# Technical Memorandum
# for
# SA1-C&B Contaminated Sediment Removal Operations

## Portage Creek Area Removal
## Kalamazoo, Michigan

Prepared for:

USEPA Region 5
Emergency Response Branch
77 West Jackson
Chicago, IL 60604

Contract No. EP-S5-08-02
Task Order No. 0087

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# 1. INTRODUCTION

Environmental Quality Management, Inc. (EQ) has been tasked with performing a time-critical-removal action (TCRA) to remove polychlorinated biphenyl (PCB) contaminated sediments from targeted locations over a 1.8-mile section of Portage Creek. The Portage Creek Area Site (Site) is a portion of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site. Located in Kalamazoo County, Michigan, this site is pervasively contaminated with PCBs as a result of historic waste practices associated with several paper mills. The Site was listed on the National Priorities List (NPL) on August 30, 1990. The Portage Creek Site is in the City of Kalamazoo, Michigan, beginning at East Cork Street and extending northward approximately 3 miles to the confluence of the Kalamazoo River. Activities associated with this removal action are anticipated to occur in segments along a 1.8-mile stretch of Portage Creek. Work activities will move downstream primarily between Reed Avenue to the East Walnut Street bridge, South Pitcher Street bridge to the railroad crossing west of Rochester Street, and the bend in Portage Creek east of Rochester Street to the confluence with the Kalamazoo River (Figure 1, Site Location Map, Attachment 1).

A comprehensive description of the project is provided in the Work Plan (comprised of sediment removal area technical memorandums and other site documents) for the Portage Creek Area TCRA. The section of Portage Creek targeted for action has been divided into 10 distinct removal areas (Figure 2, Sediment Removal Areas, Attachment 1). The areas targeted for removal will be referred to as SA1-A, SA1-B, SA1-C, SA3-A, SA5-A, SA5-C, Axtell Creek, SA5-D, SA6, and SA7. This technical memorandum will focus on establishing support facilities and contaminated sediment removal operations in the SA1-C&B Area. Approaches described in this technical memorandum supersede all other removal approaches discussed to date in related submittals. SA1C and SA1B will share some site infrastructure features to expedite the completion schedule and minimize cost. Both slope areas are in relatively close geographic proximity to each other, and thus can benefit from sharing some infrastructure features that will minimize the setup, removal, and restoration schedule and the associated costs.

# 2. PROJECT PREPARATION

EQ performed the following activities to prepare the Portage Creek Area Site for contaminated sediment excavation in SA1-C&B.

## 2.1 Pre-excavation Sampling of Data Gap Area SA1-C&B

### 2.1.1 Sampling

EQ conducted sampling at dredging areas SA1-C and SA1-B on May 2, 2013 to further define the extent of contamination and to finalize the removal depths required. Grids 1 through 4 of SA1-C and Grid SA1-B4 were sampled to verify the removal depth and extent of excavation.

### 2.1.2 Analyses

Samples were analyzed for total PCBs by ALS Global of Holland, Michigan. Sampling results are summarized below in Table 1.

**Table 1. SA1-C&B Pre-Removal Sampling Results Summary**

| Area | Grid | Interval | Analytical Result, mg/kg |
|---|---|---|---|
| SA1-C | 1 | 0-12” | 8.40 |
| | | 12”-24” | 5.10 |
| | | 24”-33” | ND |
| | | 12”-24” (Duplicate) | 5.60 |
| | 2 | 0”-12” | 0.70 |
| | | 12”-21” | 0.081 |
| | 3 | 0”-12” | 0.467 |
| | | 12”-24” | 1.69 |
| | | 24”-39” | ND |
| | | 24”-39” (Duplicate) | ND |
| | 4 | 0”-12” | 0.368 |
| | | 12”-24” | 0.32 |
| | | 24”-35” | ND |
| | 5 | - | - |
| SA1-B | 4 | 0”-12” | 0.90 |
| | | 12”-24” | 0.32 |
| | | 24”-35” | ND |

ND=Not Detected.

Sampling results for SA1-C indicated that SA1-C Grids 1 and 3 exceeded cleanup criteria to a depth of 24 inches. Grids 2 and 4 reported levels below cleanup criteria. Regardless, all four grids at SA1-C will be excavated to a depth of 36 inches to ensure contaminants are removed based on results from historical sample analyses and pre-removal sampling. Since it was reported to EPA by MDEQ that the west bank floodplain (SA1-C Grid 5) was visibly contaminated during past sampling activities, Grid 5 will also be excavated to a depth of 36 inches.

Although the samples analyzed from SA1-B were found to be below the cleanup criteria for the site, SA1-B4 will be excavated to a depth of 24 inches to ensure contaminants are removed based on results from historical sample analyses and pre-removal sampling.

Analyses verified that sediment contaminant levels for PCBs were below TSCA disposal limits, and would be acceptable for Subtitle D Landfill Disposal.

