RECORD OF DECISION AMENDMENT

SALFORD QUARRY SUPERFUND SITE
OPERABLE UNIT 1

LOWER SALFORD TOWNSHIP
MONTGOMERY COUNTY, PENNSYLVANIA

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION III, PHILADELPHIA, PENNSYLVANIA
September 2021

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LIST OF ACRONYMS

amsl	above mean sea level
AR	Administrative Record
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
BTAG	Biological Technical Assistance Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cis-1,2-DCE	cis-1,2-Dichloroethene
COC	Contaminant of Concern
CSM	Conceptual Site Model
CY	Cubic Yards
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
FS	Feasibility Study
FYR	Five-Year Review
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ICs	Institutional Controls
LDR	Land Disposal Requirements
MCL	Maximum Contaminant Level
µg/l	Micrograms per liter or parts per billion
MW	Monitoring Well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU1	Operable Unit 1
OU2	Operable Unit 2
O&M	Operation and Maintenance
PADEP	Pennsylvania Department of Environmental Protection
PHA	Public Health Assessment
PRAP	Proposed Remedial Action Plan
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Levels
SLERA	Screening Level Ecological Risk Assessment

TBC	To Be Considered
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
UECA	Uniform Environmental Covenants Act
UU/UE	Unlimited Use/Unrestricted Exposure
VOC	Volatile Organic Compound

I. DECLARATION

SALFORD QUARRY SUPERFUND SITE
OPERABLE UNIT 1
LOWER SALFORD TOWNSHIP, PENNSYLVANIA

RECORD OF DECISION AMENDMENT

RECORD OF DECISION AMENDMENT
SALFORD QUARRY SUPERFUND SITE
OPERABLE UNIT 1

DECLARATION

Site Name and Location

Salford Quarry Superfund Site
Operable Unit 1
Lower Salford Township, Montgomery County, Pennsylvania
CERCLIS ID number: PAD980693204

Statement of Basis and Purpose

This Record of Decision Amendment (ROD Amendment) presents the modified remedy (Modified Remedy) for Operable Unit 1 (OU1) at the Salford Quarry Superfund Site (Site) located in Lower Salford Township, Montgomery County, Pennsylvania (See Figure 1). On September 10, 2013, the United States Environmental Protection Agency (EPA) issued a ROD (hereinafter, 2013 ROD) selecting a response action for OU1 at the Site consisting of constructing an engineered cell onsite to contain the contaminated waste, soil and sediment. However, during the remedial design stage, EPA determined that the remedy selected in the 2013 ROD could not be constructed due to insufficient staging area on and adjacent to the quarry property.

In accordance with Section 117 of CERCLA, 42 U.S.C. § 9617, and 40 C.F.R. 300.435(c)(2)(ii), in December 2020, EPA issued a Proposed Plan to amend the 2013 ROD, held a public meeting to explain the proposed ROD Amendment and facilitate public participation, and provided an opportunity for public comment on the proposal. No comments, criticisms, or new relevant information were submitted to EPA during the public comment period.

This ROD Amendment explains the factual and legal basis for amending the 2013 selected remedial action for OU1 at the Site. The Modified Remedy selected in this ROD Amendment is chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. § 9601 et seq., and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300.

The Site is divided into two Operable Units. In the 2013 ROD, EPA presented that OU1 consisted of quarry waste, soil surrounding the waste and sediment. This ROD Amendment changes the definition of OU1 to exclude sediment so that EPA can evaluate the effectiveness of the source control remedy before evaluating the need to remediate the sediment. Thus, OU1 consists of quarry waste and soil surrounding the waste, and Operable Unit 2 (OU2) consists of groundwater, surface water, sediment, and vapor intrusion (if necessary).

In accordance with 40 C.F.R. 300.825(a)(2), which requires that an amended decision document and all documents that form the basis for the decision to modify the response action be added to the administrative record file, this ROD Amendment will be included in the Administrative Record (AR) file for the Site and is based on the AR, which was developed in accordance with Section 113(k) of CERCLA (42 U.S.C. § 9613(k)). The Site's AR file is available for review at any of the following locations, subject to any ongoing COVID-19 restrictions:

- online at https://semspub.epa.gov/src/collection/03/AR66600,
- at the EPA Region III Records Center in Philadelphia, Pennsylvania, and
- at the Indian Valley Public Library.

The AR file index (Appendix A) identifies each document contained in the AR file upon which this ROD Amendment is based.

The Pennsylvania Department of Environment Protection (PADEP) concurred with the Modified Remedy in a letter dated August 25, 2021 (Appendix D).

Assessment of the Site

Pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, the response action selected in this ROD Amendment is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Pollutants or contaminants from this Site may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Modified Remedy

In contrast to the remedy selected for OU1 in the 2013 ROD, which consisted of constructing an engineered cell to contain the contaminated waste, soil, and sediment, this ROD Amendment selects a subsurface perimeter wall and RCRA cap consistent with the Resource Conservation and Recovery Act (RCRA) to address OU1 (quarry waste and soil surrounding the waste) to replace the 2013 selected remedy at the Site. The major components of the Modified Remedy, which are described in detail in Section 12.2 (Description of the Modified Remedy and Performance Standards), are to:

1. Install a subsurface perimeter wall to encapsulate the existing waste and contaminated soil and prevent lateral groundwater flow into or out of the contained waste, in order to reduce transfer of contamination from the waste into the groundwater. The wall should be installed approximately two feet into the bedrock beneath the quarry to minimize leakage.

2. Delineate the extent of waste and soil contamination outside of the designed cap area, excavate and place contaminated material beneath the planned extent of the RCRA cap or dispose of offsite depending on the capacity of the design.

3. Install a multi-layer, impermeable RCRA Subtitle C cap to prevent direct contact with contaminated material and effectively isolate contamination from precipitation and

surface water infiltration. The cap should be designed with an optimal seal against the exposed bedrock headwall to minimize infiltration.

4. Grade surface and install drainage channels to prevent infiltration and to convey runoff water away from the cap. Surface water from these channels would be directed to existing drainage features that ultimately discharge to the West Branch of Skippack Creek.

5. Place six inches of clean topsoil on the RCRA cap and in the areas outside the landfill footprint where contaminated soil is removed.

6. Vegetate the topsoil to minimize erosion.

7. Monitor groundwater, surface water, and sediment to assess the effectiveness of these source control measures.

8. Undertake operation and maintenance (O&M) activities, such as mowing of grass/landscaping, periodic inspections to ensure isolation of the contamination as well as safety and security of the Site, and groundwater sampling to monitor the effectiveness of the Modified Remedy. For cost estimating purposes, long-term O&M includes costs for 30 years, however, O&M will be required as long as wastes remain in place.

9. Implement Institutional Controls (ICs) to protect the integrity of the Modified Remedy and to prevent exposure to Site-related contamination. EPA will coordinate these efforts with PADEP, the municipality, and the Montgomery County Office of Public Health.

10. Install property access restrictions, such as a locked perimeter fence, to prevent exposure to unacceptable risks associated with Site-related contaminants and to protect the components of the Modified Remedy.

The average estimated present worth cost for the Modified Remedy is $5.93 million. The Modified Remedy in this ROD Amendment will control the source (waste and soil) by minimizing additional contamination from migrating to groundwater, sediment, and surface water (OU2). The remedial action for OU2 will address remaining contamination in groundwater, surface water, sediment, and vapor intrusion (if necessary).

Statutory Determinations

The Modified Remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action (ARARs), is cost-effective, and utilizes permanent solutions to the maximum extent practicable.

The Modified Remedy does not satisfy the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment). However, EPA prefers the

Modified Remedy, which will control but not treat source material, because treatment alternatives are more complex in implementation, are likely to pose more risk of human exposure to contaminants during construction and transportation and are less cost-effective.

Because the Modified Remedy will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure (UU/UE), a statutory review will be conducted no less often than every five years after initiation of the remedial action to ensure that the Modified Remedy is protective of human health and the environment pursuant to Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and 40 C.F.R. § 300.430(f)(4)(ii).

Data Certification Checklist

The following information is included in the Decision Summary of this ROD Amendment. Additional information can be found in the AR supporting this ROD Amendment.

ROD DATA CERTIFICATION CHECKLIST	
Information	Location/Page Number
Chemicals of concern	Section 7.0, Page 17; Table 1
Risk represented by the chemicals of concern	Section 7.1, Page 18; Table 3
Cleanup levels for chemicals of concern	Section 9.0, Page 22; Table 4
How source materials constituting principal threats are addressed	Section 12.0, Page 38
Current and reasonably anticipated future land use and potential future beneficial uses of groundwater	Section 6.0, Page 15
Potential future groundwater use that will be available at the Site as a result of the Modified Remedy	Not applicable, OU1 is not a groundwater remedy
Estimated remedy cost	Section 11.7, Page 37; Table 5 & Appendix B
Key factors that led to selecting the Modified Remedy	Section 13.1, Page 39

Linda Dietz

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September 21, 2021

Linda Dietz, Acting Director
Superfund and Emergency Management Division
EPA Region III

Date

II. DECISION SUMMARY

SALFORD QUARRY SUPERFUND SITE
OPERABLE UNIT 1
LOWER SALFORD TOWNSHIP, PENNSYLVANIA

RECORD OF DECISION AMENDMENT

1.0 SITE NAME, LOCATION AND DESCRIPTION

The Salford Quarry Superfund Site is located at 610 Quarry Road in Lower Salford Township, Montgomery County, Pennsylvania. Figures 1 and 2 present the Site Location Map and Salford Quarry Site Features, respectively. The quarry property covers approximately three acres and is bounded on the north and east sides by residential properties, on the south side by a residence and farm, and on the west side by Quarry Road. The Site includes the quarry and any areas where contamination from the quarry has come to be located.

Since the quarry was formed on the side of a hill, the quarry resulted in a roughly U-shaped outline of the quarry walls with the western side of the quarry backfilled to grade. The former quarry area covers approximately 1.5 acres of the three-acre property. Original Site soils were removed by historic quarrying activities and backfilled with first municipal, then industrial wastes.

Groundwater flow exhibits radial flow off the quarry, then moves towards the southwest influenced by the trend of the rocks toward the West Branch of Skippack Creek. The West Branch of the Skippack Creek is about 320 feet west of the quarry at an elevation of approximately 40 feet below the existing quarry cap.

EPA divided the Site into two Operable Units to more efficiently address cleanup of contamination. Operable Unit 1 (OU1) is the subject of the remedial action selected in this ROD Amendment and addresses contamination in the quarry waste and soil surrounding the waste at the Site. The quarry property is shown on Figures 2 and 3. Waste disposal in the quarry resulted in inorganic and volatile organic contamination, primarily in groundwater. Other contamination consists of inorganic contamination in surface soils, sediment, and surface water. This Modified Remedy will control the source (waste and soil) by minimizing additional contamination from migrating to groundwater, sediment, and surface water (which comprise OU2). This ROD Amendment is the final action for OU1.

The remedial action for OU2 will address contamination in groundwater, sediment, and surface water, and risk posed by vapor intrusion, if necessary, and will be issued separately after the effectiveness of the OU1 remedy is determined.

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number for the Site is PAD980693204. EPA is the lead agency for the Site activities and the Pennsylvania Department of Environmental Protection (PADEP) is the support agency. EPA obtained funding to perform cleanup activities in connection with the Site as a result of a bankruptcy settlement with the Potentially Responsible Party (PRP) responsible for contamination of the Site. If the Agency needs additional funding to complete remedial activities at the Site, it will seek those funds from Agency appropriations.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site was used from the early 1900s to the 1930s as a shale quarry. The quarrying activities ceased due to increasing drainage difficulties resulting in water collecting in the quarry. The Site was a local swimming hole for some time. In the 1950s, the Ludwig and Son waste disposal business used the unlined quarry for disposal of industrial, commercial, and residential wastes. Some of this waste included fly ash cinders from a coal-fired power plant.

In 1963, American Encaustic Tiling Company, Inc. purchased the quarry, as well as a 1.91-acre parcel on the west side of Quarry Road. The company changed its name to the American Olean Tile Company (AOT) and, in 1969, granted the western parcel to Lower Salford Township.

According to a general plan of operation for the quarry dated August 11, 1976, AOT prepared the Site for disposal of process wastes by building an earthen dike parallel to Quarry Road, approximately 12 feet wide and 10 feet high. The purpose of the dike was to control runoff that might otherwise affect Quarry Road. AOT used the quarry for disposal of tile waste, including fired and unfired scrap tile, glaze wash-up sludge (clarifier sludge), and settlement pond sediment from its Lansdale, Pennsylvania plant. Disposal took place starting at the quarry driveway off of Quarry Road and proceeded across the quarry. The waste was dumped from trucks, and the trucks then backed over the waste for compaction.

AOT calculated that it ultimately disposed of 10,550 cubic yards of wastes, covering a lateral area of approximately 12,000 square feet. Approximately half of the waste is scrap tile, and the other is wash-up sludge. The sludge is composed of wash water from various glaze lines and clay filters that were used in the tile-making process. Boron, in the form of borosilicate, was used in the glaze. According to AOT, a typical glaze contained approximately 3 to 4 percent borosilicate.

Water contaminated with tetrachloroethene (PCE) and trichloroethene (TCE) was used to wash equipment at the plant. Consequently, some PCE and TCE may have accumulated in the clarifier sludge. In 1969, two 10,000-gallon steel former waste oil tanks (still containing some waste oil) were filled with tile slurry and placed in the quarry for disposal. Lead-containing slurries were also disposed at the Site starting in 1973.

In October of 1971, AOT applied to the Pennsylvania Department of Environmental Resources (PADER, now known as PADEP) for a solid waste disposal permit. In July 1973, PADER requested additional information about the groundwater and the nature of the scrap tile and sludge that was being disposed in order to complete the permit application. In response, AOT installed two monitoring wells on the quarry property: MW-01 (presumed to be upgradient of the waste) and MW-02 (presumed to be downgradient of the waste). See Figure 2.

In December 1980, PADER notified AOT that it was in violation of Commonwealth law for failure to have a permit for disposal of solid wastes. This Notice of Violation also requested that AOT confirm the contents of the two 10,000-gallon steel tanks that were reported to be on Site. AOT responded that the application for the required permit for disposal of solid wastes was on file with PADER. However, in 1981 AOT located and sampled the tanks as requested. After

AOT removed some fuel oil from one of the tanks, PADER allowed AOT to backfill the excavated tanks.

In May 1982, AOT closed the landfill by grading and capping the waste with approximately six feet of clay. Topsoil was placed on the cap and seeded. The Site was closed to the satisfaction of PADER in July 1982, but PADER required post-closure quarterly groundwater monitoring at wells MW-01 and MW-02 from 1982 until at least 1987. Quarterly monitoring extended through the 1990s until mid-2019 and, upon PADEP's consent, is continuing annually through the present time at the Site.

In 1982, PADER performed a Preliminary Assessment of the Site. In April 1983, NUS Corporation (NUS) performed a Site Inspection for EPA Region III (NUS 1986). NUS also prepared the Hazard Ranking System Scoring Package for Salford Quarry (HRS 1986), which it submitted to EPA on January 10, 1986. Based on the HRS score, the Site was proposed for listing on the National Priorities List (NPL) under CERCLA in January 1987. The NPL listing was finalized on August 30, 1990. AOT challenged several scoring values, including the toxicity and persistence of boron at the Site and the lack of data suggesting any release or threatened release from the Site. On June 19, 1992, the United States Court of Appeals for the District of Columbia removed Salford Quarry from the NPL, ruling that EPA had acted arbitrarily in assessing both the toxicity and persistence of boron in groundwater at the Site. The Site was re-scored to address the concerns that AOT and the Court had raised with the initial scoring and re-proposed for inclusion on the NPL on April 1, 1997. The Site remained in proposed status until the listing was finalized on September 23, 2009.

AOT entered into a Consent Agreement with EPA in March 1988 and agreed to undertake all actions required for implementation of a remedial investigation and feasibility study (RI/FS). AOT retained the consulting services of Environ Corporation (Environ), which prepared a work plan for the RI/FS in May 1988. At about the same time, the Agency for Toxic Substances and Disease Registry (ATSDR) issued a Health Assessment concluding that the Site posed a potential risk to human health. ATSDR based its conclusion on the risk to human health posed by possible exposure to hazardous substances via groundwater and surface water.

In August of 1988, National Gypsum Company (NGC), the parent company of AOT, took title of the Site, assuming all the obligations of AOT under the Consent Agreement. In October 1990, NGC petitioned the United States Bankruptcy Court for relief under Chapter 11 of the Bankruptcy Code. On May 29, 1991, the United States, on behalf of EPA, filed a Proof of Claim against NGC alleging NGC's liability under Section 107 of CERCLA, 42 U.S.C. § 9607, for the release of hazardous substances discovered at the Site. On November 25, 1992, the United States reached a settlement of EPA's claims against NGC in the bankruptcy litigation. As a result of this settlement, NGC established the Salford Quarry Custodial Trust, which, among other things, owns and manages the Site property.

In spring of 1989, the trustee's consultant Environ performed an interim sampling event to collect data to help plan the RI/FS. This sampling event included the collection of sediment and surface water from the West Branch of Skippack Creek and the spring that is located near the Site between Quarry Road and the Creek, as well as from monitoring wells and residential wells.

The final RI/FS work plan was submitted to EPA in May 1990. RI activities were initiated with the installation of eight new monitoring wells, which are identified as MW-03 through MW-10 (Figure 2). Also, as part of the RI/FS, Eastern States Environmental prepared a Natural Resources Inventory and Analysis Report (NRI Report). The NRI report concluded that existing natural habitats associated with the Site did not indicate any evidence of significant impact resulting from the quarry.

In 1991, when sampling by Environ indicated that several residential wells were contaminated with boron, an Incident Notification Report was filed with EPA's Emergency Response Section (ERS). ERS confirmed the results, and NGC offered to supply the potentially affected residences with bottled water. By October 1991, 42 residences were eligible for this bottled water. In December of 1991, ATSDR issued an addendum to the 1988 Health Assessment for Salford Quarry based on the residential well sample results. The revised conclusion was that the Site posed a threat to human health. The assessment concluded that an alternate water supply should be provided to the affected homes and that the homes should be periodically monitored for Site-related contamination. Ultimately, ATSDR recommended that public water be made available to residents within a specified distance of the Site. In July 1993, EPA began construction of a public water line for 113 residences in the area of the Salford Quarry Site, which was completed in January 1995. Bottled water was supplied to affected residents by NGC during the period when EPA was constructing the waterline. EPA connected affected and potentially affected residences up to 1.5 miles downgradient (i.e., to the southwest) of the quarry to the public water supply to mitigate immediate threats to human health while EPA evaluated whether additional studies or cleanup activities would be necessary.

In 1998, ATSDR issued a *Public Health Assessment* (ATSDR, 1998) for Salford Quarry that concluded (1) Salford Quarry no longer posed a public health threat to any citizen through consumption of residential well water due to the installation of a public water line and (2) the spring contaminated with boron presented a potential health hazard if people collect the water in containers and use it for drinking. ATSDR recommended the following:

- Characterize the three-dimensional extent of the boron groundwater plume.
- Establish Institutional Controls (ICs) and ordinances to prevent the drilling of water supply wells in the zone of contaminated groundwater.
- Sample the offsite spring. If the spring near the Site is contaminated with boron above the EPA lifetime health advisory level of 0.6 ppm[1] (or 600 micrograms per liter, μg/L), consider restricting access to the spring.

In September 1992, as a result of numerous delays that had arisen due to the bankruptcy litigation, EPA terminated the 1988 Consent Agreement with AOT/NGC and took over performance of the RI/FS. In June 2007, EPA's contractor CDM Smith completed the RI/FS, which included all contaminated media, i.e., waste, soil surrounding the waste, groundwater, surface water, and sediment.

[1] EPA's current lifetime health advisory level is 6 ppm. https://www.epa.gov/sites/production/files/2018-03/documents/dwtable2018.pdf.

After re-listing the Site onto the NPL in 2009, EPA released a Proposed Plan for OU1 in August 2012. This Proposed Plan identified the Preferred Alternatives for addressing waste, soil, and sediment contamination, then defined as OU1, at the Site. The Preferred Alternatives provided for the construction of an engineered cell to contain quarry waste, contaminated soil, and contaminated sediment onsite.

In November 2012, Pennsylvania Department of Health (PADOH) issued a *Letter Health Consultation* (LHC) after testing four private wells located within proximity of the Salford Quarry Site. This LHC concluded that (1) exposure to groundwater in private wells is not expected to harm people's health and (2) there is a potential for future exposures from the contaminated groundwater in private wells located near the quarry. PADOH recommended that EPA delineate the groundwater plume resulting from Site contamination or conduct other actions to prevent future exposure to contamination attributed to the Site in private wells. PADOH also offered, if requested, to evaluate additional Site sampling data in a future health consultation document.

In September 2013, EPA issued a ROD, which identified the selected remedy for OU1. The 2013 selected remedy (WS4, Engineered Cell) included the following elements:

- Excavation of the existing clay cap, waste, and associated contaminated soil and sediment;
- Backfilling the excavation with clean fill to bring the grade to above the water table;
- Construction of a low-permeability engineered cell above the water table and backfill;
- Replacement of the contaminated materials inside the engineered cell;
- Groundwater and surface water monitoring to ensure the effectiveness of the remedy; and
- Implementation of Institutional Controls to control future use of the property and to protect the integrity of the remedy.

In 2014, EPA's contractor CDM Smith performed the following to design the selected remedy described in the 2013 ROD:

- A civil survey to determine the quarry property boundary, topography, and location and elevation of site monitoring wells, piezometers, and a dewatering test well;
- Well and piezometer installation;
- A dewatering test;
- Sampling of municipal and tile wastes to determine geotechnical properties;
- Collection of potentiometric data to estimate seasonal high-water level and regional water level;
- Analysis of cover soil for chemical and geotechnical parameters;
- Sampling and analysis of sediment in the floodplain that may have been impacted by groundwater discharge from the quarry;
- Collection of baseline groundwater data by sampling of monitoring wells, one new piezometer, and a potential background well; and
- Groundwater sampling and analysis of perfluorooctane sulfonic acid/perfluorooctanoic acids (PFOS/PFOA).

These data are summarized in a pre-remedial design investigation (PRDI) report dated April 2016. The United States Army Corps of Engineers (USACE) also performed a Value Engineering (VE) Study, dated January 2016, to evaluate the project concept and design by a multidiscipline team not directly involved in the project.

EPA's contractor CDM Smith produced a 30% Basis of Design Report, dated June 19, 2015. During design, it was found that there would be insufficient staging area adjacent to the quarry to allow for construction of the selected remedy. Offsite staging would trigger Land Disposal Restrictions (LDRs), pursuant to the Resource Conservation and Recovery Act (RCRA), requiring treatment. If waste were treated to comply with LDRs, the volume would increase and there would be insufficient capacity in the engineered cell to contain the backfill of waste that had been staged and treated offsite.

Therefore, EPA determined that the construction of the remedy selected in the 2013 ROD was infeasible and needed to be modified. EPA tasked USACE to evaluate additional alternatives in a Revised Feasibility Study (RFS), dated August 2020. As part of this RFS process, USACE collected additional technical data, summarized in a PRDI Addendum, dated November 2020. The PRDI Addendum includes the following:

- Geophysical survey of landfill area to determine slope of landfill walls and depth of landfill bottom;
- Additional waste analysis for asbestos and radiological contamination;
- Installation of monitoring wells MW-11, MW-11B, MW-12, and MW-12B at residential locations to the south-west (downgradient) of the quarry;
- Sampling of existing residential drinking water wells in Fall 2017; and
- Sampling of all Site groundwater monitoring wells in Spring 2018.

In June 2018, EPA's ecologist performed a site reconnaissance to inspect vegetation at the Site. The conclusion of the site reconnaissance was that the stressed vegetation that had been observed in the early 2000s was no longer present. Therefore, removal of the sediments, which was required by the 2013 ROD, no longer appears warranted as part of OU1 source control to support the vegetation and ecological health (Site Reconnaissance Report, January 2020). It should be noted that these conditions may change if OU1 remedial activities do not sufficiently minimize the discharge of contaminants from the Site.

From December 2018 to April 2019, CDM Smith performed additional site investigation work to determine the distribution of Site-related contamination in groundwater, surface water, and sediments, and to characterize groundwater gradients. Data and results from this work are summarized in two technical memoranda: Technical Memorandum #1 for RI/FS (June 2020) and Technical Memorandum #2 (June 2020). Groundwater sampling results are presented visually in Figures 12 through 15.

3.0 COMMUNITY PARTICIPATION

Public participation requirements in the NCP at 40 C.F.R.300.435(c)(2)(ii) were met as part of the ROD Amendment preparation process. The notice of availability of the AR and EPA's Proposed Plan (also referenced herein as Proposed Remedial Action Plan (PRAP)) to Amend the ROD for OU1 was published in *The Reporter* on December 15, 2020.

Due to state and local COVID-19 restrictions and guidance from the Centers for Disease Control and Prevention (CDC) regarding public gathering at the time, EPA posted a pre-recorded public meeting on the EPA's Profile Page for the Site (https://www.epa.gov/superfund/salfordquarry) contemporaneously with its publication of the PRAP to Amend the ROD for OU1. The recorded public meeting video presentation, which could be watched at any time during the public comment period, presented to the public the remedial alternatives and Preferred Alternative presented in the PRAP to Amend the ROD for OU1. A transcript of this pre-recorded public meeting was placed in the AR for the Site. In addition, in December 2020, EPA engaged the local community by mailing approximately 175 fact sheets summarizing EPA's new preferred remedial alternative for the Site to residences and businesses located within an approximately 1/2-mile radius of the Site.

In addition to the historical documents already located in the AR, the Salford Quarry RI/FS, 2013 ROD, PRDI, RFS, PRDI Addendum, VE Study, 30% Basis of Design, ecologist site reconnaissance report, technical memoranda, and other Site-related documents relevant to the PRAP to Amend the ROD for OU1 and this ROD Amendment were made available to the public and placed in the AR. The AR, which was compiled in accordance with Section 113(k)(1) of CERCLA, 42 U.S.C. § 9613(k)(1) and expanded pursuant to 40 C.F.R. 300.435(c)(2)(ii), can be found online at https://www.epa.gov/superfund/salfordquarry or examined at the following locations:

Indian Valley Public Library
100 East Church Avenue
Telford, PA 18969
(215) 723-9109

EPA Region III, AR Records Room
1650 Arch Street
Philadelphia, PA 19103
(215) 814-3157 for appointment

From December 15, 2020 to February 12, 2021, EPA held a 60-day public comment period to accept public comments via email, letter, and voice mail on the remedial alternatives presented in the PRAP to Amend the ROD for OU1 and discussed in the pre-recorded public meeting, or on the other documents contained within the AR for the Site. No comments were received during the 60-day public comment period.

4.0 SCOPE AND ROLE

As with many Superfund sites, the problems at Salford Quarry are complex. The actions selected by EPA in this document constitute a phased approach for addressing the environmental issues at the Site. As a result, EPA has reorganized the work into two operable units (OUs) as follows:

OU1 Contamination of the waste and soils
OU2 Contamination of the groundwater, surface water, and sediment

The remedial action selected in this ROD Amendment modifies the remedy selected for OU1 in the 2013 ROD. This remedial action will control the source area (quarry waste and soil surrounding the waste) to minimize contamination from migrating and continuing as an ongoing source to groundwater, surface water, and sediment (OU2). The future remedial action for OU2 will address remaining contamination in groundwater, surface water, sediment, and vapor intrusion (if necessary) and will be issued separately in a future decision document after the effectiveness of the OU1 action is determined.

5.0 SITE CHARACTERISTICS

5.1 Meteorology

Climate data for temperature, precipitation, relative humidity, and prevailing winds were obtained from a weather station in Philadelphia, Pennsylvania, which is approximately 30 miles southeast of the quarry. The overall climate of the Philadelphia region is typified by warm, humid summers and generally moderate winters. The average annual daily temperature calculated for the Site area is 54.5º F. The average summer temperature is 75.2º F and the average winter temperature is 33.8º F. The average relative humidity is approximately 55 percent in the mid-afternoon, and higher at night, approximately 76 percent at dawn.

Prevailing winds are generally from the west-northwest during the first six months of the year and from the southwest during the last six months of the year (National Weather Service, 2001). Average wind speeds are at their highest (11 miles per hour) in February, March, and April.

Precipitation levels are generally steady throughout the year in the Philadelphia area. The average annual rainfall (including melted snow) is 40.94 inches and the average annual snowfall is 20.89 inches.

5.2 Surface Features

The quarry property covers approximately three acres and is bounded on the north and east sides by residential properties, on the south side by a residence and farm, and on the west side by Quarry Road. Since the quarry was formed on the side of a hill, the quarry resulted in a roughly U-shaped outline of the quarry walls with the western side of the quarry backfilled to grade. The former quarry area covers approximately 1.5 acres of the three-acre property.

