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ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES (ABCA)
FORMER HOWE'S LEATHER CORPORATION SITE
CLEARFIELD COUNTY, PA

Prepared on Behalf of Clearly Ahead Development
By Tetra Tech, Inc.
March 2022

1. Introduction and Background

The former Howe's Leather Site (Site) was transferred in 2014 from the Trustees of the Liquidating Trust of the Howe's Leather Corporation (HL Tannery Company) to Clearly Ahead Development (Clearly Ahead) formerly Clearfield County Economic Development Corporation (CCEDC). The Site consists of two properties (Figures 1 and 2):

Site 1 (Western Parcel)- is 21+/- acres located off 50 Cooper Road in Curwensville, PA. west of the R.J. Corman Group railroad tracks and south of the West Branch Susquehanna River.

Site 2 (Eastern Parcel)– is 5.5 acres, also known as the Former Sludge Lagoon, and located east of the R. J. Corman Railroad Group railroad tracks between the north side of Cooper Road and the West Branch Susquehanna River.

As discussed further below, the Site has a longstanding history as a leather tannery / treatment facility dating to at least 1900. The facility ceased operations in 2004. All previous existing buildings have been razed and removed from the Site. Site assessments and localized remediation activities have been conducted at Site 1 since 1993. The Site has excellent redevelopment potential for commercial and/or industrial end use and includes key utilities situated "at the curb". As discussed further below, some localized areas of contamination remain at the Site 1 which would likely preclude redevelopment. Site 2 has undergone all necessary assessment and remediation and completed the submission of the plans and reports with the Pennsylvania Department of Environmental Protection (PADEP) to document that PADEP Act 2 remediation standards have been attained. The following Analysis of Brownfields Cleanup Alternatives (ABCA) was developed by Tetra Tech, Inc. (Tetra Tech) according to pertinent United States Environmental Protection Agency (USEPA) guidelines and in consideration of pertinent state and local regulatory requirements, including those for remediation standards. This represents an update to the draft ABCA submitted to USEPA in November 2019 as part of the USEPA Cleanup Grant application process and the draft ABCA submitted in March 2021.

As discussed further below, the previous Phase I and II ESA work and targeted release area closure characterizations conducted at the Site have provided valuable background information in the development of this ABCA. Clearly Ahead received EPA Community-Wide Brownfields Assessment Grants (Hazardous and Petroleum) in 2018, which was utilized to conduct a Phase II ESA at Site 1. In 2020, Clearly Ahead was awarded a Cleanup Grant for the Howes Leather Site. This funding was utilized to conduct additional assessment work in areas targeted for remediation to further delineate soil and groundwater contamination. Funding under the Cleanup Grant will be utilized to conduct the proposed remediation activities. A summary of historic assessments and targeted remediation efforts and an overview of findings of the Tetra Tech environmental assessments are discussed below.

A. Site Location (address)

Site 1, also known as the western parcel, is located at 50 Cooper Road, Curwensville, Pennsylvania 16833-1544, and consists of three adjacent parcels which total approximately 21.04 acres. Site 2, also known as the eastern parcel, which consists of 5.5 acres, is situated to the east of Site 1 across the R.J. Corman railroad tracks.

B. Previous Site Use(s) and any previous cleanup/remediation

As mentioned above, the Site had been used as a tannery/leather treatment facility from at least 1900 through 2004. Figure 3 shows the locations of former operational areas, which include those discussed below. The following summarizes previous cleanup/remediation activities at the Site:

In August 1993, UST closure activities were performed on four USTS at the Site: (1) 500 gallon gasoline UST; (1) 500 gallon Varsol UST; (1) 295 gallon kerosene UST and (1) 295 gallon gasoline UST. The USTs were closed by removal with hydrocarbon odors and stained soils noted in soils surrounding the Varsol UST. Approximately 10 tons of material beneath the Varsol UST were considered impacted and were excavated. The Tank Closure Report concluded that the soils beneath the Varsol tank were adversely impacted by petroleum products. In 1994 following additional assessment in this tank area, Mountain Research, Inc. recommended that additional soils be excavated. There is no evidence in PADEP files or elsewhere that the additional soil excavation occurred. A test pit investigation in 2005 noted gasoline type odors in the pit and VOCs were identified in soil samples.

Also, as part of the 1993 UST closure activities, approximately 10 tons of material was also removed from each of the other UST excavations. It is not known where the removed material was disposed. In addition, the analytical parameters for confirmation soil sampling did not include all of the current short list constituents required by pertinent PADEP regulations (Title 25PA Code Chapter 245, Administration of the Storage Tank and Spill Prevention Program regulations}.

There was also reportedly a release from a UST in a "truck traffic and truck parking" area which was successfully remediated in 1995. Records indicate the release contained diesel-range organics.

In 2014, the building foundations were removed from the site, and with PADEP approval, utilized as fill during the sludge excavation and disposal associated with the former Howes Leather sludge lagoon located on the adjacent parcel to the east (Site 2). All assessment and remediation activities have been completed at the former sludge lagoon site with exception of filing necessary documentation with PADEP.

Cleanup of transformer oil spills was completed in 2014 following the vandalism and theft of scrap metal from non-polychlorinated biphenyl (PCB) certified transformers remaining at the Site. A total of six spill areas were excavated, disposed, and confirmatory samples collected which confirmed pertinent PADEP remediation standards were met. The spill response and remedial activities resulted in the excavation and disposal of approximately 21 tons of soil and transformer insulating materials/debris, approximately 140 gallons of transformer oil/water mixture, and the removal and recycling of all the transformers.

Non-hazardous tanning vat sludge was encountered during the removal of concrete flooring and footers at the facility in October 2014. The sludge was found to be contained within multiple wooden vats across a continuous area of approximately 1,500 sq-ft. Characterization and excavation of the sludge was completed, resulting in the excavation and disposal of approximately 960 tons of soil/sludge and associated debris. All post-excavation soil sample analytical results were reported below applicable PADEP remediation standards.

C. Site Assessment Findings

Site 1 (Western Parcel)

As indicated above, site characterization work was done as part of UST closure activities conducted at the Site in the mid-1990s. The following summarizes results of the more recent environmental assessments performed at the Site.

Malcolm Pirnie, an environmental consulting firm, conducted Phase I and Phase II ESAs at the Site in 2005 on behalf of a potential buyer. The Phase II involved collecting 23 soil samples from the following locations: 10 test pits, 12 soil borings and a surface soil location. Elevated levels of arsenic were identified in soils and groundwater in the north central portion of the Site. Certain VOCs (including toluene) were present in groundwater in the northeastern portion of the site downgradient of the Former Wastewater Treatment Area.

