TECHNICAL MEMORANDUM

for

SA6 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
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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 located 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 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).

A comprehensive description of the project is provided in the Work Plan (composed of sediment removal area Technical memorandums and other site documents) for the Portage Creek Area Time-Critical Removal Action. The section of Portage Creek targeted for action has been divided into 10 distinct removal areas (Figure 2, Sediment Removal Areas). 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 soil removal operations in the SA6 Area. Approaches described in this technical memorandum supersede all other removal approaches discussed to date in related submittals.

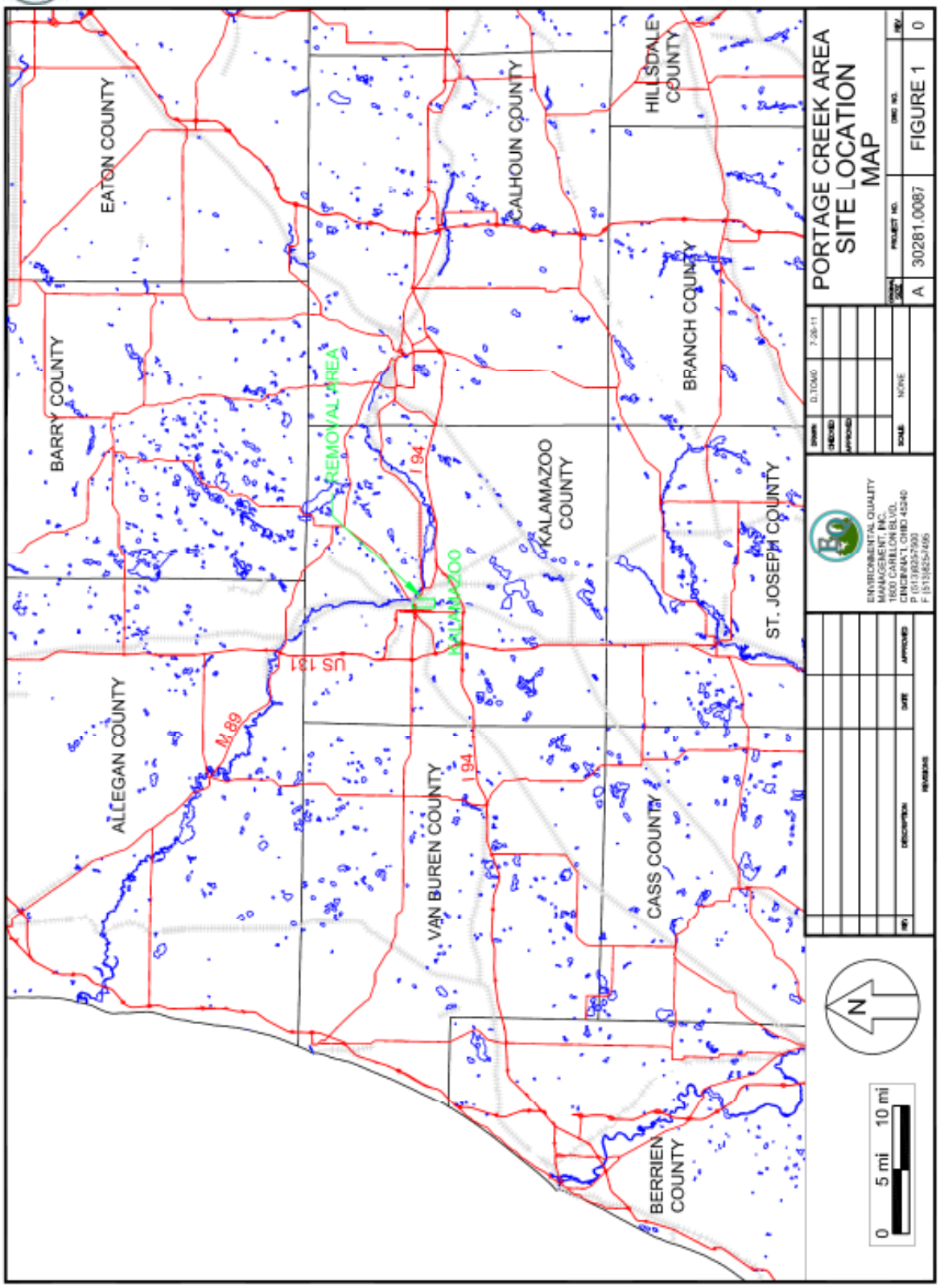

Figure 1. Site Location

Figure 2. Sediment Removal Areas

2. PROJECT PREPARATION

EQ will perform the following activities to prepare the Portage Creek Area Site for contaminated sediment excavation in SA6.