# 3. SA1-C CONTAMINATED SEDIMENT REMOVAL

The SA1-C dredging area is primarily located within a parcel of property owned by Omni Source Corporation that lies to the east of Rochester Street and extends south of Michigan Avenue. SA1-C is subdivided into five grids. The SA1-B area is located west of King Highway and south of Michigan Avenue on property owned by ARVCO Container Corporation. The SA1-B area will only address the southern half of Grid SA1-B-4. The sediment removal depth for the SA1-C removal area extends to 36 inches below the existing creek bottom, which includes an estimated 6 inches of over-dredge depth. The sediment removal depth for the SA1-B removal area extends to 24 inches below the existing creek bottom, which includes an estimated 6 inches of over-dredge depth.

The overall surface area to be excavated and dredged in SA1-C is anticipated to be approximately 13,730 $ft^2$. The approximate overall dimensions are 216 ft long with an average width per excavation area segment of 37 ft. The overall surface area to be excavated and dredged in SA1-B is anticipated to be approximately 1,241 $ft^2$. The approximate overall dimensions are 50 ft long with an average width per excavation area segment of 27 ft. EQ will dredge sediments at SA1-C that will require both non-TSCA disposal at a Subtitle D Landfill (approximately 1,933 $yd^3$) and TSCA disposal (220 $yd^3$). EQ will dredge sediments at SA1-B that will only require non-TSCA disposal at a Subtitle D Landfill (approximately 92 $yd^3$). Tables 2 and 3 present excavation details.

**Table 2. SA1-C Excavation Details**

| Grid | Dimensions, ft | Removal Depth, in. | Surface Area/Volume of Subtitle D Soils | Surface Area/Volume of TSCA Soils |
|---|---|---|---|---|
| SA1-C1 | 70’ L by 34’ W | 50 | 1965 $ft^2$ / 303 $yd^3$ | 387 $ft^2$/60 $yd^3$ |
| SA1-C2 | 51’ L by 41’ W | 49 | 1780 $ft^2$/377 $yd^3$ | 717 $ft^2$ /108 $yd^3$ |
| SA1-C3 | 48’ L by 42’ W | 46 | 2072 $ft^2$/293 $yd^3$ | 345 $ft^2$ / 52 $yd^3$ |
| SA1-C4 | 46’ L by 27’ W | 50 | 1074 $ft^2$ / 165 $yd^3$ | |
| SA1-C5 | 131 L by 41’ W | 48 | 5371 $ft^2$/ 795 $yd^3$ | |

**Table 3. SA1-B Excavation Details**

| Grid | Dimensions, ft | Removal Depth, in. | Surface Area/Volume of Subtitle D Soils |
|---|---|---|---|
| SA1-B4 | 50' L by 27' W | 24 | 1241 $ft^2$ / 92 $yd^3$ |

## 3.1 Pre-Sediment Removal Preparation

### 3.1.1 Waste Characterization Sampling Soil

EQ collected characterization soil samples during the May 2, 2013 sampling event previously described. Sampling was performed in compliance with the revised EQ Field Sampling Plan (FSP) (Revision 1, June 2012) that provided information on the number of samples, collection method, and exact analyses to be performed. The soils were analyzed for landfill disposal parameters.

### 3.1.2 Pre-Sediment Removal Condition Assessment

EQ provided a structural engineer to perform a pre-sediment removal assessment of constructed features in and adjacent to the creek channel excavation areas. Details of this assessment are provided in a report entitled "Pre-Sediment Removal Structure Feature Assessment Removal Areas SA1-A, SA1-B and SA1-C" dated May 2013 prepared by Fleis and Vandenbrink Engineering Inc. The report identifies the structural features in the SA1-A through SA1-C work areas. The structural features for SA1-B and SA1-C are presented in Table 4. Table 5 presents the potential impact of the constructed features of SA1-B and SA1-C on dredging operations.

### 3.1.3 Clearing and Grubbing of Access Road and Excavation Area

Clearing and grubbing was performed in March 2013 and again in May 2013 to open access to both dredging areas. EQ cleared and grubbed an access road route to the SA1-C excavation area. Figure 3, Sediment and Erosion Control Practices, depicts the access road route as well as other site infrastructure features. Clearing and grubbing was performed to the outer extent of the infrastructure features.

**Table 4. SA1-C&B Constructed Features**

| Report Designation | Location | Constructed Features |
|---|---|---|
| SA1-B | • East of SA1-B Excavation Area<br>• East bank of creek 50 ft north of railroad bridge at north end of SA1-C<br>• West bank of creek adjacent to excavation area<br>• East of excavation area between bank and asphalt lot<br>• East bank of SA1-B near north end<br>• East bank at north end of SA1-B | • Asphalt pavement east of the excavation area<br>• 15-in. clay tile storm water outlet<br>• Industrial building with exposed concrete foundation on southern section and steel sheet pile on the northern section<br>• Guy pole and anchor cable<br>• Corrugated PVC outlet<br>• 8-ft-tall chainlink fence with barbed wire oriented perpendicular to creek channel |
| SA1-C1 | • Along east bank<br>• Along east bank north of building<br>• West bank toward southern end<br>• Along south side of creek east of SA1-C1 | • Industrial building with 12-inch clay drain tile extending out from foundation<br>• 12-inch PVC drain line and 12-inch clay tile extending from bank<br>• Concrete slab<br>• 4-inch PVC drain line extruding from concrete retaining wall |
| SA1-C2 | • East bank toward southern end<br>• East bank | • 6-ft-tall chainlink fence with barbed wire<br>• 24-inch concrete storm sewer outlet |
| SA1-C3 | • West bank<br>• East bank | • Concrete slab<br>• Utility pole and guy wire anchor |
| SA1-C4 | • North end<br>• 20-ft south of railroad bridge | • Railroad bridge with concrete abutments and timber railing<br>• Concrete block and chainlink fencing |
| SA1-C5 | • Concrete foundations at top of bank | • Do not excavate or disturb soils adjacent to concrete foundations |