In 2012, DMS Environmental Services, LLC (DMSE) conducted a Phase I ESA at the Site which incorporated review of previous ESA activities. The Phase I identified the following Recognized Environmental Conditions (RECs):

- The Former Varsol Tank Area for potential VOC impacts to soil and groundwater due to evidence of the release in the Closure Report and inadequate characterization of impacted soils.
- The Former two gasoline and one kerosene UST areas for potential VOC impacts to soil and groundwater due to evidence of the release in the Closure Report and inadequate characterization of impacted soils. In addition, a groundwater characterization in 1995 detected diesel range organic compounds in groundwater following the closure activities.
- The Former Floor Drain System due to the likelihood of residual process water and sediments trapped in the piping.
- The current stormwater collection system outfall location due to the likelihood of historic industrial discharges potentially impacting river sediments.
- The presence of arsenic in soil and groundwater downgradient of the former Beam House (north central Site area) based on historic soil and groundwater sampling.
- The presence of VOCs in in groundwater downgradient of the Former Wastewater Treatment Plant (northeastern Site area) based on historic groundwater sampling.
- An Independent Electric Plant identified in a 1943 Sanborn Map due to potential for PCB contamination.
- The historic presence of large coal pile and layers of coal ash for potential impacts to soil and groundwater from certain heavy metals and sulfate.

In 2013 DMSE implemented a Phase II ESA to evaluate the above-referenced RECs. The following summarizes findings of the Phase II ESA which included collecting soil, groundwater and surface water and sediment samples with analysis for constituents of concern.

- Confirmation that a release occurred at the former location of the 500 gallon unleaded gasoline UST and saturated subsurface soils exhibited concentrations of several unleaded gasoline constituents which exceeded their respective Act 2 non-residential standards.
- Sediment sampling at the historic stormwater outfalls confirmed the presence of arsenic above the arsenic residential standard.
- Sediment sampling of the Fire Pond identified several metals exceeding the EPA Region III BTQAG (Biological Technical Assistance Group) pertinent benchmark screening values.
- Soil sampling in the northcentral Site area near the river confirmed the presence of arsenic concentration in soils exceeding the arsenic nonresidential soil to groundwater MSC.
- The Former Varsol Tank area was eliminated as a REC based on the soil sampling results.

- Two additional Areas of Interest (AOI's) were retained due to the investigative results not satisfying data requirements to confirm or eliminate the RECs, specifically the Former 295 gallon Kerosene AST and the sitewide groundwater evaluation for impacts from various potential sources.

In 2013 and 2014 DMSE implemented a follow-on Phase II ESA to further investigate two of the four Areas of Interest requiring further investigation based upon results of the original DMSE Phase II ESA, specifically the Former 500 Gallon Unleaded Gasoline UST and the Site-Wide Groundwater Evaluation. The scope included installing one new groundwater monitoring well downgradient of the Former Unleaded Gasoline UST area and conducting site-wide groundwater monitoring with analysis for priority pollutant metals and VOCs. The following summarizes the findings:

- 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene were detected at concentrations above the PADEP nonresidential used aquifer MSCs in the new groundwater monitoring well downgradient of the Former Unleaded Gasoline UST.
- The site-wide groundwater monitoring found that dissolved arsenic and dissolved thallium were widespread in site groundwater at concentrations exceeding their respective PADEP nonresidential used aquifer MSCs.

In 2019 and 2020 Tetra Tech with the assistance of DMSE implemented a follow-on Phase II ESA to further delineate contamination in the Site areas targeted for remediation as well as general site wide soil borings to identify any potential new areas of concern. The Phase II ESA included conducting the following activities: soil sampling (via 47 borings and test pits), historic outfall sediment sampling (2 samples), installing four additional monitoring wells, groundwater sampling of the entire 17 well network, Fire Pond surface water sampling (2 samples), and analysis of all collected samples for strategically selected parameters based on historic operations / identified releases. To help delineate areas requiring remediation, analytical results were compared to PADEP Act 2 non-residential standards as well as criteria for evaluating potential for vapor intrusion.. The following summarizes the findings:

- 1,2,4-trimethylbenzene and benzene were detected at concentrations above the PADEP nonresidential used aquifer MSCs in the groundwater monitoring well (MW-01) downgradient of the Former Unleaded Gasoline UST.
- Dissolved Arsenic was detected at concentrations above the PADEP nonresidential used aquifer MSCs in the groundwater monitoring well (GP-11) within in the High Arsenic Concentration Area.
- 1,2,4-trimethylbenzene was detected at concentrations above the PADEP nonresidential soil to groundwater MSCs in a soil boring (SB-11-07) at depths of 8 to 10 feet below ground surface in the Former Unleaded Gasoline UST area.
- Arsenic was detected at concentrations above the PADEP nonresidential soil to groundwater MSCs in six soil borings (SB-10-02, SB-10-03, SB-10-04, SB-10-05, SB-10-07, and SB-10-08) at depths ranging from 0 to 5 feet below ground surface in the High Arsenic Concentration Area.
- Lead was detected at concentrations above the PADEP nonresidential soil to groundwater MSCs in a soil boring (SB-12-08) at depths of 3 to 5 feet below ground surface in the western portion of the site as part of the General Site Wide soil boring sampling. Lead was not detected above the PADEP nonresidential soil direct contact in the borings.
- Fire Pond sediment results were evaluated according to the PADEP guidance for ecological evaluation for sediments which indicated that there was no further action needed to address the Fire Pond sediments.

  Zinc detected at concentrations above the PADEP nonresidential used aquifer MSCs in the groundwater monitoring well (GP-10S) within in the northeastern corner of the Site,

In 2020 and 2021 Tetra Tech with the assistance of DMSE implemented a follow-on Phase II ESA to the Phase II conducted in 2019/2020 to further delineate contamination in targeted areas at the Site. The Phase II ESA included conducting the following activities: soil sampling (via 21 borings and test pits), installing three additional monitoring wells downgradient of the Former Unleaded Gasoline UST area, groundwater sampling of the four Former Unleaded Gasoline UST area well network, and analysis

of all collected samples for strategically selected parameters based on identified findings. To help delineate areas requiring remediation, analytical results were compared to PADEP Act 2 non-residential standards as well as criteria for evaluating potential for vapor intrusion. The following summarizes the findings:

- 1,2,4-trimethylbenzene was detected at concentrations above the PADEP nonresidential used aquifer MSCs in the groundwater monitoring well (MW-01) downgradient of the Former Unleaded Gasoline UST area; however, no VOCs including 1,2,4trimethylbenzene were detected in any of the three recently installed wells situated downgradient of the former unleaded UST. Results from the one round of groundwater sampling indicates that the VOC groundwater contamination associated with the former unleaded UST is very limited in extent. An additional round of groundwater monitoring was conducted in the Former Unleaded Gasoline UST network in mid-March to evaluate for seasonal variations in groundwater quality (if any).
- Arsenic was detected at concentrations above the PADEP nonresidential soil to groundwater MSCs in six soil borings (SB-10-11, SB-10-12, SB-10-13, SB-10-17, SB-10-19, and SB-10-20) at depths ranging from 0 to 5 feet below ground surface (bgs) in the High Arsenic Concentration Area. However, only one of the surface samples, 0 to 2 feet bgs, exceeded the nonresidential soil direct contact MSC (0 to 2 feet). The better-defined High Arsenic Area covers approximately 10,000 sq ft with the depth of the samples exceeding the arsenic nonresidential soil to groundwater MSC ranging from ground surface to 5.0 ft below ground surface, depending on location.
- Lead was not detected at concentrations above the Act 2 MSC in any of the step-out borings, suggesting the lead in soil exceedance is limited in extent.

