using a ten percent contingency, the cost opinions for the proposed remediation shown on Table 1 is summarized as:

Engineering and IM Remediation Work Plan	$ 25,900
Supplemental Interim Investigation	$ 99,110
MW-4 Excavation/Infiltration Gallery	$380,600
Remediation / Amendment Injection (based on two injections and two performance monitoring sampling events the first year)	$144,000
Post-Remediation Monitoring (based on four annual events and allowance for Outfall Z actions)	$143,000
Total	**$790,000**

It should be noted that the cost estimate is rounded and based on the disposing of soil that is classified as non-hazardous waste. If the soil is determined to be hazardous, then the total costs increases to approximately $1,100,000. To manage this risk in advance, the soil will be sampled in-place by soil borings and be pre-characterized prior to initiating the excavation. The soil is classified as hazardous waste, then the width and depth of the excavation may be adjusted downward in consultation with the Trust and the EPA.

3.2 Anticipated Schedule

The following schedule is anticipated to complete the Interim Measures Remediation described herein:

Target Time for Completion	Task
Q4 2022 – Q2 2923	Finalize Scope and IM Remediation Work Plan
Q3 2023	Secure contractor arrangements, permits, and supplemental investigation
September 2023	Excavate MW-4 Area, Install Infiltration Gallery, First SRS Injection
November 2023	Completion Report and Outfall Z Report
November 2023	Performance Monitoring Sampling Event #1
December 2023	Interim Data Report #1
December 2023	Second injection of SRS
March 2024	Performance Monitoring Sampling Event #2
April 2024	Interim Data Report #2
June 2024	Bioremediation Evaluation Report
Annually once in each year 2025, 2026, 2027 and 2028	Groundwater Sampling and Reporting

Changes to the proposed schedule will be promptly communicated to the EERT and EPA.

Table

Table 1 – Interim Remediation Cost Estimate

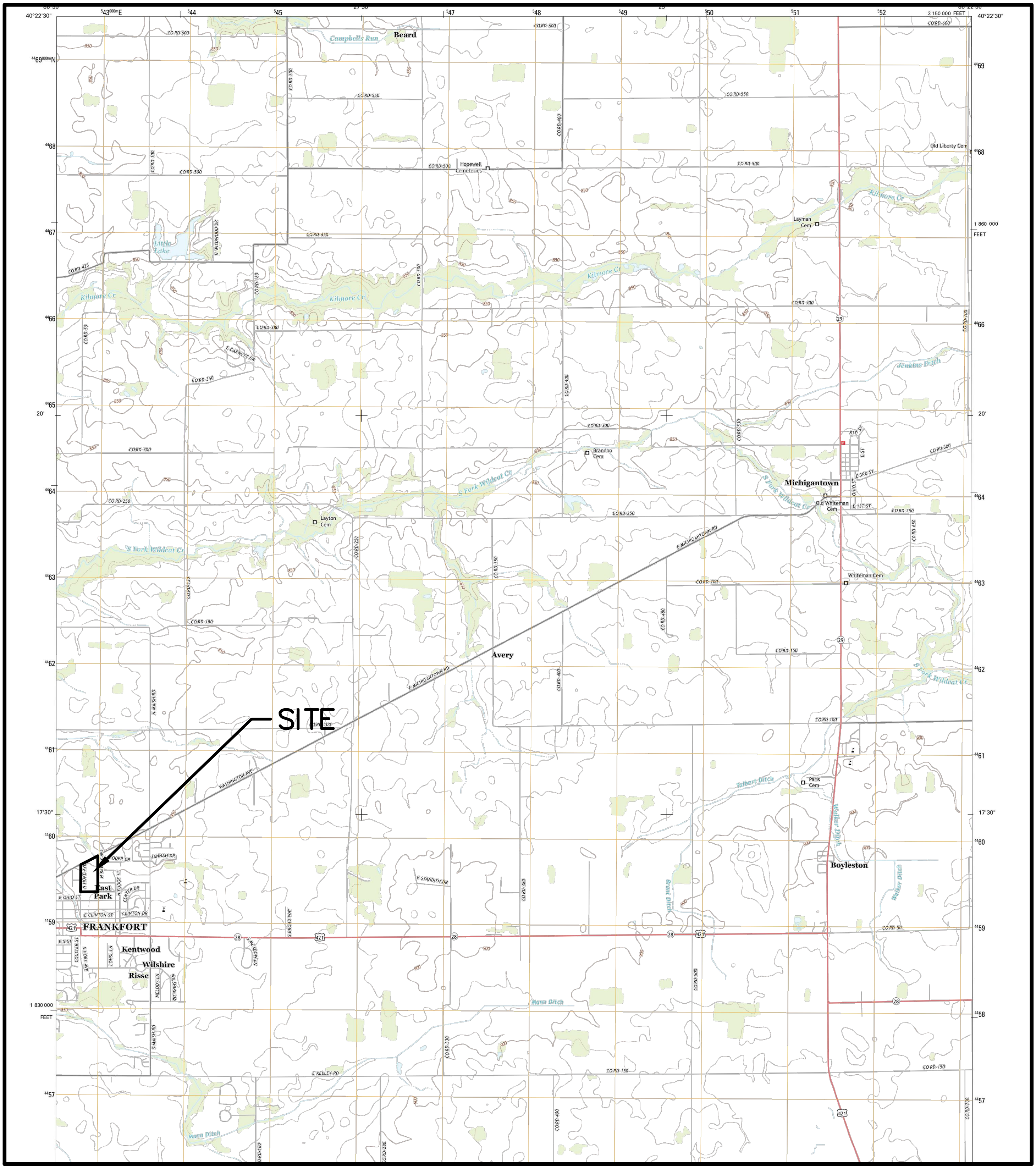
Table 1 - Exide Frankfort Chlorinated Solvent Remediation - Probabilistic Cost Scenario
555 North Hoke Avenue, Frankfort, Indiana
Estimated Further Investigation/Remediation Costs - CVOC Impacted Groundwater

The following remediation cost is based on the Revised Interim Measures Investigation Report (IMIR), Frankfort Indiana Site, dated July 29, 2022, EPA Comments on the Revised IMIR, and Montrose's experience with similar projects. The scope of work is explained more fully in the Draft Interim Measures Remediation Work Plan dated October 2022. The approach provides a strategy for excavation, followed by bioremediation, to pursue a risk-based cleanup of the groundwater for several reasons, including: 1) degradation of TCE was already taking place as evidenced by the presence cis-1,2 DCE; 2) the microbial and functional gene data in the IMIR indicate high potential for the complete reductive dechlorination of tetrachloroethene (PCE) and trichloroethene (TCE) to ethene; 3) excavation will remove much of the source soil of CVOCs to groundwater; 4) limited concern for disruption to plant operations; and 5) time is not of the essence.

DESCRIPTION	QTY	UNIT	UNIT COST	COST		NOTES
Engineering and IM Remediation Work Plan						
Draft Workplan	1	Estimate	$11,500	$11,500		
Revisions based on EPA Comments	1	Estimate	$13,400	$13,400		
Work Plan Finalization	1	Estimate	$1,000	$1,000		
SUBTOTAL				**$25,900**		
CONTINGENCY		*0%*		**$0**		
Engineering and IM Remediation Work Plan				**$25,900**		
Supplemental Interim Investigation						
Mobilization, Well Gauging, Outfall Z Sampling and Evaluation	1	Estimate	$30,000	$30,000		
Sanitary Sewer Camera Inspection	1	Estimate	$4,500	$4,500		
Vapor Point Sampling	1	Estimate	$3,500	$3,500		
Monitoring Well Installation (MW-15, 16, and 17)	5	Wells	$2,500	$12,500		
Monitoring Well Sampling (MW-1, 10, 15, 16, 17)	7	Wells	$800	$5,600		
Field Personnel and travel expenses	12	Days	$2,000	$24,000		
Data Evaluation and EPA Interaction	2	Estimate	$5,000	$10,000		
SUBTOTAL				**$90,100**		
CONTINGENCY		*10%*		**$9,010**		
				$99,110		
MW-4 Excavation/Infiltration Gallery	**QTY**	**UNIT**	**UNIT COST**	**COST**		
Mobilization/Demobilization	1	LS	$25,000	$25,000		
Site Preparation and Erosion Control	1	LS	$6,700	$6,700		
Excavation of 667 cubic yards	2	Days	$13,000	$26,000		Assume 25'x65'x12' deep excavation area (667CYx1.5 = 1,000 tons)
Vacuum Truck if water handling is needed	2	Days	$2,500	$5,000		
Water disposal, if needed	6,000	gallons	$1.25	$7,500		Assuming Non-Hazardous Aqueous Waste
Waste Transportation & Disposal	1,000	Tons	$80	$80,000		
Imported material backfill purchase	1,000	Tons	$46	$46,000		
Installing backfill/building infiltration Gallery	4	days	$9,200	$36,800		
Analytical	10	Lot	$1,400	$14,000		
Paving 1600 Sq. Yard	1,600	Sq. Yard	$15	$24,000		
Project Management and Health & Safety	1	Estimate	$30,000	$30,000		
Engineering Oversight	1	Estimate	$35,000	$35,000		
Close Out Construction Report	1	LS	$10,000	$10,000		
SUBTOTAL				**$346,000**		
CONTINGENCY		*10%*		**$34,600.00**		
On-Site Soil Excavation Total				***$380,600***		
Bioremediation / Amendment Injection	**QTY**	**UNIT**	**UNIT COST**	**COST**		
Injection Plan/Permit	1	EA	$5,000	$5,000		
First Injection of dilute substrate. The injection material is essentially slowly-biodegradable food-grade soy bean oil with proprietary additives	1	Event	$20,000	$20,000		TCE, cis-1,2 DCE, and vinyl chloride concentrations should show a reduction in nearby monitoring wells. The reductions should correlate with increased concentrations of total organic carbon (TOC), ethane, and ethene.
First Round of Groundwater Monitoring 90 days after Injection (including Outfall Z).	1	Estimate	$20,000	$20,000		
Second injection of dilute substrate minimum 180 days after first injection Including Outfall Z).	1	Event	$20,000	$20,000		The necessity of a second injection and subsequent monitoring event is not fully established and represent a conservative assumption that may not be needed.
Second round of Groundwater Monitoring 90 days after second injection	1	Estimate	$20,000	$20,000		
Interim Data Reports	2	Reports	$10,000	$20,000		
Bioremediation Evaluation Report	1	Estimate	$15,000	$15,000		
SUBTOTAL			$20,000	**$120,000**		
CONTINGENCY		*10%*		**$24,000**		
Bioremediation / Amendment Injection				***$144,000***		
Post-Remediation Monitoring	**QTY**	**UNIT**	**UNIT COST**	**COST**		
Groundwater Sampling (Four annual events)	4	Events	$25,000	$100,000		
Contingency Outfall Z Action (Jetting/sealing)	1	Estimate	$10,000	$10,000		
Reporting	4	Reports	$5,000	$20,000		
SUBTOTAL				**$130,000**		
CONTINGENCY		*10%*		**$13,000**		
Groundwater Monitoring Total				***$143,000***		
REMEDIATION TOTAL				***$790,000***		