2.1 Limb and Brush Removal Support for Pre-Survey SA6

EQ will provide a foreman and three laborers to remove limbs and brush to enable the USEPA FIELDS Group to acquire line-of-site access for survey instruments and to obtain preliminary elevation data to create design drawings for sediment removal in Area SA6. Crews will be equipped with hand saws, looping shears, and pole pruners. Crews will clear limbs and brush to open transect lines at grids SA6-1 through SA6-14 to create line-of-sight access for survey instruments. This effort is expected to be completed in 6 to 8 workdays.

2.2 Pre-excavation Sampling of Data Gap Area SA6

2.2.1 Sampling

EQ will conduct sampling at dredging area SA6 to further define the extent of contamination and to finalize the removal depths required. SA6 grids that require pre-dredging sampling are SA6-1, SA6-6, SA6-10, SA11, SA6-13, and SA6-14. Sampling efforts will be performed jointly with the USEPA START Contractor. EQ will supply sampling equipment and supplies. The START representative will be responsible for sample preparation and labeling, completing chain-of-custody, and packaging samples for shipment. Details regarding sampling, procedures, and protocols are presented in the Field Sampling Plan (FSP) and the Quality Assurance Protection Plan (QAPP). In addition, EQ will collect samples so that waste characterization analyses can be conducted as part of the process for securing disposal acceptance of the TSCA waste soils/sediments and Subtitle D waste soils/sediments.

2.2.2 Analyses

EQ will provide laboratory analyses of the collected samples. Details regarding sample analyses, turnaround time, and QAQC levels are presented in the FSP and QAPP.

3. SA6 CONTAMINATED SEDIMENT REMOVAL

The SA6 dredging area lies to the north of the East Stockbridge Avenue bridge and extends north to the Lake Street bridge. It is bordered on the east by the Grand Elk railroad, property owned by the School District of Kalamazoo, and a private residence. Property on the west side of Portage Creek is a maintenance vehicle yard owned by the City's Public Services Department. The sediment removal depth extends from 18 to 36 inches below the existing creek bottom which includes an estimated 6 inches of over-dredge depth.

The overall surface area of the dredging is anticipated to be approximately 3,491 square yards (sy). The approximate overall dimensions are 895 ft long by 36 ft wide. EQ will dredge sediments that will require TSCA disposal (approximately 28 cubic yards (cy)) and sediments requiring non-TSCA disposal at a Subtitle D Landfill (approximately 2,380 cy). The SA6 Dredging Area is subdivided into 14 grids (SA6-1 through SA6-14). All 14 grids will have sediments that require non-TSCA disposal. SA6-14 is the only grid that requires TSCA disposal. The sediment dredging areas are depicted in Figure 3, SA6 Dredging Areas. When dredging operations are conducted in Grid SA6-14, EQ will first remove the TSCA soils in SA6-14 prior to removing the Subtitle D material. Dredging in this manner will allow for segregation of the TSCA material from the Subtitle D material. Table 1 summarizes excavation information specific to Area SA6.