Figure 4 depicts the lateral extent of the above referenced areas.

Site 2 (Eastern Parcel)

At the time of the property transfer in 2014, PADEP provided $1.45 million in funding to Clearly Ahead for closure of the unlined sludge lagoon (also known as the "Impoundment") on Site 2. The plans and specifications for closure of the Impoundment were presented as part of the Invitation to Bid and Specifications (Bid Spec) prepared by Civil and Environmental Consultants, Inc. [CEC 2013]. Earthmovers Unlimited, Inc. (Earthmovers) of Kylertown, PA was the selected bidder to implement the closure. DMSE provided contractor oversight on behalf of Clearly Ahead.

The Site historically was the location of a vegetable tanning operation that had operated for nearly a century. Wastewater sludge from the tanning operation was transferred to an unlined lagoon (Impoundment) on Site 2. The Impoundment was capped pursuant to a cap-and-monitor closure plan from May 29, 1998, and modified by an addendum in May 2000, and again in November 2006 [PADEP 2006]. Analytical results of groundwater samples collected from a series of monitoring wells installed around the Impoundment indicated that groundwater degradation in the form of ammonia was being discharged into the West Branch Susquehanna River. The Impoundment grade is above the 100-yr flood plain. Approximately 31,000 tons (approximately 34,500 cubic yards) of sludge was estimated to be contained within the Impoundment.

The Closure Actions for the sludge impoundment at Site 2 are summarized in the Sludge Impoundment Certification Report [DMSE 2015] as follows:

- A verification of sludge excavation was performed by PADEP and/or DMSE across a total of 18 areas throughout the sludge impoundment. A total of approximately 47,000 CY of sludge were excavated from the Impoundment and transported to the RJ Bloom Mine Site and Hudson West Site for beneficial re-use as a soil condition agent for mine reclamation. A total of 65 acres were treated with sludge application across both mine reclamation sites.

- A total of approximately 877,412 gallons of contact water generated from sludge excavation activities were discharged to the West Branch Susquehanna River per a PADEP-approved TDA.
- Backfill and surface restoration of the Impoundment was completed to provide for positive drainage of surface water and maintaining a final Impoundment grade above the 100-yr flood plain. A variety of materials from on-Site were used as backfill including: demolished concrete fill from the Tannery portion (i.e. Site 1) of the Site, segregated inner berm materials from the Impoundment (i.e. Site 2), supplemental fill collected from cuts made at the restored Tannery portion (i.e. Site 1) of the Site, and stockpiled cap soils removed from the impoundment prior to excavation.
- The Impoundment was seeded and transformed into a pad ready for future development.
- Post-closure quarterly groundwater monitoring was completed.

The EPA Cleanup Grant awarded to Clearly Ahead will be utilized to achieve final closure of Site 2 through development of a Remedial Investigation Report (RIR) / Cleanup Plan and Final Report required under PA Act 2 to pursue Relief of Liability afforded under PA Act 2 for the property. As agreed with PADEP, additional remedial activities or sampling will not be necessary to prepare the Act 2 documents since all the required data has already been collected to develop the required Act 2 documents and otherwise document proper closure of Site 2. The RIR/Cleanup Plan and Final Report was prepared submitted to the PADEP to document attainment of PADEP remediation standards.

Site Project Goals

The planned reuse for the Site is commercial/industrial. Clearly Ahead has been in discussion with various interested parties for such end uses. Clearly Ahead intends to subdivide the property into four or more parcels to help facilitate redevelopment. A goal is to achieve relief of liability under PA Act 2.

2. Applicable Regulations and Cleanup Standards

A. Cleanup Oversight Responsibility

The Cleanup will be overseen by the Pennsylvania Department of Environmental Protection (PADEP) North Central Regional Office. In 2014 as part of the transfer of the site to Clearly Ahead, PADEP entered into a Buyer-Seller Agreement with Clearly Ahead (Buyer) and HL Tannery, Co. (Seller). Attached to the subject agreement was a Consent Order and Agreement(COA) prepared by PADEP which laid out responsibilities for Clearly Ahead and HL Tannery, Co. relating to remaining environmental issues at the Site. This agreement required that Clearly Ahead conduct follow up investigation and remediation per PA Act 2, discussed further below.

B. Cleanup Standards for Major Contaminants

The Act 2 program has three basic remediation standards: background, statewide health (medium specific) and site-specific (risk-based standards). Act 2 provides for the opportunity to apply one or more standards to portions of a site. Considering the current site conditions and anticipated non-residential end use, it is anticipated that a combination of statewide health (non-residential) standards and risk-based standards, including activity use limitations (AULs) will be applied. Clearly Ahead has continuing obligations under the above-referenced COA with PADEP to remediate portions of the Site identified as having constituent concentrations exceeding PADEP non-residential Medium-Specific Concentration (MSC) standards. In addition, Clearly Ahead must also:

- Limit use of the property to non-residential uses
- Prohibit the use of groundwater for drinking or agricultural purposes
- Provide appropriate control of the property to limit unauthorized access, illegal dumping, and/or exposure to contamination.

The Act 2 program includes regulations pertaining to vapor intrusion screening which will also be applied as appropriate based on the soil and groundwater volatile organic compound results.

C. Laws and Regulation That Apply to the Cleanup

The primary law that will apply to the Cleanup is the Pennsylvania Land Recycling Program (Act 2). Act 2 is a voluntary remediation program that has associated regulation under PA Chapter 250.

3. Evaluation of Cleanup Alternatives

The locations of the areas proposed for soil and groundwater remediation are shown on Figure 4.

Soils

Based on the above assessment activities at the Site, contaminated soils in the following three areas have been targeted for cleanup under this ABCA since the PADEP SHS are exceeded for the indicated constituents

- Former Unleaded Gasoline UST (Tank A) Area – Soil in the former tank pit at depths of approximately 6 to 8 ft contaminated with 1,2,4-trimethylbenzene.
- High Arsenic Concentration Soil Area – Average contaminated soil thickness of 4 ft; total surface area approximately 10,200 sq ft.
- High Lead Concentration Soil Area - Average contaminated soil thickness of 2 ft; total surface area approximately 500 sq ft.

Currently, DMSE is in the process of finalizing a risk assessment performed for soils in the High Arsenic area. Current indicators show the High Arsenic area soils for the direct contact exposure pathways for all receptors are below the PADEP benchmark values. Therefore, no activities for cleanup are scheduled for the High Arsenic area.

In conversations with the PADEP, due to the limited extent of the lead in soil and deed restriction at the Site, no remediation was needed to address the lead in soil.

Groundwater

Based on the above assessment activities at the Site, contaminated groundwater in the following areas has been targeted for cleanup under this ABCA:

- VOCs including 1,2,4-Trimethylbenzene and benzene at the Former Unleaded Gasoline UST (Tank A) Area

It is noted that arsenic and zinc concentrations in groundwater also exceed their respective non-residential SHS MSCs; however, remediation of arsenic and zinc is not recommended since there is a deed restriction prohibiting use of groundwater for drinking or agricultural purposes and no potable wells at the Site, therefore making the groundwater pathway incomplete. In addition, diffuse flow of groundwater discharge monitoring (via PENTOX) found that there were no impacts to the West Branch of the Susquehanna River from the arsenic in site groundwater.