NOTES:
1. Subcontractor costs have not yet been obtained for the full scope of work and are estimated based on similar projects.
2. Cost does not include all sampling and/or investigations that may be necessary to evaluate and identify the permanent solutions to assure protection of groundwater at, and beyond, the property boundary.
3. Cost is estimated for CVOC Remediation Interim Measures and does not include addressing metals in shallow soils.
4. Costs do not include efforts to complete a Corrective Measures Study (CMS), Statement of Basis (SB), or Corrective Measures Implementation.
5. Costs do not include ongoing Operations and Maintenance (O&M) at the site other than annual groundwater/outfall monitoring for four years.

Figures



EXIDE FRANKFORT

555 HOKE AVENUE
FRANKFORT, INDIANA

USGS TOPOGRAPHIC MAP

MONTROSE
ENVIRONMENTAL

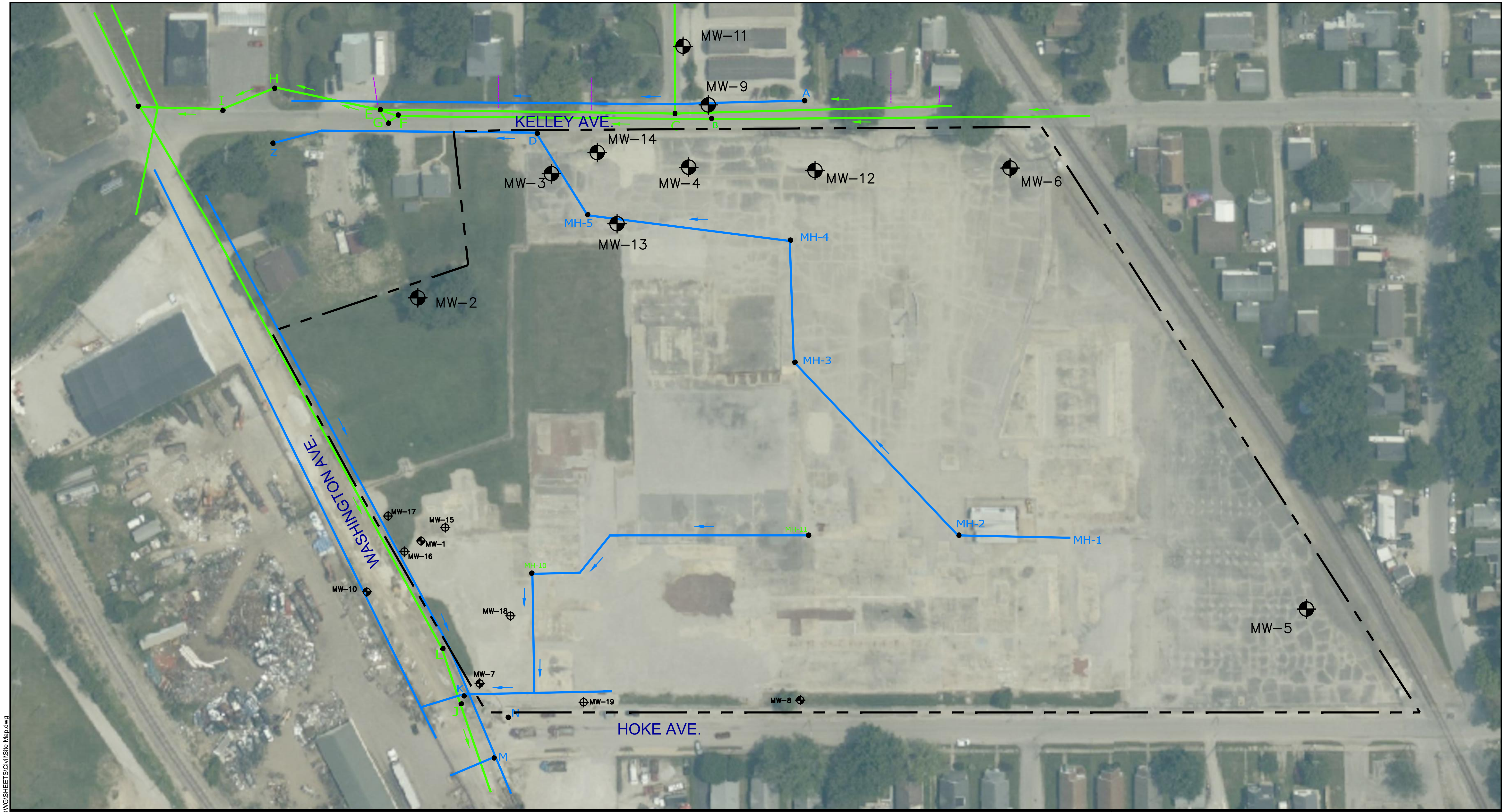
MONTROSE ENVIRONMENTAL SOLUTIONS, INC.

1140 VALLEY FORGE ROAD
VALLEY FORGE, PENNSYLVANIA 19460
T: 610.840.9100 F: 610.840.9199 montrose-env.com

Scale:	NTS
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	C.E.P.
Project No.:	2020-4123
Drawing Date:	APRIL 2023
Sheet No.:	1 1
Revision Number:	0

FIGURE 1

F:\Projects\2011\20112678-Exide Frankfort Decon DemO\Cad\UST Removal\Figure 1 - USGS Topo.dwg



LEGEND

- – – – SERVICE LINE
- —— SANITARY SEWER
- —— STORMWATER
- — — APPROXIMATE SITE BOUNDARY
- ← ← INFERRED FLOW DIRECTION
- ⊕ MW–1 EXISTING MONITORING WELL
- ⊕ MW–15 PROPOSED MONITORING WELL LOCATION

NOTE

1. UTILITY LINE LOCATIONS INFERRED FROM FIELD MEASUREMENTS AND DRAWINGS PROVIDED BY FRANKFORT UTILITY DEPARTMENTS AND SURVEY DATA COLLECTED BY RANDALL MILLER ASSOCIATES.