Table 1. Excavation Details

Excavation Area	Dimensions	Removal Depth	Surface Area/Volume of TSCA Soils	Surface Area/Volume of Subtitle D Soils
SA6-1	29.5'W by 71'L	18"	0/0	2094 sf/116 cy
SA6-2	33.5' W by 69' L	18"	0/0	2311 sf/128 cy
SA6-3	36'W by 64' L	30"	0/0	2304 sf/213 cy
SA6-4	34' W by 70' L	30"	0/0	2380 sf/220 cy
SA6-5	30' W by 76' L	36"	0/0	2280 sf/253 cy
SA6-6	30' W by 79' L	36"	0/0	2370 sf/263 cy
SA6-7	37.5' W by 60' L	18"	0/0	2250 sf/125 cy
SA6-8	42' W by 67' L	18"	0/0	2981 sf/166 cy
SA6-9	44.5' W by 56' L	18"	0/0	2492 sf/138 cy
SA6-10	42.5' W by 57' L	18"	0/0	2422 sf/135 cy
SA6-11	38' W by 57' L	18"	0/0	2166 sf/120 cy
SA6-12	37.5' W by 57' L	30"	0/0	2137 sf/198 cy
SA6-13	37 W by 64' L	30"	0/0	2368 sf/219 cy
SA6-14	37' W by 56' L	30"	302 sf/ 28 cy	1770 sf/164 cy

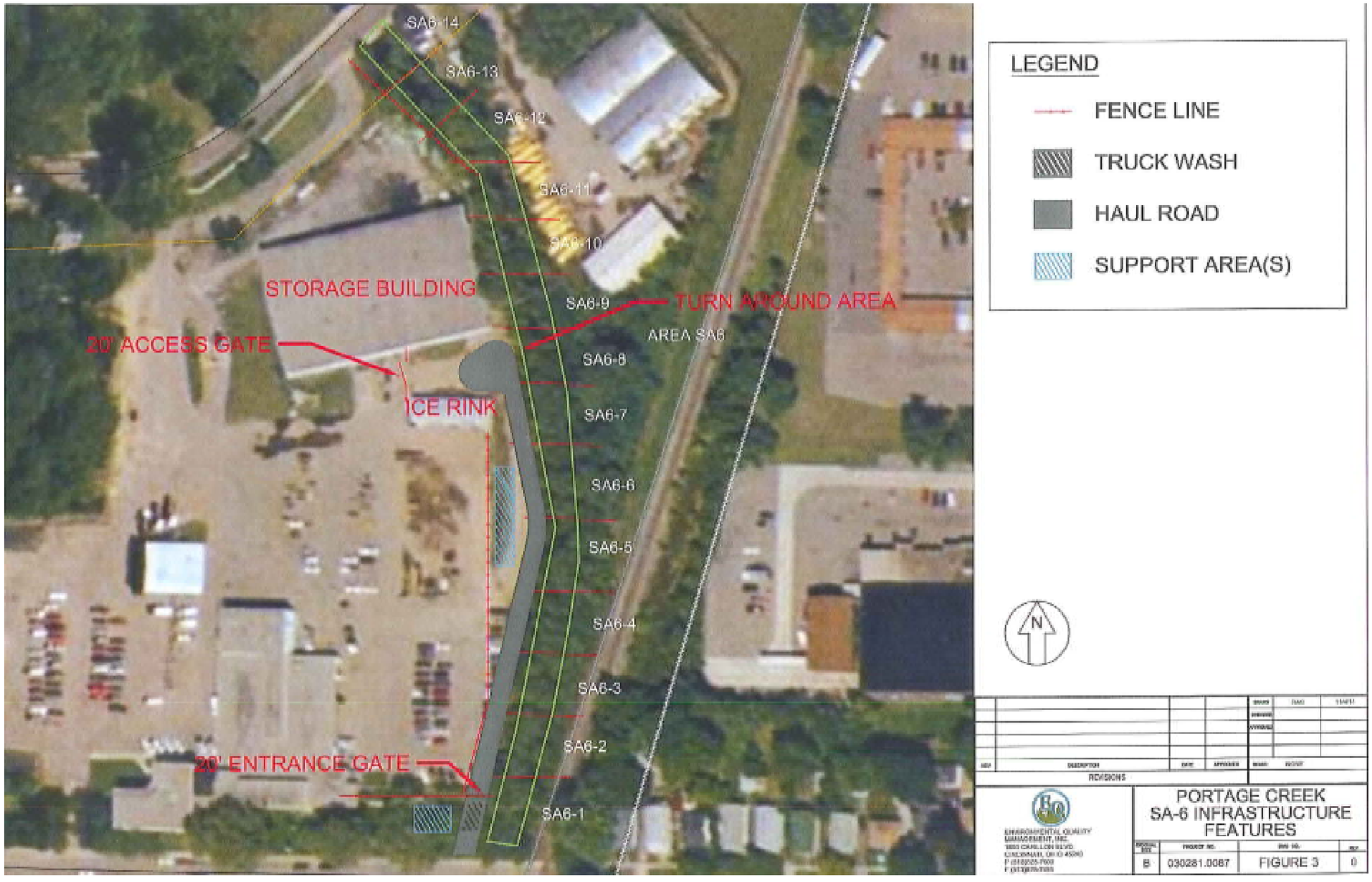
SA6-14
SA6-13
SA6-12
SA6-11
SA6-10
STORAGE BUILDING
SA6-9
TURN AROUND AREA
AREA SA6
20' ACCESS GATE
SA6-8
ICE RINK
SA6-7
SA6-6
SA6-5
SA6-4
SA6-3
SA6-2
20' ENTRANCE GATE
SA6-1
LEGEND
FENCE LINE
TRUCK WASH
HAUL ROAD
SUPPORT AREA(S)
N
REVISIONS
PORTAGE CREEK
SA-6 INFRASTRUCTURE
FEATURES
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FIGURE 3
0

