NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

PROPOSED STATEMENT OF BASIS CORRECTIVE MEASURES SELECTION

Bethlehem Steel

(Tecumseh Redevelopment, Inc.)

Site Wide Remedial Elements, Water Courses and Groundwater

Operable Units 01, 09 and 10

City of Lackawanna, Erie County

Site No. 915009
EPA ID No. NYD002134880

May 2021

PREPARED BY
DIVISION OF ENVIRONMENTAL REMEDIATION

PROPOSED STATEMENT OF BASIS
CORRECTIVE MEASURES SELECTION

Bethlehem Steel
(Tecumseh Redevelopment, Inc.)

OU-01 – Site Wide Remedial Elements
OU-09 – Water Courses
And
OU-10 – Site Wide Groundwater

City of Lackawanna, Erie County
Site No. 915009
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SECTION 1: INTRODUCTION

The New York State Department of Environmental Conservation (Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal or release of hazardous wastes at this site, as more fully described in this document, has contaminated various environmental media (defined as soil, surface water, groundwater, sediment, and soil vapor). The remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This proposed Statement of Basis (SB) identifies the proposed remedy and discusses the reasons that the remedy is being proposed. This document includes a summary of the information that can be found in the site-related reports and documents.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment. The New York State Hazardous Waste Management Program (also known as the RCRA Program) requires corrective action for releases of hazardous waste

and hazardous constituents to the environment. This facility is subject to both programs, and this remedy is consistent with the remedial requirements of both programs. The proposed Statement of Basis will serve as the Proposed Remedial Action Plan.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all final remedies. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repositories:

NYSDEC Region 9 Office
270 Michigan Avenue
Buffalo, NY 14203
Call 716-851-7220 for Appointment
Mr. Stanley Radon

Lackawanna Public Library
560 Ridge Road
Lackawanna, NY 14218
Call 716-823-0630

- Access the Statement of Basis and other project documents online through the DECinfo Locator: https://gisservices-dev.dec.ny.gov/gis/dil/index.html?rs=915009. (Click the excavator icon, then click Document Folder Link)

A public comment period has been set for:

May 5, 2021 through June 18, 2021

A virtual public meeting will be held on **May 18, 2021 at 6:00 PM** via Webex (virtual platform). The public is encouraged to participate in the virtual public meeting using the link and login information provided on the public availability website: www.bethlehemsteelcleanup.com or request a call-in number to attend via the toll-free hotline at 833-578-2019.

Written comments may be sent through June 18, 2021 to:

Stanley Radon
NYS Department of Environmental Conservation
Division of Environmental Remediation
270 Michigan Avenue
Buffalo, NY 14203
stanley.radon@dec.ny.gov

The Department may modify the proposed remedy based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary that will accompany the Department's final selection of the remedy for this site.

Receive Site Citizen Participation Information by Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at:

http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location- The Bethlehem Steel Site is located in an urban area along the eastern shores of Lake Erie in the cities of Buffalo and Lackawanna, Erie County. The 489 acres of property are located along the west side of Route 5 comprise a significant portion of the former Bethlehem Steel Corporation Lackawanna facility.

Site Features- The site is an irregular parcel which extends from south of Smokes Creek to the Buffalo Outer Harbor on the north, and from the east end of Lake Erie to the Gateway Metroport Ship Canal (Ship Canal). The site has approximately 2 miles of shoreline along Lake Erie. Smokes Creek passes westward across the site where it discharges to Lake Erie. The Ship Canal, located toward the northern end of the site, extends approximately 3,000 feet southward into the site from the Buffalo Harbor. The western portion of the site was created by the placement of slag-fill materials from iron and steel-making within an area that was formerly within the boundaries of Lake Erie. The site is mostly undeveloped, especially the western slag fill portion.

Current Zoning and Land Use- This site is currently zoned for industrial use and is used for slag reclamation, coal handling facilities, wood recycling facilities, and the site groundwater treatment plants. Renewable energy facilities have been constructed upon the site which were previously developed through the Brownfield Cleanup Program (BCP) (Site Nos. C915216 and C915217). These installations include 14 wind turbines (Steel Winds I and II) located along the Lake Erie shoreline, and two (2) large solar arrays present in the southeastern corner of the site. The majority of the land is vacant/undeveloped.

Past Use of the Site- The former Bethlehem Steel Corporation (BSC) property was used for iron and steel production since the beginning of the 20th century. Iron and steel-making operations were discontinued by the end of 1983, and by the mid-1990s, most of the steel-making facilities on the west side of Hamburg Turnpike (NYS Route 5) had been demolished. In September 2001, BSC's coke oven operation was terminated. While some buildings remain, most structures have been razed. The western portion, which includes approximately 2 miles of Lake Erie waterfront, consists of a considerable area of manmade land (~440 acres) where iron and steel-making slag and plant wastes were disposed.

Site Geology and Hydrogeology- The predominant site feature is the wedge-shaped slag fill area that extends into Lake Erie. This area extends from the former lake shore an average of 1,300 feet westward, and now forms the eastern shoreline of Lake Erie. The site geology beneath the slag-fill layer consists lake and glacial sediments overlying shale or limestone bedrock. Beneath the slag-fill there is, in order, a sand layer with occasional peat deposits, lake clay/silt deposits, and glacial till overlying shale or limestone bedrock.

The depth to groundwater is variable and depends upon the topography and can vary in depths ranging from about 10 feet to over 60 feet below ground surface. Groundwater generally flows toward Lake Erie, Smokes Creek, or the Ship Canal. Groundwater occurs within the fill and sand layers in the overburden and in the bedrock beneath the site.

Operable Units/Solid Waste Management Unit (SWMU) Groups- The site has been divided into operable units. An operable unit (OU) represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. A number of Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and two Hazardous Waste Management Units (HWMUs) in the Corrective Measures Study (CMS) area have been designated as OUs due to their proximity to each other, the similar composition of waste material, and/or similarity of remedy selection. To date, the following OUs have been designated for the Bethlehem Steel Site:

- OU-01 (Site-Wide Remedial Program) consists of 489 acres on the western portion of the former Bethlehem Steel Corporation Lackawanna Facility. This unit encompasses 44 SWMUs and nine areas of concern (AOCs). Several SWMUs and AOCs have been addressed as separate OUs under Department approved Interim Remedial Measures (IRMs) or Expedited Corrective Measures (ECMs). Under a CMS, extensive groundwater, surface water, soil, sediment and waste characterizations has been completed.

- OU-02 (Tar Decanter Pit, Blast Furnace Hot and Cold Wells, and Lime and Kish Landfill): OU-02 consists of SWMUs P-9 (Tar Decanter Pit), P-18A and P-18B (Blast Furnace Hot and Cold Wells), P-76 (Coke Oven Gas Line), and two AOCs (B and C) within S-18 (Lime and Kish Landfill R). The Tar Decanter Pit is located near the center of the coke oven area just west of the Ship Canal and is made of reinforced concrete measuring approximately 51 feet long, 37 feet wide, and 14.5 feet deep. The Tar Decanter Pit separated tar sludge from weak ammonia flushing liquor used to quench coke oven gases and was decommissioned and backfilled in 1960. The Blast Furnace Hot and Cold Wells are located at the southwest corner of the Ship Canal. The Hot Well is an irregular shape measuring approximately 130 feet across the longest section and 16 feet across the narrowest section. The Cold Well is rectangular, measuring 173 feet by 23 feet. Both wells are approximately 39 feet deep. The wells were operated from 1978 to 1983 and used to cool and recycle blast furnace scrubber water. The Lime and Kish Landfill comprises of approximately 2 acres located in the northwest portion of the site.

The landfill contained wastes generated from the Basic Oxygen Furnace (BOF) process consisting of lime dust and baghouse dust from iron transfer points called Kish. These SWMUs were found to be impacted primarily with elevated levels of benzene and lead. Waste from these SWMUs were excavated, treated, and consolidated within the OU-03 containment unit.

- OU-03 (Acid Tar Pit): OU-03 is approximately 6 acres and consists of SWMUs S-11, S-21, S-22, and S-24 known as the Acid Tar Pit (ATP) Group. S-11, S-21, and S-22 are located south of Smokes Creek in the southeast corner of the CMS Area. S-24 is located just north of Smokes Creek west of the intersection of State Highways #9 and #11. SWMU S-11 measures approximately 1.4 acres and consists of various wastes generated from steel and coke making operations deposited from the 1950s through the early 1970s. The various wastes include drums containing petroleum wastes and solvents, open-hearth precipitator dust from exhaust gas treatment, and baghouse lime dust from the BOF process. SWMU S-21 consists of a pile of scrap melter precipitator dust 40 feet long, 40 feet wide, and 8 feet high. This dust, mostly consisting of iron oxides, was generated during the movement of scrap metal used in the BOF process and was collected with an electrostatic precipitator from 1978 to 1980 prior to disposal. SWMU S-22 measures approximately 1.4 acres and consists of spent carbonate solution, also called vacuum carbonate blowdown. The solution was used in the coking process to treat off-gas from the coke ovens prior to re-use as fuel. SWMU S-24 is believed to have been used for the disposal of agitator sludge, also known as acid tar sludge, and is oval shaped and approximately 1 acre in size. Sulfuric acid used to wash and separate impurities from benzene processing of coke oven off-gas was neutralized with caustic solution generating the agitator sludge. The SWMU was identified from a 1938 aerial photo and based on subsequent photos, believed to have been unused after 1950. These SWMUs were found to be impacted with elevated levels of metals and various organic compounds.

- OU-04 (Coke Oven Area – Groundwater) consists of groundwater associated with an approximately 27-acre area along the western side of the Gateway Metroport Ship Canal. OU-04 is not intended to address soil, soil vapor, or other environmental issues associated with the former Coke Oven Area. These other media will be addressed through a separate remedy decision(s) under a proposed statement of basis for this operable unit as appropriate. This area contains portions of the former coke oven area and SWMUs P-11 (former Benzol Plant) and P-11A ("old" former Benzol Plant). The Benzol Plants were used for the treatment and processing of liquid coke gas by-products. These SWMUs were found to be impacted with various organic compounds.

- OU-05 (Slag Fill Area Zone 2, The Impoundments): OU-05 is approximately 74.4 acres and encompasses Slag Fill Area Zone 2 (SFA-2) with the exception of OU-03. OU-05 consists of steep slag bluffs located along the eastern shores of Lake Erie and the south shore of Smokes Creek. OU-05 is comprised of the SWMUs commonly referred to as The Impoundments (S-1, S-2, S-3, S-4, S-5, S-6, S-7/20,

S-8, and S-27). The Impoundment SWMUs comprise approximately 21-acres and are primarily located in the western portion of OU-05. Disposal in the Impoundment SWMUs consisted of Water Quality Control Station sludges and dredge spoils from Smokes Creek. Areas outside the SWMUs are comprised of slag fill, access roads, and the aforementioned OU-03. OU-05 does not address groundwater. Groundwater will be addressed under OU-10.

- OU-06 (Former Petroleum Bulk Storage Sub-Area): OU-06 is approximately 116 acres located just north of Smokes Creek and encompasses SWMUs: P-8 Waste Oil Storage Tanks; S-10 Slag Quench Area J; P-74 (A, B, C, and D) Solid Fuel Mix Storage Piles; P-75 Tank Storage Area for No. 6 Fuel Oil and Petroleum Tar; and tar impacted slag AOC-H and AOC-I.

- OU-07 (Coal/Coke/Ore Storage and Handling/Coke Plant and By-Products Processing): OU-07 is approximately 178 acres located just west of the Gateway Metroport Ship Canal and encompasses SWMUs: P-1 North Quench Water Pit; P-2 Arctic Quench Water Pit; P-3 Central Quench Water Pit; P-4 A Quench Water Pit; P-5 B Quench Water Pit; P-6 Lime Sludge Settling Basin; P-7 Abandoned Lime Sludge Settling Basin; P-10 Contaminated Soil Near Ball Mill; P-11 Benzol Plant Tank storage Area; P-11A Old Benzol Plant Tank Storage Area; P-12 Spill Cleanup Storage Area; S-19 Murphy's Mountain Landfill; S-25 Impoundment Under North End of Coal Pile; and S-26 Fill Area Near Coke Battery No. 8.

- OU-08 (Slag Fill Area Zones 4 and 5 SWMU/AOC Group): OU-08 is approximately 113 acres located in the northwest portion of the site along Lake Erie and encompasses nine SWMUs: S-12 Asbestos Landfill L; S-13 Tar Sludge Surface Impoundment (HWMU 1A); S-14 General Rubble Landfill N; S-15 General Rubble Landfill O; S-16 Lime Stabilized Spent Pickle Liquor (SPL) Sludge Landfill (HWMU 1B); S-17 Vacuum Carbonate Blowdown Landfill Q; S-18 Lime Dust and Kish Landfill R; S-23 Tar Pit Adjacent to Lime Stabilized SPL Sludge Landfill; and S-28 Drum Landfill. In addition, seven AOCs are also included within OU-08: AOCs-A is a lead-impacted areas within SWMU S-18; AOCs-B and -C were lead-impacted areas within SWMU S-18; AOC-D is a tar-impacted area north of SWMU S-23; AOC-E was a tar-impacted area north of SWMU S-14; AOC-F was a tar-impacted area in the Iron City Slag Reclamation area; and AOC-G was a tar-impacted area at Steel Winds II Wind Turbine 9 (WT-9).

- OU-09 (Water Courses): OU-09 is comprised of four waterbodies, including Smokes Creek, the North Return Water Trench (NRWT), the South Return Water Trench (SRWT), and the Gateway Metroport Ship Canal. Approximately 8,500 feet of the eastern shoreline of Lake Erie borders the Bethlehem Steel Site and a primary focus of any proposed remedial work is to reduce contaminant loading into Lake Erie.

  The portions of Smokes Creek and Lake Erie that are included within the site are both classified as Class C Fresh Waterbodies. The portion of Smokes Creek that

runs through the site is approximately 5,500 feet, generally flowing east to west, bisecting the site and discharging into Lake Erie, except during significant storm events, wind surges, ice jams and Lake seiche events when the Creek temporarily flows in the reverse direction. For the purpose of the analytical data discussion, Smokes Creek is divided into two parts: the Upper Reach which extends from State Route 5 to the bridge on Site Highway 9, measuring approximately 3,900 feet; and the Lower Reach from the Site Highway 9 Bridge to Lake Erie. Smokes Creek and Lake Erie are located within the United States Environmental Protection Agency's (USEPA) Niagara River Area of Concern. The focus of the AOC with respect to OU-09 begins at the mouth of Smokes Creek and extends into Lake Erie, which includes the Buffalo Outer Harbor, as shown in Figure 2A

- OU-10 (Groundwater): OU-10 covers groundwater across the entire site except for the portions already addressed under the OU-03 and OU-04 groundwater extraction and treatment systems. It also covers any off-site impacts of groundwater from the site.

This proposed Statement of Basis is for OU-01 Site Wide Remedial Elements, OU-09 Water Courses and OU-10 Groundwater.

A site location and vicinity map is attached as Figure 1, a facility map depicting corrective measure study sub-areas (solid waste management units, water courses and areas of concern) is attached as Figure 2, and a figure depicting operable units 5 through 8 is also attached (Figure 3). Figures 4 through 8 depict aspects of the proposed remedy for OU-1. Figures 9-6, 9-7, and 9-8 and Figure 10-1 illustrate the proposed remedies, respectively. The figures included in this document are enumerated in the following table:

Figure Number	Area of Interest
No. 1	Site Location Map
No. 2	Facility-wide CMS study areas
No. 2A	Operable Unit Overview
No. 3	Site Wide Remedies
No. 3A	OUs5 thru OU8
No. 4	SWCAMU Alternative 2
No. 4A	SWCAMU Design
No. 5	Proposed Cover System Impoundments & SW-CAMU
No. 6	CAMU Liner Detail
No. 7	Revetment North-North Cross Section
No. 8	Revetment South- South Cross Section

Figure Number	Area of Interest
No. 9-1A	Smokes Creek Upper Reach Data 1
No. 9-1B	Smokes Creek Upper Reach Data 2
No. 9-1C	Smokes Creek Upper Reach Data 3
No. 9-2	Smokes Creek Lower Reach Data
No. 9-3	Ship Canal Sediment Data
No. 9-4	NRWT Sediment Data
No. 9-5A	SRWT Sediment Data
No. 9-5B	SRWT Sediment Data
No. 9-6	Upper Reach Smokes Creek Dredging Area
No. 9-7	Lower Reach Smokes Creek Dredging Area
No. 9-8	Gateway Metroport Ship Canal Proposed Dredging Area
No. 10-1	Proposed Site Wide Groundwater Remedy
No. 10-2	Groundwater pH Map
No. 10-3	Groundwater Benzene Plume Map

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy. For this site, alternatives which allow for industrial use of the site are proposed, with portions that will allow for commercial use as part of the initiative to allow public access to the Lake Erie shoreline. Additionally, where appropriate, proposed alternatives will consider environmental restoration to improve site habitat.

SECTION 5: ENFORCEMENT STATUS

The Bethlehem Steel site is subject to hazardous waste treatment, storage, and disposal facility (TSDF) permitting requirements under New York State (NYS) hazardous waste regulations (6 NYCRR Part 373) and has RCRA EPA ID No. NYD002134880. Under this regulatory program, Tecumseh is responsible for implementing Corrective Action to address releases to the environment from solid waste management units (SWMUs) and areas of concern (e.g., watercourses). On June 30, 2009 the Department and Tecumseh signed an Order on Consent (the “Order”) to complete a Corrective Measures Study (CMS) for the facility. On September 24, 2020 the Department, Tecumseh Redevelopment Inc., and ArcelorMittal USA LLC, Tecumseh’s parent corporation, signed an Order on Consent and Administrative Settlement (the “Order”) to complete comprehensive investigation; evaluation; and implementation of Corrective

Measures/Remedial Actions, Closure and Post-Closure Care requirements of the site, to protect public health and the environment and to allow, when and where appropriate, the continued use of the site and its redevelopment by Tecumseh and/or third parties. Respondents' outstanding and on-going substantive remediation obligations and/or financial assurance obligations under previous Orders, agreements, and authorizations survived and are binding and enforceable under this Order.

The property is also a site listed on the Department's Registry of Inactive Hazardous Waste Disposal Sites (Site No. 915009-Former Bethlehem Steel) and is currently classified as a Class 2 site, as defined in 6 NYCRR Part 375 (significant threat to the public health or environment - action required). The proposed Statement of Basis will serve as the Proposed Remedial Action Plan. Outside of the RCRA site, portions of the former Bethlehem Steel property are also participating in the Brownfield Cleanup Program administered by the Department.

SECTION 6: SITE CONTAMINATION

6.1 Summary of the Site Investigation

A site investigation serves as the mechanism for collecting data to:

- characterize site conditions;
- determine the nature of the contamination; and
- assess risk to public health and the environment.

A RCRA Facility Investigation (RFI) was initiated by Bethlehem Steel in 1990 and subsequently completed by Tecumseh in October 2004 (URS 2004). The investigation was intended to identify the nature (or type) of contamination which may be present at a site and the extent of that contamination in the environment on the site or leaving the site. The investigation reports on data gathered to determine if wastes containing hazardous substances were disposed at the site, and if the soil, groundwater, soil vapor, indoor air, surface water or sediments may have been contaminated. The RFI investigated conditions on approximately 1,600 acres of former Bethlehem Steel property. Based on the RFI results, areas of the former Bethlehem Steel property were identified as needing remediation or further assessment. The 489 acres requiring additional remedial action comprise the site, while the remaining portions of the former Bethlehem Steel property are currently in the Brownfield Cleanup Program (BCP) and/or actively used for commercial and industrial purposes. After the RFI, Tecumseh conducted further investigation and assessment of remedial alternatives in a Corrective Measures Study (CMS) which resulted in a Final CMS Report (2019). A supplemental Comprehensive Groundwater Quality Report (2019) was also prepared that summarized and assessed the groundwater data collected during both the RFI and CMS. Investigation reports are available for review in the site document repository and pertinent results are summarized in section 6.3.

The analytical data collected includes data for:

- soils

- sediments
- surface water
- solid and hazardous waste material contained in SWMUs/AOCs
- groundwater

6.1.1 Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs. Site-specific soil cleanup objectives for PAHs and arsenic are evaluated in Appendices A and D.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the site investigations were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibits A and B list the applicable SCGs. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2 Investigation Results

The data have identified contaminants of concern. A "contaminant of concern" is a contaminant that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized below and in Exhibit A. Additionally, the site investigation reports contain a full discussion of the data. The contaminants of concern (COC) identified at this site are:

Metals
Arsenic
Barium
Cadmium
Chromium
Cyanide
Lead
Mercury
Selenium
Silver

Volatile Organic Compounds (VOCs)
Benzene
Chlorobenzene
cis -1,2-Dichloroethene
Ethylbenzene

Styrene
Toluene
Trichloroethene
trans-1,2-Dichloroethene
Vinyl chloride
Xylene
1,3,5-Trimethylbenzene
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,1,1-Trichloroethane
1,2-Dichlorobenzene

Semi-Volatile Organic Compounds (SVOCs)
Naphthalene
Phenolic Compounds
Polycyclic aromatic hydrocarbons (PAHs)
Biphenyl (1,1'-biphenyl)

PCBs/Pesticides
Polychlorinated Biphenyls (PCBs)

The contaminants of concern exceed the applicable SCGs for the site for:
- soil
- sediments
- surface water
- groundwater

6.2.1 Interim Corrective Measures

Interim Corrective Measures (ICMs) are taken if, at any time during an investigation, it becomes apparent that corrective actions should be taken to immediately address the spread of contamination. The intent is to construct an ICM as close as possible to a component of a permanent system or final remedy.

The following ICMs have been completed at the site based on conditions observed during the RFI.

OU-01A (Smokes Creek Dredging, Lower Reach): An ICM was performed to address impacts observed in Smokes Creek surface water and sediment. Under a NYSDEC ICM consent order, the lower reach (last 2,600 feet) of Smokes Creek was dredged in 2008-2009, removing approximately 40,000 cubic yards of sediment, improving the hydraulic capacity of the stream. Sediment was disposed in the Army Corps Confined Disposal Facility located near the site. Post-dredge sediment sampling data is being evaluated under OU-09. In a letter dated February 8, 2011, the Department confirmed that Tecumseh had satisfied the terms of the Smokes Creek ICM Work Plan as required by

the Second Interim Order on Consent, File 03-73, and Tecumseh's obligations under the Order were terminated.

OU-01B (Coke Oven Gas Line Removal): An ICM was performed to address SWMU P-76, an underground 30-inch coke oven gas line discovered during infrastructure improvements to the site. The gas line consists of 30-inch diameter cast iron piping that was used to transport gas from the coke ovens to various process and treatment buildings. Sediment within the pipe was found to contain elevated levels of benzene and naphthalene. Approximately 910 feet of pipe were excavated, and an additional 200 feet of pipe were removed from exposed water crossings. Twenty cubic yards of sediment were removed and consolidated in OU-03. The cleaned piping was taken off-site for recycling. Approximately 135 feet of piping were cleaned and abandoned in place due to overlying infrastructure. A Construction Completion Report (CCR) was submitted on November 20, 2015.

OU-01C (Five Million Gallon Oil Storage Tank Removal): An ICM was performed to remove a 5-million-gallon storage tank in the former petroleum storage area that was used to store approximately 350,000 gallons of wastewater generated from various plant decommissioning activities. The wastewater was sent to the wastewater treatment facility at the Galvanizing Plant on the east side of NYS Route 5. The scrap metal was sent off-site for recycling. Approximately 87 tons of solid waste was removed and sent off-site for disposal. In a letter dated February 14, 2011, the Department confirmed that Tecumseh had satisfied the terms of the Order on Consent that required the treatment and discharge of wastewater and residual solids from the storage tank, and ultimately accepted the demolition and removal of the tank from Tecumseh's property; terminating Tecumseh's obligations under the Order.

OU-01D (Galvanizing Plant, SWMU P-73): An ICM was performed to address soils in the former drum storage area (P-73) and Flander's Field. The former drum storage area was used from the late 1940s through 1983 for the storage of lubricants, oils, grease, soap, and chemical additives. All stored materials were removed from the site in 1983. In anticipation of future development, the surface soils were excavated and staged in the area known as Flander's Field. In March of 2007, 1,135 tons of soil were disposed off-site in a sanitary landfill. A Closeout Report was submitted on December 7, 2007 and the Department subsequently issued a letter on January 2, 2008 stating that no further action was required for this SWMU.

OU-04A (Benzol Yard Interim Measure, SWMU P-11 Pump and Treat): This ICM was a groundwater and NAPL pump and treat system installed in the Benzol Yard (SWMU P-11), located in the Coke Oven Area, near the south end of the Ship Canal. The system included multiple extraction wells, NAPL separation, air stripping of groundwater, and reinjection of treated water. This system began operating in 2005. A thermal oxidizer was initially used to treat vapor discharge from air stripper, but oxidizer use was discontinued due the reduced loading into the system. Between 2005 and 2018, this interim measure recovered over 36,000 pounds of contaminants. In 2019, the treatment building was

dismantled, and the extraction wells and treatment system were incorporated into the final OU-04 groundwater remedy.

OU-04B (Benzol Yard Source Control): An ICM was performed to address source material located in the unsaturated soils and “smear zone” in the vicinity of SWMU P-11. A soil vapor extraction system was installed to collect and treat VOCs in 2019. The ICM will be managed in conjunction with the OU-04 remedy. Annual operation, maintenance and monitoring reports are submitted to the Department for review and evaluation. As of April 2020, this interim measure had recovered approximately 351 pounds of VOCs. A revised CCR was submitted on October 24, 2019 and approved by the Department on November 12, 2019.

6.2.2 Final Corrective Measures

Expedited corrective measures (ECMs), like ICMs, are remedial measures that are undertaken at one or more SWMUs before or during performance of a CMS in order to more promptly control or mitigate the release of hazardous constituents into the environment and/or to reduce the potential for human or biological exposure. Unlike ICMs, which may be short-term or intermediate remedies, ECMs are considered long-term final remedies. The ECM is considered a valuable tool to expedite the remedial process at high-priority SWMUs when the need for remedial action and/or the final remedy selection is readily apparent. Final corrective measures have been implemented or completed at OUs-02, -03, and -04, as detailed below:

OU-02 (Tar Decanter Pit, Blast Furnace Hot and Cold Wells, and Lime and Kish Landfill): OU-02 consists of SWMUs P-9 (Tar Decanter Pit), P-18A and P-18B (Blast Furnace Hot and Cold Wells), P-76 (Coke Oven Gas Line), and two AOCs (B and C) within S-18 (Lime and Kish Landfill R). These SWMUs were found to be impacted primarily with elevated levels of benzene and lead. Wastes from these SWMUs were excavated, treated, and consolidated within the OU-03 containment unit. A revised CCR for OU-02 and OU-03 was submitted on July 26, 2016 and approved by the Department on August 12, 2016.

OU-03 (Acid Tar Pit SWMU Expedited Corrective Measure): OU-03 is approximately 6 acres and consists of SWMUs S-11, S-21, S-22, and S-24 known as the Acid Tar Pit Group. S-11, S-21, and S-22 are located south of Smokes Creek in the southeast corner of the CMS Area. S-24 is located just north of Smokes Creek west of the intersection of Site Highways #9 and #11. SWMU S-11 measures approximately 1.4 acres and consists of various wastes generated from steel and coke making operations deposited from the 1950s through the early 1970s. These SWMUs were found to be impacted with elevated levels of metals and various organic compounds that were migrating to Smokes Creek via groundwater discharge and surface water flow. A revised CCR for OU-02 and OU-03 was submitted on July 26, 2016 and approved by the Department on August 12, 2016.

A Consent Order to implement the Acid Tar Pit ECM was executed by Tecumseh and the Department on May 10, 2010. The remedy, completed between 2010 and 2015, included: site clearing, grading, and construction of a soil-bentonite slurry wall surrounding SWMUs

S-11 and S-22 and keyed into the native glaciolacustrine silty-clay confining unit; excavation, transport, and consolidation of residuals from SWMUs S-21 and S-24, and other SWMUs/AOCs as detailed in OU-02 above, into the containment cell; placement of a multi-layer geosynthetic membrane, drainage, and vegetated soil RCRA final cover system; and construction of a groundwater/leachate collection, pretreatment, and conveyance system. The containment system physically isolates the solid SWMU/AOC waste/fill from the environment and contains the aqueous groundwater constituents immediately surrounding them by maintaining an inward hydraulic gradient. Groundwater/leachate from within the containment cell is removed by several pumped wells with on-site pretreatment consisting of oil/water separation, neutralization, air stripping of volatile organic constituents, and filtration followed by sewer conveyance to the Erie County Sewer District (ECSD) No. 6 publicly owned treatment works (POTW) in Lackawanna for final biological treatment and discharge to Smokes Creek. A revised CCR for OU-02 and OU-03 was submitted on July 26, 2016 and approved by the Department on August 12, 2016.

OU-04 (Coke Oven Area – Groundwater): This OU consists of groundwater associated with an approximately 27-acre area along the western side of the Gateway Metroport Ship Canal. OU-04 is not intended to address soil, soil vapor, or other environmental issues associated with the former Coke Oven Area. These other media will be addressed under OU-07. This area contains portions of the former coke oven area and SWMUs P-11 (former Benzol Plant) and P-11A ("old" former Benzol Plant). The Benzol Plants were used for the treatment and processing of liquid coke gas by-products. These SWMUs were found to be impacted with various organic compounds.

A Consent Order for Coke Oven Area Groundwater Corrective Action was executed in September 2017 calling for augmenting the existing 11 ICM groundwater pumping wells in the Benzol Yard (SWMU P-11) with an additional 14 pumping wells plus an additional 27 pumping wells in the northern portion of the OU-4 Area in and around the "Old" Benzol Yard (SWWU P-11A). The existing Benzol Yard ICM groundwater treatment system and south infiltration gallery (i.e., OU-04A) were decommissioned following construction and start-up of the new OU-04 groundwater treatment system in March 2019. The OU-04 groundwater treatment building contains two parallel treatment systems or "trains" with the south groundwater treatment train consisting of an oil-water separator, bag filtration, and shallow tray air stripper; and an independent northern groundwater treatment train with a bag filter, a shallow tray air stripper, and a granular activated carbon adsorption system to treat the higher phenolic and naphthalene constituent concentrations. Treated groundwater is discharged back to the subsurface through infiltration galleries located adjacent to the treatment building in the west central portion of the OU. An amended CCR was submitted on August 13, 2019 and approved by the Department on September 11, 2019.

6.3 Summary of Environmental Assessment

Nature and Extent of Contamination:

Groundwater, surface water, soil, and sediments were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, PCBs, and pesticides. Groundwater was also sampled for the emerging contaminants (ECs) 1,4-dioxane and per- and poly-fluoroalkyl substances (PFAS). Based upon investigations conducted to date, the primary contaminants of concern include VOCs, SVOCs, and metals for groundwater, SVOCs (i.e., phenolics and polycyclic aromatic hydrocarbons [PAHs]), PCBs, and various metals (i.e., arsenic, chromium, and mercury) for soil, PCBs and various metals for sediments, and PAHs and lead for surface water. Based upon current data, there is no off-site migration in surface water, groundwater, sediment, or soil.

Surface Water-

The Gateway Metroport Ship Canal and Smokes Creek are defined as Class C fresh surface water bodies, meaning that their most suitable use is for fish, shellfish and wildlife propagation and survival. Samples were collected and compared against the NYS TOGS 1.1.1 and Ambient Water Quality Standards Part 703. There were no exceedances in the Gateway Metroport Ship Canal. In Smokes Creek, selenium and cyanide were found at a maximum concentration of 5.8 parts per billion (ppb) and 36 ppb in exceedance of Fresh Water Ambient Quality Standards of 4.6 ppb and 5.2 ppb, respectively. Additionally, one SVOC compound Bis(2-Ethylhexyl)phthalate was found in exceedance (0.6 ppb) at a maximum concentration of 24 ppb.

The Southern and Northern Return Water Trenches (SRWT and NRWT) do not have a specific NYSDEC waterbody classification as they are manmade. However, the SRWT currently serves an ecological role in fostering habitats for different fish and bird populations. Surface water samples were collected from the NRWT and SRWT and compared against the NYS Class C Stream Standards protection for fish propagation in Fresh Waters, Ambient Water Quality Standards, and TOGS 1.1.1. Samples collected from the NRWT contained certain VOCs and inorganic compounds; however, no exceedances were identified. Samples collected from the SRWT contained cyanide at a maximum concentration of 119 ppb and mercury (total) at a maximum concentration of 0.7 ppb, exceeding the Fresh Water Ambient Water Quality Standards of 5.2 ppb and 0.0007 ppb respectively. Currently, the North Return Water Trench is partially filled in with debris. A more detailed evaluation of the surface water data can be found in Exhibit A.

Groundwater-

Multiple VOCs, SVOCs, and metals exceed NYSDEC TOGS (1.1.1) Class GA groundwater standards. Data summarized in this section also include the March 2020 sampling event. VOC and SVOC compounds (namely BTEX and PAHs, respectively), exceed groundwater standards across the site. The maximum concentration of benzene (96,000 ppb) exceeds the standard of 1 ppb by almost five orders of magnitude at the easternmost portion of the site, adjacent to the Ship Canal. Maximum concentrations of toluene (5,800 ppb), ethylbenzene (880 ppb), and total xylene (2,360 ppb) exceed the standard of 5 ppb for each contaminant. The most notable SVOC exceedance in

groundwater is phenolic compounds (total phenols) with a maximum concentration of 21,038 ppb (1 ppb groundwater standard) in DSA 2B – the southeastern portion of the site. Various other SVOCs exceeded applicable groundwater standards. For example, naphthalene (10 ppb standard; 12,000 ppb maximum) and 3- and 4-methylphenol (m,p cresol) (1 ppb standard; 4,000 ppb maximum) are the next two highest SVOC concentrations. Of the metals sampled, the following maximum metal concentrations exceeded their applicable standards: arsenic at 118 ppb (25 ppb standard), barium at 15,750 ppb (1,000 ppb standard), chromium at 260.6 ppb (50 ppb standard), cyanide at 6,440 ppb (200 ppb standard), magnesium at 749,000 (35,000 ppb standard), manganese at 111,900 ppb (300 ppb standard), selenium at 40.5 ppb (10 ppb standard), and sodium at 3,060,000 ppb (20,000 ppb standard). Additionally, the pH in groundwater exceeds the 12.5 threshold as a RCRA hazardous waste in several locations (DSA 2A, 4A, 4B). PCBs and pesticide 4,4' DDE analyzed in the most recent groundwater sampling event (March 2020) did not exceed standards of 0.09 ppb and 0.2 ppb, respectively. Lastly, emerging contaminants, 1,4-dioxane and PFAS were sampled across the site in March 2020. 1,4-dioxane was detected at a maximum concentration of 215 ppb, significantly above the State's 1 ppb screening level. PFAS compounds were detected above the State's screening level for PFOA and PFOS of 10 parts per trillion (ppt) for each with a maximum concentration of 134 ppt and 25.9 ppt, respectively. See Exhibit A for more detail.