NORTH

0 50 100 200

1 INCH = 100 FT

EXIDE FRANKFORT

555 HOKE AVENUE
FRANKFORT, INDIANA

SITE MAP

MONTROSE ENVIRONMENTAL

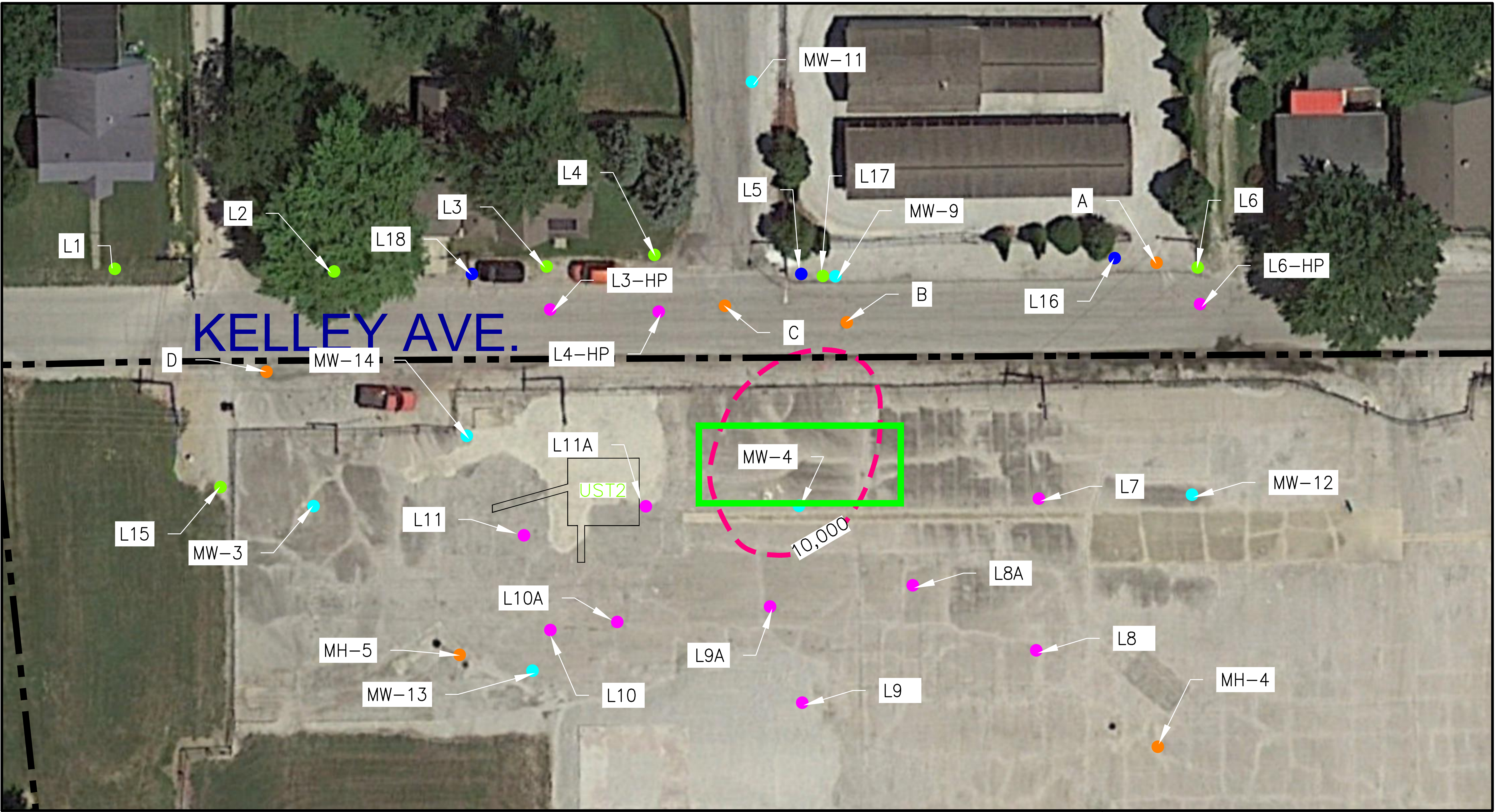
MONTROSE ENVIRONMENTAL SOLUTIONS, INC.

1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460–2658
T: 610.840.9100 F: 610.840.9199 montrose–env.com

Scale:	1" = 100'
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	G.S.
Project No.:	2020–4123
Drawing Date:	4/11/2023
Sheet No.:	1 OF 1
Revision Number:	0

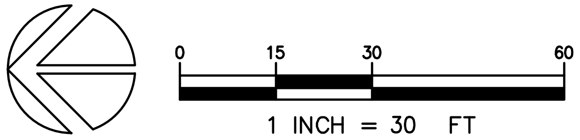
FIGURE 2

F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Site Map.dwg



LEGEND:

10,000	TCE ISOCONCENTRATION 4TH QUARTER 2021
— — —	APPROXIMATE SITE BOUNDARY
▭	FORMER UST–2 AREA
●	EXISTING MANHOLE
●	EXISTING MONITORING WELL
●	EXISTING SOIL GAS SAMPLING POINT
●	EXISTING SEWER BEDDING GAS SAMPLING POINT
●	TEMPORARY HYDROPUNCH SAMPLE LOCATION
🟩	PROPOSED EXCAVATION AREA



EXIDE FRANKFORT
555 HOKE AVENUE
FRANKFORT, INDIANA

PROPOSED EXCAVATION AREA

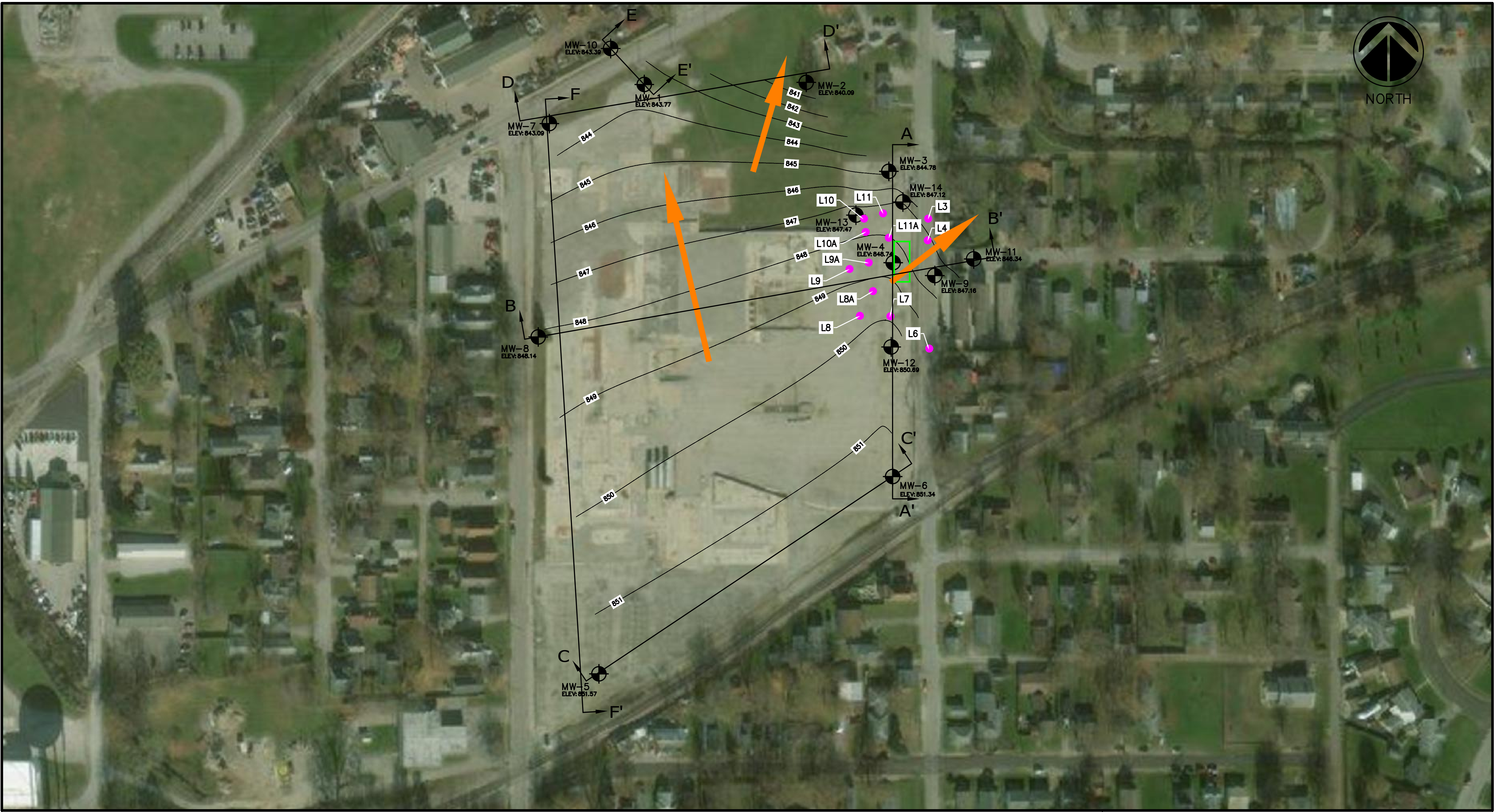
MONTROSE ENVIRONMENTAL
MONTROSE ENVIRONMENTAL SOLUTIONS, INC.

1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460–2658
T: 610.840.9100 F: 610.840.9199 montrose–env.com

Scale:	1" = 30'
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	G.S.
Project No.:	2020–4123
Drawing Date:	4/11/2023
Sheet No.:	1 OF 1
Revision Number:	0

FIGURE 3

F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Proposed Excavation Figure.dwg



➡ GROUNDWATER FLOW DIRECTION

—848— GROUNDWATER CONTOURS (DECEMBER 2021 EVENT)

⊕ MW–1 MONITORING WELL

● HYDROPUNCH SAMPLE LOCATION

A A' GEOLOGIC PROFILE LOCATION

🟩 APPROXIMATE PROPOSED EXCAVATION EXTENT

0 75 150 300

1 INCH = 150 FT

EXIDE FRANKFORT

555 HOKE AVENUE
FRANKFORT, INDIANA

GEOLOGIC CROSS SECTION LOCATIONS AERIAL PERSPECTIVE

MONTROSE ENVIRONMENTAL

MONTROSE ENVIRONMENTAL SOLUTIONS, INC.