Figure 3. SA6 Dredging Areas

3.1 Pre-Sediment Removal Preparation

3.1.1 Waste Characterization Sampling of TSCA/Subtitle D Soil

EQ will collect characterization soil samples of the TSCA and Subtitle D soils prior to excavation. The EQ FSP dated August 2011 provides information on the number of samples, collection method, and exact analyses to be performed. Both the TSCA and Subtitle D waste soils will be analyzed for landfill disposal parameters.

3.1.2 Pre-Sediment Removal Condition Assessment

EQ will provide a structural engineer to perform a pre-sediment removal assessment of constructed features in and adjacent to the creek channel excavation areas. These constructed features include but are not limited to bridges, storm sewer outfalls, retaining walls, building foundations, and fences. The structural engineer will:

- Inventory the constructed features in the work zones by performing a physical inspection and construction records review.
- Document the pre-existing condition with a written assessment and photographs.
- Prescribe protective measures to maintain the current condition such as (but not limited to) safe set-back distance, shielding, and shoring.

3.1.3 Relocation of Fence Line

EQ will need to temporarily modify the current boundary fence configuration for the Kalamazoo Public Services Facility located at 410 Stockbridge Avenue. This will require modifications to the south and east fence line to allow EQ a sufficient work area along the west side of the creek while remaining isolated from operations at the Kalamazoo Public Services Facility. EQ will temporarily relocate the fence line from SA6-1 to SA6-8 to prepare the site for further work and to maintain site security. This will also require installing a temporary entrance gate that will allow access to and from the work area from Stockbridge Avenue. A second gate will be installed between the Ice Rink Building and the Storage Building to allow the city access to the southeast large bay door on the Storage Building while permitting EQ access to space between buildings to allow sediment transfer trucks to turn around. EQ will also modify the fence

alignment in the northeast corner of the property to improve access for clearing and grubbing, and permit long-reach excavator access for sediment removal in SA6 Grids 13 and 14. This will involve moving the fence back approximately 20 feet near Lake Avenue to <8 feet as the fence alignment approaches the Storage Building. The temporary fence alignment and location of gates are depicted in Figure 3, SA6 Infrastructure Features.

EQ will procure a subcontractor to relocate the fence line. The fencing subcontractor will install new line/corner/anchor posts in the agreed-upon alignment with the City. The subcontractor will disassemble the existing fence line by removing the chainlink fence fabric and appurtenances and relocate/install it on the new line/corner/anchor posts. Original line posts will then be removed and either staged in a protected area for re-use or disposed of as scrap if not suitable for re-use. New fence appurtenances will be provided where existing items cannot be re-used.