**Table 5. SA1-C&B Impact of Constructed Features on Dredging Operations**

| Constructed Feature | Designation | Impact/Protective Measure |
|---|---|---|
| • Asphalt pavement<br>• Industrial building exposed foundation<br>• Guy pole and anchor cable<br>• Corrugated PVC outlet<br>• Chainlink fence | SA1-B | • Excavation will be performed from 8' x 14' hard wood mats to protect pavement<br>• Pole and guy wires will be removed by Consumers Energy prior to excavation and replaced afterward.<br>• Maintain safe operating distance with site equipment. |
| • Industrial building<br>• Concrete slab<br>• Drain lines and storm outlets | SA1-C1 | • Shallow removal depth and maintaining 5-ft distance from building.<br>• Slab is from demolished structure and serves no further purpose.<br>• Maintain safe operating distance with site equipment. |
| • Chainlink fence<br>• Concrete slabs bank stabilization<br>• Storm sewer outlet | SA1-C2 | • Fence is outside excavation area and on east bank from where removal operations will be conducted; therefore, no threat to damage from removal operations. Any sections removed or damaged due to access requirements or discharge pipe routing will be repaired or replaced.<br>• Maintain safe operating distance with site equipment |
| • Concrete slab<br>• Utility pole and guy wire anchor | SA1-C3 | • Slab is from demolished structure and serves no further purpose.<br>• Traffic cones and caution tape will be used to alert work crews of utility pole and guy wire anchor. Any heavy equipment or cranes operating in this area will maintain a safe setback distance to avoid contact or damage. |
| • Railroad bridge<br>• Concrete block and chainlink fence | SA1-C4 | • Though the railroad bridge is a condemned structure, a 20-ft distance will be maintained from excavation.<br>• A 5-ft easement will be maintained from fencing and block. |

The SA1-B access route did not require clearing and grubbing because access is through paved areas of the ARVCO Container Corporation facility. However, limited clearing and grubbing work was performed in May 2013 to facilitate access to the discharge area for the bypass pumping system in SA1-B. The access route to SA1-C extends from the south end of Rochester

Road southeast into a fenced-in property owned by OmniSource Corporation adjacent to the west side of the slope area.

EQ cleared and grubbed the entire eastern bank of the creek channel from the railroad bridge at the north end of SA1-C to the northern end of the 108 Parkway Drive lot in SA1-B to facilitate the installation of the bypass pump discharge lines past SA1-B. EQ cleared and grubbed both banks along the length of SA1-C to facilitate dredging that slope area. EQ performs all clearing and grubbing in such a manner to protect the root mass in the overall work area to maintain soil stability.

Tree tops and tree trunks are handled as described in the EQ Debris Management Plan dated September 2011.

### 3.1.4 Environmental Controls

EQ will install environmental controls per requirements established in the revised EQ Sedimentation and Erosion Control Plan (Revision 1, May 2013). These environmental controls will include the following Best Management Practices (BMPs):

- Construction Exits—EQ will install a construction entrance near the west gate of the OmniSource property just east of the south end of Rochester Avenue as depicted in Attachment 1, Figure 3. Installed construction exits will consist of a 6-inch-thick layer of 1- to 3-inch rock. The construction exits will be approximately 15 ft wide.
- Tire Wash Station—EQ will install and operate a portable tire wash station(s) between the support area and the entrance for the construction exits described above. After each truck is loaded with exhumed sediment, laborer(s) equipped with high-pressure water washer(s) will spray off the dirt from truck tires as they pass through the portable tire wash station prior to exiting the site. Wash waters will periodically be pumped to a temporary storage tank and trucked to the waste water treatment plant to maintain suitable storage capacity. Additional periodic maintenance will be required to remove sediment accumulations, which will be solidified and loaded into transfer trucks to be shipped to the John Street TCRA staging pad.
- Paved Surface Management—EQ will provide a power broom with a water tank to perform housekeeping of any paved work areas.
- Dust Control—EQ will provide a water truck for dust control for the mixing area and truck route.
- Fuel Station—EQ will fuel the heavy equipment in the support area depicted in Attachment 1, Figure 3, Site Infrastructure. A 300-gallon temporary fuel tank with secondary containment will be stationed at this location. Two 1000-gallon temporary fuel tanks with

secondary containment will be stationed adjacent to the bypass pump location. EQ will also provide emergency spill control kits that will include drums, oil dry, adsorbent pads, and a boom to address small spills that will be staged adjacent to the designated fueling areas.

