REVERE SMELTING & REFINING

FEASIBILITY STUDY - OPERABLE UNIT 3

REVERE SMELTING & REFINING CORPORATION MIDDLETOWN, NEW YORK

FEBRUARY 24, 2020

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PROJECT NO.: 31401015.004
DATE: FEBRUARY 24, 2020

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PROFESSIONAL ENGINEER CERTIFICATION

I, James A. Sobieraj, certify that I am currently a New York State-registered professional engineer (License No. 77394) and that this *Feasibility Study – Operable Unit 3* was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the New York State Department of Environmental Conservation's Technical Guidance for Site Investigation and Remediation (DER-10), dated May 2010.

James A. Sobieraj, P.E.
P.E. 077394-1

February 24, 2020
Date

1 INTRODUCTION

On behalf of Revere Smelting & Refining Corporation (Revere), WSP USA Inc. (WSP) has prepared this Feasibility Study (FS) - Operable Unit 3 (OU3) for the Revere facility located at 65 Ballard Road in Middletown, Orange County, New York (Figure 1). The Revere facility is a secondary lead smelter, and historical environmental investigations have identified impacts to environmental media as a result of operations at the site. The site has been listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site #3-36-053. Lead and arsenic are the primary constituents of concern (COCs). This report was prepared in accordance with requirements outlined in the February 1, 2011, Order on Consent (Index # 3-20100528-80; Site #3-36-053; [Order]) entered into by Revere, among other parties, and the New York State Department of Environmental Conservation (NYSDEC). The Order, as modified by the 2017 Statement of Basis for the Revere site, defines Operable Units (OUs) 1 to 4 as follows (Sheet 1):

- OU1 – which is comprised of nine contiguous tax parcels (Tax Parcels 41-1-70.22, 41-1-70.232, 41-1-71.22, 41-1-73.1, 41-1-73.22, 41-1-74.82, and 41-1-76 owned by Eco-Bat New York, LLC (Eco-Bat), and two offsite parcels 60-1-120 and 41-1-72.2) totaling 167 acres, less the plant facility and groundwater[1]
- OU2 – which represents the groundwater contamination outside the barrier wall surrounding the facility
- OU3 – which represents all offsite media, other than groundwater, impacted by site activities
- OU4 – which represents the plant facility, including groundwater within the barrier wall surrounding the facility

All activities addressed in this report were conducted in accordance with the NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010 (NYSDEC 2010).

The Site Characterization Summary (SCS) for OU3 (as previously defined[2]), prepared by the NYSDEC Division of Environmental Remediation (DER), determined that sufficient soil, sediment, and groundwater samples were collected within OU3 during the Remedial Investigation/Feasibility Study (RI/FS) investigation for OU1 and OU2, to warrant an additional RI/FS for OU3 (NYSDEC 2006). The NYSDEC's SCS concluded that data gaps existed for OU3 with respect to lead in surface soils and sediments.

In July 2008, WSP proposed a scope of work to address those data gaps (WSP 2008a). An OU3-specific Health and Safety Plan (HASP), Field Sampling Plan (FSP), and Quality Assurance Project Plan (QAPP) were provided as appendices within the 2008 RI/FS work plan (WSP 2008a, WSP 2008b, WSP 2008c), and a QAPP addendum was provided in May 2011 as part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation and Corrective Measures Study (RFI/CMS) work plan for OU4 (WSP 2011a). A Citizen Participation Plan (CPP) was also provided by WSP under separate cover (WSP 2008d), and the RI/FS work plan and CPP were approved by the NYSDEC in July 2008 (NYSDEC 2008). Subsequent modifications and phases of investigation in OU3 were proposed and completed as described in Section 3.1.

In January 2015, the NYSDEC requested additional information to complete the RI/FS for OU3 (NYSDEC 2015a). On behalf of Revere, WSP submitted an additional RI/FS Work Plan – Operable Unit 3 dated May 4, 2015 (WSP 2015a), proposing additional floodplain soil and sediment sampling in the portions of OU3 south of Ballard Road. Prior to formal approval of the Work Plan, Revere received permission to collect soil and sediment samples on Tax Parcel 78-1-34.4 (758 E. Main Street). These samples were collected in September 2015, the NYSDEC provided approval of the Work Plan with modifications in November 2015 (NYSDEC 2015b), and Revere accepted the proposed modifications in November 2015 (WSP 2015b). Upon receiving site access agreements with the remaining property owners and a highway work permit from the New York State Department of Transportation (NYSDOT), the outstanding field work for the OU3 RI

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[1] The draft 2017 Statement of Basis modified the boundaries of OU4 to include areas where contaminated soil still remains in the vicinity of the operating plant site that were not removed during the OU1 remedial action. OU4 was also expanded to include the main driveway entering the site from Ballard Road, to extend the boundary on the eastern and southern sides of the active facility to include those areas up to and including the barrier wall, and to add the wet electrostatic precipitator (WESP). In addition, groundwater within the barrier wall beneath the site is added to OU4. Based on these changes, OU1 and OU2 are subsequently reduced by the area added to OU4. OU1 and OU4 comprise approximately 167 acres, of which the modified OU4 is approximately 14.8 acres.

[2] Prior to the 2011 Order, OU1 was defined as all onsite areas not within OU4 and OU3 was defined as all offsite areas. The 2011 Order modified the boundaries of OU1 to include the nine contiguous tax parcels referenced above, which were previously defined as part of OU3.

was completed in October and November 2016. All data collected during the various phases of the RI were summarized in a report submitted to NYSDEC on June 9, 2017 (WSP 2017).

In August 2019, WSP submitted a revised Fish and Wildlife Impact Analysis (FWIA) to the NYSDEC for OU3. The objectives of the FWIA were to describe the ecology of the site and surrounding environment, evaluate the exposure to and ecological effects of the identified COCs, and present conclusions to the potential ecological risks posed by the former releases.

This FS was conducted in accordance with the guidance presented in the NYSDEC's DER-10, and 6 New York Codes, Rules and Regulations (NYCRR) Part 375 (NYSDEC 2010). The purpose of this OU3 FS report is to:

— Present a summary of previous remedial investigations, describe the nature and extent of contamination, and evaluate migration pathways, exposure routes, and potential receptors.
— Outline remedial goals (RGs) and remedial action objectives (RAOs).
— Identify general response actions (GRAs) and feasible technologies, and systematically screen feasible remedial technologies.
— From the development and initial screening exercise, further develop detailed remedial alternatives, and evaluate each detailed remedial alternative by a comparative analysis of alternatives.
— Present the findings of the analysis of alternatives, and recommend one remedy to achieve remedial goals.

The remainder of this report presents the FS for OU3, and is organized into the following 12 sections:

— Section 2 presents background information on the site, including a site description, description of the OU3 FS Study Area and land use, geology, surface water hydrology, topography, groundwater, and freshwater wetlands.
— Section 3 provides a summary of previous work completed for the OU3 RI/FS, and a discussion of the nature and extent of contamination in OU3. Migration pathways, exposure routes, and potential receptors are also evaluated in Section 3.
— Section 4 provides a discussion of the OU3 RGs, RAOs, and assumptions used to estimate impacted soil volumes.
— Section 5 provides a discussion of general response actions (GRAs) that would be applicable to achieve the RAOs at the site.
— Section 6 identifies and screens applicable technologies for site-specific feasibility.
— Section 7 introduces three potential remedial alternatives for application in OU3.
— Section 8 evaluates the proposed remedial alternatives, including no action, excavation to meet RGs, and excavation to meet 6 NYCRR Part 375-6.8(a) unrestricted use soil cleanup objectives (SCOs).
— Section 9 compares the proposed alternatives, utilizing the nine remedy selection factors specified in 6 NYCRR Part 375-1.8(f).
— Section 10 provides a recommended remedial alternative.
— Sections 11 and 12 include lists of references cited in this report and acronyms used throughout this report, respectively.

2 SITE DESCRIPTION AND HISTORY

The following sections describe the site location, Study Area, land uses, geology, surface water hydrology, and topography as it pertains to OU3, groundwater, and freshwater wetlands in the Study Area as identified through online mapping resources. Tax Parcels in OU3 where the RI was conducted[3], including applicable zoning districts, are listed on Table 1.

2.1 SITE LOCATION AND DESCRIPTION

Revere operates a secondary lead smelting facility located at 65 Ballard Road, approximately 7 miles east of Middletown, in the Town of Wallkill, Orange County, New York (Figure 1). The facility is located in a combined rural and industrial area of south-central New York, approximately 6,000 feet northwest of the Wallkill River. The Revere facility was constructed in 1970 and acquired by Revere in 1973. Revere manufactures lead and lead alloys. The major raw material is used lead acid batteries, such as the typical automotive battery. Other raw materials used in production include battery-manufacturing by-products, lead-bearing wastes from battery manufacturers, scrap metal from metal salvage yards, and virgin metal from metal brokers. In addition, Revere reclaims polypropylene from battery cases, and in the process, produces sodium sulfate.

The facility consists of several buildings, including the main smelter building, a crystallizer building, a containment building, a wastewater treatment building, six large storm water tanks, and employee and truck parking areas. In addition, a rail spur from the adjacent Norfolk and Southern Railroad right-of-way services the facility. The operational portion of the property (OU4) encompasses approximately 14.8 acres. Eco-Bat owns the operational property and contiguous undeveloped property to the north and east of the facility and undeveloped property south of the railroad right-of-way. The Eco-Bat properties consist of the tax parcels listed in the definition of OU1, which together with OU4 comprise approximately 167 acres.

The undeveloped areas of OU1 are in varying degrees of past disturbance that range from second growth forest, reverted farmlands, maintained lawns, and wetlands. North of OU4 are open, overgrown fields, wetlands, and mature woodlands. North of the woodlands is an Exxon service station. East of OU4 is a combination of open, overgrown fields, wetlands, and mature woodlands. Old Dominion Freight Line, Inc., operates in a facility located approximately 0.25-mile southeast of OU1. Interstate Highway 84 (I-84) is located approximately 0.6 mile south of the Revere property. A Ball Corporation aluminum can-manufacturing facility is located west across Ballard Road, and additional industrial development is located further west and south.

OU1 was recently remediated by Revere, and an onsite containment cell was constructed as part of the Phase I Remedial Design/Remedial Action (RD/RA) for OU1 to dispose of lead and arsenic contaminated soils and sediments that had first been stabilized to meet the criteria of a non-hazardous waste. From 2014 through 2016, approximately 24 acres of wetlands and over 3,500 linear feet of streams in OU1 were remediated and restored as part of the OU1 Phase IIB RA. Following remediation, Revere completed construction of a wet electrostatic precipitator emissions control unit in OU1 in the former Eastern Fill Area (EFA) east of the main plant in 2016.

2.2 OU3 FS STUDY AREA AND LAND USE

The Study Area for the OU3 FS includes the investigated area of soil and sediments within Phillipsburg Creek and the Wallkill River in OU3 as identified in the OU3 RI (WSP 2017), and the surrounding area within a 0.5-mile radius. The Study Area is a mosaic of urban-suburban land uses with residential, commercial/industrial, and fragmented forested areas.

Affected properties (Table 1) within OU3 generally consist of light industrial and commercial properties, and occupy three different zoning districts[4] within the Town of Wallkill. At the OU1/OU3 boundary, the Old Dominion Freight Line property (Old Dominion; Tax Parcel 60-1-120.3) is in an area zoned ENT-L (Light Enterprise District). Southwest across Ballard Road, the iStorage Self Storage property (iStorage; Tax Parcel 78-1-82) and the Galleria at Crystal Run property (Tax Parcel 78-1-92) are in an area of the Town of Wallkill zoned TC (Town Center District). Southeast of I-84, the Courtyard by Marriott Hotel (Courtyard; Tax Parcel 78-1-80.1), Orange Regional Medical Center (Medical Center; Tax Parcel 78-1-77.2),

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[3] Property information including tax parcel numbers, names of property owners, zoning codes, and current property use numbers were obtained from ocgis.orangecountygov.com and propertydata.orangecountygov.com.

[4] Zoning information obtained from the Town of Wallkill Orange County, New York Zoning Map, December 2009.

and 758 E. Main Street (Tax Parcel 78-1-34.4) properties are situated within an area zoned O/R (Office and Research District).

2.3 GEOLOGY

The Revere facility lies within the Great Valley physiographic region of southeastern New York State. The Great Valley region is part of the Appalachian Valley and Ridge province, which lies northwest of the Hudson Highlands. The regional hydrogeologic system underlying the facility consists of Pleistocene-age glacial till deposits which overlie Ordovician-aged bedrock consisting primarily of shale, siltstone, and greywacke horizons. The glacial tills are generally poorly sorted and primarily consist of silt- or clay- sized particle matrix with minor sand and gravel horizons. The thickness of the till deposits in the Wallkill area may exceed 30 feet. The glacial till overlies shale bedrock that has been folded and faulted during several tectonic episodes.

2.4 SURFACE WATER HYDROLOGY

Surface waters within the Study Area include several storm water retention basins , Phillipsburg Creek, and the Wallkill River (Lower Hudson River watershed). Three first-order active stream channels (Western Stream, Pond Stream, and Eastern Stream) located on the Revere property combined flow into Phillipsburg Creek in OU3. These streams best represent a rocky headwater stream cover type as defined in Edinger et al. (2014). The Western Stream flows along the western side of the facility from north to south and crosses underneath the railroad tracks approximately 225 feet east of Ballard Road (Sheet 1). The Western Stream continues to flow along a generally southern heading through the Revere property south of the railroad tracks. Based upon visual observations of surface water flow, the Western Stream is assumed to be a net gaining stream. The stream is classified as a marsh headwater stream characterized by well-defined patterns of alternating pool, riffle, and run sections with moderate flow.

The railroad pond located southeast of the facility operations has a single discharge point (Pond Stream) which flows intermittently along a generally western heading from the pond for approximately 250 feet before changing to a more southern heading and crossing underneath the railroad tracks (approximately 700-feet east of Ballard Road). The Pond Stream intersects and supplements the flow from the Western Stream within OU1 south of the railroad tracks.

The Eastern Stream is located approximately 500 feet east of the railroad pond, flows in a southerly direction, and crosses underneath the railroad tracks and onto the SP Realty Associates II LLC property (Tax Parcel 60-1-120.2) approximately 1,900-feet east of Ballard Road. The Eastern Stream joins the Western and Pond Streams south of their confluence in OU1 to form Phillipsburg Creek, a second-order stream.

Phillipsburg Creek continues on a generally southwestern heading into OU3, receiving storm water runoff from manufacturing and truck parking areas on both the 260 Matrix Ballard LLC (Tax Parcel 60-1-120.1) and the Old Dominion Freight Line, Inc. (Tax Parcel 60-1-120.3) properties, and crosses underneath Ballard Road approximately 0.5 mile south of the entrance to the Revere facility. On the western side of Ballard Road, Phillipsburg Creek travels along a southwestern heading within property owned by Crystal Run Newco LLC (referred to as the Galleria at Crystal Run property; Tax Parcel 78 1-92), where it intersects with the discharge streams from three ponds located on the same property. Based on aerial imagery, Phillipsburg Creek passes underneath I-84 approximately 0.3 mile southwest of the Ballard Road/I-84 overpass and continues towards the Wallkill River located approximately one mile south of the Revere facility. During previous sampling events, WSP noted at least two additional distinct surface water inputs to Phillipsburg Creek within the Galleria at Crystal Run property. One of the intersecting streams appears to drain all or a portion of several commercial and industrial properties west of Ballard Road and north of the Galleria at Crystal Run (Mall Stream). A second intersecting stream appears to contain runoff from I-84 that drains from the elevated highway embankment to the south.

In 2014, the NYSDOT completed improvements to the interchange between State Route 17 and Crystal Run Road. During construction, Phillipsburg Creek was realigned, resulting in significant disturbance to the surface soil and sediments in Phillipsburg Creek west of Route 17.

The streams in the Phillipsburg Creek drainage system have well defined channels that contain long runs and short riffles with a few, interspersed shallow pools (maximum depth 6-inches). The streams range from 5 to 12 feet in width with vegetated banks that range from 2 to 4 feet in height. Substrate materials range from small gravel to large cobble to small boulders, and the gradients are low to moderate upstream of the site and moderate to steep downstream of the site.

All reaches of the streams within the Revere property and Phillipsburg Creek are designated as Class C waters - C(T) Standard (6 NYCRR Parts 701 and 897). As defined by this classification, the best usage of Class C waters is fishing. Based on the classification, these waters shall be suitable for fish propagation and survival, and the water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. The Symbol (T) appearing after any standard designation, as is the case for Phillipsburg Creek, means that the designated waters are trout waters.

The section of the Wallkill River within the Study Area is classified as a Class B water (www.dec.ny.gov/gis/erm). As such, the best usage of Class B waters is primary (swimming) and secondary (boating) contact recreation and fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival. There are multiple public access points and boat launches along the Wallkill, including a boat launch just west of the confluence of Phillipsburg Creek with the Wallkill, which provide opportunities for activities such as kayaking/canoeing, boating, and fishing.

2.5 TOPOGRAPHY

The surface topography[5] in the Study Area generally slopes towards Phillipsburg Creek, starting at an elevation of approximately 472 feet above mean sea level (AMSL) at the edge of the OU1/OU3 boundary (Sheet 1) on the Old Dominion property to an elevation of approximately 352 feet AMSL where Phillipsburg Creek meets the Wallkill River. In the upstream portions of the Study Area on the Crystal Run property, the surface topography near Phillipsburg Creek is relatively flat, with elevations ranging from approximately 460 feet AMSL near Galleria Drive and decreasing down an embankment to an elevation of approximately 448 feet AMSL adjacent to the storm water ponds and Phillipsburg Creek. A steep rise that defines the 100-year floodplain is observed to the northwest of Phillipsburg Creek on the Crystal Run property (Sheets 2 and 5).

The elevation of I-84 and the associated on and off ramps are slightly higher than the surrounding topography, with man-made slopes to the north and south that direct storm water discharge to Phillipsburg Creek. Through the NYSDOT right-of-way (ROW; Tax Parcel 0-0-0) south of I-84 and the Courtyard property, the topography is relatively flat. There is a slight elevation change from approximately 452 to 440 feet AMSL from the commercial properties to the east towards the floodplain of Phillipsburg Creek (Sheets 3 and 6).

As shown on Sheets 4 and 7, the topography south of Route 17 is much steeper due to the development of the Medical Center property and the previously completed NYSDOT realignment of Route 17/East Main Street. The Medical Center property is located at an elevation approximately 40 feet higher than Phillipsburg Creek. On the east side of Phillipsburg Creek, the topography slopes from an elevation of approximately 424 to 400 feet AMSL at Phillipsburg Creek. South of East Main Street, the topography is generally flat with a slight slope towards the Wallkill River.

2.6 GROUNDWATER

Two water-bearing horizons underlie the Revere facility, although only one results in any appreciable flow of groundwater. The uppermost, unconfined horizon is associated with the glacially deposited till and/or reworked till materials. This water-bearing zone extends to the top of the underlying bedrock surface. The glacial and reworked till deposits are hydraulically connected based on historical groundwater elevation data. The glacial till is generally poorly sorted with low porosity and permeability, whereas the anthropogenic and reworked materials are generally coarser in nature, and are assumed to be slightly more permeable and porous.

The bedrock also contains groundwater, although to a much smaller degree than the surficial unit. Fractures, jointing, and secondary openings are the primary source of groundwater from these sedimentary bedrock units. Based on observations of recharge rates following monitoring well purging, the degree of interconnectivity of these fractures is believed to be low. As a result, little flow is expected to occur through the bedrock water-bearing unit.

Revere routinely collects groundwater quality samples from monitoring wells installed in the unconsolidated and bedrock aquifer system in accordance with the Groundwater Monitoring Plan (GWMP) developed for the site (WSP 2018). Revere currently has 34 active groundwater monitoring wells (21 overburden wells and 13 bedrock wells) located within the

[5] Topographic information obtained from 2-Foot Contours of Orange County NY created using the USGS 3 County LiDAR Collection, and obtained from the NYS GIS Clearing House (https://gis.ny.gov/elevation/contours/contours-orange.htm).

boundaries of OU1 and OU4. In addition, one barrier wall piezometer (PZ-13) is included in the groundwater sampling program. Based upon historical groundwater elevation data collected from existing monitoring wells, groundwater flow in the unconsolidated aquifer is to the south–southeast towards the Wallkill River. Groundwater flow in the bedrock aquifer also appears to flow south–southeast.

Data indicate affected groundwater has not migrated beyond the limits of OU1; therefore, groundwater is not considered a media of concern in OU3.

2.7 FRESHWATER WETLANDS

The presence of freshwater (palustrine) wetlands in the Study Area was evaluated through a review of applicable state and federal wetland mapping and the OU1/OU4 jurisdictional delineation completed in 2011. The New York State Freshwater Wetlands (NYSFW) map presents the boundaries of wetlands identified and regulated by the NYSDEC. Two state regulated wetlands were identified within 0.5 miles of the site: GO-47 (the OU1/OU4 jurisdictional wetlands) and GO-15 (west of the Revere property on the Mall Stream; Sheet 1). GO-15 is approximately 35.1 acres in size and has large wetland check zone around the mapped boundary that indicates this wetland may be larger than depicted. Wetland GO-47 was remediated and restored in 2016 and is currently undergoing annual monitoring.

New York State classifies the wetlands identified on the NYSFW mapping into one of four separate classes that rank wetlands according to their value to perform wetland functions and provide attributed wetland ecosystem benefits (6 NYCRR Part 664). Class I wetlands have the highest functional value rank, and the ranking descends in performance through Classes II, III and IV. Wetlands GO-47 and GO-15 are designated as Class II wetlands.

Numerous National Wetlands Inventory (NWI) wetland habitats were identified within 2 miles of OU1/OU4, including several in similar locations (significant overlapping) as the state-regulated wetlands. The NWI maps have no regulatory significance, but provide a secondary indication of areas with a high probability of meeting the federal criteria for jurisdictional wetlands regulated by the U.S. Army Corps of Engineers. Most of the NWI wetlands in the Study Area are designated as palustrine (P), emergent (EM), forested (FO), mixed EM/scrub-shrub (SS), or unknown bottom – open water (UB) on the NWI mapping. The subclass for each wetland class is 1 (persistent for EM and broad-leaved deciduous for SS and FO), with hydrology modifiers ranging from C (seasonal) to E (seasonal saturated) to F (semi-permanent) to H (permanent). Special modifiers for the NWI wetland classifications are h (diked/impounded) and x (excavated).