Sediment-

Sediments in Smokes Creek, Gateway Metroport Ship Canal, and the South Return Water Trench were found to be impacted with SVOCs, PCBs, and metals in exceedance of NYSDEC Class C Sediment Guidance Values (SGVs), NYDEC Screening and Assessment of Contaminated Sediment (2014). If the concentration of a contaminant exceeds the Class C SGV for a contaminant, there is a high potential for the sediments to be toxic to aquatic life.

Smokes Creek - In the Upper Reach of Smokes Creek, the maximum concentrations of lead were detected at 1,370 parts per million (ppm), exceeding the Class C SGV of 130 ppm. Similarly, the maximum concentration of silver was detected at 11.8 ppm, exceeding the Class C (2.2 ppm) SGV. Individual SVOC compounds were detected below the Class A SGVs; however, total PAH-17 and total PAH-34; maximum concentrations were 55.5 ppm and 70.3 ppm, which exceed the Class C (35 ppm) SGV. As stated in the NYSDEC Sediment Guidance document, PAHs always occur in the environment as complex mixtures. While there are thousands of different PAHs, U.S. EPA (2003) identified 34 individual PAHs (18 specific non-alkylated compounds and 16 generic alkylated forms) that constitute "total" PAHs. Additionally, sediment samples collected from the Lower Reach of Smokes Creek contained a maximum concentration of lead at 837 ppm, exceeding the Class C SGV of 130 ppm. Silver was detected at a maximum concentration of 11.8 ppm, exceeding Class C SGV of 2.2 ppm. Mercury was detected at a maximum concentration of 0.86 ppm, exceeding Class A but not Class C SGVs of 0.2 and 1 ppm, respectively. Individual SVOC compounds were detected below Class A SGV, however total PAH concentrations were detected at 11.48 ppm, exceeding the Class A but not

Class C SGVs of 4 ppm and 35 ppm, respectively. The maximum total PCB concentration was detected at 3.6 ppm, exceeding the Class C SGV (1 ppm).

Gateway Metroport Ship Canal - Maximum concentrations of lead were detected at 663 ppm, exceeding the SGV for Class C (130 ppm). The maximum concentration of total PCBs (0.3360 ppm) detected exceeds the Class A SGV (0.10 ppm) but does not exceed the Class C SGV (1 ppm). Similarly, the maximum concentration of silver (1.2 ppm) detected exceeds Class A (1 ppm) but not Class C SGVs (2.2 ppm).The maximum concentration of mercury (1.61 ppm) exceeds both the Class A (0.2) and Class C (1 ppm) SGV. Finally, the maximum concentration of total PAH's (1,919 ppm) exceeds the Class C (35 ppm) SGV by two orders of magnitude.

South Return Water Trench- For inorganic compounds, there were exceedances of Class C SGVs for arsenic, with a maximum concentration of 102 ppm exceeding Class C (33 ppm), (total) chromium with a maximum concentration of 212 ppm exceeding Class C (110 ppm), lead with a maximum concentration 1,010 ppm exceeding Class C (130 ppm), mercury with maximum concentration of 2.5 ppm exceeding Class C (2.5 ppm), nickel with a maximum concentration of 147 ppm exceeding Class C (49 ppm) and zinc with a maximum concentration of 3,410 ppm exceeding Class C (460 ppm). Total PCBs were detected at a maximum concentration of 0.189 ppm, exceeding the Class A SGV (0.100 ppb); however, there were no exceedances of its Class C SGV (1 ppm). The total PAH-34 maximum concentration (10.41 ppm) exceeds Class A (4 ppm) but not Class C (35 ppm) SGV.

North Return Water Trench- The maximum concentration of lead (909 ppm) was detected in exceedance of its Class C SGV (130 ppm). Mercury was detected at a maximum concentration (3.2 ppm) which exceeds the Class C (1.0 ppm) SGV. The maximum concentration of total PCBs (1.2 ppm) exceeds the Class C (1.0 ppm) SGV. There were detections of VOCs; however, they did not exceed Class A. One of the five sediment samples fall within the Class B SGV. These samples were collected in 2013 and the trench is already partially filled in.

Soil-

Multiple VOCs, SVOCs, and metals exceed industrial or commercial use soil cleanup objectives (SCOs). Naphthalene was detected at a maximum concentration at 6,500 ppm exceeding the industrial use SCO of 1,000 ppm, arsenic was detected at a maximum concentration of 90.3 ppm exceeding the industrial use SCO of 16 ppm, mercury was detected at a maximum concentration of 10.5 ppm exceeding the industrial use SCO of 5.7 ppm, benzene was detected at a maximum concentration of 2,800 ppm exceeding the industrial use SCO of 89 ppm, benzo(a)pyrene was detected at a maximum concentration of 6.2 ppm exceeding the industrial use SCO of 1.1 ppm. Additionally, various compounds exceeded the protection of groundwater standards, including but not limited to arsenic, cadmium, mercury, cyanide, benzene, ethylbenzene, toluene, xylenes, methylene chloride and numerous SVOCs.

Special Resources Impacted/Threatened:

Water courses, such as Smoke's Creek, pass through the site and flow into Lake Erie, which abuts the western edge of the site. The Department considers Smokes Creek as an important ecological corridor that connects upland areas to Lake Erie.

6.4 Summary of Human Exposure Pathways

The site is partially fenced, gated and has signage which restricts public access. However, persons who enter the site could contact contaminants in the soil by walking on the site, digging or otherwise disturbing the soil. There are several surface water areas where persons may come in contact with contaminants on-site. People are not coming into contact with the contaminated groundwater because the area is served by a public water supply that is not affected by this contamination. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Because the site is undeveloped or used for outdoor industrial purposes the inhalation of site-related contaminants due to soil vapor intrusion does not represent a current concern.

6.5 Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process in 6 NYCRR Parts 373 and 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives (RAOs) are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with contaminated groundwater.

RAOs for Environmental Protection

- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water on and off-site
- Remove the source of groundwater contamination.

Surface Water

RAOs for Public Health Protection

- Prevent ingestion or direct contact with contaminated surface water.
- Prevent contact or inhalation of contaminants from impacted water bodies.
- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Restore surface water to ambient water quality criteria for the contaminant of concern.
- Prevent impacts to biota (plants/animals) from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the aquatic food chain.

Soil

RAOs for Public Health Protection

- Prevent ingestion or direct contact with contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater, surface water or sediment contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Soil Vapor
RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

Sediment
RAOs for Public Health Protection

- Prevent direct contact with contaminated sediments.
- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Prevent releases of contaminant(s) 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 sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.
- Restore sediments to pre-release/background conditions to the extent feasible.

SECTION 7: SUMMARY OF THE PROPOSED OU1, OU9, AND OU10 REMEDY

To be selected the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the site were identified, screened and evaluated in the Corrective Measures Study (CMS) report.

A summary of the remedial alternatives that were considered for this site are presented in the statement of basis for each individual operable unit.

The proposed remedy is referred to as the Consolidation and Capping, Enhanced Groundwater Treatment, and Sediment/Soil Excavation remedy.

These components of the site-wide OU-1, OU-9 and OU-10 remedy will be supplemented by specific remedies proposed for other operable units referenced above.

The basis for the Department's proposed corrective measure is set forth in Exhibit E.

The estimated present worth cost to implement the remedy is $34,994,500. The cost to construct the remedy is estimated to be $31,538,000 and the estimated average annual cost is $225,900.

The elements of the Site-Wide, Water Courses and Groundwater Remedial Elements are as follows:

1. **Pre-Design Investigations (PDI)**

A PDI is required to aid in the design of the enhanced water treatment systems. Sufficient geotechnical information will be collected, and pumping tests will be completed to determine extraction well radii of influence and installation locations to contain the contaminant plume and prevent discharge into surface water bodies. Sampling must also take place in SWMUs where waste extends into, or close to, the groundwater table (i.e., SWMUs S-04 and S-16) to verify these wastes are not contributing contaminants to groundwater. Additional well installations will likely be required. A PDI Work Plan for each OU will be submitted and approved by the Department.

A PDI will also be implemented for Smokes Creek and Gateway Metroport Ship Canal. This pre-design investigation will include, but is not limited to the following elements:

- Sediment sampling up to the mean high-water level to further delineate sediment requiring remediation;
- Hydrologic studies to accurately delineate the mean high-water level;
- An ecological investigation to further delineate the toxicity and mobility of contaminants in sediment;
- Geotechnical sampling to help support the remediation;

- Determining the location of any underground utilities or other obstructions that may impact dredging activities. This information would be utilized to either re-route these utilities outside the remediation or to accommodate their locations and future anticipated maintenance;
- Analysis of any tributaries or drainages contributing within the work area to determine if contaminated sediments are being transported into or out of the site. Stream profile forms would be documented for restoration of the stream following dredging activities;
- Surveying, including bathymetric as appropriate, the location of any additional soil or sediment sampling and underground utilities to support the remedial design and implementation of the remedy; and
- Waste characterization, pore water, hydrodynamic and sediment transport modeling, an ice impact study and an evaluation of the potential for scour.

2. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

3. Sustainable Restoration and Climate Resiliency Plan

A Sustainable Restoration and Climate Resiliency Plan is required, which includes at a minimum the following:

- An evaluation of the feasibility, location(s) of, and designs for on-site areas of habitat creation, restoration and enhancement that will include; structural, environmental and ecological enhancements to the on-site shoreline and surrounding area that will restore the Lackawanna lakeshore to a more natural state, soften the shoreline and provide stability of the slag-cliff face where needed. The development of such enhancements will be compatible with all final remedies and a vision for the planned future use of the site;
- Design, implement and maintain on-site areas that provide opportunities for public access;
- Restoration consistent with the Great Lakes Restoration Initiative or other regional master plans;
- Design, implement and maintain areas of habitat creation, restoration and enhancement that will include structural, environmental and ecological enhancements to the on-site shoreline and surrounding area that will restore the Lackawanna lakeshore to a more natural state, and soften the shoreline and provide stability of the slag-cliff face where needed and prevent the migration of contaminated materials to nearby waterbodies;
- Routine maintenance of the mouth of Smokes Creek for flood control and fish migration;
- Climate change vulnerability analyses and adaptation planning leading to increased remedy resilience including maintaining on-site habitats;
- Identifying potential hazards posed by climate change;
- Characterizing the remedy(s) exposure to those hazards;
- Characterizing the remedy(s) sensitivity to the hazards;
- Considering factors that may exacerbate remedy(s) exposure and sensitivity, such as the size of upstream water;
- Catchment, the size of adjacent floodplains, and land use in the floodplains;
- Identifying measures that potentially apply to the vulnerabilities in a range of weather/climate scenarios; and
- Selecting and implementing priority adaptation measures for the given remedy.

4. Corrective Action Management Unit (CAMU)

If the technical requirements and timing described in this document are met, the management of nonhazardous contaminated materials in a Corrective Action Management Unit (CAMU) will be conducted on-site. If these conditions are not met, contaminated soil will be separated on-site into hazardous and non-hazardous contaminated materials and disposed of at an applicable permitted off-site facility or beneficially reused pursuant to a DEC beneficial use determination as set forth in 6 NYCRR Part 360, as approved by the Department, with the option of temporary on-site staging, with a preference towards beneficial use as commercial landfill daily cover and transport via rail.

This element would locate the Solid Waste Corrective Action Management Unit (SW-CAMU) within the footprint of SWMUs S-7 and S-20 (see Figure 5) which would serve as the containment cell for consolidation and final disposal of the solid wastes generated from the remediation of the other SWMUs (estimated to range from 27,000 CY to over 115,000 CY) as shown in Figure 2. The exact volume of waste placed in the SW-CAMU, will be further determined through the PDI. This waste/fill will be placed over the approximately 875,000 CY of waste/fill already contained in SFA Zone 2 utilizing a containment cell described in more detail below. The estimated range of SWMU waste/fill volume proposed to be consolidated into the SW-CAMU is large because excavation quantities will vary according to the lateral and vertical extent of impacts as well as the amount of slag reclaimed from the SWMUs. In this alternative, the SWMU waste/fill to be consolidated into the SW-CAMU would be placed in an engineered containment cell that will fully encapsulate the relocated wastes and include a low-permeability geocomposite liner system (see Figure 5 and 6), leachate collection system (see Figure 5 and 6), and a low-permeability geocomposite cover system (refer to Figure 6). As such, the extent of the SW-CAMU will be approximately 4.3 acres. Figure 4 and 4a illustrates the proposed SW-CAMU footprint and closure plan for the other impoundments under this alternative. The slope of the SW-CAMU final cover system would be 10% maximum and 4% minimum. A maximum slope of 25% would be allowed in coordination with public access developments.

Soil, sediment, or waste exhibiting hazardous waste regulatory levels will be disposed off-site at a permitted hazardous waste disposal facility or will be rendered non-hazardous and placed in the CAMU. The CAMU shall, to the extent practicable, minimize the land area of the facility upon which waste will remain in place after closure of the CAMU. The engineered cap will be designed, constructed and maintained in conformance with the substantive requirements of 6 NYCRR Part 360 solid waste regulations. The design of the CAMU will meet RCRA subtitle D – seismic design guidance for municipal solid waste landfill activities, as well as 40 CFR 258.15 Unstable Areas requirements. These requirements will apply to the entire waste containment system, including liners, leachate collection systems, and surface water control systems. A work plan detailing aerial configuration, design, operation, treatment and closure/post closure requirements (including groundwater monitoring and corrective action) must be submitted and approved by the Department.

5. Disposition of Excavated Material

The disposition of excavated materials will be subject to a site-wide materials management plan.

The excavation material may be:

a. The excavated materials will be sent off-site for disposal if it is found to be hazardous waste pursuant to NYCRR Part 371;
b. If the waste is determined to be non-hazardous, the off-site disposal option will allow for the staging of material on-site (for up to 24 months) in accordance with

6NYCRR Part 373-2.19(d) and 40 CFR Section 264.5 and other applicable requirements to maximize the beneficial reuse of the remedial waste as daily cover at commercial landfills, provided the remedy selection authorizes such activity. If utilized, temporary soil pile(s) may not exceed 28 feet in height; and/or

c. Placed in a CAMU to be constructed on the former Bethlehem Steel site property designed to meet all applicable rules and regulations, or if approved by the Department, staged while the CAMU is being constructed. To utilize a CAMU, a design must be completed and approved, and construction must begin within 24 months of this SB (or such other time frame as the Department agrees upon in writing) and be completed in accordance with a Department-approved schedule. If the CAMU is not constructed in accordance with the approved schedule the remedial wastes will be disposed of off-site.
d. Material placed in the CAMU will consist of the excavated material from Smokes Creek, SRWT, Metroport Ship Canal, SWMUs in OU5, OU6, OU7 and OU8. Additional material may be placed within the CAMU if determined necessary during the PDI.

While the transportation mode will be determined during the remedial design, the Department's preferred mode of transportation is rail since it reduces truck traffic, reduces greenhouse gases, facilities are located near the site, and is in line with community comments.

6. Cover System

A cover system will be required to allow for industrial use of the site in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs), including material exhibiting elevated radiological readings, and for commercial (passive recreational) use in areas proposed to enhance public access where the upper one foot of exposed surface soil will exceed the applicable SCOs. The cover system will be a minimum of one foot of soil, with the upper six inches of soil of sufficient quality to maintain a vegetative layer, or an approved fill placed over a demarcation layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, new building foundations and associated building slabs. To the extent practical, areas with one foot of cover will be used to enhance habitat or be appropriately regraded to facilitate future use.

7. Sediment Dredging

Sediment will be dredged and/or excavated at Smokes Creek (Figure 9-6 and 9-7) and Gateway Metroport Ship Canal (Figure 9-8) where sediments exceed Class C SGVs. All sediments will be removed from the South Return Water Trench. Any remaining debris in

the North Return Water Trench will be removed and backfilled in accordance with clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for industrial use. The extent of the dredged material will be determined through the PDI.

8. Waterbody Construction

a. Smokes Creek – Following dredging, Smokes Creek will be designed to improve hydraulic flow, reduce flooding, as per previous dredging activities conducted by the US Army Corps of Engineers (USACE), and provide climate resilience. Shoreline areas disturbed by the remedial effort be restored in accordance with the flood control easements and USACE requirements currently in place.
b. The Smokes Creek riparian zone through the former Bethlehem Steel property will be enhanced through bank clean-up and stabilization for greater aquatic connectivity into the creek's headwaters of Smokes Creek that runs through the Bethlehem Steel site. All shoreline areas disturbed by the remedial effort be restored in accordance with the flood control easements and USACE requirements currently in place.

c. North Return Water Trench-The North Return Water Trench will be plugged and backfilled to establish design elevations. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for industrial use will be brought in to establish the designed backfill placement and will meet the department's requirements for an industrial cover system.
d. South Return Water Trench – Will be dredged and clean fill will be placed, meeting the requirements of 6 NYCRR Part 375-6.7(c) for commercial and passive recreational use.

9. Groundwater

Enhancements to the two current groundwater extraction and treatment systems (located in the Acid Tar Pit and the Coke Oven/Benzol Plant areas) will be implemented to treat contaminants in groundwater across a larger area of the site and to ensure contaminated groundwater does not migrate off-site. Additional groundwater extraction wells will be designed and installed so that the capture zone is sufficient in intercepting and containing the groundwater contaminant plumes to stop further migration, particularly from discharging into surface water bodies**.** The proposed extraction wells will be installed near the shorelines of Smokes Creek and Lake Erie and west of the Benzol Plant/Tank Farm, shown on Figure 10-1. The extraction system will create a depression of the water table so that contaminated groundwater is directed toward the extraction wells within the plume area and treated by the two on-site existing systems or construction of an additional groundwater treatment system. Further details of the enhanced modifications to the current extraction systems will be determined during the remedial design. Prior to the full implementation of this technology, studies will be conducted to more clearly define design parameters, including extraction well spacing.

Monitoring for contaminants of concern and degradation byproducts will be required in

areas: (1) upgradient, downgradient, and within the treatment zone of the groundwater extraction wells; (2) upgradient and downgradient of any impacted groundwater; and (3) select off-site locations to ensure contaminant migration from the site is not occurring.

The operation of the remedial components will continue until RAOs have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

10. Vapor Intrusion Evaluation

All existing on-site buildings will be required to have a soil vapor intrusion evaluation completed within two years of the issuance of this Statement of Basis or as they become occupied. Any new buildings following the issuance of this statement of basis will also need to be evaluated for soil vapor intrusion. The evaluation will include a provision for implementing actions recommended to address exposures related to soil vapor intrusion.

11. Interim Groundwater Monitoring

Groundwater will be periodically monitored for site-related contaminants (in areas outside the reach of the treatment systems and at groundwater monitoring wells across the entire site and possibly off-site, as determined by the Department) to assess the effectiveness of the treatment systems and monitor groundwater conditions during pre-design investigations, remedial design, and implementation of the remedies. Sampling frequency should account for seasonality until water table fluctuations and trend analyses are established as outlined in the future monitoring plan. Any reduction in the sampling frequency must be pre-approved by the Department. A monitoring report following each sampling event is required.

12. Remedial System Optimization

After five years, or as determined by the Department, a groundwater optimization will be performed to evaluate the effectiveness of the treatment enhancements and the need for further improvements or expansion to the system(s). The nature and extent of contamination in areas where groundwater extraction has been shown to be ineffective (migration of contaminants to waterbodies or offsite, increasing trends of contaminants or other metrics as approved by the Department) will be immediately and thoroughly investigated pursuant to a work plan approved by the Department. Based on the investigation results and the Department's determination of the need for corrective measures, a Remedial Action Work Plan (RAWP) will be developed to further modify and/or expand the current treatment systems. Citizen Participation Plan (CPP) activities will continue through this process. The corrective measures may include source removal and/or the installation of additional treatment systems and extraction wells to limit plume migration and target significant groundwater exceedances. Any recommendations to reduce sampling frequency, analytical parameters, and/or treatment must be approved by the Department.

13. Financial Assurance

Tecumseh Redevelopment, Inc., shall post financial assurance using one or more of the financial instruments specified in 6 NYCRR 373-2.8 in the amount of the cost projection for the remedy selected in any Statement of Basis(s). Financial assurance must include all remedial activities, closure and post-closure care for the site that have not been implemented.

14. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- Require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- Allow the use and development of the controlled property for industrial use as defined by Part 375-1.8(g) or commercial use as defined by Part 375-1.8(g) for passive recreational areas, although land use is subject to local zoning laws;
- Define and describe areas anticipated to be made available for passive recreational use;
- Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH;
- Restrict the use of surface water for any other purposes besides passive recreational use; and
- Require compliance with the Department approved Site Management Plan.

15. Site Management Plan

A Site Management Plan is required, which includes the following:

1. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: the financial assurance described in Paragraph 14 and the environmental easement described in Paragraph 16. Implementation of controls including notification of appropriate government agencies with authority for permitting potential future activities which could impact the implementation and effectiveness of the remedy.

Engineering Controls: The Corrective Action Management Unit described in Paragraph 4, the cover system described in Paragraph 6, and the Enhanced Groundwater Extraction and Treatment discussed in Paragraph 9 above, including any subsequent modifications

or additions deemed necessary by the Department. This plan includes, but may not be limited to:

- An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- A provision for further investigation and remediation should redevelopment occur or if the subsurface is otherwise made accessible. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated pursuant to a plan approved by the Department. Based on the investigation results and the Department's determination of the need for a remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for the site, including removal and/or treatment of any source areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment;
- With respect to areas anticipated to be made available for passive recreational use, the necessary institutional and engineering controls must be effectively implemented, maintained, monitored and enforced through the site management plan. These areas would require the top one foot of cover to meet the commercial soil cleanup objectives;
- Descriptions of the provisions of the environmental easement including any land use, groundwater and surface water use restrictions;
- A provision for evaluation of the potential for soil vapor intrusion for any occupied buildings on the site, including provisions for implementing actions recommended to address exposures related to soil vapor intrusion;
- A provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described in Paragraph 6 above will be placed in any areas where the upper one foot of exposed surface soil exceeds the applicable soil cleanup objectives (SCOs);
- Provisions for the management and inspection of the identified engineering controls;
- A provision for conducting remedial system optimizations at least every five years;
- Maintaining site access controls and the Department notification; and
- The steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

2. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan must include, but may not be limited to:
    - Monitoring of soil, sediment and groundwater to assess the performance and effectiveness of the remedy;
    - Monitoring of bank soil, sediment and surface water (mass loading, discharge locations) within the mean highwater mark to assess the performance and effectiveness of the remedy;
    - Necessary requirements for monitoring the success for 5 years after remedial action and for needed restoration maintenance within the

waterways. Specific monitoring requirements and success criteria will be determined during the remedial design;
- A schedule of monitoring and frequency of submittals to the Department;
- Monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

3. An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan must include, but is not limited to:
    - Procedures for operating and maintaining the remedy;
    - Compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
    - Maintaining site access controls and Department notification; and
    - Providing the Department access to the site and O&M records.

Figures

Figure 1 – Site Location Map

Figure 2 – Facility-wide CMS study areas

Figure 2A – Operable Unit Overview

Figure 3 – Site Wide Remedies

Figure 3A- OU's 5 thru 09

Figure 4 – SWCAMU Alternative 2

Figure 4a – SWMU CAMU Potential Design

Figure 5 – Proposed Cover System Impoundments & SWCAMU

Figure 6 – SWCAMU Linear Detail

Figure 7 – Revetment North-North Cross Section

Figure 8 – Revetment South-South Cross Section

Figures 9a-c Smokes Creek Upper Reach Sediment Exceedances

Figure 9-2- Smokes Creek Lower Reach Sediment Exceedances

Figure 9-3 Gateway Metroport Ship Canal Sediment Data

Figure 9-4 NRWT Sediment Data

Figure 9-5a SRWT Sediment Data

Figure 9-5b SRWT Sediment Data

Figure 9-6 Upper Reach Smokes Creek Dredging Area

Figure 9-7 Lower Reach Smokes Creek Dredging Area

Figure 9-8 Ship Canal Dredging Area

Figure 10-1 – Proposed Groundwater Extraction Remedy

Figure 10-2 – pH Exceedances in Groundwater (2020)

Figure 10-3 – Benzene Exceedances in Groundwater (2020)

Exhibit A – Nature and Extent of Contamination

OU-9 Water Courses

OU-10 Site-Wide Groundwater

Exhibit B – Summary of the Cleanup Objectives

Exhibit C – Description of Corrective Measures Alternatives

OU-9 Water Courses

OU-10 Site-Wide Groundwater

Exhibit D – Corrective Measures Costs

OU-9 Water Courses

OU-10 Site-Wide Groundwater

Exhibit E – Summary of Proposed Corrective Measures

OU-9 Water Courses

OU-10 Site-Wide Groundwater

Appendix A – Soil Cleanup Objectives (SCO) Discussion

Appendix B – Evaluation of Transport and Disposal

Appendix C – CAMU Minimum Design Standards

Appendix D – Review of Other States' Arsenic Remedial Goals

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the RFI and CMS for environmental media that were evaluated. Samples were collected from environmental media to preliminarily characterize the nature and extent of contamination. The nature and extent of contamination is further described in the RFI and CMS report(s) and decision documents for the various operable units for the site.

The tables below summarize the findings of the investigations. The tables present the range of contamination found for site-related COCs. The tables compare COC concentrations against the applicable standards and guidance values for each medium.

Surface Water Data

Surface water samples were collected from Smokes Creek, NRWT, SRWT, and the Gateway Metroport Ship Canal and compared against the NYS A(C), protection for fish propagation in Fresh Waters, Ambient Water Quality Standards (AWQS 6 NYCRR Part 703, Waterbody Class C and TOGS 1.1.1. In the North Return Water Trench and Gateway Metroport Ship Canal there were no AWQS exceedances. In the SRWT, both total mercury and total cyanide exceed the AWQS.

The surface water of Smokes Creek was collected and analyzed. Detections of VOCs, SVOCs, and inorganic compounds were found in the samples. Of the samples collected there were AWQS exceedance of one SVOC compound inorganic compounds (cyanide and selenium), as shown in Table 1.

The two samples collected from the NRWT were collected prior to 2011. Of the two samples collected, there were no AWQS exceedances for any contaminant. In 2011, samples were attempted to be collected out of the trench and it was found that most of the northern end of the trench covered by a slag/fill pile.

The SRWT is a 5,000-foot unlined open channel with an average depth of approximately 8 feet to 10 feet to the base of the channel. Water depths vary but are typically recorded at 1 foot to 3 feet. The northern portion is approximately 8 feet to 10 feet wide while the southern portion is approximately 30 feet across. The trench varies from being constructed with concrete and brick, sheet piled walls with an open bottom, to unsupported soil/slag/fill banks. 570 cubic yards of material were dredged from a small portion of the SRWT, in 2013, to install a culvert underneath the railroad. The SRWT discharge point is an identified SPDES Outfall and has monthly flow monitoring requirements at the weir near the confluence of Smokes Creek and SRWT. Similar to Smokes Creek, flow in the SRWT can reverse direction during times of highwater elevation in the creek (i.e., high precipitation volumes or other extreme storm events). Surface water data for the North and South Return Water Trench were collected simultaneously with the post ICM 2009 sediment samples. Currently, the NRWT is

partially filled in with other debris and besides runoff surface water is rarely observed in this area. Despite the SRWT and the NRWT not being classified as a waterbody, surface water samples that were taken were compared against NYSDEC AWQS for a Class C waterbody for the protection of fish propagation. Of the three surface water samples collected in the SRWT, only cyanide (total) and mercury exceeded their respective standards.

In 2007 surface water from the Gateway Metroport Ship Canal was collected and analyzed for TCL VOC, TCL SVOC, total metals, ammonia, hardness, chemical oxygen demand (COD), total alkalinity, total dissolved solids, total organic carbon (TOC). Surface water showed no AWQS exceedances.

Table 1- Smokes Creek Surface Water

Parameter	Detected Range (ppb)[1]	Class C Ambient Water Quality Standards (ppb)	Frequency Exceeding Ambient Water Quality Standards
TCL VOCs			
Benzene[2]	ND[5]-3.3	10	0 of 20
Methylene chloride[2]	0.5-14	NS[6]	NS
Toluene[3]	ND-0.51	100	0 of 8
Xylenes, Total[3]	ND-0.66	65	0 of 8
TCL SVOCs			
Bis(2-Ethylhexyl)phthalate[2]	1.9-24	0.6	6 of 11
1,3-Dichlorobenzene	ND-0.1	5	0 of 9
Naphthalene[3]	0.4-1.7	13	0 of 11
Phenanthrene	0.44-0.47	5	0 of 4
Inorganic Compounds			
Arsenic, Total[2]	5.4-7.4	150	0 of 11
Barium, Total	27.8-50.2	NS	NS
Beryllium	0.3	NS	NS
Cadmium, Total[4]	ND-4.1	NS	NS
Selenium, Total[2]	ND-7.3	4.6	4 of 17
Cyanide[2]	ND-44	5.2	8 of 21

[1]ppb: parts per billion.

[2]New York State Class C Ambient Water Quality Standards from 6 NYCRR Part 703.
[3]New York State Class C Ambient Water Quality Guidance Values.
[4]New York State Class C Ambient Water Quality Standards based on unavailable general chemistry data (i.e., pH, temperature, hardness).
[5]New York State Class C Ambient Water Quality Standard not available for this substance.
[6] NS= No standard
[7] ND= Non-Detect

Table 2- North Return Water Trench Surface Water

Parameter	Detected Range (ppb)[1]	Class C, A (C) Fresh Water Ambient Water Quality Standards (ppb)	Frequency Exceeding Ambient Water Quality Standards
TCL VOCs			
Benzene[2]	0.2	10	0 of 2
Methylene Chloride[2]	0.9-2.4	200	0 of 2
Inorganic Compounds			
Barium, Total[3]	340	NS[5]	NS
Calcium, Total	32,800	NS	NS
Calcium, Dissolved[3]	32,800	NS	NS
Chromium, Total[4]	12.4	NS	NS
Lead, Total[4]	3.2-62	NS	NS
Chloride[3]	30,300	NS	NS

[1]ppb: parts per billion.
[2]New York State Class C Ambient Water Quality Standards from 6 NYCRR Part 703.
[3]New York State Class C Ambient Water Quality Standard not available for this substance.
[4]New York State Class C Ambient Water Quality Standards based on unavailable general chemistry data (i.e., pH, temperature, hardness).
[5] NS- No standard

Table 3- South Return Water Trench Surface Water

Parameter	Detected Range (ppb)[1]	Class C Ambient Water Quality Standards (ppb)	Frequency Exceeding Ambient Water Quality Standards
TCL VOCs			
Benzene[2]	0.2-0.68	10	0 of 4
Inorganic Compounds			
Barium, Total	39.2-75.2	NS[3]	NS
Mercury, Total[2]	0.5-0.7	0.0007	2 of 3
Chloride	11.6-119	NS	NS
Sulfate	91,800	NS	NS
Cyanide[2]	11.6-119	5.2	3 of 3

[1]ppb: parts per billion.
[2]New York State Class C Ambient Water Quality Standards from 6 NYCRR Part 703.
[3] NS- No standard

Table 4- Gateway Metroport Ship Canal Surface Water

Parameter	Detected Range (ppb)[1]	Class C Ambient Water Quality Standards (ppb)	Frequency Exceeding Ambient Water Quality Standards
TCL VOCs			
Acetone	4.2-5.2	NS[3]	NS
Benzene[2]	1.7-1.8	10	0 of 2
Inorganic Compounds			
Calcium	33,300-34,600	NS	NS
Iron	360-370	NS	NS
Magnesium	8,000-8,200	NS	NS
Manganese	13-14	NS	NS
Potassium	1,800-2,000	NS	NS
Sodium	31,300-42,600	NS	NS

[1]ppb: parts per billion.

[2]New York State Class C Ambient Water Quality Standards from 6 NYCRR Part 703.
[3] NS- No standard

Sediment Data

Sediment data were compared to the NYSDEC Screening and Assessment of Contaminated Sediment freshwater guidance values of Class A and Class C criteria to determine the nature and extent of contamination within the creek sediments. The guidance document establishes concentration guidelines for three classes of sediment contamination defined as follows:

- Class A - Sediment concentrations in this class present little or no potential risk to aquatic life. This represents a pre-release condition that was evaluated under the RFI.
- Class B - Concentrations between the Class A and Class C thresholds present a reasonable probability of chronic toxicity to aquatic life. For this discussion, a "Class A exceedance" means that the sediment is categorized as Class B unless subsequent text explicitly indicates the material is Class C (concentration also exceeds the Class C threshold).
- Class C - Sediment concentrations in this class present a significant potential risk of acute toxicity to aquatic life.

Sediment samples were collected from Smokes Creek, North Return Water Trench, South Return Water Trench, and Gateway Metroport Ship Canal. These samples have been collected from several different depths (0-6", 6"-12", and 12"-24") during several different sampling events throughout the years. Only the most recent data is included in this section, as sediment samples from Smokes Creek that were collected in June 2020 by USGS have not yet been analyzed and are therefore not included in this PRAP.

The data included in Tables 5 through 9 is a summary of the data from 2009, 2016, and 2017.

In 2008, Tecumseh completed an interim corrective measure (ICM) of dredging the Lower Reach of Smokes Creek to address hydraulic concerns. The 2009 sediment sample results represent the post-dredging conditions in this area. Pre- and post-ICM sediment samples were collected from the same 10 locations equidistant from each other. Adjacent cores were composited for SVOCs, PCBs, cyanide, total organic carbon (TOC), and metals analysis. In addition, discrete samples were collected from all 10 locations for VOC analysis. The Upper Reach of Smokes Creek was dredged by NYSDEC in 2007 for navigational purposes, and samples were collected in 2009.

Additionally, in 2017 Smokes Creek was sampled by USACE. Sample locations were divided into 10 sections (numbered 1-10), and each section was further divided into 5 subsections (labeled a-e), further described in Tables 5 and 6 and shown in Figures 9-1a, 9-1b, 9-1c, and 9-2.

The Gateway Ship Canal was sampled in November 2009, these samples were analyzed for TCL VOC, TCL SVOC, RCRA Metals, and TOC analysis. Additionally, in 2016 USACE sampled the Ship Canal at depths of 0-10", 0-12", 0-18", 0-20", 0-60", 10"-28", 12"-36" and 20"-36". From these two sampling events, 13 sediment samples were collected with exceedances of Class C SGV several inorganic compounds, VOCs, and SVOCs, PCBs related to past Bethlehem Steel activities, as further described in Table 7 and shown in Figure 9-8.

In 2006, four sediment samples were collected from the North Return Water Trench from the upper six inches. At the time, the surface water levels within the trench were approximately 1 foot to 8 feet below the surrounding groundwater table. Little to no water has been observed in the trench since 2011. The Northern-most opening to the trench is already covered with an encroaching slag/fill pile, mostly located on the BCP area. From the samples obtained, there have been past exceedances of inorganic compounds (Arsenic, Cadmium, Chromium (total), lead, and mercury) and PCBs, as further described in Table 7 and shown in Figure 9-4. Approximately 22 samples have been collected in the South Return Water Trench. In October 2009, during the implementation of the CMS work plan 17 composite samples were collected for TCL VOC, TCL SVOC, PCBs and RCRA metals plus cyanide. Organics, total PAHs, and total PCB compounds exceeded their respective SGVs. A more detailed breakdown of these exceedances is shown in Table 8 and Figures 9-5a and 9-5b show the collection locations of these samples.