A. Cleanup Alternatives Considered

A.1 Arsenic and Lead Soil Contamination Area

To address the soil contamination at the Site, the following three cleanup alternatives were considered for the arsenic and lead soil contaminated areas

Alternative #1 – No Action; Alternate #2 – Cap Placement; and Alternative #3 – Excavation with Offsite Disposal

Alternative #1 - No Action – The No Action alternative would leave all contaminants in place "as is". Therefore, ongoing restriction of access to the site would be required.

Alternative #2 – Cap Placement – For the purposes of this cost estimate, the Cap Placement Option is based on excavation to a depth of 1 ft, removal and offsite disposal of the excavated soil, placement of a permeable geotextile filter fabric covered by 1 ft of stone. The purpose of the cap is to prevent dermal contact and inhibit excavation and provide visual indicator for restricted excavation/contact in the area

through the presence of the geotextile filter fabric. This option would include an institutional control in the form of an environmental deed covenant prohibiting excavation in the cap area. A risk assessment for arsenic will be conducted to determine if the extent of the cap can be reduced. It is noted that due to its very small aerial extent, capping was not considered an option for the lead contaminated soil area.

Alternative #3 - Excavation and Offsite Disposal – The Excavation with Offsite Disposal Option includes excavation with confirmatory soil sampling; offsite transportation of soils and disposal as non-hazardous waste; backfilling with clean soils; and final grading and seeding.

A 2. VOC Soil and Groundwater Contaminated Area

To address the VOC groundwater contamination in the vicinity of the Former Unleaded Gasoline UST the following three alternatives were considered.

Alternative #1 – No Action; Alternative #2 – Groundwater Extraction and Treatment and Alternative #3 – Excavation and Offsite Disposal of soil and In-situ Enhanced Bioremediation.

Alternative #1 - No Action – The No Action alternative would leave all contaminants in place "as is". Therefore, ongoing restriction of access to the site would be required.

Alternative #2 Groundwater Extraction and Treatment would involve groundwater modeling to identify extraction well locations, installation of the extraction wells, placing pumps in the wells and piping to the treatment system (e.g. air stripper). Treated water would need to be discharged, requiring an NPDES permit. In addition to the capital costs, there would be ongoing OM&M costs including power, periodic filter replacement, etc.

Alternative #3 – Excavation and Offsite Disposal & In-situ Enhanced Bioremediation — The Excavation with Offsite Disposal Option includes excavation with confirmatory soil sampling; offsite transportation of soils and disposal as non-hazardous waste; backfilling with clean soils; and final grading and seeding. The In-Situ Enhanced Bioremediation Alternative includes backfilling the former tank area location with gravel to a depth of approximately 10 feet bgs to groundwater. The Regenesis product, RegenOx will then be placed into the gravel trench. RegenOx is an advanced chemical oxidation technology that destroys contaminants and releases oxygen which enhances biodegradation of petroleum product constituents. Lateral slotted pipe and a riser pipe will then be placed into the trench on a geotextile filter fabric covered by gravel with the pipe extending to ground surface. Clean fill soils will be placed into the remainder of the excavation area and trench to ground surface. The riser pipe / lateral slotted pipe system can be used to place additional RegenOx should a second application be necessary. It is anticipated that one application of RegenOx will be adequate to achieve the desired remediation; however, should a second application be necessary it could be readily accomplished with the above-described system. It is noted that RegenOx will likely also help to remediate contaminated soils in the "smear" zone, which is in contact with groundwater.

Alternatives #2 and #3 also include groundwater monitoring events to evaluate the performance of the remedies. It is assumed there would be a minimum of four such quarterly events conducted during the period covered by the Cleanup Grant.

B. Cost Estimate of Cleanup Alternative

An evaluation of the effectiveness, implementability and cost of each alternative is presented below. Tables are attached presenting budgetary cost estimates for the Cap Placement and Excavation and Offsite Disposal options as well as for the In-Situ Enhanced Bioremediation option for groundwater remediation.

B 1. Arsenic and Lead Soil Contamination Area

Effectiveness

Alternative #1 – No Action is not considered to be effective in preventing the exposure of receptors to contamination identified at the Site. It is likely that the No Action alternative would substantially limit the ability to transfer the property and redevelop the Site.

Alternative #2 – The cap is considered an effective way to prevent receptors from coming into direct contact with contaminated soils. In addition, an institutional control (land use restriction) would need to be recorded on the deed to prevent excavation in the capped area. Also as mentioned above, there is a deed restriction prohibiting use of groundwater for drinking and agricultural purposes.

Alternative #3 - Excavation with Offsite Disposal is an effective way to eliminate risk at the Site since contamination will be removed and the exposure pathways from these sources will no longer exist.

Implementability

Alternative #1 – No Action is easy to implement since no action will be conducted.

Alternative #2 – The Cap is relatively easy to implement, although ongoing monitoring and maintenance of the cap will require periodic coordination, inspection and reporting. Construction-related safety risks would exist but can be minimized through applying sound health and safety procedures.

Alternative #3 – Excavation with Offsite Disposal is moderately difficult to implement but has been successfully implemented in Pennsylvania and other parts of the country for decades. Coordination (e.g., dust suppression and monitoring) during cleanup activities and short-term disturbance to the community (e.g., truck transporting contaminated soils and backfill) are anticipated. Construction-related safety risks would exist but can be minimized through applying sound health and safety procedures. Ongoing monitoring and maintenance would not be required following excavation and offsite disposal.

Resilience to Extreme Weather Events

Alternative #1 - No Action – The No Action alternative would be very vulnerable to potentially spreading contaminants as a result of adverse weather conditions such as extreme precipitation events leading to substantial stormwater runoff and erosion.

Alternative #2 – Cap System Placement – The proposed cap alternative which would include placement of a 1 ft thickness of stone on top of a geotextile filter fabric would likely be overall resilient to extreme weather events, provided it was properly maintained.

Alternative #3 – Excavation with Offsite Disposal – This alternative would be the most resilient since the contaminated soil would be removed from the Site and properly disposed at an offsite permitted landfill.

B 2. VOC Soil and Groundwater Contaminated Area

Effectiveness

Alternative #1 – No Action is not considered to be effective in preventing the exposure of receptors to contamination identified at the Site. It is likely that the No Action alternative would substantially limit the ability to transfer the property and redevelop the Site.

Alternative #2 -Groundwater Extraction and Treatment would be expected to be effective in containing the contaminant plume but is not expected to be effective in significantly reducing contaminant concentrations in groundwater. Accordingly, it would probably have limited impact in reducing the risk to vapor intrusion from the VOC contaminant plume. Groundwater monitoring would be required to demonstrate effectiveness.