Several wetlands are located within the mapped 100-year floodplain of Phillipsburg Creek in the Study Area, including the 59.29 acres of jurisdictional wetlands in OU1/OU4 (GO-47). Approximately 24.5 acres of wetland habitats (PEM1/SS1E and PFO1E) are located on several properties, including the Galleria at Crystal Run property, property owned by the NYSDOT, and properties owned by TPI Industries (265 Ballard Road, Tax Parcel 78-1-81) and iStorage Self Storage. Some of the wetland areas depicted on Sheet 1 are currently developed for commercial uses. Approximately 1.09 acres of wetland habitats (PFO1A) are located at the confluence of Phillipsburg Creek with the Wallkill River.

3 REMEDIAL INVESTIGATIONS

RI activities in OU3 were first initiated in 2008 and were conducted in various phases through November 2016. Table 2 includes a list of all surface soil and sediment samples that were collected in the OU3 Study Area. The table includes the horizontal coordinates for each sample location and sample depth. In accordance with the 2008 RI/FS work plan, work plan modifications, and subsequent work plans, a subset of the surface soil and sediment samples in OU3 that were analyzed for lead and arsenic were submitted for Target Analyte List (TAL) metals analysis or the full Target Compound List (TCL)/TAL list analysis. All data collected during the RI are included the June 9, 2017 RI Summary Report (WSP 2017).

3.1 SUMMARY OF OU3 REMEDIAL INVESTIGATIONS

The initial RI/FS work plan for OU3 was submitted to the NYSDEC in July 2008. At the time, OU3 was defined as all offsite environmental media and included areas north (North Border) and east (East-Forested Wetland) of the main plant, the offsite area west of Ballard Road (West of Site), and the portion of the site south of the railroad tracks. The area south of the railroad tracks was divided into two study areas to be sampled using a phased approach - the Southern Parcel and the South Outside Parcel. OU1 was defined as all onsite areas not included in OU4 and did not include the North Border, East-Forested Wetland, the Southern Parcel, or the South Outside Parcel. OU1 was redefined in the 2011 Order to include these four areas.

Based on investigations completed in OU1, the primary compounds and media of concern in OU3 are arsenic and lead concentrations above their respective Standards, Criteria, and Guidelines (SCGs) in soil and sediment. The following SCGs were utilized as screening values where applicable during the RI process:

- The unrestricted use SCOs for soil COCs under 6 NYCRR Part 375-6.8(a)
- Soil RGs for Ecological Areas in OU1
- Sediment guidance values (SGVs) listed in the NYSDEC Commissioner's Policy 60 (CP-60) Screening and Assessment of Contaminated Sediment

The 2011 Consent Order defines Ecological Areas in OU1 as areas delineated as wetlands in the proximity of the Western Stream and within OU1 south of the railroad tracks to the east of Ballard Road, with the final definition of Ecological Areas dependent upon a wetland delineation approved by the NYSDEC during the design of the Remedial Action (RA) for OU1. During the Phase IIB RA, Ecological Areas were subject to site-specific RGs for soil of 13 milligrams per kilogram (mg/kg) for arsenic and 400 mg/kg for lead, as derived from soil analytical data and biota tissue sampling as protective of ecological resources. Sediment Areas in OU1 were defined as permanent or nearly permanent water bodies and streams that were impacted by Revere's operations to the east of Ballard Road. Deposits within Sediment Areas up to a depth of 2 feet were considered to be sediments (for cleanup criteria selection), while material below 2 feet was remediated to the site-specific RGs for soil in Ecological Areas. Given the extensive soil and sediment remediation completed in OU1 (upstream of OU3) and the similarities in predominant land usage and characteristics between OU1 and OU3 (i.e., densely wooded and undeveloped parcels), the OU1 site-specific soil RGs for lead and arsenic were utilized to guide the various phases of the OU3 RI.

The following is a timeline of previous submittals and regulatory approvals for OU3 as defined before the 2011 Order:

- In July 2008, the NYSDEC approved the RI/FS work plan and the CPP. This work plan included a background soil evaluation; surface and subsurface soil sampling at six locations in the West of Site Area; a two-phased approach based on a grid-spacing of 50-feet in the Southern Parcel and South Outside Parcel (Phase I involved soil sampling at 100-foot node points, extending the sampling an additional 200-feet based on initial results; Phase II included soil sampling at 50-foot node points around locations with surface soils in excess of the lead screening level); soil sampling the East-Forested Wetland and North Border areas using the same gridded approach; sediment sampling in the western, eastern, pond, and combined streams using a 150-foot sampling interval; surface water sampling in the eastern, western, and combined streams; and groundwater sampling of newly installed wells in the South Outside Parcel. In addition, the work plan included Step 1 of the FWIA for OU3 (as previously defined).
- A public meeting was held in September 2008; soil, sediment, and surface water samples were collected on properties owned by Revere in September and October 2008; and interim sampling results were provided to the NYSDEC in December 2008 (WSP 2008e) and January 2009 (WSP 2009). As agreed to by the NYSDEC, no soil samples were

collected on the developed portions of Tax Parcel 60-1-120. In addition to the sediment samples proposed in the work plan, two sediment samples were collected from Phillipsburg Creek approximately 100 and 250 feet south of I-84.

— Based on the results of the 2008 sampling, WSP proposed modifications to the scope of work in the RI/FS work plan, including further vertical delineation of lead in soil in the North Border, East-Forested Wetland, and Southern Parcel areas; sampling of the South Outside Parcel on a 250-foot node point frequency and at intervals consistent with the definition of surface soil in DER-10, additional sampling in the East Extended Study Area; and additional soil sampling of four transects in the South Parcel and three transects in the South Outside Parcel to refine the limits of heavily impacted soil near the pond and combined streams (WSP 2009). The NYSDEC approved these modifications with conditions in a letter dated April 7, 2009.

— In March 2010, WSP submitted an RI report for OU3 (as previously defined) detailing the results of investigation activities conducted from September 3, 2008, through December 16, 2009 (WSP 2010a). In a letter dated August 26, 2010, the NYSDEC provided comments on this report and included a requirement to submit a supplemental work plan to further characterize the contamination present in OU3 (as previously defined) and to complete the soil and sediment sampling scope of work approved under the March 6, 2009 RI Work Plan Modifications for OU3 (WSP 2009). Field investigation activities related to the supplemental work plan were conducted from October 12, 2010 through December 16, 2010. A large portion of the sampling was conducted in areas of the site that now fall under the definition of OU1.

— In October 2010, WSP submitted a FWIA for OU3 (as previously defined). The FWIA was conducted according to the 1994 NYSDEC guidance document entitled Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (NYSDEC 1994). The FWIA included an evaluation of the potential impact of site-related constituents of concern on fish and wildlife resources (WSP 2010b).

Subsequent to the supplemental RI work plan, the February 2011 Order that redefined the limits of OU3 was signed. Therefore, prior RI work completed for OU3 (as previously defined) in the North Border, East-Forested Wetland, Southern Parcel, and South Outside Parcel areas became part of OU1. To minimize confusion, WSP presented the investigation findings for these areas in a report entitled, Remedial Investigation Report Addendum, Operable Unit 1, dated March 31, 2011 (WSP 2011b).

The following activities were completed after OU3 was redefined in the 2011 Order:

— Field work activities for the supplemental work plan were completed in October 2011, and the data that were applicable to OU3 were submitted to the NYSDEC in May 2012 (WSP 2012). In August 2012, the NYSDEC requested additional sediment sampling in Phillipsburg Creek downstream of the Galleria at Crystal Run property (Tax Parcel 78-1-92). A subsequent sampling work plan including nine additional sediment samples to investigate the potential historical contribution of lead from the drainage embankments north and south of I-84 and to further define the extent of lead, arsenic, and/or other metals in Phillipsburg Creek was submitted in September 2012 and approved by the NYSDEC in November 2012. Six composite sediment samples were included as part of the Step 2C FWIA; one from each stream reach.

— WSP submitted the additional sediment sampling data to the NYSDEC in March 2013 for review (WSP 2013). The NYSDEC requested additional sampling of Phillipsburg Creek further downstream in June 2013. Additional samples were collected in May 2014 and the data submitted to the NYSDEC in July 2014.

— In January 2015, the NYSDEC requested additional sediment and floodplain sampling in OU3. On behalf of Revere, WSP submitted an additional RI/FS Work Plan – Operable Unit 3 dated May 4, 2015 (2015 Work Plan), proposing floodplain soil and sediment sampling in the portions of OU3 west and south of Ballard Road. Prior to formal approval of the 2015 Work Plan, Revere received permission to collect soil and sediment samples at the 758 E. Main Street property (Tax Parcel 8-1-34.4). These samples were collected in September 2015; the NYSDEC provided approval of the Work Plan with modifications in November 2015, and Revere accepted the proposed modifications in November 2015. The remainder of the outstanding field work for this phase of the OU3 RI was completed in October and November 2016.

In total, during the OU3 RI, WSP collected sediment samples at 65 locations and surface soil samples at 83 locations within the floodplains of Phillipsburg Creek and the Wallkill River. For all phases of the OU3 RI, an approximate interval of 150 feet along the stream reach was used to guide the placement of sediment sampling locations. Sampling locations were adjusted as necessary to obtain sediments from depositional areas within the stream. Sediment samples were collected from 0 to 3 inches unless otherwise noted.

Floodplain samples were collected at depth intervals of 0 to 2, 0 to 6, 6 to 12, and 12 to 24 inches or until refusal. Samples were collected from each side of Phillipsburg Creek approximately 50-feet perpendicular to the stream channel at the approximate locations of previously collected sediment samples, corresponding to a sampling frequency of one set of samples per 150 linear feet of stream. In locations where the 100-year floodplain was less than 50-feet from the stream bank, the soil sample was collected at the limit of the 100-year floodplain.

Soil and sediment samples were collected from six transects spanning the Wallkill River in 2016. One transect was located at the confluence of Phillipsburg Creek with the Wallkill River, one transect was located approximately 150 feet upstream of the confluence, and four transects were located at approximately 150-foot intervals downstream of the confluence. Each transect included soil samples collected from 0 to 6, 6 to 12, and 12 to 24 inches approximately 50 feet from the edge of either bank of the river, and sediment samples from similar intervals at three locations of depositional areas within the river itself. At the time of the event, the water level in the river was at normal low levels.

3.2 NATURE AND EXTENT OF CONTAMINATION

The primary transport mechanism for arsenic and lead found in floodplain soils and sediments within the Study Area appears to be sediment transport via surface water flow within Phillipsburg Creek. The arsenic and lead concentrations detected in soil and sediments exhibit a general pattern of decreasing concentration with increased distance from the facility. Additional contribution of lead and arsenic to the study area associated with historic sources has not been ruled out; leaded gasoline was commonplace through the early 1980s, the area has an industrial history including manufacture of gunpowder during the Revolutionary War on the 758 E. Main Street property, and storm water runoff from nearby highways and contaminated fill in isolated areas cannot be ruled out.

3.2.1 CONTAMINANTS OF CONCERN AND APPLICABLE ENVIRONMENTAL MEDIA

As described in Section 3.1, COCs in the Study Area with elevated concentrations include arsenic and lead. Lead and arsenic are considered the primary COCs emanating from the Revere facility based on laboratory and X-Ray Fluorescence (XRF) data collected during the OU1 and OU3 RIs. Lead is the principal component of process waste material generated at the site and is the indicating parameter of facility-related impacts. Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, or polychlorinated biphenyl compounds (PCBs) are not COCs in OU3 (WSP 2017).

As described in Section 2.6, data does not indicate that affected groundwater on the Revere site has migrated to OU3; therefore, groundwater is not an affected media for the purposes of this FS. Total and dissolved lead and arsenic were not detected above reporting limits in a surface water sample collected from OU3 (WSP 2019).

Elevated concentrations of arsenic and lead were detected in the surface soil and sediments within OU3 as described in more detail in Sections 3.2.2 and 3.2.3.

3.2.2 OU3 PHILLIPSBURG CREEK FLOODPLAIN SOIL

The concentrations of arsenic and lead in floodplain soil generally decrease as the distance from the Revere site increases (Sheets 2 through 7). Downgradient of I-84, arsenic or lead was detected above the RGs (see Section 4.2) at only six of 47 locations, with the highest concentrations detected at location WSP-OU3-38.

Arsenic or lead were only detected above the Ecological Area RGs in two locations below 12 inches (WSP-OU3-24 and WSP-OU3-60). WSP-OU3-24 is located adjacent to I-84 and the lead results at this location are markedly different from the samples collected from upstream locations on both sides of the stream. The lead concentrations at WSP-OU3-24 are two orders of magnitude higher than concentrations in adjacent samples (e.g., WSP-OU3-20 and WSP-OU3-22), and elevated concentrations persist at deeper intervals for WSP-OU3-24, whereas, the concentrations decline with depth for upstream locations. These data indicate a source other than the Revere site, likely contaminated fill or lead deposition associated with I-84. Elevated concentrations of lead detected at location WSP-OU3-60 may have also been greatly influenced by the 2013/2014 roadway construction by the NYSDOT. A temporary stream channel was created during the roadway work, and after construction was completed, the stream channel was restored to the original alignment. This location may have been significantly disturbed by the construction work and likely does not represent natural depositional conditions based on results for nearby sampling locations.

Floodplain soil samples were submitted for TAL metals analysis. In addition, two floodplain soil samples (WSP-OU3-11 and WSP-OU3-35) were submitted for the full TCL/TAL list. The samples collected from locations WSP-OU3-18, WSP-OU3-38, and WSP-OU3-67 contained metals (arsenic, lead, manganese, and zinc) above the 6 NYCRR Part 375-6.8(a) unrestricted use SCOs, but only arsenic and lead were detected above the RGs (refer to Section 4.2) at location WSP-OU3-38. The elevated concentration of manganese above unrestricted SCOs provides further evidence that the lead concentrations detected at WSP-OU3-38 are attributable to a source other than Revere, as manganese is not a COC.

3.2.3 OU3 PHILIPSBURG CREEK SEDIMENT

Throughout the OU3 RI, sediment samples were collected at 45 locations along Phillipsburg Creek, generally west and south of Ballard Road. Prior to 2011, sediment samples were only analyzed for lead (except for samples collected at locations WSP-SED-I-84-01 and WSP-SED-29, which were also analyzed for TAL metals). After 2011, all sediment samples were analyzed for arsenic and lead. In total, sediment samples collection from 12 locations were submitted for TAL metals analysis.

Like floodplain soils, the concentrations of arsenic and lead in sediment decreases as the distance from the Revere property increases (Sheets 2 through 7). Class A freshwater SGVs were exceeded for arsenic, cadmium, copper, lead, nickel, and zinc. However, Class B freshwater SGVs were only exceeded for arsenic and lead. Arsenic was detected above the Class A freshwater SGV of 10 mg/kg in 21 of 35 Philipsburg Creek sediment sample locations analyzed for arsenic, but above the Class B freshwater SGV of 33 mg/kg in only four sample locations. The arsenic concentration above the Class A freshwater SGV ranged from 10.2 to 159 mg/kg, with the highest concentrations at locations WSP-SED-51 and WSP-SED-52. All four sample locations that contained arsenic above the Class B criteria were in the reach of Phillipsburg Creek south of I-84 and east of Route 17.

Lead was detected above the Class A freshwater SGV of 36 mg/kg in 43 of 45 sample locations, but only above the Class B freshwater SGV of 130 mg/kg in samples collected at 26 locations. The lead concentration above the Class A freshwater SGV ranged from 37.3 to 5,890 mg/kg, with the highest concentrations at locations WSP-SED-32 (4,550 mg/kg), WSP-SED-51 (5,890 mg/kg), and WSP-SED-52 (3,420 mg/kg). It should be noted that all three of these locations were resampled in 2016 and the concentrations decreased to 80.3, 552, and 75.9 respectively, which may be attributable to the increase in thickness of the sampling interval (from 0 to 3 inches or 0 to 6 inches). None of the samples collected from the six most downstream locations (WSP-SED-55 and WSP-SED-64 through WSP-SED-68) contained lead above the Class B freshwater SGV, and only five out of the eight remaining locations south of Route 17 contained lead above the Class B freshwater SGV.

3.3 MIGRATION PATHWAYS, EXPOSURE ROUTES, AND POTENTIAL RECEPTORS

Prior management of lead-bearing materials and/or the use of end-of-process slag as fill and the release of fugitive emissions associated with historical operations resulted in the deposition of materials via air and water. This led to elevated concentrations of arsenic and lead in the soil adjacent to, and sediments within, the streams on the Revere property. Over time, these sediments were transported downstream into Phillipsburg Creek in OU3. Impacted floodplain soil in OU3 is likely the result of overland flow of sediments containing lead and arsenic during flooding events from Phillipsburg Creek prior to implementation of the OU1 RD/RA.

The OU3 FWIA Steps 1, 2A, and 2B study included a comprehensive assessment of potentially site-affected environmental media and flora and fauna through the sampling and analysis of soils, sediments, and surface water. The pathways analysis conducted under Step 2A identified potential exposure pathways to plants and wildlife through ingestion of surface soil and sediments and via food chain exposure. Potential risks were identified to both aquatic and terrestrial receptors based on the identified completed exposure pathways and comparison of lead and arsenic sampling in soil, sediment, and surface water to published ecologically based SCGs in Step 2B.

3.3.1 SOIL

The long-term, major exposure pathways of concern for soil include direct contact with the COCs in the upper one foot of impacted surface soils, the migration of the COCs to groundwater from impacted subsurface soils greater than 1-foot below ground surface (bgs), the transport of the COCs to surface waterbodies from the run-off of impacted soil, and the movement and redistribution of impacted soil that could result in the exposure of aquatic biota to elevated concentrations of the COCs.

The soil to air pathway will be a short-term pathway of concern during the implementation of the selected remedy due to dust generation while excavating impacted soil. Best management practices for dust suppression during the remedial action, i.e., water spray, will be used to control the generation of COC-impacted dust.

3.3.2 SEDIMENT

Impacted sediments in OU3 consist of materials that have been transported naturally downstream from OU1. The source of sediments in OU1 was erosion from the process waste/fill areas to waterbodies, including the western stream, the railroad pond, and the stream emanating from the railroad pond. These sediments have been transported to aquatic environments where they potentially affect water quality and the streambed substrate, thereby posing risks to aquatic biota. The exposure pathway of concern for sediment is the movement and redistribution of impacted sediments that could result in the exposure of aquatic biota to elevated concentrations of the COCs.

4 REMEDIAL GOALS AND REMEDIAL ACTION OBJECTIVES

RAOs are medium-specific and/or operable unit-specific goals for the protection of human health and the environment, and are developed based on contaminant-specific SCGs. RAOs specific to soil and sediment in OU3 are presented below, followed by proposed site-specific RGs used to assess achievement of the RAOs.

4.1 REMEDIAL ACTION OBJECTIVES

RAOs are defined in DER-10 as "medium or operable unit-specific objectives for the protection of public health and the environment and are developed based on contaminant-specific SCGs to address contamination identified at a site". When establishing RAOs, the following must be considered:

- applicable SCGs, considering the current, intended and reasonably anticipated future use of the site and its surroundings
- all contaminants exceeding applicable SCGs
- environmental media impacted by such contaminants and all actual or potential human exposures and/or environmental impacts resulting from the contaminants in environmental media
- extent of the impact to the environmental media, and
- any site-specific cleanup levels developed during the RI/FS process

The RAOs proposed for OU3 are designed to address risks associated with the direct contact exposure pathway in soil and sediment, the soil to air exposure pathway, and the soil to groundwater exposure pathways for the COCs as follows:

- Prevent ingestion/direct contact with contaminated soil or sediments
- Prevent inhalation exposure to contaminants from soil during implementation of any excavation remedy
- Prevent migration of contaminants that would result in groundwater, surface water, or sediment contamination
- Prevent surface water contamination which may result in fish advisories
- Prevent releases of COCs from sediments that would result in surface water levels in excess of ambient water quality criteria
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial, marine, or aquatic food chains
- Restore sediments to pre-release/background conditions to the extent feasible

4.2 REMEDIAL GOALS

RGs are defined in DER-10 as the statutory or regulatory remedial action goals for remedial actions undertaken pursuant to DER-10 as set forth in applicable regulations. The applicable regulations for this site include 6 NYCRR Part 375 Subparts 375-1 to 375-4 and 375-6. At a minimum, the recommended remedy will eliminate or mitigate threats to public health and the environment presented by the contaminants originating from the Revere facility through the proper application of scientific and engineering principles.

Based on previous phases of investigation in OU3, and remediation completed in OU1, the primary compounds and media of concern in OU3 are arsenic and lead concentrations above their respective SCGs in soil and sediment. Sediment areas in OU1 were defined as permanent or nearly permanent water bodies and streams that were impacted by Revere's operations to the east of Ballard Road. Given the similarities in predominant land usage and characteristics between OU1 and affected areas of OU3, the definition of sediments and soil that were used during the OU1 RD/RA will also apply to OU3. The horizontal extent of sediments within the stream corridor for OU3 is considered to be from bankfull to bankfull on both sides of the stream. Deposits within sediment areas up to a depth of 2 feet are considered to be sediments (for cleanup criteria selection), while material below 2 feet will be remediated to the site-specific remedial goals for soil in Ecological Areas.

The following SCGs have been selected as the RGs for OU3:

— The NYSDEC site-specific criteria of 13 mg/kg for arsenic and 400 mg/kg for lead in soil

— Class A freshwater SGVs of 10 mg/kg for arsenic and 36 mg/kg for lead listed in the NYSDEC Commissioner's Policy 60 (CP-60) Screening and Assessment of Contaminated Sediment

The 6 NYCRR Part 375-6.8(a) unrestricted use SCOs represent the generic standards developed by the NYSDEC for the protection of ecological resources. During the OU1 remedial action, the NYSDEC developed site-specific soil SCOs through a biota study conducted in OU1. These site-specific soil SCOs were determined to be sufficiently protective of ecological resources and are also applicable for OU3. These site-specific criteria achieve all 6 NYCRR Part 375-6.8(a) restricted use SCOs for lead and arsenic.