Table 5 – Smokes Creek Upper Reach Sediment

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] (ppm)	Frequency Exceeding Class A	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
TCL SVOCs					
Fluoranthene	0.053-15	14.16	1 of 73	NS[4]	NS
Phenanthrene	0.033-24	11.94	3 of 73	NS	NS
Total PAH-17	0.3748-55.504	4	22 of 66	35	2 of 66
Total PAH-34	0.12155-70.31	4	14 of 25	35	2 of 25
PCBs					
Total PCBs	0.0055-3.6	0.1	10 of 73	1	5 of 73
Inorganic Compounds					
Arsenic	1.5-33.3	10	29 of 73	33	1 of 73
Cadmium	0.01-24	1	35 of 73	5	7 of 73
Chromium	5.7-193	43	29 of 73	110	5 of 73

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] (ppm)	Frequency Exceeding Class A	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
Copper	10-239	32	50 of 66	150	3 of 66
Lead	12.3-1,370	36	63 of 73	130	41 of 73
Mercury	0.01-2.5	0.2	25 of 73	1	1 of 73
Nickel	7.2-103	23	44 of 66	49	10 of 66
Silver	0.07-11.8	1	22 of 73	2.2	11 of 73
Zinc	43.9-100,000	120	55 of 73	460	42 of 73

[1]ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment.
[2]NYSDEC Freshwater SGVs – based on site specific 9.32% TOC.
[3]NYSDEC Class A Freshwater SGVs should be used for compounds that do not have a Class C SGV.
[4] NS= No standard
[5] ND= Not Detected.

Table 6 – Smokes Creek Lower Reach Sediment

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] (ppm)	Frequency Exceeding Class A	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
TCL SVOCs					
Naphthalene	0.02-31	7.7	2 of 29	NS[4]	NS
Phenanthrene	0.043-17	11.94	1 of 29	NS	NS
Total PAH-17	1.01-18.52	4	11 of 24	35	0 of 24
Total PAH-34	3.28-11.48	4	5 of 8	35	0 of 8
PCBs					
Total PCBs	0.067-0.85	0.1	10 of 29	1	0 of 29
Inorganic Compounds					
Arsenic	3.5-56.7	10	18 of 29	33	4 of 29
Cadmium	0.34-17.2	1	20 of 29	5	6 of 29
Chromium	11.9-187	43	19 of 29	110	7 of 29
Copper	22.4-184	32	20 of 24	150	4 of 24
Lead	25.8-837	36	25 of 29	130	20 of 29

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] (ppm)	Frequency Exceeding Class A	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
Mercury	0.03-0.86	0.2	17 of 28	1	0 of 28
Nickel	15.5-118	23	21 of 24	49	6 of 24
Silver	0.16-8.4	1	16 of 29	2.2	6 of 29
Zinc	122-8,370	120	24 of 24	460	20 of 24

[1]ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment.
[2]NYSDEC Freshwater SGVs – based on site specific 9.32% TOC.
[3]NYSDEC Class A Freshwater SGVs should be used for compounds that do not have a Class C SGV.
[4] NS= No standard
[5] ND= Not Detected.

Table 7- North Return Water Trench Sediment

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] / PAH SGVs (ppm)	Frequency Exceeding Class A / PAH SGVs	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
TCL SVOCs					
Acenaphthene	0.056-14	9.82	1 of 5	NS[4]	NS
Acenaphthylene	0.14-57	9.04	1 of 5	NS	NS
Anthracene	0.14-150	11.88	1 of 5	NS	NS
Benzo(a)anthracene	0.33-160	16.82	2 of 5	NS	NS
Benzo(a)pyrene	0.27-120	19.28	1 of 5	NS	NS
Benzo(b)fluoranthene	0.33-140	19.58	1 of 5	NS	NS
Benzo(ghi)perylene	0.19-59	21.9	1 of 5	NS	NS
Benzo(k)Fluoranthene	0.16-60	19.6	1 of 5	NS	NS
Chrysene	0.27-140	16.86	2 of 5	NS	NS
Fluoranthene	0.76-390	14.16	2 of 5	NS	NS
Fluorene	0.12-180	10.78	1 of 5	NS	NS
Indeno(1,2,3-cd)pyrene	0.18-68	22.3	1 of 5	NS	NS
Naphthalene	0.29-85	7.7	1 of 5	NS	NS
Phenanthrene	0.53-550	11.94	2 of 5	NS	NS

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] / PAH SGVs (ppm)	Frequency Exceeding Class A / PAH SGVs	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
Pyrene	0.57-340	13.96	2 of 5	NS	NS
PCBs					
Total PCBs	0.225-1.2	0.1	3 of 3	1	1 of 3
Inorganic Compounds					
Arsenic	6.7-58.7	10	4 of 5	33	1 of 5
Cadmium	1.3-10.2	1	3 of 3	5	1 of 3
Chromium	21.2-438	43	3 of 5	110	1 of 5
Lead	74.7-909	36	5 of 5	130	2 of 5
Mercury	0.58-3.2	0.2	5 of 5	1	4 of 5

[1]ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment.
[2]NYSDEC Freshwater SGVs – based on site specific 9.32% TOC.
[3]NYSDEC Class A Freshwater SGVs should be used for compounds that do not have a Class C SGV.
[4] NS= No standard
[5] ND= Not Detected.

Table 8 –South Water Return Trench Sediment

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] / PAH SGVs (ppm)	Frequency Exceeding Class A / PAH SGVs	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
TCL SVOCs					
Fluoranthene	0.56-24	14.16	4 of 22	NS[4]	NS
Phenanthrene	0.24-29	11.94	2 of 22	NS	NS
Total PAH-17	2.59-98.1	4	4 of 8	35	2 of 8
Total PAH-34	3.94-10.41	4	3 of 8	35	0 of 8
PCBs					
Total PCBs	0.054-0.189	0.1	4 of 17	1	0 of 17
Inorganic Compounds					
Arsenic	9.2-102	10	20 of 22	33	7 of 22

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] / PAH SGVs (ppm)	Frequency Exceeding Class A / PAH SGVs	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
Chromium	19.3-212	43	13 of 22	110	3 of 22
Lead	96.6-1,010	36	22 of 22	130	21 of 22
Mercury	0.22-2.5	0.2	19 of 22	1	3 of 22
Nickel	13.5-147	23	3 of 13	49	1 of 13
Zinc	823-3,410	120	8 of 8	460	8 of 8

[1]ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment.
[2]NYSDEC Freshwater SGVs – based on site specific 9.32% TOC.
[3]NYSDEC Class A Freshwater SGVs should be used for compounds that do not have a Class C SGV.
[4] NS= No standard
[5] ND= Not Detected.

Table 9- Gateway Metroport Ship Canal Sediment

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] / PAH SGVs (ppm)	Frequency Exceeding Class A / PAH SGVs	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
TCL SVOCs					
Acenaphthene	0.037-97	9.82	6 of 13	NS[4]	NS
Acenaphthylene	0.016-21	9.04	4 of 13	NS	NS
Anthracene	0.053-110	11.88	7 of 13	NS	NS
Benzo(a)anthracene	0.075-100	16.82	7 of 13	NS	NS
Benzo(a)pyrene	0.062-89	19.28	7 of 13	NS	NS
Benzo(b)fluoranthene	0.064-95	19.58	7 of 13	NS	NS
Benzo(ghi)perylene	0.042-53	21.9	5 of 13	NS	NS
Benzo(k)Fluoranthene	0.027-39	19.6	5 of 13	NS	NS
Chrysene	0.097-98	16.86	7 of 13	NS	NS
Fluoranthene	0.15-250	14.16	9 of 13	NS	NS
Fluorene	0.03-69	10.78	5 of 13	NS	NS
Indeno(1,2,3-cd)pyrene	0.036-48	22.3	5 of 13	NS	NS

Parameter	Detected Range (ppm)[1]	Class A SGVs[2] / PAH SGVs (ppm)	Frequency Exceeding Class A / PAH SGVs	Class C SGVs[3] (ppm)	Frequency Exceeding Class C SGVs
Naphthalene	0.65-500	7.7	8 of 13	NS	NS
Phenanthrene	0.15-330	11.94	9 of 13	NS	NS
Pyrene	0.11-210	13.96	9 of 13	NS	NS
Total PAHs	1.645-1,919	4	12 of 13	35	11 of 13
Pesticides					
Endosulfan (alpha and beta)	0.0011-0.0021	0.001	2 of 9	0.02	0 of 9
PCBs					
Total PCBs	0.00067-0.336	0.1	7 of 13	1	0 of 13
Inorganic Compounds					
Arsenic	7-22.4	10	10 of 13	33	0 of 13
Cadmium	0.17-2.7	1	7 of 13	5	0 of 13
Chromium	18.6-80	43	8 of 13	110	0 of 13
Copper	21.5-39.6	32	2 of 9	150	0 of 9
Lead	18.4-663	36	10 of 13	130	6 of 13
Mercury	0.013-1.61	0.2	10 of 13	1	2 of 13
Nickel	16.8-30.5	23	6 of 9	49	0 of 9
Silver	0.064-1.2	1	1 of 9	2.2	0 of 9
Zinc	72.3-3,310	120	6 of 9	460	2 of 9

[1]ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment.
[2]NYSDEC Freshwater SGVs – based on site specific 9.32% TOC.
[3]NYSDEC Class A Freshwater SGVs should be used for compounds that do not have a Class C SGV.
[4] NS= No standard
[5] ND= Not Detected.

Despite past navigational or hydraulic (flood reduction) dredging, creek sediments have been contaminated by Bethlehem Steel operations. Contaminants found above the Class A (Smokes Creek) and Class C (Ship Canal and SRWT) SGV and/or the industrial soil cleanup objectives are to be addressed by the remedy selection process.

Groundwater

Groundwater samples have been collected from overburden and bedrock wells across the site, targeting various portions of the underlying geology (i.e., slag/fill, dredge soils, sand, peat, clay, bedrock). As groundwater data has been collected for more than 20 years, only data from the past 5 years is presented and discussed within this section to describe current site conditions. A full summary of data can be found in the CMS Report (May 2019) and other historical reports.

The results indicate that contamination in the overburden is extensive and exceeds SCGs for VOCs, SVOCs, and metals. Several locations across the northern and western areas of the site have elevated pH (>12.5) in groundwater (see Figure 10-2). Contaminant levels in bedrock groundwater also exceeded SCGs for VOCs, SVOCs, and metals in select locations. A summary of the detected results that exceed applicable SCGs is presented in Table 10. A contour map of benzene (Figure 10-3) illustrates general COC exceedances across the site from the most recent groundwater sampling event in 2020.

Ethylbenzene, toluene, and xylene exceedances are primarily located near the Benzol Plant, southwest of the Ship Canal. Benzene exceedances, however, are also located in the northern and southern areas of the site (see Figure 10-3). Generally, the highest exceedances of phenols and metals are in the south. PAH exceedances are located across the site.

Two sampling events (2018 and 2020) analyzed the full suite of emerging contaminants in groundwater. For PFAS, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) were reported at concentrations of up to 0.134 and 0.0259 parts per billion (ppb), respectively, exceeding the State's 0.010 ppb maximum screening value for groundwater for each. The majority of PFAS exceedances are located in DSA-2A, DSA-2B, DSA-4Aand DSA-5.

Groundwater samples analyzed for 1,4-dioxane had a maximum concentration of 215 ppb, significantly higher the screening value of 1 ppb in groundwater-. Exceedances of 1,4-dioxane are found within DSA-2A and DSA-2B.

Table 10 – Site-Wide Groundwater

Detected Constituents	Concentration Range Detected (ppb)[1]	SCG[2] (ppb)	Frequency Exceeding SCG
VOCs			
1,1 Dichloroethane	ND-7.6	5	2/132
1,4 Dioxane	ND-215	1	8/43
1,2,4-Trichlorobenzene	ND-16	5	1/101
1,2,4-Trimethylbenzene	ND-240	5	12/121

Detected Constituents	Concentration Range Detected (ppb)[1]	SCG[2] (ppb)	Frequency Exceeding SCG
1,2-Dichlorobenzene	ND-26	3	2/100
1,2-Dichloroethane	ND-180	0.6	13/117
1,3,5-Trimethylbenzene	ND-220	5	9/121
Acetone	ND-190	50	3/158
Benzene	ND-96,000	1	115/181
Carbon Disulfide	ND-480	60	2/156
Chlorobenzene	ND-49	5	1/84
Chloromethane (Methyl chloride)	ND-13	5	2/93
cis-1,2-Dichloroethene	ND-18	5	4/110
Ethylbenzene	ND-880	5	17/174
Isopropylbenzene	ND-5.5	5	1/174
Styrene	ND-410	5	8/139
Toluene	ND-5,800	5	33/180
trans-1,2-Dichloroethene	ND-15	5	4/105
Trichloroethene	ND-8.5	5	4/117
Vinyl Chloride	ND-3.4	2	2/117
Xylenes, m/p	ND-1,500	5	30/129
Xylenes, o	ND-570	5	21/129
Xylenes, Total	ND-2,360	5	52/178
SVOCs			
2,4-Dimethylphenol	ND-420	1	24/138
2-Methylphenol (o-Cresol)	ND-410	1	3/121
2-Nitrophenol	ND-260	1	1/53
3- & 4-Methylphenol (m- & p-Cresol)	ND-4,000	1	54/140
4-Nitrophenol	ND-210	1	1/55
Acenaphthene	ND-210	20	8/167
Benzo(a)anthracene	ND-17	0.002	66/167
Benzo(a)pyrene	ND-12	0.002	34/167
Benzo(b)fluoranthene	ND-14	0.002	37/167

Detected Constituents	Concentration Range Detected (ppb)[1]	SCG[2] (ppb)	Frequency Exceeding SCG
Benzo(k)fluoranthene	ND-5.3	0.002	45/167
Biphenyl (1,1'-biphenyl)	ND-68	5	15/161
Bis(2-Ethylhexyl) Phthalate	ND-98	5	6/165
Chrysene	ND-14	0.002	60/167
Fluorene	ND-150	50	7/170
Indeno(1,2,3-cd)Pyrene	ND-6.7	0.002	35/167
Naphthalene	ND-12,000	10	65/182
Pentachlorophenol	ND-2.1	1	5/150
Phenanthrene	ND-170	50	6/170
Phenol	ND-17,000	1	43/139
Total Recoverable Phenolics	ND-190	1	24/27
Phenolic compounds (total phenols)	ND-21,000	1	67/143
PCBs/Pesticides			
Total PCBs	ND-0.068	0.09	0/35
4,4'-DDE	ND-0.006	0.2	0/52
Metals			
Antimony	ND-3.65	3	4/25
Antimony (Dissolved)	ND-5.84	3	1/4
Arsenic	0.22-128	25	4/72
Arsenic (Dissolved)	2.9-128	25	1/7
Barium	13.99-15,750	1,000	8/83
Barium (Dissolved)	16.22-17,980	1,000	4/15
Chromium, Total	0.18-260.6	50	4/74
Chromium (Dissolved)	0.24-166.2	50	2/7
Cyanide	2-6,440	200	18/51
Magnesium, Total	ND-749,000	35,000	16/54
Magnesium (Dissolved)	ND-78,400	35,000	3/4
Manganese, Total	0.48-111,900	300	10/54
Selenium, Total	ND-40.5	10	4/51

Detected Constituents	Concentration Range Detected (ppb)[1]	SCG[2] (ppb)	Frequency Exceeding SCG
Selenium (Dissolved)	ND-16.4	10	1/4
Sodium, Total	8,480-3,060,000	20,000	47/55
Sodium (Dissolved)	4,990-365,000	20,000	2/3
pH (pH units)			
Elevated pH	4.48-13.31	12.5	13/193
Perfluorinated Compounds[3]			
Perfluoropentanoic Acid (PFPeA)	ND-0.249	0.1	4/31
Perfluorohexanoic Acid (PFHxA)	ND-0.143	0.1	3/31
Perfluorooctanoic Acid (PFOA)	ND-0.134	0.01	12/31
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND-0.375	0.1	1/31
Perfluorooctanesulfonic Acid (PFOS)	ND-0.0259	0.01	6/31
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND-0.134	0.1	1/31

[1]ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water. ND= Not Detected.
[2]SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5) except for 1,4-dioxane and perfluorinated compounds, that are compared to the NYSDEC screening levels.
[3]Further assessment is warranted if any other individual perfluorinated compound (not PFOA or PFOS) is detected in water at or above 0.1 ppb; or if the total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 0.5 ppb.

The primary groundwater contaminants are benzene, ethylbenzene, toluene, xylene, 2,4-dimethylphenol, 3- & 4-methylphenol (m- & p-cresol), benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, biphenyl, chrysene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, total recoverable phenolics, arsenic, barium, chromium, and cyanide . These compounds are associated with past industrial operations at the site.

Based on the last five years of data and historical industrial operations at the site, contaminants that exceed the groundwater standards will be addressed by the remedy selection process.

Emerging contaminants, 1,4-dioxane and perfluorinated compounds, are co-mingled with the site-wide groundwater plume. Therefore, emerging contaminants will not drive the remediation of groundwater, but will be evaluated during the treatment system design.

Exhibit B

Summary of the Cleanup Objectives

The goal for the corrective measure program is to achieve restricted (industrial) use of the site (and commercial use in select areas where the anticipated use is recreational activity) and to restore groundwater quality to meet applicable SCGs, to the extent feasible. At a minimum, the corrective measures shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at this facility through the proper application of scientific and engineering principles.

The established cleanup objectives at this site are:

Compound	**Soil Cleanup Objective[1] (ppm or mg/kg)**	**Groundwater Cleanup Objective[2] (ppb or ug/L)**	**SCG[3] Class A (ppm)**	**SCG[4] Class C (ppm)**
VOCs				
Benzene	89/0.06	1	0.53	1.9
Chlorobenzene	1,000/1.1	5	0.20	1.7
1,2-Dichlorobenzene	1,000/1.1	3	0.28	2.5
Cis-1,2-Dichloroethene	1,000/0.25	5	NS	NS
Trans-1,2-Dichloroethene	1,000/0.19	5	1.2	11.0
Ethylbenzene	780/1	5	0.43	3.7
Styrene	NV/NV	5	NS	NS
Toluene	500/0.7	5	0.93	4.5
1,2,4-Trichlorobenzene	NV/NV	5	35	55
Trichloroethene	400/0.47	5	1.8	8.6
1,1,1- Trichloroethane	1,000/0.68	NS	1.9	3.5
1,2,4-Trimethylbenzene	380/3.6	5	3.4	30
1,3,5-Trimethylbenzene	380/8.4	5	NS	NS
Vinyl Chloride	27/0.02	2	NS	NS
Xylenes, total	1,000/1.6	5	.590	5.2
SVOCs				

Compound	Soil Cleanup Objective[1] (ppm or mg/kg)	Groundwater Cleanup Objective[2] (ppb or ug/L)	SCG[3] Class A (ppm)	SCG[4] Class C (ppm)
Acenaphthene	1,000/98	20	NS	NS
Benzo(a)anthracene	11/1	0.002	NS	NS
Benzo(a)pyrene	1.1/22	ND	NS	NS
Benzo(b)fluoranthene	11/1.7	0.002	NS	NS
Benzo(k) fluoranthene	110/1.7	0.002	NS	NS
Biphenyl (1,1'-biphenyl)	NV/NV	5	NS	NS
Bis(2-ethylhexyl)phthalate	NV/435	5	NS	NS
Chrysene	110/1	0.002	NS	NS
2,4-Dimethylphenol	NV/NV	1	NS	NS
Indeno(1,2,3-cd)pyrene	11/8.2	0.002	NS	NS
2-Methylphenol	1,000/0.33	1	NS	NS
4-Methylphenol	1,000/0.33	1	NS	NS
Naphthalene	1,000/12	10	NS	NS
Phenol	1,000/0.33	1	NS	NS
Total PAHs	500[3]	NV	4	35
PFAS				
Perfluorooctanoic acid (PFOA)[5]	0.6/0.0011	0.01	NS	NS
Perfluorooctanesulfonic acid (PFOS)[5]	0.44/0.0037	0.01	NS	NS
Metals				
Arsenic	16/16	25	10	33
Barium	10,000/820	1,000	NS	NS
Cadmium	60/7.5	5	1	5
Chromium	800/19	50	43	110
Cyanide	10,000/40	200	NS	NS
Lead	3,900/450	25	36	130
Mercury, total	5.7/0.73	0.7	0.2	1

Compound	Soil Cleanup Objective[1] (ppm or mg/kg)	Groundwater Cleanup Objective[2] (ppb or ug/L)	SCG[3] Class A (ppm)	SCG[4] Class C (ppm)
Selenium	6,800/4	10	NS	NS
Silver	6,800/8.3	0.1	1	2.2
PCBs/Pesticides				
Total PCBs	25/3.2	0.09	0.1	1

1. 6NYCRR Part 375: Industrial Soil Cleanup Objectives (ISCOs)/Protection of Groundwater SCOs.
2. SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703 - Surface Water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).
3. SCG: Class A- The Department's Screening and Assessment of Contaminated Sediment (June 2014).
4. SCG: Class C- The Department's Screening and Assessment of Contaminated Sediment (June 2014).
5. Further assessment is warranted if any other individual perfluorinated compound (not PFOA or PFOS) is detected in water at or above 0.100 ug/L; or if the total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 0.500 ug/L. Based upon Sampling, Analysis, and Assessment of Per and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs (January 2021).

ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil.
ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
ppt: parts per trillion, which is equivalent to nanograms per liter, ng/L, in water.

ND = Not Detected.
NV = No Value.

Exhibit C

Description of Corrective Remedial Alternatives

Common Elements of Corrective Remedial Alternatives Evaluated by DEC

Each of the remedial alternatives evaluated by the Department, with the exception of Alternative 1 – No Further Action and Alternative 2 – No Further Action with Site Management, rely on the same common elements to address the site. The primary component of the site remedial plan is the consolidation and containment of materials in a corrective action management unit (CAMU), including closure in place of select solid waste management units (SWMUs) and proper disposition of materials unsuitable for placement within the CAMU. The common elements for the entire site include remedial design with appropriate pre-design investigations to ensure a comprehensive remedy, provisions for sustainable restoration and climate resiliency to ensure the long-term effectiveness of the remedial program. Other elements include earthwork (excavation and backfill) to remove the potential for ongoing releases to the environment, provide access to materials requiring remediation and to allow for protective institutional and engineering controls (environmental easement, cover system and site management plan) to be implemented. Financial assurance is also required.

Below are descriptions of the proposed remedial elements included within this Statement of Basis. The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 6.2. This alternative leaves the site in its present condition and does not provide any additional protection of the environment.

Present Worth: $0
Capital Cost:..... $0
Annual Costs:..... $0

Alternative 2: No Further Action with Site Management

The No Further Action with Site Management Alternative recognizes the remediation of a portion of the site completed by interim corrective measures. This alternative leaves the sediment in its present condition, no construction of the CAMU, and the sediment and surface waters at the Ship Canal, Smokes Creek, SWRT, and NWRT as well as site-wide groundwater will be monitored for site related contamination. Additionally, site perimeter controls and access points would be installed, and warning signage posted. This alternative maintains engineering controls, which were part of the IRM(s), OU-4 GW & Soil Vapor Extraction, and Hazardous Waste Management Unit 1A, and includes

institutional controls, in the form of an environmental easement and site management plan, necessary to protect public health and the environment from contamination remaining at the site after the IRMs.

Capital Cost……$250,000
Site Management Present Worth.....$960,000
Annual Costs (Years 1-30) $23,667

Alternative 3: Restoration to Pre-Disposal or Unrestricted Conditions for Groundwater and Waterbodies

This alternative includes the complete excavation of all sediment that exceeds the class A sediment SCGs in Smokes Creek, South Return Trench and Ship Canal. Excavation is a common remedy used to remove contaminated sediments and is effective at eliminating exposure and preventing transport of contaminants.

Verification samples will be collected following sediment removal to confirm that all contaminated sediment has been removed. All excavated sediment will be dewatered at a facility constructed at the site before being transported to approved off-site disposal facilities or placed in the CAMU created on-site.

Following excavation, the waterbodies will be restored, to the extent possible, to their original grades with material similar to the existing substrate. A restoration plan will be developed during design and will meet the substantive requirements of Article 15 USACE and 6 NYCRR Part 608.

This alternative would also include the Smokes Creek Main Stem Enhancement and plugging and backfilling of the North Return Trench.

For groundwater, pre-disposal conditions are unobtainable as the entire site is built on slag/fill and dredged sand materials. Therefore, this alternative would target soil source removal to restore the groundwater aquifer to below TOGS 1.1.1 standards and allow for unrestricted use. This alternative would include source removal of the slag/fill layer underneath the entire site which would resolve groundwater contamination. The excavation and off-site disposal of all waste and soil contamination above the unrestricted soil cleanup objectives is estimated to be significantly greater than 1,500,000 tons (approximate volume of all solid waste management units). The remedy will not rely on institutional or engineering controls to prevent future exposure after 10 years of groundwater monitoring have demonstrated applicable standards are met. Under this assumption, there is no Site Management, no restrictions, and no periodic review. The annual costs associated with this remedy include groundwater monitoring until applicable standards are met (estimated 10 years). The only capital cost addresses source material removal. Due to size of the site, the substantial volume to be excavated for this alternative, and uncertainties regarding disposal options and requirements, estimated capital costs are conceptual and may be considerably underestimated.

Present Worth: $206,179,000
Capital Cost: $206,179,000
Annual Costs: $0

Alternative 4: SW-CAMU with Sediment Removal in Smokes Creek, South Return Trench and Gateway Metroport Ship Canal, Plugging, Excavation and Backfilling the North Return Water Trench; Enhanced Groundwater Treatment Systems with Monitoring.

This alternative includes the SW-CAMU evaluated in Appendix B and D. If the technical requirements and timing described in this document are met, the management of nonhazardous contaminated materials in a Corrective Action Management Unit (CAMU) will be conducted on-site. Soil or waste exhibiting hazardous waste regulatory levels will be disposed off-site at a permitted hazardous waste disposal facility. The CAMU shall, to the extent practicable, minimize the land area of the facility upon which waste will remain in place after closure of the CAMU.

This alternative consists of the complete excavation of sediment from Smokes Creek and restoration of the bank soils, Gateway Metroport Ship Canal, and the SRWT. Excavation is a common remedy used to remove contaminated sediments and is effective at eliminating exposure and preventing transport of contaminants. Due to the continuous flow of water, flows will need to be managed during excavation activities.

Verification samples will be collected following sediment removal to confirm that all contaminated sediment has been removed. All excavated sediment will be dewatered at a facility constructed at the site before being transported to approved off-site disposal facilities or placed in the CAMU created. A restoration plan will be developed during design and will meet the substantive requirements of Article 15 USACE and 6 NYCRR Part 608. This alternative would also include the Smokes Creek Main Stem Enhancement, and the plugging and backfill of the North Return Trench.

For groundwater, this alternative includes a pre-design investigation, enhancements to the two on-site treatment systems (within the Acid Tar Pit and Benzol Plant areas), a monitoring program, and a contingency remedial action plan. Site management activities will occur for 30 years or as determined by the Department.

Details regarding the enhancements to the existing treatment systems will be determined in the pre-design investigation and remedial design component of the alternative. However, the installation of 26 additional extraction wells and corresponding infrastructure will expand the capture zone of the current extraction systems. The added volume of contaminated groundwater entering the treatment systems will likely warrant several upgrades to each system and will require updates to the Operation and Maintenance Manual to reflect new site engineering controls.

Groundwater will be monitored for site-related contaminants to assess the effectiveness of the treatment systems. Sampling frequency will occur quarterly (for an estimated 90

wells), to account for seasonality, for the first five years and then annually thereafter, or as approved by the Department. As quarterly sampling will occur on a short-term basis, the annual cost estimate only reflects annual sampling. However, the present worth includes quarterly sampling for five years.

Optimization investigations and reports will occur every five years, or as determined by the Department, to evaluate the effectiveness of the treatment enhancements and the need for corrective measures to further improve or expand the system(s). If corrective measures are determined to be necessary, a provision for further investigation and remediation is required under a Remedial Action Work Plan (RAWP), which must be approved by the Department before implementation. This provision includes further delineation of the nature and extent of groundwater contamination, evaluation of the ineffective treatment system(s), and proposed recommendations to address the remaining contamination significantly exceeding groundwater standards. Remedial actions may require additional extraction well and/or treatment system installations to address the ineffectiveness of the upgraded treatment systems.

The alternative also includes institutional controls in the form of an environmental easement, Site Management Plan, groundwater use restriction, site use restriction, excavation plan and, if necessary, further evaluation of soil vapor intrusion.

Present Worth: $32,972,000
Capital Cost: $21,741,700
Annual Costs: $374,343

Alternative 5: Off-site disposal with Restoration to Class A SGV (Smokes Creek and South Return Water Trench), Class C SGVs (Ship Canal), Plugging, Excavation and Backfilling the North Return Water Trench; Enhanced Groundwater Treatment Systems with Monitoring

This alternative is the same as Alternative 4 except the on-site consolidation CAMU is replaced with off-site disposal. It is important to note that the total cost for offsite removal based upon all of the operable units is estimated to be approximately $200,000,000 rendering off-site disposal unfeasible. The numbers below are the cost estimate for OU1, OU09, and OU10.

Present Worth Cost: $33,591,000
Capital Cost: $22,360,700
Annual Cost.....$374,343

Exhibit D

Corrective Measures Costs

Corrective Measure	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Alternative 1: No Further Action	*0*	*0*	*0*
Alternative 2: No Further Action with Site Management	*250,000*	*23,667*	*960,000*
Alternative 3: Restoration Pre-disposal or Unrestricted Conditions	*206,179,000*	*0*	*206,179,000*
Alternative 4: SW-CAMU with Dredging of Smokes Creek, South Return Trench and Gateway Metroport Ship Canal, Plugging, Excavation and Backfilling the North Return Water Trench; Enhanced Groundwater Treatment Systems with Monitoring*	*21,741,700*	*374,343*	*32,972,000*
Alternative 5: Off-site disposal** with Dredging of Smokes Creek, South Return Trench and Gateway Metroport Ship Canal, Plugging, Excavation and Backfilling the North Return Water Trench; Enhanced Groundwater Treatment Systems with Monitoring*	*22,360,700*	*374,343*	*33,591,000*

*Excluding the implementation of a contingency remedial action.
**Off-site disposal cost estimates do not account for the ~$19 million additional off-site disposal costs associated with other operable units across the site.

Exhibit E

Summary of the Proposed Final Corrective Measures

Common Elements of Corrective Measures Alternatives Evaluated by DEC

Each of the remedial alternatives evaluated by the Department, with the exception of Alternative 1 – No Further Action and Alternative 2 – No Further Action with Site Management, rely on the same common elements to address the site. The primary component of the site remedial plan the Department is proposing is the consolidation and containment of materials in a corrective action management unit (CAMU), including closure in place of select solid waste management units (SWMUs) and proper disposition of materials unsuitable for placement within the CAMU. The proposed elements for the entire site include remedial design with appropriate pre-design investigations to ensure a comprehensive remedy, provisions for sustainable restoration and climate resiliency to ensure the long-term effectiveness of the remedial program. Other elements include demolition and earthwork (excavation and backfill) to remove the potential for ongoing releases to the environment, provide access to materials requiring remediation and to allow for protective institutional and engineering controls (environmental easement, cover system and site management plan) to be implemented. Financial assurance is also required. The Department believes these common elements are the foundation of a cost-effective remedy which will be fully protective of human health and the environment, complies with statutory and regulatory standards, and is implementable and will be effective long term. The Department is proposing Alternative 4 – SW-CAMU with Dredging of Smokes Creek, South Return Trench and Gateway Metroport Ship Canal, Plugging, Excavation and Backfilling the North Return Water Trench; Enhanced Groundwater Treatment Systems with Monitoring as the final corrective measure. The North Return Water Trench will be plugged and backfilled. To the extent practicable and within the constraints of Section 8, disposal of excavated/dredged material will be placed in the on-site CAMU. This alternative also adds enhancements to the existing treatment systems with continued monitoring to address groundwater exceedances of TOGs 1.1.1 standards across the site. If the Department determines after five years of operation that standards will not be met, corrective measures, including a Remedial Action Work Plan (RAWP), are required to further investigate and remediate the remaining contamination.

Basis for Selection

The proposed final corrective measures are based on the following: recent groundwater sampling; the results of the RFI and CMS; the lack of a previous comprehensive environmental cleanup at the site (only navigational or hydraulic flood reduction dredging); and that the site soil, groundwater, surface water and sediments have been contaminated by historical Bethlehem Steel and Tecumseh operations. Appendix B provides an evaluation of transportation and disposal, including onsite disposal in a SW-CAMU.

Threshold Criteria

The first two evaluation criteria are termed threshold criteria and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment.

This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

Alternatives 1 and 2 (No Further Action/No Further Action with Site Management) do not satisfy this criterion as soil and sediment exceeding SGVs/SCGs remain on-site and continue to present a significant threat to public health and the environment. Neither Alternative 1 (No Further Action) nor Alternative 2 (No Further Action with Site Management) provide any protection to public health and the environment in a reasonable timeframe for groundwater and it is unlikely that full restoration of groundwater resources would be achieved. Furthermore, the No Action alternatives (Alternatives 1 and 2) do not address transport mechanisms, such as erosion and loading from seeps, that allow contaminated slag to remain a potential source of contamination to the waterbodies, and for contaminated sediment to continue to migrate downstream. As Alternatives 1 and 2 are not fully protective of public health and the environment they are not considered for implementation at the site.

Alternatives 3, 4, and 5 best satisfy this criterion by removing all sediment that exceeds the New York State SGVs/SCGs for sediment, consolidating or removing waste, installing a site cover, and providing protection to public health and the environment in a reasonable timeframe for groundwater. Alternative 3 fulfills this criterion by removing the contaminants exceeding applicable SCGs. Alternative 4 and 5 fulfill this criterion by closing off the soil/sediment exposure pathway; and thereby preventing human contact with remaining contamination. Dredging in Smokes Creek and the South Return Trench would mean remaining sediment would present no potential for risk to aquatic life or wildlife. Additionally, Alternatives 4 and 5 prevent human exposure with groundwater contamination through plume containment via expanding the existing treatment systems and institutional controls (groundwater use restrictions).

2. Compliance with SGVs/SCGs.

Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternative 3 (Removal to meet pre-disposal or unrestricted conditions) satisfies this criterion by removing all sediment that exceeds the sediment Class A SGVs and all soil that exceeds unrestricted SCOs. Alternatives 4 and 5 also satisfy this criterion through the installation of a site cover that meets the SCOs for the anticipated uses of the site. For groundwater, Alternative 3 complies with this criterion as it would likely reduce contaminant concentrations below groundwater SCGs, preventing restrictions on future

groundwater use. Alternatives 4 and 5 also met this criterion by treating and containing hot spots of contamination in groundwater to below SCGs, to the extent practicable. Alternatives 3, 4 and 5 prevent contaminants from discharging into and contaminating nearby surface water bodies, thereby addressing surface water SCGs. Action-Specific SGVs/SCGs for these alternatives would be associated with dust and odor control, erosion and sediment control, transportation and disposal of remediation wastes, and stream restoration. These alternatives would maintain current flood plain storage capacity. As Alternatives 3, 4, and 5 satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy.