Topography in the area around the Site is characterized by moderately broad, gently rolling hilltops separated by moderately narrow to moderately broad valley bottoms. Elevations within a ½-mile radius of the Site range from approximately 200 to 320 feet above mean sea level (amsl), and the elevation of the quarry cap is approximately 235 feet amsl based on surveyed ground surface elevations for Site monitoring wells MW-02 and MW-05, which are located on the Site immediately adjacent to the western side of the quarry.

5.3 Surface Water Hydrology

The most significant surface water body near the Site is the West Branch of Skippack Creek, which is about 320 feet west of the Site at an elevation of approximately 40 feet below the quarry cap. The West Branch of the Skippack Creek flows to the south. The source of water for this branch is two to three miles upstream of the Site, and its confluence with Skippack Creek is approximately two miles downstream. Skippack Creek eventually flows into Perkiomen Creek, a tributary of the Schuylkill River.

The only other surface water body in the immediate vicinity is a spring located between the Creek and the quarry. The spring is approximately 140 feet west of the quarry and approximately 180 feet east of the creek. The spring originates along the hillside downslope of Quarry Road. It flows toward the West Branch of Skippack Creek and then enters into a high flow channel of the West Branch. Typically, the water from the spring ponds in an area approximately 40 feet downslope of its origin and covers an area of less than approximately 20 square feet. The depth is commonly six to 12 inches. During high flow, this area flows through the floodplain and into the West Branch. Figure 2 identifies the dry, stream bed area between the creek and the Site.

Ponded water bodies are also located at points north of the quarry (Figure 2). A pond approximately 10 feet wide by 20 feet long by two feet deep is located 300 feet north of the Site at 605 Quarry Road. Also, a pond approximately 40 feet long by 30 feet wide by five feet deep is located 900 feet north of the Site at 591 Quarry Road. The ponds' dimensions are based on field estimates; no measurements were collected. The ponds appear to be recharged by groundwater since distinct surface inlets are not apparent. These two ponds and the spring are located at or near the toe of the slope between Quarry Road and the creek.

The West Branch of Skippack Creek receives surface water runoff from the Site. Water drains off the Site to the west to the front gate and across Quarry Road. Water also drains off the Site to the southwest and flows to a culvert near the southern boundary of the Site that runs to the west under Quarry Road. On the west side of the road, stormwater flows from the culvert down a slope into the dry stream bed with the ponded spring. It appears that some stormwater may drain to the ponded spring and some may drain to the dry stream bed immediately downgradient of the spring. The dry stream bed reaches to the southwest and intersects with the West Branch of the Skippack Creek.

5.4 Site Soils

Original soils at the Site were mapped as the Lansdale and Reaville series. These soils formed from the weathering of the underlying sandstone, conglomerate and shale bedrock. The depth of soils can vary from two to six feet. Soils at the quarry itself were removed by historic quarrying activities.

5.5 Regional Geology

The regional geology of this area consists of the Triassic Newark Group, which is made up of (in ascending geologic age) the Stockton Formation, the Lockatong Formation, and the Brunswick Formation. The Brunswick and Lockatong Formations have been mapped beneath the Site.

Interbedding of these formations, as well as episodes of regional deformation, have resulted in a very complex geology. The regional strike (trend) of these rocks are to the northeast-southwest. Dips are north and northwest. Several broad synclines and anticlines (large regional sinuous folds) which trend west, are superimposed on these northeast-southwest trending rocks. The Brunswick Formation consists of reddish-brown shale, siltstone, and mudstone, with a few thin beds of green and brown shale. The Lockatong consists of dark gray to black argillite (very hard compacted mudstone or shale). Red, thick-bedded argillites at the base of the Brunswick are interlayered with the dark gray argillite of the Lockatong. Joints (fractures which do not move) and fractures are common in the Brunswick. The Lockatong is more resistant to erosion than the Brunswick and therefore the ridges in the area are the result of where the Lockatong crops out, or surfaces.

5.6 Site Geology

The Site geology is consistent with the regional geology. Two bands of the Lockatong Formation subcrop (occur below the surface) to the east and west of the Site (Figure 3). Measurements of the quarry walls indicate bedding trending N45º with dips of 10º to 15º to the northwest. In addition to bedding planes, three joint sets were also identified in the quarry. The joint sets are sub-parallel to bedding and nearly vertical. The best developed, primary set strikes between N30ºE and N40ºE and dips 75º to 85º southeast. A secondary joint set strikes N60ºE to N70ºE. A third possible joint set is nearly perpendicular to bedding at N115ºE; however, no open joints were observed. The joint trend was only measurable on rock faces broken by quarrying. Evidence suggests that the average distance between joints in most sets was estimated at six inches. The strike of the joint sets appears to be independent of the dip and strike of the beds.

5.7 Hydrogeology

Beneath the Salford Quarry Site is a fractured bedrock aquifer. In fractured bedrock aquifers, water typically occurs in openings, such as bedding planes, joints, fractures, or other areas of broken rock. Estimating groundwater flow direction in a fractured bedrock aquifer is difficult since the orientation and size of fractures, where water flow occurs, usually vary and are difficult to define. The variability in fracture size, orientation, and interconnectedness make water flow directions chaotic and, in many cases, unpredictable.

In the Brunswick and Lockatong Formations beneath the quarry, groundwater occurs under unconfined water table conditions in the shallow aquifer, and under confined conditions in the deeper bedrock. The shallow aquifer consists of weathered bedrock while the deeper aquifer consists of consolidated, fractured rock. The shallow system is connected to the deeper system and recharges it via precipitation. Groundwater moves downward and laterally via gravity toward discharge areas, either natural (springs, streams) or manmade (pumping centers).

Groundwater flow at the landfill exhibits radial flow off of the quarry, then moves towards the southwest influenced by the trend of the rocks toward the West Branch of Skippack Creek. See Figures 4 and 14. Figure 5 shows a schematic of the Conceptual Site Model. Many current or former residential wells in the area are screened in the consolidated bedrock.

5.8 Nature and Extent of Contamination, OU1

Landfill Waste

The RI found that beneath topsoil and clay cap, waste consists of a white-to-light grey tile waste slurry zone, from approximately 6 to 26 feet below ground surface (bgs), which is in sharp contrast to the mixed municipal waste that extends to the bedrock surface. The tile waste consisting of moist-to-wet tile slurry-containing fragmented or whole pieces of ceramic floor tiles, and municipal waste consisting of a mixture of moist-to-wet broken glass, plastic, wood chips, nails, and other metals. Landfill waste had high concentrations of inorganic contamination (boron, iron, zinc, lead, aluminum, and copper). Auger refusal was encountered at the bedrock surface between 35.5 and 37.5 feet bgs.

Boron is the Site's most ubiquitous contaminant. See Figure 6. The highest boron concentration (maximum boron 3,150 mg/kg at WT02) was detected in the upper tile waste; however, boron was pervasive throughout both the tile and municipal waste. Additionally, cadmium and lead concentrations in tile waste exceeded federal regulatory limits for hazardous waste (maximum cadmium 2,140 µg/L at WT03 and maximum lead 143,000 µg/L at WT03), indicating they have the potential to migrate into groundwater. There is no Toxic Characteristic Leaching Procedure (TCLP) limit for boron regarding its potential to migrate to groundwater. For further detail on the types, locations, and quantities of contaminants at the Site, reference the 2013 ROD located in the AR. Since this document amends the 2013 ROD, this data is not reiterated.

Additional data collected since the 2013 ROD has refined the nature and extent of contamination and is available for review in the AR. The PRDI report documents additional sampling of municipal and tile wastes to determine geotechnical properties and chemical analysis of cover soil for chemical and geotechnical parameters. The outcome of this sampling refined and increased the waste volume assumptions that had been used in the cost estimates and decreased the implementability of the selected remedy of the 2013 ROD.

The PRDI Addendum includes waste analysis for asbestos and radiological contamination, which show no impact from asbestos or radiological contamination in the quarry.

Surface and Subsurface Soil

Surface and subsurface soil samples were each collected at five locations situated around the perimeter of the landfill and at three locations offsite and upgradient from the landfill (Figure 7). Each sample location had a surface soil sample taken from 0-6" bgs and a subsurface soil sample taken from 6-24" bgs. The greatest concentrations of inorganic contaminants (i.e., aluminum at 24,200 mg/kg, chromium at 91.5 mg/kg, copper at 1,820 mg/kg, iron at 63,600 mg/kg, lead at 1,940 mg/kg, mercury at 71.4 mg/kg, and zinc at 2,390 mg/kg) were found in the subsurface soil located at the west side of the Site in SL-08. Low levels of volatile organic compounds (VOCs), e.g. PCE, were detected in subsurface soils in all boring locations (SL-04 through SL-07 with concentrations between 3 J[2] µg/kg and 7 J µg/kg). At SL-08, PCE, TCE, and cis-1,2-dichloroethene were 11 J µg/kg, 160 J µg/kg and 19 J µg/kg, respectively.

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[2] The laboratory assigns a "J" qualifier to indicate the reported result is an estimated quantity. The analyte was positively identified, and the associated numerical value is the approximate concentration (due either to the quality

Historically, unusual patterns of stressed and dead vegetation were noticed at the base (between the cap toe and Quarry Road) of the disposal area on the Site property in 2004. Site visits since 2004 had revealed that the area surrounding the spring and dry creek bed continue to be devoid of vegetation. However more recently, EPA's ecologist did not observe stressed vegetation at the Site that had been observed in the early 2000s (Site Reconnaissance Report, January 2020).

Groundwater

Even though groundwater is not part of OU1, groundwater data is briefly summarized and included here since the groundwater contamination pathway prompts the need for source control. Groundwater monitoring data will be needed to determine the long-term effectiveness and permanence of any OU1 remedy. Notably, the groundwater data through time (Figures 8 through 13) show continuing waste/soil-to-groundwater migration of boron from the quarry waste to groundwater.

RI data from 1991 to 1993, 2002 and 2004 show contamination extending southwest of the Site. Compared to levels from the early 1990s (Figure 8), the 2002 and 2004 analytical results (Figure 9) suggest that the concentrations of boron and other Site-related contamination in the groundwater had decreased at locations away from the quarry. Near the quarry, however, contamination continues to persist at concentrations similar to levels detected in the early 1990s. Although the waste is a continuing source, two factors may be influencing the reduction in boron concentrations downgradient of the source: (1) reduction in groundwater withdrawal from residential wells, and (2) the installation of the landfill cap in 1982.

In the early 1990s, residential wells in the area were still in use; however, by 1995, 113 homes had been connected to a public water system so that residents were provided with safe drinking water. As a result, groundwater withdrawal significantly diminished, which, in turn, reduced migration of Site contaminants downgradient of the quarry.

In addition, PADER oversaw the installation of a landfill cap covering the quarry in 1982. As a result, the infiltration of surface water (i.e., precipitation) into the landfill had been reduced or eliminated, reducing contaminants from leaching into the groundwater from stormwater infiltration. However, almost 40 years after installation, the current clay cap is in relatively poor condition, allowing for some water infiltration.

Potentiometric surface maps developed for the Site indicate a radial or near radial hydraulic gradient centered near the middle of the Site. This evidence suggests that the landfill collects surface water, which ponds in the permeable landfill waste, and serves as a localized recharge area in the form of a groundwater mound. The seasonal variation in the mounded groundwater in the landfill area ranges from an elevation of approximately 209 ft amsl to approximately 220 ft amsl. Based on monitoring performed in the PRDI, the natural bedrock groundwater table is approximately at or below that of the base of the quarry bottom, which ranges from approximately 198 ft amsl to 200 ft amsl. See Figure 14.

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of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the SQL).

According to the analysis presented in the USACE memorandum "Dewatering during excavation at Salford Quarry," dated 2 May 2016, a decrease in surface water and surficial groundwater infiltration could reduce groundwater elevations within the quarry landfill. Given adequate time and water diversion, it is anticipated that reduced precipitation inflow into the landfill would decrease the observed groundwater mounding at the Site to levels approaching the natural bedrock groundwater table. If groundwater levels approached natural bedrock groundwater table levels, it is anticipated that the waste/soil-to-groundwater pathway would be minimized.

Currently, groundwater continues to be impacted by the water table residing within the landfill waste. See Figures 12 and 13 for the most recent concentrations of boron. VOCs have been historically consistent. The most recent concentrations of VOCs in groundwater are shown in Figure 15. This waste/soil-to-groundwater pathway will continue until migration of contaminants from the source to groundwater is addressed. The Site conceptual model is presented in Figure 5.

5.9 Conceptual Site Model

Typically, a Conceptual Site Model (CSM) indicates contaminant sources, contaminant release mechanisms and migration routes, exposure pathways, and potential human and ecological receptors. For this Site, the CSM was developed to assist in describing the movement of groundwater and contaminants in the subsurface. Several media were identified to be contaminated with several types of contaminants of potential concern (COPCs). However, the most ubiquitous COPC that has contaminated the largest volume of an environmental medium is boron in groundwater. Therefore, the model focuses on the boron groundwater plume.

As shown in Figure 5, the tile slurry and underlying mixed municipal waste are within the saturated zone. Groundwater flows through the quarry waste, and thus, carries boron contamination downward and southwestward into a local and regional flow regime. Immediately west of the Site on the slope of the landfill is an area that has been identified to contain stressed and dead vegetation. During high rain periods, the groundwater level in this area is elevated sufficiently such that roots, and possibly the bases of vegetation, come in contact with the groundwater. High precipitation events during the RI time frame may explain the previous observations of stressed vegetation, which are no longer apparent. Vegetation surveys performed earlier in the Site's history and most recently (i.e., those where vegetation stress was not noted) may have occurred during low/no precipitation periods (i.e., lower groundwater elevations). Under these conditions, visible vegetation stress may not be evident.

The local groundwater regime discharges to a spring and the West Branch of the Skippack Creek. Also, the regional flow regime continues southwestward. Therefore, boron contamination in groundwater could migrate to the southwest beneath and beyond the creek. Providing public water to 113 residences eliminated exposure to groundwater via dermal contact, ingestion, and/or inhalation due to showering with groundwater in the vicinity of the quarry. However, Section 7.0 below discusses risks for current and future scenarios resulting from the contamination at the Site.

The CSM was also developed to assist in describing soil contamination. When AOT capped the quarry, the majority of the contaminated waste areas were covered, reducing the potential for exposure by dermal contact, ingestion, and/or inhalation of particulates; however, the RI identified contaminated soils, i.e. "soils surrounding the waste," that had not been capped.

6.0 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

Lower Salford Township is characterized by rural residential neighborhoods with some higher density villages, developments, and commercial areas, and some lower density agricultural areas. The estimated population of the township in 2019 was 15,592.[3] Community centers near the Site include the villages of Harleysville, Kulpsville and Skippack: Harleysville is located within the township; Kulpsville is located in Towamencin Township; and Skippack is located within Skippack Township. The villages are located approximately 1.5 to 2 miles northwest, east, and south of the Site, respectively.

In general, in the immediate vicinity of the quarry property, the area is rural residential with homes located on lots of approximately one to four acres, although some homes are located on larger parcels that also have fields for agricultural crop production. Directly adjacent to the quarry is a farm which cultivates and sells vegetables and farm-raised meats. Much of the land along the West Branch of the Skippack Creek near the Site is maintained by the Township as park land.

Streams in the area are used for recreation. Immediately west of the quarry property is the West Branch of the Skippack Creek, which flows through township park land. Some reaches of the stream near the quarry property are also located on private property. Additionally, the Skippack Creek, located approximately one mile south and west of the quarry property, is stocked with trout for recreational fishing. Skippack Creek is classified as a Trout Stocking Fishery by PADEP.

The aquifer in the vicinity of the Site is being used as a current source of drinking water by some residences within a 2-mile radius and therefore, is considered a Class IIA aquifer, a current source of drinking water under the *Guidelines for Ground-Water Classification Under the [1984] EPA Ground-Water Protection Strategy, Final Draft November*, 1986. However, most residences in close proximity of the quarry property are served by public drinking water from the North Penn Water Authority (NPWA). Figures 8 and 9 identify NPWA water lines near the Site. Until the mid-1990s, many of the residents used private wells as a water source. However, from 1993 to 1995, EPA installed a public water line to provide area residents with public water service and eliminate the risk of contact with groundwater contaminated from the Site. Since 1995, public water has been extended to other homes in the area.

To determine how many residential wells were in use, in 2002 EPA mailed a survey to residents 8,000 feet southwest (in the direction of groundwater flow) of the quarry, 2,000 feet to the northwest and southeast, and 4,500 feet to the northeast. Based on residential well survey responses from 2002 to 2004, 131 wells were still in use in the area. However, it is important to

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[3] U.S. Census Bureau. QuickFacts Lower Salford Township, Montgomery County, Pennsylvania. Available at https://www.census.gov/quickfacts/fact/table/lowersalfordtownshipmontgomerycountypennsylvania/INC110218 (accessed June 15, 2020).

note that not all residents returned the delivered survey forms. Therefore, there could be some wells in use that were not identified. According to the survey results, the number of wells currently used for potable water is 116, and the number of wells used for non-potable water is 15. The wells that are in use for a potable supply are located outside of the historically known extent of Site contamination. Many of the wells are located west and southeast of the Site.

According to local township officials, future land uses at the Site and surrounding area are not anticipated to change.

7.0 SUMMARY OF OU1 SITE RISKS

As part of the RI/FS, a Baseline Human Health Risk Assessment (HHRA) evaluated human health risks and a Screening Level Ecological Risk Assessment (SLERA) evaluated environmental impacts associated with site contaminants. The risk analysis for the Site has not changed since the 2013 ROD. Therefore, this section of the ROD Amendment briefly summarizes the results of the HHRA and SLERA risk assessments. For a more comprehensive discussion of the risk analysis, reference the 2013 ROD or the RI/FS in the AR.

Given the results of the HHRA and SLERA, and the unchanged risk analysis detailed in the 2013 ROD, the response action identified in this ROD Amendment is still necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, and contaminants into the environment.

Contaminants of concern (COCs) are determined by identifying COPCs and performing a site-specific risk analysis for each COPC and each exposure pathway to identify current or potential future risk. To determine whether risk posed by COPCs is unacceptable to human health, thereby becoming a COC, EPA calculates whether the risk exceeds EPA's acceptable risk level, set forth in the NCP, 40 C.F.R. § 300.430(e)(2)(i)(A), of 1E-04 to 1E-06 for lifetime excess carcinogenic risk or exceeds a hazard index (HI) of 1 for non-carcinogens. Table 1 lists the COCs identified at OU1 based on the HHRA and SLERA across multiple exposure pathways.

Table 1
Contaminants of Concern from the 2013 ROD

	HHRA Soil	HHRA Waste to Groundwater
Aluminum	X	
Boron		X
Cadmium	X	X
Chromium	X	
Copper	X	
Iron	X	
Lead	X	
Manganese	X	
Mercury	X	
Vanadium	X	
Zinc	X	X

X - Denotes COC (Contaminant of Concern); for Human health, COCs that contribute the most to the total cancer risks and hazards for each medium by exposure pathways and exposure routes are summarized in the 2013 ROD.
HHRA - Human Health Risk Assessment. For the HHRA, in addition to ingestion and direct contact, the soil COCs were also identified for soil-to-air pathways. For groundwater, COCs were identified for ingestion of groundwater, skin contact during bathing and inhalation of contaminants in groundwater during showering. All organics detected in groundwater were considered for potential vapor intrusion into basements from groundwater exposure route.

7.1 Summary of Human Health Risk Assessment

In this ROD Amendment, only unacceptable risks posed by contaminants at OU1 (waste and soil surrounding the waste) are discussed. The waste was not evaluated quantitatively by the HHRA; however, the action for the waste is triggered by the risk associated with the waste's migration to groundwater. The table below shows the waste (soil) screening for groundwater protection.

Boron, cadmium, and zinc in waste exceeded their respective soil-to-groundwater screening levels. In addition, there are VOCs and other metals that are in the waste and soil surrounding the waste contributing to groundwater future risk, and other metals contributing to future soil risk.

Table 2
Waste (Soil) Screening for Groundwater Protection

Contaminant in Waste (Soil)	Range of Concentrations found in Waste (Soil) (mg/Kg)	Site Specific SSLs* (mg/Kg)	Range of HI Found in Waste (Soil)
Boron	1,042-3,150	22	47-143
Cadmium	50-117	13	3.8-9
Zinc	22,350-29,600	6895	3.2-4.3

* Soil-to-Groundwater Screening Levels represent HI=1.0, based on a Dilution Attenuation Factor (DAF) of 9.85 and back calculated from the April 2006 EPA Region III risk-based concentration (RBC) table for tap water.

The waste's potential impact on the future use of groundwater is demonstrated by the groundwater risk calculated in the HHRA and discussed below. The human health risks posed by Site conditions have not changed since the issuance of the 2013 ROD. For a comprehensive discussion of site risk assessments, the 2013 ROD, which presented the outcome of the HHRA in detail, can be referenced in the AR.

Human health risks presented by the soil surrounding the waste and groundwater (due to waste's migration to groundwater) are summarized in the following table for future receptor population exposures exceeding EPA's risk criteria.

Table 3
Human Health Risk Summary for Future Receptor Population Exposures Exceeding EPA's Risk Criteria* due to Soil Surrounding the Waste and Groundwater

Receptor	Media	Carcinogenic Risks	Non-Carcinogenic Hazards	Chemicals Contributing Significantly to Results
Future Child Resident, onsite	Soil**		8.9	Aluminum, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Vanadium and Zinc
Future Adult Resident, onsite	Groundwater		27	Boron, Arsenic and TCE
Future Child Resident, onsite	Groundwater		82	Boron, Arsenic, Iron, Lithium, Manganese, and TCE
Future Combined Offsite Resident child/adult (lifetime*)	Groundwater	1.5 E-04		Vinyl Chloride and TCE
Future Combined Onsite Resident child/adult (lifetime*)	Groundwater	1.1 E-03		TCE, Vinyl Chloride and Arsenic

*The receptor populations include exposure to soil and groundwater for future onsite residents and groundwater only for future offsite residents; EPA's Risk Criteria: Cancer Risk- 1E-04-1E-06, HI<1: Lifetime cancer risks are additive for the child and adult resident; Non-cancer risks are not additive across receptor populations; Separate child and adult HIs are presented for media driving the total non-carcinogenic risks (HIs) presented in the text. Note that there were no HIs exceedances for the future offsite resident child or adult receptor population (HI<1); Therefore, non-cancer risks were not included in this table for the offsite resident exposure to future groundwater from the Site (see text).
** Note that there were no soil HI exceedance for the future onsite resident adult (HI=1) and no cancer risk exceedance for soil for the future onsite resident-combined child/adult (lifetime cancer risk <1E-06) receptor populations. Therefore, these receptor populations were omitted from the table (see text.)

Future groundwater and soil exposure pathways drive the future total onsite resident non-carcinogenic risk (summed across receptors, pathways and media), with an HI of 91 (i.e., the sum of 8.9 for soil plus 82 for groundwater) for the child resident and an HI of 28 (i.e., the sum of 1 for soil, which, as discussed in the footnote to the table above, is not included in the table above as a medium driving the risk, and 27 for groundwater) for the adult resident. The potential future onsite groundwater HIs for future child and adult resident are primarily driven by boron in groundwater and to a lesser extent by TCE, arsenic, iron, lithium, and manganese. The potential future onsite soil HI for a future onsite resident child that has direct contact (e.g., incidental ingestion) with the soil surrounding the waste is primarily driven by copper, iron, lead, manganese, mercury, vanadium and zinc, and to a lesser extent to aluminum, cadmium and chromium.

Therefore, groundwater poses an unacceptable risk to future receptors due to the hazardous substances that have leached into groundwater from the waste or soil contaminated by the waste. According to the HHRA, the exposure pathways by which the groundwater poses an unacceptable risk to future receptors are drinking (by onsite children and adults), bathing (by onsite children), showering (by onsite adults), in swimming pools and sprinklers (by offsite children and adult), and breathing indoor air (by potentially onsite and offsite residents due to vapor intrusion). Soil that is used by future onsite residents also poses a risk by the ingestion route due to the waste that has leached into the soil.

The future total *onsite* resident lifetime cancer risk of 1.1×10^{-3}, and the future total offsite resident lifetime cancer risk of 1.5×10^{-4} are driven by the future use of groundwater, as noted in the table above. There were no cancer risk exceedances for the soil. As noted above, potential future cancer as well as non-cancer risks are due to hazardous substances leaching into the groundwater from the waste and from soil contaminated by the waste.

Offsite residences downgradient from the quarry are connected to public drinking water. Therefore, the residents were not assumed to be at risk from contamination from groundwater used as a potable source. Future risk estimates are provided for offsite use of residential wells only to inform the offsite residents of their risk if they were to use their private wells for non-potable usages similar to those assessed in the risk assessment. The only exposure pathway that could pose a risk to the offsite resident due to the waste in the landfill is vapor intrusion into the basement of the offsite residences from contaminated groundwater migrating offsite impacted by the waste and soil surrounding the waste. However, the potential for vapor intrusion into indoor air is likely to be low since the volatile groundwater contamination is limited to directly beneath the quarry. Risk posed by the vapor intrusion pathway will be evaluated under OU2.

7.2 Summary of Ecological Risk Assessment

As discussed in further detail in the SLERA and the 2013 ROD, both found in the AR, the ecological risk assessment concluded that there is a continued potential for Site-related contaminants to be transported to nearby areas and impact both aquatic and terrestrial habitats. Also, the SLERA found that mammal, avian, and reptile species were at risk due to onsite soil contamination. Risk based on direct toxicity to ecological receptors was determined based on exposure to contaminants in soil, sediment, and groundwater, with the majority of the risk due to inorganic analytes. For the media defined as OU1, risk to ecological receptors appears to be limited to two hotspots at SL-07 and SL-08, which are located outside the current clay cap. The waste and soil surrounding the waste that lie beneath the cap is not accessible to ecological receptors.

8.0 BASIS FOR CHANGE OF 2013 SELECTED REMEDY

In the 2013 ROD, EPA selected a remedy for OU1, which consisted of constructing an engineered cell onsite to contain the contaminated waste, soil and sediment. However, during the remedial design stage prior to the construction of the selected remedy, EPA determined that the selected remedy could not be constructed as set forth in the 2013 ROD, due to insufficient staging area on and adjacent to the quarry property and the anticipated volume of contaminated waste and soil. Continuing with the construction of the engineered cell would necessitate transporting the excavated contaminated materials offsite and, accordingly, would significantly alter the costs, remedial actions involved, and applicable legal requirements discussed and selected in the 2013 ROD. Therefore, EPA has determined that the remedy selected in the 2013 ROD is infeasible to implement and the ROD needs to be amended to account for the physical constraints at the Site.

Additionally, in the 2013 ROD EPA defined OU1 as the contaminated waste, soil, and sediment. In June 2018, EPA’s ecologist performed a site reconnaissance to inspect vegetation at the Site. EPA’s ecologist observed that, contrary to observations in the early 2000s, there was no stressed vegetation. Therefore, removal of the sediments no longer appears warranted as part of OU1 source control. Addressing sediment after the source is remediated will prevent the need to address potential recontamination of the sediment in the future. It should be noted that conditions regarding vegetation may change if OU1 remedial activities do not arrest the discharge of contaminants from the Site. As a result, sediment is no longer part of OU1 in this ROD Amendment which selects the Remedial Action for contaminated waste and soil.

Therefore, EPA is amending the remedy as outlined below.

9.0 OU1 REMEDIAL ACTION OBJECTIVES

The goal for the final remedy for contaminated waste and soil (OU1) at the Salford Quarry Site is to reduce exposure to contaminants to levels that do not present an unacceptable risk to human health and the environment. The following remedial action objectives (RAOs) have been identified to mitigate the potential present and/or future risks associated with OU1:

- Prevent human exposure, including ingestion, inhalation, and dermal contact, and environmental exposure to the quarry waste and related contaminants in the soil.
- Minimize the migration of contaminants in the waste and soil to the groundwater.
- Minimize the impacts to the West Branch of Skippack Creek from migration of contaminants from the soil.

The 2013 ROD included the first two above-listed RAOs, a slightly modified version of the last above-listed RAO, as well as two additional RAOs pertaining to sediment. Since this ROD Amendment no longer addresses sediment as part of OU1, those two additional RAOs included in the 2013 ROD are no longer relevant or included here. The last RAO of this ROD Amendment was included in the 2013 ROD as "prevent the impacts…"; the second and third RAOs, described above, are to minimize but not prevent migration and impacts because the perimeter wall is expected to minimize groundwater contact with the waste laterally but will not prevent groundwater from entering the waste from the bottom.

These RAOs address risk posed to the future hypothetical residential users of the quarry property from exposure to contamination in surface soils surrounding the waste and to contamination from the waste leaching contaminants into groundwater.