In accordance with DER-10, if concentrations in environmental media exceed the 6 NYCRR Part 375-6.8(a) unrestricted use SCOs, SCOs based on protection of health should also be considered. Therefore, 6 NYCRR Part 375-6.8(a) unrestricted use SCOs are also provided for evaluation of alternatives in this report.

4.3 SOIL VOLUME EXCAVATION ESTIMATES TO ACHIEVE RAOS

Estimated volumes of affected soil and sediment to be excavated from OU3 to achieve RGs (Sections 4.2 and 7.2) or 6 NYCRR Part 375-6.8(a) unrestricted use SCOs and Class A SGVs (Section 7.3) were calculated based on the OU3 RI investigation results (Table 3). Phillipsburg Creek sediment and floodplain soil within OU3 exceed RGs on seven different properties (Table 2). Accordingly, the soil and sediment excavation volume estimates assume that COC-impacted material will be excavated on each affected property. Assumptions used to estimate soil volumes to meet RGs (Alternative 2, Section 7.2) and NYCRR Part 375-6.8(a) unrestricted use SCOs and Class A SGVs (Alternative 3, Section 7.3) are presented in Sections 4.3.1 and 4.3.2 below, respectively.

4.3.1 EXCAVATION ASSUMPTIONS TO MEET RGS

The limits of soil excavated to meet RGs were based on the results from the previous OU3 RIs (Section 3). Estimated volumes are presented in Table 3, while excavation areas are illustrated on Sheets 2 through 4. Assumptions utilized to calculate estimated excavation volumes to meet RGs are as follows:

— If a soil or sediment sample was collected that did not exceed the RGs, excavation is not required.

— If soil concentrations exceed the RGs, the soil would be removed to the top of the underlying clean interval. If no clean sample was collected, then excavation would proceed a minimum of 0.5-feet below the deepest collected sample.

— Sediments within Phillipsburg Creek would be removed to a minimum of 1-foot. If data indicate deeper excavation of sediment was required, then excavation would proceed a minimum of 0.5-feet below the deepest sample collected that contained lead or arsenic above the SGVs.

— Lateral excavation limits were determined as halfway between sample points.

— If no sample was available to bound the excavation laterally, the extent was estimated by the limits of the 100-year floodplain, surface topography, or land features.

4.3.2 EXCAVATION ASSUMPTIONS TO MEET UNRESTRICTED USE SCOS AND CLASS A SGVS

The limits of soil excavated to meet NYCRR Part 375-6.8(a) unrestricted use SCOs and Class A SGVs were based on the results from the previous OU3 RIs (Section 3). Estimated volumes are presented in Table 3, while excavation areas are illustrated on Sheets 5 through 7. Assumptions utilized to calculate estimated excavation volumes to meet NYCRR Part 375-6.8(a) unrestricted use SCOs and Class A SGVs are as follows:

— If a soil or sediment sample was collected that did not exceed the unrestricted use SCOs, excavation is not required.

— If soil concentrations exceed the NYCRR Part 375-6.8(a) unrestricted use SCOs, the soil would be removed to the top of the next clean interval. If sampling does not indicate a clean interval, then excavation would proceed to a minimum of 0.5-feet below the deepest collected sample.

- Sediments within Phillipsburg Creek would be removed to a minimum of two feet. If data indicate deeper excavation of sediment was required, then excavation would proceed a minimum of 0.5-feet below the deepest sample collected that contained lead or arsenic above the SGVs.
- Lateral excavation limits were determined as halfway between sample points.
- If no sample was available to bound the excavation laterally, the extent was estimated by the limits of the 100-year floodplain, surface topography, or land features.

5 GENERAL RESPONSE ACTIONS

GRAs are activities completed in response to actual or potential health-threatening environmental events such as spills or releases of contaminants. GRAs are medium-specific and, for the COCs in soil and sediment in OU3, may include treatment, containment, excavation, disposal, institutional actions, or a combination of these.

5.1 NO ACTION

The National Contingency Plan (NCP) requires that No Action be included among the GRAs evaluated. No action means that no remedial response to the contamination is undertaken, activities previously initiated are abandoned, and no further engineered intervention occurs. Under the No Action response, monitoring of the contamination may continue.

5.2 INSTITUTIONAL AND ENGINEERING CONTROLS

Institutional controls include actions such as deed restrictions/environmental easements and property acquisition that would prevent human exposure to contaminants by controlling the property's use and restricting access. An example of a deed restriction would be to restrict residential development of the affected portion of the property and to note in the property deed that the site contains non-naturally occurring compounds and caution must be exercised when excavating the onsite soils. Institutional controls of this sort are potentially applicable to OU3. An example of an applicable engineering control would be perimeter fencing.

Institutional and engineering controls do not reduce the volume, toxicity, or mobility of COCs. Therefore, institutional and engineering controls generally have a medium degree of effectiveness, unless used in concert with other technologies. However, certain exposure pathways may be controlled or eliminated through institutional and engineering controls. The implementability of institutional and engineering controls is generally high but is often site-specific. The cost of institutional and engineering controls is low.

5.3 CONTAINMENT

Containment of contaminated soils and sediment is typically accomplished by the construction of a capping system that would prevent direct contact of the COCs by humans and wildlife. A low permeability cap would minimize infiltration of precipitation and consequently limit the generation and transport of contaminated leachate to groundwater. A soil cover would eliminate direct contact and reduce infiltration of precipitation. Caps minimize the erosion of contaminated surficial soils to adjacent surface water bodies. Caps can also include a horizontal drainage layer to direct infiltrating surface water away from the capped material and an erosion-resistant vegetated layer. Containment technologies do not reduce the toxicity or volume of contaminated soil, rather, the technology reduces risks associated with the contaminants by eliminating exposure pathways and reducing contaminant mobility.

5.4 EXCAVATION/TREATMENT

Excavation is a method of removal in which affected soils/sediments are mechanically removed and transported offsite to an appropriate permitted treatment or disposal facility. Soil/sediments with contaminant concentrations above the RGs would be removed to the extent necessary to achieve the RAOs. Excavation of soil/sediments would be completed using conventional construction equipment such as backhoes, excavators, front-end loaders, and dump trucks. Excavation and offsite treatment and/or disposal of COC-containing soils/sediments is generally an effective technology and has a high degree of effectiveness where feasible.

6 IDENTIFICATION AND SCREENING OF FEASIBLE TECHNOLOGIES

Table 4 presents a summary of the screening of identified technologies and process options that were selected based on their potential application to address arsenic and lead in soil and sediment in OU3. The following criteria were qualitatively evaluated for each remedial technology/process option and assigned a rank of low, moderate, or high for each criterion:

— Effectiveness: Interpretation of identified risk, achievement of RAOs, and potential for significant reduction of toxicity, mobility, or volume of the site-related COCs.

— Technical Implementability: Applicability of the technology to the site with full consideration of topographic, geologic, and hydrogeologic constraints. Technologies that are unproven or experimental are eliminated because their implementability is uncertain in comparison with readily available, proven technologies.

— Administrative Implementability: Applicability of the technology to the site with full consideration of legal and public constraints. Technologies that cannot be implemented at the site because of an overriding administrative issue were removed from further consideration.

— Cost: The costs of construction and long-term costs to operate and maintain the alternatives were considered. Costs that are grossly excessive compared to the overall effectiveness of the alternative are also considered.

The detailed screening was performed to provide a concise list of technologies/process options to be utilized in developing the potential remedial alternatives. The evaluation and assigned ranking for each technology/process option are relative to other technologies/process options that achieve the same RAOs. Technologies/process options were not evaluated independently for soil versus sediments.

6.1 NO ACTION

The No Action response serves as a baseline for comparison to other GRAs. Therefore, this GRA was retained for further evaluation.

6.2 INSTITUTIONAL AND ENGINEERING CONTROLS

Deed restrictions/environmental easements have been eliminated from the remedial alternatives evaluation because the human health direct contact exposure pathway will be removed and ecological resources protected through achievement of the RGs. Property acquisition was removed from consideration due to the number of affected property owners including the NYSDOT, from which acquiring property is likely not possible. In addition, fencing was removed from consideration due to the discontinuous spatial extent of the contamination over multiple properties. Neither property acquisition nor fencing will remove the potential for continued offsite migration of COCs.

6.3 CONTAINMENT

Due to the discontinuous distribution of contaminated floodplain soils in OU3, several areas of capping would be required. These areas could span multiple properties, resulting in technical and administrative challenges in terms of both construction and long-term maintenance. In addition, it would be technically infeasible to cap stream sediments in areas where bedrock is exposed. For these reasons, containment technology was eliminated from further consideration.

6.4 EXCAVATION/TREATMENT

The implementability of excavation is moderate to high due to the location and depth of the affected soil and sediment in OU3. The technical implementability of excavation is moderate in offsite areas along Phillipsburg Creek due to site access (i.e., areas of dense vegetation) and the potential for excavation within the median of highway I-84. The relative cost of soil and sediment excavation and offsite disposal is moderate to high compared to other technologies because materials can be placed in the existing containment cell on the Revere property, even though there are additional transportation costs to move the material to the Revere property. Excavation has been retained for further consideration because of the high effectiveness and technical/administrative implementability of the technology and the proven effectiveness of this technology during the OU1 RD/RA.

7 DEVELOPMENT AND DETAILED DESCRIPTION OF ALTERNATIVES

The technologies and process options that were retained in Section 6 represent either complementary or stand-alone measures, which when considered individually, may address one or more of the RAOs. This section assembles the candidate technologies and process options into three remedial alternatives to achieve the RAOs. Table 5 summarizes the remedial technologies and process options that comprise each alternative.

The names assigned to the alternatives are intended to convey the major components included within each that distinguish them from one another; however, the names do not convey all components included in each alternative. The following sections provide a detailed description of all actions that are proposed under each alternative. The three alternatives are arranged in order of increasing cost.

Technical details included in the following descriptions are intended for the purposes of cost estimates associated with the typical accuracy of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) compliant FS (i.e., -30 to +50 percent). Detailed cost estimates for each alternative are presented in Table 6.

7.1 ALTERNATIVE 1: NO ACTION

The No Action alternative includes no remedial action. The alternative includes periodic inspection of affected areas for accelerated signs of erosion or ecological exposures. A formal inspection plan would be prepared and submitted to the NYSDEC for approval. Monitoring frequency would be performed on an annual basis for 30 years. The cost estimate presented in Table 6 assumes the annual inspection of offsite areas in OU3 and a subsequent summary letter following each event.

7.2 ALTERNATIVE 2: EXCAVATION OF SOIL TO MEET RGs

Alternative 2 includes excavation of soil and sediments to meet the RGs (arsenic and lead concentrations in soil greater than the NYSDEC site-specific criteria of 13 mg/kg and 400 mg/kg, respectively, and sediments with arsenic and lead concentrations greater than Class A freshwater SGVs). Access agreements would be negotiated and additional investigation would be completed before the remedial design is finalized to better define excavation limits. The access agreements would be amended as necessary for full-scale construction.

Temporary bypasses would be constructed along Phillipsburg Creek to allow access to the sediments and underlying soil, if any, that would require excavation to achieve the RGs. Floodplain soils, and sediments/subsurface soils, associated with the Phillipsburg Creek OU3 study area that have COCs greater than the RGs would be excavated and transported to the Revere facility. Once the sediments/soils arrive at the Facility, they would be stabilized, as necessary to prevent leaching of lead and arsenic to groundwater, and placed in the onsite containment cell. The containment cell would be permanently covered once excavation associated with OU3 is complete. Phillipsburg Creek, the affected adjacent wetlands, and the disturbed upland areas would be reconstructed and vegetated with plantings similar to pre-excavation conditions.

Monitoring and maintenance of the restored creek, wetlands, and upland areas would be conducted for a minimum of six years until stabilized conditions have been established. The leachate collection system in the onsite containment cell would be maintained in accordance with the existing OU1 containment cell operations and maintenance (O&M) plan, and groundwater sampled in accordance with the GWMP to verify the containment cell is effectively preventing migration of arsenic and lead to groundwater.

The cost estimate presented in Table 6 assumes the excavation of approximately 4,100 cubic yards (cy) of soil and 2,700 cy of sediment from Phillipsburg Creek and the surrounding floodplain based on the assumptions described in Section 4.3. These values may be revised based on the results of the additional investigation but are estimated with expected accuracies of -30 to +50 percent (USEPA 2000) for the development of remedial alternatives for comparison in the FS process. Alternative 2 also includes additional monitoring and maintenance activities to ensure adequate restoration of the wetlands and Phillipsburg Creek. This estimate volume is within the remaining design capacity of the containment cell. Costs are not included for operation, maintenance, and monitoring of the containment cell, which are already included under the O&M Plan for the Containment Cell (ENTACT 2018) and GWMP (WSP 2018).

7.3 ALTERNATIVE 3: EXCAVATION OF SOIL TO UNRESTRICTED USE SCOS AND SEDIMENT TO CLASS A SGVS

Alternative 3 includes excavation of soil with arsenic and lead concentrations greater than 6 NYCRR Part 375-6.8(a) unrestricted use SCOs of 13 mg/kg and 63 mg/kg, respectively, and sediments with arsenic and lead concentrations greater than Class A freshwater SGVs. Access agreements would be negotiated and additional investigation would be completed before the remedial design is finalized to better define excavation limits. The access agreements would be amended as necessary for full-scale construction.

Temporary bypasses would be constructed along Phillipsburg Creek to allow access to the sediments and underlying soil, if any, that would require excavation to achieve the 6 NYCRR Part 375-6.8(a) unrestricted use SCOs or Class A freshwater SGVs. Floodplain soil from OU3 and sediments/subsurface soil from Phillipsburg Creek would be excavated, transported to the Revere facility, stabilized if necessary to prevent leaching of lead and arsenic to groundwater, placed in the onsite containment cell, and the containment cell covered. Phillipsburg Creek, affected adjacent wetlands, and disturbed upland areas would be reconstructed and vegetated with plantings similar to pre-excavation conditions.

Alternative 3 includes monitoring and maintenance of the restored creek, wetlands, and upland areas for a minimum of six years until stabilized conditions have been established. The leachate collection system in the containment cell would be maintained in accordance with the existing OU1 containment cell O&M plan, and groundwater sampled in accordance with the GWMP to verify the containment cell is effectively preventing migration of arsenic and lead to groundwater.

The cost estimate presented in Table 6 assumes the excavation of approximately 9,300 cy of soil and 5,300 cy of sediment from Phillipsburg Creek and the surrounding floodplain. These values may be revised based on the results of the additional investigation but are estimated with expected accuracies of -30 to +50 percent (USEPA 2000) for the development of remedial alternatives for comparison in the FS process. Alternative 3 also includes additional monitoring and maintenance activities to ensure adequate restoration of the wetlands and Phillipsburg Creek. This volume exceeds the remaining design capacity of the containment cell, so additional costs are included to modify the cell design to accommodate the additional volume. Like Alternative 2, costs are not included for operation, maintenance, and monitoring of the containment cell, which are already included under the OU1 O&M plan (ENTACT 2018) and GWMP (WSP 2018).

8 REMEDIAL ALTERNATIVE EVALUATION CRITERIA

This section presents information relevant to the selection of a remedial alternative for OU3. Potentially feasible technologies were identified and screened in Section 6 and the retained technologies were assembled in Section 7 into three remedial alternatives to achieve the RAOs. This section analyzes the three remedial alternatives with respect to criteria listed in DER-10 as set forth in 6 NYCRR 375-1.8(f). These criteria gauge the overall feasibility and acceptability of remedial alternatives. The results of the detailed evaluation of remedial alternatives will be used to aid in the recommendation of the appropriate alternative for implementation within OU3.

8.1 OVERALL PROTECTIVENESS OF PUBLIC HEALTH AND THE ENVIRONMENT

This evaluation criterion assesses whether the remedial alternative is protective of human health and the environment and relies on the assessments conducted for other evaluation criteria, including long-term and short-term effectiveness, and compliance with SCGs.

8.2 STANDARDS CRITERIA AND GUIDANCE

This evaluation criterion evaluates the ability of the remedial alternative to comply with the applicable SCGs. The following items are considered during the evaluation of the remedial alternative:

— compliance with chemical-specific RAOs

— compliance with location-specific RAOs

— compliance with action-specific RAOs

This evaluation criterion also addresses if the remedial alternative complies with other appropriate federal and state criteria, advisories, and guidance.

8.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

The evaluation of each remedial alternative relative to its long-term effectiveness and permanence is made considering the risks that may remain following implementation and completion of the remedy. The following factors will be assessed in the evaluation of the long-term effectiveness and permanence of the remedial alternative:

— impacts from residuals COCs at the completion of the remedial alternative

— the adequacy and reliability of controls (if any) that will be used to manage residual COCs

— the alternative's ability to meet the RAOs established for OU3

8.4 REDUCTION IN TOXICITY, MOBILITY OR VOLUME OF CONTAMINATION

This evaluation criterion addresses the degree to which remedial actions will permanently and significantly reduce the toxicity, mobility, or volume of the constituents present in OU3 through application of the technology. The evaluation focuses on the following factors:

— the technology and the amount of materials to be addressed through application of the technology

— the anticipated ability of the technology to reduce the toxicity, mobility, or volume

— the nature and quantity of residuals COCs that will remain after the technology is applied

- the relative amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled
- the degree to which the applied technology is irreversible

8.5 SHORT-TERM IMPACTS AND EFFECTIVENESS

The short-term effectiveness of the remedial action is evaluated relative to its effect on human health and the environment during implementation of the alternative. The evaluation of each alternative with respect to its short-term effectiveness will consider the following:

- short-term impacts to which the community may be exposed during implementation of the alternative
- potential impacts to workers during implementation of the remedial actions, and the effectiveness and reliability of protective measures
- potential environmental impacts of the remedial action and the effectiveness of mitigating measures to be used during implementation
- amount of time until protection is achieved

8.6 IMPLEMENTABILITY

This evaluation criterion addresses the technical and administrative feasibility of implementing the remedial alternative, including the availability of the various services and materials required for implementation. The following factors are considered during the implementation evaluation:

- Technical Feasibility: This factor refers to the relative ease of implementing or completing the remedial alternative based on site-specific constraints. In addition, the constructability and operational reliability of the remedial alternative are considered, as well as the ability to monitor the effectiveness of the remedial alternative.
- Administrative Feasibility: This factor refers to the feasibility of acquiring, and the time required to obtain, any necessary approvals and permits.

8.7 COST

This evaluation criterion refers to the total cost to implement the remedial alternative. The total cost of each alternative represents the sum of the direct capital costs (materials, equipment, and labor), indirect capital costs (engineering, licenses or permits, and the contingency allowances), and O&M costs. O&M costs may include operating labor, energy, chemicals, and sampling and analysis. These costs, which are developed to allow the comparison of remedial alternatives, are estimated with expected accuracies of -30 to +50 percent (USEPA 2000). Contingency factors of 10 and 20 percent, for Alternative 2 and Alternative 3, respectively, were included to cover unforeseen cost incurred during implementation.

A comparative cost estimate was prepared for each of the alternatives (Table 6). Unit prices for materials, equipment, and labor were selected from various sources, including product vendors, construction companies, and project-specific experience.

8.8 COMMUNITY ACCEPTANCE

These modifying criteria consider state and public comments provided during the RI/FS process. State acceptance will be part of the NYSDEC review and comment process. Community input regarding the OU3 FS will be solicited by the NYSDEC during the public comment period, during which time the FS report will be available for public review.

8.9 LAND USE

The land use remedy selection factor is used to assess remedial alternatives based on how the affected land is currently used, how the land is intended to be used, as well as future uses of the land and surrounding properties (6 NYCRR

Part 375-1.8(f)(9)). Considerations included within the land use remedy selection factor include the current, intended, and reasonably anticipated future land uses of the site and its surroundings.

9 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents a comparative analysis of relative performance of each alternative in relation to the nine specific evaluation criteria listed in Section 8. The purpose of the comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another, so that key trade-offs may be identified and evaluated. Differences between alternatives are measured either qualitatively or quantitatively, as appropriate, and substantive differences between alternatives (e.g., greater short-term effectiveness concerns, greater cost, etc.) are identified. A descriptive and comprehensive comparative analysis of each alternative relative to the evaluation criteria is presented on Table 7.

9.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The potential long-term risk to human health from exposure to COCs via direct contact is greatest for Alternative 1 and is significantly reduced under Alternatives 2 and 3 because much of the contamination will be removed under these alternatives. The short-term risk to human health via direct-contact is greater in Alternatives 2 and 3 than Alternative 1 due to dust generation during excavation, and is slightly higher in Alternative 3 than Alternative 2 because a greater volume of soil will be handled, though the concentrations of COCs in the additional material would be lower. Long-term protection of human health is comparable among Alternatives 2 and 3.

Alternatives 2 and 3 provide protection to ecological resources in Phillipsburg Creek and the adjacent wetlands by removing arsenic and lead that exceed Class A freshwater SGVs, which is defined as the level of above which impacts may be observed. Under Alternative 1, the risk remains for surface soils and sediments containing lead and arsenic to potentially serve as COCs to ecological resources in Phillipsburg Creek and the adjacent upland and wetland areas under current and some hypothetical future land use scenarios.

Alternative 2 provides additional ecological protection compared to Alternative 1 by removing soil to meet RGs. Alternative 3 provides the greatest level of ecological protection by removing the affected soils to meet 6 NYCRR Part 375-6.8(a) unrestricted use SCOs.

9.2 STANDARDS, CRITERIA, AND GUIDANCE

The developed alternatives focus primarily on lead and arsenic removal. Under Alternative 1, the chemical-specific RGs would not be met because lead and arsenic would remain in place in soil and sediment above the RGs. Under Alternative 2, RGs would be met for lead and arsenic for both soil and sediment, except where material is inaccessible. Soil removal to 6 NYCRR Part 375-6.8(a) unrestricted use SCOs would only be achieved under Alternative 3.

9.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Long-term effectiveness can be measured by examining the adequacy of each alternative. Alternative 1 does not meet the RAOs for lead and arsenic. Alternative 2 would offer long-term effectiveness and permanence at addressing lead and arsenic; however, it could necessitate increased annual maintenance over Alternative 3 in the form of site inspections. Alternative 3 completely removes lead and arsenic-affected soil at concentrations above 6 NYCRR Part 375-6.8(a) unrestricted use SCOs from OU3 and therefore, is inherently permanent relative to lead and arsenic in OU3 because O&M would not be required; the long-term care is transferred to OU1.