Balancing Criteria

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Long-Term Effectiveness and Permanence.

This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 3 best satisfies this criterion by removing all sediment that exceeds the class A sediment SCGs and all soils that exceeds unrestricted SCOs. Complete soil and sediment removal could eliminate the need for long term monitoring and maintenance. However, alternative 3 would rely on natural attenuation processes to restore the contaminated aquifer. Therefore, due to the unreasonable amount of time required to restore the aquifer, this alternative would not be an effective long-term remedy Alternatives 4 and 5 also satisfy this criterion but would require long-term monitoring and maintenance to ensure its long-term effectiveness. Both disposal options would provide similar levels of acceptable long-term effectiveness and permanence. Consolidation of the material at the CAMU, or at an approved commercial facility would result in the permanent containment of contaminated soils and floodplain soils/sediments. Bank soil along Smokes Creek, will be evaluated in Alternatives 4 and 5 through the PDI. The PDI will determine the extent of any bank soil removal.

For groundwater, Alternative 3 best satisfies this criterion as it would remove all major source material currently present, thereby eliminating the need for engineering or institutional controls. Alternatives 4 and 5 require an engineering control (extraction and treatment of groundwater) and institutional controls (environmental easement, groundwater use restriction, monitoring plan, Site Management Plan). These controls would be an effective means of managing residual contamination. Furthermore, the contingency for additional modifications/expansion to the treatment systems in Alternatives 4 and 5 would increase the reliability and long-term effectiveness of the remedy.

4. Reduction of Toxicity, Mobility or Volume.

Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternatives 3, 4 and 5 all satisfy this criterion by removing some or all sediment or soil that exceeds the class A sediment SCGs or industrial SCOs respectively. The mobility of contaminants is reduced under all three of these alternatives. Consolidation within the containment system at the CAMU, or removal to a commercial facility off-site would reduce the mobility of COCs, potentially through treatment to remove hazardous characteristics. The reduction in mobility would be the same for consolidation at the CAMU, and removal to an approved commercial facility.

Similarly, for groundwater these three alternatives satisfy this criterion by removing the major areas of source material and treating the groundwater, respectively. Alternative 3 permanently reduces contaminant mobility and volume and does not require additional components, although this reduction would likely take an unreasonable amount of time to achieve through natural attenuation. Alternatives 4 and 5 would significantly reduce mobility, and volume of contaminants through active groundwater treatment and would consistently meet this criterion.

5. Short-Term Impacts and Effectiveness.

The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

For sediments, the time needed to complete the remediation is the shortest for Alternative 3. Alternatives 4 and 5 are comparable in short term effectiveness. Consolidation and containment at the CAMU would provide the highest level of short-term effectiveness. The dominant short-term impact of off-site disposal of excavated sediments and soils is truck traffic, which presents potential issues for noise, dust/exhaust, traffic congestion, and safety concerns for the local community. For consolidation and containment onsite, truck traffic would be generally routed along onsite haul roads from the location of the dredging/excavation activities at the site via easily constructed/accessible non-residential roads suitable for truck traffic. Therefore, this disposal option would have limited direct impact on the local community since the haul route(s) would be short and no residential roads would be used. The remaining alternatives pose increased short-term risks to the public during excavation, dredging, grading, treatment, and other site activities through the generation of dust and water quality impacts at point of dredging; these effects can be reduced through the implementation of standard dust and turbidity mitigation construction practices. In order to minimize potential short-term impacts, the area would be secured and access would be restricted to authorized personnel only. Workers can potentially be exposed to contaminated media during excavation and/or treatment activities involved. Risks can be minimized by implementing health and safety procedures

and preventive measures including the use of appropriate personal protective equipment. All site workers would be OSHA certified and would be instructed to follow OSHA protocols.

For groundwater, Alternatives 4 and 5 best meet this criterion due to a shorter construction period. Alternative 3 creates the largest disruption in the community, workers, and the environment due to the long, invasive nature of the construction and implementation period. During this period, the site and surrounding community would be subject to extensive noise and traffic impacts, along with the potential for dust and vapor emissions. Whereas Alternative 3 would take decades (estimated at 70 years) to complete based on the large volume of contaminated materials, Alternatives 4 and 5 only require up to seven construction seasons to implement and would significantly limit any disruption to the surrounding community. The CAMU will be operated (open) for a period of 5-6 years to allow for consolidation of SWMUs waste/fills, followed by final cover construction in year 7. Impact to the community will be limited as community air monitoring will be completed, and dust suppression and typical landfill construction and operation techniques will be employed. Off-site truck traffic will increase due to the need to import soil and other materials (~2,000 truckloads) for the final cover system. In addition to the relatively short construction phase, the short-term effectiveness of Alternatives 4 and 5 surpasses that of Alternative 3, which would require years of monitoring before contaminants demonstrate levels consistently below standards through natural attenuation. Alternatives 4 and 5 have localized impacts in the areas of extraction well installation and treatment system upgrades while Alternative 3 would impact a far larger area during implementation.

Overall, alternatives 4 and 5 involve consolidation or offsite disposal of materials with treatment to remove hazardous characteristics and the use of engineering and institutional controls including clean covers, an easement and long term site management which has been demonstrated to be highly effective at protecting human health and the environment at remediated sites across New York State.

6. Implementability.

The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

For sediments, Alternatives 3, 4 and 5 are implementable as there is ample availability of remedial contractors and equipment to complete the excavation/dredging activities. There would be some technical issues with implementation; associated primarily with access, stream diversion/dewatering, as well as the excavation, and restoration within Smokes Creek. State or Federal regulations for construction within a flood plain may complicate implementation of this alternative. In addition, the earthwork and

transportation technologies necessary for the implementation of these alternatives are proven and reliable. The sediment is expected to have low bearing capacity, due to the saturated and fine-grained nature of the sediment may need to be stabilized prior to offsite disposal or placement in the CAMU. Both disposal options are readily implementable, technically and administratively. However, due to the shorter travel distances involved, consolidation at the on-site containment system at the CAMU is more implementable than consolidation at an off-site commercial facility.

For groundwater, the execution of Alternatives 4 and 5 are feasible as there is available conventional technology and materials to implement installation of extraction wells and update treatment systems. As there are existing treatment systems on-site, it would be seamless to monitor additional wells to measure the effectiveness of reducing toxicity and mobility in groundwater. Alternative 3, however, would be extremely difficult to implement due to the large volume of soil and accessibility of these locations. The administrative and construction effort needed to remove all solid waste management units would be very disruptive to nearby residences and businesses, and the transportation of exorbitant volume of waste would impact the community for a much longer timeframe.

7. Cost-Effectiveness.

Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

Alternative 4 has the lowest cost, followed by Alternative 5. Both alternatives require long-term monitoring and maintenance to ensure their long-term effectiveness and have the potential for implementability issues that could increase the capital cost of these alternatives. It is important to note that although Alternative 5 costs are estimated at $619,000 higher when compared to Alternative 4, Alternative 5 does not take into account roughly $19 million additional costs that would be required for additional off-site disposal under separate operable units. Alternative 3 has the highest cost because removal to pre-disposal conditions would require the largest quantity of sediment and material to be removed from all four of the waterbodies and underneath the site. There are major issues with the implementability of this alternative, which results in an infeasible present worth. Therefore, Alternative 4 has the best balance between cost and effectiveness.

8. Land Use.

When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Surface water from Smokes Creek flows directly into Lake Erie, which is used for recreational use. The waterbodies are not subject to redevelopment.

For groundwater, Alternative 3 would allow for unrestricted use of the groundwater, regardless of future land use; however, this alternative is infeasible as described in the aforementioned criteria. Therefore, Alternative 4 or 5 would best meet this criterion as each allows for the reasonably anticipated land use for this site, a combination of industrial or commercial and passive recreational uses.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance.

Concerns of the community regarding the investigation, the evaluation of alternatives, and the proposed Statement of Basis are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Alternative 4 has been proposed for because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion. This alternative would allow for public access to Smokes Creek. Based upon the above analysis, consolidation and containment at the CAMU is the preferred disposal option. This preference is based on consideration of the primary and balancing criteria and the cost disparity between consolidation locally and at a commercial facility. On-site management at the CAMU would be a proven and reliable technology for waste management.

Appendix A
Soil Cleanup Objectives (SCO) Discussion

Soil Cleanup Objectives (SCO) Discussion

The Department may approve a remedial program for soil that:

(i) Utilizes different soil cleanup objectives between different areas of a site, provided such areas can be defined and described in the environmental easement and the necessary institutional and engineering controls can be effectively implemented, maintained, monitored and enforced through the site management plan;

(ii) Considers site specific background concentrations, including the location of a site in areas of historic fill, in the development of the remedy; and/or

(iii) Achieves a cleanup which is more stringent than the current, intended and reasonably anticipated future land uses of the site and its surroundings.

Tecumseh has proposed site-specific action limits for arsenic (118 ppm) and total PAHs (500 ppm) in soil. Elevated arsenic and PAH concentrations are ubiquitous across the site due to historic slag/fill deposition, coal burning for coke production, and other steel-making operations.

Site-specific SCOs have been developed for PAHs in fill that may be covered in-place. Fill concentrations that exceed the NYSDEC Part 375-6.8(b) Industrial SCOs as well as the Protection of Groundwater SCOs but meet the site-specific SCOs for total PAHs may remain in-place beneath an appropriate cover provided the total PAH concentration is less than 500 mg/kg and the waste waste/fill is not grossly impacted. Part 375 says “Grossly contaminated media” means soil, sediment, surface water or groundwater which contains sources or substantial quantities of mobile contamination in the form of NAPL, as defined in subdivision 375-1.2 (ac), that is identifiable either visually, through strong odor, by elevated contaminant vapor levels or is otherwise readily detectable without laboratory analysis. For purposes of this provision, subsurface soil shall mean the soil beneath permanent structures, pavement, or similar cover systems; or at least one foot of soil cover (which must meet the applicable SCOs). Institutional controls (e.g., an environmental easement) along with a site management plan will be required when this soil cleanup level is employed at a site. This cleanup level is determined to be feasible and protective based on DEC’s experience in its various remedial programs.

The Department’s October 21, 2010 Final Soil Cleanup Guidance (CP-51) provides for the following:

H. Subsurface Soil Cleanup for Total Polycyclic Aromatic Hydrocarbons: For non-residential use sites (i.e., commercial or industrial use sites) where the Ecological SCOs are not applicable, NYSDEC may approve a remedial program that achieves a soil cleanup level of 500 parts per million (ppm) for total PAHs (i.e., Base-Neutral SVOCs) for all subsurface soil. The 500 ppm soil cleanup level is in lieu of achieving all the PAH-specific SCOs in 6 NYCRR 375-6. For purposes of this provision, subsurface soil shall mean the soil beneath permanent structures, pavement, or similar cover systems; or at

least one foot of soil cover (which must meet the applicable SCOs). Institutional controls (e.g., an environmental easement) along with a Site Management Plan will be required when this soil cleanup level is employed at a site. This cleanup level is determined to be feasible and protective based on the Department's experience in its various remedial programs. This approach has existed in TAGM 4046 since it was first issued in 1992.

In determining the remedial goal for arsenic and other soil contaminants, the Department considered applicable laws, regulations, policies, and guidance including but not necessarily limited to:

- USEPA 40 CFR § 265
- NYSDEC 6 NYCRR Part 373
- NYSDEC ECL Article 27, Title 9
- NYSDEC ECL Article 27, Title 13
- NYSDEC 6 NYCRR Part 375-6, which provides soil cleanup objectives (SCOs) – see note 1 below
- NYSDEC and NYSDOH's Technical Support Document (TSD)4 for the SCOs – see note 2 below
- NYSDEC Commissioner's Policy #51 (CP-51) – Soil Cleanup Guidance, issued October 21, 2010.5 – see note 3 below
- NYSDEC's Guidance Document, DER-10 – Technical Guidance for Site Investigation and Remediation – see note 4 below

The Department also looked at other available information and multiple lines of evidence in arriving at the remedial goal such as:

- Arsenic standards in 14 other states (see Appendix D).

The Department cannot accept Tecumseh's site-specific proposed SCO for arsenic (118 ppm) since it substantially underestimates potential arsenic human health risks and is therefore not appropriate for use in making risk management and remedial decisions. However, the Department considers the arsenic risk assessments performed by NYSDOH in conjunction with the NYS Soil Cleanup Objectives (16 ppm for commercial use) to be appropriately site-specific in terms of addressing arsenic exposures in the Lackawanna community and appropriately conservative with regard to the assumptions used to characterize those exposures. The proposed remedy is based on SCOs included in 6 NYCRR Part 375-6 which are supported by the NYSDOH SCO risk assessments and the use of a background-based arsenic remedial goal.

Notes:

1. NYSDEC's SCOs are presented in tables under Subpart 375-6.8 of the regulations and can be viewed at: http://www.dec.ny.gov/regs/15507.html#15513
2. NYSDEC's TSD for the SCOs can be viewed at: http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf
3. NYSDEC CP – 51 can be viewed at: http://www.dec.ny.gov/docs/remediation_hudson_pdf/cpsoil.pdf

4. NYSDEC's DER-10 guidance can be viewed at:
   http://www.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

With respect to areas anticipated to be made available for passive recreational use, the Department requires such areas be defined and described in the environmental easement and the necessary institutional and engineering controls be effectively implemented, maintained, monitored and enforced through the site management plan. These areas would require the top one foot to meet the industrial (or commercial in areas proposed for passive recreational use) soil cleanup objectives.

Appendix B

Evaluation of Transport and Disposal

Evaluation of Transport and Disposal

1.0 Presentation of Transport and Disposition Options

The CMS provided the following transport/disposal options for the remedial wastes from the site:

A. Off-site Disposal: The off-site disposal options in the Corrective Measures Study (CMS) were:

- Commercial Landfill - Off-site disposal of remedial materials as non-hazardous waste at appropriate commercial landfill(s) which meet all applicable rules and regulations for such disposal. Any hazardous waste will be disposed at a permitted hazardous waste disposal facility.

- Beneficial Reuse at a Commercial Landfill - Beneficial reuse of remedial soils as daily landfill cover at appropriate off-site commercial landfill(s) which meet all applicable rules and regulations, including those related to material exhibiting elevated radiological readings.

The transport options for off-site disposal are:

- Transport by truck directly from the excavation to the commercial landfill.

- Transport by truck to a portion of the facility for temporary storage (i.e., staging) followed by loading into larger trucks for transport to the commercial landfill.

- Transport by truck to a portion of the facility for temporary storage (i.e., staging) followed by loading into rail cars for transport to the commercial landfill.

B. On-site Disposal: The Alternative 1 solid waste CAMU presented in the 2019 CMS is roughly based on the solid waste CAMU presented in the CAMU Application that submitted to Department by Bethlehem Steel on November 16, 2000 (CMS Appendix A). The CAMU Application was deemed by the Department, to be substantially complete for the purposes of grandfathering under the 1993 regulations. The Alternative 1 CAMU design presented in the 2019 CMS Report, proposed coalescing all the OU-5 impoundments under a contiguous 24.1-acre cover system that would drain to a future stormwater pond located in empty SWMU S-8. The addition of a liner and leachate collection system to the Alternative 1 CAMU design would result in construction costs that are higher than those presented in Appendix Q of the 2019 CMS Report.

Tecumseh's other proposed on-site disposal option (Alternative 2) presented in the 2019 Corrective Measures Study consists of constructing an engineered CAMU) located at the southern portion of the Facility to receive the remedial materials for permanent disposal with the conditions that no free liquids would exist in materials to be placed, solidification/stabilization would occur to render materials non-hazardous or to meet

compaction requirements, and all provisions of this statement of basis are adhered to. The CAMU would be constructed in accordance with RCRA regulations with a maximum bluff elevation of 650 feet at its highest point and a maximum footprint (i.e., area at its base) of approximately 24 acres. The existing slag bluffs shall have a maximum slope of 1.5H:1V and be pulled back such that a minimum separation distance of 50 feet exists from the waste to the outside edge of bluff. Tecumseh proposed construction of a regulatory required liner, leachate collection system, and a final cover system consisting of geotextile/geomembrane, barrier protection layer and vegetated topsoil layer. Tecumseh also proposed to leave the Interim Corrective Measure wastes in place to be incorporated into the new CAMU. For the entire CAMU Tecumseh proposed to construct an engineered cover system consisting of natural and geosynthetic components with grasses and shrubs on its surface conducive to wildlife habitat and potential passive recreational uses such as hiking and wildlife observation. Tecumseh's proposal also called for trees to be planted at select locations along the perimeter of the CAMU. A system of perimeter drainage swales and culvert pipes will be designed to convey storm water runoff from the CAMU to a detention basin where storm water peak runoff flows will be stored, equalized, and released from the retention/detention ponds in a controlled and reduced manner. Strict nuisance controls to minimize noise, odor, fugitive dust, turbidity, traffic and other potential impacts on the community will be required. Daily cover material or appropriate physical covers will be required to be placed at the end of each workday as an engineering control during the filling of the CAMU.

2.0 Department's Evaluation of Transport and Disposition Options

This evaluation focuses on comparing the major options of off-site and on-site disposal. It also includes some discussion of off-site beneficial use and transport options. The seven evaluation criteria used to analyze these options are:

- Technical
- Environmental
- Human Health
- Institutional
- Green Remediation Practices
- Cost
- Community/Property Owner Acceptance

Below is DEC's evaluation of the disposal options based on these criteria:

Technical

The technical criterion requires the disposal options to be evaluated with respect to performance, reliability, implementability, and safety. The performance and reliability evaluation examine the effectiveness of the disposal options in reducing unacceptable risks and its demonstrated ability to maintain that effectiveness over time. The implementability evaluation examines the engineering and construction-related tasks necessary to carry out the disposal and any obstacles associated with the disposal option

that might delay or lengthen implementation of the proposed remedy. The safety evaluation examines potential safety risks to workers and community members that might be associated with the disposal options.

Performance and Reliability – One important aspect of performance and reliability in terms of disposal is how well the disposal unit prevents migration of contaminants long-term. Both the on-site disposal option and the offsite commercial landfill option offer a number of features which are designed to prevent future contaminant migration. It can be assumed with a high degree of confidence that remedial materials sent for off-site disposal will be received by a modern commercial landfill that is constructed with one or more liners and with systems to collect leachate containing waste contaminants.

The on-site CAMU which Tecumseh proposed is lined since it would be a new disposal area. The CAMU must be located within the facility under the control of the owner or operator where the waste to be managed in the CAMU originated. The location of the proposed CAMU meets this requirement. Wastes to be disposed in the CAMU must be "CAMU–eligible wastes" (see Appendix C) There are several ways to enhance the reliability of the on-site disposal option.

1 - Require a liner for all disposal areas. The requirement for a liner would be predicated on the concentrations and leachability of the waste going into the CAMU.

2 - Testing the soil and setting concentration limits. Previous testing has indicated that the arsenic-contaminated soil does not have the propensity to leach arsenic or other contaminants into the groundwater. In addition, a maximum soil concentration would be set for on-site disposal. The CAMU shall use, when appropriate, treatment technologies (including innovative technologies) to enhance the long-term effectiveness of the CAMU by reducing the toxicity, mobility, or volume of wastes that will remain in place after closure of the CAMU. The CAMU will be designed to incorporate proven and innovative treatment technologies (such as soil washing, stabilization, or solidification) to significantly reduce the toxicity and mobility of remediation waste prior to placement into the on-site cell.

3 – Proper construction and maintenance of the CAMU cap. A well-built cap would prevent runoff from being contaminated and prevent soil from eroding. A properly built and maintained CAMU would be very effective and reliable at containing and isolating the waste long-term.

4 - The remedial design could make provisions to reduce infiltration through the berms and roads by extending cap membranes up berm slopes in effect lining the perimeter drainage swales and covering the berms and roads with low permeability materials. Prior to performing a detailed remedial design, a pre-design investigation should be performed that includes additional chemical and geotechnical sampling of berms and roads surrounding the SWMUs. The information gained from the pre-design should verify that uncovered surfaces are suitable for passive recreational use and minimize the potential for water to percolate through waste materials.

Therefore, the CAMU would facilitate the implementation of reliable, effective, protective, and cost-effective remedy. The CAMU consists of on-site staging, treatment, and containment capabilities for hazardous remediation wastes. On-site, permanent waste containment will allow for cost-effective and controlled management of hazardous remediation wastes.

Implementability – The off-site disposal option has some problems which could affect implementation; however, they appear to be easily reconcilable. For example, the off-site option can cause implementation delays attributable to a lack of available long-haul transport vehicles and/or scheduling limitations with receiving commercial landfills. However, this is easily rectified through the use of on-site temporary staging of remedial soils prior to final off-site disposition. Such staging would allow remediation to continue without any delays due to logistical transport or disposal problems that might occur; however, it would require double handling of contaminated soils.

With respect to the on-site disposal option, the DEC has identified several issues that could cause a delay in remedy implementation.

SWMUs S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-20 and S-27 occupy the area of the Facility where Tecumseh proposed to construct the CAMU. The RCRA Facility Investigation (RFI) conducted with respect to these SWMUs has identified both soil and groundwater contamination in this area, and enhancement of groundwater collection and treatment would be a requirement of the CAMU.

Both 2019 CMS Alternatives 1 and 2 propose that SWMU S-8 be used as a stormwater detention basin following cap construction, with the intent that most of the stormwater directed to this basin would infiltrate the bottom and sides of the basin and that excess stormwater would be discharged to Smokes Creek or SFA Zone 1 during extreme precipitation events. Use of this area may be acceptable for detaining and storing stormwater, however, there would be problems associated with its use for stormwater infiltration. These include that focused infiltration could lead to increased groundwater flow through contaminated areas, that raising the groundwater table in this area could reduce the stability of the slope along the south shore of Smokes Creek, and that increasing groundwater flow in this area could in turn increase the amount of pumping needed at the nearby Acid Tar Pit Expedited Corrective Measure (ATP-ECM) groundwater extraction system and the groundwater extraction wells in OU-5 proposed as part of the site-wide groundwater remedy. An enhanced treatment system remedial element has been included to address this concern.

The 2019 CMS Alternative 2 design locates the CAMU in SWMU S-7/20, with SWMUs S-1 through S-6 and the recommended Alternative 2 CAMU design that have implications both for environmental protectiveness and for cost. The grading plan presented for Alternative 2 on CMS Figure 4a appears to include as little regrading and fill as possible in order to meet minimum slopes for closure in place of SWMUs S-1 through S-6. Under this grading scheme, most of these SWMUs will have top of waste elevations below at least some of the surrounding roads and berms, which may have implications for the

design of stormwater infrastructure. Ultimately, the grading in this area is required to be re-designed as part of the remedial design to address this concern.

Location of a CAMU at an alternate on-site location may be another option which would avoid the above complications. The CAMU would include uncontaminated areas of the facility, only if such areas for the purpose of managing remediation waste is more protective than management of such wastes at contaminated areas of the facility. However, the CAMU must, to the extent practicable, minimize the land area of the facility upon which wastes will remain in place after closure, by consolidating remediation waste from multiple areas into one centralized location which minimizes the land area of the facility at which wastes will remain in place after closure.

Also, the remedy which will include a schedule for completion of construction of the CAMU, will not allow for the soil removal to be delayed because of lack of on-site disposal capacity. To utilize a CAMU, construction must begin within 24 months of the final SB (or such other time frame as the DEC agrees upon in writing) and be completed in accordance with a Department-approved schedule. The CAMU would expedite the timing of remedial activity implementation, since the CAMU will allow multiple areas of contamination to be remediated and co-located within a centralized location, thus expediting the corrective action process. If the CAMU is not constructed in accordance with the approved schedule the remedial wastes will be disposed of offsite.

Safety – There are safety issues related to both on-site and off-site disposal options. The off-site option involves transporting remedial soils over greater distances, either by truck or rail, than would be necessary for the on-site option, which inherently increases the potential for a vehicle accident which might release contaminated materials. It would also require handling the soil twice, first to stage it onsite and then to pick it up and move it offsite which somewhat increases the accident potential. The onsite option entails construction, operation and closure of a CAMU which creates a construction accident potential that is not present with respect to the off-site option. Waste management activities associated with the CAMU would not create unacceptable risks to humans or to the environment resulting from exposure to hazardous wastes or hazardous constituents. The CAMU is located in a remote area, from which most of the waste will originate. On-site management of hazardous remediation waste will reduce risks associated with off-site transport. The waste will be treated to decrease or eliminate the hazardous constituents before being placed in an on-site containment engineered cell. While each option may have safety issues, the Department considers the on-site option to be slightly better than the off-site option in terms of safety.

In summary, the on-site disposal option is considered slightly less favorable than the off-site disposal with respect to performance and reliability, equal with respect to implementability, and slightly better than the off-site option with respect to safety. From an overall perspective, the Department considers the on-site disposal option for the remedial wastes to be comparable to the off-site option with respect to the Technical criterion.

Environmental

The environmental criterion requires disposal options to be evaluated with respect to potential long-term impacts on the environment. The design of the cover system for the on-site CAMU is essentially equivalent to the typical cover designs utilized at off-site solid waste disposal facilities, making the covers essentially equal in terms of environmental protection against surface water contamination. However, as previously stated above, remedial wastes existing in SWMUs S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-20 and S-27, where the CAMU would be constructed on top of existing in place materials would be unlined and would rely on groundwater extraction systems to minimize contamination to environmental media caused by contaminants leached from the disposed remedial waste. In comparison, most, if not all modern off-site commercial disposal facilities are single if not double-lined with leachate collection systems. Such liners and collection systems are widely regarded as superior over groundwater extraction systems in terms of environmental protection. Since materials that leach levels of metals that would impact groundwater would not be allowed in the CAMU, whether or not a portion of the CAMU is lined or unlined is no longer a deciding factor.

Areas within the CAMU, where wastes would remain in place after closure of the CAMU, would be managed and contained so as to minimize future releases, to the extent practicable. All hazardous remediation waste, except the debris, will be treated to meet specific treatment standards prior to being placed in the on-site containment cell. Debris and treated wastes not meeting treatment standards will be stabilized in containers before being transferred to the on-site containment cell. The containment cell would be designed with a groundwater monitoring system to monitor the cell either during operation or the post closure period.

There are several benefits to managing materials in one location in the CAMU , including that the overall area containing waste throughout the site would be reduced, the waste would be better contained and subject to more substantial engineering controls than at present, and that closure of the impoundments could open up this area to public access or habitat improvements.

From an overall perspective, the Department considers the on-site disposal option to be comparable to the off-site option with respect to the environmental criterion.

Human health

The human health criterion requires disposal options to be evaluated based on their protection against short- and long-term exposures to contaminants present in remedial soils.

Both on-site 2019 CMS Alternative 1: Granfathered SW-CAMU and Alternative 2: Close In-Place SWMUs S-1, S-2, S-3, S-4, S-5, S-6 and Reduced SW-CAMU Footprint Enhanced with Base Liner and Leachate Collection System would improve protectiveness to human health and the environment by placing sitewide waste materials within a lined

CAMU with a membrane cover. Both CAMU alternatives provide for the construction of a revetment to protect the OU-5 shoreline.

Short-Term Exposures - Both on-site and off-site disposal options involve similar methods of remedial soil placement in their respective disposal units with similar precautions taken during such placement designed to prevent short-term exposures to workers and the general public (e.g., personnel protection equipment, dust suppression, etc.). Since the on-site CAMU would be located in an area of the facility that is not in proximity to any nearby commercial spaces which are occupied (or will be occupied in the near future), similar for the case of the typical commercial landfill that is often more remotely located, it may pose a similar short-term human exposure potential to that posed by a commercial landfill. However, the fact that the off-site disposal option requires more waste transportation putting remedial soils in close proximity to offsite areas along the truck or rail transport routes must be considered as well. As a result, the Department considers the off-site option as having a higher short-term human exposure potential than the on-site option.

Long-Term Exposures - As stated above, both the on-site and off-site disposal options involve disposal units which have similar cover system designs. Therefore, they are considered by the Department as offering similar protection against direct human exposure from a long-term perspective.

In summary, the Department considers the on-site option to be somewhat more protective with respect to the human health criterion.

Institutional

The institutional criterion requires disposal options to be evaluated with respect to Federal, State and local laws, ordinances, regulations, standards, criteria and guidance. Both the on-site CAMU and off-site commercial landfills are allowable under current Federal and State laws and regulations. Each has similar processes for obtaining permits or approvals from appropriate Federal or State regulatory agencies. Therefore, the on-site and off-site disposal options appear similar with respect to conformance to Federal and State laws/regulations. However, the on-site CAMU may not follow local ordinances. Based on the current Town of Lackawanna Zoning Map, the facility is zoned as a “Commercial/Industrial” district. A zoning variance or other approval may need to be obtained from the City government for an on-site CAMU at the proposed location, as applicable. Or it may be possible for a CAMU to be placed at a different location on site. Due to this uncertainty, the Department considers the off-site disposal option to be slightly more favorable than the on-site option with respect to the institutional criterion.

Green Remediation Practices

The green remediation practices criterion requires disposal options to be evaluated for consistency with USEPA’s and DEC’s Green Remediation concepts and strategies including land conservation, resource/material consumption, soil conservation, and reduction of greenhouse gases and other air emissions. The on-site and offsite disposal

options are evaluated below with respect to each of these green remediation concepts and strategies:

Land Conservation – The on-site CAMU would occupy approximately 24 acres of land in a southern area of the facility. Past environmental investigations have indicated that this area includes remedial wastes existing in SWMUs S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-20 and S-27. Therefore, on-site disposal is considered by the Department as equivalent compared to off-site-site disposal in terms of land conservation since the area already has remedial wastes which would be properly managed in the proposal.

Resource/Material Consumption – The on-site disposal option, as proposed by Tecumseh, would require the usage of natural resources and geosynthetic materials to construct the liner and leachate collection system under the on-site CAMU and a final cover over the entire CAMU. Off-site commercial landfills use these same resources/materials for construction of their liner and cover systems. Therefore, the Department considers off-site disposal and on-site disposal to be comparable in terms of reducing resource/material consumption.

Soil Conservation – The off-site option allows for the beneficial use of some, or possibly all, remedial soils as daily cover for commercial solid waste landfills. It is reasonably anticipated that the nature of these nonhazardous remedial soils (e.g., gradable soils with generally moderate levels of contamination) will make them a viable substitute for “clean” soils which are often used as daily cover for municipal wastes in commercial landfills. While Tecumseh has estimated that 25% of the remedial soils could be beneficially used in this manner, a much higher percentage of beneficial use could result from proper use of on-site staging of remedial soils, as explained in more detail below under the “cost” criterion. Regardless of what percentage of the remedial soils are able to be beneficially re-used, the off-site option allows for the conservation of a significant volume of “clean” soil resources that would otherwise be required for daily cover at municipal landfill facilities. However, consistent with Green Remediation practices, the Department would still allow the less contaminated soils to be beneficially used as commercial landfill daily cover if the on-site option was chosen. Therefore, the Department considers the off-site and on-site disposal options to be comparable in terms of soil conservation.

Reduction of Greenhouse Gases and Other Air Emissions –In terms of greenhouse gas generation and other air emissions, the Department believes that off-site disposal would produce more emissions due to the significant additional transport of remedial soils involved in the off-site option (i.e., added emissions from truck or rail transport to offsite commercial landfills). However, a number of factors must be considered before making such a conclusion. Some of these factors are discussed below:

• An on-site disposal option entails the use of heavy equipment to construct the liner and cover systems for the on-site CAMU, and as a result produces an additional volume of air emissions.

• An off-site disposal option would require double handling of remedial soils on-site, resulting in an additional volume of air emissions.

• The mass of air emissions associated with the additional transport of remedial soils under the off-site option is also related to the mode of transport being employed. A 2009 report issued by the "Federal Railroad Administration" (see link below) indicates, as do other information sources, that shipment by rail is in most cases, is more fuel efficient than shipment by truck, and therefore often produces less air emissions. This is especially true for shipment distances over 300 miles where the reduction in fuel consumption and corresponding reduction in air emissions from rail verses truck becomes substantial. Therefore, maximizing transport of remedial soils by rail where the distance between the Bethlehem Steel site and the commercial landfill is over 300 miles can significantly reduce the additional air emissions associated with the off-site option. These additional emissions can be further reduced if commercial facilities that can directly accept rail shipments are utilized, as opposed to those which would require a rail to truck transfer to complete transport to the landfill. This study referenced below provides a comparative evaluation of rail and truck fuel efficiency on corridors and services in which both modes compete. For the purposes of this study, competitive movements are defined as those of the same commodity having the same (or proximate) origin and destination (O-D) pairs. This study also provides an analysis of past and future trends of rail and truck fuel efficiency.
http://www.fra.dot.gov/Downloads/Comparative_Evaluation_Rail_Truck_Fuel_Efficiency.pdf

• The volume of air emissions associated with the additional transport of remedial soils under the off-site option is directly related to the distance between the site and the commercial landfill facility. Based on Tecumseh's Draft CMS Report, there may be existing commercial landfills within a short distance of the facility (under 100 miles). Utilization of such facilities will substantially reduce the additional air emissions associated with off-site transport of remedial soils.

It must be understood, that neither this document nor Tecumseh's Draft CMS Report contain a detailed quantitative analysis of air emissions for both on-site and off-site disposal options, and that without such an analysis it is impossible to definitively conclude which option will produce the smaller volume of greenhouse gases and other air emissions. However, based on the Department's qualitative evaluation, the additional air emissions assumed to be attributable to the off-site option are expected to be substantially more than those produced by on-site disposal.

In summary, the off-site option is considered equivalent to the on-site disposal option in terms of land conservation while the on-site option is superior in terms of Greenhouse Gas Emissions. The two options are comparable in terms of resource/material consumption and soil conservation. Therefore, from an overall perspective, the DEC considers the on-site option to be favorable to the off-site option with respect to the green remediation practices criterion.

Cost

The cost criterion requires each disposal option to be evaluated with respect to the capital, engineering, and any long-term costs (e.g., inspection, monitoring, and maintenance) associated with the final disposition of remedial soils. The cost estimates contained in Tecumseh's CMS Report indicate the cost of on-site disposal to be approximately $18.8 million and off-site disposal (including transportation) to be approximately $130 million, based on the volume of remedial wastes generated by implementing the Department's proposed remedy. However, the Department performed an independent cost assessment for the offsite disposal alternative, including assessment of the CMS waste volume estimates, evaluation of disposal requirements based on waste characteristics, and independent development of disposal pricing and considers that these Tecumseh cost estimates make certain assumptions and fail to adequately consider certain factors that may serve to underestimate on-site costs and overestimate off-site costs. Some of these possible under and overestimations are described below:

- With respect to on-site disposal, the Department does not agree with all of Tecumseh's projected costs associated with on-site CAMU construction, operation, closure, and post-closure care and maintenance. This is especially true with regard to the cost associated with the long-term care of such a disposal unit which would likely have to continue in perpetuity. The Department considers the assumptions used by Tecumseh to calculate the "present worth" of long-term care as flawed in terms of the anticipated rate of return and an inadequate accounting for inflation among other things. For these and other reasons, Tecumseh's estimate may have under-estimated the true costs of onsite disposal.