- Sediment Curtain—EQ will install one or more Type II sediment curtains downstream of the sediment removal operations perpendicular to the stream flow. Additional curtain(s) will be installed downstream of the cofferdams and bypass pumping discharge pads.
- Silt Fence—EQ will install a silt fence at the bottom of the slopes along both sides of the creek subsequent to completion of excavation activities to stabilize sediments until vegetation is re-established.
- Mulch Blanket—EQ will install an additional mulch blanket as needed.
- Rock Discharge Pads—When EQ isolates an excavation area, bypass pumping will be required to maintain creek flow. EQ will isolate the entire SA1-C&B dredging area with one upstream and one downstream coffer dam. Therefore, EQ will install one or more rock discharge pads downstream of each isolated section through which the discharge lines of the various bypass pumps will be directed to release their water. The rock discharge pads will be filled with rip-rap stone to dissipate discharge velocity.
- Turbidity Monitoring Station—EQ will establish turbidity monitoring station(s) to monitor the turbidity levels during removal operations. Real-time turbidity monitoring will be performed with stations set 300 ft upstream, 200 ft downstream, and 300 ft downstream of cofferdams set at each area. Turbidity monitoring will be recorded on half-hour intervals by a programmed data logger at the turbidity station. Other readings may be collected based on field conditions such as the presence of visible runoff to the creek in the work vicinity, or as part of mitigation measures. Data will be transferred to a computer in the EQ command post trailer via a cellular modem. Further details concerning turbidity monitoring and corrective action measures are presented in EQ's FSP for Portage Creek Removal Area (Revision 1, June 2012).

Additional environmental controls will be implemented as needed to supplement pre-construction controls as work progresses and site features are impacted by the sediment remediation activities.

### 3.1.5 Access Road Construction

EQ only needed to make minimal improvements to construct the access roads to SA1-C and SA1-B.

### 3.1.6 Dredging Area Isolation

EQ will install two sheet pile cofferdams to isolate the SA1-C dredging area and facilitate dewatering to permit "dredging-in-the-dry" of the contaminated sediments. The location of the coffer dams is depicted in Attachment1, Figure 3, Sediment and Erosion Control Practices.

These cofferdams will be completed to an elevation approximately 6 inches above the average creek water level elevation. The elevation completion height has been specified by USEPA to allow storm water overflow into the isolated excavation area in the event of bypass pumping failure and/or a storm event to prevent upstream flooding due to sediment removal operations.

### 3.1.7 Bypass Pumping

Creek channel bypass pumping will consist of capturing the stream flow from the creek from above the upstream isolation cofferdam and pumping it past the downstream isolation cofferdam and discharging captured creek waters on a rock discharge pad installed by EQ. The subcontractor will be required to provide redundant pumps and ancillary equipment to allow for maintenance of the pumping systems without impacting dredging operations. There may be exceptions to this specification during bypass pumping around isolated areas where suitable work space is unavailable to operate multiple 18-inch discharge lines. Bypass pumping operations will be described in the subsequent water management subsection. The bypass pumping systems will be installed prior to installation of the upstream/downstream isolation cofferdam. Attachment 1, Figure 3, Sediment and Erosion Control Practices, depicts the location of the bypass pumps and discharge piping.

### 3.1.8 Dredging Area Dewatering

EQ will provide a dewatering subcontractor to perform isolated dredging area dewatering. The subcontractor will install a series of PVC sipper wells with a jetting probe. The sipper wells will consist of PVC tubes on approximate 5-foot centers jetted to an approximate depth of 10 feet below the creek bottom surface elevation. Tubing will connect the sipper wells to a manifold pipe. The manifold pipe will be connected to a vacuum pump that discharges into a pipeline that transfers recovered water past the downstream isolation cofferdam onto the same discharge pads as the bypass pumping system. A vacuum will be placed on the sipper wells to extract water

from the sediment. Several days of pumping will be permitted prior to the start of dredging to remove the maximum amount of moisture from the sediments prior to dredging. The sipper wells and manifold system will be installed along both east and west banks of SA1-C. The sipper wells and manifold system will be installed only along the east bank at SA1-B. This will facilitate sediment removal with minimal solidification at the removal area. Minimizing water content in sediment has the following benefits:

- Requires less solidification material, thus lowering the purchase cost of solidification material and dust control issues associated with solidification.
- Decreases water weight in sediment, thus reducing disposal cost by reducing disposal tonnage.
- Decreases volume of solidification material, thus decreasing waste volume and tonnage disposal costs.

The end result is a cost and safety benefit.