9.4 REDUCTION IN TOXICITY, MOBILITY OR VOLUME OF CONTAMINATION THROUGH TREATMENT

Alternative 1 will not reduce the toxicity, mobility, or volume of lead and arsenic-affected soil. Alternatives 2 and 3 will reduce the total volume of lead and arsenic-affected soil and sediment in OU3 by approximately 6,800 and 14,600 cy, respectively, through excavation, stabilization, and containment of soil with lead and arsenic above the RGs or 6 NYCRR Part 375-6.8(a) unrestricted use SCOs.

The cap on the containment cell would reduce the mobility of lead and arsenic by minimizing infiltration and preventing erosion, a reduction in toxicity would be realized through *ex situ* stabilization, and the leachate collection system would prevent migration of COCs to groundwater. The volume of affected soil in OU3 would be reduced; however, this material would be transferred to OU1.

9.5 SHORT-TERM IMPACTS AND EFFECTIVENESS

There will be no short-term impacts associated with Alternative 1; however, there will also be no beneficial effects. The type of short-term risks to human health and the environment are generally consistent for Alternatives 2 and 3, though slightly greater for Alternative 3 due to the increased time needed to implement the remedy. The risks result from activities associated with excavation, construction, and transportation. Excavation of soil can result in fugitive dust generation and direct contact with affected soil. However, engineering controls can be applied to reduce the production of dust, and health and safety measures can reduce direct contact with contamination.

9.6 IMPLEMENTABILITY

Alternative 1 involves no construction and, by definition, is easy to implement. Despite the potential for lengthy site access negotiations, significant schedule delays are not likely to occur during the implementation of Alternative 1.

There are limited uncertainties associated with soil removal under Alternatives 2 and 3 since excavation of the affected soil would be conducted using readily available equipment and the technology is well established. *Ex situ* stabilization of metals in soil is also a well-established technology that can be implemented with readily available equipment and was proven successful during the OU1 RD/RA. The likelihood of technical problems and schedule delays increases with complexity.

9.7 COST-EFFECTIVENESS

Table 6 summarizes the capital cost, annual cost, and total non-discounted cost of each alternative. The three alternatives are arranged in order of escalating capital cost, ranging from $105,000 to $7,732,000. Due to inherent unknowns with excavation to achieve RGs, a contingency of 10% was applied to Alternative 2, while a contingency of 20% was applied to Alternative 3 to meet the lower Part 375-6.8(a) criteria. The capital cost of Alternatives 3 is approximately $7,732,000 with the capital costs of Alternative 2 being lower ($4,837,000) and the cost of Alternative 1 significantly lower ($105,000).

Alternative 1 assumes 30 years of site-related O&M. Alternatives 2 and 3 assume six years of restoration monitoring and maintenance at a relative annual O&M cost based on the acreage of disturbance. The minor variation in annual maintenance costs ($223,000 for Alternative 3 versus $186,000 for Alternative 2) has little effect when comparing the total non-discounted cost between the alternatives which follow the same escalating pattern as the capital costs.

Total estimated costs (capital costs, O&M, and contingency) for each remedial alternative are $1,005,000, $6,549,000, and $10,884,000 for Alternatives 1, 2, and 3, respectively.

9.8 COMMUNITY ACCEPTANCE

Community input regarding the OU3 FS will be solicited by the NYSDEC during the public comment period, during which time the report will be available for public review.

9.9 LAND USE

Current land use is a mix of public and commercial. Due to the presence of I-84 and Route 17 bisecting the affected area, future land use is anticipated to be similar. Alternative 1 would restrict future land use by leaving contaminants in place at concentrations above the RGs.

Alternative 2 would achieve the RGs, which are the same or lower values than all restricted use SCOs for lead and arsenic. Under Alternative 2, lead and arsenic would remain at concentrations above the generic protection of ecological resources

SCOs, but below the site-specific protection of ecological resources criteria. Therefore, no restrictions on land use relative to protection of human health or ecological resources would be anticipated for Alternative 2.

Alternative 3 would achieve the unrestricted SCOs; and therefore, no restrictions on land use would be anticipated for Alternative 3.

10 RECOMMENDED REMEDY

The remedial alternatives developed for the impacted floodplain soil and sediment in OU3 were evaluated in Section 9 using the nine evaluation criteria prescribed by 6 NYCRR Part 375-1.8(f). The recommended remedy for soil and sediment is Alternative 2. Alternative 2 includes excavation of soil and sediments to meet the RGs and achieve RAOs while minimizing disturbed areas and disruption to the public. The potential future land use would not be restricted relative to protection of human health or ecological resources. Many of the affected properties are currently zoned commercial or are highway rights-of-way and are likely to remain so in the future.

The recommended remedy will provide long-term protection through the permanent removal of arsenic and lead-impacted surface soil from OU3 to address human health direct contact exposures and for the protection of groundwater. Under Alternative 2, ecological resources are also protected through achieving the site-specific RGs. The over $4 million incremental cost of Alternative 3 is unjustified, because while Alternative 3 would achieve the generic protection of ecological resources criteria (i.e., the unrestricted SCOs for lead and arsenic), the RGs achieved under Alternative 2 have been deemed protective of ecological resources based on the site-specific data, including biota data, collected during the OU1 RI and evaluated by the NYSDEC.

Stabilization of the impacted materials will reduce the leachability of the material, and consolidation and capping of the stabilized materials within the existing containment cell in OU1 will reduce surface water infiltration, erosion, and the potential for leaching to groundwater. This alternative also eliminates the potential risk of exposure to impacted materials for the environment, including biota and surface water, and the surrounding community by the removal of impacted soils and sediment with arsenic and lead concentrations exceeding the RGs. The inspection and maintenance of the low permeability cover during the life of the containment cell will ensure that the remedy operates as designed.

Short-term risks associated with this alternative can be managed using various best management practices and engineering controls and these short-term impacts will be eliminated once the remedy is completed. This alternative can be implemented in a relatively short time period, i.e. less than a year from the date of approval of the remedial design, and the required contractors, equipment and supplies are readily available in the area. The alternative can also be implemented in accordance with the applicable SCGs.

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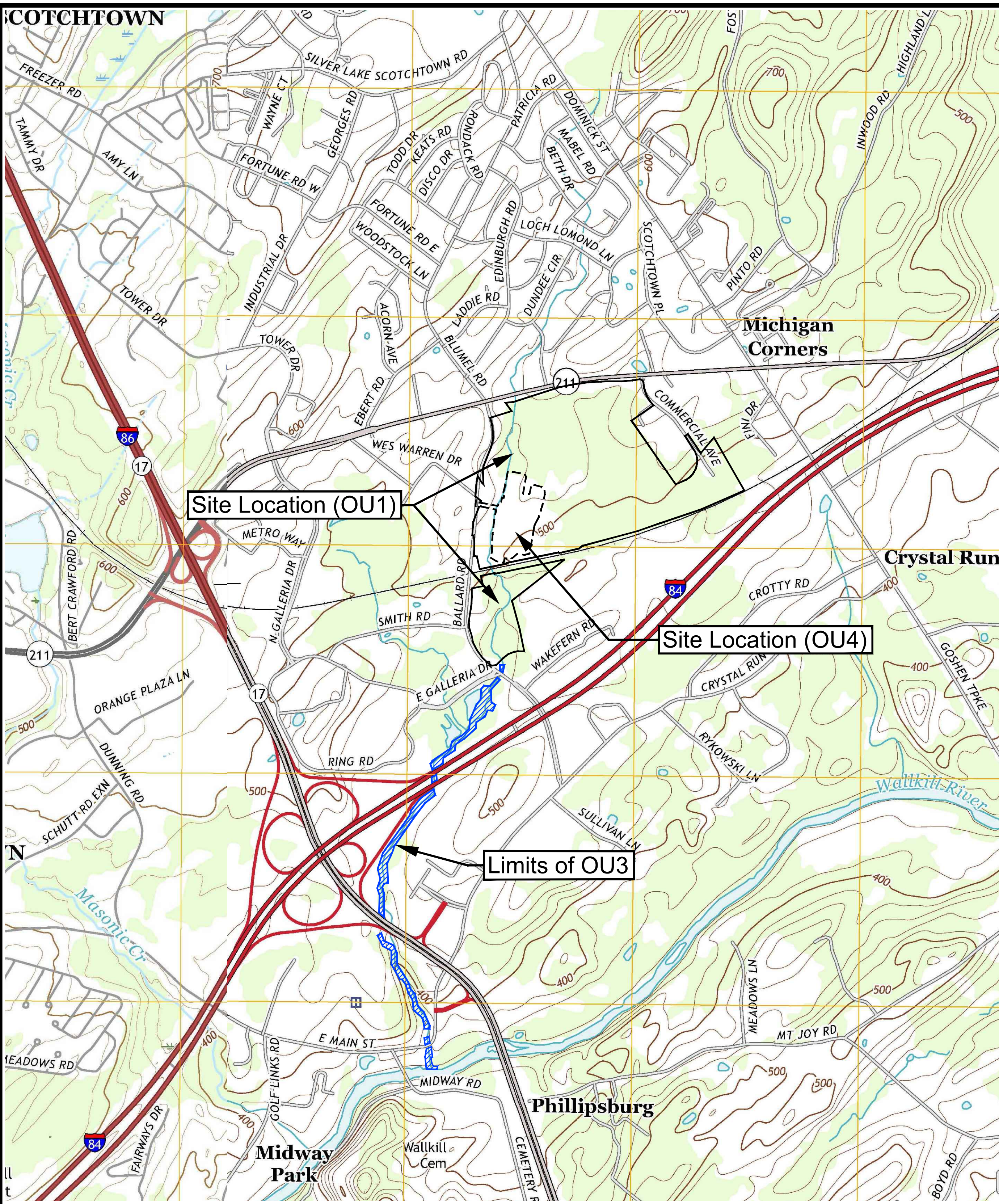
12 ACRONYMS

AMSL	above mean sea level
bgs	below ground surface
COCs	constituents of concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CP-60	Commissioner’s Policy 60
CPP	citizen participation plan
cy	cubic yards
DER	Division of Environmental Remediation
DER-10	Division of Environmental Remediation-10
EFA	eastern fill area
ENT-L	light enterprise district
FS	feasibility study
FSP	field sampling plan
FWIA	fish and wildlife impact analysis
GRAs	general response actions
HASP	health and safety plan
I-84	Interstate Highway 84
mg/kg	milligrams per kilogram
NCP	National Contingency Plan
NWI	National Wetlands Inventory
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
NYSFW	New York State Freshwater Wetlands
O&M	Operations and Maintenance
O/R	office and research district
OU	Operable Unit
OU1	Operable Unit 1
OU2	Operable Unit 2
OU3	Operable Unit 3
OU4	Operable Unit 4
PCBs	polychlorinated biphenyl compounds
QAPP	quality assurance project plan
RA	remedial action
RAO	remedial action objective

RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
RFI/CMS	RCRA Facility Investigation and Corrective Measures Study
RG	remedial goals
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROW	right-of-way
SCS	Site Characterization Summary
SCGs	standards, criteria, and guidelines
SCOs	soil cleanup objectives
SGV	sediment guidance values
SVOCs	semi-volatile organic compounds
TAL	target analyte list
TC	town center district
TCL	target compound list
VOCs	volatile organic compounds
XRF	X-Ray Fluorescence
WESP	wet electrostatic precipitator
WSP	WSP USA Inc.

FIGURES



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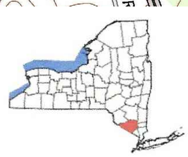

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WSP USA Inc.
75 ARLINGTON STREET
4th FLOOR
BOSTON, MA 02116
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FIGURE 1

SITE LOCATION MAP

REVERE SMELTING & REFINING FACILITY
MIDDLETOWN, NEW YORK

PREPARED FOR
REVERE SMELTING & REFINING CORPORATION

TABLES

Table 1

Property Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a,b)

Tax Parcel No.	Property Name	Property Address	Property Owner	Zoning Code	Current Property Use
0-0-0	NYSDOT ROW	New York State ROW	NYSDOT	N/A	NYSDOT Right-of-Way
60-1-120.3	Old Dominion Freight Line	300 Ballard Road	Old Dominion Freight Line Inc	ENT-L	447-Truck Terminal
78-1-34.4	Private Residence	758 E. Main Street	East Main Mill House LLC	O/R	483-Converted Residence
78-1-77.2	Orange Regional Medical Center	707 E. Main Street	Arden Hill Hospital/Horton Medical Center	O/R	641-Hospital
78-1-80.1	Courtyard by Marriott Hotel	24 Crystal Run Crossing	High Hotels Ltd	NA	414-Hotel
78-1-82	iStorage Self Storage	295 Ballard Road	2016 JV MHC LLC	TC	449-Other Storage
78-1-92	Galleria at Crystal Run Mall	1 N. Galleria Drive	Crystal Run Newco LLC	N/A	451-Regular Shopping Center

Notes:

a) ENT-L = light enterprise district; NYSDOT = New York State Department of Transportation; O/R = office and research district; OU3 = Operable Unit 3; TC = town center district; ROW = Right-of-Way.

b) Property information obtained from ocgis.orangecountygov.com and propertydata.orangecountygov.com.

Table 2

Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis							Data Package
							Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	
Tax Parcel 0-0-0		**NYSDOT Right-of-Way**												
WSP-SED-01	Sediment	0-3	09/23/08	2008 OU3 RI	530380.4070	954956.4320		X						J6667
WSP-SED-I84-01	Sediment	0-3	10/07/08	2008 OU3 RI	529390.0531	953185.8087	X	X						J6872
WSP-SED-I84-02	Sediment	0-3	10/07/08	2008 OU3 RI	529261.1150	953100.8407		X						
WSP-SED-44	Sediment	0-3	01/17/13	2013 OU3 RI	530298.2243	954167.4480	X	X						JB26748
WSP-SED-45	Sediment	0-3	01/17/13	2013 OU3 RI	530173.9679	954092.9426	X	X						
WSP-SED-46	Sediment	0-3	01/17/13	2013 OU3 RI	529632.6089	953386.1663	X	X						
WSP-SED-47	Sediment	0-3	01/17/13	2013 OU3 RI	529508.7915	953304.8882	X	X						
WSP-SED-48	Sediment	0-3	01/17/13	2013 OU3 RI	529071.6576	952863.5299	X	X						
WSP-SED-49	Sediment	0-3	01/17/13	2013 OU3 RI	528983.5623	952736.7001	X	X						
WSP-SED-50	Sediment	0-3	01/17/13	2013 OU3 RI	528897.7641	952616.3319	X	X						
WSP-SED-51	Sediment	0-3	01/17/13	2013 OU3 RI	528813.6114	952491.1563	X	X						
		0-6	11/03/16	2016 OU3 RI	528816.0740	952495.5040	X	X						JC31102
		0-6 (c)					X	X						
WSP-SED-52	Sediment	0-3	01/17/13	2013 OU3 RI	528728.5788	952371.1564	X	X						JB26748
		0-6	11/03/16	2016 OU3 RI	528725.8590	952377.2270	X	X	X					JC31102
WSP-SED-53	Sediment	0-3	01/17/13	2013 OU3 RI	528720.2615	951509.9249	X	X	X					JB26748
		0-3 (d)					X	X	X					
WSP-SED-54	Sediment	0-3	01/17/13	2013 OU3 RI	528776.9977	951391.9253	X	X						
WSP-SED-55	Sediment	0-3	05/09/14	2014 OU3 RI	529270.4140	949956.0020	X	X						JB66752
WSP-SED-56	Sediment	0-3	05/09/14	2014 OU3 RI	529106.1730	950259.9300	X	X	X					
		0-3 (e)					X	X	X					
WSP-SED-57	Sediment	0-3	05/09/14	2014 OU3 RI	529050.4240	950381.4980	X	X						
		0-6	11/10/16	2016 OU3 RI	529046.4900	950389.9460	X	X						JC31580
		0-6 (f)					X	X						
		6-12					X	X						
WSP-SED-58	Sediment	0-3	05/09/14	2014 OU3 RI	528870.8270	950691.6160	X	X						JB66752
WSP-SED-59	Sediment	0-3	05/09/14	2014 OU3 RI	528822.2870	950742.5200	X	X						
WSP-SED-60	Sediment	0-3	05/09/14	2014 OU3 RI	528826.5270	951019.1260	X	X						
WSP-SED-61	Sediment	0-3	05/09/14	2014 OU3 RI	528958.9180	950648.3970	X	X						
WSP-SED-62	Sediment	0-3	05/09/14	2014 OU3 RI	529026.0100	950510.8460	X	X						

Table 2

Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis							Data Package
							Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	
Tax Parcel 0-0-0		**NYSDOT Right-of-Way (Continued)**												
WSP-SED-63	Sediment	0-3	05/09/14	2014 OU3 RI	529110.0810	950313.1100	X	X						JB66752
WSP-SED-64	Sediment	0-3	05/09/14	2014 OU3 RI	529202.6750	950088.5900	X	X						
WSP-SED-65	Sediment	0-3	11/03/16	2016 OU3 RI	529299.9770	949688.6810	X	X						JC31102
WSP-OU3-20	Soil	0-6	11/10/16	2016 OU3 RI	529719.9490	953825.2320	X	X						JC31580
		6-12					X	X						
WSP-OU3-22	Soil	0-6	11/10/16	2016 OU3 RI	529570.0140	953713.8700	X	X						
		6-12					X	X						
WSP-OU3-24	Soil	0-6	11/10/16	2016 OU3 RI	529447.9150	953642.9010	X	X						
		6-12					X	X						
		12-18					X	X						JC31282R
WSP-OU3-25	Soil	0-6	11/07/16	2016 OU3 RI	529360.3510	953218.3300	X	X						JC31282
		6-12					X	X						
		12-24						X						JC31282R
WSP-OU3-26	Soil	0-6	11/07/16	2016 OU3 RI	529394.0990	953177.8640	X	X						JC31282
		6-12					X	X						
WSP-OU3-27	Soil	0-6	11/07/16	2016 OU3 RI	529246.2100	953120.5290	X	X						
		6-12					X	X						
		12-24					X	X						JC31282R
WSP-OU3-28	Soil	0-6	11/07/16	2016 OU3 RI	529284.7280	953069.2240	X	X						JC31282
		6-12					X	X						
WSP-OU3-29	Soil	0-6	11/03/16	2016 OU3 RI	529034.0090	952888.4320	X	X						JC31102
		6-12					X	X						
		6-12 (g)					X	X						
WSP-OU3-30	Soil	0-6	11/07/16	2016 OU3 RI	529093.4440	952852.0070	X	X						JC31282
		6-12					X	X						
WSP-OU3-31	Soil	0-6	11/03/16	2016 OU3 RI	528943.8110	952761.1510	X	X						JC31102
		6-12					X	X						
WSP-OU3-32	Soil	0-6	11/07/16	2016 OU3 RI	529017.2630	952717.1210	X	X						JC31282
		6-12					X	X						

Table 2

Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis							Data Package
							Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	
Tax Parcel 0-0-0		**NYSDOT Right-of-Way (Continued)**												
WSP-OU3-33	Soil	0-6	11/03/16	2016 OU3 RI	528863.9940	952642.4850	X	X						JC31102
		0-6 (h)					X	X						
		6-12					X	X						
WSP-OU3-34	Soil	0-6	11/07/16	2016 OU3 RI	528942.1390	952602.4740	X	X						JC31282
		6-12					X	X						
WSP-OU3-35	Soil	0-6	11/03/16	2016 OU3 RI	528777.1230	952525.3170	X	X	X	X	X	X	X	JC31102
		6-12					X	X						
WSP-OU3-36	Soil	0-6	11/03/16	2016 OU3 RI	528853.7470	952460.4760	X	X						
		6-12					X	X						
WSP-OU3-37	Soil	0-6	11/03/16	2016 OU3 RI	528697.6690	952396.1370	X	X						
		0-6 (i)					X	X						
		6-12					X	X						
WSP-OU3-38	Soil	0-6	11/03/16	2016 OU3 RI	528769.3340	952350.2600	X	X	X					
		0-6 (j)					X	X	X					
		6-12					X	X						
		12-24						X						JC31102R
WSP-OU3-39	Soil	0-6	11/07/16	2016 OU3 RI	528703.4630	951484.7580	X	X						JC31282
		6-12					X	X						
WSP-OU3-40	Soil	0-6	11/07/16	2016 OU3 RI	528747.2800	951537.0320	X	X						
		6-12					X	X						
WSP-OU3-41	Soil	0-6	11/07/16	2016 OU3 RI	528746.0640	951426.2670	X	X						JC31282
		6-12					X	X						
WSP-OU3-42	Soil	0-6	11/07/16	2016 OU3 RI	528807.5870	951386.8520	X	X						
WSP-OU3-43	Soil	0-6	11/08/16	2016 OU3 RI	528818.0590	951016.4240	X	X						JC31386
		6-12					X	X						
WSP-OU3-44	Soil	0-6	11/08/16	2016 OU3 RI	528852.3810	951022.6810								
		6-12												
WSP-OU3-45	Soil	0-6	11/08/16	2016 OU3 RI	528812.7350	950739.6870	X	X						
		6-12					X	X						

Table 2

Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis: Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	Data Package
Tax Parcel 0-0-0		**NYSDOT Right-of-Way (Continued)**												
WSP-OU3-46	Soil	0-6	11/08/16	2016 OU3 RI	528853.6630	950750.6840	X	X						JC31386
		6-12					X	X						
WSP-OU3-47	Soil	0-6	11/08/16	2016 OU3 RI	528857.9840	950695.4710	X	X						
		6-12					X	X						
WSP-OU3-48	Soil	0-6	11/08/16	2016 OU3 RI	528914.3290	950694.2500	X	X						
		6-12					X	X						
WSP-OU3-49	Soil	0-6	11/08/16	2016 OU3 RI	528903.0700	950632.0870	X	X						
		6-12					X	X						
WSP-OU3-50	Soil	0-6	11/08/16	2016 OU3 RI	528986.9350	950661.8960	X	X						
		6-12					X	X						
WSP-OU3-51	Soil	0-6	11/08/16	2016 OU3 RI	528999.5790	950501.3800	X	X						
		0-6 (k)					X	X						
		6-12					X	X						
WSP-OU3-52	Soil	0-6	11/08/16	2016 OU3 RI	529065.1850	950526.8180	X	X						
		6-12					X	X						
WSP-OU3-53	Soil	0-6	11/09/16	2016 OU3 RI	529032.928	950375.763	X	X						JC31460
		6-12					X	X						
WSP-OU3-54	Soil	0-6	11/09/16	2016 OU3 RI	529078.099	950390.414	X	X						
		6-12					X	X						
WSP-OU3-55	Soil	0-6	11/09/16	2016 OU3 RI	529078.945	950301.035	X	X						
		6-12					X	X						
WSP-OU3-56	Soil	0-6	11/09/16	2016 OU3 RI	529110.98	950311.825	X	X						JC31460
		6-12					X	X						
WSP-OU3-57	Soil	0-6	11/09/16	2016 OU3 RI	529111.014	950256.923	X	X						
		6-12					X	X						
WSP-OU3-58	Soil	0-6	11/09/16	2016 OU3 RI	529143.427	950251.454	X	X						
		6-12					X	X						
		12-24						X						
WSP-OU3-59	Soil	0-6	11/09/16	2016 OU3 RI	529159.77	950069.913	X	X						
		6-12					X	X						