1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460–2658
T: 610.840.9100 F: 610.840.9199 montrose–env.com

Scale:	AS SHOWN
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	G.S.
Project No.:	2020–4123
Drawing Date:	MARCH 20, 2023
Sheet No.:	OF
Revision Number:	

FIGURE 4

F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Geologic Profile Aerial.dwg

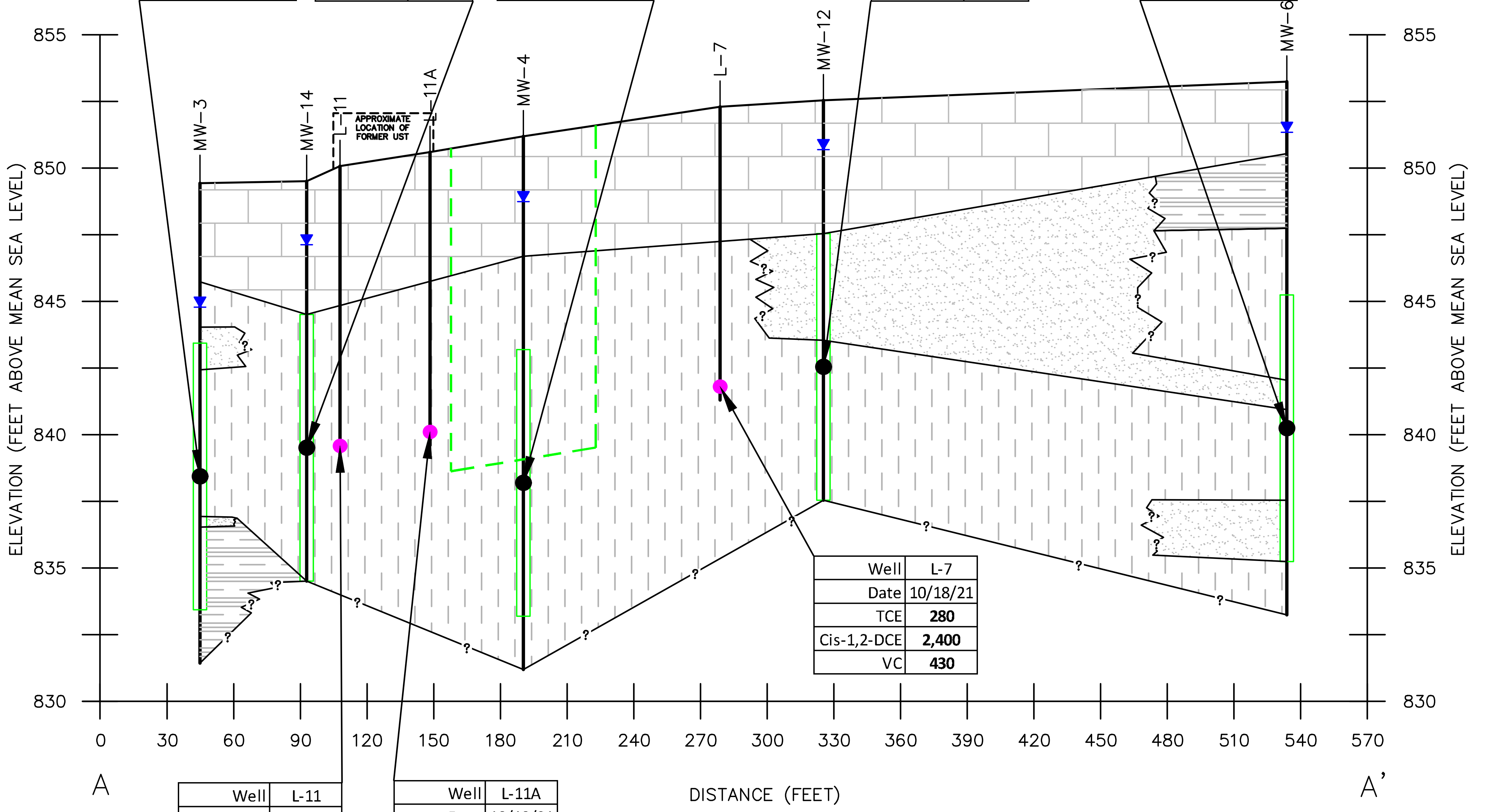
Well	MW-3
Date	12/8/21
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)

Well	MW-14
Date	12/9/21
TCE	ND (5)
Cis-1,2-DCE	1.2 J
VC	ND (2)

Well	MW-4
Date	12/9/21
TCE	**187,000**
Cis-1,2-DCE	**267,000**
VC	**22,900**

Well	MW-12
Date	12/9/21
TCE	0.46 J
Cis-1,2-DCE	4.7 J
VC	1.1 J

Well	MW-6
Date	11/9/19
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)



Well	L-7
Date	10/18/21
TCE	**280**
Cis-1,2-DCE	**2,400**
VC	**430**

Well	L-11
Date	10/18/21
TCE	ND (0.5)
Cis-1,2-DCE	2.7
VC	**2.1**

Well	L-11A
Date	10/19/21
TCE	1.1
Cis-1,2-DCE	21
VC	**14 J**

▨ FILL MATERIAL

▤ CLAY/SANDY CLAY (CL)

▥ SILTS/SANDY SILTS (ML)

░ SAND/SILTY SAND (SM)

▼ WATER ELEVATION MEASURED 12/9/21

● WELL SCREEN ZONE AND PUMP ELEVATION

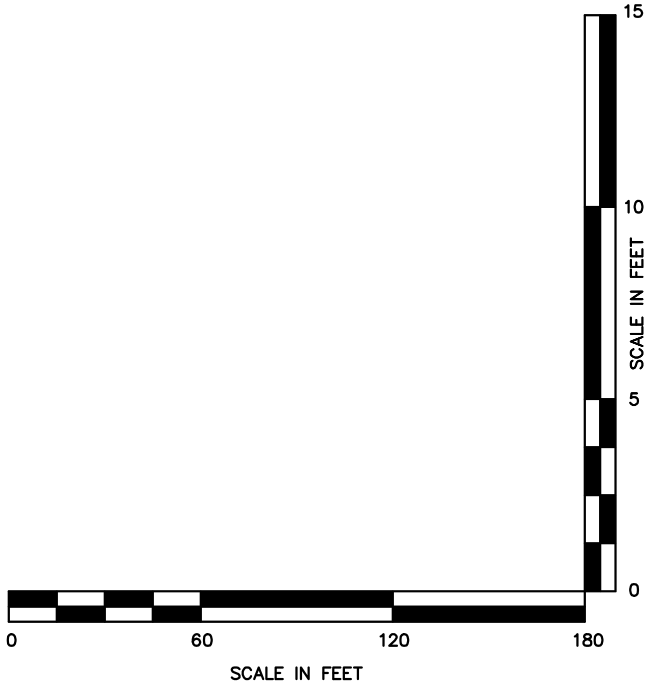
● HYDROPUNCH SAMPLE COLLECTION ELEVATION

——?—— UNKNOWN BOUNDARY

⬚ APPROXIMATE PROPOSED EXCAVATION EXTENT

Notes:
J - Denotes an estimated reporting limit
U - Analyte was not detected at or above the provided method detection limit
Concentrations in microgram per liter
Bolding indicates exceedances of IDEM 2021 RCG GW Tap Limit
TCE = Trichloroethene
Cis-1,2-DCE = Cis-1,2-Dichloroethene
VC = Vinyl Chloride

IDEM 2021 RCG GW Tap Limit	
TCE	5
Cis-1,2-DCE	70
VC	2



EXIDE FRANKFORT
555 HOKE AVENUE
FRANKFORT, INDIANA

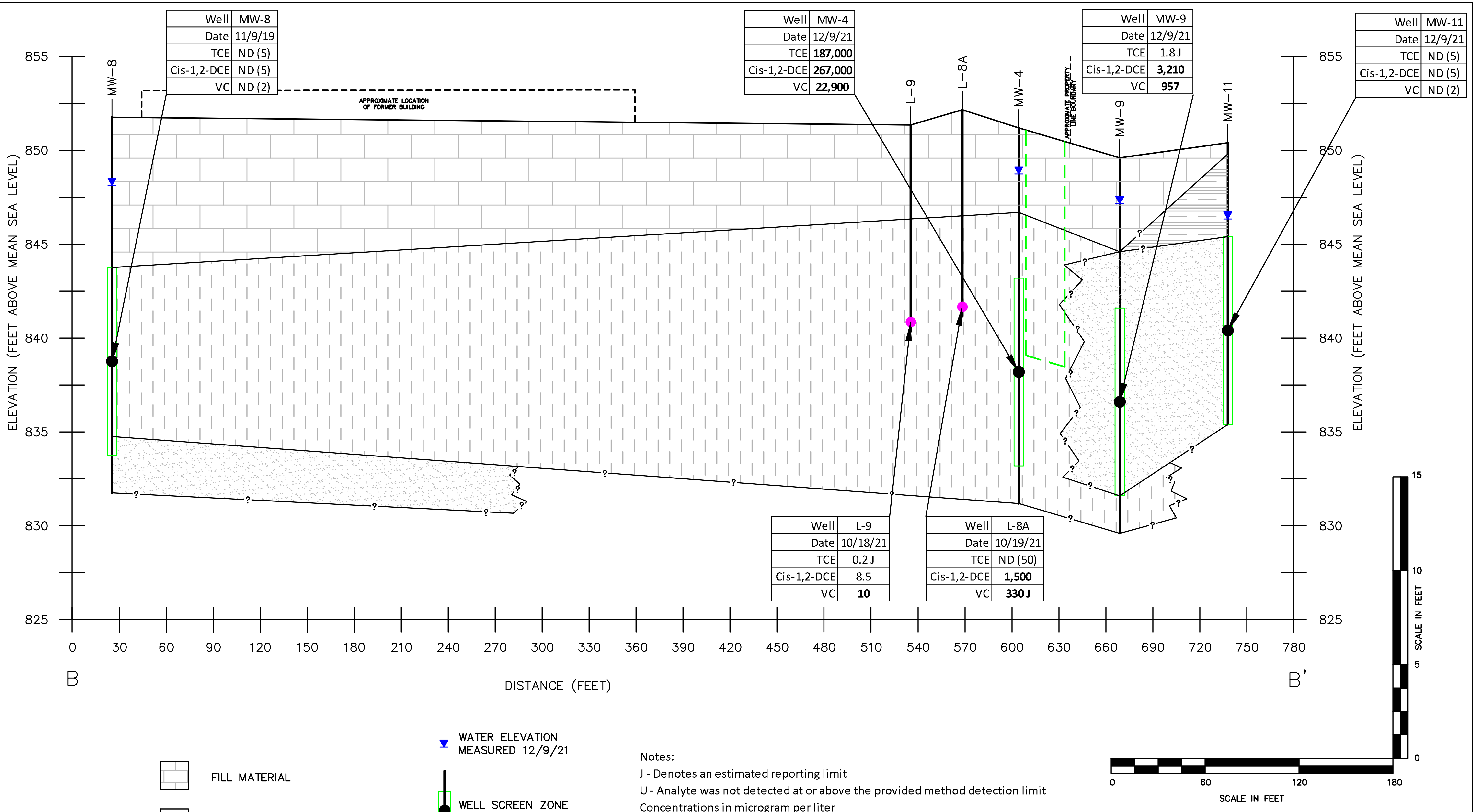
GEOLOGIC CROSS SECTION A - A'