Alternative #3 – Excavation with Offsite Disposal is an effective way to eliminate risk at the Site since contamination will be removed and the exposure pathways from these sources will no longer exist. Enhanced In-Situ Bioremediation with the Regenesis RegenOx product is expected to successfully

remediate the VOC groundwater contamination through chemical oxidation and enhancing the ability of existing microorganisms to biodegrade the contaminants through increasing the oxygen levels in the groundwater. Reducing the VOC levels in groundwater and adjacent soils through this approach should help to protect future receptors against vapor intrusion or dermal contact exposure. Groundwater monitoring would be required to demonstrate effectiveness.

Implementability

Alternative #1 – No Action is easy to implement since no action will be conducted.

Alternative #2 – Groundwater extraction and treatment would be relatively easy to implement from the standpoint of installing and equipping extraction wells (with pumps and tubing). Air stripper treatment systems to remove the VOCs from the extracted water are available. An electric power line would need to be run to the treatment system area to power the extraction pumps and treatment system. There would be OM&M required to make sure the extraction and treatment system is operating properly.

Alternative #3 – Excavation with Offsite Disposal is moderately difficult to implement but has been successfully implemented in Pennsylvania and other parts of the country for decades. Coordination (e.g., dust suppression and monitoring) during cleanup activities and short-term disturbance to the community (e.g., truck transporting contaminated soils and backfill) are anticipated. Construction-related safety risks would exist but can be minimized through applying sound health and safety procedures. Ongoing monitoring and maintenance would not be required following excavation and offsite disposal. Enhanced In-Situ Bioremediation would be very easy to implement, and since it is a "passive" approach there are no ongoing systems to maintain.

Resilience to Extreme Weather Events

Alternative #1 The No Action alternative would be very vulnerable to potentially spreading contaminants as a result of adverse weather conditions such as extreme precipitation events leading to substantial stormwater runoff and erosion.

Alternative #2 – Groundwater Extraction and Treatment would likely be vulnerable to extreme weather events since it would include above-ground equipment including the treatment system. Also, it could be affected by power outages which may result from such events.

Alternative #3 – Excavation with Offsite Disposal would be the most resilient since the contaminated soil would be removed from the Site and properly disposed at an offsite permitted landfill. In addition, Enhanced In-Situ Bioremediation would be very resilient to extreme weather events since there are no surface structures associated with the proposed approach and there are no associated power needs.

Cost

The following presents the estimated approximate cost of implementing each alternative. It is noted that actual costs may vary based on field conditions and other factors.

Site 1 (Western Site)

The following presents cost information for implementing the above soil and groundwater remediation alternatives. As mentioned above, due to its small size, the option of placing a cap on the high lead contamination area is not included. Cost estimates are summarized on Tables 1A through 1C.

Arsenic and Lead Soil Contamination Area

Alternative #1 – No Action – There will be no cost under this alternative.

Alternative #2 – Cap Placement – High Arsenic Area – Approximately $77,000.

Alternative #3 – Implementing the Excavation with Offsite Disposal option

- High Arsenic Area – Approximately $233,000
- High Lead Area – Approximately $6,000

VOC Soil and Groundwater Contaminated Area

Alternative #1 – No Action – There will be no cost with this alternative.

Alternative #2 – Groundwater Extraction and Treatment Approximately $50,000 to $70,000.

Alternative #3 - Implementing the Excavation with Offsite Disposal option and Enhanced In-Situ Bioremediation – Approximately $140,000 to $180,000.

Site 2 (Eastern Parcel with Former Sludge Lagoon)

As stated above the remedial activities are completed on the Eastern Parcel and Remedial Investigation Report / Cleanup Plan and Final Report has been submitted as documentation of closure and attainment of cleanup standards per PADEP Act 2.

C. Recommended Cleanup Alternative

The recommended cleanup alternative for the High Arsenic Area soil is Alternative #1 – No Action is recommended since, according to the Risk Assessment, the arsenic in soils in the area appear to be below the PADEP benchmark values for the direct contact exposure pathways for all receptors. A site-specific standard arsenic in soil will be used for this area. As discussed above an institutional control in the form of an environmental covenant will prohibit excavation in the area.

Comparative evaluation of Alternatives #2 and #3 – An important consideration related to selecting a remedy for the High Arsenic Area is that it lies within the 100 year flood plain, which would likely present significant obstacles to future building development from the standpoint of obtaining necessary permits, insurance, etc. Considering such impediments to development, the benefit of using Cleanup Grant resources to excavate and dispose offsite all the arsenic contaminated soil above the MSC is diminished. The Excavation and Offsite Disposal option is approximately three times more expensive to implement than the Cap alternative. While arsenic contaminated soil beneath 1 ft in depth would remain under the Cap remedy, it would provide protection against dermal contact with the arsenic contaminated soil. However, since the completion of a Risk Assessment no capping would be needed since the area does not demonstrate excessive risk to future exposures.

The recommended cleanup alternative for the High Lead Area soil is Alternative #1 – No Action.

Due to its small size (estimated to be only 500 sq ft and 50 ton volume) it is recommended that the soils in the High Lead Area be left in place rather than utilizing a cap and an associated required institutional control as discussed with the PADEP.

The recommended cleanup alternative for VOCs in soil and groundwater is Alternative #3 – Excavation and Offsite Disposal & Enhanced In-Situ Bioremediation

The groundwater extraction and treatment system would help to contain migration of the VOC plume but would be unlikely to accomplish remediation of the plume itself and would not remove soil from the source. The groundwater extraction treatment system would have significant OM&M costs including sampling and analysis, power, filter change outs, etc. Excavation of soils has been shown to be successful in removing the source soils causing the plume in the groundwater. Enhanced In-Situ Bioremediation has been shown to be extremely effective in cost-effectively remediating petroleum product plumes in groundwater. The groundwater extraction and treatment system would likely have to stay in operation for many years while

the enhanced bioremediation is expected to prove effective in reducing the VOC levels to below vapor intrusion and groundwater MSC levels within two or three months. For these reasons Excavation and Offsite Disposal & Enhanced In-Situ Bioremediation is the recommended alternative.

Site 2 (Eastern Site with Former Sludge Lagoon)

As mentioned above, all remediation and sampling/monitoring activities, including the report documentation have been completed and submitted to the PADEP for the Former Sludge Lagoon Site.

4. Proposed Cleanup Activities

The proposed area and trench for the Former Unleaded Gasoline UST (Former Tank A area) for soil and groundwater excavation and remediation are shown on Figure 4.

A. Soils

Based on the above assessment activities at the Site, contaminated soils in the Former Unleaded Gasoline UST (Tank A) Area have been targeted for cleanup under this ABCA for the soil in the former tank pit at depths of approximately 6 to 8 feet for exceedances of the PADEP SHS for 1,2,4-trimethylbenzene. To address the soil contamination in the area, soil from around the former Tank A excavation area will be removed to the approximately 10 feet below ground surface (bgs). The horizontal excavation will be determined in the field based on visual observations, odors, and or screening for VOCs. After confirmation samples, the excavation area will be backfilled with gravel to a depth of approximately 10 feet bgs and a 2-inch PCV screen with riser will be installed in the gravel area. The gravel will be covered with a geotechnical fabric and the remainder of the excavation will be covered with clean fill soil. Excavated soils will be transported and disposed at an offsite location. As needed, RegenOx materials will be added to the gravel portion of the excavation through the PVC pipe to enhance bioremediation.