### 3.1.9 Pre-Excavation Topographic Survey

EQ will coordinate with the EPA FIELDS Group to perform a pre-excavation survey of the removal area to fill in data gaps not captured when surveying the transect lines. This survey data will be used for multiple purposes. First, it will document the pre-removal topographical condition of the creek channel. This serves as a baseline to measure the performance of contaminated sediment removal and creek channel stabilization/backfill activities. To accomplish this, the survey data will then be loaded into the Real-Time Kinematic–Global Positioning System (RTK-GPS) equipment mounted on the excavators used for dredging to guide excavation/backfill efforts and ensure the lateral/vertical extent of contaminated sediment removal and backfill restoration are performed correctly.

## 3.2 Contaminated Sediment Removal

Sediment removal at SA1-C will be performed in the same manner as upstream removals that included SA3-A, SA5-A, SA5-C, SA5-D, Axtell Creek, and the downstream half of SA6. This approach utilized a long-reach excavator equipped with an RTK-GPS to excavate sediments, transfer them to a mixing box for further solidification if needed, and load them into tri-axle dump trucks (TDTs) to relocate the material to the John Street TCRA staging for accumulation

prior to shipment to either the approved TSCA or subtitle D landfill as waste sediment characteristics dictated.

Sediment removal at SA1-B will be performed in a similar manner as SA1C removing sediment from the east bank of the creek with a long reach excavator. Site conditions are such that the long reach excavator can reach to target removal depth from limited work space on top of the creek bank.

Sediment removal will begin in SA1-C at the northern end of the slope area. Sediment in the creek channel will be removed from the top of the bank with a long-reach excavator with RTK-GPS equipment. Bypass pumping will be performed to maintain creek flow and storm water drainage. Sediments will be solidified sufficiently in place to allow TDTs to move material to the John Street TCRA Staging Pad for final dewatering/solidification and subsequent shipment for disposal. Exhumed material will be directly loaded and shipped to the staging pad. Post-removal sampling and surveying will be performed to verify that cleanup objectives have been met. Once isolated removal area objectives have been met, toe-of-bank stabilization and backfilling will be conducted along with survey verification. The western bank floodplain grid (SA1-C5) will be excavated once Grids 1-4 are excavated and backfilled from the top of the bank. Grid 5 will be backfilled and the slope will be stabilized with clean fill material obtained from SA3A.

### 3.2.1 Water Management

Bypass pumping operations will begin prior to isolating the dredging area with sheet pile cofferdams. Bypass pumping will operate 24 hours/day, 7 days/week until the isolated dredging area is dredged, the area is confirmatory surveyed/sampled, toe-of-bank stabilization is completed, and the area is backfilled. Bypass pumping will be terminated during rain and associated flooding events that exceed pumping capacity, and creek flow will be permitted to enter the isolated dredging area; bypass pumping will resume subsequent to flood crest. The discharge of bypass pumping waters will not require a Substantive Requirements Document (SRD).

The isolation area dewatering pumping system will be operated 24 hours/day, 7 days/week until the isolated dredging area is dredged, the area is confirmatory surveyed/sampled, bank stabilization is completed, and the area is backfilled.

### 3.2.2 Dredging of SA1-C

#### 3.2.2.1 Sediment Removal

As previously stated, sediment removal in the SA1-C removal area will begin in Grid SA1-C1. EQ will then dredge contaminated sediments from Grids SA1-C1 to C4 using a top-of-bank dredging approach subsequent to surface dewatering the isolated sections working from portions of Grid SA1-C5. EQ will then complete Grid SA1-C5, subsequent to sediment removal and backfill of Grids SA1-C1-4. EQ will dredge the isolated areas from atop the western bank by using a long-reach excavator equipped with an RTK-GPS. EQ will solidify sediments in the creek bed or in solidification boxes (as/if needed) to prepare them for transfer to the John Street TCRA staging pad. EQ may use one or a combination of three solidification materials that include Calciment ®, crystallized polymer, and/or corn cob grit. The long-reach excavator will use a smooth-edge bucket to exhume sediments to the target depth in each grid, clearing sediment from the east bank to the west bank as removal progresses to the north in a downstream direction. Once sediments are sufficiently solidified, the excavator operator will load the TDTs for transfer to the John Street TCRA staging pad.

#### 3.2.2.2 Contaminated Sediment Removal and Transfer to Staging Area

TDTs will back up to the load-out area at the creek side. The load-out area will be covered with plastic sheeting draped back into the active excavation area to allow for containment and recovery of spillage from loading operations. Excavator operators will take special care during loading so as to not spill sediment. Trucks will advance to the tire wash station for tire cleaning prior to departing to the John Street TCRA staging pad. TDTs will follow the prescribed route in the Traffic Control Plan (Revision 2, March 2013) to return to the John Street TCRA staging pad to transfer their sediment waste load. Trucks will advance to the John Street TCRA tire wash station before returning to SA1-C over the prescribed route in the EQ Traffic Control Plan.

#### 3.2.2.3 Post-Excavation Sampling

EQ will support the START contractor in post-excavation sampling of the contaminated soil removal area following the methods and procedures described in the confirmation sediment collection sampling described in the FSP. EQ will provide laboratory analyses through a competitively procured laboratory. Sampling and analyses will be performed in accordance with the updated QAPP and FSP. Sampling locations will be marked in order to document locations during post-excavation survey operations. The turnaround time for sample analyses will be determined at/or near the time of collection subject to time constraints with other site operations.