MONTROSE ENVIRONMENTAL
MONTROSE ENVIRONMENTAL SOLUTIONS, INC.
1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460-2658
T: 610.840.9100 F: 610.840.9199 montrose-env.com

Scale:	AS SHOWN
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	G.S.
Project No.:	2020-4123
Drawing Date:	MARCH 20, 2023
Sheet No.:	OF
Revision Number:	

FIGURE 5

F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Geologic Cross Sections.dwg



Well	MW-8
Date	11/9/19
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)

Well	MW-4
Date	12/9/21
TCE	**187,000**
Cis-1,2-DCE	**267,000**
VC	**22,900**

Well	MW-9
Date	12/9/21
TCE	1.8 J
Cis-1,2-DCE	**3,210**
VC	**957**

Well	MW-11
Date	12/9/21
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)

Well	L-9
Date	10/18/21
TCE	0.2 J
Cis-1,2-DCE	8.5
VC	**10**

Well	L-8A
Date	10/19/21
TCE	ND (50)
Cis-1,2-DCE	**1,500**
VC	**330 J**

▦ FILL MATERIAL

▤ CLAY/SANDY CLAY (CL)

▥ SILTS/SANDY SILTS (ML)

░ SAND/SILTY SAND (SM)

▼ WATER ELEVATION MEASURED 12/9/21

● WELL SCREEN ZONE AND PUMP ELEVATION

● HYDROPUNCH SAMPLE COLLECTION ELEVATION

——?—— UNKNOWN BOUNDARY

▯ APPROXIMATE PROPOSED EXCAVATION EXTENT

Notes:
J - Denotes an estimated reporting limit
U - Analyte was not detected at or above the provided method detection limit
Concentrations in microgram per liter
Bolding indicates exceedances of IDEM 2021 RCG GW Tap Limit
TCE = Trichloroethene
Cis-1,2-DCE = Cis-1,2-Dichloroethene
VC = Vinyl Chloride

IDEM 2021 RCG GW Tap Limit	
TCE	5
Cis-1,2-DCE	70
VC	2

EXIDE FRANKFORT
555 HOKE AVENUE
FRANKFORT, INDIANA

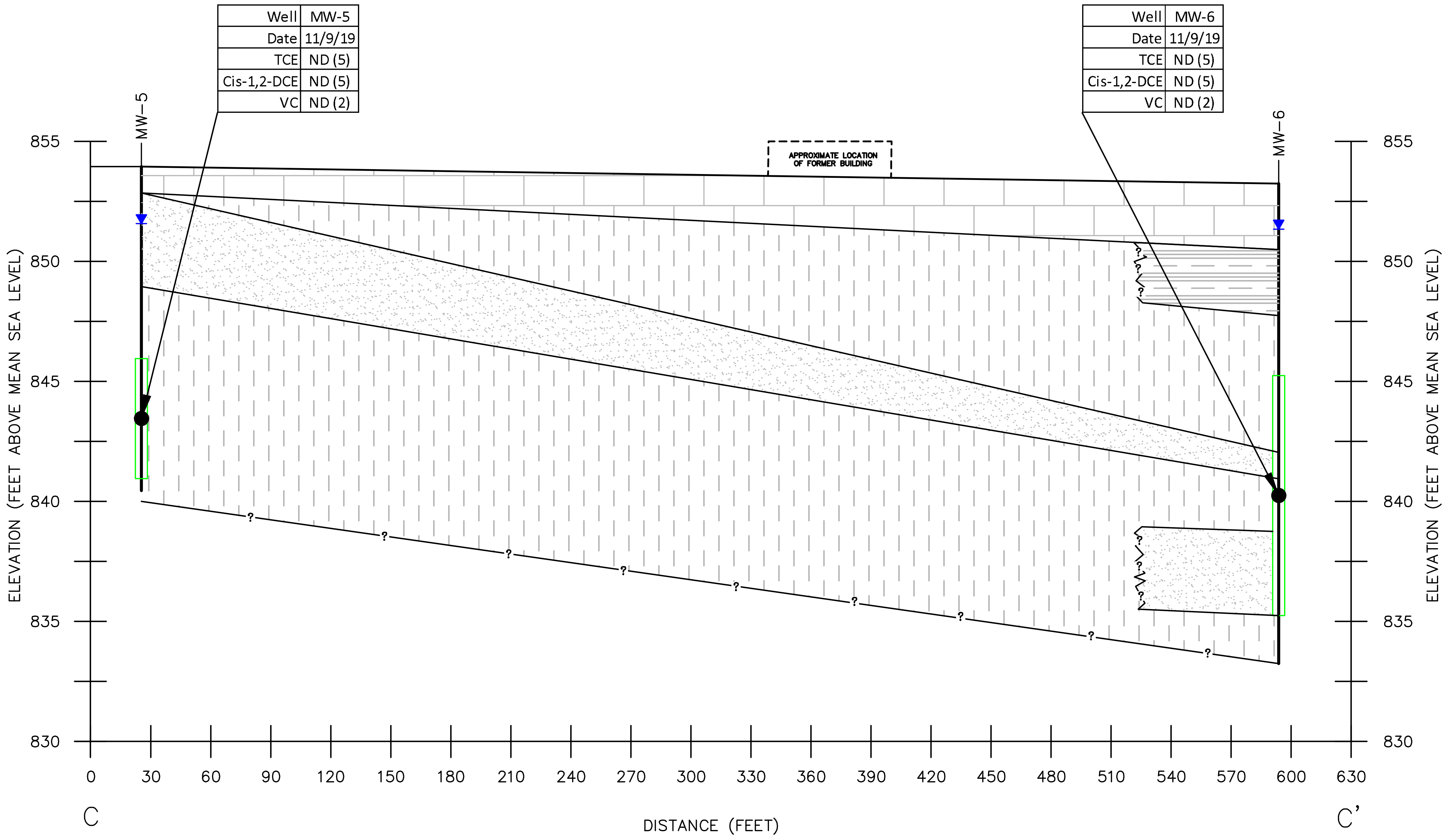
GEOLOGIC CROSS SECTION B - B'

MONTROSE ENVIRONMENTAL
MONTROSE ENVIRONMENTAL SOLUTIONS, INC.
1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460-2658
T: 610.840.9100 F: 610.840.9199 montrose-env.com

Scale:	AS SHOWN
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	G.S.
Project No.:	2020-4123
Drawing Date:	MARCH 20, 2023
Sheet No.:	OF
Revision Number:	

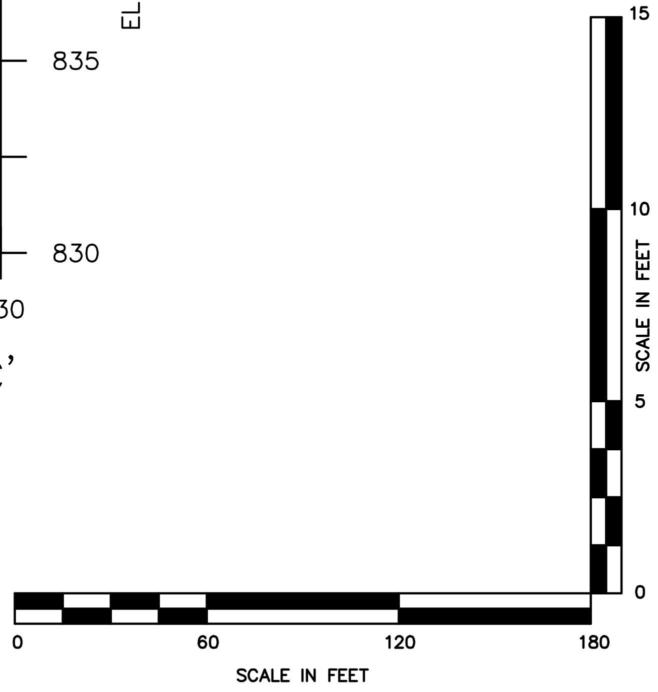
FIGURE 6

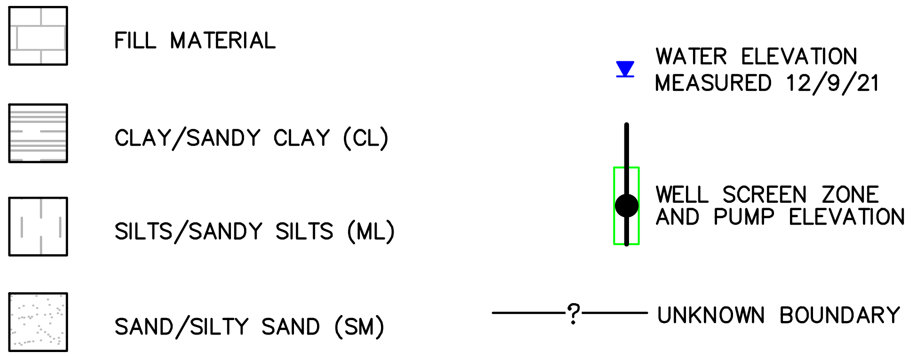
F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Geologic Cross Sections.dwg