- Tecumseh's estimate for off-site disposal also assumes that 100% of the remedial soils would be transported by truck to the off-site commercial disposal facility. However, the costs of transport by rail for distances over 300 miles is often substantially less than the costs of truck transport (http://mechdb.com/index.php/File:Railvstruck.png). Therefore, transporting remedial soils by rail at such distances would reduce the cost of off-site disposal.

- Tecumseh's CAMU grading scheme likely underestimates the amount of regrading needed (does not include regrading along Smokes Creek).

The Alternative 1 CAMU construction cost Appendix Q of the 2019 CMS report did not accurately account for the volume of berm slag that would need to be excavated to construct a 24.1-acre contiguous cover and did not provide any cost to construct a geo-composite liner and leachate collection system. When these important construction elements are accounted for, the construction costs for Alternative 1 ($15,088,000) become approximately 30% higher ($3,452,000) than the construction cost for Tecumseh's recommended Alternative 2 CAMU ($11,66,000).

Given the absence of data substantiating that the soils and wastes onsite qualify as technologically enhanced naturally occurring radioactive material wastes as presented in

Appendix Q are likely overestimated site wide, characteristics such as high specific energy (BTU/lb) and the presence of high and potentially hazardous levels of such COCs as benzene, mercury, and lead are more likely to impose disposal restrictions on excavated soils and wastes from the Tecumseh site. In particular, waste with high specific energy or those characteristically hazardous for benzene (D018) may require thermal treatment or incineration rather than land disposal. This requirement for incineration may serve to increase costs for offsite disposal beyond those presented in Appendix D for wastes from certain SWMUs, including P-75, S-16, and S-23, that may exhibit these characteristics. Incinerators typically have limited capacity based both on waste volume and waste composition (e.g. specific energy value), so a requirement for incineration may also serve to complicate offsite disposal by limiting the volume of waste that can be sent offsite at a time, or by requiring wastes to be sent to multiple locations in order to keep pace with the volume generated.

Some of the offsite disposal quantities also seem to be either under- or overestimated as presented in Appendices E and Q. The total offsite disposal quantity presented in Appendix D may be overestimated since it includes several SWMUs, including P-9, P-18a/b, S-13, and S-21, that have already undergone remediation and have had their wastes incorporated into closed, permitted landfills. Alternatively, several SWMUs appear to not yet be fully delineated, which may result in their disposal costs being underestimated. These include S- 23 and AOC-D, which as discussed above were not vertically delineated during the test pitting work in 2011, and which in the case of AOC-D was not completely horizontally delineated either due to tar impacts appearing to continue beneath SWMU S-14. The mercury-impacted waste in S-17 has also not been fully delineated or characterized. The mercury ISCO exceedance is attributed in the CMS to a broken thermometer; however, Appendix Q assumes that 1,000 yds3 of mercury-contaminated waste is present. Given that mercury contamination may restrict land disposal options, additional characterization will be performed during the remedial action for S-17.

In summary, based on the above, it is likely that the disparity between on-site versus off-site costs is less than indicated by the Tecumseh estimates, though it is still expected to be substantial. However, since assumptions such as the volume of soil beneficially re-used are highly speculative, it must be conservatively assumed that off-site disposal will be higher than on-site disposal. Therefore, the DEC considers the on-site disposal option to be more favorable than the off-site option with respect to the cost criterion.

Community Acceptance

Disposal options are to be evaluated based on the degree to which they are acceptable to the community.

Implementation of the proposed CAMU is anticipated to include opportunities (which are further described in the paragraphs that follow) for:

- Public access to Lake Erie;
- Habitat creation, restoration and enhancement;

- Additional opportunities for redevelopment involving the combination of road, rail and water transportation routes;
- Opportunities for public recreation; and
- Shoreline which is appropriately reconfigured to provide stability and lake access through a combination of such techniques as regrading, ecologically enhanced revetments, breakwaters or jetties, beach restoration, nature-based living shoreline or other approaches to soften the lakeshore impacted by past operations of the facility.

Rather than constructing the CAMU as a single mound, undulations and more natural grading could be incorporated into the CAMU design, although this would represent a more significant grading effort than construction of a single mound, or of construction of seven individual SWMU covers as presented in Alternative 2. This would allow for construction of natural-appearing landforms were previously submitted to the Department, which shall be considered in the final design.

The City of Lackawanna and its citizens have previously expressed a strong desire for public accessibility to Lake Erie. There is precedent for incorporating public access into former landfills. The Staten Island NY Fresh Kills Park master plan could be referenced as a model for how this has been done successfully in New York. Additionally, several design concepts included in the landform grading reference materials previously provided to the Department could also be retained. These references include concepts such as the incorporation of natural grading techniques and revegetation concepts which could provide for a post-closure project which more closely mimics natural features and formations, enhancing the public access experience.

Through relatively common CAMU design strategies and concepts, the incorporation of nature trails that could be utilized for walking, running, and/or snowshoeing could be incorporated into the design (with the approval of Tecumseh). Additionally, the vantage point of Lake Erie from the top of the CAMU area would likely provide for a desirable hiking destination for the City of Lackawanna. The construction of a viewing/observation area at the apex of the CAMU would provide for this vantage point (with the approval of Tecumseh). The potential for additional elements for public (i.e., passive recreation protective of human health such as educational kiosk displays, dog park/trails, playground/sports fields, canoe launch) will be discussed with the community for their input and referenced in a community participation plan.

The shoreline of Lake Erie may likely be a tempting destination for people visiting the public access features of the site. Since the metal, slag, and debris found along the shoreline would pose a significant health and safety risk to anyone in the area, it is recommended that this area be evaluated for a public access plan assess means of deterring people from the shoreline area and/or softening the shoreline to provide gentler slopes, reduce erosion and minimize physical hazards posed by slag.

Based on the input received from the affected community as indicated above, the department will evaluate the on-site and off-site options and determine its preference with respect to the community acceptance criterion.

Summary of Disposal Option Evaluation

A review of the department's evaluation of disposal options with respect to the seven (7) criteria indicates that on-site disposition of remedial soils with a preference towards beneficial re-use is: the more favorable option in terms of the green remediation practices and cost criteria; equal to off-site disposal in terms of the technical, environmental, and human health criteria; and slightly less favorable than off-site disposal for the institutional criteria.

Therefore, pending input from the affected community, from an overall perspective, the DEC considers the on-site CAMU option for remedial wastes with emphasis on encouraging beneficial use and the off-site option as being very comparable and both acceptable.

3.0 Proposed Elements of the Transport and Disposition of Wastes Portion of Remedy

The following are the elements of the proposed remedy's options for transport and disposition of remedial wastes that will be generated by implementation of the remedy:

- The option for on-site disposal is available if doing so does not substantially delay implementation of the remedy. If the conditions for on-site disposal are not met, off-site disposition of remedial wastes at a commercial land disposal facility, or facilities, with the proper Permits and/or authorizations to accept such soils will be required;

- The DEC encourages maximizing the volume of remedial soils which are beneficially re-used as daily cover at commercial landfills to the greatest extent practical for either the on-site or off-site disposal options, to provide for a more "green" and less costly soil disposition;

- For the off-site disposal option, the use of on-site temporary staging within the Facility area in accordance with a plan approved by the DEC and consistent with 6 NYCRR 373-2.19(e) of the DEC regulations is allowed. The plan will set a time limit for temporary storage, the maximum volume of remedial soils that can be present at the site at any one time, as well as limits on the area, height, and slopes of the temporary unit. Such staging will help ensure the expeditious cleanup of properties and help to maximize the volume of remedial soil sent off-site for beneficial re-use as daily cover;

- For any remedial soils transported off-site, the use of rail to transport remedial soils is encouraged, especially for transport to any commercial landfill which is over 300 miles from the facility.

Appendix C

CAMU Minimum Design Standards

CAMU Minimum Design Standards

CAMU-Eligible Waste

CAMU-Eligible Waste

(a) All solid and hazardous wastes, and all media (including groundwater, surface water, soils, and sediments) and debris that contain listed hazardous wastes or that themselves exhibit a hazardous characteristic and are managed for implementing cleanup. Prior to placement in the CAMU, hazardous wastes must be appropriately treated to either meet the applicable treatment standard or eliminate the hazardous characteristic.

(b) As-generated wastes (either hazardous or non-hazardous) from ongoing industrial operations at a site are not CAMU-eligible wastes.

(c) Wastes that would otherwise meet the description in (a) are not "CAMU-Eligible Wastes" where: (1) the wastes are hazardous wastes found during cleanup in intact or substantially intact containers, tanks, or other non-land-based units, unless (i) the wastes are first placed in the tanks, containers or non-land-based units as part of cleanup, or (ii) the containers are excavated during the course of cleanup; or (2) the Department exercises the discretion to prohibit the wastes from management in a CAMU.

(d) Notwithstanding (a), where appropriate, as-generated non-hazardous waste may be placed in a CAMU where such waste is being used to facilitate treatment or the performance of the CAMU.

Prohibition Against Placing Liquids in the CAMU

(a) The placement of bulk or noncontainerized liquid hazardous waste or free liquids contained in hazardous waste (whether or not absorbents have been added) in the CAMU is prohibited except where placement of such wastes facilitates the remedy selected for the waste.

(b) The requirements in §264.314(d) for placement of containers holding free liquids in landfills apply to placement in the CAMU except where placement facilitates the remedy selected for the waste.

(c) The placement of any liquid which is not a hazardous waste in the CAMU is prohibited unless: (i) such placement facilitates the remedy selected for the waste; or (ii) a demonstration is made pursuant to §264.314(f).

* Consistent with the long-standing approach for landfills, liquids should generally not be placed in the CAMU. However, there will be instances where it is appropriate to place liquids or wastes containing liquids in the CAMU to facilitate the remedy selected for the waste. Liquids might be introduced into the CAMU, for example, during dewatering of sludges or sediments, to facilitate bioremediation, for soil washing or solvent extraction technologies, for dust suppression.

Treatment standards for waste placed in the CAMU. Waste that contains principal hazardous constituents must meet treatment standards determined in accordance with paragraph (a) or (b) below:

(a) Treatment standards for wastes placed in CAMUs.

(1) For non-metals, treatment must achieve 90 percent reduction in total principal hazardous constituent concentrations, except as provided by paragraph (3) of this section.
(2) For metals, treatment must achieve 90 percent reduction in principal hazardous constituent concentrations as measured in leachate from the treated waste or media (tested according to the TCLP) or 90 percent reduction in total constituent concentrations (when a metal removal treatment technology is used), except as provided by paragraph (3) of this section.
(3) When treatment of any principal hazardous constituent to a 90 percent reduction standard would result in a concentration less than 10 times the Universal Treatment Standard for that constituent, treatment to achieve constituent concentrations less than 10 times the Universal Treatment Standard is not required. Universal Treatment Standards are identified in 40 CFR §268.48 Table UTS.
(4) For waste exhibiting the hazardous characteristic of ignitability, corrosivity or reactivity, the waste must also be treated to eliminate these characteristics.
(5) For debris, the debris must be treated in accordance with 40 CFR §268.45 or by methods or to levels established under paragraph (a) or (b) of this section.

The CAMU into which wastes are placed must be designed in accordance with the following:
(a) Liners

The CAMU must include a composite liner and a leachate collection system that is designed and constructed to maintain less than a 30-cm depth of leachate over the liner. For purposes of this section, composite liner means a system consisting of two components; the upper component must consist of a minimum 30-mil flexible membrane liner (FML), and the lower component must consist of at least a two-foot layer of compacted soil with a hydraulic conductivity of no more than 1x10-7 cm/sec. FML components consisting of high density polyethylene (HDPE) must be at least 60 mil thick. The FML component must be installed in direct and uniform contact with the compacted soil component; and

(b) Cap

At final closure of the CAMU, the owner or operator must cover the CAMU with a final cover designed and constructed to meet the following performance criteria:
(A) Provide long-term minimization of migration of liquids through the closed unit;
(B) Function with minimum maintenance;
(C) Promote drainage and minimize erosion or abrasion of the cover;
(D) Accommodate settling and subsidence so that the cover's integrity is maintained;
(E) Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present; and
(F) Other post-closure requirements necessary to protect human health and the environment will include monitoring, and maintenance activities to ensure the integrity of the CAMU, including the final cover, in perpetuity.

Groundwater Monitoring and Corrective Action -- the CAMU must include the following:
Requirements for ground water monitoring and corrective action that are sufficient to:
(i) Continue to detect and to characterize the nature, extent, concentration, direction and movement of existing releases of hazardous constituents in ground water from sources located within the CAMU;
(ii) Detect and subsequently characterize releases of hazardous constituents to ground water that may occur from areas of the CAMU in which wastes will remain in place after closure of the CAMU; and
(iii) Require notification and corrective action, as necessary to protect human health and the environment, for releases to groundwater from the CAMU.

Site specific design issues to be resolved during pre-design investigation and/or remedial design:

- The existing side slopes in SWMU S-7/S-20 are steeper than 2H:1V (Figure 4a). Either the side slopes will need to be flattened or special considerations will be needed during design to line the steep slopes. Further, the CAMU is proposed to have only one cell and it may take time to fill the cell as the remedial work is performed. If the side slopes are not flattened, special considerations will be needed during design to place and maintain the 1' clean graded sand in place atop the bottom liner system.
- The proposed grading plan indicates top of CAMU perimeter berm at El. 630' (Figure 4a). Assuming base elevations as El. 620' to El. 625' (top of bottom liner system), the storage volume up to the top of perimeter berm is approximately 50,000-60,000 cubic yards. Considering the wide range for the volume of waste that will be consolidated in the CAMU, two very different final grade outcomes are possible as discussed below. CAMU design needs to maintain flexibility for both the outcomes.
    - Volume of waste that needs to be consolidated in the CAMU is towards the higher end of the estimated range resulting in final waste grade above the top of perimeter berm. In this scenario, perimeter ditch/swale will need to be designed to effectively manage leachate during operating life of the CAMU and to manage clean storm water post-construction.
    - Volume of waste that needs to be consolidated in the CAMU is towards the lower end of the estimated range resulting in final waste grade below the top of perimeter berm. In this scenario, special considerations will be needed during design to manage storm water post-construction.
- Considering the typical short working window (April through November), it is possible that only small amount of waste is disposed in the CAMU in the first year or two after construction of the cell. This possibility should be considered during

the development of the waste disposal plan to minimize and effectively manage the leachate generated in the CAMU.

- The storm water system will be designed for a 25-year 24-hour event. The CAMU and other impoundments are expected to exist for several decades post-closure. As a minimum, ensure that the CAMU design can sustain a 100-year 24-hour event without damage to the designed systems.
- The final surface above the perimeter berm (above El. 630') is indicated to have a slope of 4% to 10%. If the volume of waste to be consolidated in the CAMU increases significantly, then the slopes may need to be steepened to accommodate the waste. The geosynthetic drainage composite (GDC) is proposed only around the perimeter and 25' up the side slope. If final slopes are steepened, then GDC will need to be installed on the entire slope (crest to toe of side slope).
- The design proposes removal of sludge and mill scale from the footprint of the CAMU. If the materials left behind within the footprint are likely to settle under the waste loading, then the leachate collection system should be designed to accommodate the expected settlements.
- Considerable gradings is proposed in the S-8 area. Installing outlet discharge prior to completing grading near the NE corner of the CAMU may be necessary.

Corrective Measures Study, Appendix S: Subsurface Exploration, Geotechnical Engineering Evaluation and Coastal Engineering Services, the following will need to be addressed during the pre-design investigation and/or remedial design:

- Additional analyses be conducted with seasonal high elevations of groundwater that consider the elevation of groundwater in monitoring wells as well as the water elevation in Lake Erie.
- It is recommended the stability analyses are conducted with the "optimization" option in the Slope/W software used by GEI (2013).
- It is recommended that an additional loading case be added to the analysis that demonstrates the stability of the slopes in the long term in static loading condition.
    - It is recommended that the selected earthquake loading and liquefaction triggering analysis be revised using ground motion based on the latest Coterminous US Edition of the USGS hazard map.

Appendix D

Review of Other States' Arsenic Remedial Goals

Review of Other States' Arsenic Remedial Goals

The DEC reviewed the arsenic cleanup levels in numerous other states. Over the past 20 years there have been various attempts to unify soil remediation cleanup standards across the U.S. The EPA has not established standard action levels for soil which trigger cleanup actions. In reviewing arsenic remedial goals and Records of Decision (RODs) in the Superfund program for sites across the U.S., there has been substantial variability in remedial goals and the nature of each site is important in explaining the difference. For example, in EPA Region 2 (NY and NJ) most of the decisions were either based on background or residential risk analyses (a majority of these were around 20 ppm). In EPA Regions 8, 9, and 10 combined (CO, MT, UT, AZ, CA, and AK), there were substantially more industrial decisions resulting in higher cleanup values (200 ppm and higher) at these sites. In addition, some States have established cleanup levels for arsenic in soil for a residential setting.

Out of 17 States responding to a 1998 survey conducted by the Association for the Environmental Health of Soils 16 have established arsenic cleanup levels ranging from 0.4 ppm to 20.0 ppm with most based on background. Established levels in New York (16.0 ppm) and New Jersey (20.0 ppm) are based on background. Colorado is the only state responding to the survey which allows 40-250 ppm based on site-specific considerations. There are many factors to consider when determining a cleanup number for any constituent, including arsenic. Therefore, remedial decisions or arsenic cleanup levels for any particular site should not be interpreted as necessarily applicable to Lackawanna since factors which are unique to each site are often involved in remedy selection.

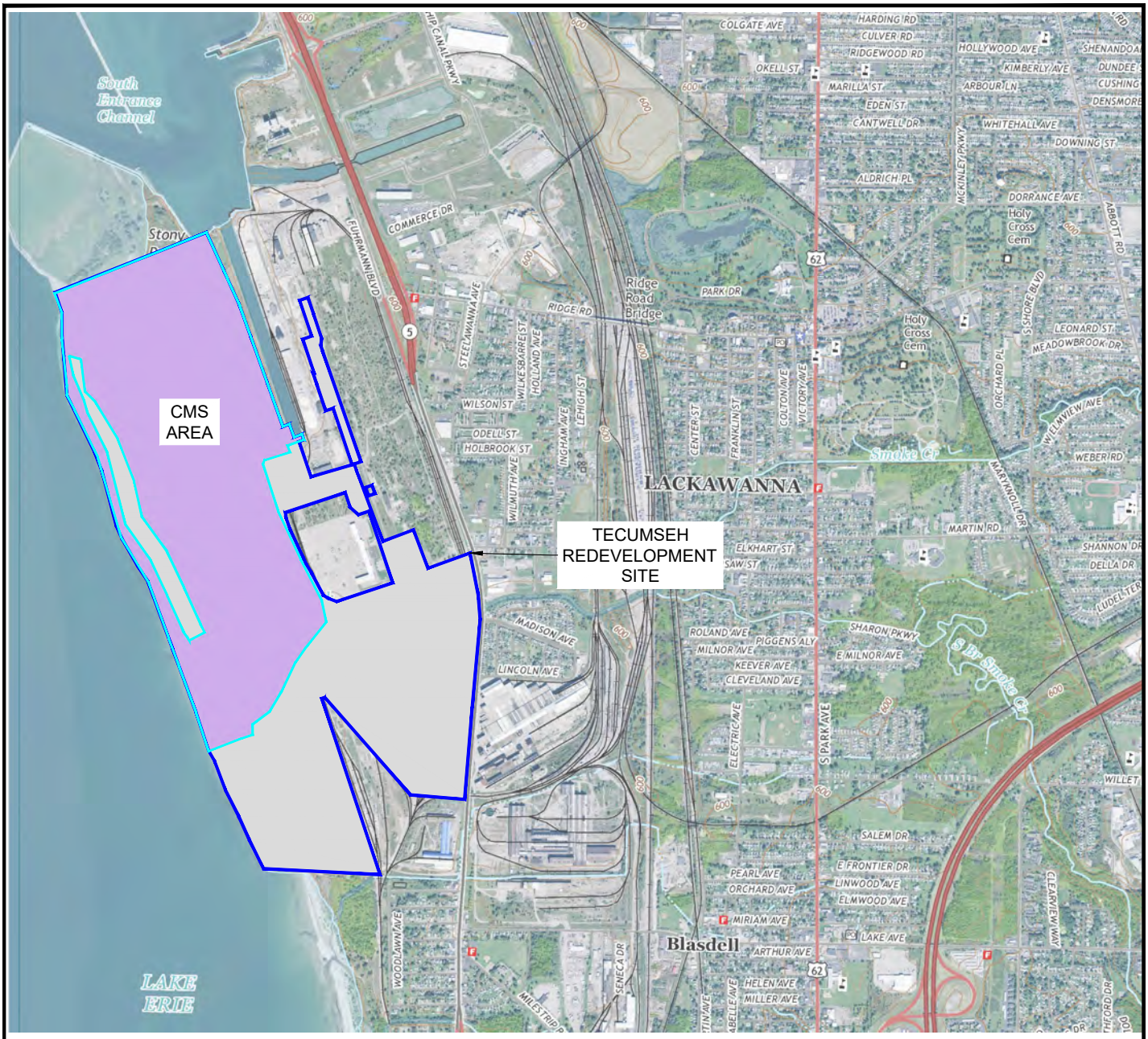
The DEC recently reviewed current cleanup levels in 14 states and found that the 16 ppm cleanup value proposed for this site is higher than or equal to the state-wide calculated health based cleanup value in almost all reviewed states for residential use and 11 out of the 14 reviewed states for all other uses. Following is a summary of that review:

STATE	**USE**	**CLEANUP LEVEL (in parts per million)**
Arizona	All Uses	1
Connecticut	All Uses	10
Delaware	Restricted Use/Non-Critical Water	4
Florida	Residential	2.1
	Commercial/Industrial	12
Iowa	All Uses	1
Kansas	Residential	11.3
	Non-Residential	38
Maryland	Residential	0.43
	Non-Residential	1.9
Maine	Residential	0.14
	Other Uses	0.42 – 4.2

STATE	USE	CLEANUP LEVEL (in parts per million)
Massachusetts	All Uses (S-1, S-2 and S-3)	20
Mississippi	Unrestricted	0.426
	Restricted	3.82
New Jersey	All Uses	1
New York	All Uses	16
	Protection of Ecological Resources	13
Oregon	Urban Residential	0.3
	Other Uses	1 – 370
Pennsylvania	Residential	12
	Non-Residential (0 - 2' and 2' – 15')	53 – 190,000
Rhode Island	All Uses	7

Natural background arsenic concentrations in the U.S. soil are based on research conducted by the U.S. Geological Survey (USGS). The concentration of arsenic in U.S. natural background samples ranged up to 97.0 ppm with an average of 7.2 ppm.

The DEC had previously conducted a *statewide* rural background study and determined the background level of arsenic. That study determined that the background level for arsenic was 16 ppm. The Technical Support Document (TSD) expressly reviewed the background level of arsenic and the various studies in NYS relative to this issue and expressly discussed the arsenical pesticide use in parts of New York State. *(See TSD, page 301 - 302)* The TSD considered five studies conducted in NYS relative to arsenic which indicated arsenic concentrations ranging from 14.1 ppm to 19.1 ppm. Based on these background levels the 6NYCRR Part 375 and CP-51 soil cleanup objective was set at 16 ppm.



TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0071-019-111

DATE: MAY 2019

DRAFTED BY: RFL

FIGURE 1

SITE LOCATION MAP

CMS AREA - FORMER BETHLEHEM STEEL SITE

LACKAWANNA, NEW YORK

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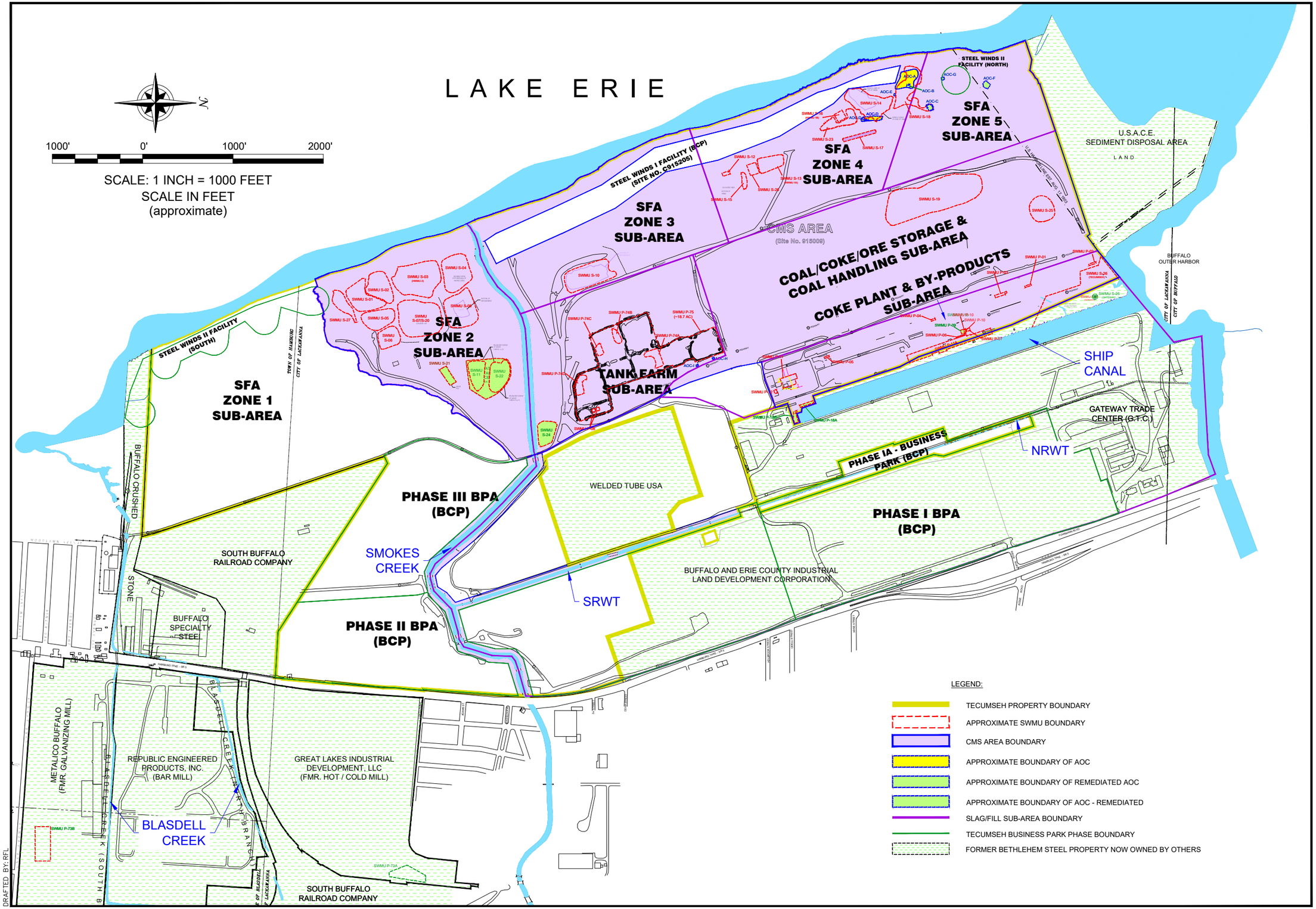


DATE: MARCH 2019
DRAFTED BY: RFL

TurnKey Environmental Restoration, LLC

Benchmark Environmental Engineering & Science, PLLC

JOB NO.: 0071-017-111

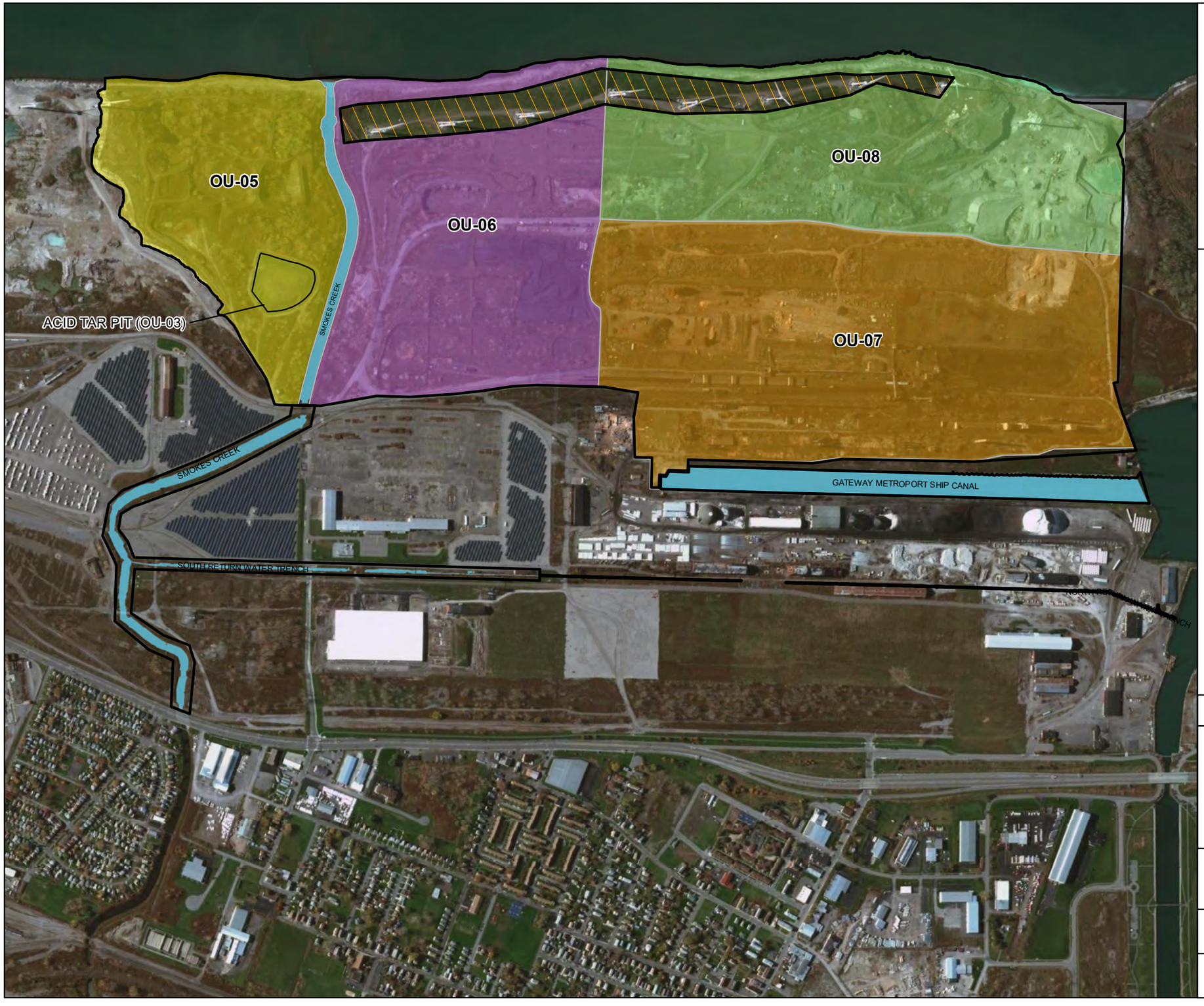
CMS SUB-AREAS W/ SWMUs, WATER COURSES & AOCs REQUIRING FURTHER ASSESSMENT

CMS REPORT

CMS AREA - FORMER BETHLEHEM STEEL SITE
LACKAWANNA, NEW YORK

PREPARED FOR
TECUMSEH REDEVELOPMENT INC.