Based on observations made and field experience during calendar year 2012, excavation will proceed to the initial target depth; if visual contamination is still apparent in the grid(s), samples will be collected in every other grid of the slope area to verify remaining contamination. If over-excavation is warranted in a particular grid(s), it will be over-excavated until visual evidence of paper sludge or contaminated sediment has been removed. At that time, samples will again be collected in each grid. If cleanup performance standards/goals are met in each grid, work will proceed with backfilling the excavation. If any grid fails to meet performance standards/goals, the excavation and sampling process will be repeated as needed (or as directed by the EPA OSC) prior to backfilling.

#### 3.2.2.4 Post-Excavation Survey

EQ will coordinate with the EPA OSC to provide post-excavation elevations by taking at least 3 final depth measurements in each grid using the RTK-GPS system on the excavator. EQ will provide the measurements to the EPA OSC to facilitate the required volume removal calculations by the EPA FIELDS Group.

#### 3.2.2.5 Toe-of-Bank Restoration

The floodplain and toe of banks will be restored as described in EQ's Restoration Plan dated September 2011 as well as in a Site-Specific Restoration Plan to be developed in coordination with the landowners.

#### 3.2.2.6 Backfill of Creek Bottom and Floodplain

EQ will deploy backfill using rip-rap, river rock, and a sand-and-gravel mix (bank run) to backfill the creek bottom in accordance with EQ's Restoration Plan.

#### 3.2.2.7 Post-Backfill Survey

EQ will coordinate with the EPA OSC and EPA FIELDS Group to conduct post-backfill surveying of SA1-C. The EPA FIELDS Group will prepare as-built drawings and make required volume removal calculations.

#### 3.2.2.8 Post-Sediment Removal Condition Assessment

EQ will provide a structural engineer to perform a post-sediment removal assessment of constructed features in and adjacent to the creek channel excavation areas. Details of this assessment will be provided in a report prepared by a professional engineer. The report will identify the same structural features presented in Table 2 along with any impacts of dredging operations on the constructed features.

### 3.2.3 Dredging of SA1-B

#### 3.2.3.1 Sediment Removal

Dredging of SA1-B will be executed in the same manner as previous slope areas. SA1-B will be excavated from the east bank of the creek. The creek by pass discharge lines and a utility pole restrict access for the long reach excavator. Therefore the utility pole positioned east of the creek in the approximate center of grid length will require temporary removal to facilitate access for the long reach excavator to reach the entire span of the removal area. In the event that the long reach excavator cannot complete removal of the entire grid area to the targeted depth, a high volume vacuum truck will be used to vacuum excavate the remainder of targeted sediments. The vacuum truck will be positioned as close to the creek as possible and a laborer equipped with the vacuum suction line will exhume areas not accessible with the long reach excavator. The vacuum truck will direct exhumed sediments into vacuum boxes positioned near the vacuum truck. The vacuum boxes will be transferred to the John Street staging pad via roll off tractor

trailer vehicle to deposit the material for final dewatering. The vacuum boxes will be decontaminated with a high pressure rinse prior to be released from site.

#### 3.2.3.2 Contaminated Sediment Removal and Transfer to Staging Area

Sediment solidification and transfer will be completed in the same manner as described in Section 3.2.2.2.

#### 3.2.3.3 Post-Excavation Sampling

EQ will support the START contractor in post-excavation sampling of the contaminated soil removal area following the methods and procedures described in the confirmation sediment collection sampling described in the FSP. EQ will provide laboratory analyses through a competitively procured laboratory. Sampling and analyses will be performed in accordance with the QAPP and FSP. Sampling locations will be marked in order to document locations during post-excavation survey operations. The turnaround time for sample analyses will be determined at/or near the time of collection subject to time constraints with other site operations.

Based on observations made and field experience during calendar year 2012, excavation will proceed to the initial target depth; if visual contamination is still apparent in the grid(s), samples will be collected in the grid of the slope area to verify remaining contamination. If over-excavation is warranted in a particular grid(s), the grid will be over-excavated until visual evidence of paper sludge or contaminated sediment has been removed. At that time, samples will again be collected in each grid. If cleanup performance standards/goals are met in each grid, work will proceed with backfilling the excavation. If the grid fails to meet performance standards/goals, the excavation and sampling process will be repeated as needed (or as directed by the EPA OSC) prior to backfilling.

#### 3.2.3.4 Post-Excavation Survey

EQ will coordinate with the EPA OSC to provide post-excavation elevations by either taking 3 final depth measurements in the SA1-B4 grid using the RTK-GPS system on the excavator or working with the EPA FIELDS Group survey team. EQ will provide the measurements to the EPA OSC to facilitate the required volume removal calculations by the EPA FIELDS Group.

#### 3.2.3.5 Toe-of-Bank Restoration

The floodplain and toe of banks will be restored as described in EQ's Restoration Plan as well as in a Site-Specific Restoration Plan to be developed in coordination with the landowners.