Waste cleanup levels are based on exceedances of SSLs. These cleanup levels are back-calculated from risk-based tap water screening levels protective of groundwater residential exposures [i.e., ingestion, skin absorption (child only) and/or inhalation (adult only)] and/or the Maximum Contaminant Levels (MCLs) pursuant to the Safe Drinking Water Act when available. The exceedance of the SSL assumes transfer of contaminants from waste into the groundwater.

Cleanup levels for soils surrounding the waste are based on the risk posed by direct contact with soil [ingestion and skin absorption (child only)] for the future onsite child and adult residents and were developed assuming that there would be concurrent exposure [ingestion, skin absorption (child only) and inhalation (adult only)] to onsite contaminated groundwater. These risk-based cleanup levels were calculated using a target organ approach that took into consideration the cumulative non-carcinogenic effects of all contaminants in groundwater and soil on target organs. The more conservative cleanup goals for the soil surrounding the waste calculated in the HHRA (see PRG Table in Attachment L of the RI RA, Volume II of III) were for the future onsite child resident.

Table 4, below, presents the cleanup levels for both the waste and soil surrounding the waste. The cleanup levels are based on the more stringent of either the SSLs or the direct-contact risk level, except for iron, manganese, and vanadium. The naturally occurring levels (also known as background levels) of these three COCs in the area surrounding the Site are higher than the risk-based cleanup levels. Therefore, for these COCs, the waste and the soil surrounding the waste will be cleaned up to the maximum background concentration. Table 4 is a revised version of the table reflecting cleanup levels for the waste and soil surrounding the waste that was utilized in the 2013 ROD. The only revision made to Table 4 from the 2013 ROD earlier version pertains to the lead cleanup level. EPA's Office of Land and Emergency Management (OLEM) is in the process of reviewing the lead policy. As a new policy has yet to be issued by EPA, this ROD Amendment utilizes the Center for Disease Control's (CDC) recommendation, updated in 2012, which establishes a target blood lead level of 5 µg/dL. If EPA revises its national lead policy that results in lower cleanup concentrations, then EPA will determine if the lead-in-soil cleanup concentrations for this Site needs to be modified to be consistent with the revised national guidance and to ensure that the remedy is protective.

Table 4
Cleanup Levels for
Waste and Soil Surrounding the Waste

Contaminant of Concern	Cleanup Level[1] (mg/Kg)	Basis for Cleanup Level
Aluminum	19,021	Future Onsite Resident Direct Contact[2]
Boron	22	Protection of Groundwater[2]
Cadmium	12	Future Onsite Resident Direct Contact[2]
Chromium	111	Future Onsite Resident Direct Contact[2]
Copper	1,014	Future Onsite Resident Direct Contact[2]
Iron	22,900	Maximum Background
Lead	200	Future Onsite Resident Direct Contact[3]
Manganese	861	Maximum Background
Mercury	8.4	Future Onsite Resident Direct Contact[2]
Vanadium	30.7	Maximum Background
Zinc	4,565	Future Onsite Resident Direct Contact[2]

[1] The December 14, 2011 memo in the Administrative Record explains the rationale for developing cleanup levels using the risk data presented in the RI.
[2] Cleanup level indicates cumulative cancer risk < 1E-06 or HI ≤1 based on target organs
[3] The cleanup level for lead was calculated using the Integrated Exposure Biokinetic Model for Lead in Children. This lead screening level is currently under review.
NOTE: Some risk drivers for groundwater (arsenic, TCE, vinyl chloride, and lithium) were not present in the waste in levels exceeding the SSLs or in the surrounding soil exceeding the risk levels; therefore, waste and soil cleanup levels are not established for these constituents.
NOTE: The footprint established by these cleanup levels are anticipated to encompass areas potentially exceeding ecological risk-based values.

During the remedial action, waste delineation is an action-specific goal and excavation will be based on visual observation of waste materials. Extent of soil cleanup will be determined either by post-excavation confirmation soil sampling or by delineation during design. The extent of soil cleanup may be limited by physical constraints such as encountering bedrock or structurally undermining Quarry Road.

10.0 SUMMARY OF OU1 REMEDIAL ALTERNATIVES

The Superfund law and regulations require that the alternative chosen to clean up a contaminated site meet several criteria. The alternative must protect human health and the environment and meet the requirements of environmental regulations. Permanent solutions to contamination problems, which reduce the volume, toxicity, or mobility of the contaminants, should be developed wherever possible. Emphasis is also placed on treating the wastes at the site, whenever this is possible, and on applying innovative technologies to clean up the contaminants.

Because the 2013 ROD-selected remedy proved infeasible to implement, an RFS was completed to identify and evaluate a range of remedial alternatives to protect human health and the environment from potential risks associated with OU1 of the Site. A more detailed analysis of the remedial alternatives can be found in the RFS located in the AR. The waste and soil (WS) alternatives are:

WS1 No Action
WS10 In Situ Solidification/Stabilization
WS11 Perimeter Wall and RCRA Cap
WS15 Engineered Cell, Modified

The EPA ROD Guidance, "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents" (July 1999, OSWER 9200.1-23P)[4] advises that the original selected remedy be retained for comparison with new alternatives. As a result, the original selected remedy, Engineered Cell (WS4), which proved infeasible to construct, is presented as a modified Engineered Cell (WS15). This modified alternative WS15 represents a remedial approach similar to the original selected remedy but can be implemented in accordance with applicable or relevant and appropriate requirements (ARARs). EPA retains the alternative WS15 as a substitute for the original selected remedy (WS4) through the alternative screening process.

10.1 Common Elements and Distinguishing Features

This section presents a summary of elements that are common to all of the alternatives except for WS1 No Action. Alternatives WS10, WS11, and WS15 each requires regrading and revegetating, monitoring, installation of topographic benchmarks, O&M, and ICs. Five-Year Reviews would be required for each of the three action alternatives because hazardous substances would be left in place. The common elements are included in the cost estimate for each of the alternatives.

Regrading and Revegetating –The clay cap material would remain onsite. Surface grading would be performed, and drainage channels would be installed to convey runoff water away from the waste and prevent infiltration. Surface water from these channels would be directed to existing drainage features that ultimately discharge to the West Branch of Skippack Creek. The design would incorporate appropriate stormwater best management practices consistent with the anticipated end use of the Site and adjacent open space. The design would also

[4] Available at https://www.epa.gov/sites/production/files/2015-02/documents/rod_guidance.pdf.

ensure that impacts to terrestrial receptors and habitats would be mitigated and ecological revitalization components would be integrated wherever possible, particularly in wooded areas.

The existing clay cap material may be reused onsite for regrading or inclusion in a slurry design mix, depending on the alternative selected. Details will be decided during design.

Topsoil placement and grading would permit vegetation to grow and allow adequate surface drainage. The topsoil surface would then be planted with grass or other vegetation per the final design requirements to minimize erosion.

Monitoring – Groundwater monitoring will be required since the waste will remain onsite regardless of which alternative is selected. Monitoring would likely include groundwater level measurements, groundwater sampling of monitoring wells, laboratory analysis (target analyte list (TAL) metals and boron), and generation of a report to summarize results. Two sampling events per year for 30 years are included for cost estimating purposes.

Also, surface water and sediment should be monitored to assess the effectiveness of the source control measures.

Topographic Benchmark Monuments –Some form of intrusive earthwork such as excavation, in situ mixing, backfill, etc. will occur. These activities will be followed by topsoil placement and grading. Topographic benchmark monuments will be installed at the Site after completion of these work features in order to monitor potential subsidence.

Operation and Maintenance (O&M) –O&M will be required since waste will remain onsite. Many of the O&M tasks are similar, including mowing of grass/landscaping, periodic inspections to ensure isolation of the contamination as well as safety and security of the Site, and groundwater sampling to monitor the effectiveness of the Modified Remedy. Periodic inspections should include the fence, sediment erosion control measures, the integrity of the cap, etc. For cost estimating purposes, long-term O&M includes costs for 30 years, however, O&M will be required as long as wastes are left in place above performance standards.

Institutional Controls –ICs (legal and administrative controls and informational devices) would be implemented to protect the integrity of the Modified Remedy and to prevent exposure to Site-related contamination. The types of ICs employed would include activity and use restrictions enacted through proprietary (e.g., easements, covenants) and/or governmental (e.g., zoning) controls to prevent use of the property that would damage the components of the Modified Remedy or that would pose an unacceptable risk to receptors (i.e., by residential use). Advisories, public education activities, municipal ordinances, Uniform Environmental Covenant Act (UECA) environmental covenant, Pennsylvania Hazardous Sites Cleanup Act (HSCA) 512 order or deed notices could also be employed to protect potential receptors from site contamination. EPA will coordinate implementation of ICs with PADEP and the Montgomery County Office of Public Health.

Engineering Controls – Property access restrictions, such as a locked perimeter fence, would prevent exposure to unacceptable risks associated with Site-related contaminants and protect the components of the Modified Remedy. The fence height and location would be specified during design.

Five-Year Reviews – EPA is required to review sites where hazardous substances are left onsite at least every five years after the initiation of a remedial action, per Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and 40 CFR 300.430(f)(4)(ii). Since hazardous substances would remain onsite under alternatives WS10, WS11 and WS15 and site conditions would not allow for unlimited use and unrestricted exposure, a Five-Year Review will be required to be performed at least every five years.

ALTERNATIVE WS1: No Action
Present Worth Cost: $ 0
Implementation Time: none

The No Action alternative is considered in accordance with NCP requirements and provides a baseline for comparison with other alternatives. Under this alternative, no further action would be implemented and the current status of the waste and contaminated soil in the quarry area remains unchanged. The existing landfill clay cap has been maintained but large brush at the cap edges and some depressions in the cap suggest poor integrity. The cap may continue to deteriorate resulting in increasing infiltration of water and greater dissolution of contaminants into the environment. Studies of clay caps have found that they can fracture, and sometimes infill with higher-permeable soils resulting in permanent increases in hydraulic conductivity. A Five-Year Review would not be conducted for the Site for a No Action alternative because a remedial action would not have been selected. The No Action alternative would only be selected if the Site conditions were currently protective of human health and the environment.

ALTERNATIVE WS10: In Situ Solidification/Stabilization
Present Worth Cost: $15,979,062
Onsite Implementation Time: 16 months

Alternative WS10 includes solidification/stabilization (S/S) of waste and contaminated soil and the common elements above. S/S is an immobilization technology that EPA defines as a presumptive remedy for principal threat metals-in-soil waste targeted for treatment. The tile waste, municipal waste, and contaminated soil in the quarry footprint would be mixed with an additive to render it less soluble, mobile, or toxic. The decision to stabilize and include or haul and dispose of the contaminated soil outside of the quarry footprint would be made during design. The contaminated material would be stabilized by mixing in place using commercially available shallow soil mixing and S/S equipment, such as one or more large vertical augers. Since this technology does not require excavating or stockpiling the waste, there is a substantial reduction in work area requirements as well as a reduction in potential chemical exposure.

After completion of the in situ S/S procedures, confirmatory testing (e.g., toxicity characteristic leaching procedure (TCLP) for contaminants, unconfined compressive strength, and permeability) would be performed on the stabilized waste material and surrounding soil to verify that treatment requirements have been met.

Addition of binding agents can increase the volume of treated waste by up to 30% to 50%. For cost estimating purposes, soil mixing would increase the waste volume by 30% and the addition of an amendment would further increase the waste volume by an additional 25%. Therefore the 44,100 CY volume of waste in the quarry would increase to approximately 71,662 CY after stabilization. The anticipated volume increase would be refined during design; however excess stabilized material that cannot reside onsite would need to be properly disposed of offsite. A geotechnical evaluation of the stabilized material would need to be performed during design to ensure that the Site work could be completed safely and effectively.

The type and quantity of S/S amendment would be selected using a treatability test during design. Magnesium compounds may have some effectiveness in stabilizing boron present in water, wastewater, and sludges. Portland-limestone cements (PLCs) may also be a treatment option and appear to have some advantages compared to standard Portland cement, with no negative impacts on cement performance, durability, or constructability. These advantages include reduced permeability and porosity, reduced shrinkage, and strength improvement. PLCs require less energy to grind than standard Portland cement and have an approximately 10% smaller carbon footprint. Additionally, a geotechnical evaluation of the stabilized material would need to be performed during design to ensure that the Site work could be completed safely and effectively.

A protective clay cap would be placed above the stabilized mass to limit water infiltration and residual risks from direct contact with treated waste. A multi-layer, impermeable RCRA Subtitle C cap is not required since the waste would be solidified and stabilized to meet TCLP standards. Surface grading, topsoil, seeding, and monitoring would be performed as described in common elements above.

For cost estimating purposes, it is assumed the same volume of waste that was originally present in the quarry (44,100 CY in situ) would remain onsite, while the excess (27,562 CY) would be disposed offsite in a Subtitle D (non-hazardous) waste landfill. This assumption would result in an elevation contour similar to that of the landfill prior to remedial action and represents a conservative cost approach. The decision to keep some of this excess waste onsite, which would change the surface topography in the quarry and could potentially limit reuse potential, would be decided during design. Removal of the excess waste could be managed and scheduled such that no staging problems occur due to lack of space.

For cost estimating purposes, it is estimated that 3,400 CY of contaminated soil would be treated, and placed beneath the protective clay cap. The extent of the contaminated soil near SL-07 and SL-08 would be defined during design or remedial action. In the areas where contaminated soil is removed outside of the cap footprint, six inches of topsoil would be placed and vegetated. The decision to manage this treated soil onsite or dispose offsite will be made during design.

The total duration of onsite activities associated with this S/S alternative is estimated at 16 months (316 working days). This assumes approximately 6 months to complete the in situ S/S.

The duration also assumes 10 loads per day using 20 CY trucks, or 200 CY of excess S/S-treated waste hauled offsite per day. As a result, the duration of the transport and offsite treatment/disposal activity for the waste would require 138 working days to remove a total of 27,562 CY of excess S/S-treated waste and contaminated soil transported in 1,378 truckloads. The duration also assumes a similar loading and removal rate for the untreated contaminated soil associated with the waste, which is located outside of the landfill footprint and which would require 22 work days to remove a total of 4,420 CY ex situ of excavated untreated contaminated soil transported in 221 truckloads. Following disposal of this material offsite, the duration assumes 21 working days to transport the clay cap onsite and 15 working days would be required in order to backfill the excavated area with 6 inches of topsoil.

ALTERNATIVE WS11: Perimeter Wall and RCRA Cap
Present Worth Cost: $5,926,155, average of three wall types
Implementation Time: 8 months

Alternative WS11 includes the installation of a subsurface perimeter wall (typically soil-bentonite slurry wall, grout barrier, or sheet pile) surrounding the quarry waste to the extent practicable, possible inclusion of contaminated soil/waste from outside of the capped area (will be decided during design), and installation of a multi-layer, impermeable RCRA Subtitle C cap (RCRA cap) on top of the waste and contaminated soil. The perimeter wall would surround and encapsulate the existing waste, which is expected to minimize lateral groundwater flow into or out of the contained waste area. The RCRA cap would be designed to mitigate infiltration of surface runoff and precipitation from entering the waste and mobilizing contamination into the groundwater and to prevent direct contact with the waste. The combination of the perimeter wall and RCRA cap is expected to lower the water table below the waste, which would reduce the impact of the source to groundwater. It is not anticipated that groundwater management would be necessary during construction, however, monitoring groundwater levels during design and construction will better inform the need for managing groundwater inside the waste.

Slurry/grout walls and sheet piling that are connected to the rock surface beneath have a well-documented history of success in containing and diverting groundwater flows. The perimeter wall would isolate the waste laterally from the surrounding groundwater aquifer outside of the perimeter wall. It is anticipated that installation of a perimeter wall would substantially reduce groundwater levels within the quarry by preventing the groundwater mounding that currently occurs in the quarry. Preventing groundwater mounding would likely keep the water table below the tile waste and possibly the quarry floor, resulting in reduced transfer of contamination from the waste into the groundwater.

This technology is typically implemented by installing a soil-bentonite cut-off wall, i.e. slurry wall, or sheet pile in the subsurface with conventional heavy construction equipment such as excavators, cranes, etc. along with appropriate attachments, if needed. Any material removed during soil-bentonite slurry wall installation could be placed beneath the RCRA cap if it is not suitable for use in the slurry wall.

High pressure grout injection could also be implemented using cranes or drill rigs in combination with a drill stem and rotating pressure sprayer. This alternative WS11 does not specify a particular type of perimeter cut-off wall since EPA would determine this based on contractor proposals on how to best meet performance based standards for the subsurface perimeter wall during remedial action contracting. Costs to implement this alternative were estimated based on each of the three techniques for constructing the perimeter wall; the estimated costs are presented as an average of the three estimates.

Placement of a slurry wall would be adjacent to the rock wall face with an intent to install the wall approximately two feet into the bedrock beneath the quarry to minimize leakage. The slurry wall would need to be in contact with the bedrock at the bottom of the quarry in order to prevent lateral leakage of contamination from the waste. For the sheet pile wall, instead of driving the sheets into bedrock which is not feasible, the base of the sheet pile wall would have to be grouted to create a seal with the bedrock. Any type of perimeter wall would need to be in contact with the bedrock at the bottom of the quarry in order to inhibit lateral leakage of contamination from the waste and only needs to be located in areas where the base of the wall is expected to be below the water table during some or all of the year. The actual alignment of the perimeter wall would be decided during design.

For a grout wall, placement of the perimeter wall in contact with bedrock would not preclude vertical groundwater leakage via the fractures in the bedrock underlying the waste. Use of high-pressure grout injection may enable penetration of fractures in the rock wall, thus further reducing permeability in the bedrock. Grout injection could also be employed to treat waste adjacent to the irregular rock walls in locations that are hard to establish a slurry wall trench.

After the perimeter wall is installed, the RCRA cap would be installed to prevent exposure to humans and ecological receptors from direct contact with contaminated material and effectively isolate contamination from precipitation and surface water infiltration. The cap would extend beyond the areal extent of the quarry limits of excavation where feasible. Effort will be made to remove contaminated soil or waste from those areas that are not able to be covered by the cap and include it beneath the capped area. During design, special consideration would be given to designing the cap with an optimal seal against the bedrock wall.

The RCRA cap would be designed and constructed in general accordance with “Design and Construction of RCRA/CERCLA Final Covers” (EPA 1991), with low-permeability material above the waste and contaminated soil surrounding the waste. A RCRA Subtitle C cap is necessary because the tile waste is a RCRA-characteristic hazardous waste because it failed cadmium and lead TCLP tests. The following could be layers for the RCRA cap, however, specific materials and thicknesses would be decided during design (from top to bottom): 6-inch vegetative layer, 24-inch protective layer, geotextile fabric layer, 12-inch drainage layer, 20-millimeter (mil) geomembrane barrier layer, and 24-inch low-permeability soil confining layer ($<1 \times 10^{-7}$ cm/sec permeability). Surface grading, topsoil, seeding and monitoring would be performed as described in common elements above.

For cost estimating purposes, it is estimated that 3,400 CY of contaminated soil would be excavated and placed beneath the RCRA cap. It is anticipated that the contaminated soil near SL-08 will be included in the design of the cap. Actual delineation for any excavation near SL-07 and SL-08 would occur during design or remedial action. The actual decision to include contaminated soil under the cap or haul and dispose of the contaminated soil outside of the quarry footprint will be made during design. Six inches of topsoil would be placed and vegetated in the areas where contaminated soil would be removed outside of the RCRA cap footprint. Placing contaminated soil associated with the waste beneath the RCRA cap would likely result in a Site surface elevation contour similar to, but slightly higher in elevation than, that of the landfill prior to remedial action.

The duration of onsite activities associated with this perimeter wall and RCRA cap alternative is estimated at approximately 8 months (153 working days). This estimate assumes approximately 6 months to complete the perimeter wall and RCRA cap installation. The duration also assumes that contaminated soil associated with the waste which is located outside of the landfill footprint would be excavated at a rate of 200 CY per day, which would require 22 work days to excavate and move the total 4,420 CY of contaminated soil within the landfill footprint prior to cap construction. The duration also assumes 11 working days to place 2,140 CY of topsoil transported in 107 truckloads.

Alternative WS15: Engineered Cell, Modified
Present Worth Cost: $ 24,776,237
Implementation Time: 33 months

Alternative WS15 involves many of the same components as the selected remedy in the 2013 ROD, Alternative WS4, which included excavating the existing clay cap, waste, contaminated soil and contaminated sediment and staging the material onsite; dewatering the quarry as necessary; backfilling the excavation with clean fill to bring the grade to above the water table; placing clean backfill above the water table; constructing of a low-permeability engineered cell; replacing the contaminated materials inside the engineered cell; monitoring groundwater and surface water to ensure the effectiveness of the remedy; and implementing ICs to control future use of the property and to protect the integrity of the remedy.

Inherent in the 2013 ROD remedy selection was an intention to temporarily stage the excavated existing clay cap, waste, contaminated soil and sediment onsite, while the engineered cell was constructed. Because all the excavated material cannot physically be staged onsite as expected in the 2013 ROD-selected remedy, Alternative WS4, Alternative WS15 involves the following actions to be undertaken in accordance with the LDRs:

- Loading of waste and contaminated soil into trucks;
- Treating waste and contaminated soil at approved offsite facility;
- Loading of treated waste into trucks;
- Replacing treated waste back into the quarry; and
- Disposing excess treated waste and contaminated soil offsite.

Two components of the original WS4 Engineered Cell remedial alternative, i.e., placement of clean backfill to above the water table following excavation and liner above the backfill, were eliminated from this modified alternative because surface drainage modification is expected to allow the groundwater table to recede to its background level at or below the elevation of the quarry floor. This expectation is supported by a memorandum produced by USACE indicating that if proper surface grading is performed and maintained, surface infiltration can be reduced, and the groundwater mounding effect eliminated. For cost estimating purposes, these changes would mean not importing clean backfill to the quarry, more waste would be able to be returned to the quarry, and less waste would need to be disposed of offsite.

The soil and waste would be excavated using conventional heavy machinery. The RI data demonstrated that the tile waste would be characteristic hazardous waste if generated due to cadmium and lead concentrations exceeding the RCRA TCLP regulatory limits. Therefore, if the tile waste is excavated and stored offsite ("generated"), it would require treatment to meet the LDR treatment standards specified in 40 CFR 268.40. For cost estimating purposes, it is assumed that all waste, 44,100 CY, will require treatment if transported offsite.

Based on the analysis in the USACE memorandum, better surface grading or the placement of a temporary plastic cover could modify surface water direction and flow patterns to reduce expected dewatering needs/costs during excavation of the waste. The cost estimate for this alternative includes the assumption of placement of a surface plastic cover approximately 6 months prior to initiation of construction to minimize the amount of groundwater in the quarry. There are fractures in the walls of the quarry that are hydraulically connected to areas outside the quarry which may allow exfiltration of water and/or assist in draining the groundwater mounding in the quarry. For cost estimating purposes, some dewatering would be performed to minimize any liquid leakage from soils and waste during transportation and disposal. It is expected that precipitation into the excavation during construction activities would necessitate dewatering. This water would be transported via tank trucks to a treatment/disposal facility.

Under this alternative, it is assumed that a total of 44,100 CY of waste and 9,000 CY of contaminated soil would be excavated and transported to an offsite facility for treatment. By excavating the waste and soil, the volume will increase 30% and by treating the waste and soil, the volume will increase another 25% to approximately 86,288 CY ex situ. The excavated material previously residing below the water table would need to be dewatered in order to prevent contaminated groundwater from leaking on roadways during transportation offsite. After treatment, the treated material would be loaded into trucks for return transport to the Site for compaction per geotechnical design requirement, and final placement in the quarry.

Excess treated soil and waste would be sent to either a Subtitle C (hazardous waste) or D (solid waste) landfill for final disposal in accordance with RCRA regulations. For cost estimating purposes, it is assumed that approximately 28,958 CY treated waste would be disposed of offsite. Disposal of this excess stabilized waste offsite would result in a Site surface elevation contour similar to that of the landfill prior to remedial action, which represents a more conservative cost approach. Although it is possible and less expensive to keep more of the excess waste onsite, the resulting surface topography could potentially limit reuse potential, and introduce erosion and other maintenance issues. During design, it may be decided to keep more waste onsite, however disposal of this excess waste offsite would result in a Site surface elevation contour similar to the current elevation and is conservative for cost estimating purposes.

The total duration of onsite activities associated with this WS15 alternative is estimated at approximately 33 months (669 working days). The duration assumes 10 loads per day using 20 CY trucks, or 200 CY of waste hauled offsite per day. As a result, the duration of the transport and offsite treatment/disposal activity would require 346 working days to remove a total of 69,030 CY of waste and contaminated soil transported in 3,452 truckloads. Following treatment, a similar level of effort would be required in order to return, place, and compact the treated waste in the quarry. The duration also assumes 21 working days to transport and place the clay cap onsite.

11.0 EVALUATION OF ALTERNATIVES

The remedial alternatives summarized above were compared to each other in the RFS using the criteria set forth in 40 C.F.R. § 300.430(e)(9)(iii). The evaluation of the alternatives was presented in the PRAP and is summarized below. EPA uses these nine criteria, summarized in the table below, in the decision-making process.

Evaluation Criteria for Superfund Remedial Alternatives	
Threshold Criteria	**1. Overall Protection of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
	2. Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
Primary Balancing Criteria	**3. Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.
	4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
	5. Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
	6. Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
	7. Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total of an alternative over time in today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
Modifying Criteria	**8. State/ Support Agency Acceptance** considers whether the State agrees with EPA's analyses and recommendations, as described in the FS and Proposed Plan.
	9. Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

The nine criteria fall into three groups. The first group, which are considered ***threshold criteria***, consist of two criteria: (1) overall protection of human health and the environment and (2) compliance with applicable or relevant and appropriate requirements ("ARARs"). These two ***threshold criteria*** must be satisfied in order for a remedial alternative to be eligible for selection. The second group, the ***primary balancing criteria***, consist of five criteria that are used to weigh major tradeoffs between remedies: (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility or volume through treatment; (5) short-term effectiveness; (6) implementability; and (7) cost. The third group, ***modifying criteria***, evaluates (8) state/support agency acceptance and (9) community acceptance, which are formally taken into account after the public comment is received on the PRAP.

11.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether a remedial alternative provides adequate protection of human health and the environment by analyzing how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or ICs.

Alternative WS1 provides no additional protection against exposure to waste or contaminated soil, nor does it address potential future leaching of contamination from source waste or soil into groundwater. The existing clay cap above landfill waste provides a barrier to surface exposure; however, the clay cap is currently in a state of disrepair and is permitting surface infiltration of precipitation and runoff. The waste remaining within the saturated zone acts as a continuing source of contamination within the aquifer, which would continue to migrate downgradient. Although there is no current groundwater use in the affected area, the contaminants have the potential to migrate to areas where the groundwater may be used. Thus, Alternative WS1, which must be evaluated in accordance with CERCLA and the NCP, fails to meet the threshold criterion of overall protection of human health and the environment, so it has been eliminated from further analysis.

The remaining waste and soil alternatives (WS10, WS11, and WS15) each meet the threshold criterion for Overall Protection of Human Health and the Environment because each of the alternatives, if implemented, is expected to achieve the RAOs by reducing unacceptable risk to human health and the environment.

11.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), and the NCP at 40 C.F.R. § 300.430(f)(1)(ii)(B), require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal environmental laws and state environmental or facility siting laws or provide grounds for a specified waiver under Section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4), and the NCP at 40 C.F.R. § 300.430(f)(1)(ii)(C). Legally applicable or relevant and appropriate requirements are collectively referred to as "ARARs," and are defined by the NCP at 40 C.F.R. § 300.5.

"Applicable" requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under

Federal environmental or State environmental or facility-siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

"Relevant and appropriate" requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility-siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified by a State in a timely manner and are more stringent than Federal requirements may be applicable or relevant and appropriate.

In addition to ARARs, EPA also sometimes considers additional material referred to as "to-be-considered materials" (TBCs) in its site risk assessment and the remedial cleanup process. TBCs are non-promulgated advisories or guidance issued by Federal or State governments that are not legally binding and do not have the status of potential ARARs. EPA may use TBCs in determining the necessary level of cleanup for protection of human health or the environment when ARARs do not exist for particular contaminants.

The remaining waste and soil alternatives (WS10, WS11, and WS15) are expected to achieve compliance with ARARs in a reasonable period of time. For Alternative WS10, the S/S process would bind contamination into the waste so that it cannot leach into the groundwater and would no longer be a continuing source to groundwater, and is expected to comply with ARARs by ensuring that the solidified waste is not hazardous by completing TCLP testing in accordance with state hazardous waste regulations. Alternative WS11 is expected to comply with ARARs by containing waste and soil onsite in a perimeter wall and RCRA cap. WS15 is expected to comply with RCRA LDRs by treating contaminated material offsite before it is either replaced into the quarry onsite (as space allows) or disposed offsite.