FIGURE 2



LEGEND

- CMS Boundary (OU-01 & OU-10)
- Steel Winds Boundary
- OU-05
- OU-06
- OU-07
- OU-08
- OU-9 Boundaries

0 500 1,000 2,000 Feet

Figure 2

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

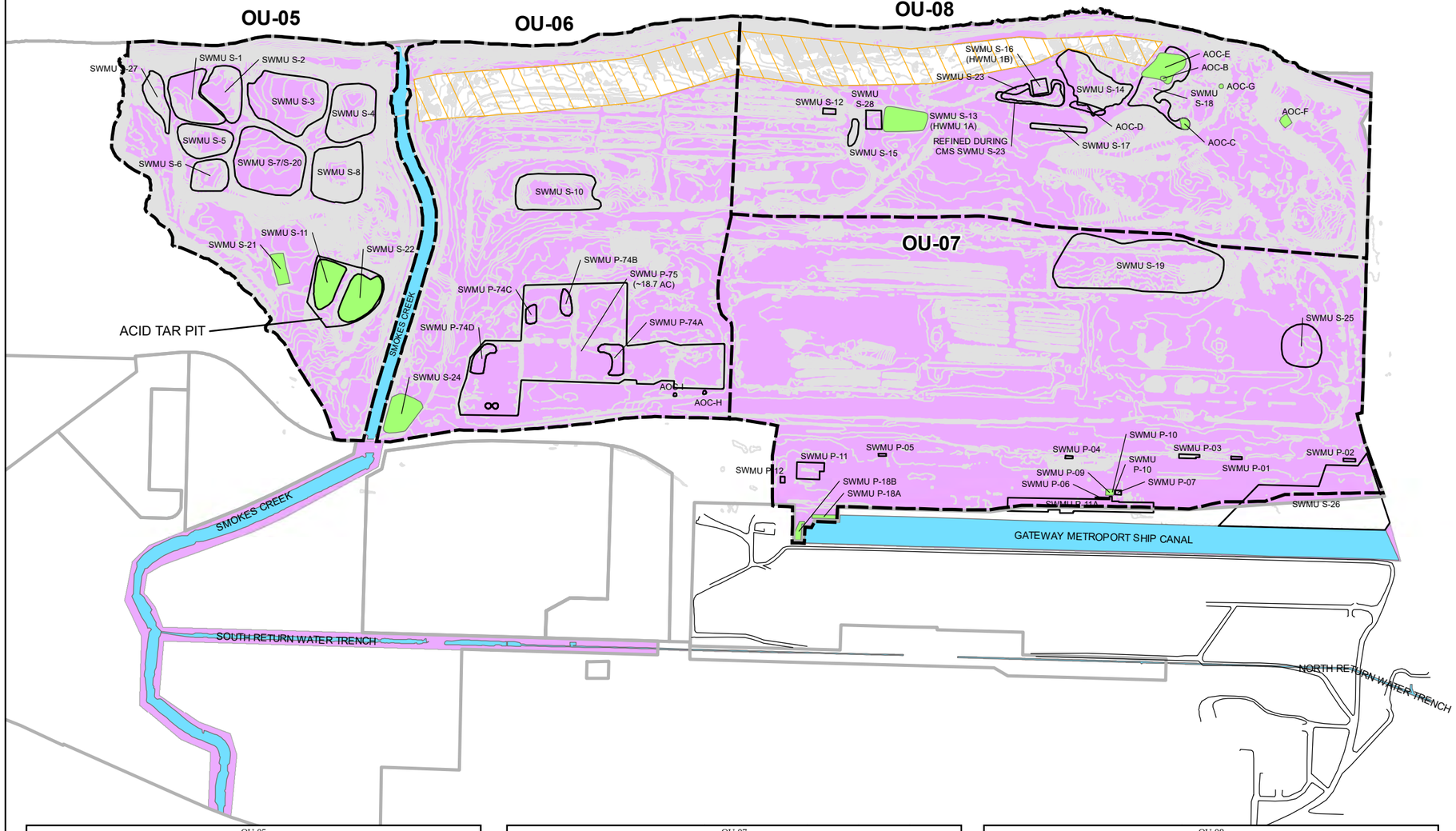
Bethlehem Steel Operable Units

Tecumseh Redevelopment Site
Lackawanna, New York

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan
Plot Date: 2/26/2021

Document Path: E:\C Drive\p005664b\NYSDEC Tecumseh\MXDs\NYSDEC Tecumseh OUs.mxd



- OU Boundaries
- Steel Winds Boundary
- Property Boundaries
- SWMU Boundaries
- SWMUs with Corrective Measures Implemented
- OU-9 Boundaries
- CMS Boundary (OU-01 & OU-10)

Notes:

OU-01 - SITE WIDE
OU-02 AOC-B, AOC-C, P-9, P-18A, P-18B, P-76
OU-03 ACID TAR PIT SWMUs S-11, S-21, S-22 AND S-24
OU-04 COKE OVEN BY-PRODUCTS SUB AREA GROUNDWATER
OU-05 SFA ZONE 2 SWMUs
OU-06 TANK FARM SWMUs
OU-07 COKE OVEN BY-PRODUCT SWMUs
OU-08 SFA ZONES 4 & 5
OU-09 WATER COURSES
OU-10 SITE-WIDE GROUNDWATER

0 500 1,000 2,000
Feet

Figure 2

NEW YORK STATE OF OPPORTUNITY
Department of Environmental Conservation

Bethlehem Steel Operable Units

Tecumseh Redevelopment Site
Lackawanna, New York

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

OU-05

Site Sub-Area	SWMUs	Estimated Acres	Estimated Depth (ft)	Estimated Slag/Fill Volume (CY) and Potential			
				SW-CAMU	Close In-Place	OFF-SITE TSDF	Slag/Scrap Reclaimed
SFA -Zone 2 SWMUs	S-1	1.87	27.0		81,500		
	S-2	1.62	36.8		96,200		
	S-3	3.72	20.0		120,000		
	S-4	2.44	38.1		150,000		
	S-5	1.46	22.9		54,000		
	S-6	0.99	41.5		66,300		
	S-7/20	**3.83**	45.8	283,000			
	S-8	2.7		None			
	S-27	0.86	17.3	24,000			

OU-06

Site Sub-Area	SWMUs	Estimated Acres	Estimated Depth (ft)	Estimated Slag/Fill Volume (CY) and Potential			
				SW-CAMU	Close In-Place	OFF-SITE TSDF	Slag/Scrap Reclaimed
Tank Farm SWMUs	Group P-8, 74, 75	18.7	2.4	70,000		1,800	
SFA Zone 3 - SWMUs	S-10 (Slag Quench Area J)	2.8		None			

OU-07

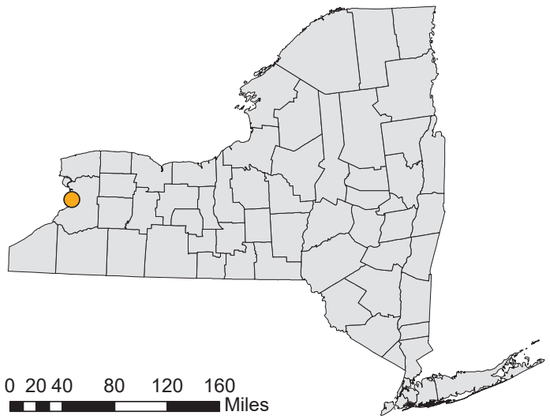
Site Sub-Area	SWMUs	Estimated Acres	Estimated Depth (ft)	Estimated Slag/Fill Volume (CY) and Potential			
				SW-CAMU	Close In-Place	OFF-SITE TSDF	Slag/Scrap Reclaimed
Coke Plant SWMUs	GROUP P-1 to P-6	0.2		None			
	P-7 & P-10	0.02	31.0	1,000			
	OU-4 (P-11, P-11A, & P12)	2.5		None			
	S-26	3.3		None			
North Coal Field	S-19 (Murphy's Mountain Landfill AA)	8	4.0	10,000			41,000
	S-25	1.4		None			

OU-08

Site Sub-Area	SWMUs	Estimated Acres	Estimated Depth (ft)	Estimated Slag/Fill Volume (CY) and Potential			
				SW-CAMU	Close In-Place	OFF-SITE TSDF	Slag/Scrap Reclaimed
SFA Zone 4 - SWMUs	S-12 (Asbestos Landfill L)	0.071	3.9	450			
	S-13 (HWMU-1A)	0.95	15.0		23,000		
	S-14 (General Rubble Landfill N)	2.51	14.1	16,000			41,000
	S-15 (General Rubble Landfill O)	0.15	4.1	1,000			
	S-16 (HWMU-1B) (Lime Stabilized Spent Pickle Liquor Sludge)	0.25	14.9		6,000		
	S23 & AOC-D Tar pit	0.85	7.3		10,000		
	S-17 (Vacuum Carbonate Blowdown Landfill Q)	0.2	3.1			1,000	
	S-18 (Lime Dust and Kish Landfill R) & AOC-A	2.24	1.2	4,200			
	S-28 (Drum Landfill)	0.29		None			

Plotted By: Sisson, Evan
Plot Date: 2/17/2021

Document Path: E:\C Drive\p005664b\NYSDEC Tecumseh\MXDs\NYSDEC Tecumseh Base Map.mxd



Legend

- OU-05
- OU-06
- OU-07
- OU-08
- SteelWinds_boundary

0 0.6 Miles

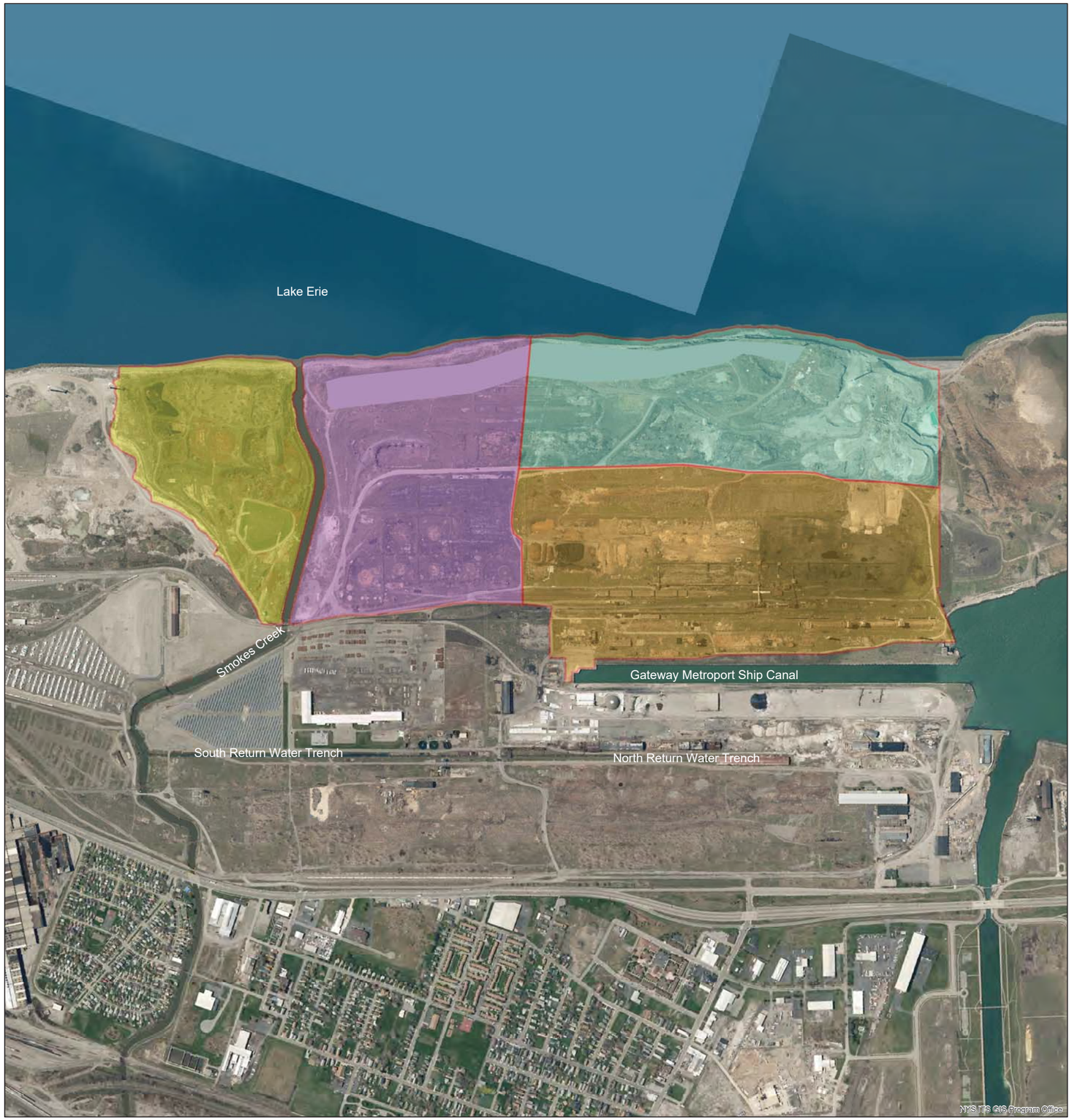
Region 9 Erie County
City of Lackawanna

Tecumseh Redevelopment Inc.
(Former Bethlehem Steel)
#915009
Operable Unit Designation Map

Figure 3

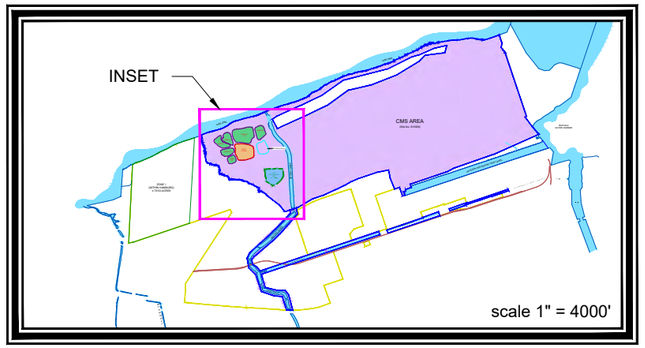
NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

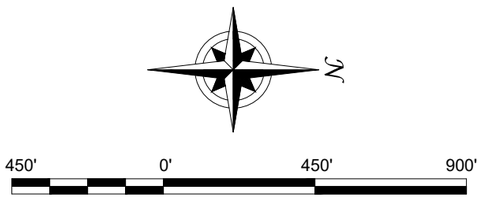
Date Created: 8/26/2019



F:\CAD\TurnKey\Tecumseh Redevelopment\CMS\2019 CMS Report\Figure 5-7; SW CAMU Alt 2.dwg

SITE PLAN:



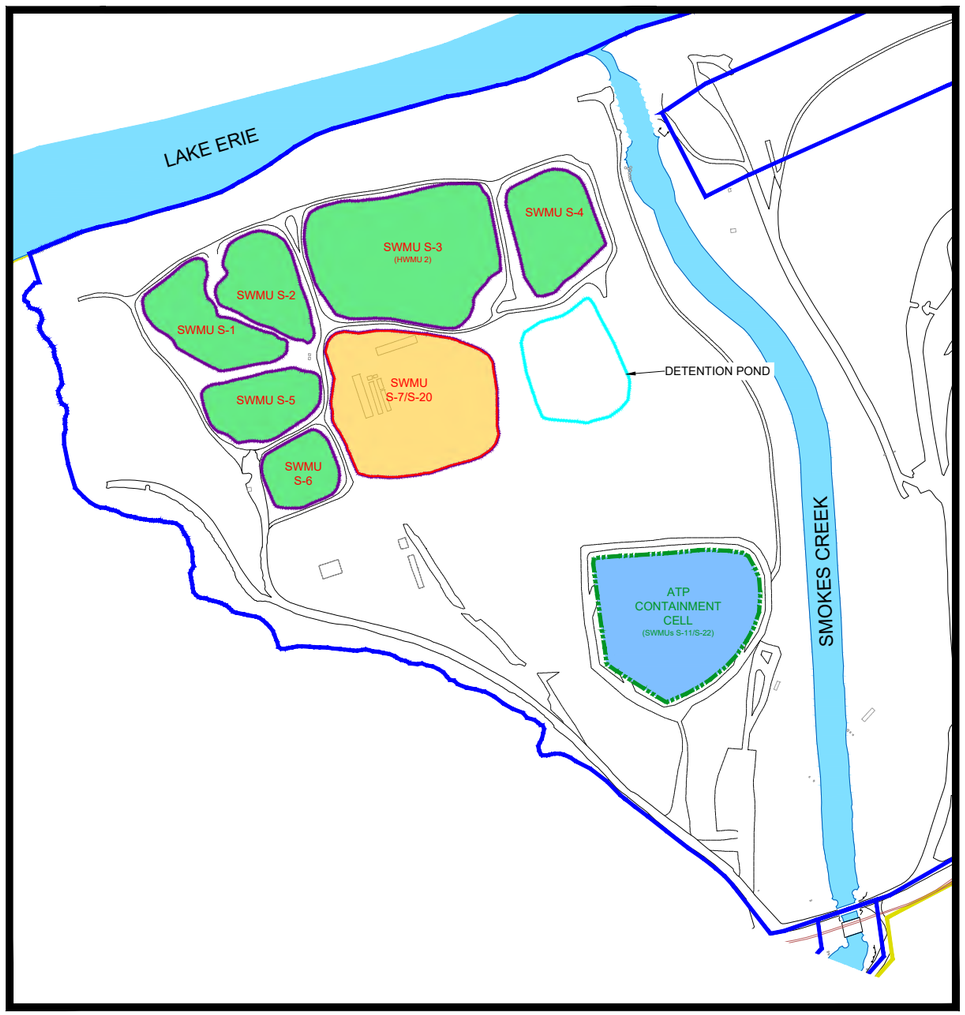


SCALE: 1 INCH = 450 FEET
SCALE IN FEET
(approximate)

LEGEND:

- APPROXIMATE BOUNDARY OF SOLID WASTE CAMU
- APPROXIMATE BOUNDARY OF CLOSED IN-PLACE IMPOUNDMENT
- APPROXIMATE ATP SLURRY WALL ALIGNMENT
- CMS BOUNDARY
- TECUMSEH PROPERTY BOUNDARY

SFA ZONE 2 SW-CAMU ALTERNATE 2



DATE: MAY 2019
DRAFTED BY: RFL

TurnKey Environmental Restoration, LLC

Benchmark Environmental Engineering & Science, PLLC

JOB NO.: 0071-019-111

SW-CAMU ALTERNATE 2

CMS REPORT

CMS AREA - FORMER BETHLEHEM STEEL SITE
LACKAWANNA, NEW YORK

PREPARED FOR
TECUMSEH REDEVELOPMENT INC.

FIGURE 4

LEGEND:

- TECUMSEH PROPERTY BOUNDARY
- SW-CAMU
- SWMU TO BE CLOSED AND CAPPED IN-PLACE
- SWMU LIMITS
- MAJOR CONTOUR (10')
- MINOR CONTOUR (2')
- APPROXIMATE AREA OF WASTE PULL BACK

N

100' 0' 100' 200'

SCALE: 1 INCH = 100 FEET
SCALE IN FEET
(approximate)

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
IN ASSOCIATION WITH
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

JOB NO.: 0071-019-111

REVISIONS

NO.	BY	DATE	REMARKS

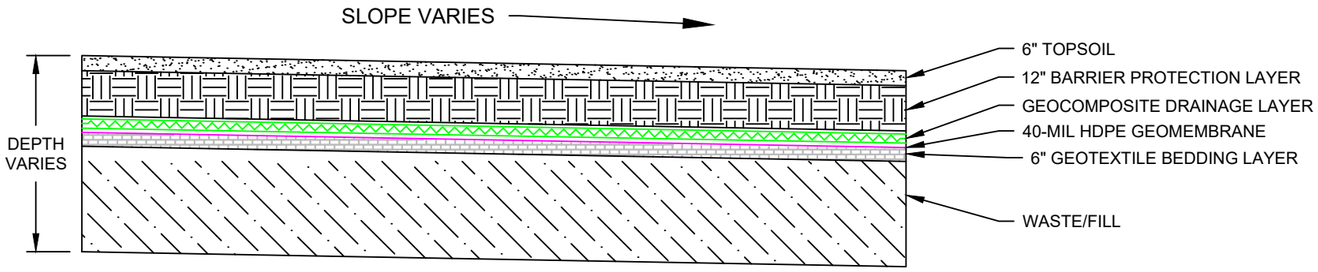
SEAL

DRAWN BY:	RFL
DATE:	MAY 2019
CHECKED BY:	
APPROVED BY:	PHW

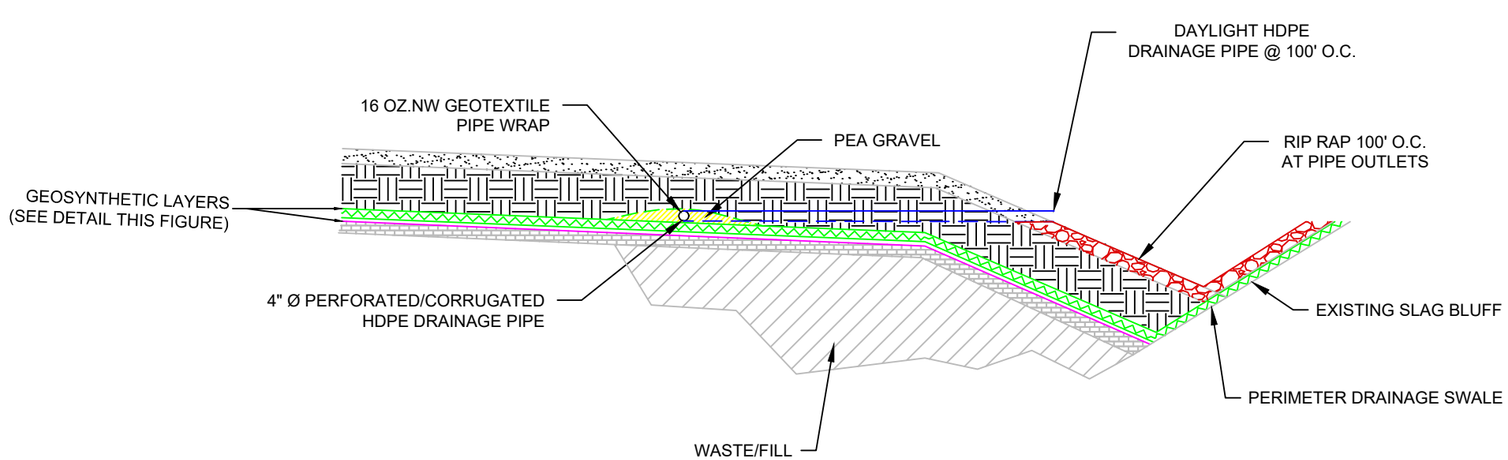
SFA ZONE 2: RECOMMENDED IMPOUNDMENTS CLOSURE AND SW-CAMU PRELIMIMINARY GRADING PLAN

CMS REPORT
TECUMSEH LACKAWANNA, SITE
LACKAWANNA, NEW YORK
PREPARED FOR
TECUMSEH REDEVELOPMENT INC.

Figure 4a- SWMU CAMU DESIGN



COVER SYSTEM
Scale: NTS



COVER SYSTEM DRAINAGE PIPE
Scale: NTS

DATE: APRIL 2019
DRAFTED BY: RFL

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TURNKEY ENVIRONMENTAL RESTORATION, LLC

JOB NO.: 0071-019-111

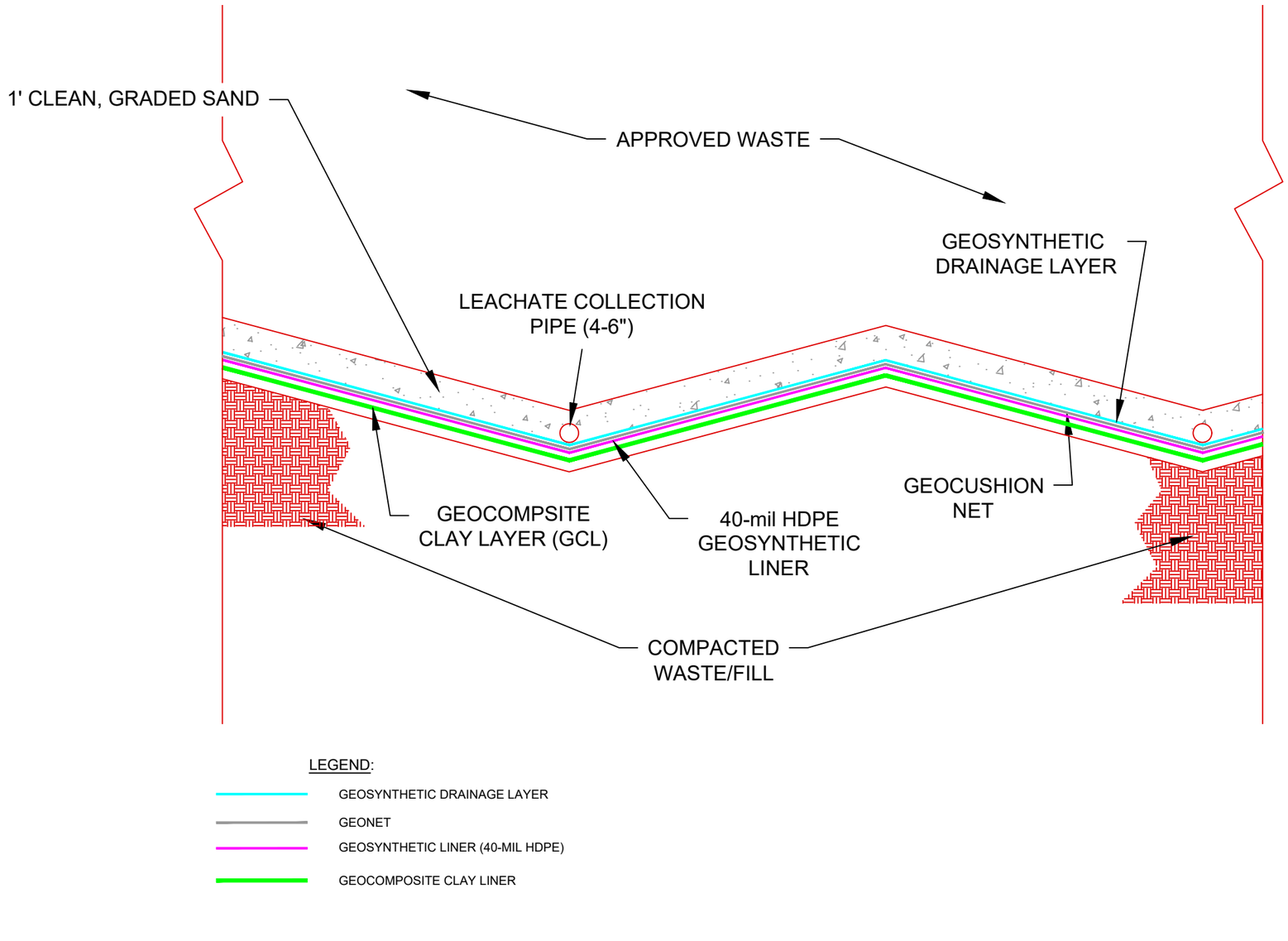
PROPOSED COVER SYSTEM FOR IMPOUNDMENTS TO BE CLOSED IN PLACE AND FOR SW-CAMU

CMS REPORT

TECUMSEH REDEVELOPMENT SITE
LACKAWANNA, NEW YORK

PREPARED FOR
TECUMSEH REDEVELOPMENT LLC

FIGURE 5



DATE: APRIL 2019
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BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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JOB NO.: 0071-019-111

PROPOSED LINER SYSTEM AND LEACHATE CONCEPT DETAIL FOR SW-CAMU

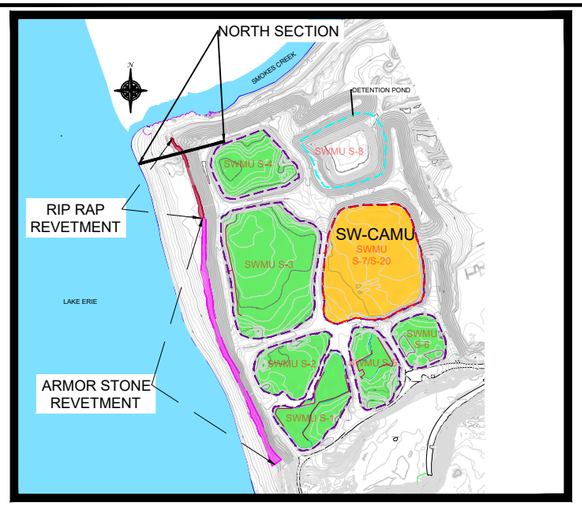
CMS REPORT

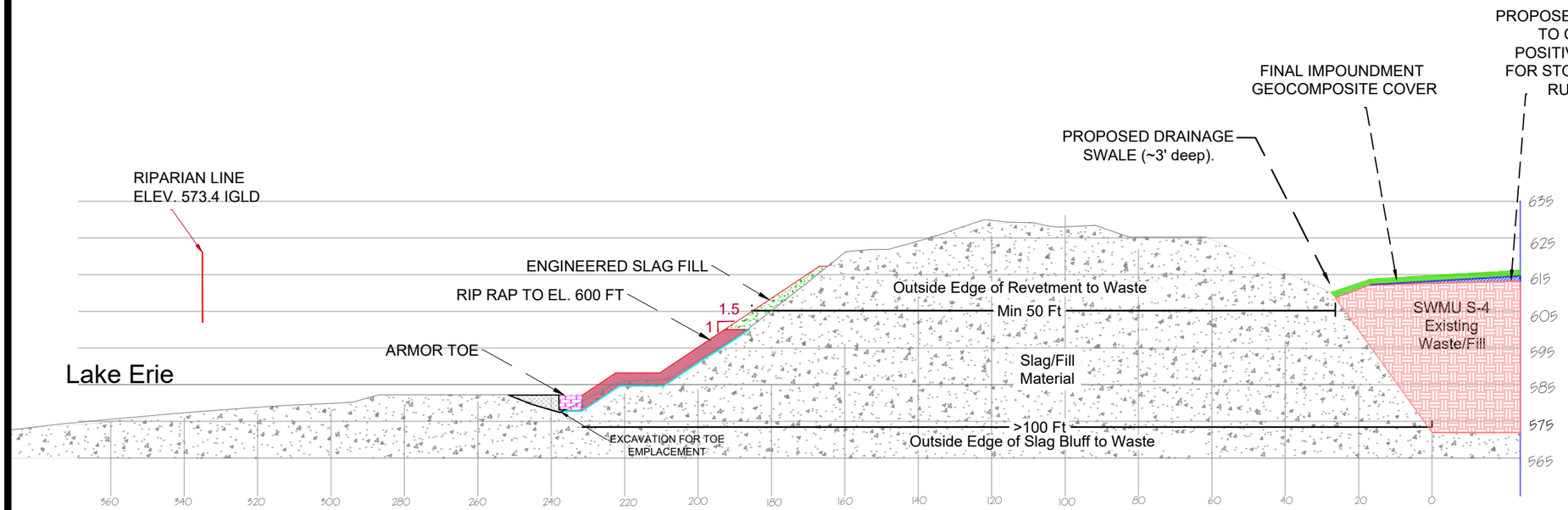
TECUMSEH REDEVELOPMENT SITE
LACKAWANNA, NEW YORK

PREPARED FOR
TECUMSEH REDEVELOPMENT LLC

FIGURE 6

NORTH SECTION





DATE: MAY 2019
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BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

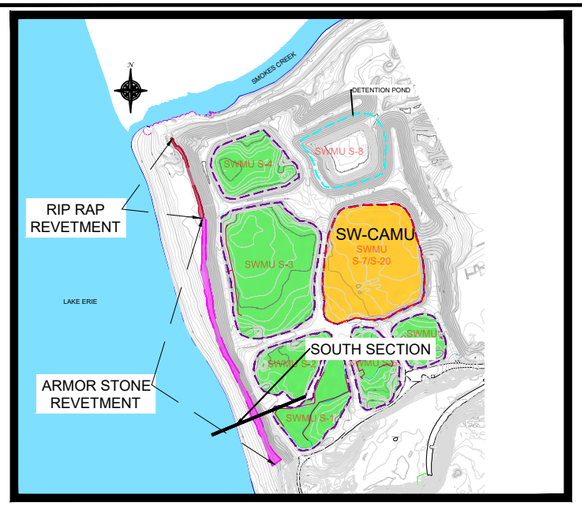
TURNKEY ENVIRONMENTAL RESTORATION, LLC

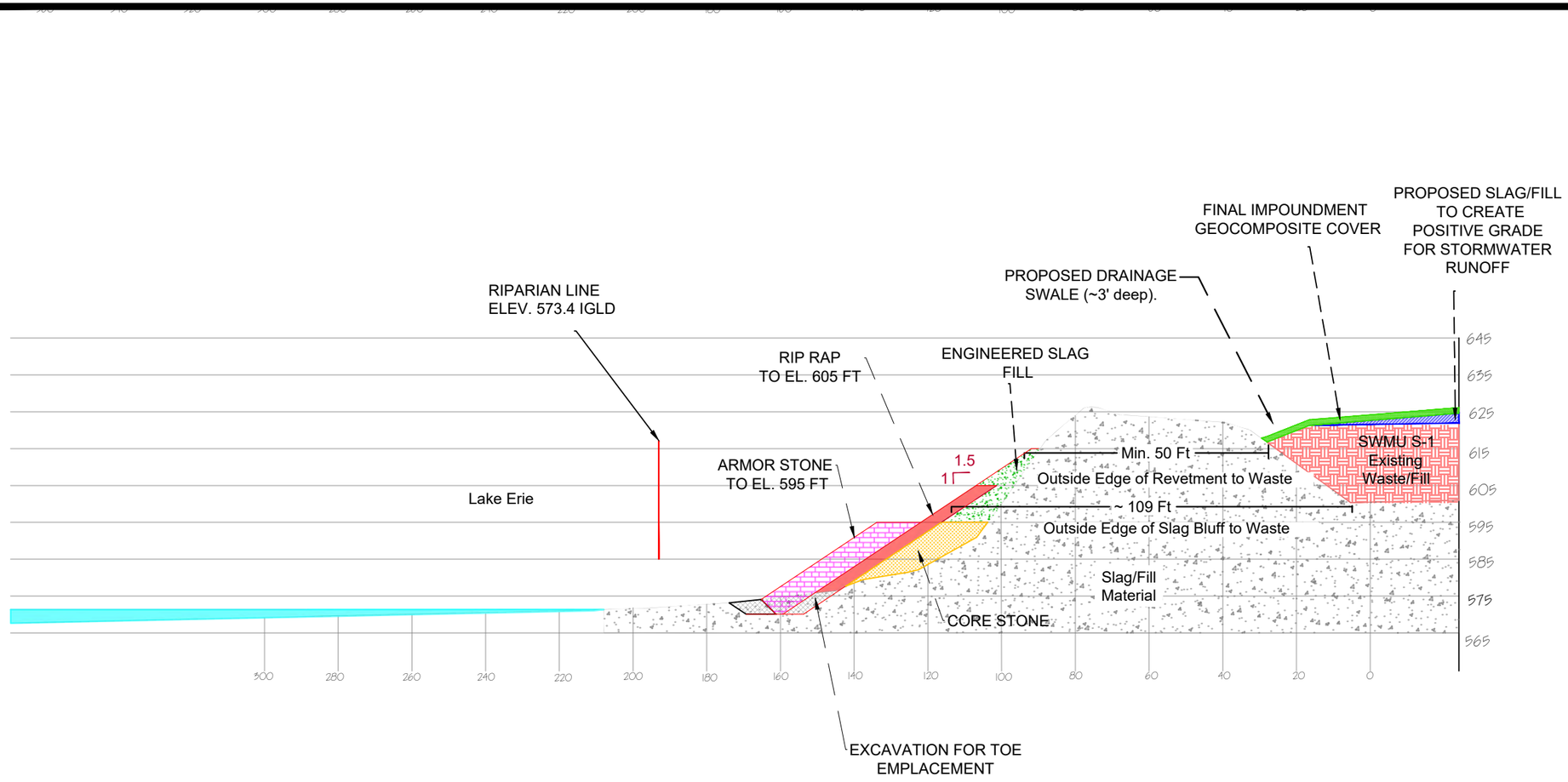
JOB NO.: 0071-019-111

PROPOSED WESTERN REVETMENT
NORTHERN SECTION
CMS REPORT
TECUMSEH REDEVELOPMENT SITE
LACKAWANNA, NEW YORK
PREPARED FOR
TECUMSEH REDEVELOPMENT INC.

FIGURE 7

SOUTH SECTION





DATE: MAY 2019
DRAFTED BY: RFL

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

JOB NO.: 0071-019-111

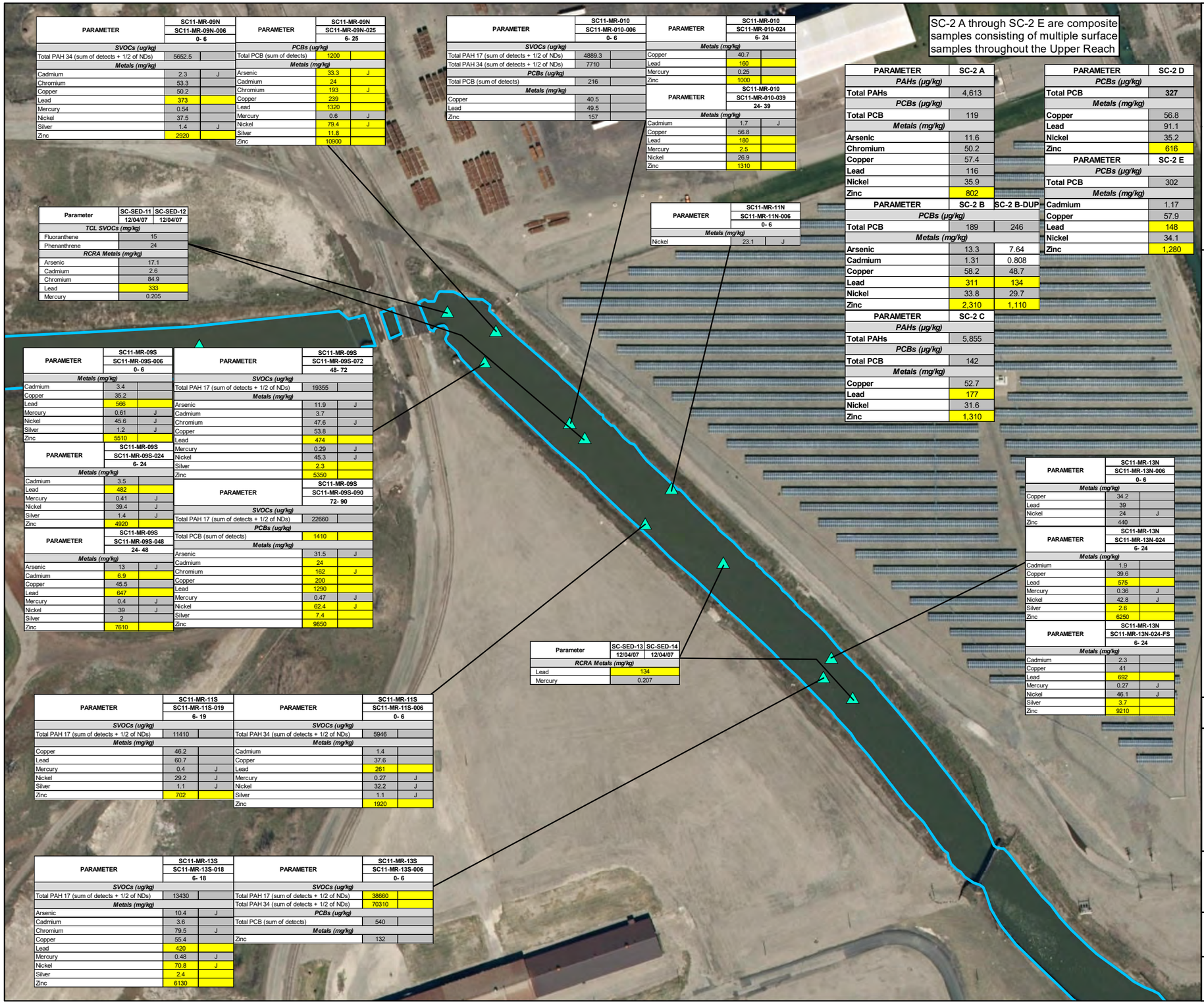
PROPOSED WESTERN REVETMENT SOUTHERN SECTION

CMS REPORT

TECUMSEH REDEVELOPMENT SITE
LACKAWANNA, NEW YORK

PREPARED FOR
TECUMSEH REDEVELOPMENT INC.