Well	MW-5
Date	11/9/19
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)

Well	MW-6
Date	11/9/19
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)





Notes:
J - Denotes an estimated reporting limit
U - Analyte was not detected at or above the provided method detection limit
Concentrations in microgram per liter
Bolding indicates exceedances of IDEM 2021 RCG GW Tap Limit
TCE = Trichloroethene
Cis-1,2-DCE = Cis-1,2-Dichloroethene
VC = Vinyl Chloride

IDEM 2021 RCG GW Tap Limit	
TCE	5
Cis-1,2-DCE	70
VC	2

EXIDE FRANKFORT
555 HOKE AVENUE
FRANKFORT, INDIANA

GEOLOGIC CROSS SECTION C - C'

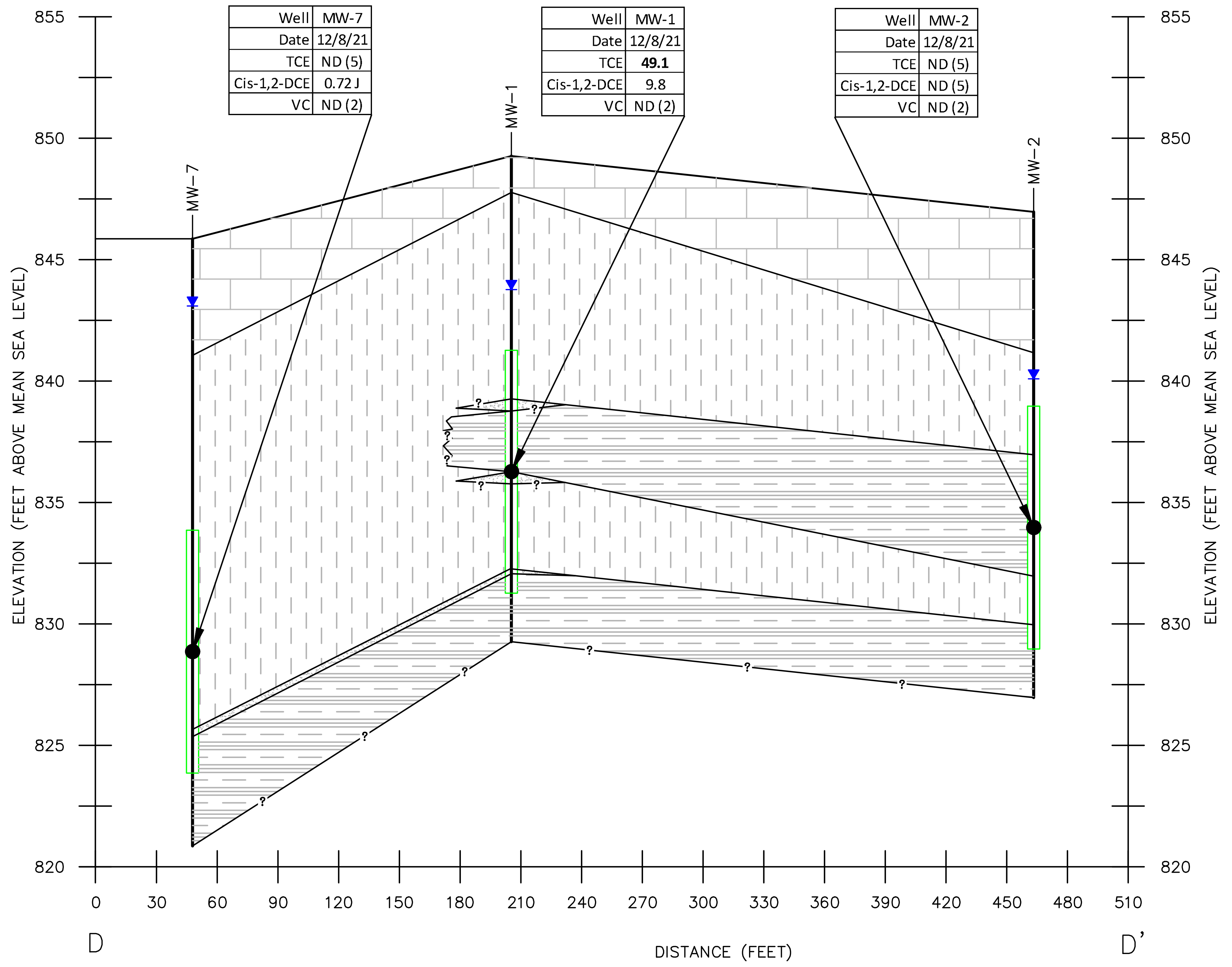
MONTROSE ENVIRONMENTAL

MONTROSE ENVIRONMENTAL SOLUTIONS, INC.
1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460–2658
T: 610.840.9100 F: 610.840.9199 montrose–env.com

Scale:	AS SHOWN
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	G.S.
Project No.:	2020–4123
Drawing Date:	MARCH 20, 2023
Sheet No.:	OF
Revision Number:	

FIGURE 7

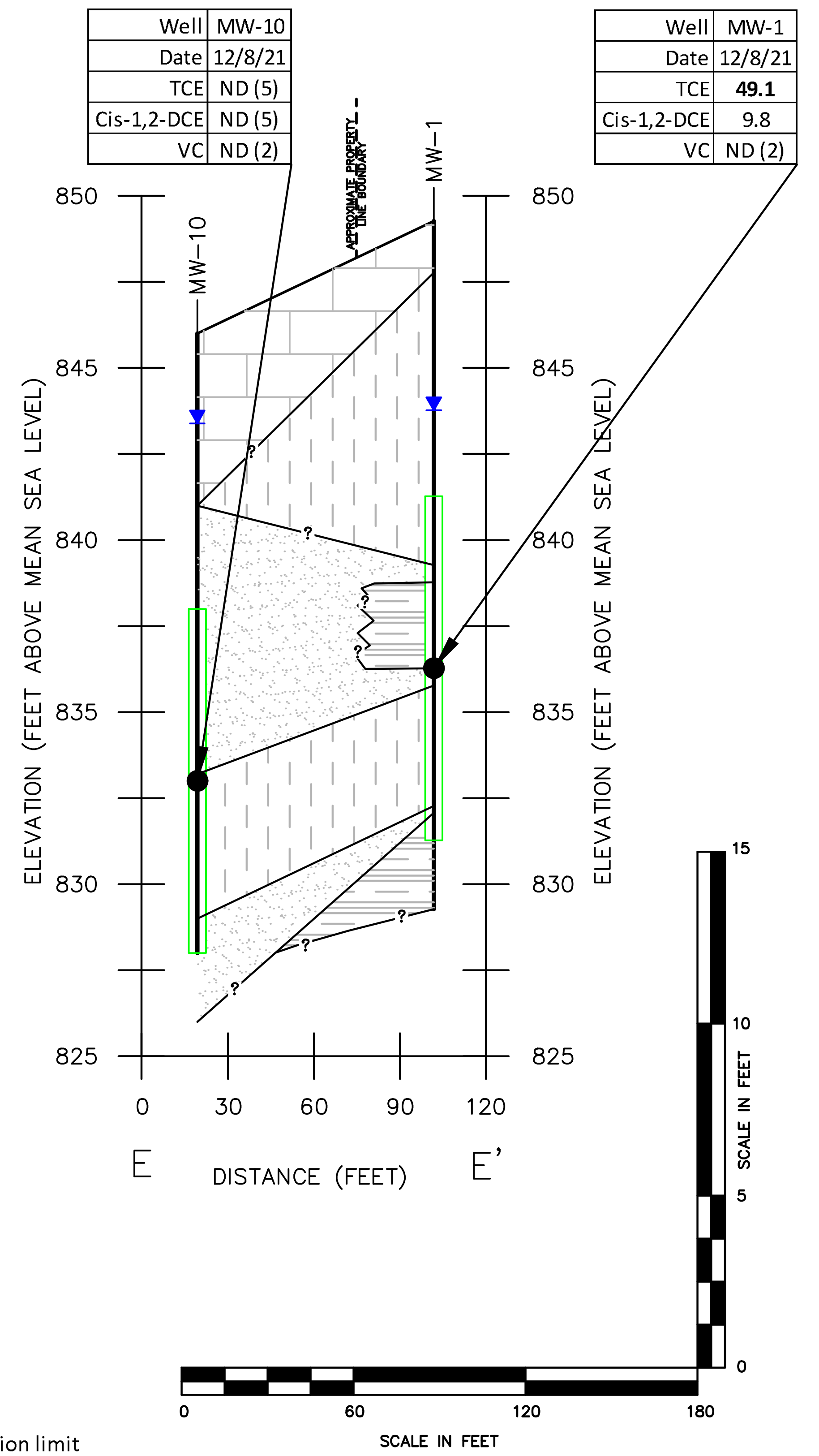
F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Geologic Cross Sections.dwg



Well	MW-7
Date	12/8/21
TCE	ND (5)
Cis-1,2-DCE	0.72 J
VC	ND (2)