Specific ARARs identified for the Modified Remedy are further discussed in Section 13.2 below and Tables in Appendix C.

11.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refer to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once the cleanup levels have been met. Alternative WS11 is preferable to WS10 and WS15 for this balancing criterion.

Alternatives WS10 and WS15 would provide long-term effectiveness and permanence by stabilizing/treating/binding the waste using chemical amendments. Alternatives WS10 and WS15 would utilize in situ and offsite treatment, respectively. The effectiveness of S/S remedies has been demonstrated at other Superfund sites, but the performance of the selected treatment for these alternatives (WS10 and WS15) would require verification for the set of COCs and matrix at the Site.

For Alternative WS10, in situ S/S, a moderate degree of long-term effectiveness and permanence is expected, however, the effectiveness and permanence relate to the ability for contamination to be demobilized; if the binding agent cannot be mixed with waste uniformly and thoroughly, contamination will not be completely demobilized and, thus, not completely effective. Additionally, the selected reagent must simultaneously reduce the mobility of multiple inorganic contaminants while not being hindered by the presence of other contaminants. Contaminants such as oil, grease, phenol, some soluble salts, cyanide and sulfate may inhibit proper bonding of reagent with waste, reduce the setting of treated material or reduce durability, strength and leach resistance of the final product. Treatability studies would need to be conducted in order to identify appropriate binding agents and determine the proper formulation for those agents.

Limited data are available on long-term performance of S/S; however, the long-term environment and conditions to which solidified waste is exposed can affect its stability. For example, cement-based stabilized wastes are vulnerable to the same physical and chemical degradation processes as concrete and other cement-based materials (i.e., can potentially degrade over a period of 50 to 100 years).

Alternative WS11 is expected to provide a moderate to high long-term effectiveness and permanence through containment of the untreated waste using a very low-permeability perimeter cut-off wall of soil-bentonite slurry, grout, or sheet pile, combined with a RCRA Subtitle C cap. The subsurface perimeter cut-off wall would provide horizontal groundwater control, while the RCRA Subtitle C cap would prevent vertical infiltration of precipitation, and with proper surface grading, reduce existing groundwater mounding to an elevation similar to that of background groundwater levels, which are generally below the bottom of the quarry. Since there is no impermeable barrier at the bottom of the quarry, the potential for flow of contamination through this route would be determined by post-construction monitoring.

Alternative WS15 is expected to provide a moderate degree of long-term effectiveness and permanence by preventing direct human contact with waste and contaminated soil. It is expected that contaminant concentrations in materials within the quarry would persist at levels that would be protective for the long term. However, cement-based stabilized wastes are vulnerable to the same physical and chemical degradation processes as concrete and other cement-based materials (i.e., can potentially degrade over a period of 50 to 100 years). Therefore, similar to Alternative WS10, treatability studies would need to be conducted in order to identify appropriate binding agents and determine the proper formulation for those agents in order to maximize Alternative WS15's permanence and long-term effectiveness. Similar to Alternative WS11, there is no impermeable barrier at the bottom of the quarry in Alternative WS15 so the potential for flow of contamination through this route would also be determined by post-construction monitoring.

It should be noted that any alternatives which allow the contamination source material to remain in place generally provide lower levels of long-term effectiveness and permanence compared to those that include removal or destruction of the contamination source. Alternatives WS10, WS11, and WS15 all include having the waste remain in place. Therefore, all require ICs and long-term maintenance to ensure continued long-term protectiveness and permanence and a Five-Year Review will be required to be performed at least every five years.

11.4 Reduction of Toxicity, Mobility or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. Alternative WS11 is preferable to other alternatives for this balancing criterion because the ability of Alternative WS11 to minimize the migration of contaminants is more certain than Alternatives WS10 and WS15, even though it is achieved through containment and not treatment.

WS10 and WS15 would reduce toxicity and mobility, yet increase volume, through treatment. The addition of S/S binding agents or other treatment amendments could increase the volume of treated waste material by 25%-50%. Furthermore, WS10 and WS15 may not be completely implementable since a treatability study has not yet been performed. In addition, the stabilized waste/soil could breakdown over time, resulting in incomplete reduction of mobility over time for both alternatives.

Alternative WS11 would not treat the waste but the perimeter wall and RCRA cap would prevent direct contact with and minimize the migration of contaminants. Therefore, reduction of contaminant mobility from waste and contaminated soil to groundwater could be achieved through containment measures, though not through treatment.

11.5 Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to human health and the environment during construction and implementation of the remedy until cleanup levels are achieved. Alternatives WS10 and WS11 have better short-term effectiveness than Alternative WS15 since they are expected to have less of an impact on the community and the environment during construction.

Alternatives WS10 and WS11 would both limit worker and resident exposure to contaminated soil and waste since implementation of the Modified Remedy would take place without extensive excavation. These two alternatives would employ heavy construction equipment as well as additives/binding agents/perimeter wall materials and require health and safety best management practices and precautions for workers and residents. Materials exposure and traffic risks for Alternative WS11 would be much lower than those encountered with WS10. Alternative WS10 could also pose some increased risks as the buried tanks and space constraints may necessitate offsite disposal of excess S/S waste materials. Consequently, Alternative WS11 offers a higher degree of short-term effectiveness than Alternative WS10.

Alternative WS15 provides the lowest degree of short-term effectiveness of all of the alternatives due to risks and increased exposure potential for both workers and the community stemming from transportation of the waste and soil. Conventional traffic controls for waste transport, such as defining specific travel routes to/from the Site for waste transportation vehicles and coordinating waste shipments to avoid peak traffic hours, would be used as needed to minimize the potential for accidents and exposure.

11.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as the availability of services and materials, administrative feasibility, and coordination with other governmental entities may also be considered. In consideration of the various factors, as detailed below, Alternative WS11 is the most favorable remedial alternative regarding implementability.

All three alternatives are readily implementable from the perspective of construction equipment requirements as these items are commercially available. Some difficulties are anticipated in implementing the S/S treatment in Alternative WS10 given the importance of properly mixing the binding agents with the heterogeneous tile and municipal waste (reportedly consisting of industrial, commercial, and residential wastes, and fly ash cinders from a coal fired power plant), in order to achieve good distribution and contact of the amendment with the waste. Additionally, the presence of two buried tanks in the waste could be problematic and may cause mixing difficulties.

The technology and procedures necessary for installing the perimeter wall and RCRA cap of Alternative WS11 exist and are readily implementable. This alternative does not require substantial excavation or dewatering so the implementability would be easier (or higher) compared to Alternatives WS10 and WS15. If the type of wall chosen is a soil-bentonite cut-off wall, then some excavation around the perimeter of the Site would be required, however, this work would be minor compared to the excavation involved in Alternative WS15.

It is anticipated that the vast majority of the existing clay cap material would remain in place with Alternatives WS10 and WS11. Wholesale staging/stockpiling of this material onsite is not a viable option, as there is limited usable space available on the quarry property. Offsite staging/stockpiling is not a viable option either since there is no storage area identified nearby at this time. Additional reasons for this approach include: the extent of contamination of the clay material is not entirely known at this time; the floodplain owned by the township, to the extent the clay cap would otherwise be possible to stage there, would require substantial improvements, such as ingress/egress roads, tree removal as required, stockpile base, possible sump for runoff collection (if no cover and no proof of lack of contamination), disposition of runoff, whether a cover is needed, as well as other design issues, etc.

Any extraneous cap material could and may be used for onsite regrading purposes. Additionally, under Alternative WS11, if a soil-bentonite cutoff wall were selected as the perimeter wall during the remedial design, a portion of the clay could be potentially included as material to be used in the slurry wall design mix, depending on geotechnical evaluation test results, as well as designer plans. Notably, under this scenario, the clay cap material would not replace the fine-grained bentonite that would typically be included in a soil-bentonite slurry design mix.

Alternative WS15 is expected to have low implementability for several reasons. Alternative WS15 requires removal of the entire quarry (waste, contaminated soil, and clay cap); however, there is very little space available for excavation, dewatering, stockpiling, and loading of the waste into trucks. Quarry Road is narrow and has a limited field of vision, thus making transportation and traffic control very problematic.

Based upon the foregoing, Alternative WS10 has a moderate rating for overall implementability, Alternative WS11 has a moderate to high rating for overall implementability, and Alternative WS15 has a low rating for overall implementability.

11.7 Costs

Cost is the final balancing criterion that EPA considers in evaluating remedial alternatives. Cost considers the construction total capital, O&M costs, and present worth costs associated with each remedial alternative. The capital cost includes contractor mark-ups, contingency, project management and supervision/administration/quality control, but not cost of design. The present worth has been calculated based on Federal policy which recommends assuming a 7% discount rate over a 30-year evaluation period. Table 5, below, contains a cost summary for Alternatives WS10, WS11, and WS15 with an expected accuracy of +50% to -30%.

Overall costs are lowest for Alternative WS11. The detailed cost estimate of the Modified Remedy is also contained in Appendix B.

Table 5
Costs of Evaluated Alternatives

Alternative	Capital	Annual O&M	Present Worth
WS10 In Situ S/S	15,189,226	63,650	15,979,062
WS11 Perimeter Wall/RCRA Cap			
Slurry Wall	4,292,061	66,150	5,112,919
Jet Grout	5,621,568	66,150	6,442,426
Sheet Pile Wall	5,402,261	66,150	6,223,119
Average			5,926,155
WS15 Engineered Cell, Modified	23,986,402	63,650	24,776,237

11.8 State Acceptance

The Pennsylvania Department of Environment Protection (PADEP) concurred with the Modified Remedy in a letter dated August 25, 2021 (Appendix D).

11.9 Community Acceptance

Community acceptance is evaluated based on feedback received regarding the preferred alternative, primarily indicated through comments received in response to the proposed plan.

From December 15, 2020, to February 12, 2021, EPA held a 60-day public comment period to accept public comments on the remedial alternatives presented in the 2020 PRAP to Amend the ROD for OU1 and the other documents contained in the Administrative Record, as well as in response to EPA's pre-recorded public meeting.

The notice of availability of the PRAP to Amend the ROD for OU1 and the documents in the Administrative Record was published in *The Reporter* on December 15, 2020. In addition, EPA distributed fact sheets summarizing EPA's preferred remedial alternative for OU1 to local residences and businesses within an approximately 0.5-mile radius of the Site in December 2020.

Due to state and local COVID-19 restrictions and guidance from the Centers for Disease Control and Prevention (CDC) regarding public gathering at the time, EPA posted a pre-recorded public meeting on the Site's Profile Page (https://www.epa.gov/superfund/salfordquarry) contemporaneously with its publication of the PRAP to Amend the ROD for OU1. EPA's pre-recorded public meeting could be watched at any time during the public comment period and comments were collected via email, letter, and voice-mail. The pre-recorded public meeting enabled EPA to share and discuss the remedial alternatives and Preferred Alternative presented in the PRAP to Amend the ROD for OU1 with the public, while following then-current social-distancing guidance from the Centers for Disease Control and Prevention (CDC) and other local, state, and federal health advice and restrictions. A transcript of this pre-recorded public meeting is included in the AR supporting this ROD Amendment for the Site.

While EPA received some comments on the Site's original PRAP in 2012, which are detailed in the Responsiveness Summary of the 2013 ROD and available for review in the AR, no comments were received on the PRAP to Amend the ROD for OU1 during the 60-day public comment period.

12.0 Principal Threat Waste

EPA characterizes waste onsite as either principal threat waste or low-level threat waste. The concept of principal threat waste and low-level threat waste, as developed by EPA in the NCP, is applied on a site-specific basis when characterizing source material. EPA considers "source material" to be material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, to surface water, to air, or that act as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile, which would present a significant risk to human health or the environment should exposure occur.

At this Site, the contaminated waste is considered principal threat waste because of the mobility of boron. By addressing this contamination, the Modified Remedy in this ROD Amendment will remove a source of contamination to groundwater, surface water, and sediment, and minimize further migration of the contamination. The remedy for OU1 at the Site is intended to permanently reduce the mobility of the source materials that constitute the principal threat wastes.

Section 300.430(a)(1)(iii) of the NCP states that “EPA expects to use treatment to address the principal threats posed by a site, wherever practicable,” that “EPA expects to use engineering controls, such as containment, for waste that poses a relatively low, long-term threat or where treatment is impracticable,” and that “EPA expects to use a combination of methods, as appropriate, to achieve protection of human health and the environment.” It also states that “EPA expects to use institutional controls...to supplement engineering controls as appropriate...,” and that ICs may be used “where necessary, as a component of the completed remedy.” However, the NCP also states that ICs “shall not substitute for active response measures...as the sole remedy unless such active measures are determined not to be practicable...”

After giving careful consideration to the expectations in the NCP regarding principal threat waste and to the nine criteria in the NCP (40 C.F.R. § 300.430(e)(9)(iii)), which EPA is required to use to evaluate various possible remedial alternatives, EPA is selecting an alternative that combines containing the waste and soil at the Site along with ICs based on the Site specific circumstances.

13.0 MODIFIED REMEDY

Following review and consideration of the information in the Administrative Record supporting this ROD Amendment, the requirements of CERCLA and the NCP, and the absence of public comments, EPA has selected Alternative WS11 (Perimeter Wall and RCRA Cap) as the Modified Remedy for OU1 of the Salford Quarry Superfund Site. The average estimated present worth cost for the Preferred Alternative is $5.93 million.

13.1 Summary of the Rationale for the Modified Remedy

EPA’s Modified Remedy for OU1 meets the threshold criteria of overall protection of human health and the environment and compliance with ARARs. Based on the information available in the AR, EPA believes that Alternative WS11 meets the threshold criteria and provides the best balance among the other alternatives with respect to the balancing criteria. EPA expects the Modified Remedy to satisfy the following statutory requirements of CERCLA Section 121: (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

The Modified Remedy (Perimeter Wall and RCRA Cap) would minimize exposure to Site contaminants by human and ecological receptors and minimize the migration of contaminants to groundwater through containment of the source waste and surrounding soil and would achieve all of the RAOs. The Modified Remedy does not rely on as many unknowns such as treatability studies that would be required for Alternative WS10, nor does it have low short-term effectiveness and low implementability like Alternative WS15.

The Modified Remedy is expected to provide short-term and long-term effectiveness for a comparatively lower price, while ensuring protection of human health and the environment.

Groundwater, surface water, and sediment monitoring would be performed to evaluate the impact of the source control. Institutional controls would be implemented to restrict future Site development and land use to prevent exposure to Site-related contaminants and to protect the integrity of the remedy.

The Modified Remedy does not satisfy the statutory preference for treatment as a principal element. However, treatment alternatives are more complex in implementation (WS10 and WS15); could pose more of a risk of human exposure to contaminants during construction and transportation (WS15); and are less cost-effective (WS10 and WS15). Solidification/stabilization of the landfill waste would be difficult to implement because of the heterogeneous nature of the waste.

13.2 Description of the Modified Remedy and Performance Standards

The remedy selected in the 2013 ROD for OU1 consisted of constructing an engineered cell onsite to contain the contaminated waste, soil and sediment. The Modified Remedy (Perimeter Wall and RCRA Cap along with the Common Elements described above in Section 10.1) for OU1 selected in this ROD Amendment changes the definition of OU1 to exclude sediment (now included in OU2) and will replace the 2013 ROD-selected remedy with the following components:

1. Install a subsurface perimeter wall to encapsulate the existing waste and contaminated soil and minimize lateral groundwater flow into or out of the contained waste, in order to reduce transfer of contamination from the waste into the groundwater. The wall should be installed approximately two feet into the bedrock beneath the quarry to minimize leakage.

2. Delineate the extent of waste and soil contamination outside of the designed cap area, excavate and place contaminated material beneath the planned extent of the RCRA cap or dispose of offsite depending on the capacity of the design.

3. Install a multi-layer, impermeable RCRA Subtitle C cap to prevent direct contact with contaminated material and effectively isolate contamination from precipitation and surface water infiltration. The cap should be designed with an optimal seal against the exposed bedrock headwall to minimize infiltration.

4. Grade surface and install drainage channels to prevent infiltration and to convey runoff water away from the cap. Surface water from these channels would be directed to existing drainage features that ultimately discharge to the West Branch of Skippack Creek.

5. Place six inches of clean topsoil on the RCRA cap and in the areas outside the landfill footprint where contaminated soil is removed.

6. Vegetate the topsoil to minimize erosion.

7. Monitor groundwater, surface water, and sediment to assess the effectiveness of these source control measures.

8. Undertake operation and maintenance (O&M) activities, such as mowing of grass/landscaping, periodic inspections to ensure isolation of the contamination as well as safety and security of the Site, and groundwater sampling to monitor the effectiveness of the Modified Remedy. For cost estimating purposes, long-term O&M includes costs for 30 years, however, O&M will be required as long as wastes remain in place.

9. Implement Institutional Controls (ICs) to protect the integrity of the Modified Remedy and to prevent exposure to Site-related contamination. EPA will coordinate these efforts with PADEP, the municipality, and the Montgomery County Office of Public Health.

10. Install property access restrictions, such as a locked perimeter fence, to prevent exposure to unacceptable risks associated with Site-related contaminants and to protect the components of the Modified Remedy.

The Modified Remedy will comply with all applicable or relevant and appropriate requirements (ARARs) contained in Section 14.2 and Appendix C.

13.3 Summary of the Estimated Remedy Costs

The estimated present worth cost of the Modified Remedy ranges from $5,112,919 to $6,442,426, contingent upon the type of perimeter wall built. The specific type of perimeter wall to be installed at the Site will be determined during the design phase or remedial action. The average estimated present worth cost is $5,926,155. A more detailed breakdown of costs for the three types of perimeter walls (bentonite slurry, jet grout, and steel sheet pile) is provided in Appendix B.

The information in Table 5 and Appendix B Bis based on the best available information regarding the anticipated scope of the remedial action. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.

Minor changes to the cost estimate may be documented by EPA in the form of a memorandum in the Administrative Record. Changes that are significant, but not fundamental, may be documented in an Explanation of Significant Differences. Any fundamental changes would be documented in a subsequent ROD amendment.

13.4 Expected Outcomes of the Modified Remedy

This section presents the expected outcomes of the Modified Remedy in terms of resulting land and groundwater uses and risk reduction achieved as a result of the response action. The Modified Remedy will be a final action for OU1 and will control the source (quarry waste and soil) to minimize additional contamination from migrating to groundwater, sediment, and surface water (OU2). The final remedial action for OU2, which will address remaining contamination in groundwater, surface water, and sediment, will be issued separately in a future decision document.

The selected Modified Remedy will address contaminant migration from wastes and soils surrounding the waste to area soils, surface water, and groundwater and prevent exposure to waste and contaminants in the soil by humans, as well as plants and animals.

As part of the long-term monitoring at the Site, groundwater, surface water, and sediment (OU2) shall be monitored to assess the effectiveness of the OU1 remedy. ICs shall prevent exposure to remaining contaminants in groundwater beneath the quarry property and ensure the integrity of the Modified Remedy. A final remedial action for OU2 will address remaining contamination in groundwater, sediment, and surface water and will be the subject of a future decision document after the effectiveness of the remedy for OU1 is evaluated.

Any minor, significant, or fundamental change to the remedy following the issuance of this ROD Amendment will be appropriately documented in accordance with the NCP, 40 C.F.R. § 300.435(c)(2).

14.0 STATUTORY DETERMINATIONS

Under Section 121 of CERCLA and the NCP, selected remedies must protect human health and the environment, comply with ARARs, be cost-effective and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Additionally, CERCLA includes a preference for remedies that use treatment to significantly and permanently reduce the volume, toxicity, or mobility of hazardous substances as their principal element. The following sections discuss how the Modified Remedy for OU1 of the Salford Quarry Site meets these statutory requirements.

14.1 Protection of Human Health and the Environment

The Modified Remedy of this ROD Amendment will protect human health and the environment by eliminating exposure or the potential for exposure to Site-related contaminants through containment of contaminated waste and soil by installing a perimeter wall and RCRA Cap and through the implementation of ICs.

Isolating and containing waste and soil surrounding the waste by installing a perimeter wall and RCRA Cap will prevent human direct-contact exposure to contaminants. The Modified Remedy will also eliminate further migration of contaminants from the waste and soil to groundwater, surface water, and sediment, and reduce risk posed to human receptors to within EPA's risk range of $1x10^{-4}$ to $1x10^{-6}$ for carcinogenic risk and below the HI of 1 for non-carcinogens. Implementation of the Modified Remedy will not pose unacceptable short-term risks.

ICs will ensure that future use of the quarry property is appropriate to prevent exposure of humans or ecological receptors to contamination and protect the components of the Modified Remedy. The ICs shall run with the land and prohibit activities that allow exposure to contaminants or compromise the Modified Remedy. For example, digging into the RCRA Cap or using contaminated groundwater shall be prohibited.

14.2 Compliance with Applicable or Relevant and Appropriate Requirements

The Modified Remedy will attain all applicable or relevant and appropriate requirements, which are specified in Table 6. ARARs are generally divided into three categories: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs provide standards for acceptable or permissible contaminant concentrations in soil, air, and water. Location-specific ARARs govern activities in critical environments such as floodplains, wetlands, endangered species habitats, or historically significant areas, while action-specific ARARs are technology-or activity-based requirements. The following sections provide a summary of Federal and State ARARs identified for this Site.

Chemical-Specific

Pennsylvania Land Recycling and Environmental Remediation Standards Act (Act 2), 35 P.S. § 6026.101 et seq., provides for the promulgation of remediation standards for cleanup of contaminated sites in the Commonwealth of Pennsylvania. The Act's Statewide health standards for contaminants in soil, set forth at 25 Pa. Code § 250, Appendix A, Tables 3 and 4, have been identified as applicable requirements for the soil COCs at the Site. The soil COCs and cleanup levels are set forth in Table 4. The Modified Remedy will be designed to achieve compliance with these soil cleanup standards.

Action-Specific

Pennsylvania Hazardous Waste Management Regulations, 25 Pa. Code § 264a.1, which incorporates federal regulations at 40 C.F.R. § 264.1(j)(2) through (7), (9) through (12), establishes requirements for remediation waste management. 25 Pa. Code § 264a.1 also incorporates federal regulations at 40 C.F.R. § 264.554(d), (h), (j), and (k), which establish requirements for the storage of remediation waste in temporary staging piles; federal regulations at 40 C.F.R. §§ 264.171-.175 and 264.178, which establishes requirements for the use and management of containers for storage of hazardous waste; federal regulations at 40 C.F.R. §§ 264.111, 264.114, 264.117, and 264.310(a), which require landfills to be closed in accordance with the regulations and require owners and operators of such landfills to engage in post-closure care; federal regulations at 40 C.F.R. §§ 264.301(a) and 264.303(a), which require specific liner systems for certain landfills. 25 Pa. Code § 264a.301(1) incorporates the federal closure requirements for landfills and includes additional requirements to make certain the bottom of the landfill and its liner are above the groundwater table. Activities undertaken at the Site will comply with these requirements.

Pennsylvania Hazardous Waste Management Regulations, 25 Pa. Code § 261a.1, which incorporates federal regulations at 40 C.F.R. §§ 261.20-.24, which proscribes the process for identifying hazardous wastes based upon toxicity characteristic. 25 Pa. Code § 262a.1, which incorporates federal regulations at 40 C.F.R. §§ 262.11, 262.13, 262.30-.35, which requires specific obligations of generators of hazardous waste prior to transportation of the wastes; 25 Pa. Code §§ 262a.11, 262a.13 are related but separate Commonwealth obligations regarding hazardous waste determinations and generator classification. Excavated soils will be analyzed to characterize materials as hazardous waste. Prior to any transportation offsite, the excavated materials will be temporarily staged or stored appropriately with adherence to pre-transportation requirements.

Pennsylvania Hazardous Waste Management Regulations, 25 Pa. Code § 268a.1, which incorporates 40 C.F.R. §§ 268.20-268.39, 268.40, 268.45, 268.50, which establish treatment standards for hazardous waste and debris, prohibitions for storage of hazardous wastes, and prohibition of land disposal. Remedial activities will comport with land disposal restrictions.

National Pollutant Discharge Elimination System Regulations, 25 Pa. Code §§ 92.a.11; 92a.12(a)-(b); 92a.41(a)(4), (5) (incorporating 40 C.F.R. § 122.41(d), (e)); 92a.41(c); 92a.44 (incorporating 40 C.F.R. § 122.44(a)(1), (b)(1)(first sentence), (d), (e), (i)(1), and (k)); 92a.45 (incorporating 122.45(a), (b)(2)(i), (c), (e), and (f)); 92a.48(a)(1); and 92a.61(d), (e), and (i), set forth requirements governing discharges of pollutants into waters of the United States. Remedial activities that involve discharges into a surface water, including but not limited to the West Branch of the Skippack Creek, will be undertaken in compliance with these requirements.

Pennsylvania Solid Waste Management Act, 35 P.S. §§6018.301-.303, 6018.401-.404, establishing requirements for the management, disposal, storage, and transportation of residual wastes and hazardous wastes

Pennsylvania Solid Waste Management Regulations, 25 Pa. Code § 287.2, 25 Pa. Code § 287.54-.56, 25 Pa. Code § 299.111-.133, establishes requirements for management and storage of residual wastes, including certain residual wastes subject to municipal waste regulations under 25 Pa. Code § 271, and requires a chemical analysis of the waste prior to any disposal. Any residual, non-hazardous wastes produced during remedial actions at the Site will comply with these requirements, including sampling to ensure proper classification and onsite handling.

Pennsylvania Fugitive Emissions Regulations, 25 Pa. Code §§ 121.7,123.1, 123.2, 123.31, establish standards for the regulation of particulate matter and any odor emissions released during remedial activities. Excavation activities undertaken at the Site will comply with these requirements to ensure that fugitive emissions and odor emissions are not beyond property line.

Federal Regulation of Particulate and Fugitive Air Emissions, 40 C.F.R. §§ 50.6-50.7, 50.12, which establishes thresholds for particulate matter, fugitive dust, and lead in air, and 40 C.F.R. Part 52, Subpart NN, § 52.2020(c)(1), which establishes the fugitive dust regulation for particulate matter. Particulate levels generated during the remedial earth-moving would be monitored to ensure compliance with the National Ambient Air Quality Standards.

The Pennsylvania Erosion and Sediment Control Regulations, 25 Pa. Code §§ 102.4(b), 102.11, 102.22, set forth measures to limit soil erosion during any earth disturbance activities. Similarly, Pennsylvania's Clean Streams Law, 35 P.S. § 691.402(c)(1), requires the implementation of best management practices during remedial activities that involve disturbance of the land (cleaning, grading, excavation, etc.) in order to minimize erosion and sedimentation and protect water quality and uses of local water bodies. Remedial activities will be undertaken in compliance with these requirements.

The Pennsylvania Stormwater Management Act, 32 P.S. § 680.13, requires the implementation of measures to control stormwater runoff during construction and remediation activities. Stormwater controls will be put into place during remedial activities that involve disturbance of the land (cleaning, grading, excavation, etc.) in compliance with these requirements in order to eliminate or diminish runoff into surface water.

Federal Stormwater Regulations promulgated under the Clean Water Act of 1972, as amended (CWA), 33 U.S.C. §§ 1251 et seq., 40 C.F.R. § 122.26(c)(1)(ii), requires the operator of a new stormwater discharge associated with small construction activity, as defined by 40 C.F.R. § 122.26(b)(15), to maintain certain information about the nature of the site, the nature of onsite activities, proposed best management practices to control pollutants in stormwater during and after construction activities, and an estimate of the runoff.

Effluent Standards for RCRA Subtitle C Hazardous Waste Landfills, 40 C.F.R. §§ 445.11, 445.12, and 445.13, establish effluent limitations for wastewater discharged from landfills subject to regulation under 40 C.F.R. Part 264, Subpart N. The Modified Remedy will be designed to achieve compliance with these standards.

Pretreatment Standards for Discharges to POTWs, 40 C.F.R. § 403.5(a)(1), (b), and (d), prohibit the introduction of certain pollutants into a publicly owned treatment works (POTW), including those which will cause a Pass Through or Interference. Additionally, 40 C.F.R. § 445.3 requires landfills that introduce wastewater pollutants into a POTW to comply with 40 C.F.R. Part 403. The Modified Remedy will be designed to achieve compliance with these standards, should the final design include discharge to a POTW.

Pennsylvania Water Quality Standards and Criteria, 25 Pa. Code §§ 93.4a, 93.6, 93.7, 93.8a-.8c 93.9, defines general and specific standards for the quality of Pennsylvania's waters and includes specific water quality criteria including anti-degradation requirements, and designated water uses for each stream in Pennsylvania. 25 Pa. Code §§ 16.11-.52, 16.102, and Appendix A, which establish surface water quality criteria for toxic substances. Site water could be discharged to surface water if in conformance with these regulations.