B. Groundwater

Based on the above assessment activities at the Site, contaminated groundwater in the Former Unleaded Gasoline UST (Tank A) Area has been targeted for cleanup under this ABCA for VOCs including 1,2,4-Trimethylbenzene and benzene and are included due to potential for vapor intrusion into future site buildings and continued impacts to the groundwater.

To address the VOC groundwater contamination in the vicinity of the Former Unleaded Gasoline UST an In-situ Enhanced Bioremediation will be used. RegenOx will be placed in a 2 ft by 20 ft wide gravel trench to groundwater, which is anticipated at a depth no greater than 10 feet bgs, in the center of the excavation area in the area of the former Tank A. RegenOx is an advanced chemical oxidation technology that destroys contaminants and releases oxygen which enhances biodegradation of petroleum product constituents. Lateral slotted pipe and a riser pipe will then be placed into the trench on a geotextile filter fabric covered by gravel with the pipe extending to ground surface. The riser pipe / lateral slotted pipe system can be used to place additional RegenOx should a second application be necessary. It is anticipated that one application of RegenOx will be adequate to achieve the desired remediation; however, should a second application be necessary it could be readily accomplished with the above-described system. It is noted that RegenOx will likely also help to remediate contaminated soils in the "smear" zone, which is in contact with groundwater. In addition, groundwater monitoring events will be completed to evaluate the performance of the remedies. It is assumed there would be a minimum of four such quarterly events conducted during the period covered by the Cleanup Grant.

5. Summary

The statewide health and site-specific standards will be used attain PADEP remediation completion and achieve relief of liability under PA Act 2.

Excavation with offsite disposal and remediation will be completed for soil and groundwater at the Site 1 (Western Parcel) Former Gasoline UST area. The cleanup is targeted for 1,2,4-Trimethylbenzene for soil and 1,2,4-Trimethylbenzene and benzene for groundwater.

The following presents the locations which cleanup alternatives of no action are recommended:

- The High Arsenic area soils and groundwater - Findings of the risk assessment indicating direct contact exposure pathways for all receptors are below the PADEP benchmark values;
- The High Lead area soils - conversations with the PADEP and to the limited extent of lead in soil; and,
- Arsenic and zinc in groundwater – Deed restriction prohibiting use of groundwater for drinking or agricultural purposes and no potable wells at the Site, therefore making the groundwater pathway incomplete.

Remediation and sampling/monitoring activities have been completed for the Site 2 (Eastern Parcel). A RIR/Cleanup Plan and Final Report was prepared submitted to the PADEP to document attainment of PADEP remediation standards.

The Site is planned for commercial/industrial use and subdivided into multiple parcels for development. The goal is to achieve relief of liability under PA Act 2 for the entire Site.

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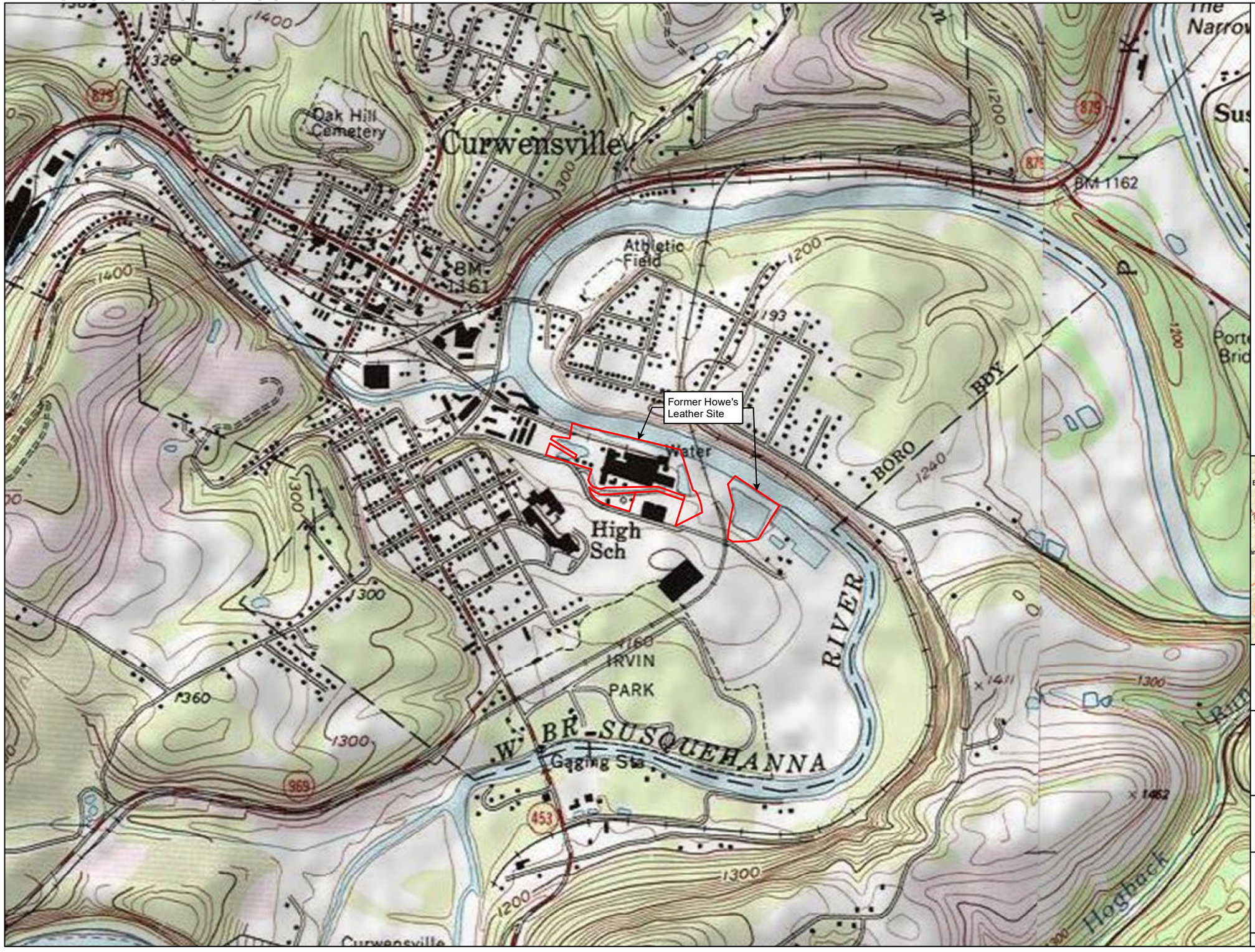

Legend

Approximate Property Boundary

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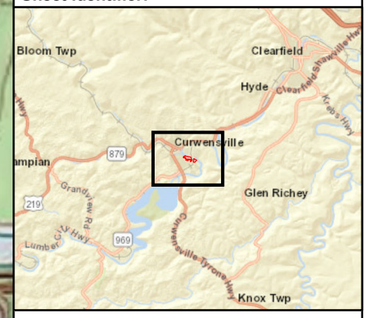

N W E S

0 500 1,000 Feet

1 inch = 1,000 feet

FIGURE 1
SITE LOCATION MAP

CLEARLY AHEAD DEVELOPMENT
FORMER HOWE'S LEATHER SITE
ABCA - 2022
CLEARFIELD COUNTY, PENNSYLVANIA

TETRA TECH

Notes:
1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
2) Quadrangle(s) displayed: Curwensville and Glen Richey.