#### 3.2.3.6 Backfill of Creek Bottom and Floodplain

EQ will deploy backfill using rip-rap, river rock, and a sand-and-gravel mix (bank run) to backfill the creek bottom in accordance with EQ's Restoration Plan.

#### 3.2.3.7 Post-Backfill Survey

EQ will coordinate with the EPA OSC and EPA FIELDS Group to conduct post-backfill surveying of SA1-B4. The EPA FIELDS Group will prepare as-built drawings and make required volume removal calculations.

#### 3.2.3.8 Post-Sediment Removal Condition Assessment

EQ will provide a structural engineer to perform a post-sediment removal assessment of constructed features in and adjacent to the creek channel excavation areas. Details of this assessment will be provided in a report prepared by a professional engineer. The report will identify the same structural features presented in Table 4 along with any impacts of dredging operations on the constructed features.

### 3.2.4 Site Restoration

#### 3.2.4.1 Removal of Excavation Facilities and Equipment

EQ will remove non-essential facilities and equipment from the work area to restore the site to pre-existing conditions. The fuel tanks, excavation equipment, tire wash station, cofferdams, pumps, pipelines, etc., will be removed.

#### 3.2.4.2 Restoration Planting

EQ will perform restoration planting as described in EQ's Restoration Plan. The final site-specific restoration design plan will include stakeholder input by landowners.

#### 3.2.4.3 Restoration Planting Monitoring

EQ will provide monitoring and corrective action/maintenance for a period of 1 year from the restorative planting date or as directed by EPA in accordance with EQ's Restoration Plan. EQ will also maintain erosion sediment controls until re-vegetation planting is accepted or as directed by EPA.

#### 3.2.4.4 Facility Impact Repair

EQ will make repairs to the sediment removal sites caused by sediment removal operations. EQ, EPA, and the appropriate property owner stakeholder will review pre-existing photo-documentation to develop a punch list of any necessary repair items to be addressed prior to complete demobilization from the SA1-C&B contaminated sediment removal area. EQ anticipates (at a minimum) that this will include landscaping of disturbed areas, asphalt/concrete patching, and general housekeeping.