Pennsylvania Clean Streams Law, 35 P.S. §§691.301, 691.401, prohibits discharging industrial waste into any of the waters of the Commonwealth, or any substance of any kind or character resulting in pollution. 25 Pa. Code § 91.34, requires anyone engaged in impoundment, production, processing, transportation, storage, use, application or disposal of pollutants to take necessary measures to prevent the substances from directly or indirectly reaching waters of this Commonwealth, through accident, carelessness, maliciousness, hazards of weather or from another cause. The Modified Remedy will adhere to these requirements.

Location-Specific

Regulations Governing Activities Impacting Wetlands, 25 Pa. Code § 105.18a, which requires dam, water obstruction or encroachments in, along, across or projecting into wetlands to minimize impacts on wetland and water quality. Given that this ROD Amendment narrowed the scope of OU1 to no longer address remediation of sediment, encroachment in, along, or across into wetlands is not expected, but in the event that actions are required in that location, the Modified Remedy will comply with this state regulation.

Groundwater Withdrawal Regulations, 18 C.F.R. §§ 410.1, 430.7, 430.9, 430.13(i)(3)(i), 430.15(b)(1) and (2), govern the withdrawal of water from the Delaware River Basin. These regulations require groundwater withdrawals to meet certain standards to limit the impact on the Delaware River Basin. Any dewatering activities undertaken at the Site under the Modified Remedy will comply with these requirements.

Section 7 of the Endangered Species Act of 1973, as amended (ESA), and regulations promulgated thereunder. 16 U.S.C. § 1536 and 50 C.F.R. §§ 402.01-402.17, requires consultation between the U.S. Department of Interior and other federal agencies to ensure that that any action authorized, funded, or carried out by these agencies (a/k/a "agency action") is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species. EPA will coordinate with the U.S. Fish and Wildlife Service to ensure the remedial action does not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of these species.

To Be Considered (TBC)

Executive Order 13112 – Invasive Species requires federal agencies to take action to prevent the introduction of invasive plant or animal species and to provide native species restoration in carrying out their responsibilities. The requirements of this Order will be followed during the design and implementation of the Modified Remedy.

PADEP Management of Fill Policy provides procedures for determining whether material to be used as fill may be considered "clean." This Policy will be followed during design and implementation of the Modified Remedy if fill is necessary at the Site following excavation or other earth-moving activities.

Policy for Pennsylvania Natural Diversity Inventory ("PNDI") Coordination During Permit Review and Evaluation, May 25, 2013. The PNDI coordination effort facilitates the avoidance and minimization of impacts to threatened and endangered species and special concern species where applicable in PA.

14.3 Cost Effectiveness

The Modified Remedy is cost effective in that it eliminates or mitigates the risks posed by the OU1 contaminants at the Site, meets all requirements of CERCLA and the NCP, and its overall effectiveness in meeting the RAOs is proportional to its cost. In fact, the selected Modified Remedy (Perimeter Wall and RCRA Cap) is the lowest cost remedial alternative considered that will achieve long-term effectiveness and permanence and short-term effectiveness, as compared to the other alternatives.

14.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The Modified Remedy utilizes long-term solutions to the maximum extent practicable by preventing exposure to Site contaminants by human and ecological receptors and minimizing the migration of contaminants to groundwater. The Modified Remedy will not require an intensive O&M effort to ensure functional integrity, is expected to provide long-term effectiveness through monitored engineering controls and will not pose unacceptable short-term risks.

The Modified Remedy does not employ treatment or resource recovery technologies, but the perimeter wall and RCRA cap implementation will prevent direct contact with and minimize the migration of contaminants. Therefore, a permanent solution to address contaminant mobility for waste and contaminated soil would be achieved through containment measures, though not through treatment. The uncertain implementability of the remedial alternative that included treatment, increased risk of human exposure due to timing and the nature of implementation, and increased costs associated with treatment alternatives made treatment of the waste and soil not reliably protective and not cost-effective.

14.5 Preference for Treatment as a Principal Element

Since the Modified Remedy contains the contaminated waste and soil, the Modified Remedy does not satisfy the statutory preference for treatment as a principal element, nor does it treat principal threat waste as identified in Section 11.0. EPA is selecting the perimeter wall and RCRA cap alternative (WS11), which will separate the contaminants from the environment but will not treat them, because treatment alternatives are anticipated to be less certain in implementation (WS10 and WS15), would pose more of a risk of human exposure to contaminants, and are not cost-effective. Solidification/ stabilization (WS10) of the quarry waste may not be implementable because of the heterogeneous nature of the waste. Offsite treatment and disposal of landfill waste (WS15) would pose more of an exposure risk in implementation than construction of an engineered cell. Offsite disposal would also be far less cost-effective.

Of those alternatives that are protective of human health and the environment and that comply with ARARs, EPA has determined that the Modified Remedy, a perimeter wall and RCRA cap, provides the best balance of tradeoffs, in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost, while also considering State and community acceptance.

14.6 Five-Year Review Requirements

Because the Modified Remedy will result in hazardous substances remaining onsite above levels that will allow for unlimited use and unrestricted exposure, a statutory review will be conducted at least every five years after initiation of the remedial action, pursuant to CERCLA Section 121(c) and the NCP, 40 C.F.R. § 300.430(f)(5)(iii)(C), in order to ensure that the Modified Remedy continues to provide adequate protection of human health and the environment. The first five-year review will be conducted within five years of the initiation of remedial action at the Site and will continue at least every five years after that.

15.0 DOCUMENTATION OF SIGNIFICANT CHANGES

No public comments were received regarding the modified remedial alternatives identified in the PRAP to Amend the ROD for OU1. Therefore, there have not been any significant or fundamental changes in the Modified Remedy from the alternatives identified in the 2020 PRAP to Amend the ROD for OU1. No changes to the PRAP's proposed alternative are needed based on public comments.

In this ROD Amendment, EPA has changed the wording of the second and third RAOs as presented in the 2020 PRAP from "prevent/minimize" to "minimize" to acknowledge that the Modified Remedy, when implemented, is expected to reduce migration of contamination from the waste and soil to groundwater very significantly but perhaps not completely under all conditions over time. The cap will prevent infiltration of precipitation and surface water runoff into the quarry waste; however, the perimeter wall will be installed vertically around the waste, thus it will only prevent groundwater contact with the waste laterally. Although EPA anticipates that the Modified Remedy, when implemented, will reduce groundwater mounding and thus lower the groundwater level, the perimeter wall will not prevent groundwater from entering the waste from the bottom, which could occur if groundwater levels rise during heavy and sustained precipitation. Therefore, EPA has revised the second and third RAOs to more accurately indicate that the objectives for OU1 at the Site are to minimize migration of contamination to groundwater and, thus, to also minimize the impact of such migration on the environment.

III. RESPONSIVENESS SUMMARY

SALFORD QUARRY SUPERFUND SITE
OPERABLE UNIT 1
LOWER SALFORD TOWNSHIP, PENNSYLVANIA

RECORD OF DECISION AMENDMENT

SALFORD QUARRY SUPERFUND SITE
OPERABLE UNIT 1
LOWER SALFORD TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA

RESPONSIVENESS SUMMARY

The purpose of a Responsiveness Summary is to provide a summary of significant public comments, criticisms, and new data regarding a proposed plan for a Superfund Site and provide the EPA's responses to those comments and questions, in accordance with Section 117 of CERCLA, 42 U.S.C. § 9617, and the NCP, 40 C.F.R. §§ 300.430(f)(3)(i)(F) and 300.430(f)(5)(iii)(B). In a ROD Amendment, EPA is also obligated to issue a response to each of the significant comments, criticisms, and new relevant information submitted during the public comment period (40 C.F.R. § 300.435(c)(2)(ii)(F)).

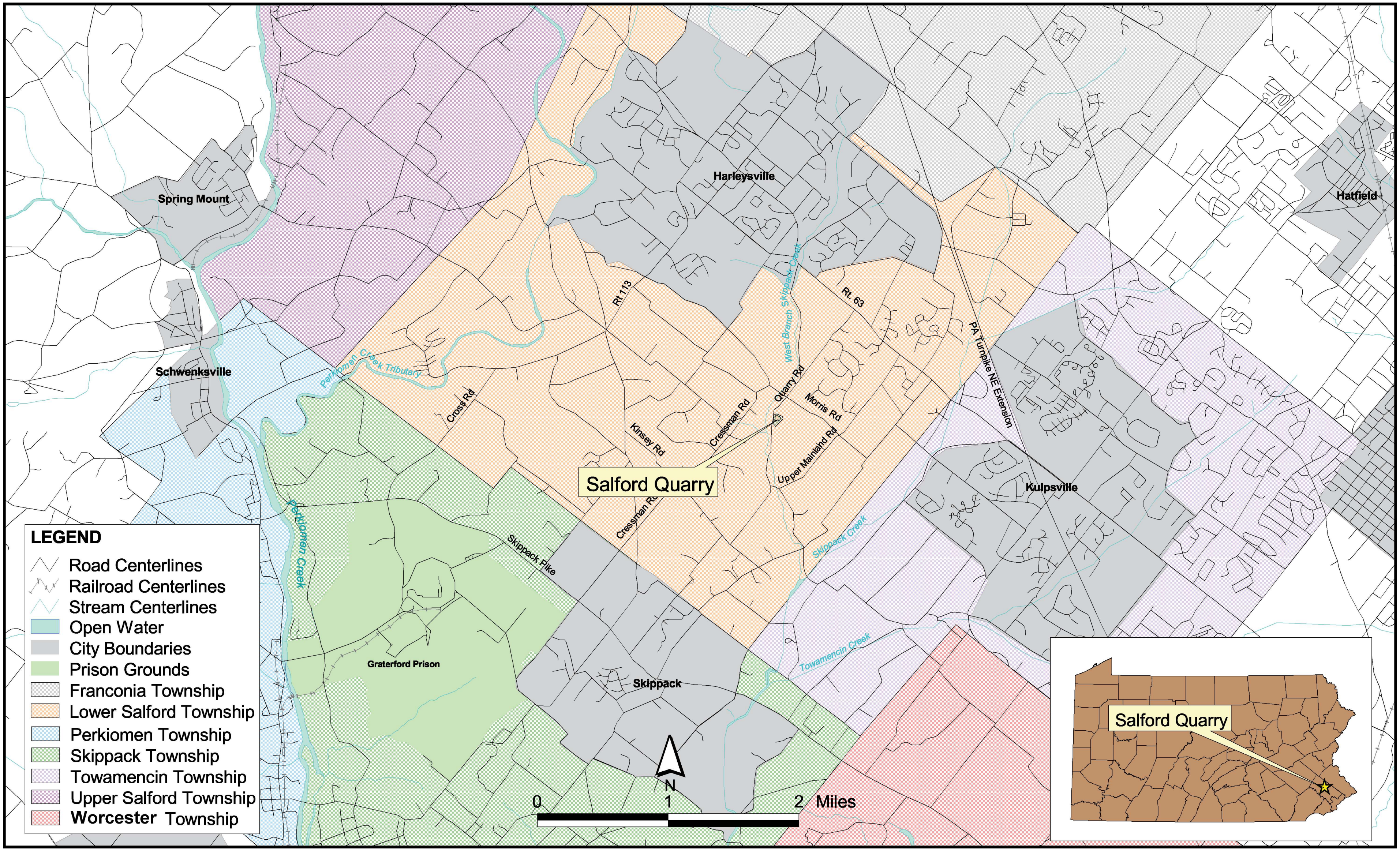
The original 2012 Proposed Plan for Salford Quarry Superfund Site OU1 and supporting documentation were made available to the public in the Administrative Record (AR), a public notice was issued, and a 30-day comment period began on August 2, 2012. In response to the 2012 Proposed Plan and the public meeting held on August 13, 2012, EPA received several comments that were subsequently detailed and responded to in the 2013 ROD's Responsiveness Summary, which and can be reference in the AR.

In issuing the PRAP to Amend the ROD for OU1 for the Salford Quarry Superfund Site, EPA published notice (Figure 16) in *The Reporter* of availability of the PRAP to amend the ROD for OU1 and the documents in the AR on December 15, 2020. In addition, EPA distributed fact sheets summarizing EPA's preferred modified remedial alternative for OU1 to local residences and businesses within an approximately 0.5-mile radius of the Site in December 2020 and posted a pre-recorded public meeting on the Site's Profile Page (https://www.epa.gov/superfund/salfordquarry). A transcript of the public meeting is available in the AR for the Site.

From December 15, 2020, to February 12, 2021, EPA held a 60-day public comment period to accept public comments on the remedial alternatives presented in the 2020 PRAP to Amend the 2013 ROD for OU1 and the other documents contained in the AR, as well as in response to EPA's pre-recorded public meeting. No comments, criticisms, or new relevant information were submitted to EPA during the 60-day public comment period. Accordingly, there are no EPA responses required in this Responsiveness Summary and obligations have been satisfied under the NCP, 40 C.F.R. §§ 300.435(c)(2)(ii)(F).

FIGURES

File Path: f:\projects\Salford Quarry\GIS\Salford\GIS\salford_ri_2004.apr

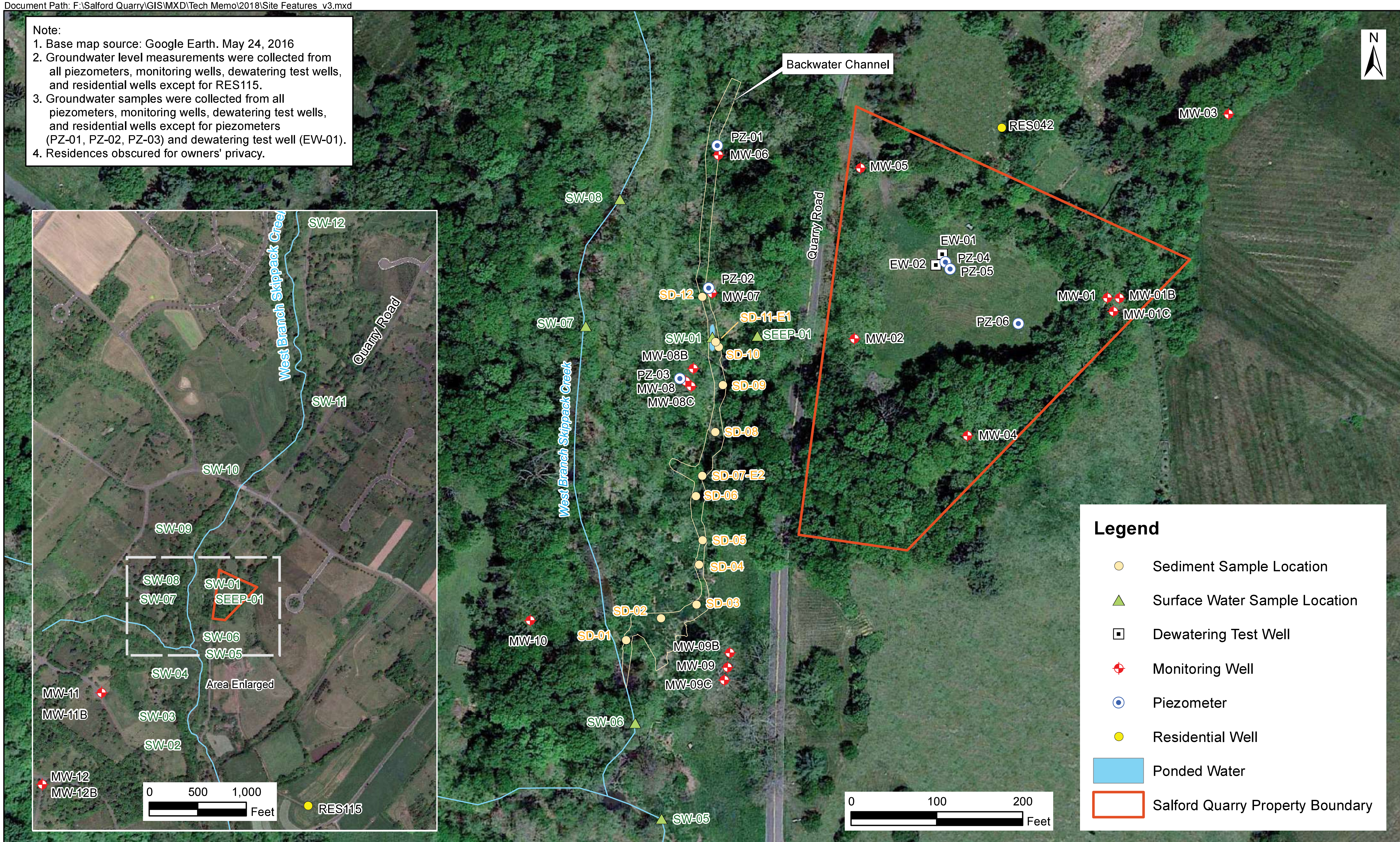


Salford Quarry
Lower Salford Township
Montgomery County, Pennsylvania

Figure 1.
Site Location Map

CDM

Document Path: F:\Salford Quarry\GIS\MXD\Tech Memo\2018\Site Features_v3.mxd

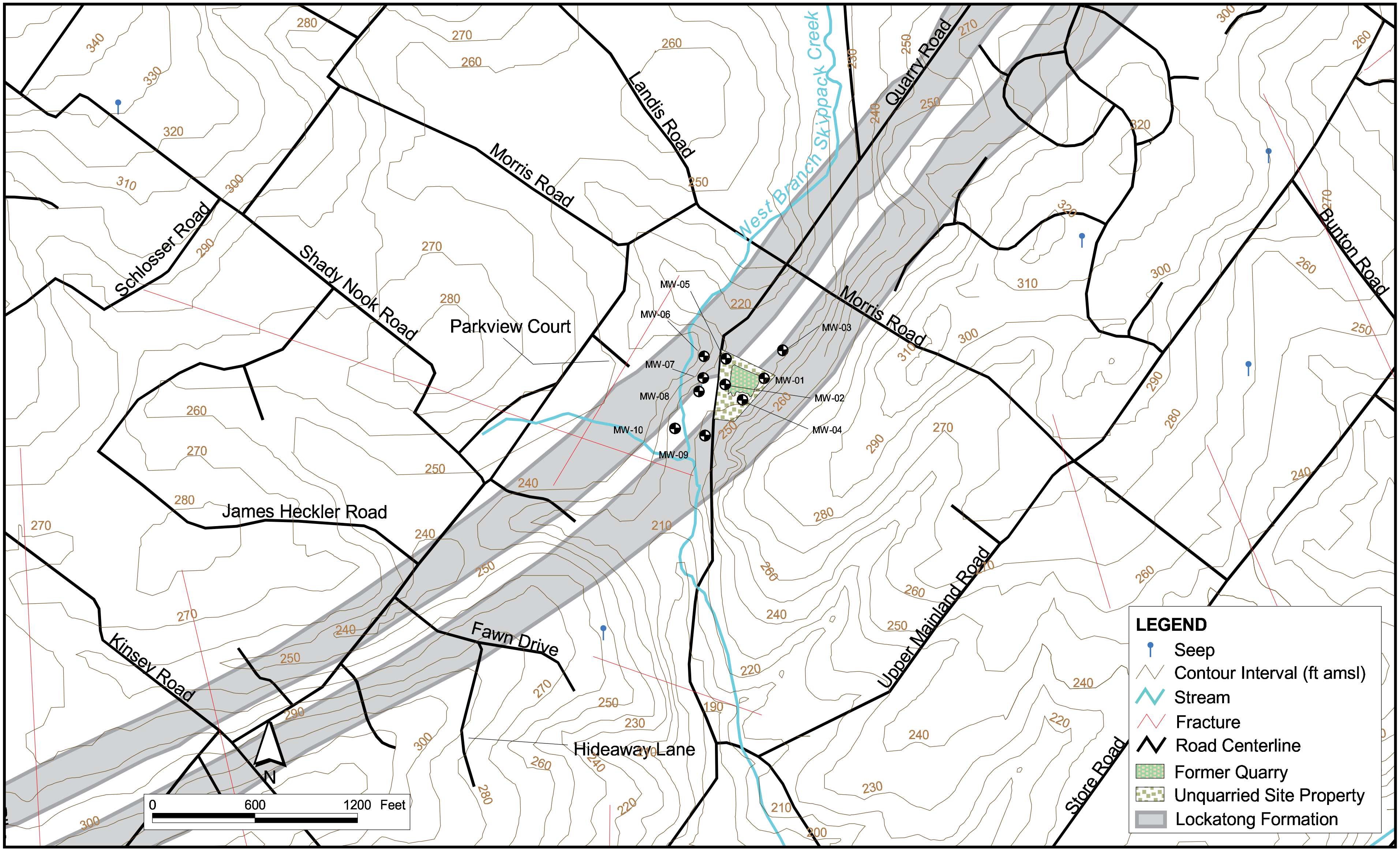


CDM Smith

Salford Quarry Superfund Site
Lower Salford Township
Montgomery County, Pennsylvania

Figure 2
Salford Quarry Site Features

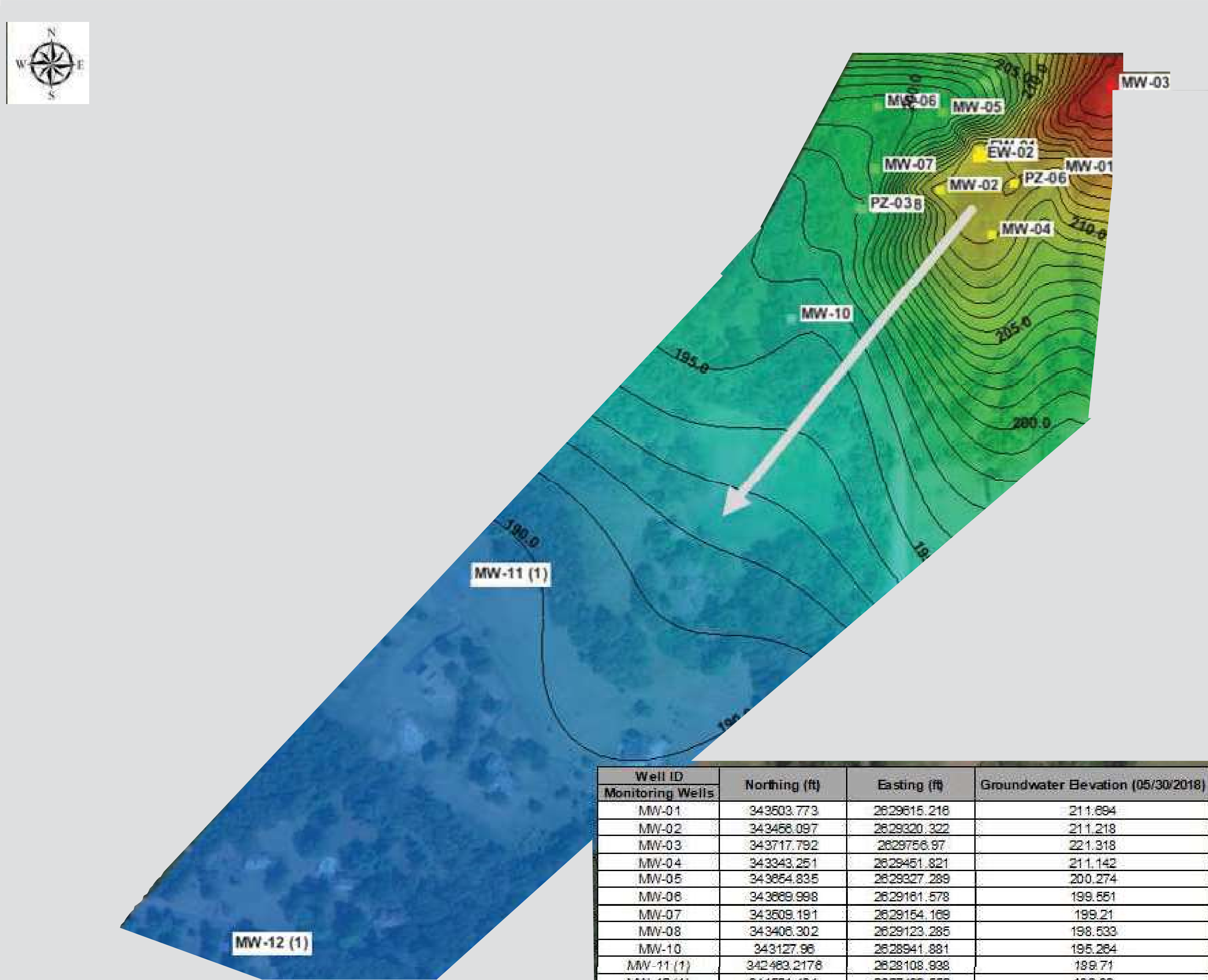
File Path: f:\salford quarry\gis\salford\gis\salford_ri_2004.apr



CDM

Salford Quarry
Lower Salford Township
Montgomery County, Pennsylvania

Figure 3
Salford Quarry Geology



Well ID Monitoring Wells	Northing (ft)	Easting (ft)	Groundwater Elevation (05/30/2018)
MW-01	343503.773	2629615.216	211.694
MW-02	343456.097	2629320.322	211.218
MW-03	343717.792	2629756.97	221.318
MW-04	343343.251	2629451.821	211.142
MW-05	343654.835	2629327.289	200.274
MW-06	343669.998	2629161.578	199.551
MW-07	343509.191	2629154.169	199.21
MW-08	343406.302	2629123.285	198.533
MW-10	343127.96	2628941.881	195.264
MW-11 (1)	342463.2178	2628108.938	189.71
MW-12 (1)	341521.481	2627499.562	189.03
PZ-03	343409.842	2629116.707	197.755
PZ-04	343545.659	2629426.476	211.97
PZ-05	343537.492	2629432.01	212
PZ-06	343473.998	2629511.361	212.04
EW-01	343555.003	2629422.717	211.94
EW-02	343539.3604	2629415.899	211.97

Legend

Groundwater Elevation

220
215
210
205
200
195
190
185

Notes:

Water Levels measured
30 May 2018

Contour interval 1 ft.