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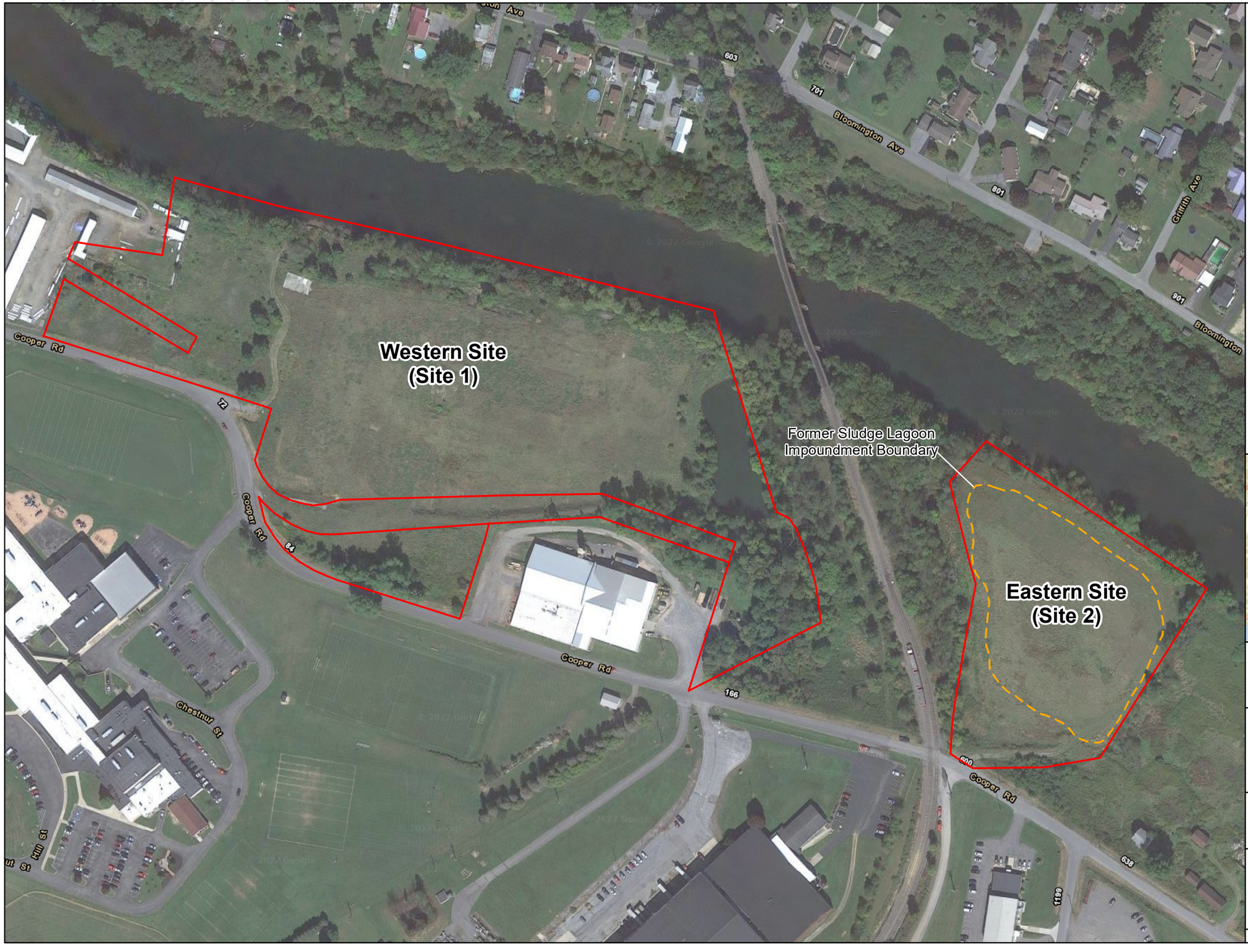
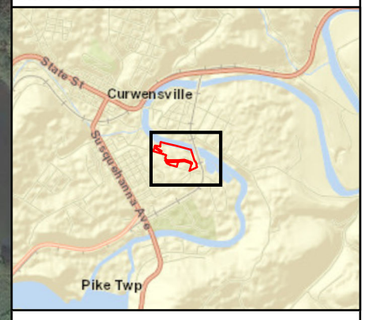


Legend

- Approximate Property Boundary
- Former Sludge Lagoon Impoundment Boundary

Sheet Identifier:



N
W E
S

Feet
0 100 200

1 inch = 200 feet

FIGURE 2
WESTERN AND EASTERN SITES

CLEARLY AHEAD DEVELOPMENT
FORMER HOWE'S LEATHER SITE
ABCA - 2022
CLEARFIELD COUNTY, PENNSYLVANIA

TETRA TECH

Notes:
1) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2019 ESRI and its data suppliers).