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Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis							Data Package
							Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	
Tax Parcel 0-0-0		**NYSDOT Right-of-Way (Continued)**												
WSP-OU3-60	Soil	0-6	11/09/16	2016 OU3 RI	529199.6380	950094.5390	X	X						JC31460
		6-12					X	X						
		12-24						X						
WSP-OU3-61	Soil	0-6	11/09/16	2016 OU3 RI	529273.9420	949958.6830	X	X						
		6-12					X	X						
WSP-OU3-62	Soil	0-6	11/09/16	2016 OU3 RI	529301.8360	949971.5000	X	X						
		0-6 (l)					X	X						
WSP-OU3-63	Soil	0-6	11/03/16	2016 OU3 RI	529289.3710	949622.9110	X	X						JC31102
		6-12					X	X						
WSP-OU3-64	Soil	0-6	11/03/16	2016 OU3 RI	529329.7750	949638.2400	X	X						
		6-12					X	X						
WSP-OU3-71	Soil	0-6	11/02/16	2016 OU3 RI	529176.5620	949286.6700	X	X						JC31040
		6-12					X	X						
WSP-OU3-77	Soil	0-6	11/02/16	2016 OU3 RI	529656.8380	949293.5090	X	X						
		6-12					X	X	X					
WSP-OU3-79	Soil	0-6	11/03/16	2016 OU3 RI	529788.4700	949357.8670	X	X	X	X	X	X	X	JC31102
		0-6 (m)					X	X	X	X	X	X	X	
		6-12					X	X						
		12-24						X						JC31102R
WSP-OU3-81	Soil	0-6	11/03/16	2016 OU3 RI	529913.7710	949432.4860	X	X						JC31102
		6-12					X	X						
WSP-OU3-83	Soil	0-6	11/10/16	2016 OU3 RI	529254.1550	949845.1810	X	X						JC31580
		6-12					X	X						
Tax Parcel 78-1-92		**Galleria at Crystal Run Mall**												
WSP-SED-27	Sediment	0-3	12/16/09	2009 OU3 RI	530274.0900	954788.3750		X						J11106
WSP-SED-28	Sediment	0-3	12/16/09	2009 OU3 RI	530201.2050	954667.1420		X						
WSP-SED-29	Sediment	0-3	12/16/09	2009 OU3 RI	530169.5710	954533.3530		X	X					
WSP-SED-32	Sediment	0-3	12/16/09	2009 OU3 RI	529974.1790	954173.9150		X						J11106
		0-6	11/02/16	2016 OU3 RI	529968.5980	954180.5370	X	X						JC31040
		6-12					X	X						

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Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis							Data Package
							Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	
Tax Parcel 78-1-92		**Galleria at Crystal Run Mall (Continued)**												
WSP-SED-33	Sediment	0-3	12/16/09	2009 OU3 RI	529867.1370	954072.4030		X						J11106
WSP-SED-34	Sediment	0-3	12/16/09	2009 OU3 RI	529738.3600	953960.8300		X						
WSP-SED-35	Sediment	0-3	12/16/09	2009 OU3 RI	529664.2830	953858.0500		X						J11106
WSP-SED-36	Sediment	0-3	12/16/09	2009 OU3 RI	529525.5400	953755.2470		X						
WSP-SED-37	Sediment	0-3	12/16/09	2009 OU3 RI	529407.0040	953680.2970		X						
		0-6	11/02/16	2016 OU3 RI	529416.2340	953676.7570	X	X						JC31040
		6-12					X	X						
WSP-SED-38	Sediment	0-3	10/20/11	2011 OU3 RI	529481.2800	953930.9010	X	X	X					JA89990
WSP-SED-39	Sediment	0-3	10/20/11	2011 OU3 RI	529480.0190	953779.3850	X	X	X					
		0-3 (n)					X	X	X					
WSP-SED-40	Sediment	0-3	10/20/11	2011 OU3 RI	529857.0010	954152.7120	X	X	X					
WSP-SED-41	Sediment	0-3	10/20/11	2011 OU3 RI	529894.5580	954185.9930	X	X	X					
WSP-SED-42	Sediment	0-3	10/20/11	2011 OU3 RI	529880.8470	954164.3980	X	X	X					
WSP-SED-43	Sediment	0-3	10/20/11	2011 OU3 RI	529714.9150	954274.4800	X	X	X					
WSP-OU3-01	Soil	0-6	10/31/16	2016 OU3 RI	530238.5580	954831.6640	X	X						JC30867
		6-12					X	X						
WSP-OU3-03	Soil	0-6	10/31/16	2016 OU3 RI	530149.4440	954678.1830	X	X						
		6-12					X	X						
		12-24					X	X						JC30867R
WSP-OU3-05	Soil	0-6	10/31/16	2016 OU3 RI	530130.5030	954575.8890	X	X						JC30867
		6-12					X	X						
		12-18						X						JC30867R
WSP-OU3-07	Soil	0-6	10/31/16	2016 OU3 RI	530105.5250	954402.0250	X	X						JC30867
		6-12					X	X						
		12-24						X						JC30867R
WSP-OU3-09	Soil	0-6	10/31/16	2016 OU3 RI	530006.1100	954305.6940	X	X						JC30867
		6-12					X	X						
WSP-OU3-11	Soil	0-6	11/01/16	2016 OU3 RI	529906.5540	954210.9480	X	X	X	X	X	X	X	JC30909
		6-12					X	X						

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Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis: Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	Data Package
Tax Parcel 78-1-92		**Galleria at Crystal Run Mall (Continued)**												
WSP-OU3-13	Soil	0-6	11/01/16	2016 OU3 RI	529655.5510	954269.1110	X	X						JC30909
		6-12					X	X						
WSP-OU3-14	Soil	0-6	11/01/16	2016 OU3 RI	529777.6980	954284.9960	X	X						
		6-12					X	X	X					
WSP-OU3-15	Soil	0-6	11/01/16	2016 OU3 RI	529826.9640	954107.2650	X	X						
		6-12					X	X						
WSP-OU3-16	Soil	0-6	11/01/16	2016 OU3 RI	529904.0960	954043.1860	X	X						
		0-6 (o)					X	X						
		6-12					X	X						
WSP-OU3-17	Soil	0-6	11/01/16	2016 OU3 RI	529695.5170	953992.9730	X	X						
		6-12					X	X						
WSP-OU3-18	Soil	0-6	11/01/16	2016 OU3 RI	529773.8970	953935.6810	X	X	X					
		6-12					X	X						
		6-12 (p)					X	X						
WSP-OU3-19	Soil	0-6	11/01/16	2016 OU3 RI	529629.1260	953894.9950	X	X						
		0-6 (q)					X	X						
		6-12					X	X						
WSP-OU3-21	Soil	0-6	11/02/16	2016 OU3 RI	529371.7960	953864.1450	X	X						JC31040
		6-12					X	X						
WSP-OU3-23	Soil	0-6	11/02/16	2016 OU3 RI	529372.0240	953714.1090	X	X						
		6-12					X	X						
Tax Parcel 78-1-82		**4 Storage 2 LLC Property**												
WSP-SED-30	Sediment	0-3	12/16/09	2009 OU3 RI	530139.4110	954352.8020		X						J11106
WSP-SED-31	Sediment	0-3	12/16/09	2009 OU3 RI	530040.7020	954260.7970		X						
WSP-OU3-02	Soil	0-6	10/27/16	2016 OU3 RI	530306.9420	954756.1250	X	X						JC30678
		6-12					X	X						
		6-12 (r)					X	X						
WSP-OU3-04	Soil	0-6	10/27/16	2016 OU3 RI	530243.0200	954664.8020	X	X						JC30678
		6-12					X	X						

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Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis							Data Package
							Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	
Tax Parcel 78-1-82	**4 Storage 2 LLC Property (Continued)**													
WSP-OU3-06	Soil	0-6	10/28/16	2016 OU3 RI	530214.2340	954516.0130	X	X						JC30756
		6-12					X	X						
		12-18						X						JC30756R
WSP-OU3-08	Soil	0-6	10/28/16	2016 OU3 RI	530180.6420	954340.3970	X	X	X					JC30756
		6-12					X	X						
WSP-OU3-10	Soil	0-6	10/28/16	2016 OU3 RI	530088.4410	954245.7380	X	X						
		6-12					X	X						
WSP-OU3-12	Soil	0-6	10/28/16	2016 OU3 RI	530015.0300	954141.9540	X	X						
		6-12					X	X						
Tax Parcel 78-1-34.4	**758 E. Main Street**													
WSP-SED-66	Sediment	0-3	09/02/15	2015 OU3 RI	529334.0500	949511.6000	X	X						JC3143
WSP-SED-67	Sediment	0-3	09/02/15	2015 OU3 RI	529324.2400	949367.1300	X	X	X					
WSP-SED-68	Sediment	0-3	09/02/15	2015 OU3 RI	529319.0200	949253.2500	X	X						
WSP-OU3-65	Soil	0-2	09/02/15	2015 OU3 RI	529321.1800	949490.9400	X	X						
		2-6					X	X						
		6-12					X	X						
WSP-OU3-66	Soil	0-2	09/02/15	2015 OU3 RI	529356.1400	949510.5500	X	X						
		2-6					X	X						
		6-12					X	X						
WSP-OU3-67	Soil	0-2	09/02/15	2015 OU3 RI	529303.8300	949368.9800	X	X	X					
		2-6					X	X						
		6-12					X	X						
WSP-OU3-68	Soil	0-2	09/02/15	2015 OU3 RI	529341.2500	949374.7900	X	X						
		2-6					X	X						
		6-12					X	X						
WSP-OU3-69	Soil	0-2	09/02/15	2015 OU3 RI	529292.7900	949250.7100	X	X						JC3143
		2-6					X	X						
		6-12					X	X						

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Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis							Data Package
							Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	
Tax Parcel 78-1-34.4		**758 E. Main Street (Continued)**												
WSP-OU3-70	Soil	0-2	09/02/15	2015 OU3 RI	529362.8200	949255.5900	X	X						JC3143
		2-6					X	X						
		2-6 (s)					X	X						
		6-12					X	X						
WSP-OU3-73	Soil	0-6	11/02/16	2016 OU3 RI	529329.5530	949279.2720	X	X						JC31040
		0-6 (t)					X	X						
		6-12					X	X						
		12-24					X	X						JC31040R
WSP-OU3-75	Soil	0-6	11/02/16	2016 OU3 RI	529502.9070	949255.4870	X	X						JC31040
		6-12					X	X						
		12-24						X						JC31040R
Tax Parcel 78-1-30		**Wallkill Cemetery Association**												
WSP-OU3-72	Soil	0-6	10/26/16	2016 OU3 RI	529163.1850	949095.4970	X	X						JC30595
		6-12					X	X						
WSP-OU3-74	Soil	0-6	10/26/16	2016 OU3 RI	529321.9570	949089.6570	X	X						
		6-12					X	X						
WSP-OU3-76	Soil	0-6	10/26/16	2016 OU3 RI	529530.7820	949105.8010	X	X						
		6-12					X	X						
		12-24					X							JC30595R
WSP-OU3-78	Soil	0-6	10/26/16	2016 OU3 RI	529719.7320	949175.3970	X	X						JC30595
		6-12					X	X						
WSP-OU3-80	Soil	0-6	10/27/16	2016 OU3 RI	529853.0360	949238.4980	X	X						JC30678
		6-12					X	X	X					
		6-12 (u)					X	X	X					
WSP-OU3-82	Soil	0-6	10/27/16	2016 OU3 RI	529992.5090	949323.4840	X	X						
		6-12					X	X						

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Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis							Data Package
							Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	
Tax Parcel 999		**Wallkill River**												
WSP-SED-70	Sediment	0-6	10/25/16	2016 OU3 RI	529172.9990	949209.2300	X	X						JC30595
		6-12	11/04/16				X	X						JC31213
WSP-SED-71	Sediment	0-6	10/25/16	2016 OU3 RI	529170.8130	949176.4140	X	X						JC30595
WSP-SED-72	Sediment	0-6	10/25/16	2016 OU3 RI	529168.9740	949139.1540	X	X						
WSP-SED-73	Sediment	0-6	10/25/16	2016 OU3 RI	529325.1040	949215.9970	X	X						
WSP-SED-73A	Sediment	6-12	11/04/16	2016 OU3 RI	529336.7040	949235.3040	X	X						JC31213
WSP-SED-74	Sediment	0-6	10/25/16	2016 OU3 RI	529323.9380	949176.1360	X	X						JC30595
WSP-SED-75	Sediment	0-6	10/25/16	2016 OU3 RI	529322.5350	949135.6010	X	X						
WSP-SED-76	Sediment	0-6	10/26/16	2016 OU3 RI	529508.3350	949217.4290	X	X						
		0-6 (v)					X	X						
		6-12	11/04/16				X	X						JC31213
WSP-SED-77	Sediment	0-6	10/26/16	2016 OU3 RI	529517.8120	949173.0380	X	X						JC30595
WSP-SED-78	Sediment	0-6	10/26/16	2016 OU3 RI	529524.0030	949133.0140	X	X						
WSP-SED-79	Sediment	0-6	10/26/16	2016 OU3 RI	529673.6180	949256.5910	X	X						
WSP-SED-79A	Sediment	6-12	11/04/16	2016 OU3 RI	529665.7560	949276.6940	X	X						JC31213
WSP-SED-80	Sediment	0-6	10/26/16	2016 OU3 RI	529686.1050	949228.1450	X	X	X					JC30595
		0-6 (w)					X	X	X					
WSP-SED-81	Sediment	0-6	10/26/16	2016 OU3 RI	529699.9440	949202.6370	X	X						
WSP-SED-82	Sediment	0-6	10/26/16	2016 OU3 RI	529807.4350	949320.8510	X	X						
WSP-SED-83	Sediment	0-6	10/26/16	2016 OU3 RI	529820.7720	949292.2270	X	X						
WSP-SED-84	Sediment	0-6	10/26/16	2016 OU3 RI	529837.1510	949264.4790	X	X						
WSP-SED-85	Sediment	0-6	10/27/16	2016 OU3 RI	529942.2860	949406.7910	X	X	X	X	X	X	X	JC30678
		0-6 (x)					X	X	X	X	X	X	X	

Table 2

Remedial Investigation Sample Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Sample ID	Sample Type	Sample Depth (inches)	Sample Date	Investigation Phase	Easting (b)	Northing (b)	Sample Analysis							Data Package
							Arsenic	Lead	TAL Metals	TCL VOCs	TCL SVOCs	TCL PCBs	TCL Pesticides	
Tax Parcel 999		**Wallkill River (Continued)**												
WSP-SED-86	Sediment	0-6	10/27/16	2016 OU3 RI	529957.9470	949363.3900	X	X						JC30595
WSP-SED-87	Sediment	0-6	10/27/16	2016 OU3 RI	529980.2420	949344.7930	X	X						

Notes:

a) OU3 = Operable Unit 3; PCBs = Polychlorinated Biphenyls; RI = Remedial Investigation; SVOCs = Semi-volatile Organic Compounds; TAL = Target Analyte List; TCL = Target Compound List; VOCs = Volatile Organic Compounds.

b) The horizontal datum is the New York East State Plane Coordinate System NAD83. Northings and eastings for samples WSP-SED-I84-01 and WSP-SED-I84-02 are approximate.

c) WSP-SED-113-0-0.5 is a blind duplicate of WSP-SED-51-0-0.5.

d) WSP-SED-530 is a blind duplicate of WSP-SED-53.

e) WSP-SED-560 is a blind duplicate of WSP-SED-56.

f) WSP-SED-114-0-0.5 is a blind duplicate of WSP-SED-57-0-0.5.

g) WSP-OU3-112-0.5-1 is a blind duplicate of WSP-OU3-29-0.5-1.

h) WSP-OU3-111-0-0.5 collected on 11/03/16 is a blind duplicate of WSP-OU3-33-0-0.5.

i) WSP-OU3-109-0-0.5 is a blind duplicate of WSP-OU3-37-0-0.5.

j) WSP-OU3-110-0-0.5 is a blind duplicate of WSP-OU3-38-0-0.5.

k) WSP-OU3-111-0-0.5 collected on 11/08/16 is a blind duplicate of WSP-OU3-51-0-0.5.

l) WSP-OU3-113-0-0.5 is a blind duplicate WSP-OU3-62-0-0.5.

m) WSP-OU3-108-0-0.5 is a blind duplicate of WSP-OU3-79-0-0.5.

n) WSP-SED-390 is a blind duplicate of WSP-SED-39.

o) WSP-OU3-104-0-0.5 is a blind duplicate of WSP-OU3-16-0-0.5.

p) WSP-OU3-105-0.5-1 is a blind duplicate of WSP-OU3-18-0.5-1.

q) WSP-OU3-106-0-0.5 is a blind duplicate of WSP-OU3-19-0-0.5.

r) WSP-OU3-104-0.5-1 is a blind duplicate of WSP-OU3-02-0.5-1.

s) WSP-OU3-700 (2-6) is a blind duplicate of WSP-OU3-70 (2-6).

t) WSP-OU3-107-0-0.5 is a blind duplicate of WSP-OU3-73-0-0.5.

u) WSP-OU3-103-0.5-1 is a blind duplicate of WSP-OU3-80-0.5-1.

v) WSP-SED-100-0-0.5 is a blind duplicate of WSP-SED-76-0-0.5.

w) WSP-SED-101-0-0.5 is a blind duplicate of WSP-SED-80-0-0.5.

x) WSP-SED-102-0-0.5 is a blind duplicate of WSP-SED-85-0-0.5.

Table 3

Excavation Areas and Volumes by Remedial Alternative
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Excavation Area	Area (b) (Square Feet)	Alternative No. 2 Excavation to Meet RGs		Alternative No. 3 Excavation to Meet NYCRR Part 375-6 Unrestricted Use SCOs and Class A SGVs	
		Depth (Feet bgs)	Volume (Cubic Yards)	Depth (Feet bgs)	Volume (c) (Cubic Yards)
Soil					
1	11,745	0.0	0	0.5	218
2	11,875	1.0	440	2.5	1,100
3	12,339	0.5	229	2.0	914
4	17,556	0.5	325	1.0	650
5	10,691	0.5	198	1.0	396
6	11,517	0.5	213	1.5	640
7	24,935	0.0	0	0.5	462
8	8,170	2.0	605	2.0	605
9	4,570	0.0	0	2.5	423
10	9,029	0.0	0	1.0	334
11	5,344	0.0	0	0.5	99
12	6,966	0.0	0	0.5	129
13	24,948	1.0	924	1.0	924
14	2,174	0.0	0	0.5	40
15	2,035	0.0	0	1.5	113
16	3,456	0.5	64	1.5	192
17	2,287	0.0	0	0.5	42
18	1,140	1.5	63	1.5	63
19	1,788	0.0	0	1.5	99
20	1,918	0.0	0	2.5	178
21	2,475	0.0	0	0.5	46
22	4,087	2.5	378	2.5	378
23	1,914	0.0	0	1.5	106
24	1,703	0.0	0	0.5	32
25	1,344	0.0	0	1.5	75
26	2,503	0.0	0	1.5	139
27	5,493	1.5	305	1.5	305
28	5,323	0.0	0	1.5	296
29	5,707	1.5	317	1.5	317

Table 3

Excavation Areas and Volumes by Remedial Alternative
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Excavation Area	Area (b) (Square Feet)	Alternative No. 2 Excavation to Meet RGs		Alternative No. 3 Excavation to Meet NYCRR Part 375-6 Unrestricted Use SCOs and Class A SGVs	
		Depth (Feet bgs)	Volume (Cubic Yards)	Depth (Feet bgs)	Volume (c) (Cubic Yards)
Sediment					
30A	723	1.0	27	2.0	54
30B	14,697	1.0	544	2.0	1,089
30C	424	1.0	16	2.0	31
30D	24,655	1.0	913	2.0	1,826
30E	11,360	1.0	421	2.0	841
30F	1,365	1.5	76	1.5	76
30G	7,848	1.0	291	2.0	581
30H	1,365	1.0	51	2.0	101
30I	6,381	1.0	236	2.0	473
30J	2,105	1.0	78	2.5	195
		Total:	**6,800**	**Total:**	**14,600**

Notes:

a) bgs = below ground surface; NYSDEC = New York State Department of Environmental Conservation; OU3 = Operable Unit 3; RGs = remedial goals; NYCRR = New York Codes, Rules and Regulations; SCOs = Soil Cleanup Objectives; SGVs = sediment guidance values.

b) A safety factor of 1.5 was applied to the estimated stream area to account for variability in width.

c) Estimated excavation volumes have been rounded to the nearest hundred cubic yards.