Interpolation scheme : Natural Neighbor with gradient nodal function

Data contoured shown in table

Due to limited down gradient data, control points added to smooth interpolation between MW-10 and MW12 (1)

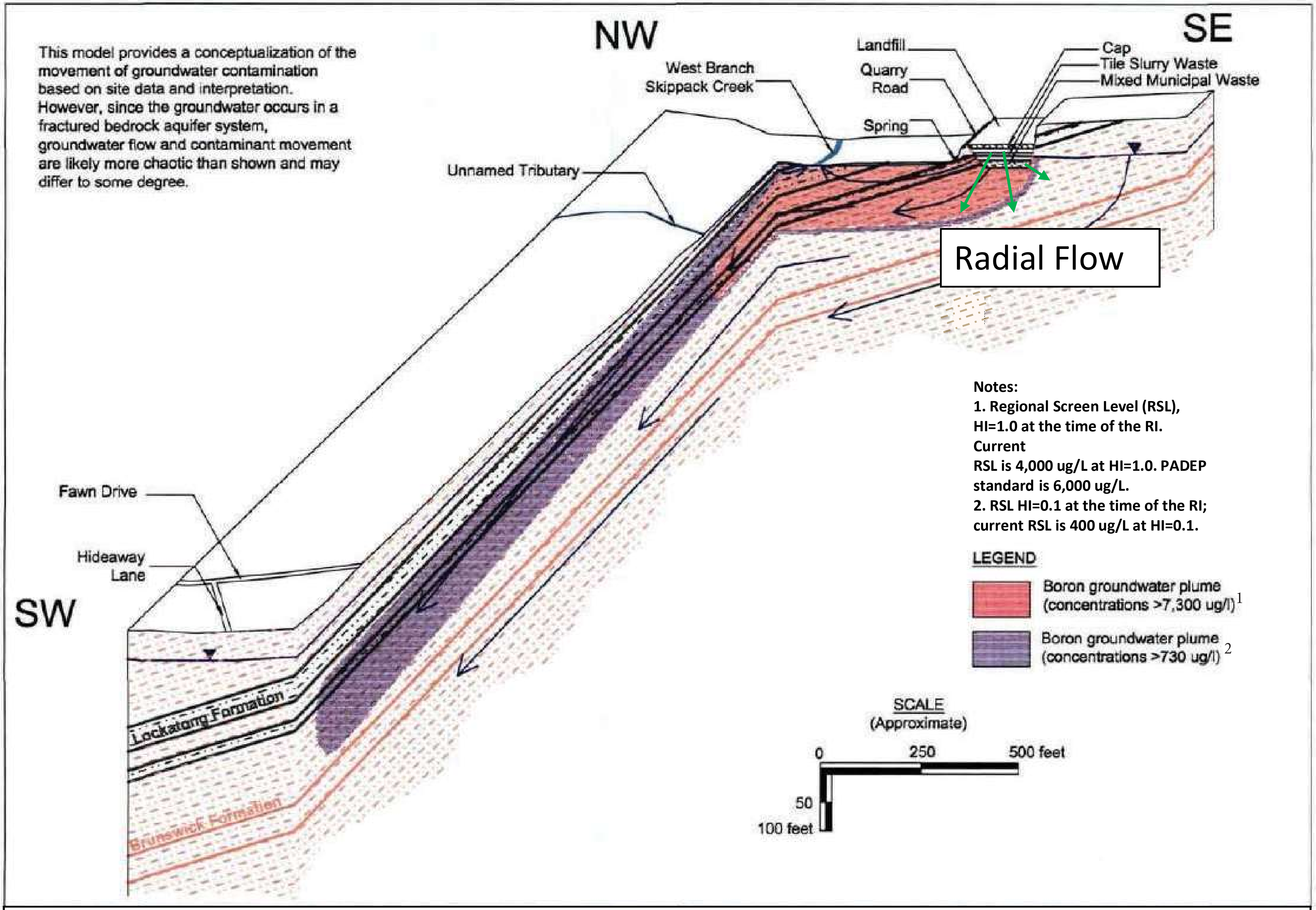
General Groundwater Flow Direction

May 2018 Groundwater Elevation
Overall Trend

Salford Quarry, Lower Salford Township, Montgomery County, Pennsylvania

Figure 4 General Groundwater Flow Direction

May 2018



Salford Quarry
Lower Salford Township
Montgomery County, Pennsylvania

Figure 5
Schematic of Groundwater Conceptual Model

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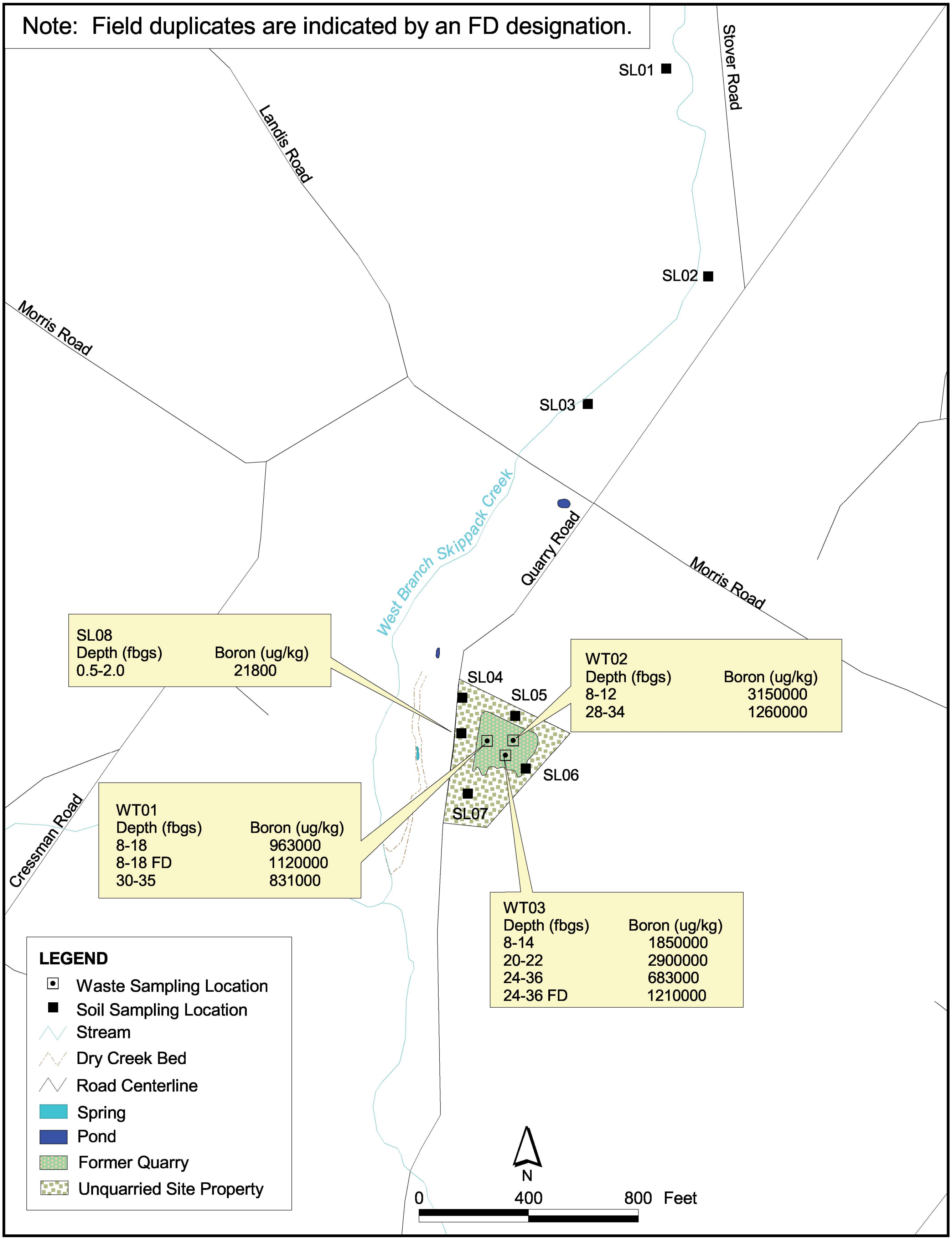
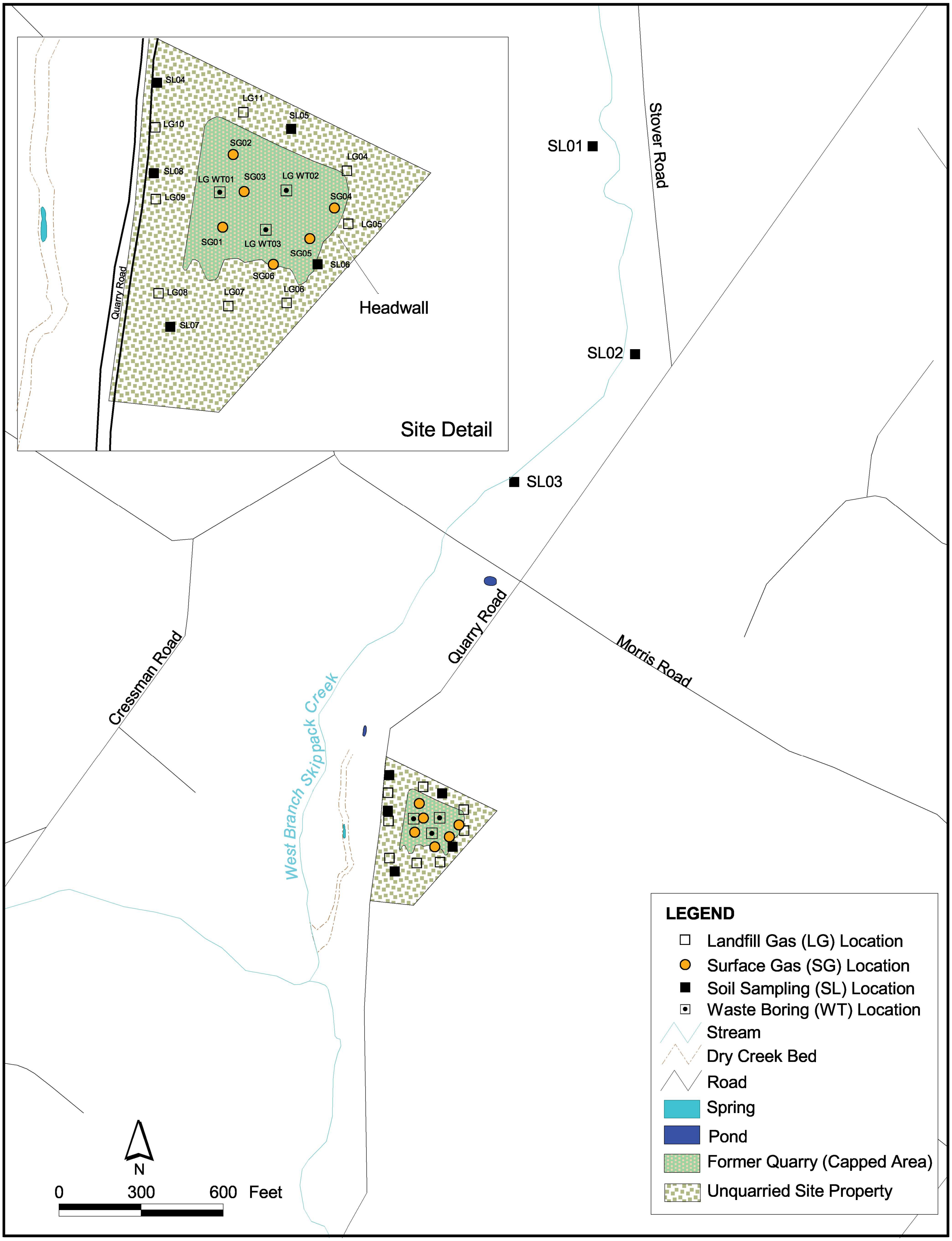


CDM

Salford Quarry
Lower Salford Township
Montgomery County, Pennsylvania

Figure 6.
Surface/Subsurface Soil and Waste Sample Map of Boron Concentrations

File Path: f:\salford quarry\gis\salford\gis\salford_ri_2004.apr

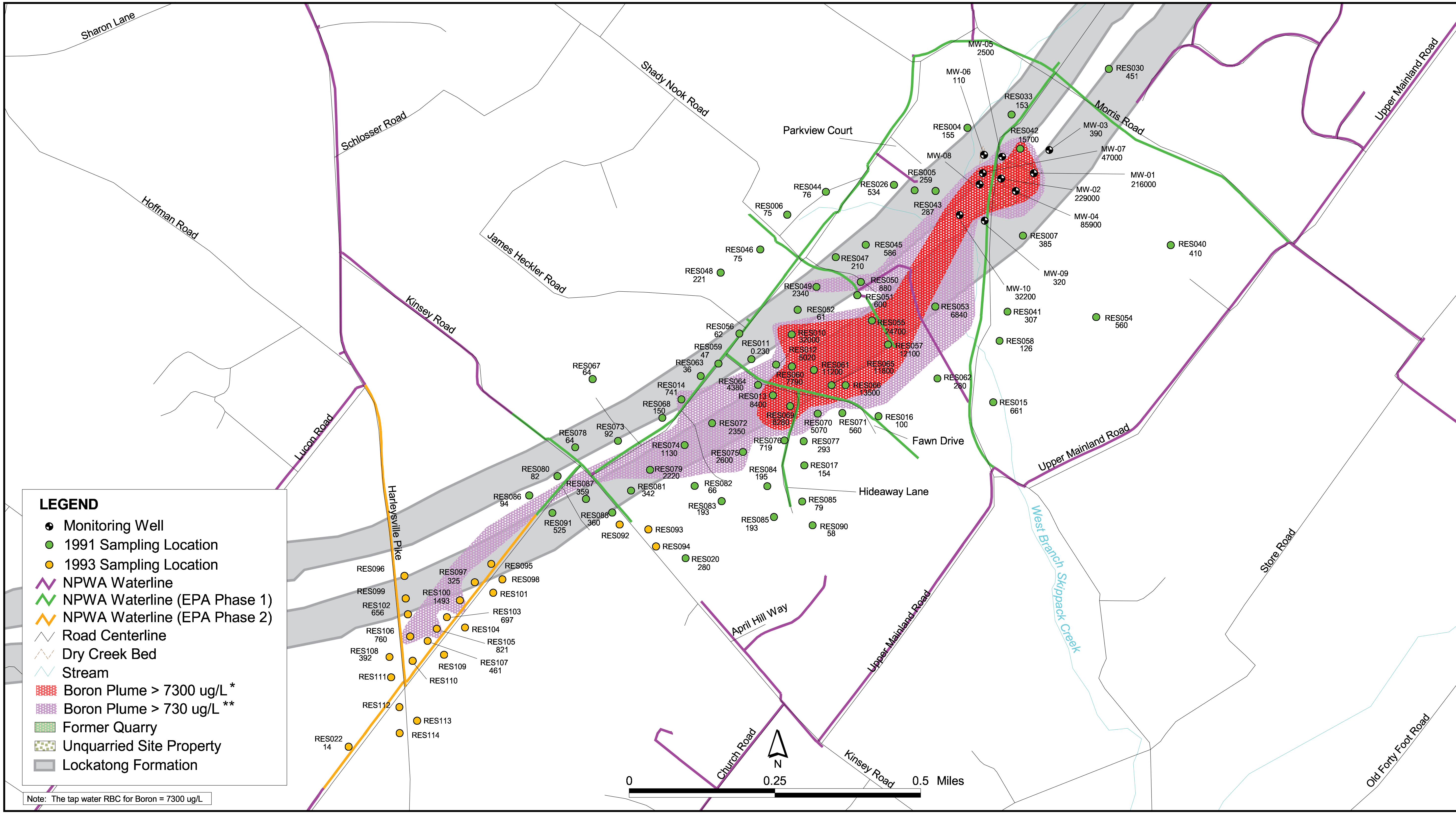


Salford Quarry
Lower Salford Township
Montgomery County, Pennsylvania

Figure 7
Landfill Gas, Surface/Subsurface
Soil Sample, and Waste Characterization
Location Map

CDM

File Path: f:\salford quarry\gis\salford\gis\salford_ri_final_2005.apr



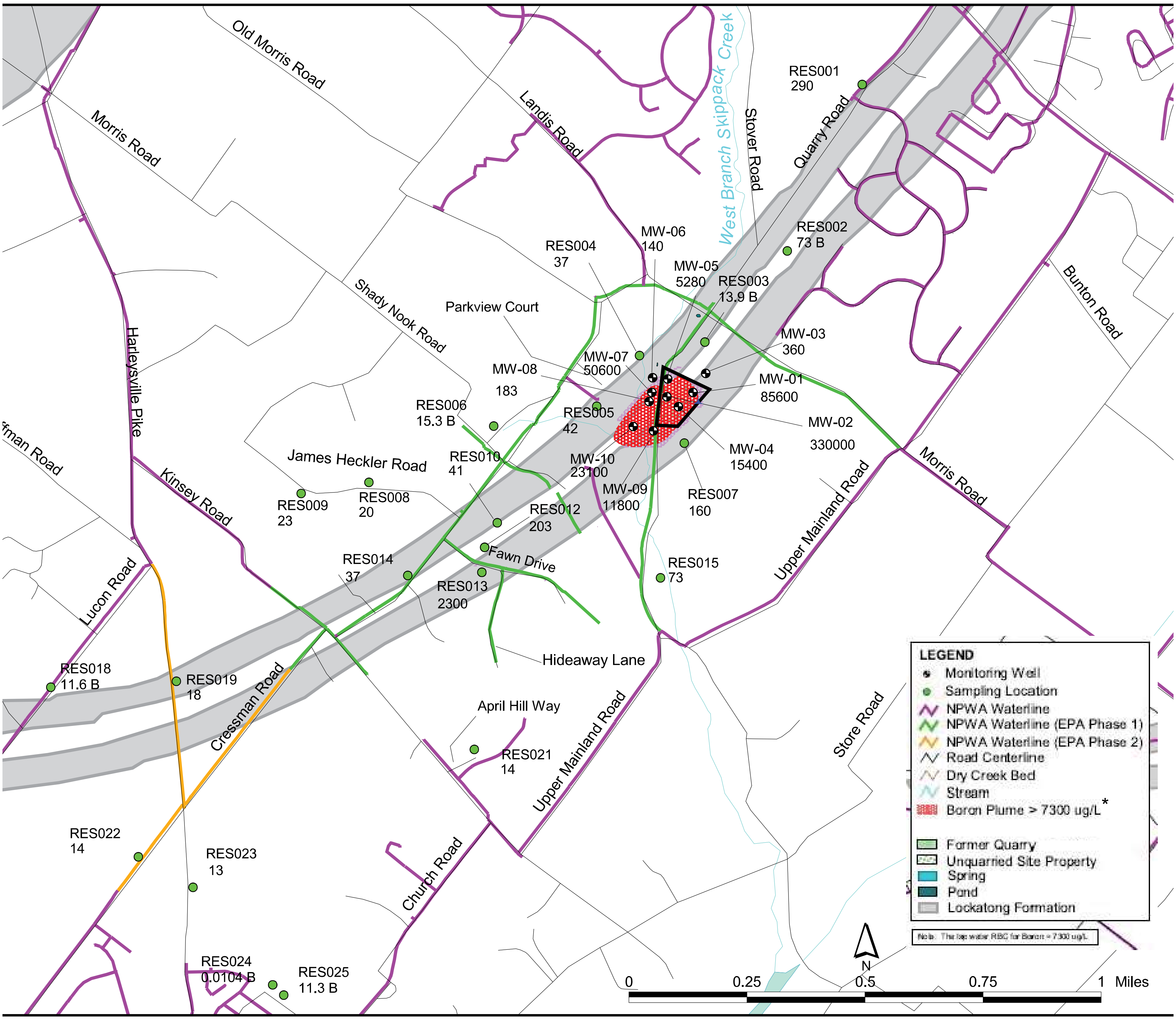
* Regional Screening Level (RSL), HI-1.0 at the time of the RI.
Current RSL is 4,000 ug/l at HI=1.0

** RSL HI=0.1 at the time of the RI.
Current RSL is 400 at HI=0.1

CDM

Salford Quarry
Lower Salford Township
Montgomery County, Pennsylvania

Figure 8
Plume Map of Boron Concentrations, 1991-1993



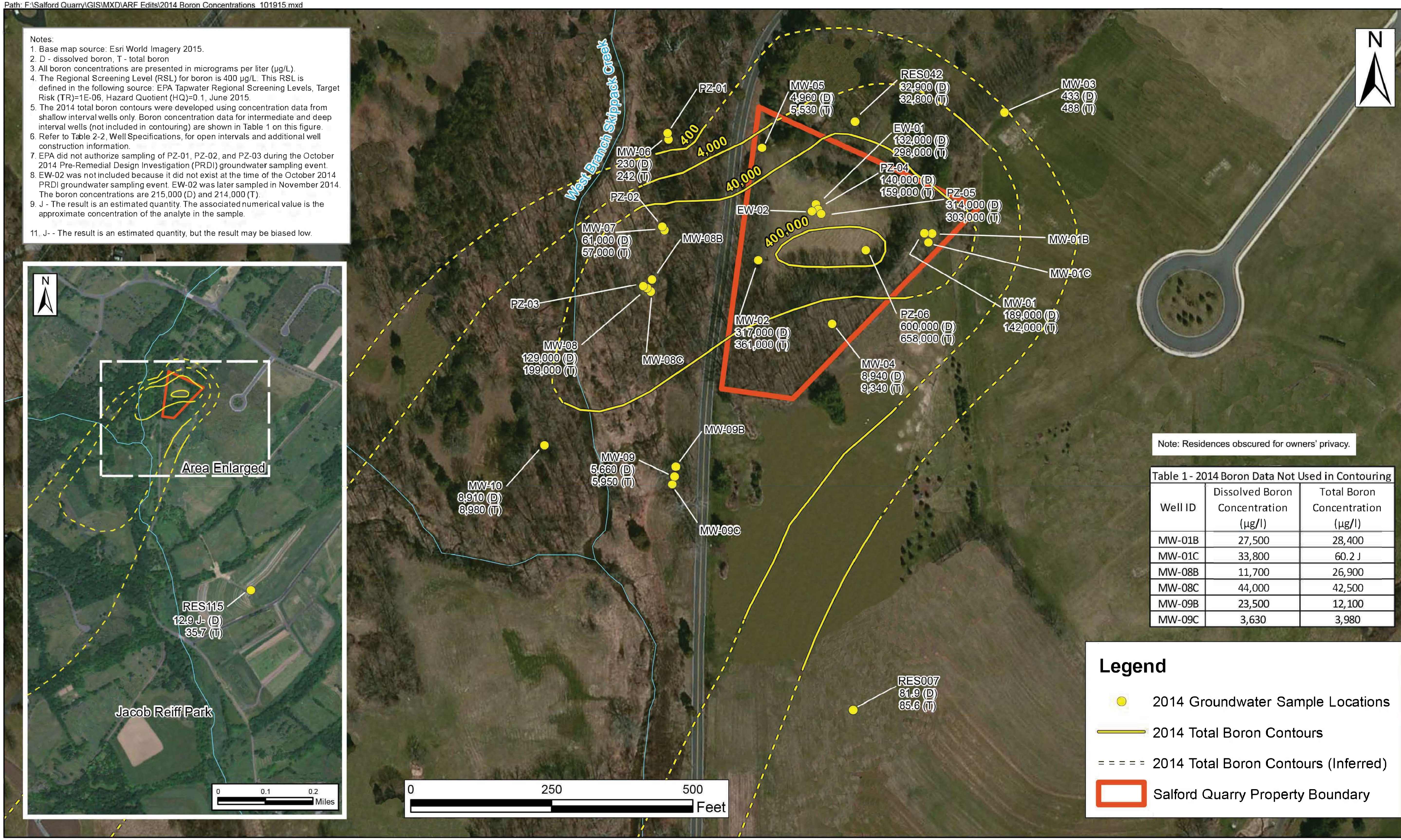
Salford Quarry
Lower Salford Township
Montgomery County, Pennsylvania

AR300135

Figure 9
Plume Map of Boron2002/04

* Regional Screening Level (RSL), HI-1.0 at the time of the RI.
Current RSL is 4,000 ug/l at HI=1.0

Path: F:\Salford Quarry\GIS\MXD\ARF Edits\2014 Boron Concentrations_101915.mxd



Notes:
1. Base map source: Esri World Imagery 2015.
2. D - dissolved boron, T - total boron
3. All boron concentrations are presented in micrograms per liter (µg/L).
4. The Regional Screening Level (RSL) for boron is 400 µg/L. This RSL is defined in the following source: EPA Tapwater Regional Screening Levels, Target Risk (TR)=1E-06, Hazard Quotient (HQ)=0.1, June 2015.
5. The 2014 total boron contours were developed using concentration data from shallow interval wells only. Boron concentration data for intermediate and deep interval wells (not included in contouring) are shown in Table 1 on this figure.
6. Refer to Table 2-2, Well Specifications, for open intervals and additional well construction information.
7. EPA did not authorize sampling of PZ-01, PZ-02, and PZ-03 during the October 2014 Pre-Remedial Design Investigation (PRDI) groundwater sampling event.
8. EW-02 was not included because it did not exist at the time of the October 2014 PRDI groundwater sampling event. EW-02 was later sampled in November 2014. The boron concentrations are 215,000 (D) and 214,000 (T).
9. J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

11. J- - The result is an estimated quantity, but the result may be biased low.

Table 1 - 2014 Boron Data Not Used in Contouring

Well ID	Dissolved Boron Concentration (µg/l)	Total Boron Concentration (µg/l)
MW-01B	27,500	28,400
MW-01C	33,800	60.2 J
MW-08B	11,700	26,900
MW-08C	44,000	42,500
MW-09B	23,500	12,100
MW-09C	3,630	3,980

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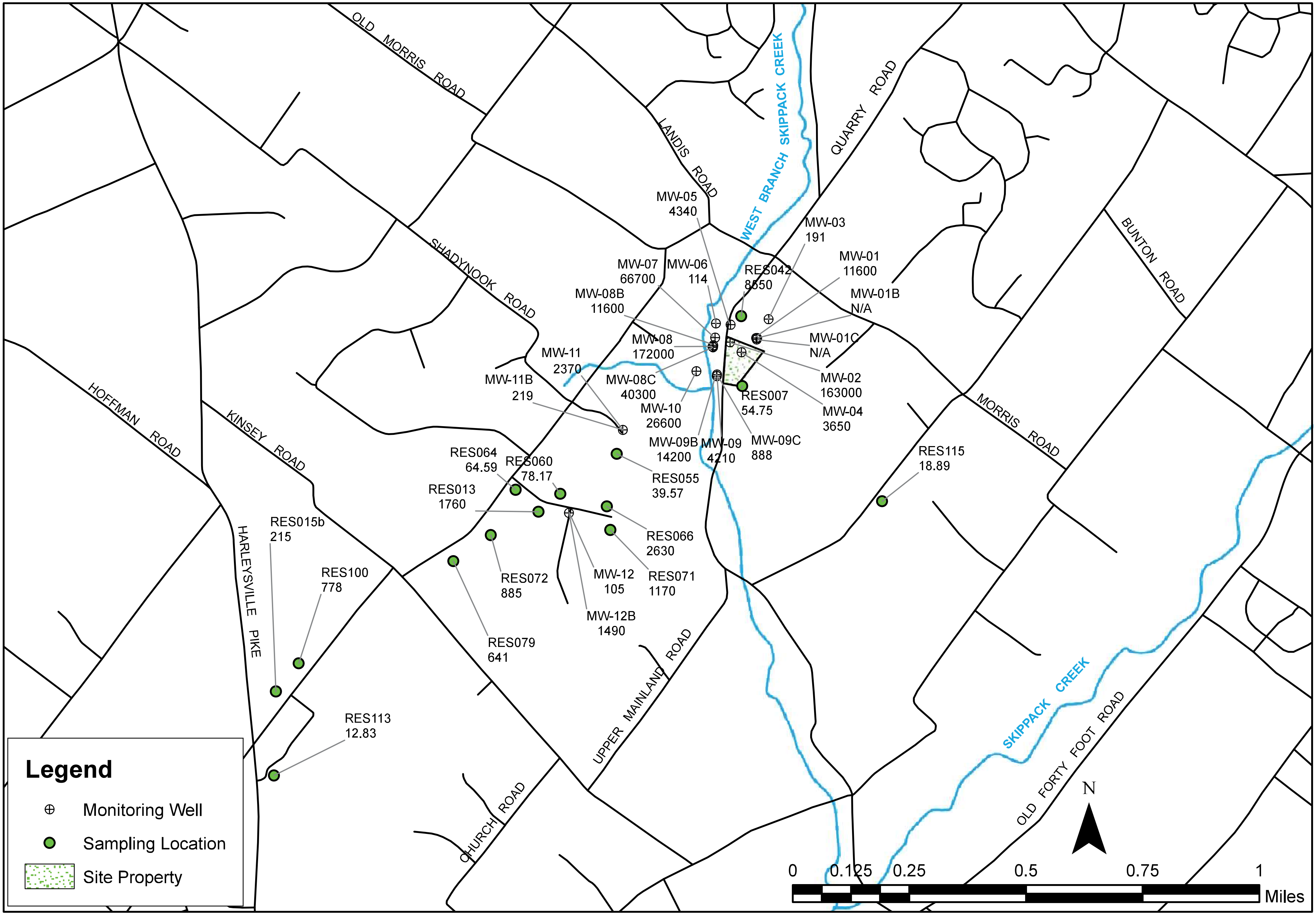
Salford Quarry Superfund Site
Lower Salford Township
Montgomery County, Pennsylvania

Figure 10
Boron Concentrations in Groundwater
October 2014

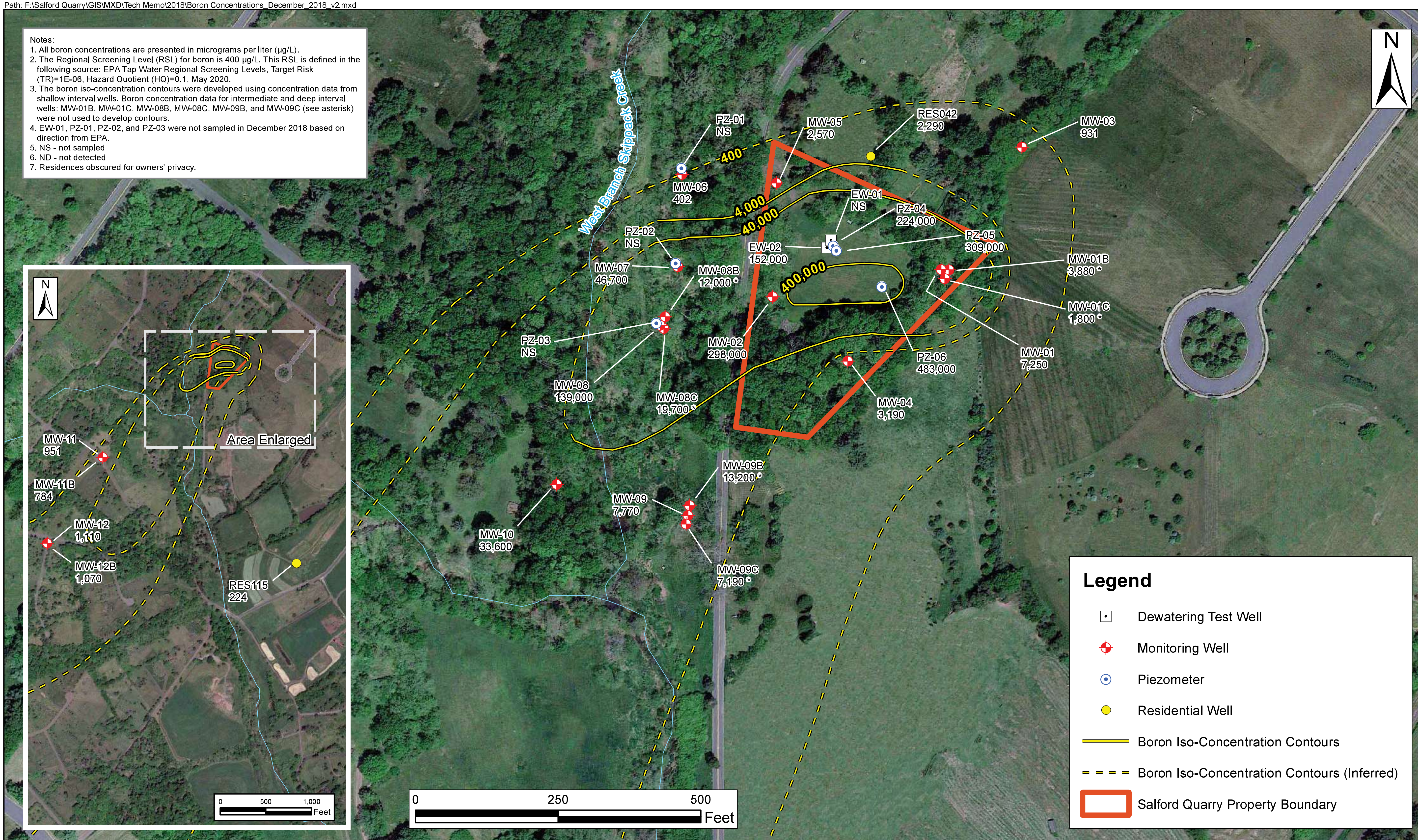


Notes:
1) The RSL for Boron (HI=1.0) = 4000 ug/L
2) Results are for total boron (ug/L)