Well	MW-1
Date	12/8/21
TCE	**49.1**
Cis-1,2-DCE	9.8
VC	ND (2)

Well	MW-2
Date	12/8/21
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)



Well	MW-10
Date	12/8/21
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)

Well	MW-1
Date	12/8/21
TCE	**49.1**
Cis-1,2-DCE	9.8
VC	ND (2)

▦	FILL MATERIAL
▤	CLAY/SANDY CLAY (CL)
▥	SILTS/SANDY SILTS (ML)
▨	SAND/SILTY SAND (SM)
▼	WATER ELEVATION MEASURED 12/9/21
●	WELL SCREEN ZONE AND PUMP ELEVATION
—?—	UNKNOWN BOUNDARY

Notes:

J - Denotes an estimated reporting limit

U - Analyte was not detected at or above the provided method detection limit

Concentrations in microgram per liter

Bolding indicates exceedances of IDEM 2021 RCG GW Tap Limit

TCE = Trichloroethene

Cis-1,2-DCE = Cis-1,2-Dichloroethene

VC = Vinyl Chloride

IDEM 2021 RCG GW Tap Limit	
TCE	5
Cis-1,2-DCE	70
VC	2

EXIDE FRANKFORT
555 HOKE AVENUE
FRANKFORT, INDIANA

GEOLOGIC CROSS SECTIONS D-D' AND E-E'

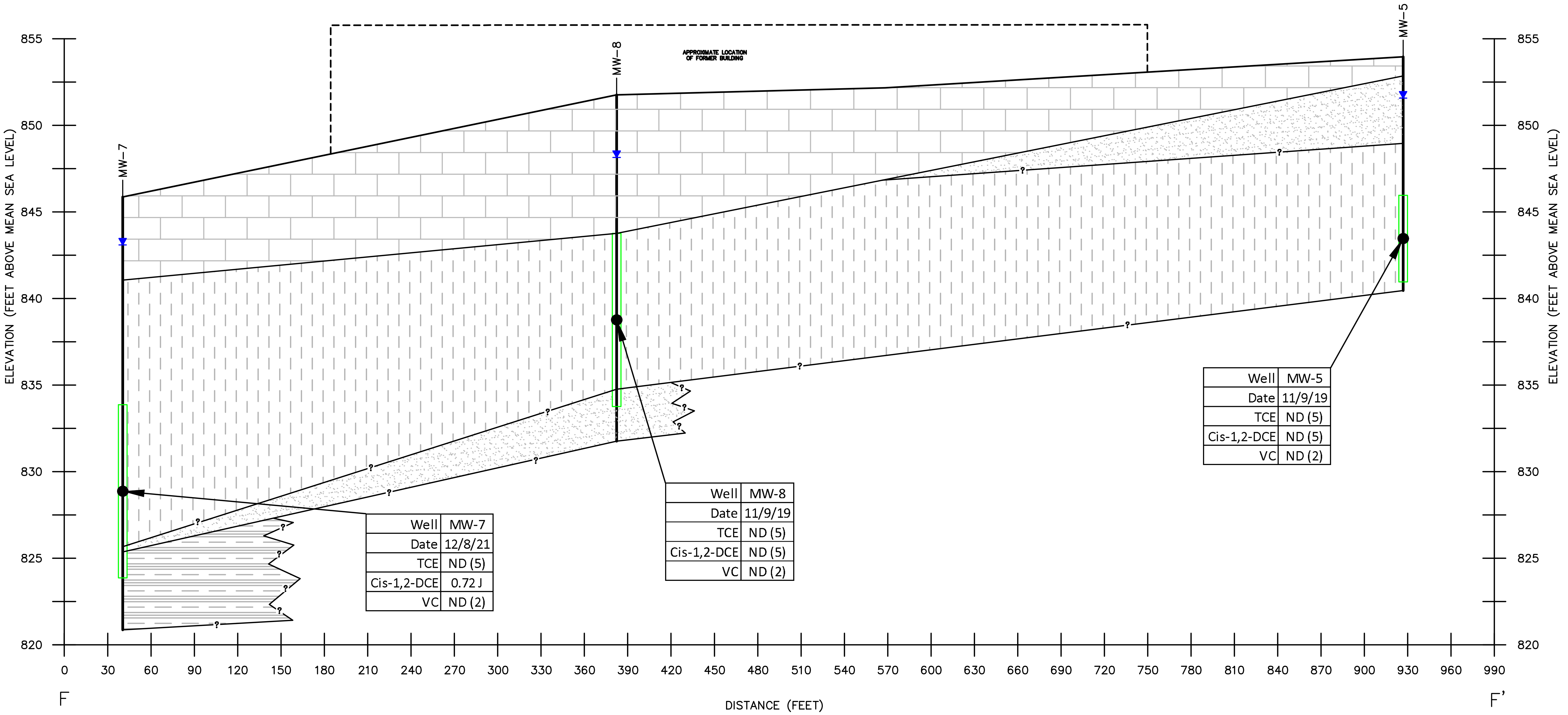
MONTROSE ENVIRONMENTAL

MONTROSE ENVIRONMENTAL SOLUTIONS, INC.
1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460-2658
T: 610.840.9100 F: 610.840.9199 montrose-env.com

Scale:	AS SHOWN
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	G.S.
Project No.:	2020-4123
Drawing Date:	MARCH 20, 2023
Sheet No.:	OF
Revision Number:	

FIGURE 8

F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Geologic Cross Sections.dwg



Well	MW-7
Date	12/8/21
TCE	ND (5)
Cis-1,2-DCE	0.72 J
VC	ND (2)

Well	MW-8
Date	11/9/19
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)

Well	MW-5
Date	11/9/19
TCE	ND (5)
Cis-1,2-DCE	ND (5)
VC	ND (2)

▨ FILL MATERIAL

▤ CLAY/SANDY CLAY (CL)

▥ SILTS/SANDY SILTS (ML)

▨ SAND/SILTY SAND (SM)

▼ WATER ELEVATION MEASURED 12/9/21

● WELL SCREEN ZONE AND PUMP ELEVATION

● HYDROPUNCH SAMPLE COLLECTION ELEVATION

——?—— UNKNOWN BOUNDARY

▯ APPROXIMATE PROPOSED EXCAVATION EXTENT

Notes:
J - Denotes an estimated reporting limit
U - Analyte was not detected at or above the provided method detection limit
Concentrations in microgram per liter
Bolding indicates exceedances of IDEM 2021 RCG GW Tap Limit
TCE = Trichloroethene
Cis-1,2-DCE = Cis-1,2-Dichloroethene
VC = Vinyl Chloride

IDEM 2021 RCG GW Tap Limit	
TCE	5
Cis-1,2-DCE	70
VC	2

EXIDE FRANKFORT
555 HOKE AVENUE
FRANKFORT, INDIANA

GEOLOGIC CROSS SECTION F - F'

MONTROSE ENVIRONMENTAL
MONTROSE ENVIRONMENTAL SOLUTIONS, INC.
1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460-2658
T: 610.840.9100 F: 610.840.9199 montrose-env.com

Scale:	AS SHOWN
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	G.S.
Project No.:	2020-4123
Drawing Date:	MARCH 20, 2023
Sheet No.:	OF
Revision Number:	

FIGURE 9

F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Geologic Cross Sections.dwg

● APPROXIMATE PROPOSED SURFACE WATER AND SEDIMENT SAMPLING LOCATION

0 20 40 80

1 INCH = 40 FT

EXIDE FRANKFORT

555 HOKE AVENUE
FRANKFORT, INDIANA

PROPOSED SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

MONTROSE
ENVIRONMENTAL

MONTROSE ENVIRONMENTAL SOLUTIONS, INC.

1140 VALLEY FORGE ROAD
VALLEY FORGE, PENNSYLVANIA 19460
T: 610.840.9100 F: 610.840.9199 montrose-env.com

Scale: 1" = 40'
Drawn By: C.E.P.
Checked By: G.S.
Project Mgr.: J.S.D.
Originated By: C.E.P.
Project No.: 2020-4123
Drawing Date: APRIL 2023
Sheet No.: 1 1
Revision Number: 0

FIGURE 10

F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Outfall Z Sampling.dwg

LEGEND

🟩	SANITARY SEWER
🟦	STORMWATER
— — —	APPROXIMATE SITE BOUNDARY
← ←	INFERRED FLOW DIRECTION
⊕ MW–1	EXISTING MONITORING WELL
⊕ MW–15	PROPOSED MONITORING WELL LOCATION

NOTE
1. UTILITY LINE LOCATIONS INFERRED FROM FIELD MEASUREMENTS AND DRAWINGS PROVIDED BY FRANKFORT UTILITY DEPARTMENTS AND SURVEY DATA COLLECTED BY RANDALL MILLER ASSOCIATES.