Table 4

Initial Identification and Screening of Technologies Summary
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

General Response Action	Remedial Technology	Process Option	Effectiveness	Technical Implementability	Administrative Implementability	Cost	Evaluation
No Action	NA	NA	Low	High	High	Low	Retained as baseline comparison
Institutional/ Engineering Controls	Land Use Controls	Deed Restrictions/ Environmental Easement	Low to Moderate	High	Low	Low	Eliminated because human health and ecological resources will be protected through the achievement of the RGs.
	Property Acquisition	Property Acquisition	Low to Moderate	High	Low	High	Eliminated due to the number of affected property owners (seven) including the New York State Department of Transportation, from which acquiring property is likely not possible. Also does not remove potential for continued offsite migration of COCs.
	Fencing	Fencing	Moderate	Low	Low	Moderate to High	Eliminated due to the number of affected property owners (seven) and large affected area. Installation and maintenance of fencing around affected areas of OU3 would be costly, and would be difficult administratively due to the segmentation of affected areas by multiple highways.
Containment	Capping In-Place	Soil Cover	High	Low	Low to Moderate	High	Eliminated due to the number of affected property owners (seven) and the technical impracticability of capping impacted sediment in Philipsburg Creek, which in some areas has exposed bedrock.
Excavation/Treatment	Excavation and Offsite Disposal	Excavation of floodplain soil and sediment to meet RGs	Moderate to High	Moderate	Moderate to High	Moderate to High	Retained
		Excavation of floodplain soil to meet NYCRR Part 375-6 Unrestricted Use SCOs and sediment to meet freshwater Class A SGVs	High	Moderate	Moderate to High	High	Retained

Notes:

a) NA = not applicable; NYSDEC = New York State Department of Environmental Conservation; NYCRR = New York Codes, Rules and Regulations; OU3 = Operable Unit 3; RGs = remedial goals; SCOs = Soil Cleanup Objectives; SGVs = sediment guidance values.

Table 5

Alternatives Development Matrix
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Remedial Technology	Process Option and Location	Alternative		
		1	2	3
No Action	No Action	X		
Excavation and Disposal	Excavation of Floodplain Soil and Sediment to Meet RGs		X	
	Excavation of Floodplain Soil to Meet NYCRR Part 375-6 Unrestricted Use SCOs and Freshwater Sediment to Meet Class A SGVs			X

Notes:

a) NYSDEC = New York State Department of Environmental Conservation; NYCRR = New York Codes, Rules and Regulations; OU3 = Operable Unit 3; RGs = remedial goals; SCOs = Soil Cleanup Objectives; SGVs = sediment guidance values.

Table 6

Cost Estimates by Remedial Alternative
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Remedial Alternative	Alternative No. 1 No Action (b)				Alternative No. 2 Excavation to Meet RGs				Alternative No. 3 Excavation to Meet NYCRR Part 375-6 Unrestricted Use SCOs and Class A SGVs			
Cost Category	**Quantity**	**Units**	**Unit Cost**	**Total Cost**	**Quantity**	**Units**	**Unit Cost**	**Total Cost**	**Quantity**	**Units**	**Unit Cost**	**Total Cost**
Capital Costs												
Professional Services												
Design, Permitting, and Reporting												
Wetland Delineation and Land Survey	-	-	-	$ -	1	LS	$ 200,000.00	$ 200,000	1	LS	$ 200,000.00	$ 200,000
Pre-Design Investigations	-	-	-	$ -	1	LS	$ 150,000.00	$ 150,000	1	LS	$ 150,000.00	$ 150,000
Vegetation/Geomorphological Surveys	-	-	-	$ -	1	LS	$ 150,000.00	$ 150,000	1	LS	$ 150,000.00	$ 150,000
Design Development (8% of Construction Cost) (c)	-	-	-	$ -	1	LS	$ 265,000.00	$ 265,000	1	LS	$ 464,000.00	$ 464,000
Permitting (Assumes NYSDEC and USACOE)	-	-	-	$ -	1	LS	$ 150,000.00	$ 150,000	1	LS	$ 150,000.00	$ 150,000
Construction Oversight (7% of Construction Cost) (d)	-	-	-	$ -	1	LS	$ 232,000.00	$ 232,000	1	LS	$ 406,000.00	$ 406,000
As-Built Survey	-	-	-	$ -	6	AC	$ 15,000.00	$ 90,000	8	AC	$ 15,000.00	$ 120,000
Real Estate, Legal, Planning				$ -								
Access Agreements - General Access & Sampling	7	EA	$ 15,000	$ 105,000	7	EA	$ 15,000.00	$ 105,000	7	EA	$ 15,000.00	$ 105,000
Access Agreements - Remediation	-	-	-	$ -	7	EA	$ 20,000.00	$ 140,000	7	EA	$ 20,000.00	$ 140,000
Local Laws and Permits	-	-	-	$ -	1	LS	$ 50,000.00	$ 50,000	1	LS	$ 50,000.00	$ 50,000
			Subtotal:	***$ 105,000***			***Subtotal:***	***$ 1,532,000***			***Subtotal:***	***$ 1,935,000***
Remedial Construction												
Contractor Project Management	-	-	-	$ -	1	LS	$ 200,000.00	$ 200,000	1	LS	$ 430,000.00	$ 430,000
Site Setup/Mobilization	-	-	-	$ -	1	LS	$ 209,000.00	$ 209,000	1	LS	$ 209,000.00	$ 209,000
Clearing/Grubbing	-	-	-	$ -	6	AC	$ 15,000.00	$ 90,000	8	AC	$ 15,000.00	$ 120,000
Stream Pump Around	-	-	-	$ -	6	MO	$ 15,000.00	$ 90,000	9	MO	$ 15,000.00	$ 135,000
Excavation & Stockpiling	-	-	-	$ -	6,800	CY	$ 20.00	$ 136,000	14,600	CY	$ 20.00	$ 292,000
Community Air Monitoring	-	-	-	$ -	6	MO	$ 25,000.00	$ 150,000	9	MO	$ 25,000.00	$ 225,000
Transport of Material to Site (e)	-	-	-	$ -	10,200	TON	$ 15.00	$ 153,000	21,900	TON	$ 15.00	$ 329,000
Street Sweeper (f)	-	-	-	$ -	6	MO	$ 10,000.00	$ 60,000	9	MO	$ 10,000.00	$ 90,000
Analytical and Data Validation												
Excavation Confirmation Analytical	-	-	-	$ -	1	LS	$ 46,000.00	$ 46,000	1	LS	$ 78,000.00	$ 78,000
Stabilization Verification Analytical	-	-	-	$ -	1	LS	$ 6,000.00	$ 6,000	1	LS	$ 10,000.00	$ 10,000
Fill Material Sampling	-	-	-	$ -	1	LS	$ 28,000.00	$ 28,000	1	LS	$ 55,000.00	$ 55,000
Stabilization (g)	-	-	-	$ -	5,100	CY	$ 63.00	$ 322,000	10,950	CY	$ 63.00	$ 690,000
Containment Cell Placement (h)	-	-	-	$ -	8,160	CY	$ 37.00	$ 302,000	17,520	CY	$ 37.00	$ 649,000
Fill Material (h)	-	-	-	$ -	8,160	CY	$ 35.00	$ 286,000	17,520	CY	$ 35.00	$ 614,000
Backfilling with Clean Fill (h)	-	-	-	$ -	8,160	CY	$ 37.00	$ 302,000	17,520	CY	$ 37.00	$ 649,000
Stream Restoration	-	-	-	$ -	6,250	LF	$ 50.00	$ 313,000	6,250	LF	$ 50.00	$ 313,000
Wetlands Restoration	-	-	-	$ -	2	AC	$ 85,000.00	$ 136,000	2	AC	$ 85,000.00	$ 183,000
Uplands Restoration	-	-	-	$ -	4	AC	$ 50,000.00	$ 221,000	6	AC	$ 50,000.00	$ 293,000
Containment Cell Capping	-	-	-	$ -	4,840	TN	$ 32.00	$ 155,000	10,392	TN	$ 32.00	$ 333,000
Demobilization	-	-	-	$ -	1	LS	$ 100,000.00	$ 100,000	1	LS	$ 100,000.00	$ 100,000
			Subtotal:	***$ -***			***Subtotal:***	***$ 3,305,000***			***Subtotal:***	***$ 5,797,000***
			Total Estimated Capital Costs:	***$ 105,000***			**Total Estimated Capital Costs:**	***$ 4,837,000***			**Total Estimated Capital Costs:**	***$ 7,732,000***

Table 6

Cost Estimates by Remedial Alternative
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Remedial Alternative	Alternative No. 1 No Action (b)				Alternative No. 2 Excavation to Meet RGs				Alternative No. 3 Excavation to Meet NYCRR Part 375-6 Unrestricted Use SCOs and Class A SGVs			
Cost Category	**Quantity**	**Units**	**Unit Cost**	**Total Cost**	**Quantity**	**Units**	**Unit Cost**	**Total Cost**	**Quantity**	**Units**	**Unit Cost**	**Total Cost**
Operations and Maintenance (O&M) Costs												
Inspections and Reporting	1	LS	$ 30,000	$ 30,000	1	LS	$ 75,000.00	$ 75,000	1.0	LS	$ 75,000.00	$ 75,000
Replanting (i)	-	AC	-	$ -	0.6	AC	$ 85,000.00	$ 51,000	0.8	AC	$ 85,000.00	$ 68,000
Invasive Species Control (j)	-	AC	$ 10,000.00	$ -	6	AC	$ 10,000.00	$ 60,000	8	AC	$ 10,000.00	$ 80,000
			Subtotal:	$ 30,000			***Subtotal:***	$ 186,000			***Subtotal:***	$ 223,000
			Number of Years:	30			**Number of Years:**	6			**Number of Years:**	6
			Total Estimated O&M Costs:	***$ 900,000***			**Total Estimated O&M Costs:**	***$ 1,116,000***			**Total Estimated O&M Costs:**	***$ 1,338,000***
Total Estimated Costs By Remedial Alternative												
			Subtotal Estimated Cost:	***$ 1,005,000***			**Subtotal Estimated Cost:**	***$ 5,953,000***			**Subtotal Estimated Cost:**	***$ 9,070,000***
			Contingency (0%):	***$ -***			**Contingency (10%):**	***$ 595,300***			**Contingency (20%):**	***$ 1,814,000***
			Total Estimated Costs:	***$ 1,005,000***			**Total Estimated Costs:**	***$ 6,549,000***			**Total Estimated Costs:**	***$ 10,884,000***

Notes:

a) AC = Acre; CY = cubic yard; LF = linear foot; LS = lump sum; MO = month; NYSDEC = New York State Department of Environmental Conservation; NYCRR = New York Codes, Rules and Regulations; O&M = operations and maintenance; OU3 = Operable Unit 3; RGs = remedial goals; SCOs = Soil Cleanup Objectives; SGVs = sediment guidance values; TN = ton; USACOE = United States Army Corps of Engineers; YR = year.

b) Assumes an annual inspection of site conditions and preparation of an annual summary report would be required.

c) Design development costs estimated as 8% of remedial construction capital costs.

d) Construction oversight costs estimated as 7% of remedial construction capital costs.

e) Soil density assumed to be 1.5 tons per cubic yard.

f) Duration of remedial construction activities assumed to 6 months for Alternative No. 2, and 9 months for Alternative No. 3.

g) Volume of excavated soil requiring stabilization is assumed to be 75% of the total soil and sediment to be excavated in Alternative Nos. 2 and 3.

h) Assumes a 20% bulking factor for excavated material.

i) Assumes that 10% of the restored area in Alternative Nos. 2 and 3 will require replanting.

j) Invasvie species management is assumed for each year of post-restoration monitoring.

k) All total line item costs rounded up to the nearest $1,000.

Table 7

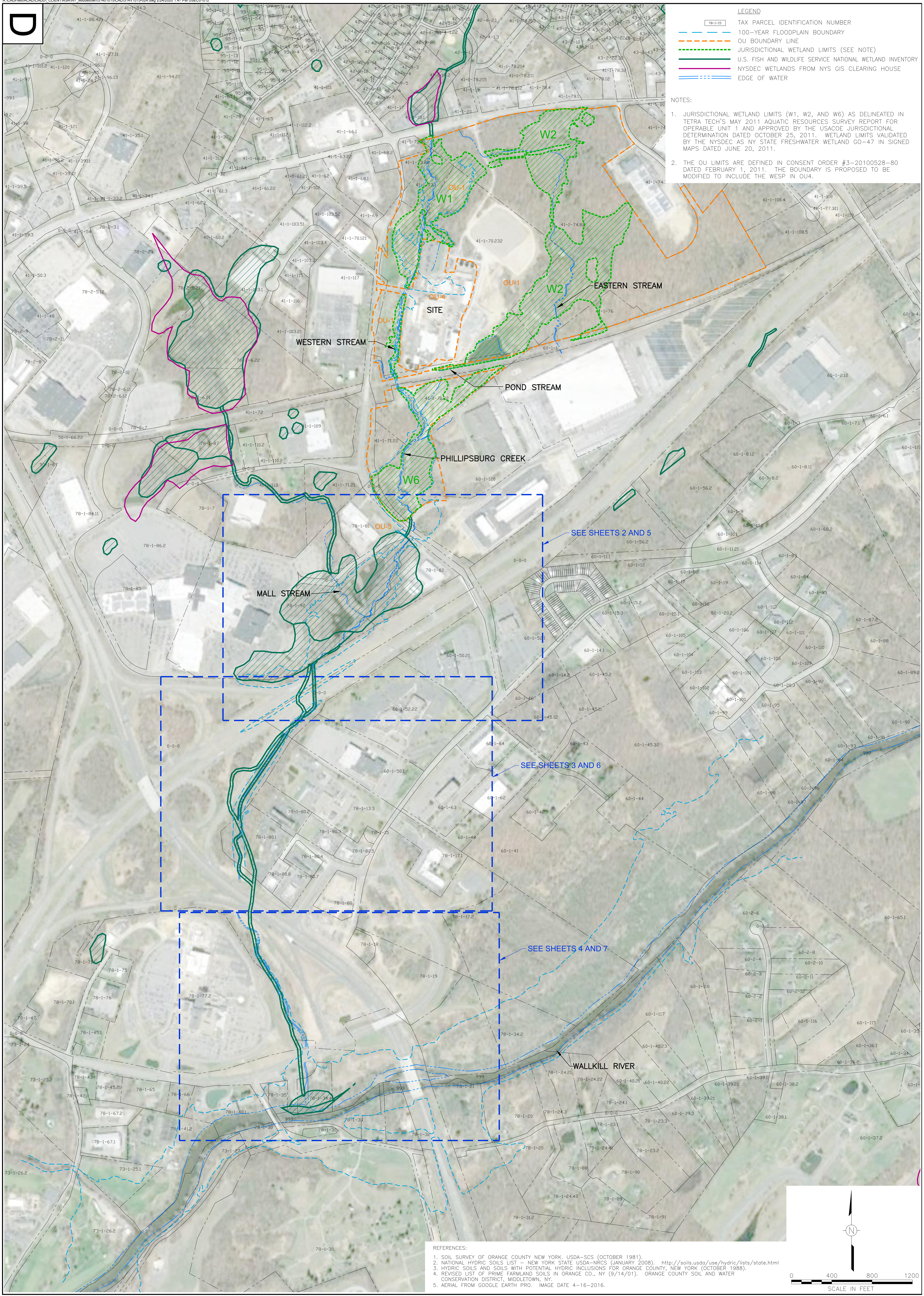
Remedial Alternative Detailed Evaluation
OU3 Feasibility Study
Revere Smelting & Refining
Middletown, New York (a)

Evaluation Criteria	**Remedial Alternatives**		
	Alternative No. 1 **No Action**	**Alternative No. 2** **Excavation to Meet NYSDEC** **Site-Specific Criteria and Class A SGVs**	**Alternative No. 3** **Excavation to Meet NYCRR Part 375-6** **Unrestricted Use SCOs and Class A SGVs**
Overall Protection of Human Health and the Environment	**Low** - This alternative does not reduce or remove lead and arsenic impacted soil and sediment from OU3.	**Medium-High** - This alternative has a high level of protectiveness to human health and the environment. Implementation of Alternative No. 2 in OU3 would meet the RGs. However, it does not meet this does not meet NYCRR Part 375-6 criteria for unrestricted use.	**High** - This alternative has a high level of protectiveness to human health and the environment as it would meet NYCRR Part 375-6 criteria for unrestricted use.
Standards, Criteria, and Guidance	**Low** - The no action alternative will leave contaminated soil above NYSDEC site-specific criteria, and Part 375-6.3 SCOs for unrestricted use. This alternative will leave contaminated sediment above Class A SGVs for freshwater sediments.	**Medium-High -** This alternative will result in soil and sediment on affected properties achieving the RGs; however, this does not meet NYCRR Part 375-6 criteria for unrestricted use.	**High** - This alternative will result in soil and sediment on affected properties achieving NYCRR Part 375-6 criteria for Unrestricted Use and Class A Freshwater SGVs for Philipsburg Creek sediment. As such, there will be no required use restrictions on affected properties for the protection of public health, groundwater, and ecological resources.
Long-Term Effectiveness and Permanence	**Low -** This alternative does not reduce or remove lead and arsenic impacted soil and sediment from OU3.	**High** - This alternative includes removal of affected soil and sediment to meet the RGs. This is permanent and is therefore effective in the long-term.	**High** - This alternative includes removal of affected soil and sediment to meet the NYCRR Part 375-6 criteria for Unrestricted Use and Class A Freshwater SGVs for Phillipsburg Creek sediment. This is permanent and is therefore effective in the long-term.
Reduction in Toxicity, Mobility or Volume of Contamination Through Treatment	**Low** - The no action alternative will not have any direct effect on the toxicity, mobility, or volume of contamination.	**High** - Removal of affected soil and sediment to meet the RGs will reduce the toxicity of contaminated soil and eliminate the toxicity and mobility of contaminated sediments. The volume of soil in OU3 containing lead and arsenic at concentrations above RGs will be eliminated.	**High** - Removal of affected soil and sediment to meet the NYCRR Part 375-6 unrestricted use SCOs and Class A Freshwater SGVs will reduce the toxicity of contaminated soil and eliminate the toxicity and mobility of contaminated sediments. The volume of soil in OU3 containing lead and arsenic at concentrations will be eliminated.
Short-Term Impacts and Effectiveness	**N/A** - The evaluation criteria refers to action related to implementation of a remedy.	**Medium-High** - Short-term impacts are medium for this alternative. Access/haul roads will need to be constructed, trees and brush cleared, and sections of Philipsburg Creek temporarily re-routed. Following completion of remedial excavations, restoration of the stream, wetlands, and upland areas will be required. However, effectiveness of this alternative is high. Once excavated and replaced with clean backfill, soil and sediment contamination exceeding the RGs will be removed.	**High** - Short-term impacts are high for this alternative. Access/haul roads will need to be constructed, trees and brush cleared, and sections of Philipsburg Creek temporarily re-routed. Following completion of remedial excavations, restoration of the stream, wetlands, and upland areas will be required. However, effectiveness of this alternative is high. Once excavated and replaced with clean backfill, contamination will be eliminated. It is important to note that Alternative No. 3 will cause a greater degree of short-term impacts than Alternative No. 2, as approximately twice the volume of soil and sediment will be excavated, requiring greater land disturbance and restoration.
Implementability	**N/A** - The evaluation criteria refers to action related to implementation of a remedy.	**High** - Excavation, ex-situ soil stabilization, and disposal within the onsite containment cell are conventional technologies easily implementable with standard earth-moving/construction equipment. The onsite containment cell was constructed during the OU1 remedial action with the intention of serving as the repository of excavated material generated during OU1 and OU3 remedial activities.	**High** - Excavation, ex-situ soil stabilization, and disposal within the onsite containment cell are conventional technologies easily implementable with standard earth-moving/construction equipment. The onsite containment cell was constructed during the OU1 remedial action with the intention of serving as the repository of excavated material generated during OU1 and OU3 remedial activities.
Cost-effectiveness	Capital Cost = $ 105,000 Years of Site O&M = 30 Annual Site O&M Cost = $ 30,000 Total Cost (Non-Discounted) = $ 1,005,000	Capital Cost = $ 4,837,000 Years of Site O&M = 6 Annual Site O&M Cost = $ 186,000 Total Cost (Non-Discounted) = $ 6,549,000	Capital Cost = $ 7,732,000 Years of Site O&M = 6 Annual Site O&M Cost = $ 223,000 Total Cost (Non-Discounted) = $ 10,884,000
Community Acceptance	**Low -** The no action alternative will not remove or reduce the toxicity, mobility, or volume of impacted soil and sediment. Seven different properties are affected by the impacted material.	**N/A** - Community input regarding the OU3 FS will be solicited by the NYSDEC during the public comment period, during which time the report will be available for public review.	**N/A** - Community input regarding the OU3 FS will be solicited by the NYSDEC during the public comment period, during which time the report will be available for public review.
Land Use	**Low -** This alternative will leave the affected offsite properties with land use restrictions.	**High** - Implementation of this alternative will not affect land use.	**High** - Implementation of this alternative will not affect land use.

Notes:

a) N/A = Not Applicable; NYCRR = New York Codes, Rules and Regulations; NYSDEC = New York State Department of Environmental Conservation; OU3 = Operable Unit 3; RGs = remedial goals; SCOs = Soil Cleanup Objectives; SGVs = sediment guidance

SHEETS



LEGEND

- 78-1-15 — TAX PARCEL IDENTIFICATION NUMBER
- 100-YEAR FLOODPLAIN BOUNDARY
- OU BOUNDARY LINE
- JURISDICTIONAL WETLAND LIMITS (SEE NOTE)
- U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLAND INVENTORY
- NYSDEC WETLANDS FROM NYS GIS CLEARING HOUSE
- EDGE OF WATER

NOTES:

1. JURISDICTIONAL WETLAND LIMITS (W1, W2, AND W6) AS DELINEATED IN TETRA TECH'S MAY 2011 AQUATIC RESOURCES SURVEY REPORT FOR OPERABLE UNIT 1 AND APPROVED BY THE USACOE JURISDICTIONAL DETERMINATION DATED OCTOBER 25, 2011. WETLAND LIMITS VALIDATED BY THE NYSDEC AS NY STATE FRESHWATER WETLAND GO-47 IN SIGNED MAPS DATED JUNE 20, 2011.
2. THE OU LIMITS ARE DEFINED IN CONSENT ORDER #3-20100528-80 DATED FEBRUARY 1, 2011. THE BOUNDARY IS PROPOSED TO BE MODIFIED TO INCLUDE THE WESP IN OU4.

REFERENCES:

1. SOIL SURVEY OF ORANGE COUNTY NEW YORK. USDA-SCS (OCTOBER 1981).
2. NATIONAL HYDRIC SOILS LIST – NEW YORK STATE USDA-NRCS (JANUARY 2008). http://soils.usda/use/hydric/lists/state.html
3. HYDRIC SOILS AND SOILS WITH POTENTIAL HYDRIC INCLUSIONS FOR ORANGE COUNTY, NEW YORK (OCTOBER 1988).
4. REVISED LIST OF PRIME FARMLAND SOILS IN ORANGE CO., NY (9/14/01). ORANGE COUNTY SOIL AND WATER CONSERVATION DISTRICT, MIDDLETOWN, NY.
5. AERIAL FROM GOOGLE EARTH PRO. IMAGE DATE 4-16-2016.