Salford Quarry
Lower Salford Township
Montgomery County, Pennsylvania

Figure 11
Map of Boron Concentrations
Oct 2017 - Mar 2018

Path: F:\Salford Quarry\GIS\MXD\Tech Memo\2018\Boron Concentrations_December_2018_v2.mxd



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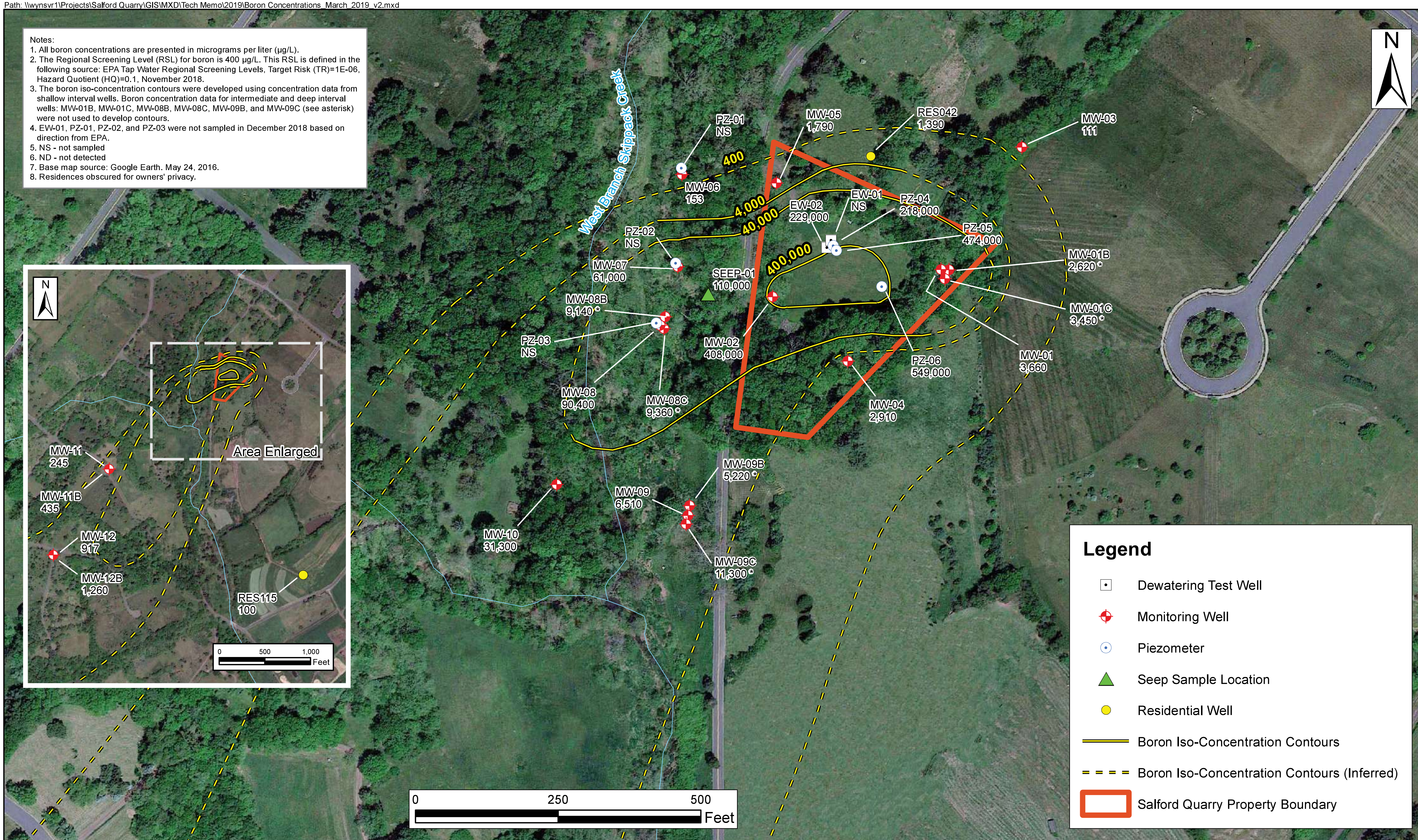
Salford Quarry Superfund Site
Lower Salford Township
Montgomery County, Pennsylvania

Figure 12
Boron Concentrations in Groundwater
December 2018

Path: \\wynsvr1\Projects\Salford Quarry\GIS\MXD\Tech Memo\2019\Boron Concentrations_March_2019_v2.mxd



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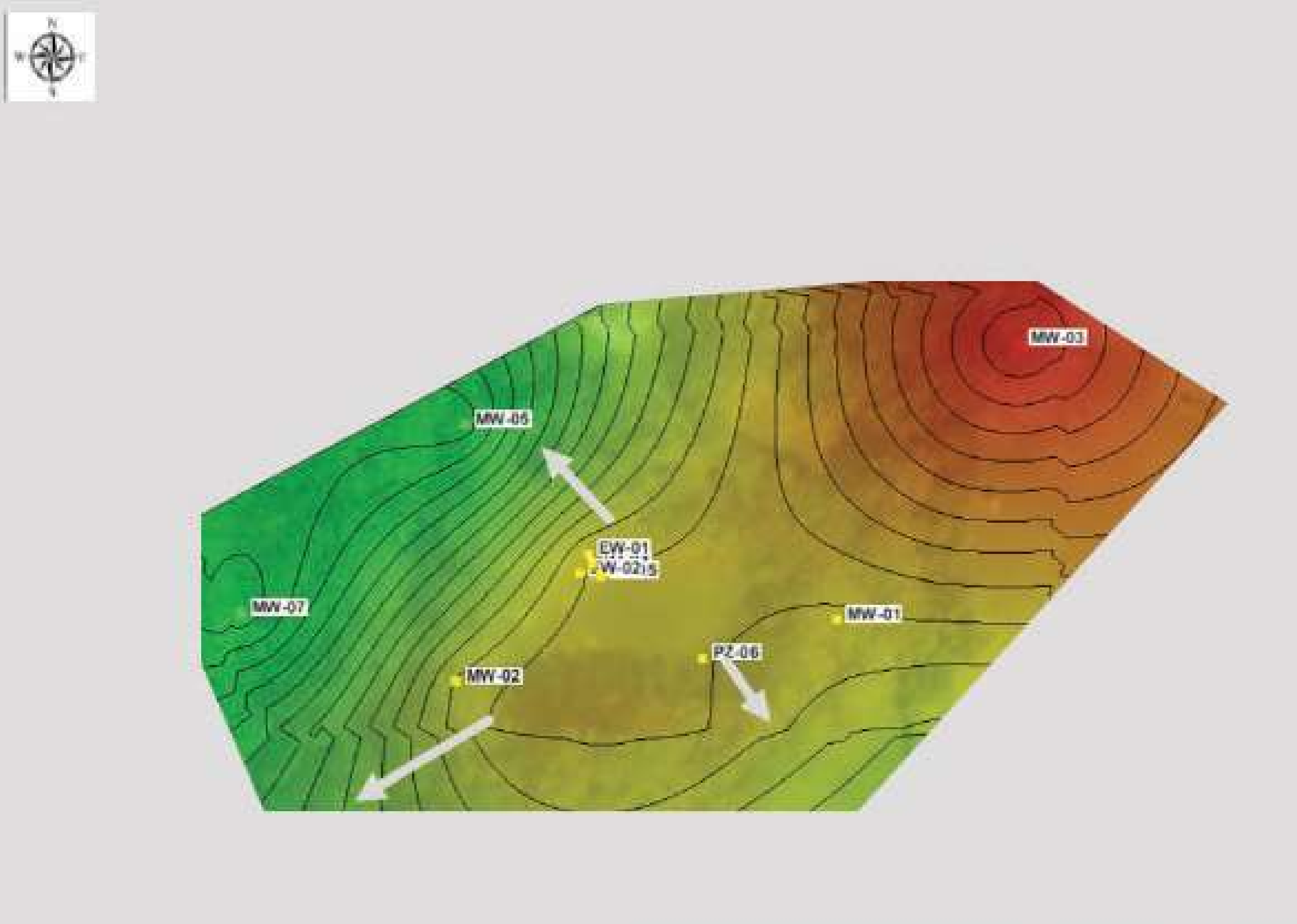
Salford Quarry Superfund Site
Lower Salford Township
Montgomery County, Pennsylvania

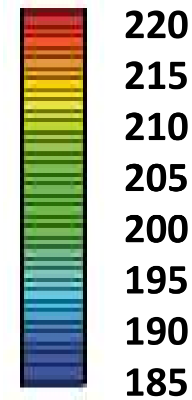
Figure 13
Boron Concentrations in Groundwater and Seep
March 2019



Well ID Monitoring Wells	Northing (ft)	Easting (ft)	Groundwater Elevation (05/30/2018)
MW-01	343503.773	2629615.216	211.694
MW-02	343456.097	2629320.322	211.218
MW-03	343717.792	2629756.97	221.318
MW-05	343654.838	2629327.289	200.274
MW-07	343508.191	2629154.169	199.21
PZ-04	343545.659	2629428.476	211.97
PZ-05	343537.492	2629432.01	212
PZ-06	343473.986	2629511.381	212.04
EW-01	343555.003	2629422.717	211.94
EW-02	343539.3804	2629415.899	211.97

Legend

Groundwater Elevation



Notes:

Water levels taken 30MAY2018

Contour interval 1 ft

Interpolation scheme : Ordinary Kriging

Data contoured shown in table

Groundwater Flow Around Quarry

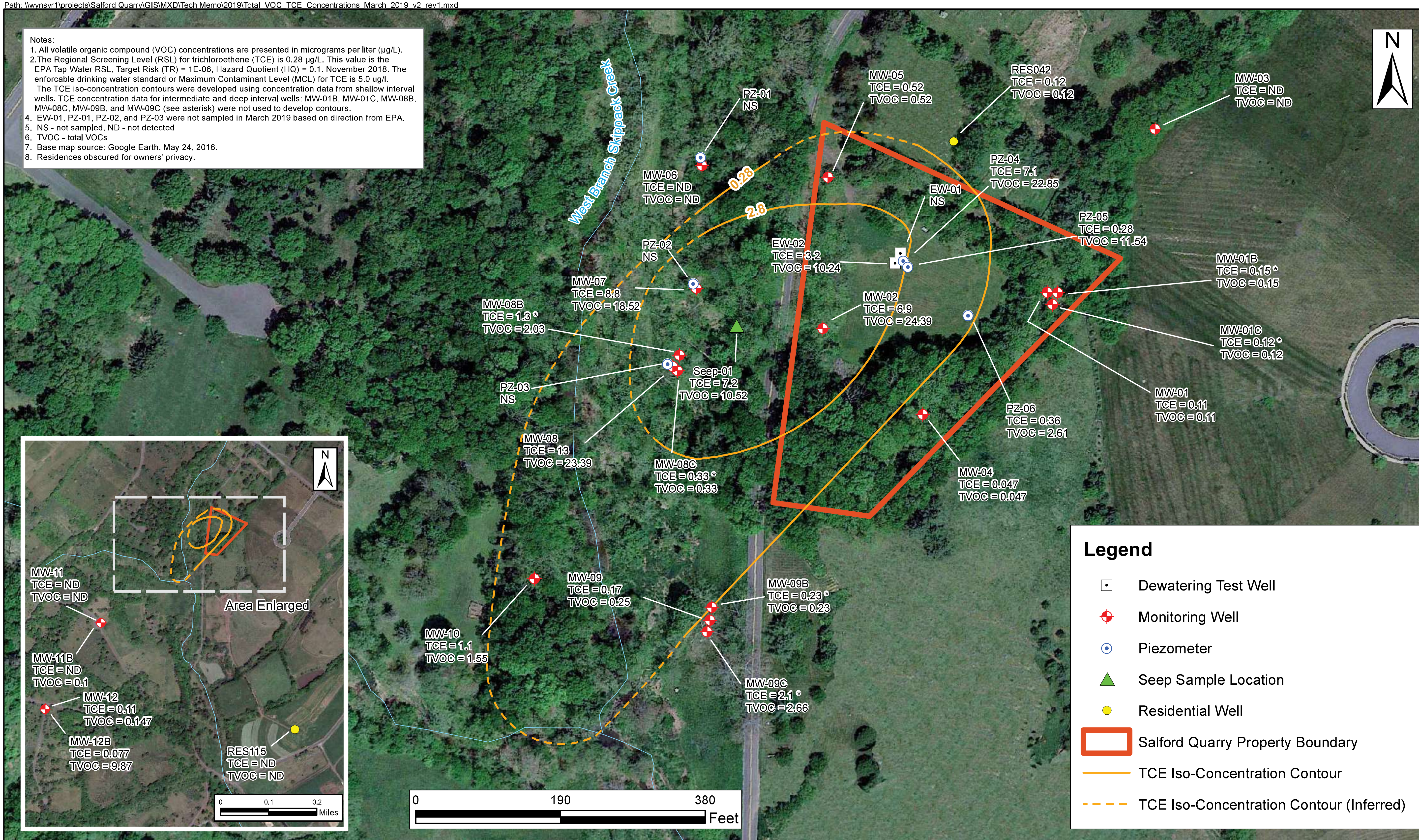
May 2018 Groundwater Elevation
Shallow Groundwater

Salford Quarry

Figure 14

Groundwater near Quarry

Path: \\wynsvr1\projects\Salford Quarry\GIS\MXD\Tech Memo\2019\Total_VOC_TCE_Concentrations_March_2019_v2_rev1.mxd



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Salford Quarry Superfund Site
Lower Salford Township
Montgomery County, Pennsylvania

Figure 15
TCE and Total VOC Concentrations in Groundwater
March 2019

Figure 16
Ad run in The Reporter on December 15, 2020.

EPA PUBLIC NOTICE

Proposed Cleanup Plan Available for Public Comment

Salford Quarry Superfund Site

The U.S. Environmental Protection Agency (EPA) has developed a proposed cleanup plan for Operable Unit 1 at the Salford Quarry Superfund Site. The proposed plan addresses waste and contaminated soil at the site and includes a summary of cleanup alternatives.

Based on the available information, EPA's preferred alternative is Alternative WS11: Perimeter Wall and Resource Conservation and Recovery Act (RCRA) Cap.

EPA is seeking your input during a 60-day public comment period. Details on how to review the proposed plan and submit comments are as follows:

The proposed plan can be viewed at the following locations:

Online: www.epa.gov/superfund/salfordquarry

Information repositories:

Indian Valley Public Library*
100 East Church Avenue
Telford, PA 18969
(215) 723-9109

U.S. EPA Region 3*
1650 Arch Street
Philadelphia, PA 19103
(215) 814-3157

**The Indian Valley Public Library and EPA Region 3 office may be closed due to the COVID-19 public health emergency. Please call for operational status.*

A recorded video presentation, which has the same information that EPA would have shared during a public meeting, is published in place of a public meeting. Watch the recorded presentation and read the presentation transcript at: www.epa.gov/superfund/salfordquarry.

A 60-day public comment period on the proposed plan and cleanup alternatives begins December 15, 2020 and ends February 12, 2021.

Submit your Public Comments by February 12, 2021:

Email: Sharon Fang, Remedial Project Manager at fang.sharon@epa.gov

Postal Mail: U.S. EPA Region 3
Attn: Katie Page, Community Involvement Coordinator
1650 Arch Street (Mail Code 3RA22)
Philadelphia, PA 19103

Voicemail: Call 215-814-2009 to leave a message. Please speak slowly and clearly and include your name and phone number.

APPENDIX A

SALFORD QUARRY OU 1 REMEDIAL ADMINISTRATIVE RECORD FILE INDEX OF DOCUMENTS AVAILABLE 12/15/20, UPDATED, 9/21/21

https://semspub.epa.gov/src/collection/03/AR66600

DOC ID	DOC DATE	TITLE	PAGE COUNT	ADDRESSEE NAME	AUTHOR NAME
2309462	06/19/2015	REDACTED OU 1 30% BASIS OF DESIGN REPORT (COVER LETTER ATTACHED)	371	(EPA)	(CDM FEDERAL PROGRAMS CORP)
2309456	09/10/2015	MEMO TO FILE REGARDING TEMPORARY STORAGE OF HAZARDOUS WASTE	2		ZIEGLER,LAUREN (EPA)
2309464	10/02/2015	REDACTED DRAFT MEMO REGARDING HAZARDOUS WASTE STOCKPILE EVALUATION	1	PYPE,LUCINDA (CDM FEDERAL PROGRAMS CORP)	GLAZIER,STEVEN,D (CDM SMITH)
2309463	10/20/2015	REDACTED MEMO REGARDING HAZARDOUS WASTE STABILIZATION & SOLIDIFICATION TREATMENT	6	FANG,SHARON (EPA)	PYPE,LUCINDA (CDM FEDERAL PROGRAMS CORP)
2309408	01/28/2016	VALUE ENGINEERING STUDY	39	(EPA)	(US ARMY CORPS OF ENGINEERS PHILADELPHIA DISTRICT)
2309448	05/06/2016	TRIP REPORT MEMORANDUM REGARDING CAP INTEGRITY	1	ENGLAND,STEPHEN (US ARMY CORPS OF ENGINEERS)|SIRKIS,DANIEL (US ARMY CORPS OF ENGINEERS)	MOHN,MICHAEL (US ARMY CORPS OF ENGINEERS)
2309403	07/25/2019	REDACTED FINAL PRE-REMEDIAL DESIGN INVESTIGATION (PRDI) REPORT OU 1 (COVER LETTER ATTACHED)	265	(EPA)	(CDM FEDERAL PROGRAMS CORP)
2309407	01/09/2020	MEMO REGARDING ECOLOGICAL FINDINGS FROM 6/21/18 SITE VISIT	6	FANG,SHARON (EPA)	PLUTA,BRUCE,R (EPA)
2309458	01/09/2020	EPA REQUEST FOR STATE IDENTIFICATION OF ARARS	3	CHERRY,TIMOTHY (PA DEPT OF ENVIRONMENTAL PROTECTION)	FANG,SHARON (EPA)
2309459	02/19/2020	PADEP COMMENTS ON ARARS	3	FANG,SHARON (EPA)	SEABOURNE,BRIN (PA DEPT OF ENVIRONMENTAL PROTECTION)
2309406	06/23/2020	FINAL TECHNICAL MEMORANDUM #1 FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) OU 1, FALL 2018	497	(EPA)	(CDM FEDERAL PROGRAMS CORP)
2309404	06/23/2020	FINAL TECHNICAL MEMORANDUM #2 FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) OU 1, SPRING 2019	275	(EPA)	(CDM FEDERAL PROGRAMS CORP)
2309449	08/01/2020	PRE-REMEDIAL DESIGN INVESTIGATION (PRDI) REPORT ADDENDUM OU1	744		(US ARMY CORPS OF ENGINEERS PHILADELPHIA DISTRICT)
2309477	09/28/2020	REDACTED TRANSMITTAL OF PADEP COMMENTS ON DRAFT PROPOSED REMEDIAL ACTION PLAN (PRAP)	2	FANG,SHARON (EPA)	CHERRY,TIMOTHY (PA DEPT OF ENVIRONMENTAL PROTECTION)
2309447	10/01/2020	DRAFT REVISED FEASIBILITY STUDY	209		(US ARMY CORPS OF ENGINEERS PHILADELPHIA DISTRICT)
2309468	11/10/2020	REDACTED EMAIL REGARDING PADEP COMMENTS ON DRAFT PROPOSED REMEDIAL ACTION PLAN (PRAP)	5	FANG,SHARON (EPA)	CHERRY,TIMOTHY (PA DEPT OF ENVIRONMENTAL PROTECTION)
2309452	12/01/2020	FACT SHEET: SALFORD QUARRY SUPERFUND SITE COMMUNITY UPDATE	4		(EPA)
2309445	12/03/2020	PROPOSED REMEDIAL ACTION PLAN (PRAP) OU 1	53		(EPA)
2309453	12/15/2020	PUBLIC NOTICE: PROPOSED CLEANUP PLAN AVAILABLE FOR PUBLIC COMMENT	1		(EPA)

DOC ID	DOC DATE	TITLE	PAGE COUNT	ADDRESSEE NAME	AUTHOR NAME
2317739	12/15/2020	PROPOSED REMEDIAL ACTION PLAN (PRAP) VIRTUAL PUBLIC MEETING PRESENTATION TRANSCRIPT	12		(EPA)
2317740	12/15/2020	VIDEO: PROPOSED REMEDIAL ACTION PLAN (PRAP) VIRTUAL PUBLIC MEETING PRESENTATION (WITH CAPTIONS)	1		(EPA) *
2317777	08/25/2021	PADEP LETTER OF CONCURRENCE WITH RECORD OF DECISION (ROD) AMENDMENT	3		(PA DEPT OF ENVIRONMENTAL PROTECTION)

* The virtual public meeting presentation can also be viewed online at:
https://www.youtube.com/watch?v=bLw8KCReJ58

APPENDIX B

DETAILED COST ESTIMATE

Appendix B WS11: In Situ Solidification/Stabilization

Item	Quantity	Unit Cost	Units	Cost
1. Mob/Demob	1	$ 292,000.00	EA	$ 292,000.00
2. In Situ Mixing and Stabilization	44100	$ 100.00	CY	$ 4,410,000.00
3. Clay Liner and Cover Soil				
a. Backfill, Clay	4,140	$ 30.00	LCY	$ 124,200.00
b. Backfill, Topsoil	2,925	$ 35.00	LCY	$ 102,375.00
c. Delivery	7,065	$ 5.00	LCY	$ 35,325.00
d. Spreading/placement	6,280	$ 1.33	LCY	$ 8,352.40
e. Compaction	4,140	$ 2.53	CY	$ 10,474.20
f. Fine Grading	4,777	$ 2.57	SY	$ 12,276.89
g. labor - operator	360	$ 133.00	hr	$ 47,880.00
h. labor - laborer	360	$ 116.00	hr	$ 41,760.00
i. labor - truck driver	360	$ 150.00	hr	$ 54,000.00
4. Remove Waste				
a. Load waste in trucks to disposal	31,982	$ 2.43	LCY	$ 77,716.26
b. Transportation of Waste Materi	1,599	$ 600.00	EA	$ 959,400.00
c. Offsite disposal	31,982	$ 65.00	LCY	$ 2,078,830.00
e. labor - operator	1,600	$ 133.00	hr	$ 212,800.00
f. labor - laborer	1,600	$ 116.00	hr	$ 185,600.00
g. labor - truck driver	1,600	$ 150.00	hr	$ 240,000.00
Construction Subtotal				**$ 8,892,989.75**
Contractor Mark-Ups (25%)				**$ 2,223,247.44**
Contingency (15%)				**$ 1,333,948.46**
Capital Cost Subtotal				**$ 12,450,185.65**
Project Management (10%)				**$ 1,245,018.57**
Supervision/Admin/QC (12%)				**$ 1,494,022.28**
Total Capital Costs				**$ 15,189,226.49**
Design (10% of Capital Cost Subtotal)				**$ 1,245,018.57**
Operation and Maintenance				
1. Mowing	1	$ 3,400.00	YR	$ 3,400.00
2. Inspections	1	$ 750.00	YR	$ 750.00
3. Sampling	1	$ 45,500.00	YR	$ 45,500.00
4. Reports (sampling/5 yr)	1	$ 10,000.00	YR	$ 10,000.00
5. Repairs	1	$ 4,000.00	YR	$ 4,000.00
Annual O&M Total				**$ 63,650.00**
Total O&M Costs				**$789,835.47**
Net Present Worth of Costs (not including design)				**$ 15,979,061.96**

Appendix B WS11: Perimeter Wall (soil bentonite slurry) and RCRA Cap

Item	Quantity	Unit Cost	Units	Cost
1. Mob/Demob	1	$ 460,000.00	EA	$ 460,000.00
2. Install Slurry Wall	35000	$ 20.00	VSF	$ 700,000.00
3. Remove/relocate haz waste				
a. Surveys	1	$ 28,668.00	LS	$ 28,668.00
b. Excavate Material	3,400	$ 2.43	BCY	$ 8,262.00
c. Load Material in trucks to landfil	4,420	$ 2.43	LCY	$ 10,740.60
c. Spreading/placement on landfill	4,420	$ 1.33	LCY	$ 5,878.60
d. Compaction	4,420	$ 2.53	LCY	$ 11,182.60
e. labor - operator	220	$ 133.00	hr	$ 29,260.00
f. labor - laborer	220	$ 116.00	hr	$ 25,520.00
g. labor - truck driver	220	$ 150.00	hr	$ 33,000.00
4. RCRA Subtitle C Cap				
a. Backfill, Sand	7,653	$ 25.00	LCY	$ 191,325.00
b. Geosynthetics	5,500	$ 40.00	SY	$ 220,000.00
c. Backfill Common Earth	1,822	$ 12.00	LCY	$ 21,864.00
d. Backfill Clay	7,653	$ 30.00	LCY	$ 229,590.00
e. Backfill Topsoil	2,140	$ 35.00	LCY	$ 74,900.00
f. Delivery	19,268	$ 5.00	LCY	$ 96,340.00
g. Spreading/placement	19,268	$ 1.33	LCY	$ 25,626.44
h. Compaction	17,128	$ 2.53	LCY	$ 43,333.84
i. Fine Grading	5,500	$ 2.57	SY	$ 14,135.00
j. labor - operator	710	$ 133.00	hr	$ 94,430.00
k. labor - laborer	710	$ 116.00	hr	$ 82,360.00
l. labor - truck driver	710	$ 150.00	hr	$ 106,500.00
Construction Subtotal				**$ 2,512,916.08**
Contractor Mark-Ups (25%)				**$ 628,229.02**
Contingency (15%)				**$ 376,937.41**
Capital Cost Subtotal				**$ 3,518,082.51**
Project Management (10%)				**$ 351,808.25**
Supervision/Admin/QC (12%)				**$ 422,169.90**
Total Capital Costs				**$ 4,292,060.66**
Design (10% of Capital Cost Subtotal)				**$ 351,808.25**
Operation and Maintenance				
1. Mowing	1	$ 3,400.00	YR	$ 3,400.00
2. Inspections	1	$ 750.00	YR	$ 750.00
3. Sampling	1	$ 45,500.00	YR	$ 45,500.00
4. Reports (sampling/5 yr)	1	$ 10,000.00	YR	$ 10,000.00
5. Repairs	1	$ 6,500.00	YR	$ 6,500.00
Annual O&M Total				**$ 66,150.00**
Total O&M Costs				**$820,858.07**
Net Present Worth of Costs (not including design)				**$ 5,112,918.74**