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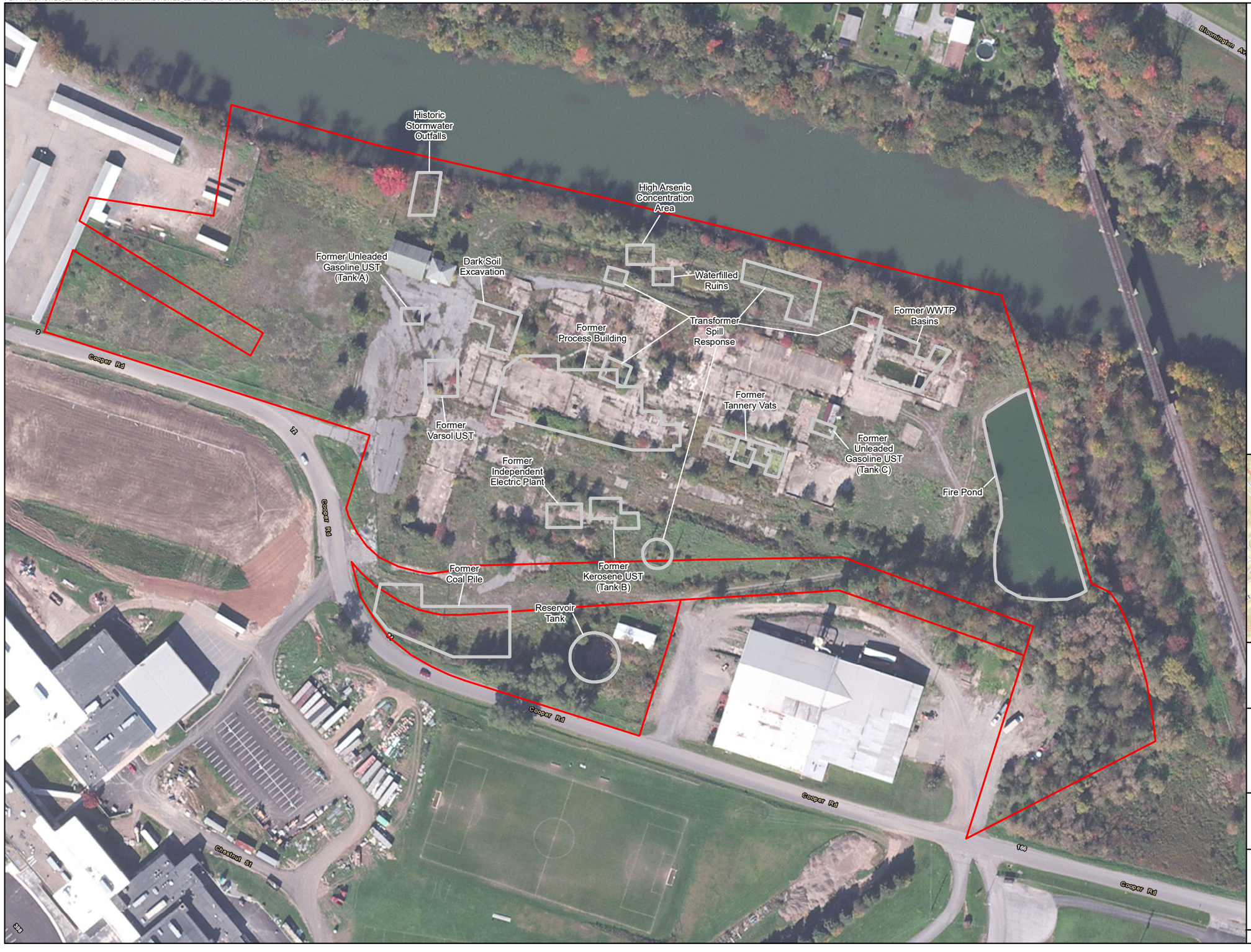
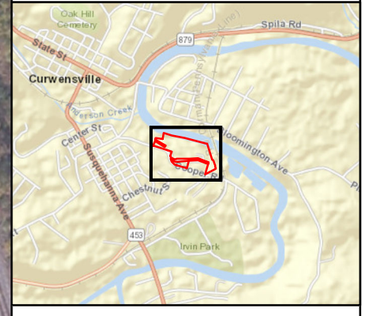


Legend

- Approximate Property Boundary
- Historical Area Boundary

Sheet Identifier



N W E S

0 70 140 Feet

1 inch = 140 feet

FIGURE 3
HISTORIC SITE OPERATIONS AND REMEDIATED AREAS

CLEARLY AHEAD DEVELOPMENT
FORMER HOWE'S LEATHER SITE
ABCA - 2022
CLEARFIELD COUNTY, PENNSYLVANIA

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Notes:
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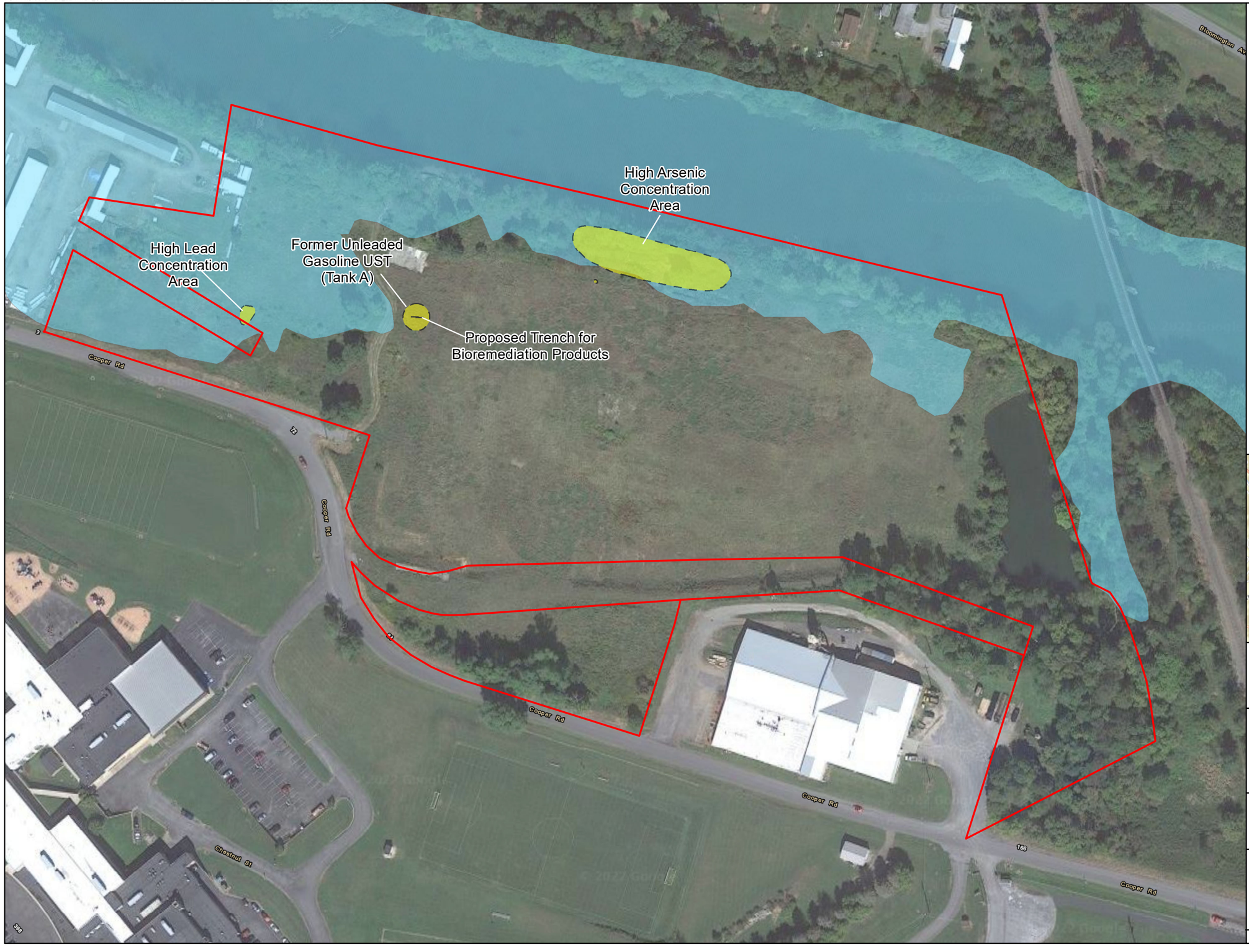

Legend

- Approximate Property Boundary
- Approximate Boundary of Targeted Area
- 1% Annual Chance Flood Hazard

Sheet Identifier:

N
W E
S

0 70 140 Feet

1 inch = 140 feet

FIGURE 4
TARGETED AREAS

CLEARLY AHEAD DEVELOPMENT
FORMER HOWE'S LEATHER SITE
ABCA - 2022
CLEARFIELD COUNTY, PENNSYLVANIA

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