Drawing Number 314V1015-024

SHEET 1

WSP USA Inc.
75 ARLINGTON STREET, 4th FLOOR
BOSTON, MA 02116
TEL: +1 617.426.7330

PROPOSED EXCAVATION AREAS KEY MAP
OU3 FEASIBILITY STUDY

REVERE SMELTING & REFINING
MIDDLETOWN, NEW YORK

PREPARED FOR

REVERE SMELTING & REFINING CORPORATION
MIDDLETOWN, NEW YORK

DRAWN BY	EGC
CHECKED	CDA 2/24/2020
APPROVED	JS 2/24/2020

SEAL

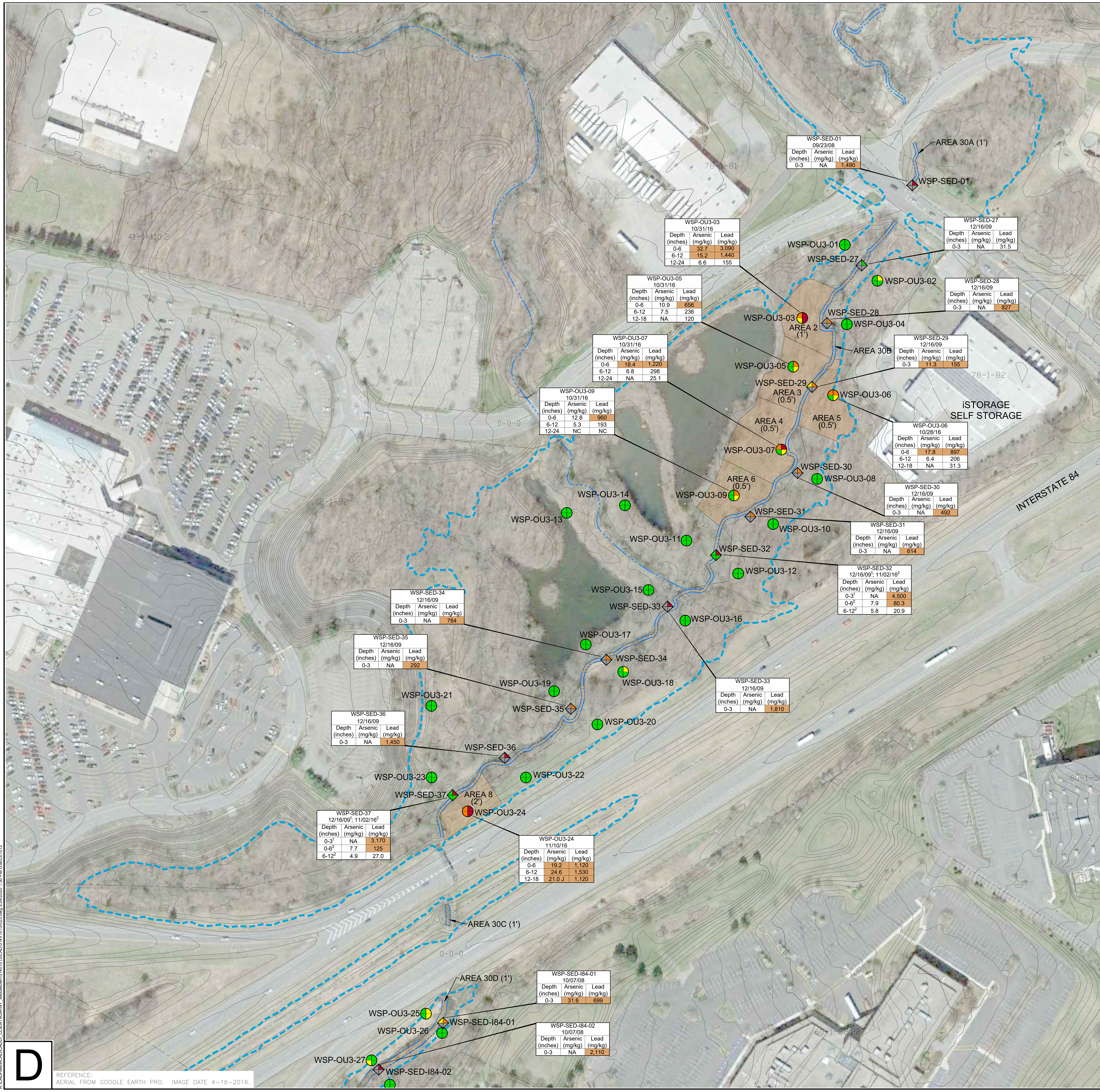
STATE OF NEW YORK ★ JAMES ALLEN SOBIERAJ ★ 077394 LICENSED PROFESSIONAL ENGINEER

2/24/20

DATE

REVISIONS

REV	DESCRIPTION		
1	Revised:	Chkd:	Appr.:
2	Revised:	Chkd:	Appr.:
3	Revised:	Chkd:	Appr.:



LEGEND

- EDGE OF WATER
- 100-YEAR FLOODPLAIN BOUNDARY
- 78-1-15 TAX PARCEL IDENTIFICATION NUMBER
- PROPOSED EXCAVATION

WSP-SED-29: ARSENIC ← → LEAD; 0-3" or 0-6" BGS RESULT; SEDIMENT SAMPLE; 6-12" BGS RESULT; SAMPLE ID

WSP-OU3-02: ARSENIC ← → LEAD; 0-2", 2-6", OR 0-6" BGS RESULT; SOIL SAMPLE; 6-12" BGS RESULT; SAMPLE ID

SAMPLE ID / DATE SAMPLED

WSP-SED-01 09/23/08		
Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	NA	1,490

HIGHLIGHTED VALUES EXCEED NYSDEC's CLASS A FRESHWATER SEDIMENT GUIDANCE VALUES OF <10 mg/kg FOR ARSENIC OR <36 mg/kg FOR LEAD

SAMPLE ID / DATE SAMPLED

WSP-OU3-03 10/31/16		
Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-6	32.7	3,090
6-12	15.2	1,440
12-24	6.6	155

HIGHLIGHTED VALUES EXCEED NYSDEC's SITE-SPECIFIC CRITERIA OF 13 mg/kg FOR ARSENIC OR 400 mg/kg FOR LEAD

BGS	BELOW GROUND SURFACE
NA	NOT ANALYZED
NC	NOT COLLECTED
J	ESTIMATED RESULT

FRESHWATER SEDIMENT GUIDANCE VALUES (SGVs)

ARSENIC	LEAD
<10 mg/kg (CLASS A)	<36 mg/kg (CLASS A)
>10 mg/kg AND <33 mg/kg (CLASS B)	>36 mg/kg AND <130 mg/kg (CLASS B)
>33 mg/kg (CLASS C)	>130 mg/kg (CLASS C)
>1,000 mg/kg	>1,000 mg/kg
NOT COLLECTED	NOT COLLECTED

SOIL CLEANUP OBJECTIVES (SCOs)

ARSENIC	LEAD
<13 mg/kg (UNRESTRICTED USE SCO)	<63 mg/kg (UNRESTRICTED USE SCO)
>13 mg/kg AND <16 mg/kg	>63 mg/kg AND <400 mg/kg
>16 mg/kg AND <1,000 mg/kg	>400 mg/kg AND <1,000 mg/kg
>1,000 mg/kg	>1,000 mg/kg
NOT COLLECTED	NOT COLLECTED

NOTES:

1. PROPERTY LINES SHOWN ARE BASED ON THE MOST RECENT (2019) TAX RECORDS OBTAINED FROM THE ORANGE COUNTY NY REAL PROPERTY TAX SERVICES OFFICE (propertydata.orangecountygov.com).
2. THE OU LIMITS ARE DEFINED IN CONSENT ORDER #3-20100528-80 DATED FEBRUARY 1, 2011.
3. CONTOUR LINES USED TO DEFINE PROPOSED EXCAVATION LIMITS ARE 2-FOOT CONTOURS OF ORANGE COUNTY NY CREATED USING THE USGS 3 COUNTY 2014 LiDAR COLLECTION, AND OBTAINED FROM THE NYS GIS CLEARING HOUSE (https://gis.ny.gov/elevation/contours/contours-orange.htm).
4. FRESHWATER SEDIMENT GUIDANCE VALUES LISTED IN TABLE 5 OF THE NYSDEC'S SCREENING AND ASSESSMENT OF CONTAMINATED SEDIMENT REPORT (JUNE 2014).
5. IF A DUPLICATE SAMPLE WAS COLLECTED, ONLY THE GREATER CONCENTRATION IS SHOWN FOR CLARITY.
6. IF SAMPLES WERE COLLECTED FROM BOTH 0-3" AND 0-6", THE GREATER CONCENTRATION IS USED FOR COMPARISON TO APPLICABLE CRITERIA.
7. FOR CLARITY, CONCENTRATION BOXES ARE ONLY SHOWN FOR SAMPLES WHICH REQUIRE EXCAVATION TO MEET APPLICABLE CRITERIA.

60-1-52.1

N

0 100 200 300
SCALE IN FEET

REVISIONS

REV	DESCRIPTION		
1	Revised:	Chkd:	Appr.:
2	Revised:	Chkd:	Appr.:
3	Revised:	Chkd:	Appr.:

SEAL

STATE OF NEW YORK ★ JAMES ALLEN SOBIERAJ ★ 077394 ★ LICENSED PROFESSIONAL ENGINEER

2/24/20
DATE

DRAWN BY	EGC/MDP/CDA	
CHECKED	CDA	2/24/2020
APPROVED		2/24/2020

PROPOSED EXCAVATION TO MEET SITE-SPECIFIC CRITERIA AND CLASS A FRESHWATER SGVs OU3 FEASIBILITY STUDY (SHEET 1 OF 3)

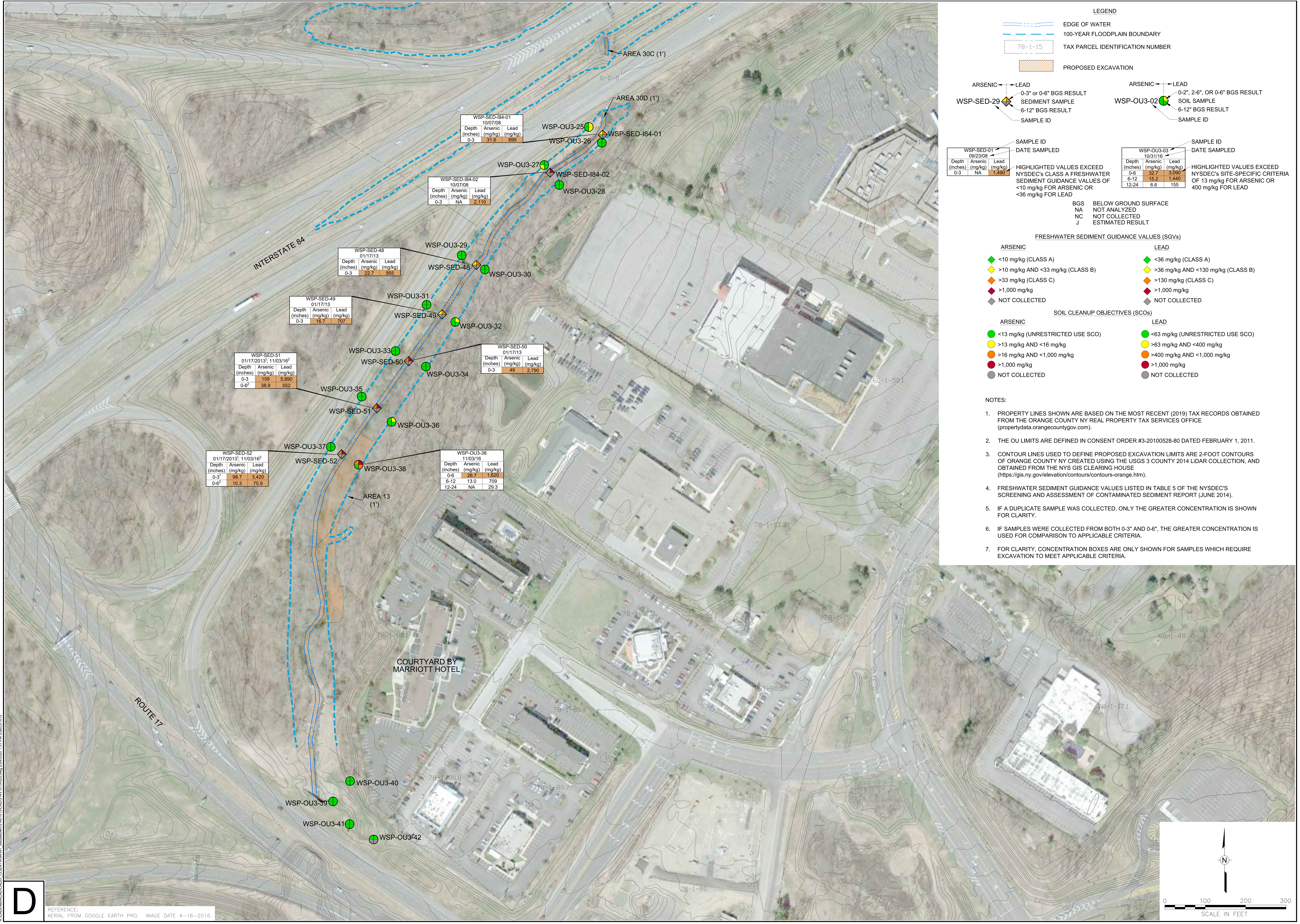
REVERE SMELTING & REFINING
MIDDLETOWN, NEW YORK

PREPARED FOR
REVERE SMELTING & REFINING CORPORATION
MIDDLETOWN, NEW YORK

WSP USA Inc.
75 ARLINGTON STREET, 4th FLOOR
BOSTON, MA 02116
TEL: +1 617.426.7330

SHEET 2

Drawing Number
314V1015-025



WSP-SED-I84-01
10/07/08

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	31.6	699

WSP-SED-I84-02
10/07/08

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	NA	2,110

WSP-SED-48
01/17/13

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	22.7	955

WSP-SED-49
01/17/13

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	16.7	707

WSP-SED-50
01/17/13

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	49	2,790

WSP-SED-51
01/17/2013[1]; 11/03/16[2]

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	159	5,890
0-6[2]	38.9	552

WSP-SED-52
01/17/2013[1]; 11/03/16[2]

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3[1]	98.7	3,420
0-6[2]	10.3	75.9

WSP-OU3-38
11/03/16

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-6	26.7	1,620
6-12	13.0	709
12-24	NA	29.3

LEGEND

EDGE OF WATER
100-YEAR FLOODPLAIN BOUNDARY
78-1-15 TAX PARCEL IDENTIFICATION NUMBER
PROPOSED EXCAVATION

WSP-SED-29: ARSENIC / LEAD; 0-3" or 0-6" BGS RESULT; SEDIMENT SAMPLE; 6-12" BGS RESULT; SAMPLE ID

WSP-OU3-02: ARSENIC / LEAD; 0-2", 2-6", OR 0-6" BGS RESULT; SOIL SAMPLE; 6-12" BGS RESULT; SAMPLE ID

WSP-SED-01 (SAMPLE ID)
09/23/08 (DATE SAMPLED)

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	NA	1,490

HIGHLIGHTED VALUES EXCEED NYSDEC's CLASS A FRESHWATER SEDIMENT GUIDANCE VALUES OF <10 mg/kg FOR ARSENIC OR <36 mg/kg FOR LEAD

WSP-OU3-03 (SAMPLE ID)
10/31/16 (DATE SAMPLED)

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-6	32.7	3,090
6-12	15.2	1,440
12-24	6.6	155

HIGHLIGHTED VALUES EXCEED NYSDEC's SITE-SPECIFIC CRITERIA OF 13 mg/kg FOR ARSENIC OR 400 mg/kg FOR LEAD

BGS BELOW GROUND SURFACE
NA NOT ANALYZED
NC NOT COLLECTED
J ESTIMATED RESULT

FRESHWATER SEDIMENT GUIDANCE VALUES (SGVs)

ARSENIC	LEAD
<10 mg/kg (CLASS A)	<36 mg/kg (CLASS A)
>10 mg/kg AND <33 mg/kg (CLASS B)	>36 mg/kg AND <130 mg/kg (CLASS B)
>33 mg/kg (CLASS C)	>130 mg/kg (CLASS C)
>1,000 mg/kg	>1,000 mg/kg
NOT COLLECTED	NOT COLLECTED

SOIL CLEANUP OBJECTIVES (SCOs)

ARSENIC	LEAD
<13 mg/kg (UNRESTRICTED USE SCO)	<63 mg/kg (UNRESTRICTED USE SCO)
>13 mg/kg AND <16 mg/kg	>63 mg/kg AND <400 mg/kg
>16 mg/kg AND <1,000 mg/kg	>400 mg/kg AND <1,000 mg/kg
>1,000 mg/kg	>1,000 mg/kg
NOT COLLECTED	NOT COLLECTED

NOTES:

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REVISIONS

REV	DESCRIPTION

SEAL — STATE OF NEW YORK, JAMES ALLEN SOBIERAJ, LICENSED PROFESSIONAL ENGINEER, 0773.. — 2/24/20 — DATE

DRAWN BY	EGC/MDP/CDA	
CHECKED	CDA	2/24/2020
APPROVED	JS	2/24/2020

PROPOSED EXCAVATION TO MEET SITE-SPECIFIC CRITERIA AND CLASS A FRESHWATER SGVs OU3 FEASIBILITY STUDY (SHEET 2 OF 3)

REVERE SMELTING & REFINING
MIDDLETOWN, NEW YORK

PREPARED FOR
REVERE SMELTING & REFINING CORPORATION
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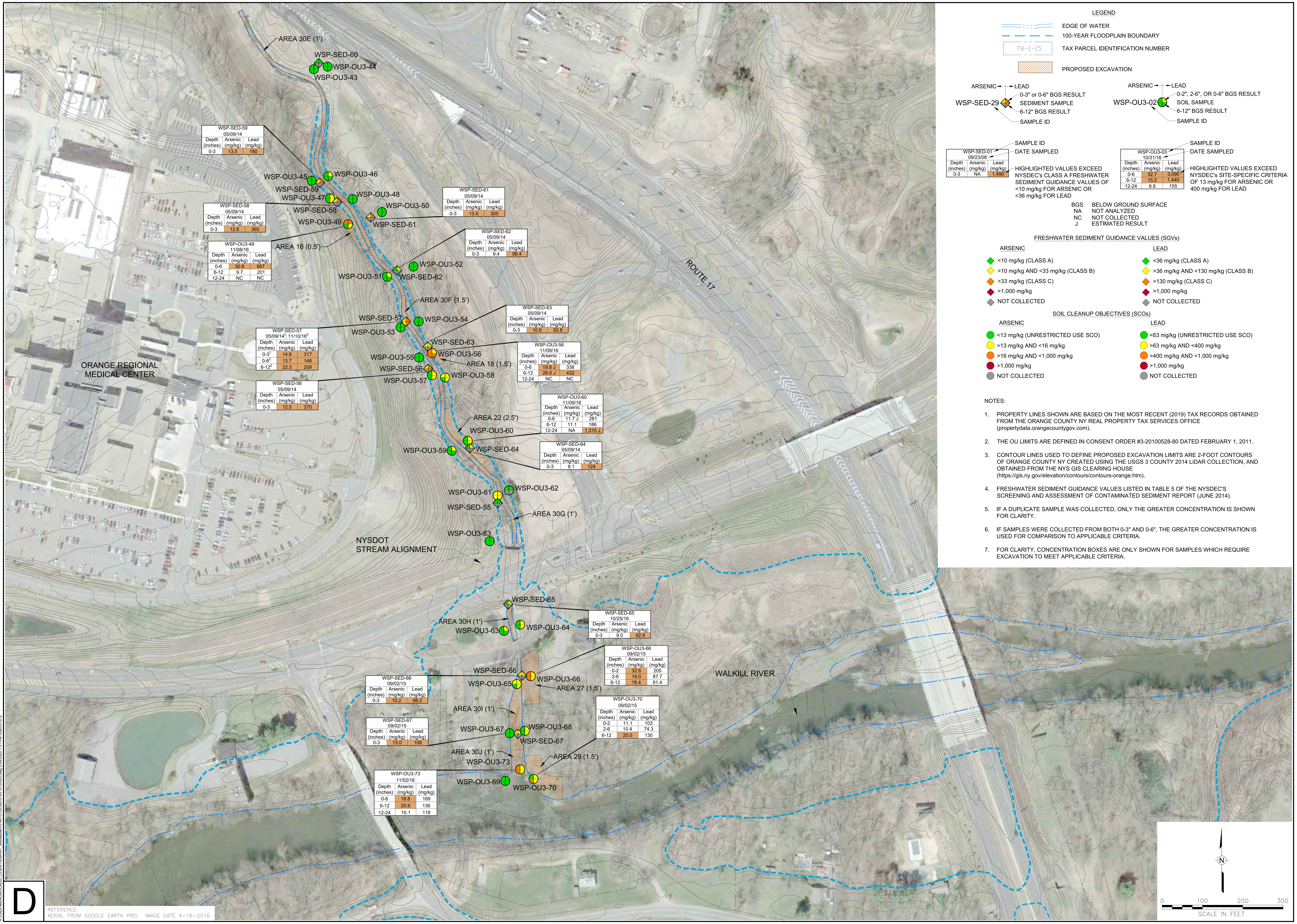
75 ARLINGTON STREET, 4th FLOOR
BOSTON, MA 02116
TEL: +1 617.426.7330

SHEET 3

Drawing Number
314V1015-025



LEGEND

EDGE OF WATER
100-YEAR FLOODPLAIN BOUNDARY
78-1-15 TAX PARCEL IDENTIFICATION NUMBER
PROPOSED EXCAVATION

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WSP-OU3-02: ARSENIC / LEAD; 0-2", 2-6", OR 0-6" BGS RESULT; SOIL SAMPLE; 6-12" BGS RESULT; SAMPLE ID

SAMPLE ID: WSP-SED-01
DATE SAMPLED: 09/23/08

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	NA	1,490

HIGHLIGHTED VALUES EXCEED NYSDEC's CLASS A FRESHWATER SEDIMENT GUIDANCE VALUES OF <10 mg/kg FOR ARSENIC OR <36 mg/kg FOR LEAD

SAMPLE ID: WSP-OU3-03
DATE SAMPLED: 10/31/16

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-6	32.7	3,090
6-12	15.2	1,440
12-24	6.6	155

HIGHLIGHTED VALUES EXCEED NYSDEC's SITE-SPECIFIC CRITERIA OF 13 mg/kg FOR ARSENIC OR 400 mg/kg FOR LEAD

BGS BELOW GROUND SURFACE
NA NOT ANALYZED
NC NOT COLLECTED
J ESTIMATED RESULT

FRESHWATER SEDIMENT GUIDANCE VALUES (SGVs)

ARSENIC	LEAD
<10 mg/kg (CLASS A)	<36 mg/kg (CLASS A)
>10 mg/kg AND <33 mg/kg (CLASS B)	>36 mg/kg AND <130 mg/kg (CLASS B)
>33 mg/kg (CLASS C)	>130 mg/kg (CLASS C)
>1,000 mg/kg	>1,000 mg/kg
NOT COLLECTED	NOT COLLECTED

SOIL CLEANUP OBJECTIVES (SCOs)

ARSENIC	LEAD
<13 mg/kg (UNRESTRICTED USE SCO)	<63 mg/kg (UNRESTRICTED USE SCO)
>13 mg/kg AND <16 mg/kg	>63 mg/kg AND <400 mg/kg
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7. FOR CLARITY, CONCENTRATION BOXES ARE ONLY SHOWN FOR SAMPLES WHICH REQUIRE EXCAVATION TO MEET APPLICABLE CRITERIA.