Appendix B WS11: Perimeter Wall (jet grout) and RCRA Cap

Item	Quantity	Unit Cost	Units	Cost
1. Mob/Demob	1	$ 460,000.00	EA	$ 460,000.00
2. Install Grout Columns (320)	13440	$ 110.00	LF	$ 1,478,400.00
3. Remove/relocate haz waste				
a. Surveys	1	$ 28,668.00	LS	$ 28,668.00
b. Excavate Material	3,400	$ 2.43	BCY	$ 8,262.00
c. Load Material in trucks to landfil	4,420	$ 2.43	LCY	$ 10,740.60
c. Spreading/placement on landfill	4,420	$ 1.33	LCY	$ 5,878.60
d. Compaction	4,420	$ 2.53	LCY	$ 11,182.60
e. labor - operator	220	$ 133.00	hr	$ 29,260.00
f. labor - laborer	220	$ 116.00	hr	$ 25,520.00
g. labor - truck driver	220	$ 150.00	hr	$ 33,000.00
4. RCRA Subtitle C Cap				
a. Backfill, Sand	7,653	$ 25.00	LCY	$ 191,325.00
b. Geosynthetics	5,500	$ 40.00	SY	$ 220,000.00
c. Backfill Common Earth	1,822	$ 12.00	LCY	$ 21,864.00
d. Backfill Clay	7,653	$ 30.00	LCY	$ 229,590.00
e. Backfill Topsoil	2,140	$ 35.00	LCY	$ 74,900.00
f. Delivery	19,268	$ 5.00	LCY	$ 96,340.00
g. Spreading/placement	19,268	$ 1.33	LCY	$ 25,626.44
h. Compaction	17,128	$ 2.53	LCY	$ 43,333.84
i. Fine Grading	5,500	$ 2.57	SY	$ 14,135.00
j. labor - operator	710	$ 133.00	hr	$ 94,430.00
k. labor - laborer	710	$ 116.00	hr	$ 82,360.00
l. labor - truck driver	710	$ 150.00	hr	$ 106,500.00
Construction Subtotal				**$ 3,291,316.08**
Contractor Mark-Ups (25%)				**$ 822,829.02**
Contingency (15%)				**$ 493,697.41**
Capital Cost Subtotal				**$ 4,607,842.51**
Project Management (10%)				**$ 460,784.25**
Supervision/Admin/QC (12%)				**$ 552,941.10**
Total Capital Costs				**$ 5,621,567.86**
Design (10% of Capital Cost Subtotal)				**$ 460,784.25**
Operation and Maintenance				
1. Mowing	1	$ 3,400.00	YR	$ 3,400.00
2. Inspections	1	$ 750.00	YR	$ 750.00
3. Sampling	1	$ 45,500.00	YR	$ 45,500.00
4. Reports (sampling/5 yr)	1	$ 10,000.00	YR	$ 10,000.00
5. Repairs	1	$ 6,500.00	YR	$ 6,500.00
Annual O&M Total				**$ 66,150.00**
Total O&M Costs				**$820,858.07**
Net Present Worth of Costs (not including design)				**$ 6,442,425.94**

Appendix B WS11: Perimeter Wall (steel sheet pile) and RCRA Cap

Item	Quantity	Unit Cost	Units	Cost
1. Mob/Demob	1	$ 300,000.00	EA	$ 300,000.00
2. Install Steel Sheet Pile Wall	35000	$ 40.00	VSF	$ 1,400,000.00
3. Jet grout bottom seal - pile to rocl	1	$ 110,000.00	LS	$ 110,000.00
4. Remove/relocate haz waste				
a. Surveys	1	$ 28,668.00	LS	$ 28,668.00
b. Excavate Material	3,400	$ 2.43	BCY	$ 8,262.00
c. Load Material in trucks to landfil	4,420	$ 2.43	LCY	$ 10,740.60
c. Spreading/placement on landfill	4,420	$ 1.33	LCY	$ 5,878.60
d. Compaction	4,420	$ 2.53	LCY	$ 11,182.60
e. labor - operator	220	$ 133.00	hr	$ 29,260.00
f. labor - laborer	220	$ 116.00	hr	$ 25,520.00
g. labor - truck driver	220	$ 150.00	hr	$ 33,000.00
5. RCRA Subtitle C Cap				
a. Backfill, Sand	7,653	$ 25.00	LCY	$ 191,325.00
b. Geosynthetics	5,500	$ 40.00	SY	$ 220,000.00
c. Backfill Common Earth	1,822	$ 12.00	LCY	$ 21,864.00
d. Backfill Clay	7,653	$ 30.00	LCY	$ 229,590.00
e. Backfill Topsoil	2,140	$ 35.00	LCY	$ 74,900.00
f. Delivery	19,268	$ 5.00	LCY	$ 96,340.00
g. Spreading/placement	19,268	$ 1.33	LCY	$ 25,626.44
h. Compaction	17,128	$ 2.53	LCY	$ 43,333.84
i. Fine Grading	5,500	$ 2.57	SY	$ 14,135.00
j. labor - operator	710	$ 133.00	hr	$ 94,430.00
k. labor - laborer	710	$ 116.00	hr	$ 82,360.00
l. labor - truck driver	710	$ 150.00	hr	$ 106,500.00
Construction Subtotal				**$ 3,162,916.08**
Contractor Mark-Ups (25%)				**$ 790,729.02**
Contingency (15%)				**$ 474,437.41**
Capital Cost Subtotal				**$ 4,428,082.51**
Project Management (10%)				**$ 442,808.25**
Supervision/Admin/QC (12%)				**$ 531,369.90**
Total Capital Costs				**$ 5,402,260.66**
Design (10% of Capital Cost Subtotal)				**$ 442,808.25**
Operation and Maintenance				
1. Mowing	1	$ 3,400.00	YR	$ 3,400.00
2. Inspections	1	$ 750.00	YR	$ 750.00
3. Sampling	1	$ 45,500.00	YR	$ 45,500.00
4. Reports (sampling/5 yr)	1	$ 10,000.00	YR	$ 10,000.00
5. Repairs	1	$ 6,500.00	YR	$ 6,500.00
Annual O&M Total				**$ 66,150.00**
Total O&M Costs				**$820,858.07**
Net Present Worth of Costs (not including design)				**$ 6,223,118.74**

Appendix B WS15: Engineered Cell, Modified

Item	Quantity	Unit Cost	Units	Cost
1. Mob/Demob	1	$ 191,883.77	EA	$ 191,883.77
2. Remove Cover Material and Clay Cap				
a. Topsoil stripping, clay	7653	$ 1.56	CY	$ 11,938.68
2. Dewatering				
a. Pump	450	$ 80.67	HR	$ 36,337.80
b. Contaminated Water Disposal	250,000	$ 0.40	GAL	$ 100,000.00
c. Contaminated Water Transporta	50	$ 550.00	EA	$ 27,500.00
d. PPE	360	$ 30.00	Days	$ 10,800.00
e. Engineer	360	$ 75.00	Days	$ 27,000.00
d. Laborer	1,440	$ 45.25	Hours	$ 65,160.00
e. Temporary landfill cover-reduce	1	$ 20,000.00		$ 20,000.00
3. Remove Hazardous Waste				
a. Surveys	1	$ 28,668.00	LS	$ 28,668.00
b. Excavate Material	53,100	$ 2.43	BCY	$ 129,033.00
c. Load Material in trucks to facility	69,030	$ 2.43	LCY	$ 167,742.90
d. Transportation of Contaminatec	3,452	$ 600.00	EA	$ 2,071,200.00
e. Treatment of Contaminated Ma	69,030	$ 50.00	LCY	$ 3,451,500.00
f. Load treated waste in trucks to s	57,330	$ 2.43	LCY	$ 139,311.90
g. Trans of Treated Waste back to :	2,867	$ 395.00	EA	$ 1,132,465.00
h. PPE	669	$ 45.00	Days	$ 30,105.00
i. Silt Fence	1,000	$ 1.49	FT	$ 1,490.00
j. labor - operator	3,460	$ 133.00	hr	$ 460,180.00
k. labor - laborer	3,460	$ 116.00	hr	$ 401,360.00
l. labor - truck driver	3,460	$ 150.00	hr	$ 519,000.00
4. Dispose Hazardous Waste				
a. Offsite disposal	28,958	$ 65.00	LCY	$ 1,882,270.00
5. Backfill - treated waste				
a. Load treated waste in trucks to :	57,330	$ 2.43	LCY	$ 139,311.90
b. Trans of Treated Waste back to	2,867	$ 395.00	EA	$ 1,132,465.00
c. Spreading/placement	57,330	$ 1.33	LCY	$ 76,248.90
d. Compaction	57,330	$ 2.53	LCY	$ 145,044.90
e. labor - operator	2,870	$ 133.00	hr	$ 381,710.00
f. labor - laborer	2,870	$ 116.00	hr	$ 332,920.00
g. labor - truck driver	2,870	$ 150.00	hr	$ 430,500.00
6. Clay Liner and Cover Soil				
a. Backfill, Clay	4,140	$ 30.00	LCY	$ 124,200.00
b. Backfill, Topsoil	3,960	$ 35.00	LCY	$ 138,600.00
c. Delivery	8,100	$ 5.00	LCY	$ 40,500.00
d. Spreading/placement	8,100	$ 1.33	LCY	$ 10,773.00
e. Compaction	4,140	$ 2.53	LCY	$ 10,474.20
f. Fine Grading	4,777	$ 2.57	SY	$ 12,276.89
g. labor - operator	410	$ 133.00	hr	$ 54,530.00
h. labor - laborer	410	$ 116.00	hr	$ 47,560.00
i. labor - truck driver	410	$ 150.00	hr	$ 61,500.00
Construction Subtotal				**$ 14,043,560.84**
Contractor Mark-Ups (25%)				**$ 3,510,890.21**
Contingency (15%)				**$ 2,106,534.13**
Capital Cost Subtotal				**$ 19,660,985.18**
Project Management (10%)				**$ 1,966,098.52**
Supervision/Admin/QC (12%)				**$ 2,359,318.22**
Total Capital Costs				**$ 23,986,401.92**
Design (10% of Capital Cost Subtotal)				**$ 1,966,098.52**
Operation and Maintenance				
1. Mowing	1	$ 3,400.00	YR	$ 3,400.00
2. Inspections	1	$ 750.00	YR	$ 750.00
3. Sampling	1	$ 45,500.00	YR	$ 45,500.00
4. Reports (sampling/5 yr)	1	$ 10,000.00	YR	$ 10,000.00
5. Repairs	1	$ 4,000.00	YR	$ 4,000.00
Annual O&M Total				**$ 63,650.00**
Total O&M Costs				**$789,835.47**
Net Present Worth of Costs (not including design)				**$ 24,776,237.39**

APPENDIX C

ARAR TABLE

Appendix C
Applicable or Relevant and Appropriate Requirements (ARARs)
Salford Quarry Superfund Site, OU1

ARAR OR TBC	LEGAL CITATION	MEDIUM	CLASSIFICATION	SUMMARY OF REQUIREMENT	FURTHER DETAIL REGARDING ARARS IN THE CONTEXT OF THE MODIFIED REMEDY
Chemical-Specific					
Pennsylvania Land Recycling and Environmental Remediation Standards Act ("Act 2") and Land Recycling and Environmental Remediation Standards Regulations	35 P.S. § 6026.101 et seq.; 25 Pa. Code Chapter 250, Appendix A, Tables 3 & 4	Soil	Applicable	This regulation establishes requirements for Statewide Health Standards for soil cleanup activities that are protective of human health and the environment.	Act 2's Statewide health standards for soils were evaluated for the soil COCs at the Site. The remedy will incorporate and be designed to achieve compliance with the soil cleanup standards for the Site.
Action-Specific					
Pennsylvania Hazardous Waste Management Regulations, incorporating Resource Conservation and Recovery Act (RCRA) regulations	25 Pa. Code § 264a.1 (incorporating 40 C.F.R. §§ 264.1(j)(2) - (7), (9) - (12); 264.111; 264.114; 264.117; 264.171-.175. 264.178; 264.310; 264.301(a); 264.303(a); 264.554(d), (h), (j), (k)) 25 Pa. Code § 264a.301(1)	Waste Soil	Relevant and Appropriate	Establishes requirements for remediation waste management; identification of hazardous materials; the storage of remediation waste in temporary staging piles and in containers; the construction and closure of landfills including surface water control; post-closure care and monitoring, and decontamination of any containers.	Any temporary storage of excavated contaminated soil in staging piles prior to shipment offsite for treatment and disposal, will comply with these regulations. Construction of the vertical barrier and cap will also comply with these requirements.

Appendix C
Summary of Applicable or Relevant and Appropriate Requirements (ARARs)
Salford Quarry Superfund Site, OU1

ARAR OR TBC	LEGAL CITATION	MEDIUM	CLASSIFICATION	SUMMARY OF REQUIREMENT	FURTHER DETAIL REGARDING ARARS IN THE CONTEXT OF THE REMEDY
Action-Specific (continued)					
Pennsylvania Hazardous Waste Management Regulations, incorporating Resource Conservation and Recovery Act (RCRA) Pennsylvania Hazardous Waste Management Regulations	25 Pa. Code § 261a.1 (incorporating 40 C.F.R. §§ 261.20-.24) 25 Pa. Code § 262a.1 (incorporating 40 C.F.R. §§ 262.11, 262.13, 262.30-.35); 25 Pa. Code §§ 262a.11, 262a.13	Waste Soil	Applicable	Requirements proscribing process for identifying hazardous wastes based upon toxicity characteristic, and governing requirements pre-transport of hazardous waste.	Excavated soils will be analyzed to characterize materials as hazardous waste. Prior to any transportation offsite, the excavated materials will be temporarily staged or stored in accordance with pre-transportation requirements.
Resource Conservation and Recovery Act (RCRA) Pennsylvania Hazardous Waste Management Regulations	25 Pa. Code § 268a.1 (incorporating 40 C.F.R. §§ 268.20-268.39, 268.40, 268.45, 268.50)	Waste Soil Extracted Groundwater	Applicable	These regulations establish treatment standards for hazardous waste and debris, prohibitions for storage of hazardous wastes, and prohibition of land disposal.	Excavated materials and extracted groundwater will be classified prior to being sent for offsite for hazardous waste disposal in appropriate facilities and not land-disposed or stored.
Pennsylvania Solid Waste Management Regulations	25 Pa. Code § 287.2; 25 Pa. Code § 287.54-.56; 25 Pa. Code § 299.111-.133	Waste Soil	Applicable	Establishes requirements for management and storage of residual wastes, including certain residual wastes subject to municipal waste regulations under 25 Pa. Code § 271. Also requires a chemical analysis of the waste prior to disposal.	Any residual, non-hazardous wastes produced during remedial actions at the Site will comply with these requirements, including sampling to ensure proper classification and onsite handling.
Pennsylvania Solid Waste Management Act	35 P.S. §§ 6018.301-.303, 6018.401-.404	Waste Soil	Applicable	Establishes requirements for the management, disposal, storage, and transportation of residual wastes and hazardous wastes.	Any residual or hazardous wastes produced during remedial actions at the Site will comply with these requirements.

Appendix C
Summary of Applicable or Relevant and Appropriate Requirements (ARARs)
Salford Quarry Superfund Site, OU1

ARAR OR TBC	LEGAL CITATION	MEDIUM	CLASSIFICATION	SUMMARY OF REQUIREMENT	FURTHER DETAIL REGARDING ARARS IN THE CONTEXT OF THE REMEDY
Action-Specific (continued)					
National Pollutant Discharge Elimination System Regulations	25 Pa. Code §§ 92a.11; 92a.12(a)-(b); 92a.41(a)(4), (5) (incorporating 40 C.F.R. § 122.41(d), (e)); 92a.41(c); 92a.44 (incorporating 40 C.F.R. § 122.44(a)(1), (b)(1)(first sentence), (d), (e), (i)(1), and (k)); 92a.45 (incorporating 122.45(a), (b)(2)(i), (c), (e), and (f)); 92a.48(a)(1); and 92a.61(d), (e), and (i)	Extracted Groundwater	Relevant and Appropriate	Requirements to administer the National Pollutant Discharge Elimination System (NPDES) program within Pennsylvania and, accordingly, in order to discharge pollutants into waters of the Commonwealth.	Any discharge into a surface water, including but not limited to, the West Branch of the Skippack Creek, will comply with these requirements.
Federal Regulation of Particulate Emissions	40 C.F.R. §§ 50.6-50.7, 50.12	Air	Applicable	Establishes thresholds for particulate matter, fugitive dust, and lead in air.	Particulate levels generated during the remedial earth-moving will be monitored to ensure compliance with the National Ambient Air Quality Standards.
Federal Fugitive Air Emission Regulation	40 C.F.R. Part 52, Subpart NN, § 52.2020(c)(1)		Applicable	Establishes the fugitive dust regulation for particulate matter.	Management of fugitive air emissions encountered during the remedial action will comply with the requirements of the EPA approved Pennsylvania State Implementation Plan (SIP).
Pennsylvania Regulations of Contaminant Emissions, promulgated under the Air Pollution Control Act, Act of Jan. 8, (1960) 1959	25 PA Code §§ 121.7, 123.1; 123.2; 123.31 35 P.S. § 4008	Soil	Applicable	No person may permit air pollution; it is unlawful to cause a public nuisance, to cause air pollution, soil or water pollution resulting from an air pollution incident, or to not abide by air regulation. Establishes standards for the regulation of fugitive emissions, fugitive particulate matter, and odor emissions released during remedial activities.	Excavation activities at the Site will comply with these regulations to ensure that fugitive emissions and odor emissions are not beyond property line.

Appendix C
Summary of Applicable or Relevant and Appropriate Requirements (ARARs)
Salford Quarry Superfund Site, OU1

ARAR OR TBC	LEGAL CITATION	MEDIUM	CLASSIFICATION	SUMMARY OF REQUIREMENT	FURTHER DETAIL REGARDING ARARS IN THE CONTEXT OF THE REMEDY
Action-Specific (continued)					
Pennsylvania Erosion and Sediment Control Regulations Pennsylvania Clean Streams Law	25 Pa. Code §§ 102.4(b), 102.11, 102.22; 35 P.S. § 691.402(c)(1)	Soil	Applicable	Requires implementation of best management practices during and after any earth disturbance activities to limit erosion.	EPA shall utilize best management practices during construction activities at the Site that disturb the ground surface, including clearing, grading, and excavation, in order to minimize erosion and sedimentation and protect water quality and uses of local water bodies.
Pennsylvania Storm Water Management Act	32 P.S. § 680.13	Soil	Applicable	Requires implementation of stormwater control measures to prevent injury to health, safety, or property. Controls runoff during construction and remediation activities.	Stormwater controls will be put into place during the remedial activities that involve disturbance of the land to ensure that stormwater is managed and eliminate or diminish runoff into surface water.
Stormwater regulations promulgated under the Clean Water Act of 1972, as amended	40 C.F.R. § 122.26(c)(1)(ii)	Stormwater	Relevant and Appropriate	This regulation requires the operator of a new stormwater discharge associated with small construction activity, as defined by 40 C.F.R. § 122.26(b)(15), to maintain certain information about the nature of the site, the nature of onsite activities, proposed best management practices to control pollutants in stormwater during and after construction activities, an estimate of the runoff, coefficient of the site, and the name(s) of the receiving water(s).	EPA will implement best management practices to control COCs in stormwater during and after the remedial action will be implemented at the Site.
Effluent Standards for RCRA Subtitle C Hazardous Waste Landfills	40 C.F.R. §§ 445.11, 445.12, and 445.13	Groundwater from Excavation	Relevant and Appropriate	Establishes effluent limitations for wastewater discharged from landfills subject to regulation under 40 C.F.R. Part 264, Subpart N.	The Modified Remedy will be designed to achieve compliance with these standards.
Federal Pretreatment Standards for Discharges to POTW	40 C.F.R. § 403.5 (a)(1), (b), and (d) 40 C.F.R. § 445.3	Groundwater from Excavation	Relevant and Appropriate	Establishes prohibitions on the introduction of certain pollutants into publicly owned treatment works. Also, requires landfills that introduce wastewater pollutants into a POTW to comply with 40 C.F.R. Part 403.	If water is sent to the POTW as a result of remedial activities at the Site, it will meet these standards.

Appendix C
Summary of Applicable or Relevant and Appropriate Requirements (ARARs)
Salford Quarry Superfund Site, OU1

ARAR OR TBC	LEGAL CITATION	MEDIUM	CLASSIFICATION	SUMMARY OF REQUIREMENT	FURTHER DETAIL REGARDING ARARS IN THE CONTEXT OF THE REMEDY
Action-Specific (continued)					
Pennsylvania Water Quality Standards and Criteria	25 Pa. Code §§ 93.4a, 93.6, 93.7, 93.8a-.8c 93.9 25 Pa. Code §§ 16.11-.52, 16.102 and Appendix A	Surface water	Relevant and Appropriate	Defines general and specific standards for the quality of Pennsylvania's waters and includes specific water quality criteria including anti-degradation requirements, and designated water uses for each stream in Pennsylvania. Establishes surface water quality criteria for toxic substances.	Any Site water that is discharge into or migration into surface water will adhere to the requirements.
Pennsylvania Clean Streams Law	35 P.S. §§691.301, 691.401 25 Pa. Code § 91.34	Surface water	Applicable	Prohibits discharging industrial waste into any of the waters of the Commonwealth, or any substance of any kind or character resulting in pollution. Requires anyone engaged in impoundment, production, processing, transportation, storage, use, application or disposal of pollutants to take necessary measures to prevent the substances from directly or indirectly reaching waters of this Commonwealth, through accident, carelessness, maliciousness, hazards of weather or from another cause.	The Modified Remedy will adhere to these requirements.

Appendix C
Summary of Applicable or Relevant and Appropriate Requirements (ARARs)
Salford Quarry Superfund Site, OU1

ARAR OR TBC	LEGAL CITATION	MEDIUM	CLASSIFICATION	SUMMARY OF REQUIREMENT	FURTHER DETAIL REGARDING ARARS IN THE CONTEXT OF THE REMEDY
Location-Specific					
Pennsylvania Dam Safety and Water Management Regulations	25 PA Code § 105.18a	Soil	Relevant and Appropriate	Requires dam, water obstruction or encroachments in, along, across or projecting into wetlands to minimize impacts on wetland and water quality	Activities undertaken to address contaminated soil and waste at the Site will minimize adverse impacts on the wetland and water quality
Federal regulations governing groundwater withdrawals in the Delaware River Basin	18 C.F.R. §§ 430.7, 430.9, 430.13(i)(3)(i) and 430.15(b)(1) and (2); 18 C.F.R. § 410.1	Groundwater	Applicable	Governs the withdrawal of water from the Delaware River Basin, where the Site is located	Any dewatering activities at the Site will meet these standards
Section 7 of the Endangered Species Act of 1973, as amended (ESA), and regulations promulgated thereunder	16 U.S.C. § 1536 and 50 CFR §§ 402.01-402.17		Applicable, if any endangered or threatened species are present at the Site.	The ESA requires consultation between the U.S. Department of Interior and other federal agencies to ensure that that any action authorized, funded, or carried out by these agencies (a/k/a "agency action") is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species.	EPA will coordinate with Fish and Wildlife Service to ensure the remedial action does not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of habitat of these species.

Appendix C
Summary of Applicable or Relevant and Appropriate Requirements (ARARs)
Salford Quarry Superfund Site, OU1

ARAR OR TBC	LEGAL CITATION	MEDIUM	CLASSIFICATION	SUMMARY OF REQUIREMENT	FURTHER DETAIL REGARDING ARARS IN THE CONTEXT OF THE REMEDY
To Be Considered (TBCs)					
Invasive Species- Executive Order 13112	64 Fed. Reg. 6183 (February 8, 1999)	Soil Surface Water	TBC	Requires federal agencies to take action to prevent the introduction of invasive species and restore native species in carrying out their responsibilities.	This Order will be followed during remedial design.
PADEP Management of Fill Policy, Effective January 1, 2020	Pennsylvania E-Library Document No.: 81095/258-2182-773PO.pdf	Soil	TBC	Provides procedures for determining whether material to be used as fill may be considered "clean."	This Policy will be followed in selecting any fill needed for backfilling excavated areas at the Site, if any.
Policy for Pennsylvania Natural Diversity Inventory ("PNDI") Coordination During Permit Review and Evaluation, May 25, 2013	Pennsylvania E-Library Document No.: 021-0200-001		TBC	The PNDI coordination effort facilitates the avoidance and minimization of impacts to threatened and endangered species and special concern species where applicable in PA.	EPA will coordinate with PADEP to ensure the remedial action does not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of habitat of these species.

APPENDIX D

PADEP CONCURRENCE LETTER

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

August 25, 2021

Mr. Paul Leonard, Acting Director
Superfund & Emergency Management Division
United States Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Re: Letter of Concurrence with the Record of Decision (ROD) Amendment
Salford Quarry NPL Site
Lower Salford Township, Montgomery County

Dear Mr. Leonard:

The Record of Decision (ROD) Amendment for the Salford Quarry NPL Site, received by this office on July 27, 2021, has been reviewed by the Pennsylvania Department of Environmental Protection (DEP).

DEP recognizes that the ROD Amendment's modification of the Remedy includes the following major components:

- Installation of a subsurface perimeter wall to encapsulate the existing waste and contaminated soil and prevent lateral groundwater flow into or out of the contained waste, in order to reduce transfer of contamination from the waste into the groundwater. The wall will be installed approximately two feet into the bedrock beneath the quarry to minimize leakage.

- Delineation of the extent of waste and soil contamination outside of the designed cap area, excavation and placement of contaminated material beneath the planned extent of the RCRA cap or dispose of offsite depending on the capacity of the design.

- Installation of a multi-layer, impermeable Resource Conservation and Recovery Act (RCRA) Subtitle C cap to prevent direct contact with contaminated material and effectively isolate contamination from precipitation and surface water infiltration. The cap will be designed with an optimal seal against the exposed bedrock headwall to minimize infiltration.

- Grading of the surface and installation of drainage channels to prevent infiltration and to convey runoff water away from the cap. Surface water from these channels will be directed to existing drainage features that ultimately discharge to the West branch of Skippack Creek.

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- Placement of six inches of clean topsoil on the RCRA cap and in the areas outside the landfill footprint where contaminated soil is removed.
- Vegetation of the topsoil to minimize erosion.
- Monitoring of groundwater, surface water, and sediment to assess the effectiveness of these source control measures.
- Operation and maintenance (O&M) activities, such as mowing of grass/landscaping, periodic inspections to ensure isolation of the contamination as well as safety and security of the Site, and groundwater sampling to monitor the effectiveness of the Modified Remedy. For cost estimating purposes, long-term O&M includes costs for 30 years, however, O&M will be required as long as wastes are left in place.
- Implementation of Institutional Controls (ICs) to protect the integrity of the Modified Remedy and to prevent exposure to Site-related contamination. EPA will coordinate these efforts with PADEP, the municipality, and the Montgomery County Office of Public Health.
- Installation of property access restrictions, such as a locked perimeter fence, to prevent exposure to unacceptable risks associated with Site-related contaminants and to protect the components of the Modified Remedy.

DEP hereby concurs with EPA's proposed remedy with the following conditions:

- DEP will be given the opportunity to review and comment on documents and concur with decisions related to the design and implementation of the remedial action, to assure compliance with Pennsylvania's Applicable or Relevant and Appropriate Requirements (ARARs) and to be considered requirements (TBCs).
- ICs that implement the Activity and Use Limitations (AULs) will be in the form of Environmental Covenants (ECs), pursuant the Section 6517(a)(1) of the Pennsylvania Uniform Environmental Covenants Act (UECA), 27 Pa.C.S. § 6517(a)(1). For these instances, EPA should add UECA to its ARAR table Section 6517(a)(1) of the UECA, 27 Pa.C.S. § 6517(a)(1). In addition, Section 512(a) states that "[a] site at which hazardous substances remain after completion of a response action shall not be put to a use which would disturb or be inconsistent with the response action implemented." As such, EPA should add to its ARAR table Section 512(a) of HSCA, and this provision can be implemented through an EC. In cases where property owners refuse to execute an EC, at EPA's request, DEP may issue an Administrative Order under Section 512(a) of HSCA, to implement such restrictions directly as it has already done for Ambler Asbestos and plans to do for Clearview Landfill.

- DEP will have the opportunity to review and comment before any modification to the ROD and the issuance of an Explanation of Significant Difference (ESD).

- This concurrence with the selected remedial action is not intended to provide any assurances pursuant to CERCLA Section 104(c)(3), 42 U.S.C. 9604(c)(3).

- Concurrence with the remedy should not be interpreted as acceptance of on-site O&M by DEP. State O&M obligations will be determined during design of the remedy and the completion of a Superfund State Contract.

- EPA will assure that the DEP is provided an opportunity to fully participate in any negotiations with responsible parties.

- DEP reserves the right and responsibility to take independent enforcement actions pursuant to state law.

This letter documents DEP's concurrence with USEPA's ROD Amendment for the Salford Quarry NPL Site. Should you have any questions regarding the matter of this letter, please feel free to contact me.

Sincerely,

Patrick L. Patterson
Regional Director
Southeast Regional Office

cc: Ms. S. Fang, USEPA
Mr. R. Patel
Ms. N. Wagner
Ms. B. McClennen
Mr. T. Cherry
Ms. B. Seabourne
Ms. G. Thomas, Esq.
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