NORTH

0 25 50 100
1 INCH = 50 FT

EXIDE FRANKFORT
555 HOKE AVENUE
FRANKFORT, INDIANA

PROPOSED WELL LOCATIONS

MONTROSE ENVIRONMENTAL

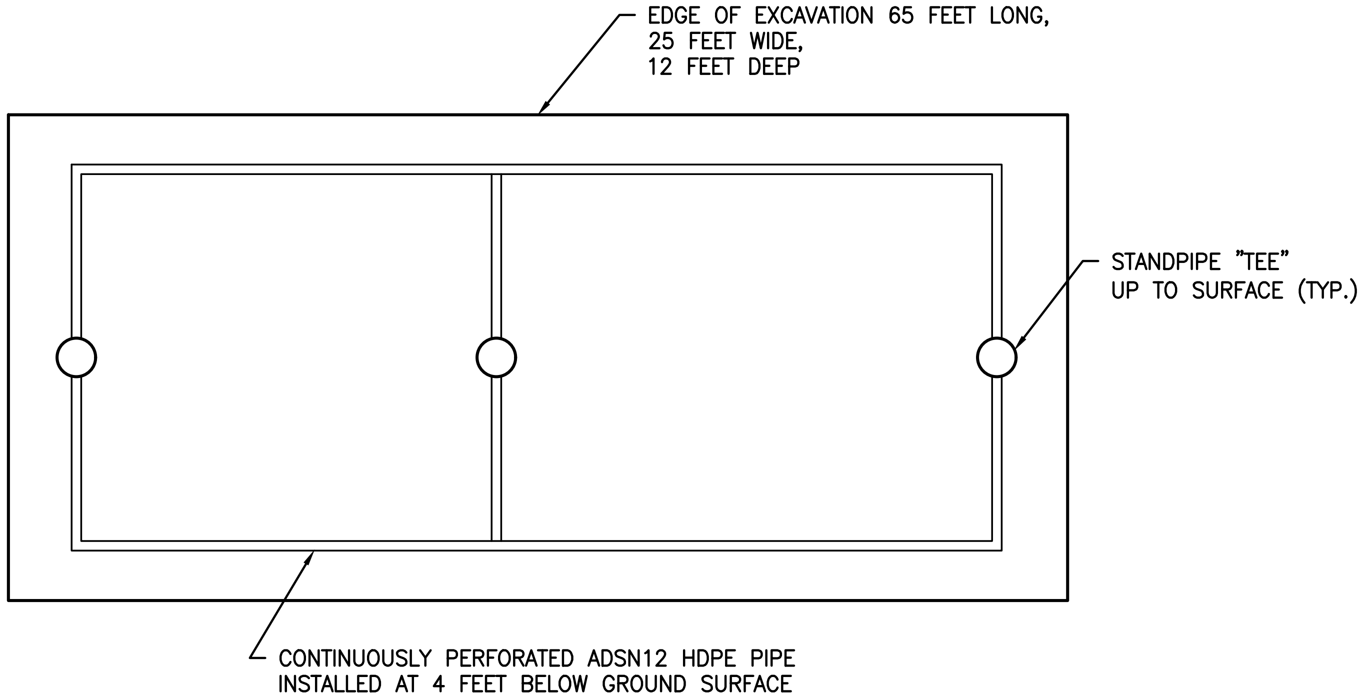
MONTROSE ENVIRONMENTAL SOLUTIONS, INC.

1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460–2658
T: 610.840.9100 F: 610.840.9199 montrose–env.com

Scale:	1" = 50'
Drawn By:	C.E.P.
Checked By:	G.S.
Project Mgr.:	J.S.D.
Originated By:	G.S.
Project No.:	2020–4123
Drawing Date:	4/11/2023
Sheet No.:	1 OF 1
Revision Number:	0

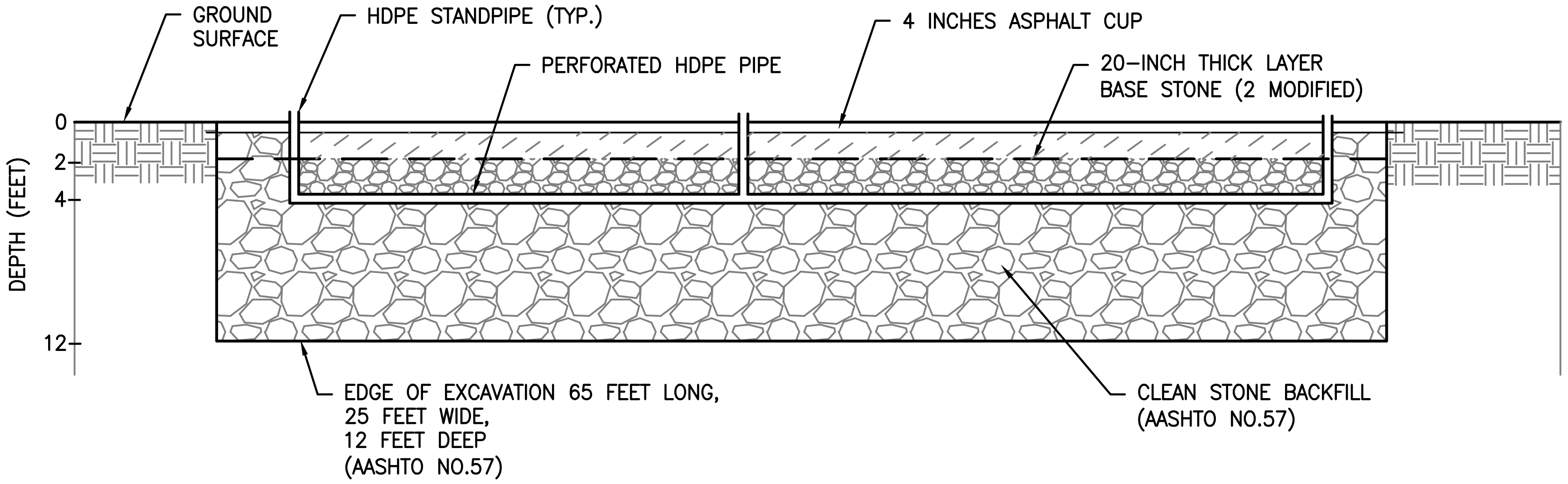
FIGURE 11

F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\Civil\Site Map.dwg



PLAN VIEW – MW–4 INFILTRATION GALLERY

NOT TO SCALE



CROSS SECTION – MW–4 INFILTRATION GALLERY

NOT TO SCALE

EXIDE FRANKFORT
555 HOKE AVENUE
FRANKFORT, INDIANA

MW-4 INFILTRATION GALLERY DETAILS

MONTROSE ENVIRONMENTAL

MONTROSE ENVIRONMENTAL SOLUTIONS, INC.

1140 VALLEY FORGE ROAD,
PHOENIXVILLE, PENNSYLVANIA 19460–2658
T: 610.840.9100 F: 610.840.9199 montrose–env.com

Scale:	AS SHOWN
Drawn By:	KHF
Checked By:	GS
Project Mgr.:	GS
Originated By:	KHF
Project No.:	2020–4123–02
Drawing Date:	10/7/2022
Sheet No.:	1 OF 1
Revision Number:	0

FIGURE 12

F:\Projects\2020\20204123 - Exide Trust - Frankfort\CAD\DWG\SHEETS\MW-4 INFILTRATION GALLERY FIGURES-New Block.dwg

Appendix A

EPA Correspondence IM Report Approval

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
LR-16J

TRANSMITTED VIA EMAIL

Exide Environmental Response Trust
c/o Mr. Jacob Collins
PathForward Consulting, Inc.
One World Trade Center, 8th Floor
Long Beach, CA 90831

RE: Revised Interim Measures Investigation Report
Former Exide Technologies, 555 Hoke Avenue, Frankfort, Indiana
IND 001 647 460

Dear Mr. Collins:

EPA has reviewed the July 29, 2022 responses to EPA comments and the Revised Interim Measures Investigation (IMI) Report (Report), submitted by Montrose Environmental Services on your behalf, for the former Exide Technologies facility (Facility) in Frankfort, Indiana. EPA provided comments on the April 29, 2022 IMI Report on June 2, 2022.

Regarding the General Comment Response, EPA agrees that addressing the elevated chlorinated volatile organic chemical (CVOC) area proximal to MW-4 via an Interim Measure is warranted. EPA expects the Exide Environmental Response Trust (ERT) to mitigate migration of contamination at and beyond the Facility boundary including potential exposure to contamination which has migrated from the Facility to off-Facility receptors.

Based upon the review of the July 29, 2022 responses to comments and Revised IMI Report, EPA approves the IMI Report with the following comments:

1. The IMI Report includes recommendations for additional investigation of the MW-1 area to define the extent of contamination. As part of that forthcoming work, the ERT should attempt to identify the source of the contamination. Additionally, Section 3.12 (Microbial Insights Results) of the IMI Report states that the microbial and functional gene data indicate high potential for the complete reductive dechlorination of tetrachloroethene (PCE) and trichloroethene (TCE) to ethene at well MW-1 using the Bioaugmentation Bio-Trap Unit. As part of the Interim Measures Work Plan (IMWP), include the MW-1 area in scoping and implementation of the interim measures at MW-4 to determine if reductive dechlorination would provide a meaningful and cost-effective reduction in contamination at MW-1.

2. As part of the IMWP development, include a plan to collect an additional round(s) of soil gas samples as part of IM fieldwork.

3. As part of the IMWP, the ERT should proceed with including assessment and mitigation of any facility contamination that is infiltrating into sanitary sewer piping.

4. The ERT should develop an Interim Measure to cease the stormwater discharges to the creek at Outfall Z and to stormwater infrastructure on Washington Avenue.

Please proceed with developing the Interim Measures Work Plan for the Facility. EPA looks forward to receiving the IMWP within 60 days of the date of this letter.

If you have any questions regarding this matter, please contact me at (312) 886-7890.

Sincerely,

Peter Ramanauskas
Project Manager
Corrective Action Section 1
Land, Chemicals, and Redevelopment Division

CC: Tim Johnson, Indiana Department of Environmental Management
Mark Koller, EPA Office of Regional Counsel