# ATTACHMENT 1

# FIGURES

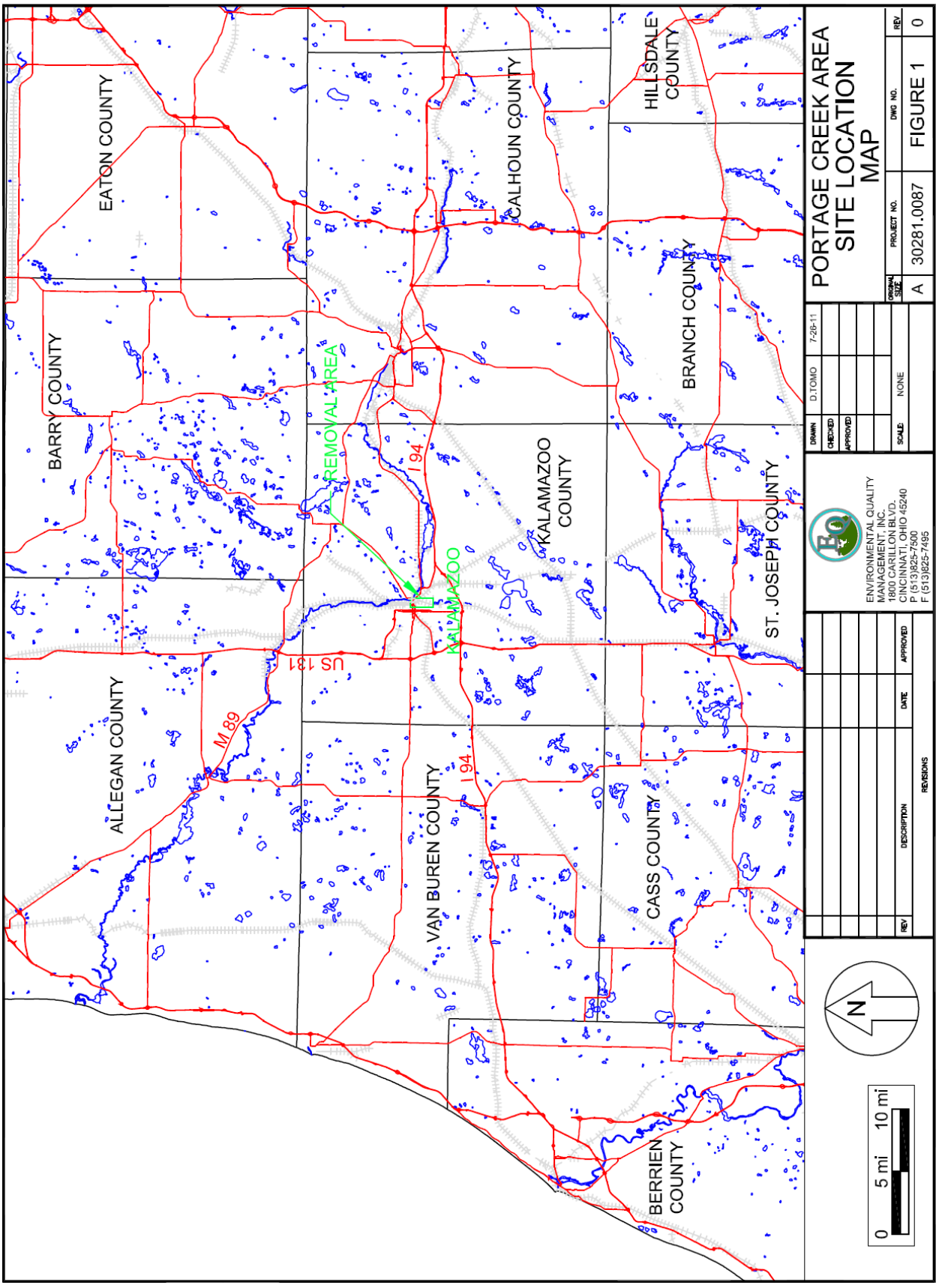


**Figure 1. Site Location Map**

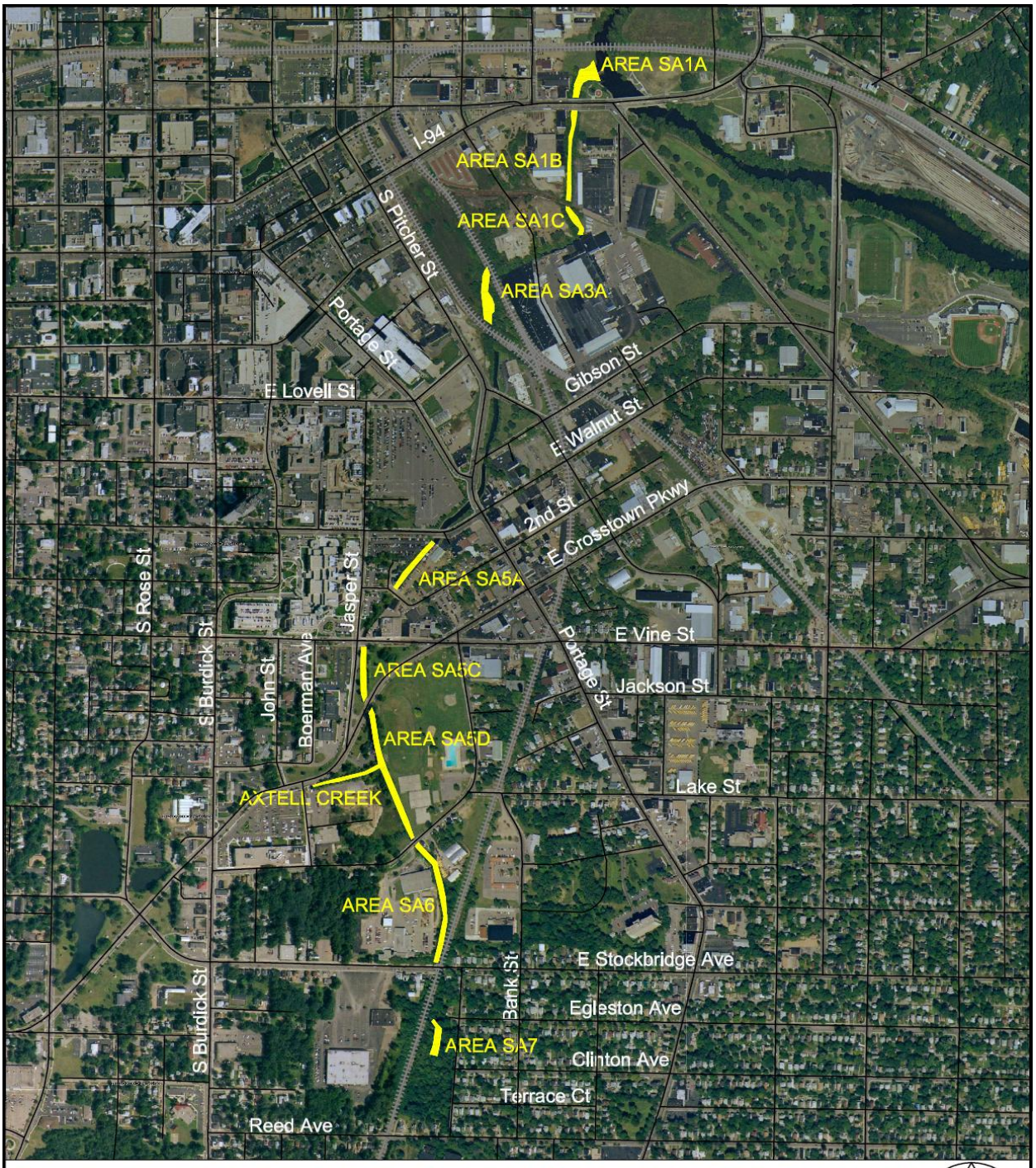


**Figure 2. Sediment Removal Areas**


**Figure 3. Sediment and Erosion Control Practices**