REVISIONS
REV | DESCRIPTION

SEAL

DRAWN BY EGC/MDP/CDA
CHECKED CDA 2/24/2020
APPROVED 2/24/2020

PROPOSED EXCAVATION TO MEET SITE-SPECIFIC CRITERIA AND CLASS A FRESHWATER SGVs OU3 FEASIBILITY STUDY (SHEET 3 OF 3)

REVERE SMELTING & REFINING
MIDDLETOWN, NEW YORK

PREPARED FOR
REVERE SMELTING & REFINING CORPORATION
MIDDLETOWN, NEW YORK

WSP USA Inc.
75 ARLINGTON STREET, 4th FLOOR
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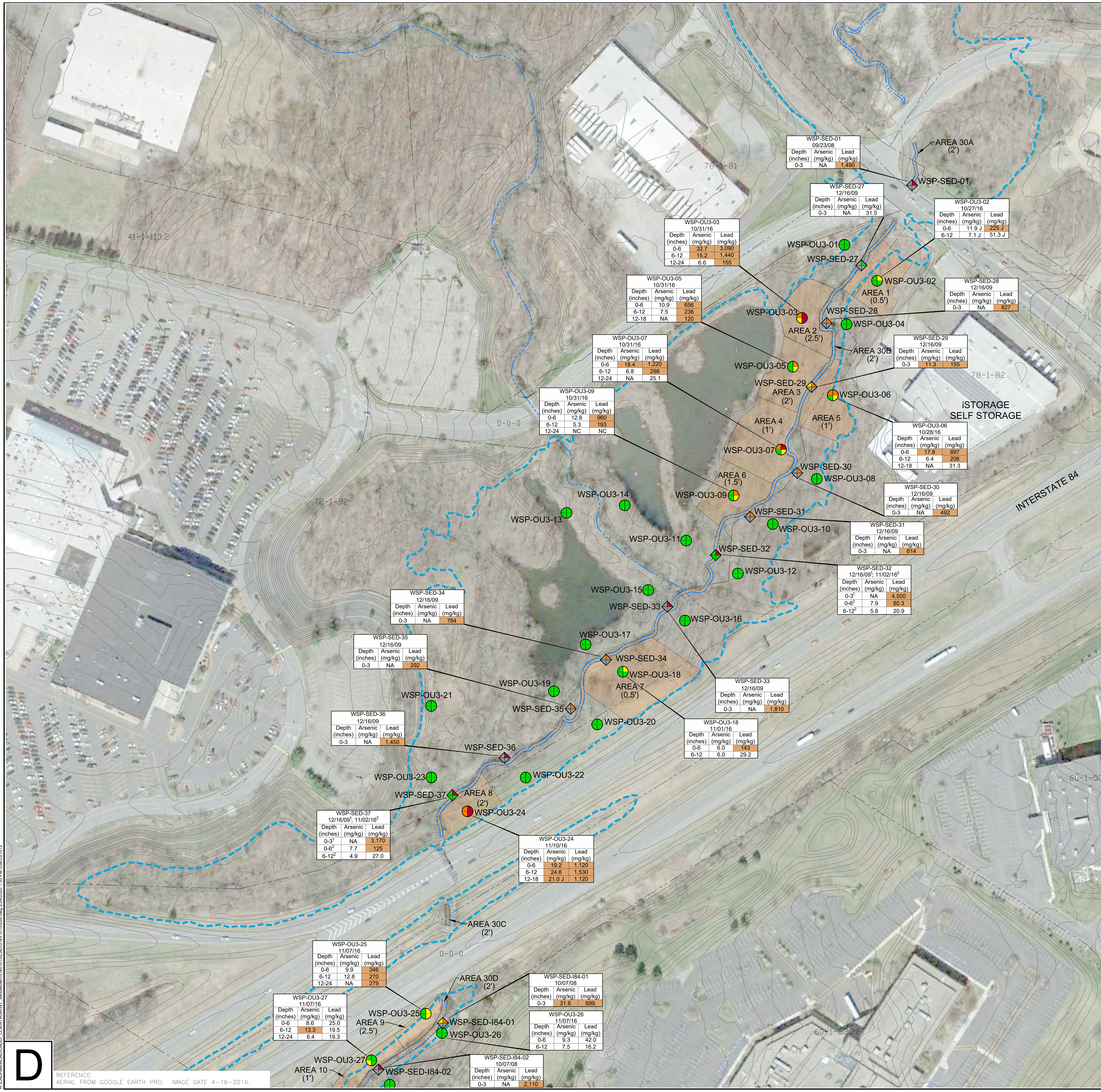
TEL: +1 617.426.7330

SHEET 4

Drawing Number
314V1015-025



LEGEND

- EDGE OF WATER
- 100-YEAR FLOODPLAIN BOUNDARY
- 78-1-15 TAX PARCEL IDENTIFICATION NUMBER
- PROPOSED EXCAVATION

WSP-SED-29: ARSENIC / LEAD; 0-3" or 0-6" BGS RESULT; SEDIMENT SAMPLE; 6-12" BGS RESULT; SAMPLE ID

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WSP-SED-01 (SAMPLE ID), 09/23/08 (DATE SAMPLED)

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	NA	1,490

HIGHLIGHTED VALUES EXCEED NYSDEC's CLASS A FRESHWATER SEDIMENT GUIDANCE VALUES OF <10 mg/kg FOR ARSENIC OR <36 mg/kg FOR LEAD

WSP-OU3-03 (SAMPLE ID), 10/31/16 (DATE SAMPLED)

Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-6	32.7	3,090
6-12	15.2	1,440
12-24	6.6	155

HIGHLIGHTED VALUES EXCEED NYCRR SUBPART 375-6.8(a) - UNRESTRICTED USE SOIL CLEANUP OBJECTIVES OF 13 mg/kg FOR ARSENIC OR 63 mg/kg FOR LEAD

BGS	BELOW GROUND SURFACE
NA	NOT ANALYZED
NC	NOT COLLECTED
U	NOT DETECTED ABOVE THE REPORTING LIMIT
J	ESTIMATED RESULT

FRESHWATER SEDIMENT GUIDANCE VALUES (SGVs)

ARSENIC	LEAD
<10 mg/kg (CLASS A)	<36 mg/kg (CLASS A)
>10 mg/kg AND <33 mg/kg (CLASS B)	>36 mg/kg AND <130 mg/kg (CLASS B)
>33 mg/kg (CLASS C)	>130 mg/kg (CLASS C)
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ARSENIC	LEAD
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N

0 100 200 300

SCALE IN FEET

REVISIONS

REV	DESCRIPTION	Revised:	Chkd:	Appr.:

SEAL: JAMES ALLEN SOBIERAJ, STATE OF NEW YORK, LICENSED PROFESSIONAL ENGINEER, 2/24/20, DATE

DRAWN BY	EGC/MDP/CDA	2/24/2020
CHECKED	[illegible]	2/24/2020
APPROVED	[illegible]	2/24/2020

PROPOSED EXCAVATION TO MEET UNRESTRICTED USE SOIL SCOs AND CLASS A FRESHWATER SGVS OU3 FEASIBILITY STUDY (SHEET 1 OF 3)

REVERE SMELTING & REFINING CORPORATION
MIDDLETOWN, NEW YORK

PREPARED FOR
REVERE SMELTING & REFINING CORPORATION
MIDDLETOWN, NEW YORK

WSP USA Inc.
75 ARLINGTON STREET, 4th FLOOR
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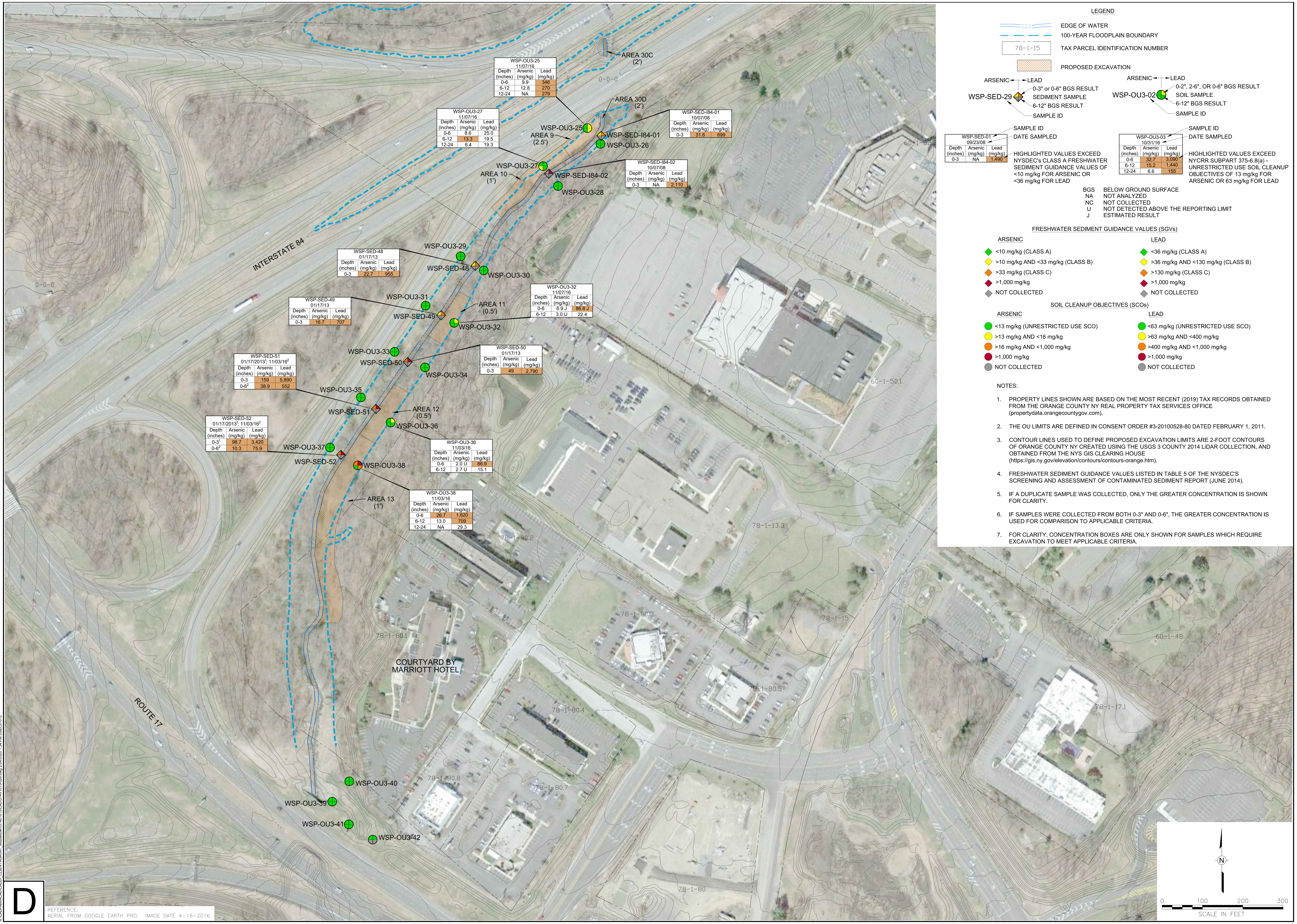
TEL: +1 617.426.7330

SHEET 5

Drawing Number
314V1015-026



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REVISIONS

REV	DESCRIPTION

DRAWN BY EGC/MDP/CDA
CHECKED 2/24/2020
APPROVED 2/24/2020

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PROPERTY OF WSP USA INC.

NOTICE: THIS DRAWING HAS BEEN PREPARED UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. IT IS A VIOLATION OF STATE LAW FOR ANY PERSONS, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT IN ANY WAY.

SEAL: STATE OF NEW YORK, JAMES ALLEN SOBIERAJ, LICENSED PROFESSIONAL ENGINEER
2/24/20
DATE

PROPOSED EXCAVATION TO MEET UNRESTRICTED USE SOIL SCOs AND CLASS A FRESHWATER SGVS
OU3 FEASIBILITY STUDY (SHEET 2 OF 3)

REVERE SMELTING & REFINING
MIDDLETOWN, NEW YORK

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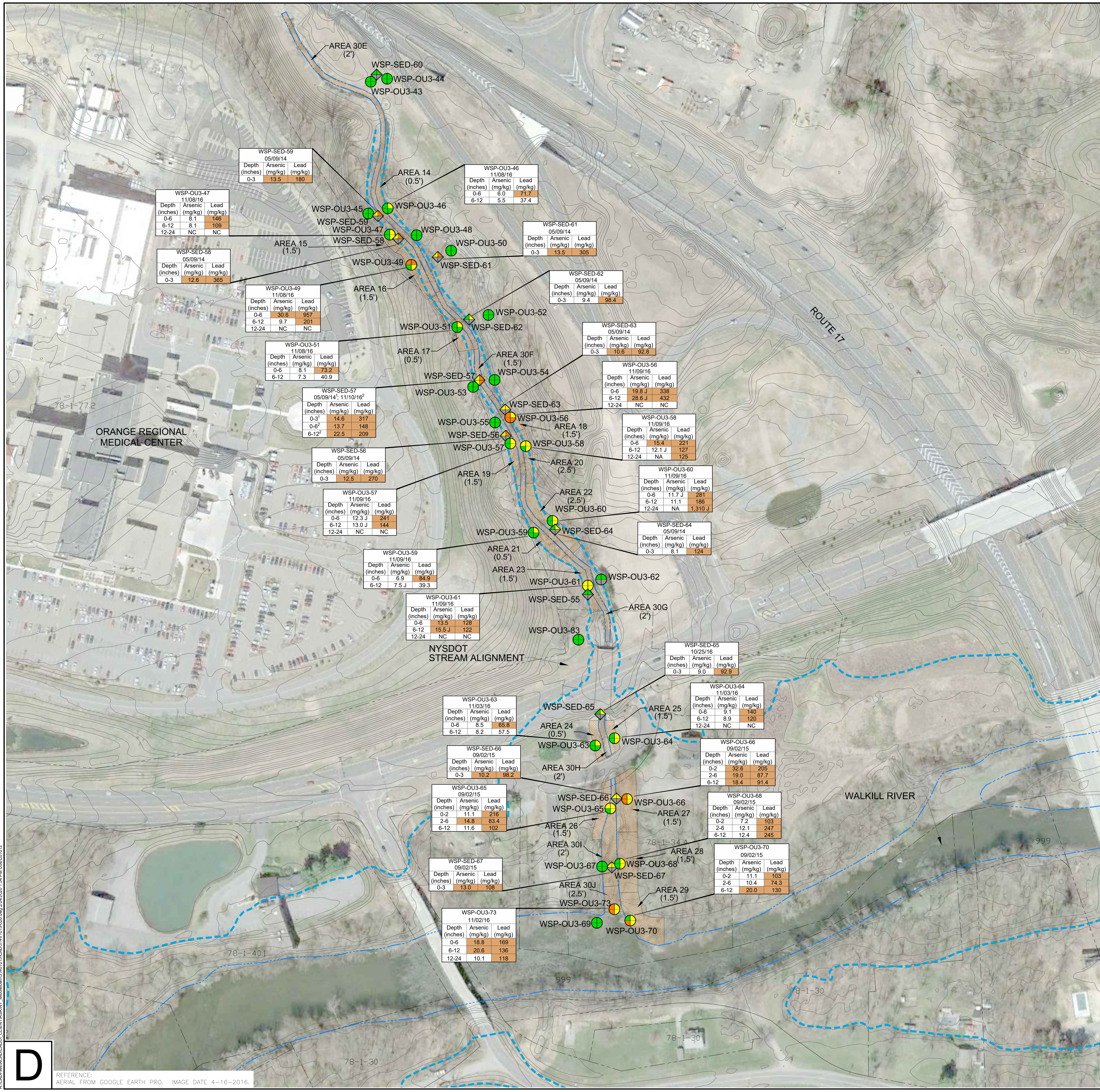
SHEET 6

Drawing Number
314V1015-026



LEGEND

- EDGE OF WATER
- 100-YEAR FLOODPLAIN BOUNDARY
- 78-1-15 TAX PARCEL IDENTIFICATION NUMBER
- PROPOSED EXCAVATION

WSP-SED-29: ARSENIC / LEAD; 0-3" or 0-6" BGS RESULT; SEDIMENT SAMPLE; 6-12" BGS RESULT; SAMPLE ID

WSP-OU3-02: ARSENIC / LEAD; 0-2", 2-6", OR 0-6" BGS RESULT; SOIL SAMPLE; 6-12" BGS RESULT; SAMPLE ID

WSP-SED-01 09/23/08		
Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-3	NA	1,490

SAMPLE ID
DATE SAMPLED
HIGHLIGHTED VALUES EXCEED NYSDEC's CLASS A FRESHWATER SEDIMENT GUIDANCE VALUES OF <10 mg/kg FOR ARSENIC OR <36 mg/kg FOR LEAD

WSP-OU3-03 10/31/16		
Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
0-6	32.7	3,090
6-12	15.2	1,440
12-24	6.6	155

SAMPLE ID
DATE SAMPLED
HIGHLIGHTED VALUES EXCEED NYCRR SUBPART 375-6.8(a) - UNRESTRICTED USE SOIL CLEANUP OBJECTIVES OF 13 mg/kg FOR ARSENIC OR 63 mg/kg FOR LEAD

- BGS BELOW GROUND SURFACE
- NA NOT ANALYZED
- NC NOT COLLECTED
- U NOT DETECTED ABOVE THE REPORTING LIMIT
- J ESTIMATED RESULT

FRESHWATER SEDIMENT GUIDANCE VALUES (SGVs)

ARSENIC	LEAD
<10 mg/kg (CLASS A)	<36 mg/kg (CLASS A)
>10 mg/kg AND <33 mg/kg (CLASS B)	>36 mg/kg AND <130 mg/kg (CLASS B)
>33 mg/kg (CLASS C)	>130 mg/kg (CLASS C)
>1,000 mg/kg	>1,000 mg/kg
NOT COLLECTED	NOT COLLECTED

SOIL CLEANUP OBJECTIVES (SCOs)

ARSENIC	LEAD
<13 mg/kg (UNRESTRICTED USE SCO)	<63 mg/kg (UNRESTRICTED USE SCO)
>13 mg/kg AND <16 mg/kg	>63 mg/kg AND <400 mg/kg
>16 mg/kg AND <1,000 mg/kg	>400 mg/kg AND <1,000 mg/kg
>1,000 mg/kg	>1,000 mg/kg
NOT COLLECTED	NOT COLLECTED

NOTES:

1. PROPERTY LINES SHOWN ARE BASED ON THE MOST RECENT (2019) TAX RECORDS OBTAINED FROM THE ORANGE COUNTY NY REAL PROPERTY TAX SERVICES OFFICE (propertydata.orangecountygov.com).
2. THE OU LIMITS ARE DEFINED IN CONSENT ORDER #3-20100528-80 DATED FEBRUARY 1, 2011.
3. CONTOUR LINES USED TO DEFINE PROPOSED EXCAVATION LIMITS ARE 2-FOOT CONTOURS OF ORANGE COUNTY NY CREATED USING THE USGS 3 COUNTY 2014 LiDAR COLLECTION, AND OBTAINED FROM THE NYS GIS CLEARING HOUSE (https://gis.ny.gov/elevation/contours/contours-orange.htm).
4. FRESHWATER SEDIMENT GUIDANCE VALUES LISTED IN TABLE 5 OF THE NYSDEC'S SCREENING AND ASSESSMENT OF CONTAMINATED SEDIMENT REPORT (JUNE 2014).
5. IF A DUPLICATE SAMPLE WAS COLLECTED, ONLY THE GREATER CONCENTRATION IS SHOWN FOR CLARITY.
6. IF SAMPLES WERE COLLECTED FROM BOTH 0-3" AND 0-6", THE GREATER CONCENTRATION IS USED FOR COMPARISON TO APPLICABLE CRITERIA.
7. FOR CLARITY, CONCENTRATION BOXES ARE ONLY SHOWN FOR SAMPLES WHICH REQUIRE EXCAVATION TO MEET APPLICABLE CRITERIA.

REVISIONS
REV | DESCRIPTION | Revised: | Chkd: | Appr.:

SEAL
JAMES ALLEN SOBIERAJ, STATE OF NEW YORK, LICENSED PROFESSIONAL ENGINEER
DATE 2/24/20

DRAWN BY EGC/MDP
CHECKED 2/24/2020
APPROVED 2/24/2020

PROPOSED EXCAVATION TO MEET UNRESTRICTED USE SOIL SCOs AND CLASS A FRESHWATER SGVS OU3 FEASIBILITY STUDY (SHEET 3 OF 3)
REVERE SMELTING & REFINING CORPORATION
MIDDLETOWN, NEW YORK

PREPARED FOR
REVERE SMELTING & REFINING CORPORATION
MIDDLETOWN, NEW YORK

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SHEET 7
Drawing Number
314V1015-026