FIGURE 8



PARAMETER	SC11-MR-09N SC11-MR-09N-006 0- 6	
SVOCs (ug/kg)		
Total PAH 34 (sum of detects + 1/2 of NDs)	5652.5	
Metals (mg/kg)		
Cadmium	2.3	J
Chromium	53.3	
Copper	50.2	
Lead	373	
Mercury	0.54	
Nickel	37.5	
Silver	1.4	J
Zinc	2920	

PARAMETER	SC11-MR-09N SC11-MR-09N-025 6- 25	
PCBs (ug/kg)		
Total PCB (sum of detects)	1200	
Metals (mg/kg)		
Arsenic	33.3	J
Cadmium	24	
Chromium	193	J
Copper	239	
Lead	1320	
Mercury	0.6	J
Nickel	79.4	J
Silver	11.8	
Zinc	10900	

PARAMETER	SC11-MR-010 SC11-MR-010-006 0- 6	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	4889.3	
Total PAH 34 (sum of detects + 1/2 of NDs)	7710	
PCBs (ug/kg)		
Total PCB (sum of detects)	216	
Metals (mg/kg)		
Copper	40.5	
Lead	49.5	
Zinc	157	

PARAMETER	SC11-MR-010 SC11-MR-010-024 6- 24	
Metals (mg/kg)		
Copper	40.7	
Lead	160	
Mercury	0.25	
Zinc	1000	

PARAMETER	SC11-MR-010 SC11-MR-010-039 24- 39	
Metals (mg/kg)		
Cadmium	1.7	J
Copper	56.8	
Lead	180	
Mercury	2.5	
Nickel	26.9	
Zinc	1310	

Parameter	SC-SED-11 12/04/07	SC-SED-12 12/04/07
TCL SVOCs (mg/kg)		
Fluoranthene	15	
Phenanthrene	24	
RCRA Metals (mg/kg)		
Arsenic	17.1	
Cadmium	2.6	
Chromium	84.9	
Lead	333	
Mercury	0.205	

PARAMETER	SC11-MR-11N SC11-MR-11N-006 0- 6	
Metals (mg/kg)		
Nickel	23.1	J

SC-2 A through SC-2 E are composite samples consisting of multiple surface samples throughout the Upper Reach

PARAMETER	SC-2 A
PAHs (µg/kg)	
Total PAHs	4,613
PCBs (µg/kg)	
Total PCB	119
Metals (mg/kg)	
Arsenic	11.6
Chromium	50.2
Copper	57.4
Lead	116
Nickel	35.9
Zinc	802

PARAMETER	SC-2 B	SC-2 B-DUP
PCBs (µg/kg)		
Total PCB	189	246
Metals (mg/kg)		
Arsenic	13.3	7.64
Cadmium	1.31	0.808
Copper	58.2	48.7
Lead	311	134
Nickel	33.8	29.7
Zinc	2,310	1,110

PARAMETER	SC-2 C
PAHs (µg/kg)	
Total PAHs	5,855
PCBs (µg/kg)	
Total PCB	142
Metals (mg/kg)	
Copper	52.7
Lead	177
Nickel	31.6
Zinc	1,310

PARAMETER	SC-2 D
PCBs (µg/kg)	
Total PCB	327
Metals (mg/kg)	
Copper	56.8
Lead	91.1
Nickel	35.2
Zinc	616

PARAMETER	SC-2 E
PCBs (µg/kg)	
Total PCB	302
Metals (mg/kg)	
Cadmium	1.17
Copper	57.9
Lead	148
Nickel	34.1
Zinc	1,280

PARAMETER	SC11-MR-09S SC11-MR-09S-006 0- 6	
Metals (mg/kg)		
Cadmium	3.4	
Copper	35.2	
Lead	566	
Mercury	0.61	J
Nickel	45.6	J
Silver	1.2	J
Zinc	5510	

PARAMETER	SC11-MR-09S SC11-MR-09S-024 6- 24	
Metals (mg/kg)		
Cadmium	3.5	
Lead	482	
Mercury	0.41	J
Nickel	39.4	J
Silver	1.4	J
Zinc	4920	

PARAMETER	SC11-MR-09S SC11-MR-09S-048 24- 48	
Metals (mg/kg)		
Arsenic	13	J
Cadmium	6.9	
Copper	45.5	
Lead	647	
Mercury	0.4	J
Nickel	39	J
Silver	2	
Zinc	7610	

PARAMETER	SC11-MR-09S SC11-MR-09S-072 48- 72	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	19355	
Metals (mg/kg)		
Arsenic	11.9	J
Cadmium	3.7	
Chromium	47.6	J
Copper	53.8	
Lead	474	
Mercury	0.29	J
Nickel	45.3	J
Silver	2.3	
Zinc	5350	

PARAMETER	SC11-MR-09S SC11-MR-09S-090 72- 90	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	22660	
PCBs (ug/kg)		
Total PCB (sum of detects)	1410	
Metals (mg/kg)		
Arsenic	31.5	J
Cadmium	24	
Chromium	162	J
Copper	200	
Lead	1290	
Mercury	0.47	J
Nickel	62.4	J
Silver	7.4	
Zinc	9850	

Parameter	SC-SED-13 12/04/07	SC-SED-14 12/04/07
RCRA Metals (mg/kg)		
Lead	134	
Mercury	0.207	

PARAMETER	SC11-MR-11S SC11-MR-11S-019 6- 19	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	11410	
Metals (mg/kg)		
Copper	46.2	
Lead	60.7	
Mercury	0.4	J
Nickel	29.2	J
Silver	1.1	J
Zinc	702	

PARAMETER	SC11-MR-11S SC11-MR-11S-006 0- 6	
SVOCs (ug/kg)		
Total PAH 34 (sum of detects + 1/2 of NDs)	5946	
Metals (mg/kg)		
Cadmium	1.4	
Copper	37.6	
Lead	261	
Mercury	0.27	J
Nickel	32.2	J
Silver	1.1	J
Zinc	1920	

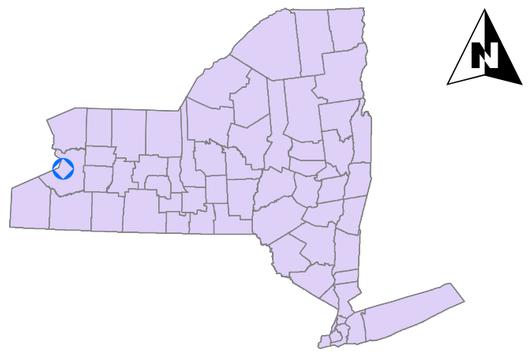
PARAMETER	SC11-MR-13S SC11-MR-13S-018 6- 18	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	13430	
Metals (mg/kg)		
Arsenic	10.4	J
Cadmium	3.6	
Chromium	79.5	J
Copper	55.4	
Lead	420	
Mercury	0.48	J
Nickel	70.8	J
Silver	2.4	
Zinc	6130	

PARAMETER	SC11-MR-13S SC11-MR-13S-006 0- 6	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	38660	
Total PAH 34 (sum of detects + 1/2 of NDs)	70310	
PCBs (ug/kg)		
Total PCB (sum of detects)	540	
Metals (mg/kg)		
Zinc	132	

PARAMETER	SC11-MR-13N SC11-MR-13N-006 0- 6	
Metals (mg/kg)		
Copper	34.2	
Lead	39	
Nickel	24	J
Zinc	440	

PARAMETER	SC11-MR-13N SC11-MR-13N-024 6- 24	
Metals (mg/kg)		
Cadmium	1.9	
Copper	39.6	
Lead	575	
Mercury	0.36	J
Nickel	42.8	J
Silver	2.6	
Zinc	6250	

PARAMETER	SC11-MR-13N SC11-MR-13N-024-FS 6- 24	
Metals (mg/kg)		
Cadmium	2.3	
Copper	41	
Lead	692	
Mercury	0.27	J
Nickel	46.1	J
Silver	3.7	
Zinc	9210	



Exceeds NYSDEC's Class A Freshwater Sediment Guidance Value

Exceeds NYSDEC's Class C Freshwater Sediment Guidance Value

Sediment Sample Locations

Waterway Boundary

0 100 200 400

Feet

Figure 1a

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Smokes Creek Upper Reach Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/3/2020

Document Path: E:\C Drive\p005664b\NYSDEC Tecumseh\MXDs\NYSDEC Tecumseh OU-9 Figure 1a.mxd

PARAMETER	SC11-MR-15N SC11-MR-15N-006 0- 6	
SVOCs (ug/kg)		
Total PAH 34 (sum of detects + 1/2 of NDs)	6021	
Metals (mg/kg)		
Copper	33.7	J
Lead	45.7	
Mercury	0.28	J
Zinc	417	J

PARAMETER	SC11-MR-15N SC11-MR-15N-006-FS 0- 6	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	4843	
Metals (mg/kg)		
Copper	41.1	J
Lead	60.4	
Silver	1.1	J
Zinc	723	J

PARAMETER	SC11-MR-15N SC11-MR-15N-024 6- 24		SC11-MR-15N SC11-MR-15N-024-DP 6- 24	
SVOCs (ug/kg)				
Total PAH 17 (sum of detects + 1/2 of NDs)	19106		2495.9	
Metals (mg/kg)				
Copper	47.3	J	35.4	J
Lead	80.9		85.1	J
Mercury	0.29	J	0.21	
Nickel	25.7	J	22.4	J
Zinc	821	J	926	J

PARAMETER	SC11-MR-15N SC11-MR-15N-048 24- 48		SC11-MR-15N SC11-MR-15N-048-DP 24- 48	
Metals (mg/kg)				
Arsenic	12.6	J	11.5	
Cadmium	2.9	J	2.3	J
Chromium	60.6	J	74.8	J
Copper	56.1	J	49.5	J
Lead	403		370	J
Mercury	0.31	J	0.97	
Nickel	37.5	J	42.1	J
Zinc	3840	J	3760	J

PARAMETER	SC11-MR-15N SC11-MR-15N-062 48- 62		SC11-MR-15N SC11-MR-15N-062-DP 48- 62	
Metals (mg/kg)				
Arsenic	24.6	J	22.3	
Cadmium	6.1	J	4.5	J
Chromium	114	J	99.7	J
Copper	88.9	J	75.8	J
Lead	984		796	J
Mercury	0.21	J	0.23	
Nickel	34.3	J	36.3	J
Silver	1.5	J	0.08	J
Zinc	8500	J	7690	J

PARAMETER	SC11-MR-18N SC11-MR-18N-006 0- 6		SC11-MR-18N SC11-MR-18N-006-FS 0- 6	
Metals (mg/kg)				
Cadmium	1	J	1.4	J
Lead	196		184	
Zinc	1970	J	1720	J

PARAMETER	SC11-MR-18N SC11-MR-18N-024 6- 24	
Metals (mg/kg)		
Arsenic	14.1	
Cadmium	2.4	J
Chromium	56.7	J
Copper	43.4	J
Lead	607	J
Nickel	25.2	J
Silver	1.7	J
Zinc	4340	J

PARAMETER	SC11-MR-18N SC11-MR-18N-048 24- 48	
Metals (mg/kg)		
Arsenic	22.6	
Cadmium	3.2	J
Chromium	59.8	J
Copper	48.4	J
Lead	856	J
Nickel	33.1	J
Silver	2.5	J
Zinc	6820	J

PARAMETER	SC11-MR-19N SC11-MR-19N-006 0- 6	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	6073	
Total PAH 34 (sum of detects + 1/2 of NDs)	9259	
Metals (mg/kg)		
Lead	47.4	
Zinc	142	J

PARAMETER	SC11-MR-20N SC11-MR-20N-006 0- 6	
SVOCs (ug/kg)		
Total PAH 34 (sum of detects + 1/2 of NDs)	12906	
Metals (mg/kg)		
Lead	67.3	

PARAMETER	SC11-MR-20N SC11-MR-20N-024 6- 24	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	18604	
Metals (mg/kg)		
Cadmium	1.2	J
Chromium	82.7	J
Copper	54.6	J
Lead	179	J
Nickel	90.5	J
Zinc	2060	J

PARAMETER	SC11-MR-20N SC11-MR-20N-053 24- 53	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	20520	
Metals (mg/kg)		
Arsenic	13.6	
Cadmium	1.3	J
Chromium	92.4	J
Copper	120	J
Lead	163	J
Nickel	103	J
Zinc	1350	J

Parameter	SC-SED-15 12/04/07	SC-SED-16 12/04/07
RCRA Metals (mg/kg)		
Arsenic	30.6	
Cadmium	3.9	
Chromium	117	
Lead	1370	
Silver	5.3	

Parameter	SC-SED-19 12/05/07
TCL SVOCs (mg/kg)	
Phenanthrene	14 J
Total PCBs (mg/kg)	
Total PCBs (mg/kg)	*3.6*
RCRA Metals (mg/kg)	
Arsenic	11.3
Chromium	44.9

PARAMETER	SC11-MR-15S SC11-MR-15S-006 0- 6	
SVOCs (ug/kg)		
Total PAH 34 (sum of detects + 1/2 of NDs)	9022	
PCBs (ug/kg)		
Total PCB (sum of detects)	504	
Metals (mg/kg)		
Arsenic	18.6	
Cadmium	2.3	
Chromium	75.3	
Copper	61	
Lead	337	
Nickel	51.2	
Zinc	4400	

PARAMETER	SC11-MR-20S SC11-MR-20S-006 0- 6	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	8307	
Total PAH 34 (sum of detects + 1/2 of NDs)	15013	
PCBs (ug/kg)		
Total PCB (sum of detects)	1420	
Metals (mg/kg)		
Copper	38.2	
Lead	1240	

PARAMETER	SC11-MR-15S SC11-MR-15S-024 6- 24	
Metals (mg/kg)		
Arsenic	17.2	
Cadmium	2.4	J
Chromium	99.8	J
Copper	72.9	J
Lead	314	J
Mercury	0.33	
Nickel	46.6	J
Silver	1.1	J
Zinc	4570	J

PARAMETER	SC11-MR-20S SC11-MR-20S-024 6- 24	
Metals (mg/kg)		
Arsenic	13	
Cadmium	2.9	J
Chromium	77.7	J
Copper	56.8	J
Lead	465	J
Nickel	91.8	J
Zinc	5430	J

PARAMETER	SC11-MR-15S SC11-MR-15S-049 24- 49	
Metals (mg/kg)		
Arsenic	28.7	
Cadmium	5.5	J
Chromium	115	J
Copper	124	J
Lead	820	J
Nickel	52	J
Zinc	6910	J

PARAMETER	SC11-MR-20S SC11-MR-20S-049 24- 49	
Metals (mg/kg)		
Arsenic	16.2	
Cadmium	6.9	J
Chromium	71.9	J
Copper	70.1	J
Lead	617	J
Nickel	37.6	J
Zinc	3910	J

Parameter	SC-SED-17 12/05/07	SC-SED-18 12/05/07
RCRA Metals (mg/kg)		
Arsenic	22.4	
Cadmium	9.4	
Chromium	81	
Lead	926	
Silver	3.4	

PARAMETER	SC11-MR-19S SC11-MR-19S-006 0- 6	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	10242.5	
Total PAH 34 (sum of detects + 1/2 of NDs)	21100	
PCBs (ug/kg)		
Total PCB (sum of detects)	2800	
Metals (mg/kg)		
Copper	69.4	J
Nickel	35.9	J

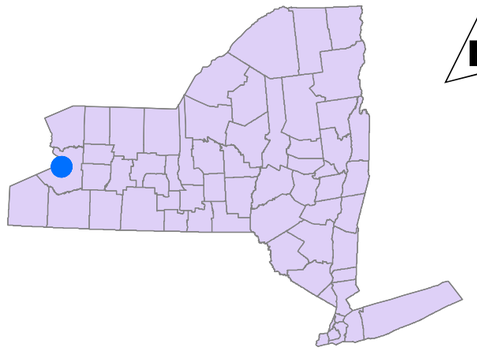
PARAMETER	SC11-MR-19S SC11-MR-19S-024 6- 24	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	22440	
PCBs (ug/kg)		
Total PCB (sum of detects)	400	
Metals (mg/kg)		
Chromium	100	J
Copper	65.2	J
Lead	129	J
Mercury	0.2	
Nickel	38.8	J
Zinc	3350	J

PARAMETER	SC11-MR-18S SC11-MR-18S-006 0- 6	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	6345	
Total PAH 34 (sum of detects + 1/2 of NDs)	11451	
Metals (mg/kg)		
Zinc	190	J

PARAMETER	SC11-MR-18S SC11-MR-18S-025 6- 25	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	10990	
Metals (mg/kg)		
Arsenic	11.8	
Cadmium	1.4	J
Copper	48.9	J
Lead	124	J
Nickel	23.9	J
Zinc	675	J

PARAMETER	SC11-MR-16 SC11-MR-16-006 0- 6
No exceedances	

PARAMETER	SC11-MR-16 SC11-MR-16-024 6- 24		PARAMETER	SC11-MR-16 SC11-MR-16-065 48- 65		PARAMETER	SC11-MR-16 SC11-MR-16-048 24- 48	
Metals (mg/kg)			*Metals (mg/kg)*			*Metals (mg/kg)*		
Arsenic	12.6	J	Arsenic	19.1	J	Arsenic	20.8	J
Cadmium	2.2	J	Cadmium	3.3	J	Cadmium	3.9	J
Chromium	50.1	J	Chromium	66.9	J	Chromium	94.4	J
Copper	45.5	J	Copper	58.8	J	Copper	63.3	J
Lead	332		Lead	619		Lead	971	
Mercury	0.22	J	Mercury	0.2	J	Nickel	51.5	J
Nickel	31.9	J	Nickel	24	J	Silver	3.6	
Silver	1.3	J	Silver	3.8		Zinc	7160	J
Zinc	3350	J	Zinc	5990	J			



Exceeds NYSDEC's Class A Freshwater Sediment Guidance Value

Exceeds NYSDEC's Class C Freshwater Sediment Guidance Value

Sediment Sample Locations

Waterway Boundary

0 100 200 400

Feet

Figure 1b

NEW YORK STATE OF OPPORTUNITY
Department of Environmental Conservation

Smokes Creek Upper Reach Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/3/2020

Document Path: E:\C Drive\p005664b\NYSDEC Tecumseh\MXDs\NYSDEC Tecumseh OU-9 Figure 1b.mxd

PARAMETER	SC11-MR-025	
	SC11-MR-025-006	
	0- 6	
SVOCs (ug/kg)		
Phenanthrene	12000	
Total PAH 17 (sum of detects + 1/2 of NDs)	55504	
Total PAH 34 (sum of detects + 1/2 of NDs)	49102	
Metals (mg/kg)		
Lead	734	

PARAMETER	SC11-MR-025	
	SC11-MR-025-026	
	6- 26	
Metals (mg/kg)		
Lead	81.4	J
Zinc	162	J

PARAMETER	SC11-MR-26N	
	SC11-MR-26N-006	
	0- 6	
Metals (mg/kg)		
Lead	43.5	
Nickel	26.1	
Zinc	198	

PARAMETER	SC11-MR-26N	
	SC11-MR-26N-026	
	6- 26	
Metals (mg/kg)		
Copper	37.3	J
Lead	52	J
Zinc	125	J

PARAMETER	SC11-MR-027	
	SC11-MR-027-006	
	0- 6	
SVOCs (ug/kg)		
Total PAH 34 (sum of detects + 1/2 of NDs)	23864	

PARAMETER	SC11-MR-027	
	SC11-MR-027-019	
	6- 19	
PCBs (ug/kg)		
Total PCB (sum of detects)	860	
Metals (mg/kg)		
Chromium	83.2	
Lead	38	

Parameter	SC-SED-22
	12/05/07
RCRA Metals (mg/kg)	
Lead	113

PARAMETER	SC11-MR-24N	
	SC11-MR-24N-006	
	0- 6	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	5308	
Metals (mg/kg)		
Copper	71.8	

PARAMETER	SC11-MR-24N	
	SC11-MR-24N-006-FS	
	0- 6	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	4768	

PARAMETER	SC11-MR-24N	
	SC11-MR-24N-020	
	6- 20	
Metals (mg/kg)		
Arsenic	11.1	
Copper	66.2	
Lead	266	
Nickel	46.7	
Zinc	190	

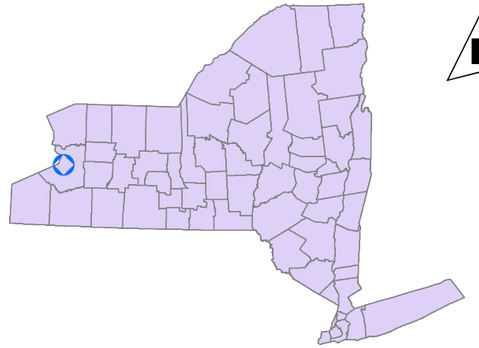
PARAMETER	SC11-MR-22N	
	SC11-MR-22N-006	
	0- 6	
Metals (mg/kg)		
Copper	56.2	J
Lead	90.7	
Nickel	30.7	J
Zinc	365	J

PARAMETER	SC11-MR-22N	
	SC11-MR-22N-028	
	6- 28	
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	4213	
Metals (mg/kg)		
Arsenic	21.8	
Chromium	50.2	J
Copper	152	J
Lead	76.9	J
Nickel	60.6	J
Zinc	161	J

Parameter	SC-SED-20
	12/05/07
RCRA Metals (mg/kg)	
Lead	75.2

PARAMETER	SC11-MR-22S	
	SC11-MR-22S-006	
	0- 6	
SVOCs (ug/kg)		
Total PAH 34 (sum of detects + 1/2 of NDs)	9161	

PARAMETER	SC11-MR-22S	
	SC11-MR-22S-025	
	6- 25	
Metals (mg/kg)		
Copper	34.8	J
Lead	71.6	J
Nickel	22.8	J
Zinc	412	J



Exceeds NYSDEC's Class A Freshwater Sediment Guidance Value

Exceeds NYSDEC's Class C Freshwater Sediment Guidance Value

Sediment Sample Locations

Waterway Boundary

0 75 150 300

Feet

Figure 1c

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Smokes Creek Upper Reach Sediment Exceedances

Tecumseh Redevelopment Site

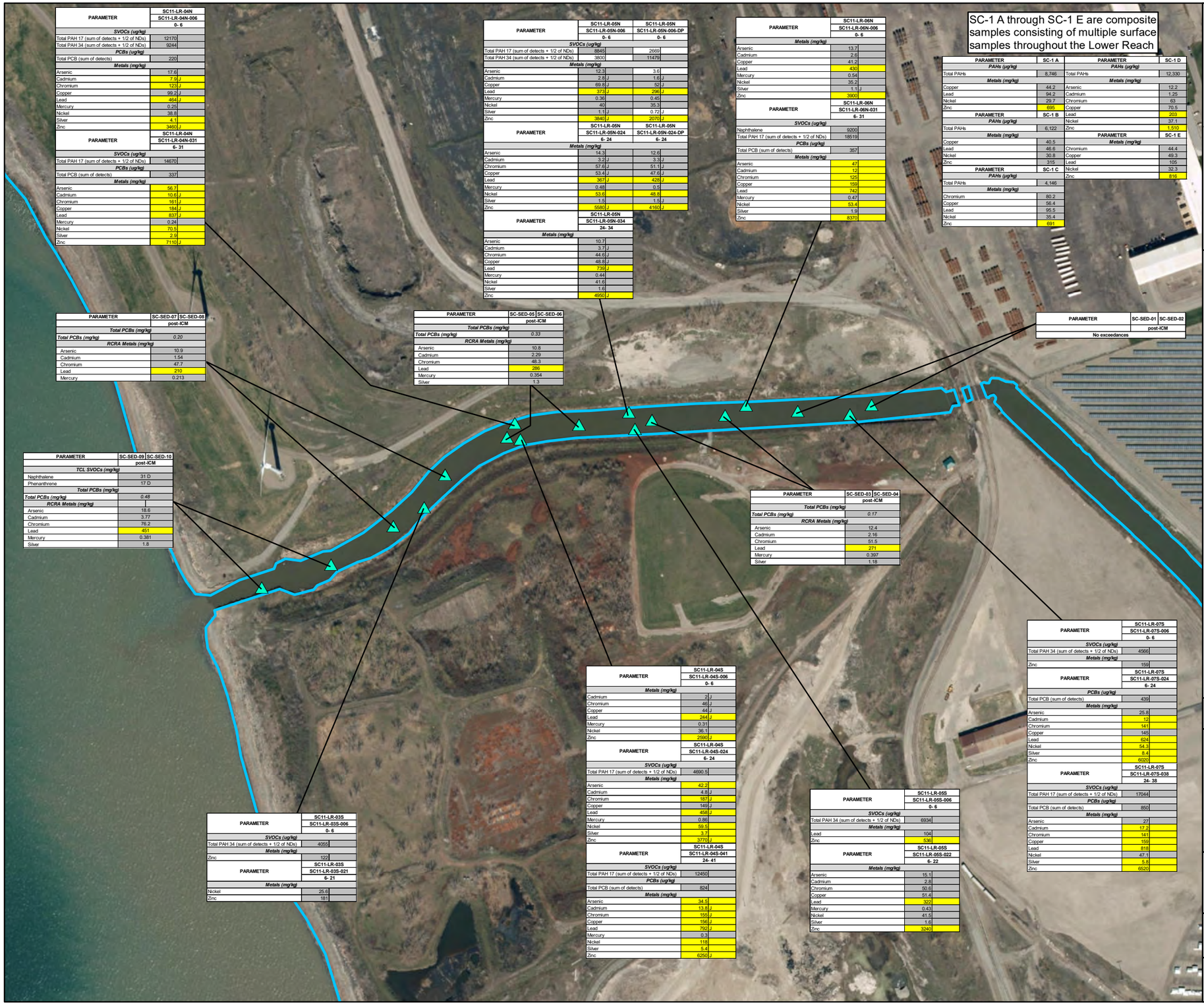
PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 3/26/2021

Document Path: E:\C Drive\p005664b\NYSDEC Tecumseh\MXDs\NYSDEC Tecumseh OU-9 Figure 1c.mxd



PARAMETER	SC11-LR-04N SC11-LR-04N-006 0- 6
SVOCs (ug/kg)	
Total PAH 17 (sum of detects + 1/2 of NDs)	12170
Total PAH 34 (sum of detects + 1/2 of NDs)	9244
PCBs (ug/kg)	
Total PCB (sum of detects)	220
Metals (mg/kg)	
Arsenic	17.6
Cadmium	7.9 J
Chromium	123 J
Copper	99.2 J
Lead	464 J
Mercury	0.25
Nickel	38.8
Silver	4.1
Zinc	3460 J

PARAMETER	SC11-LR-04N SC11-LR-04N-031 6- 31
SVOCs (ug/kg)	
Total PAH 17 (sum of detects + 1/2 of NDs)	14670
PCBs (ug/kg)	
Total PCB (sum of detects)	337
Metals (mg/kg)	
Arsenic	56.7
Cadmium	10.6 J
Chromium	161 J
Copper	184 J
Lead	837 J
Mercury	0.24
Nickel	70.5
Silver	2.9
Zinc	7110 J

PARAMETER	SC11-LR-05N SC11-LR-05N-006 0- 6	SC11-LR-05N SC11-LR-05N-006-DP 0- 6
SVOCs (ug/kg)		
Total PAH 17 (sum of detects + 1/2 of NDs)	8845	2669
Total PAH 34 (sum of detects + 1/2 of NDs)	3800	11479
Metals (mg/kg)		
Arsenic	12.3	3.6
Cadmium	2.8 J	1.6 J
Copper	69.8 J	52 J
Lead	373 J	296 J
Mercury	0.36	0.45
Nickel	40	35.3
Silver	1.1 J	0.72 J
Zinc	3640 J	2070 J

PARAMETER	SC11-LR-05N SC11-LR-05N-024 6- 24	SC11-LR-05N SC11-LR-05N-024-DP 6- 24
Metals (mg/kg)		
Arsenic	14.3	12.6
Cadmium	3.2 J	3.3 J
Chromium	57.6 J	51.1 J
Copper	53.4 J	47.6 J
Lead	367 J	428 J
Mercury	0.48	0.5
Nickel	53.6	48.8
Silver	1.5	1.8 J
Zinc	5580 J	4160 J

PARAMETER	SC11-LR-05N SC11-LR-05N-034 24- 34
Metals (mg/kg)	
Arsenic	10.7
Cadmium	3.7 J
Chromium	44.6 J
Copper	48.8 J
Lead	739 J
Mercury	0.44
Nickel	41.6
Silver	1.6
Zinc	4950 J

PARAMETER	SC11-LR-06N SC11-LR-06N-006 0- 6
Metals (mg/kg)	
Arsenic	13.7
Cadmium	2.6
Copper	41.2
Lead	430
Mercury	0.54
Nickel	35.2
Silver	1.1 J
Zinc	3900

PARAMETER	SC11-LR-06N SC11-LR-06N-031 6- 31
SVOCs (ug/kg)	
Naphthalene	9200
Total PAH 17 (sum of detects + 1/2 of NDs)	18519
PCBs (ug/kg)	
Total PCB (sum of detects)	357
Metals (mg/kg)	
Arsenic	47
Cadmium	12
Chromium	125
Copper	159
Lead	742
Mercury	0.47
Nickel	53.4
Silver	1.9
Zinc	8370

PARAMETER	SC-1 A	PARAMETER	SC-1 D
PAHs (ug/kg)		*PAHs (ug/kg)*	
Total PAHs	8,746	Total PAHs	12,330
Metals (mg/kg)		*Metals (mg/kg)*	
Copper	44.2	Arsenic	12.2
Lead	94.2	Cadmium	1.25
Nickel	29.7	Chromium	63
Zinc	686	Copper	70.5
PARAMETER	**SC-1 B**	Lead	203
PAHs (ug/kg)		Nickel	37.1
Total PAHs	6,122	Zinc	1,510
Metals (mg/kg)		**PARAMETER**	**SC-1 E**
Copper	40.5	*Metals (mg/kg)*	
Lead	46.6	Chromium	44.4
Nickel	30.8	Copper	49.3
Zinc	315	Lead	105
PARAMETER	**SC-1 C**	Nickel	32.3
PAHs (ug/kg)		Zinc	816
Total PAHs	4,146		
Metals (mg/kg)			
Chromium	80.2		
Copper	56.4		
Lead	95.5		
Nickel	35.4		
Zinc	691		

PARAMETER	SC-SED-01	SC-SED-02
	post-ICM	
No exceedances		

PARAMETER	SC-SED-05	SC-SED-06
	post-ICM	
Total PCBs (mg/kg)	0.33	
RCRA Metals (mg/kg)		
Arsenic	10.8	
Cadmium	2.29	
Chromium	48.3	
Lead	286	
Mercury	0.354	
Silver	1.3	

PARAMETER	SC-SED-07	SC-SED-08
	post-ICM	
Total PCBs (mg/kg)	0.20	
RCRA Metals (mg/kg)		
Arsenic	10.9	
Cadmium	1.54	
Chromium	47.7	
Lead	210	
Mercury	0.213	

PARAMETER	SC-SED-09	SC-SED-10
	post-ICM	
TCL SVOCs (mg/kg)		
Naphthalene	31 D	
Phenanthrene	17 D	
Total PCBs (mg/kg)		
Total PCBs (mg/kg)	0.48	
RCRA Metals (mg/kg)		
Arsenic	18.6	
Cadmium	3.77	
Chromium	76.2	
Lead	451	
Mercury	0.381	
Silver	1.8	

PARAMETER	SC-SED-03	SC-SED-04
	post-ICM	
Total PCBs (mg/kg)	0.17	
RCRA Metals (mg/kg)		
Arsenic	12.4	
Cadmium	2.16	
Chromium	51.5	
Lead	271	
Mercury	0.397	
Silver	1.18	

PARAMETER	SC11-LR-03S SC11-LR-03S-006 0- 6
SVOCs (ug/kg)	
Total PAH 34 (sum of detects + 1/2 of NDs)	4055
Metals (mg/kg)	
Zinc	122

PARAMETER	SC11-LR-03S SC11-LR-03S-021 6- 21
Metals (mg/kg)	
Nickel	25.6
Zinc	181

PARAMETER	SC11-LR-04S SC11-LR-04S-006 0- 6
Metals (mg/kg)	
Cadmium	2 J
Chromium	46 J
Copper	44 J
Lead	244 J
Mercury	0.31
Nickel	36.1
Zinc	2990 J

PARAMETER	SC11-LR-04S SC11-LR-04S-024 6- 24
SVOCs (ug/kg)	
Total PAH 17 (sum of detects + 1/2 of NDs)	4690.5
Metals (mg/kg)	
Arsenic	42.2
Cadmium	4.8 J
Chromium	167 J
Copper	149 J
Lead	458 J
Mercury	0.86
Nickel	59.5
Silver	3.7
Zinc	3770 J

PARAMETER	SC11-LR-04S SC11-LR-04S-041 24- 41
SVOCs (ug/kg)	
Total PAH 17 (sum of detects + 1/2 of NDs)	12450
PCBs (ug/kg)	
Total PCB (sum of detects)	824
Metals (mg/kg)	
Arsenic	34.5
Cadmium	13.8 J
Chromium	155 J
Copper	156 J
Lead	792 J
Mercury	0.3
Nickel	118
Silver	5.4
Zinc	6250 J

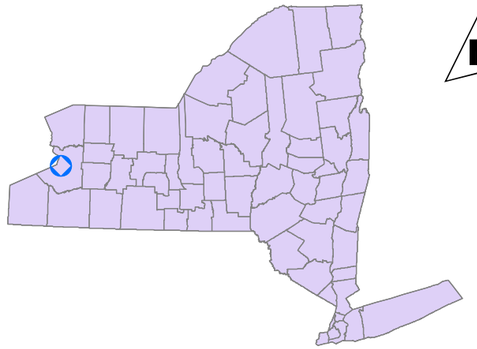
PARAMETER	SC11-LR-05S SC11-LR-05S-006 0- 6
SVOCs (ug/kg)	
Total PAH 34 (sum of detects + 1/2 of NDs)	6934
Metals (mg/kg)	
Lead	104
Zinc	536

PARAMETER	SC11-LR-05S SC11-LR-05S-022 6- 22
Metals (mg/kg)	
Arsenic	15.1
Cadmium	2.8
Chromium	50.6
Copper	51.4
Lead	322
Mercury	0.43
Nickel	41.5
Silver	1.6
Zinc	3240

PARAMETER	SC11-LR-07S SC11-LR-07S-006 0- 6
SVOCs (ug/kg)	
Total PAH 34 (sum of detects + 1/2 of NDs)	4566
Metals (mg/kg)	
Zinc	159

PARAMETER	SC11-LR-07S SC11-LR-07S-024 6- 24
PCBs (ug/kg)	
Total PCB (sum of detects)	439
Metals (mg/kg)	
Arsenic	25.8
Cadmium	12
Chromium	141
Copper	145
Lead	624
Nickel	54.3
Silver	8.4
Zinc	6020

PARAMETER	SC11-LR-07S SC11-LR-07S-038 24- 38
SVOCs (ug/kg)	
Total PAH 17 (sum of detects + 1/2 of NDs)	17044
PCBs (ug/kg)	
Total PCB (sum of detects)	850
Metals (mg/kg)	
Arsenic	27
Cadmium	17.2
Chromium	141
Copper	159
Lead	818
Nickel	47.1
Silver	5.8
Zinc	6520



Exceeds NYSDEC's Class A Freshwater Sediment Guidance Value

Exceeds NYSDEC's Class C Freshwater Sediment Guidance Value

Sediment Sample Locations

Waterway Boundary

0 200 400 800

Feet

Figure 3

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Smokes Creek Lower Reach Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/3/2020

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PARAMETER	LSC 1 1 60
Metals (mg/kg)	
ARSENIC	14.5
CADMIUM	1.1
CHROMIUM, TOTAL	67.7
COPPER	39.6
LEAD	127
NICKEL	26.4
ZINC	377
MERCURY	0.52
PCBs (ug/kg)	
Total PCBs	217
PAHs (ug/kg)	
ACENAPHTHENE	67000
ACENAPHTHYLENE	21000
ANTHRACENE	67000
BENZO(A)ANTHRACENE	64000
BENZO(A)PYRENE	61000
BENZO(B)FLUORANTHENE	67000
BENZO(G,H,I)PERYLENE	43000
BENZO(K)FLUORANTHENE	23000
CHRYSENE	62000
FLUORANTHENE	160000
FLUORENE	43000
INDENO(1,2,3 C,D)PYRENE	35000
NAPHTHALENE	500000
PHENANTHRENE	240000
PYRENE	150000
Total PAHs	1646000

PARAMETER	GSC-SED-4A 11/12/09	GSC-SED-4B 11/12/09
TCL SVOCs (mg/kg)		
Fluoranthene	32 DJ	
Naphthalene	21 D	
Phenanthrene	29 D	
Pyrene	24 D	
Total PCBs (mg/kg)		
Total PCBs (mg/kg)	0.158	
RCRA Metals (mg/kg)		
Arsenic, Total	18.6	
Cadmium, Total	1.9	
Chromium, Total	80	
Lead, Total	220	
Mercury, Total	0.43	

PARAMETER	LSC 2 1 60
Metals (mg/kg)	
ARSENIC	15.2
CADMIUM	1.2
CHROMIUM, TOTAL	72.3
COPPER	38.7
LEAD	136
NICKEL	30.5
ZINC	711
MERCURY	0.61
PCBs (ug/kg)	
Total PCBs	210
PAHs (ug/kg)	
ACENAPHTHENE	97000
ACENAPHTHYLENE	14000
ANTHRACENE	110000
BENZO(A)ANTHRACENE	100000
BENZO(A)PYRENE	89000
BENZO(B)FLUORANTHENE	95000
BENZO(G,H,I)PERYLENE	53000
BENZO(K)FLUORANTHENE	39000
CHRYSENE	98000
FLUORANTHENE	220000
FLUORENE	69000
INDENO(1,2,3 C,D)PYRENE	48000
NAPHTHALENE	290000
PHENANTHRENE	330000
PYRENE	200000
Total PAHs	1919000

PARAMETER	GSC-SED-3A 11/12/09	GSC-SED-3B 11/12/09
TCL SVOCs (mg/kg)		
Fluoranthene	26 DJ	
Phenanthrene	14 DJ	
Pyrene	21 D	
Total PCBs (mg/kg)		
Total PCBs (mg/kg)	0.154	
RCRA Metals (mg/kg)		
Arsenic, Total	14.4	
Cadmium, Total	1.5	
Chromium, Total	53.2	
Lead, Total	139	
Mercury, Total	0.551	

PARAMETER	LSC 3 1 18
Metals (mg/kg)	
LEAD	52.3
ZINC	150
MERCURY	0.38
PAHs (ug/kg)	
ACENAPHTHENE	43000
ANTHRACENE	56000
BENZO(A)ANTHRACENE	50000
BENZO(A)PYRENE	47000
BENZO(B)FLUORANTHENE	50000
BENZO(G,H,I)PERYLENE	30000
BENZO(K)FLUORANTHENE	20000
CHRYSENE	49000
FLUORANTHENE	140000
FLUORENE	33000
INDENO(1,2,3 C,D)PYRENE	26000
NAPHTHALENE	110000
PHENANTHRENE	200000
PYRENE	110000
Total PAHs	993600

PARAMETER	LSC 4 1 10
Metals (mg/kg)	
ARSENIC	12.2
LEAD	85.2
ZINC	256
MERCURY	0.51
PAHs (ug/kg)	
ACENAPHTHENE	34000
ACENAPHTHYLENE	9900
ANTHRACENE	54000
BENZO(A)ANTHRACENE	61000
BENZO(A)PYRENE	59000
BENZO(B)FLUORANTHENE	62000
BENZO(G,H,I)PERYLENE	39000
BENZO(K)FLUORANTHENE	24000
CHRYSENE	61000
FLUORANTHENE	140000
FLUORENE	28000
INDENO(1,2,3 C,D)PYRENE	32000
NAPHTHALENE	140000
PHENANTHRENE	160000
PYRENE	120000
Total PAHs	1047500

PARAMETER	LSC-4-2-28
Metals (mg/kg)	
NICKEL	26.9
PAHs (ug/kg)	
ACENAPHTHENE	26000
ACENAPHTHYLENE	10000
ANTHRACENE	98000
BENZO(A)ANTHRACENE	82000
BENZO(A)PYRENE	76000
BENZO(B)FLUORANTHENE	81000
BENZO(G,H,I)PERYLENE	51000
BENZO(K)FLUORANTHENE	33000
CHRYSENE	77000
FLUORANTHENE	250000
FLUORENE	32000
INDENO(1,2,3 C,D)PYRENE	42000
NAPHTHALENE	56000
PHENANTHRENE	310000
PYRENE	210000
Total PAHs	1446100

PARAMETER	LSC 6 1 12
Metals (mg/kg)	
ARSENIC	16.4
CHROMIUM, TOTAL	55.6
LEAD	124
ZINC	380
MERCURY	0.84
Pesticides (ug/kg)	
Endosulfan (alpha and beta)	2.1
PAHs (ug/kg)	
ACENAPHTHENE	11000
ANTHRACENE	20000
BENZO(A)ANTHRACENE	32000
BENZO(A)PYRENE	27000
BENZO(B)FLUORANTHENE	28000
CHRYSENE	30000
FLUORANTHENE	64000
NAPHTHALENE	61000
PHENANTHRENE	59000
PYRENE	55000
Total PAHs	450900

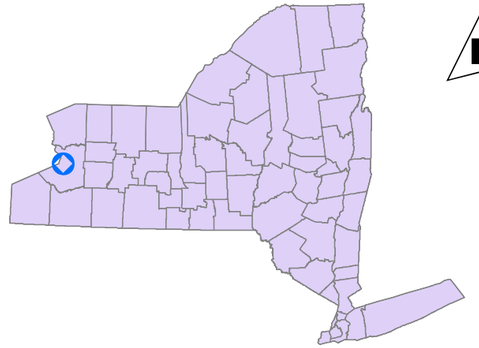
PARAMETER	LSC 6 2 36
Metals (mg/kg)	
ARSENIC	10.8
NICKEL	29.9
PAHs (ug/kg)	
Total PAHs	4635

PARAMETER	GSC-SED-2A 11/12/09	GSC-SED-2B 11/12/09
Total PCBs (mg/kg)		
Total PCBs (mg/kg)	0.101	
RCRA Metals (mg/kg)		
Arsenic, Total	12.8	
Cadmium, Total	1.68	
Chromium, Total	50.4	
Lead, Total	271	
Mercury, Total	1.07	

PARAMETER	LSC 5 1 20
Metals (mg/kg)	
ARSENIC	15.5
CADMIUM	2.4
CHROMIUM, TOTAL	51.2
LEAD	663
NICKEL	26.6
SILVER	1.2
ZINC	3310
MERCURY	0.97
Pesticides (ug/kg)	
Endosulfan (alpha and beta)	1.1
PCBs (ug/kg)	
Total PCBs	130
PAHs (ug/kg)	
ANTHRACENE	17000
BENZO(A)ANTHRACENE	23000
BENZO(A)PYRENE	21000
BENZO(B)FLUORANTHENE	21000
CHRYSENE	24000
FLUORANTHENE	40000
NAPHTHALENE	31000
PHENANTHRENE	45000
PYRENE	36000
Total PAHs	311000

PARAMETER	LSC 5 2 36
Metals (mg/kg)	
NICKEL	29.3

PARAMETER	GSC-SED-1A 11/12/09	GSC-SED-1B 11/12/09
Total PCBs (mg/kg)		
Total PCBs (mg/kg)	0.336	
RCRA Metals (mg/kg)		
Arsenic, Total	22.4	
Cadmium, Total	2.7	
Chromium, Total	65.3	
Lead, Total	404	
Mercury, Total	1.61	



Exceeds NYSDEC's Class A Freshwater Sediment Guidance Value

Exceeds NYSDEC's Class C Freshwater Sediment Guidance Value

Sediment Sample Locations

Waterway Boundary

0 400 800 1,600 Feet

Figure 5

NEW YORK STATE OF OPPORTUNITY
Department of Environmental Conservation

Gateway Metroport Ship Canal
Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/5/2020

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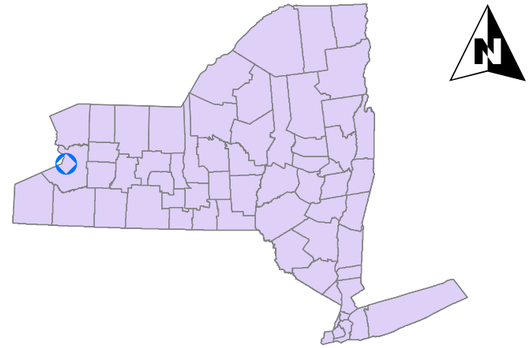
PARAMETER	NTWT-SED-4
Total PCBs (mg/kg)	
Total PCBs	0.23
RCRA Metals (mg/kg)	
Arsenic, Total	12
Cadmium, Total	1.3
Chromium, Total	45
Lead, Total	89
Mercury, Total	1.1

PARAMETER	NRWT-SED-3
Total PCBs (mg/kg)	
Total PCBs	1.2
RCRA Metals (mg/kg)	
Arsenic, Total	19.8
Cadmium, Total	2.4
Chromium, Total	62.2
Lead, Total	140
Mercury, Total	3.2

PARAMETER	NRWT-SED-1
Total PCBs (mg/kg)	
Total PCBs	0.34
RCRA Metals (mg/kg)	
Arsenic, Total	58.7
Cadmium, Total	10.2
Chromium, Total	438
Lead, Total	909
Mercury, Total	1.4



Exceeds NYSDEC's Class A Freshwater Sediment Guidance Value

Exceeds NYSDEC's Class C Freshwater Sediment Guidance Value

Sediment Sample Locations

Waterway Boundary

0 150 300 600

Feet

Figure 7

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

North Return Water Trench
Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/5/2020

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PARAMETER	SRWT- SED-6 09/30/09	SRWT- SED-7 09/30/09
RCRA Metals (mg/kg)		
Arsenic, Total	33.5	
Cadmium, Total	1.72	
Lead, Total	206	
Mercury, Total	0.22	

PARAMETER	SRWT- SED-4 09/30/09	SRWT- SED-5 09/30/09
RCRA Metals (mg/kg)		
Arsenic, Total	36.8	
Cadmium, Total	2.57	
Chromium, Total	49.1 B	
Lead, Total	295	
Mercury, Total	0.416	

PARAMETER	SRWT- SED-1 09/30/09	SRWT- SED-2 09/30/09
Total PCBs (mg/kg)	*0.141*	
RCRA Metals (mg/kg)		
Arsenic, Total	27.7	
Cadmium, Total	1.37	
Lead, Total	147	
Mercury, Total	0.335	

PARAMETER	SRS-3 11/23/1994
RCRA Metals (mg/kg)	
Arsenic, Total	19.9
Lead, Total	96.6 Jm

PARAMETER	SRS-1 11/23/1994	SRS-1 DUP 11/23/1994
RCRA Metals (mg/kg)		
Arsenic, Total	28.9	24.3
Chromium, Total	49.7 Jm	45.5 Jm
Lead, Total	355 Jm	326 Jm
Mercury, Total	0.33	-
Nickel, Total	147 Jm	13.7 Jm

PARAMETER	SRWT-SED-3 10/01/09
RCRA Metals (mg/kg)	
Arsenic, Total	43
Cadmium, Total	1.91
Chromium, Total	174
Lead, Total	318
Mercury, Total	0.381

PARAMETER	SC11-RT-030-006 (0-6 inches)
RCRA Metals (mg/kg)	
Arsenic, Total	34.3 J
Cadmium, Total	1.5
Chromium, Total	46.5 J
Copper, Total	57.9 J
Lead, Total	205 J
Zinc, Total	1,020

PARAMETER	SC11-RT-030-029 (6-29 inches)
RCRA Metals (mg/kg)	
Arsenic, Total	24.8 J
Cadmium, Total	1.3
Chromium, Total	212 J
Copper, Total	48.9 J
Lead, Total	184 J
Mercury, Total	0.5
Zinc, Total	872

PARAMETER	SC11-RT-029-006 (0-6 inches)
TCL SVOCs (mg/kg)	
Fluoranthene	24
Total PAH-17 [4] (mg/kg)	*88*
EPA-34 PAHs (mg/kg)	
Total PAH-34 [4] (mg/kg)	*7.9*
RCRA Metals (mg/kg)	
Arsenic, Total	28.9 J
Cadmium, Total	1.2
Chromium, Total	45.5 J
Copper, Total	50.8 J
Lead, Total	189 J
Mercury, Total	0.36
Zinc, Total	934

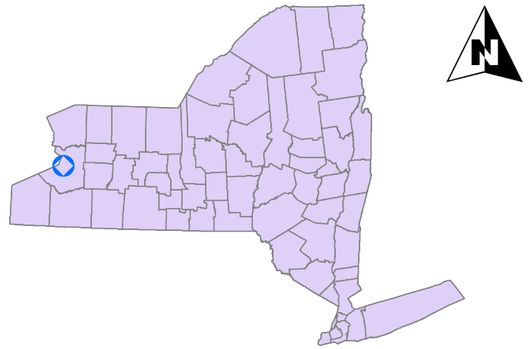
PARAMETER	SC11-RT-029-025 (6-25 inches)
TCL SVOCs (mg/kg)	
Total PAH-17 [4] (mg/kg)	*5.2*
RCRA Metals (mg/kg)	
Arsenic, Total	32.4 J
Cadmium, Total	3.6
Chromium, Total	57.7 J
Copper, Total	53.6 J
Lead, Total	458 J
Mercury, Total	0.47
Nickel, Total	24 J
Zinc, Total	3,410

PARAMETER	SC11-RT-029-006-DP (0-6 inches)
EPA-34 PAHs (mg/kg)	
Total PAH-34 [4] (mg/kg)	*4.5*
RCRA Metals (mg/kg)	
Arsenic, Total	26.1 J
Cadmium, Total	1
Copper, Total	38.9 J
Lead, Total	159 J
Mercury, Total	0.34
Zinc, Total	823

PARAMETER	SC11-RT-028-006 (0-6 inches)
TCL SVOCs (mg/kg)	
Total PAH-17 [4] (mg/kg)	5.06
EPA-34 PAHs (mg/kg)	
Total PAH-34 [4] (mg/kg)	*10*
RCRA Metals (mg/kg)	
Lead, Total	204 J
Mercury, Total	0.56
Zinc, Total	892

PARAMETER	SC11-RT-028-024 (6-24 inches)
RCRA Metals (mg/kg)	
Cadmium, Total	1.3
Copper, Total	39 J
Lead, Total	194 J
Mercury, Total	0.62
Silver, Total	2.1
Zinc, Total	828

PARAMETER	SC11-RT-028-039 (24-39 inches)
TCL SVOCs (mg/kg)	
Fluoranthene	17
Phenanthrene	29
Total PAH-17 [4] (mg/kg)	98
Total PCBs (mg/kg)	
Total PCBs (mg/kg) (sum of detects)	*0.174*
RCRA Metals (mg/kg)	
Arsenic, Total	15.1 J
Cadmium, Total	1.8
Chromium, Total	48.1 J
Copper, Total	44.7 J
Lead, Total	275 J
Mercury, Total	0.4
Zinc, Total	2,390



Exceeds NYSDEC's Class A Freshwater Sediment Guidance Value

Exceeds NYSDEC's Class C Freshwater Sediment Guidance Value

Sediment Sample Locations

Waterway Boundary

0 150 300 600

Feet

Figure 9a

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

South Return Water Trench
Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/5/2020

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PARAMETER	SRWT- SED-16	SRWT- SED-17
	10/01/09	10/01/09
TCL SVOCs (Method 8270C) (mg/kg)		
Fluoranthene	16 DJ	
Total PCBs (Method 8082) (mg/kg)		
Total PCBs (mg/kg)	0.189	
RCRA Metals (Method 6010B/7471A) (mg/kg)		
Arsenic, Total	17.8	
Cadmium, Total	2.21	
Lead, Total	330	
Mercury, Total	2.5 D	

PARAMETER	SRWT- SED-14	SRWT- SED-15
	10/01/09	10/01/09
TCL SVOCs (mg/kg)		
Fluoranthene	16 DJ	
Phenanthrene	12 DJ	
Total PCBs (mg/kg)		
Total PCBs (mg/kg)	0.116	
RCRA Metals (mg/kg)		
Arsenic, Total	59.6	
Cadmium, Total	2	
Lead, Total	282	
Mercury, Total	2.1	

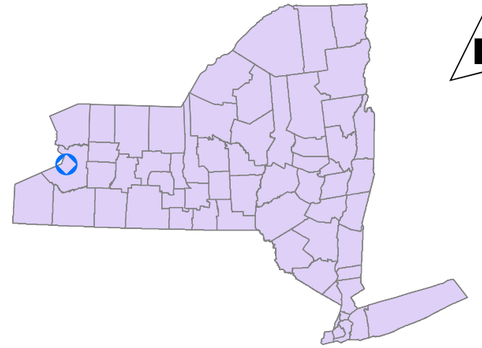
PARAMETER	NRS-1
	11/23/1994
RCRA Metals (mg/kg)	
Arsenic, Total	102
Cadmium, Total	1.4 Jm
Chromium, Total	63 Jm
Lead, Total	366 Jm
Mercury, Total	1.4

PARAMETER	SRWT- SED-12	SRWT- SED-13
	10/01/09	10/01/09
RCRA Metals (mg/kg)		
Arsenic, Total	50.3	
Cadmium, Total	1.85	
Chromium, Total	44.5	
Lead, Total	247	
Mercury, Total	0.737	

PARAMETER	SRS-2
	11/23/1994
RCRA Metals (mg/kg)	
Arsenic, Total	21.6
Cadmium, Total	3.5 Jm
Chromium, Total	127 Jm
Lead, Total	1010 Jm
Mercury, Total	0.59
Nickel, Total	24.9 Jm
Silver, Total	2.1

PARAMETER	SRWT- SED-10	SRWT- SED-11
	09/30/09	09/30/09
RCRA Metals (mg/kg)		
Arsenic, Total	24.8	
Cadmium, Total	3.18	
Chromium, Total	49.7 B	
Lead, Total	275	
Mercury, Total	0.433	
Silver, Total	1.14	

PARAMETER	SRWT- SED-8	SRWT- SED-9
	09/30/09	09/30/09
RCRA Metals (mg/kg)		
Arsenic, Total	24	
Cadmium, Total	1.88	
Lead, Total	204	
Mercury, Total	0.347	



Exceeds NYSDEC's Class A Freshwater Sediment Guidance Value

Exceeds NYSDEC's Class C Freshwater Sediment Guidance Value

Sediment Sample Locations

Waterway Boundary

0 250 500 1,000 Feet

Figure 9b

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

South Return Water Trench
Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/5/2020

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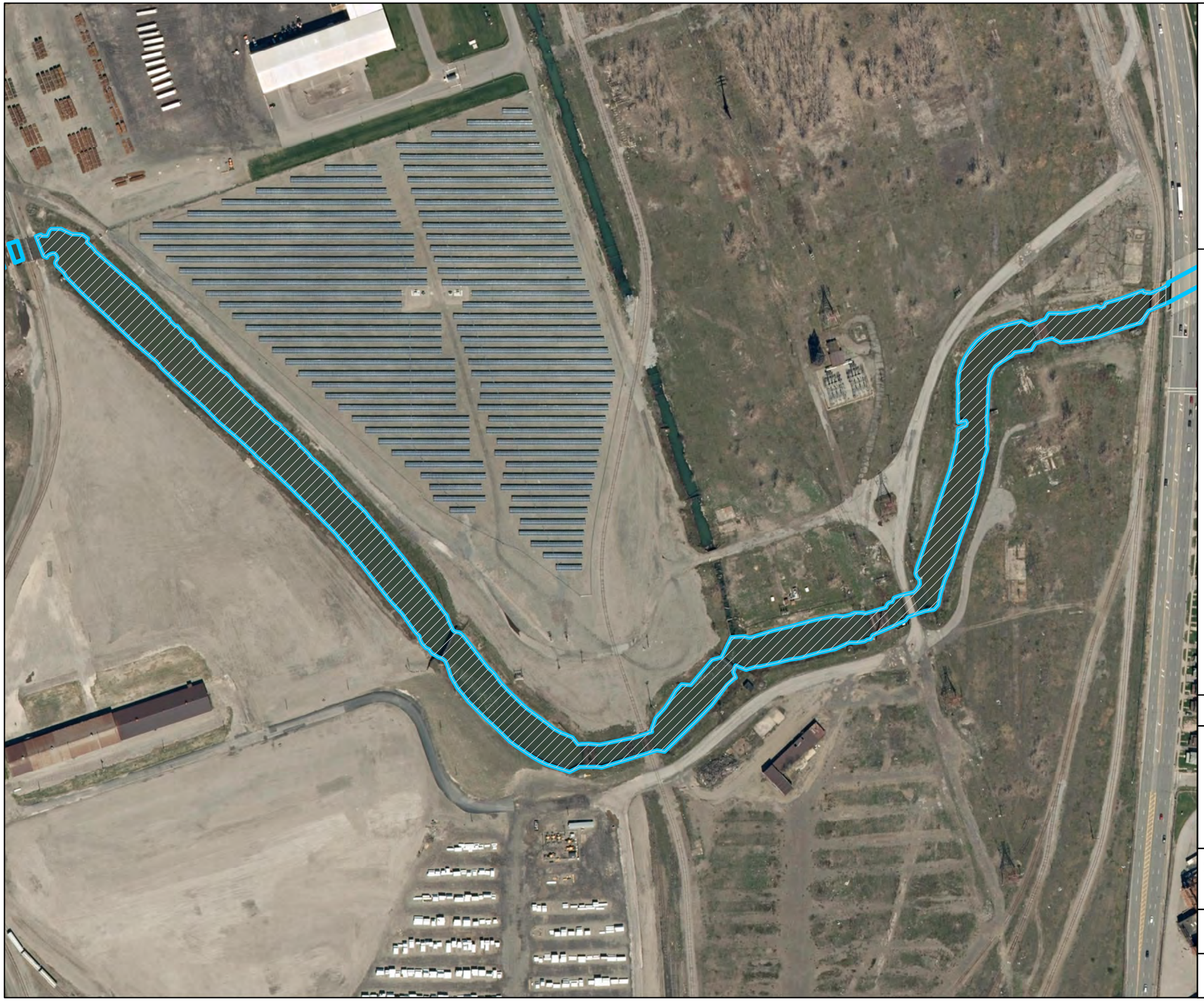

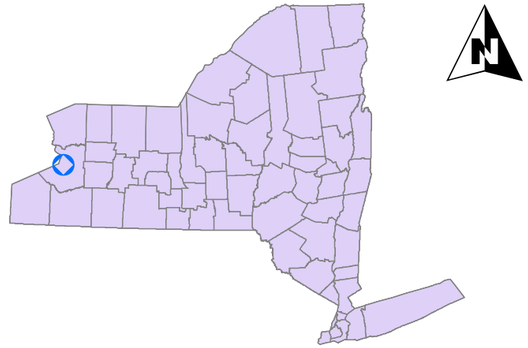

Removal Area (6.28 Acres)

Waterway Boundary

0 150 300 600

Feet

Figure 11

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Smokes Creek Upper Reach Removal Area - Based on Class A Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/3/2020

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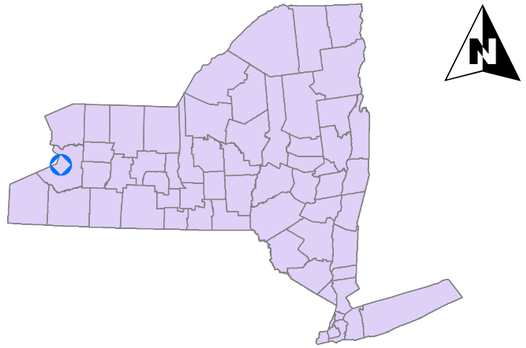

Removal Area (5.44 Acres)

Waterway Boundary

0 150 300 600

Feet

Figure 12

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Smokes Creek Lower Reach Removal Area - Based on Class A Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/3/2020

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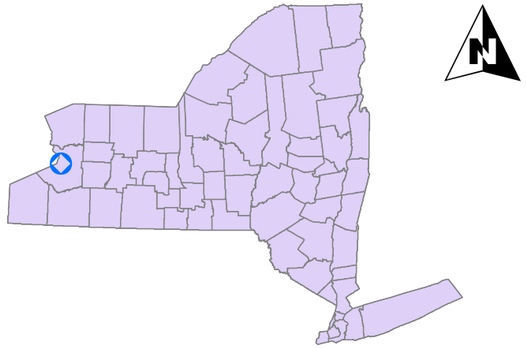

Removal Area (16.87 Acres)

Waterway Boundary

0 300 600 1,200

Feet

Figure 13

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Gateway Metroport Ship Canal Removal Area - Based on Class C Sediment Exceedances

Tecumseh Redevelopment Site

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

Plotted By: Sisson, Evan

Plot Date: 6/5/2020

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F:\CAD\Turnkey\Tecumseh Redevelopment\CMS\2019 ESAS Report\Plates\PLATE 1-2 EXE AREA CORRECTIVE MEASURES ACTION PLAN SUMMARY MAY.dwg

LEGEND:

- CMS AREA BOUNDARY (~25' EASEMENT AROUND SRWT & NRWT, ~50' BUFFER AROUND SMOKES CREEK)
- APPROXIMATE SWMU BOUNDARY
- APPROXIMATE AOC BOUNDARY
- SWMU CONTAINED IN-PLACE
- SWMU OR WATERCOURSE - CONSOLIDATE TO IMPOUNDMENTS
- SWMU OR WATERCOURSE - NO FURTHER ACTION
- SWMU - NO FURTHER ACTION; EXISTING LOW-PERMEABILITY GEOCOMPOSITE COVER EXISTS
- SWMU WASTE/FILL TO BE CONSOLIDATED IN SW-CAMU
- MERCURY-IMPACTED WASTE TO BE DISPOSED OFF-SITE
- SWMU - SLAG COVER
- RECOMMENDED ADDITIONAL SECONDARY AND TERTIARY GROUNDWATER COLLECTION WELLS
- EXISTING GROUNDWATER COLLECTION AND TREATMENT AREA
- NON-TECUMSEH PROPERTY
- TECUMSEH PROPERTY LINE

CMS AREA
(Site No. 915009)

LAKE ERIE
STEEL WINDS I LEASE AREA
REVETMENT & SLOPE STABILIZATION AREA
SMOKES CREEK LOWER REACH PREVIOUSLY DREDGED AS ICM
GRADE SIDE SLOPES TO IMPROVE SAFETY
OU-3 EXTERNAL GROUNDWATER COLLECTION & TREATMENT AREA
EXCAVATE HG-IMPACTED SLAG/FILL FOR OFFSITE DISPOSAL
SOLID WASTE CAMU
PREVIOUSLY EXCAVATED AND CONSOLIDATED WITHIN ATP-ECM
ATP-ECM CONTAINMENT CELL
ATP-ECM PRE-TREATMENTBUILDING
ATP-ECM PRE-TREATMENT DISCHARGE TO ERIE COUNTY SEWER DISTRICT #6
SMOKES CREEK
SMOKES CREEK UPPER REACH (MAINTENANCE DREDGING BY OTHERS)
SOUTH BUFFALO RAILROAD COMPANY
WELDED TUBE USA
SWMUS P-18 A& B PREVIOUSLY DREDGED, TREATED, AND CONSOLIDATED WITHIN ATP-ECM
SWMU P-76 (COKE OVEN GAS LINE) SOLID RESIDUE
DREDGE AND REMOVE SEDIMENT AND DEBRIS FROM SRWT AND NRWT CONSOLIDATE IN THE SW-CAMU
BUFFALO AND ERIE COUNTY INDUSTRIAL LAND DEVELOPMENT CORPORATION
OU-4 COKE BY-PRODUCTS GROUNDWATER COLLECTION & TREATMENT AREA
OU-4 INFILTRATION GALLERY
OU-4 COKE BY-PRODUCTS VEGETATED SOIL COVER PLACEMENT SUB-AREA
OU-4 PRE-TREATMENTBUILDING
BENZOL YARD SOURCE AREA TREATMENT AREA (SOIL VAPOR EXTRACTION)
PREVIOUSLY REMEDIATED
AOC-D TO BE EXCAVATED AND CONSOLIDATED WITH SWMU S-23
EXISTING GEOCOMPOSITE COVER SYSTEM
MINE SLAG FOR RECOVERY, UNSUITABLE MATERIALS TO SW-CAMU
U.S.A.C.E. SEDIMENT DISPOSAL AREA
U.S. HARBOR LINE EST. AUG. 17, 1903
BUFFALO OUTER HARBOR
GATEWAY TRADE CENTER (G.T.C.)
SOUTH RETURN WATER TRENCH
NORTH RETURN WATER TRENCH

SCALE: 1 INCH = 350 FEET
SCALE IN FEET
(approximate)

WASTE TO BE CONSOLIDATED INTO SW-CAMU*

SWMUs	Estimated Waste Volume (CY)		Comments
	Low	High	
S-12	0	460	Bagged asbestos
S-14	0	16,000	PAH impacted slag potentially generated during slag reclamation
S-15	0	1,000	General Rubble Landfill O, C&D Debris, tires, scrap steel
S-18	0	4,200	Waste with lead > ISCOs (TCLP Pb < 5 mg/L) and weathered lime waste
S-19	0	10,000	Murphy's Mountain, Steel slag, C&D Debris: C&D Debris to SW-CAMU, Slag to SWMU S-10 for backfilling
Tank Farm P-8, P-74, P-75	22,000	70,000	Petroleum-impacted slag
P-7 & P-10	1,000	1,000	PAH impacted slag fill
NRWT	100	100	Debris
SRWT	4,000	12,000	Assumed between 1 and 3 feet of sediment to be dredged
Total	**27,000**	**115,000**	Total Quantity will vary from this amount due to additions from Coke Plant and other areas within the CMS Area

* - Quantities do not reflect waste/fill in S-7/S-20.

WASTE AND C&D DEBRIS TO BE CONSOLIDATED INTO IMPOUNDMENTS

Source	Estimated Volume (CY) *		Comments
	Low	High	
S-7/20	14,000	35,000	Excavate and relocate waste from SWMU to impoundment area to make space available for the low permeability liner and leachate collection system and to provide material to raise subgrade of waste in the impoundments to promote positive drainage
S-27	1,000	24,000	Sludge from SWMU S-1; Quantity Undefined. Assume 1,000 to 24,000 CY present
Coke Plant Building Demolition	0	10,000	Roughly estimated quantity of C&D debris
CMS Area Slag Reclamation SW Debris	0	25,000	SW Debris generated during slag reclamation and miscellaneous debris
Totals	**15,000**	**94,000**	

* - Quantities do not reflect waste/fill in S-1, S-2, S-3, S-4, S-5, & S-6

REVISIONS

NO.	BY	DATE	REMARKS

DRAWN BY: RFL
DATE: MAY 2019
CHECKED BY: LR
APPROVED BY: PHW

SEAL

JOB NO.: 0071-017-111

CMS AREA RECOMMENDED CORRECTIVE ACTION PLAN SUMMARY

CMS REPORT
CMS AREA - FORMER BETHLEHEM STEEL SITE
LACKAWANNA, NEW YORK

PREPARED FOR
TECUMSEH REDEVELOPMENT INC.

Figure 10-1

Bethlehem Steel (915009)

Lackawana, NY
Statement of Basis OU1, 9 & 10

Figure 10-2
Elevated pH

Legend

Wells

Field pH (S.U.)

- 7.0 - 11.0
- 11.0 - 12.5
- 12.5 - 14.0

Note: (1) Contours interpolated from April 2020 data. (2) Validated data from the April 2020 event is not included.

NEW YORK STATE | Department of Environmental Conservation

Bethlehem Steel (915009)

Lackawana, NY
Statement of Basis OU1, 9 & 10

Figure 10-3
Benzene Exceedances

Legend

Wells

Benzene (ppb)

- 1 - 10
- 10 - 100
- 100 - 1000
- 1000 - 10000

Note: (1) Contours interpolated from April 2020 data. (2) Validated data from the April 2020 event is not included.

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