3.1.4 Clearing and Grubbing of Access Road and Excavation Area

EQ will clear and grub the western bank of the creek channel along the entire length of SA6 to facilitate dewatering pipeline installation, dredging, and removal of contaminated sediments off site. Clearing and grubbing of vegetation will extend from south of the Lake Street bridge to just north of the Stockbridge bridge crossing, along the western creek bank edge. EQ will selectively clear vegetation from the eastern bank, primarily by removing limbs and branches that encroach the dredging area. EQ intends to preserve the vegetative cover along the eastern bank as much as possible. EQ also intends to perform all clearing and grubbing in such a manner to protect the root mass in the overall work area to maintain soil stability. EQ will use a brush hog mower affixed to a posi-track loader to clear underbrush from the western creek bank where accessible. The western creek bank in many locations along the creek channel has a steep grade with 5 ft to 7 ft of relief. The brush hog operation will be conducted perpendicular to the creek bank to permit the operator to work in the safest manner.

Tree removal along the southern half of the SA6 work area is complicated by the presence of aboveground high-voltage electric power lines and telecommunication lines. These lines are installed over the creek channel or extremely close to the stream channel from the bridge at Stockbridge Avenue north approximately 500 ft. EQ has contacted Consumers Energy

Corporation and has determined that it is not possible to temporarily relocate or shield the high-voltage electric lines.

Therefore, a manlift will be used to climb and surgically remove tree trunks. Limbs and trunk sections will be secured with non-conductive ropes/cables and lowered to the ground to prevent contact with the power lines. Laborers equipped with chain saws, looping shears, and pruning saws will then fell trees along the western creek bank. Tree felling will be supported by an excavator with a thumb attachment, and a rubber-tire loader to assist with handling and processing of vegetation. Tree tops and tree trunks will be handled as described in the EQ Debris Management Plan Dated September 2011.

3.1.5 Environmental Controls

EQ will install environmental controls per requirements established in the EQ Sedimentation and Erosion Control Plan dated September 2011. These environmental controls will include the following Best Management Practices (BMPs):

- Storm Drain Inlet Protection—EQ will install filtration fabric in storm drain inlets in the EQ work area as well as potentially affected inlets in the Kalamazoo Public Service Yard, and along Stockbridge Avenue 100 ft east and west of EQ's construction entrance.
- Construction Entrance—EQ will install a construction entrance off Stockbridge Avenue through the greenbelt up to the paved southeast corner of the Kalamazoo Public Services Facility. The construction entrance will consist of an 8-ounce geotextile underlayment with a 6-inch-thick layer of 1- to 3-inch rock or HDPE construction mats. The construction entrance will be approximately 15 ft wide.
- Tire Wash Station—EQ will install and operate a tire wash station at the south end of the construction entrance. The tire wash station will consist of a steel box with a steel-grate cover suitable for supporting loaded dump trucks. 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 tire wash station prior to exiting the site. The dislodged dirt and water will be captured in the steel box containment. Wash waters will periodically be pumped or 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 the 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 provide a double-wall 500-gallon fuel tank near the work area for fueling heavy equipment and pumps. EQ will also provide emergency spill control kits that will include drums, oil dry, adsorbent pads, and a boom to address small spills.
- Sediment Curtain—EQ will install one or more Type II sediment curtains downstream of sediment removal operations and will also install one sediment curtain downstream of the Lake Street Bridge 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 slope between SA6-5 and SA6-8 and will install a silt fence along the east side of the length of the construction entrance. Additional silt fencing will be installed as needed.
- Mulch Blanket—EQ will install a mulch blanket at the bottom of the slope between SA6-5 and SA6-8. EQ will install additional mulch blanket as needed.
- Rock Discharge Box(es)—When EQ isolates an excavation area, bypass pumping will be required to maintain creek flow. EQ intends to address the entire sediment removal area by dividing it into four isolated sections and completing dredging, post removal toe-of-bank stabilization, and backfilling one isolated section at a time before isolating an adjacent section. This may be modified by adding sections if a particular section's dewatering load is determined to be greater than the capacity of the waste water treatment plant. Therefore, EQ will install one or more rock discharge boxes 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 box will consist of a 16- to 20-cy rock miser box partially filled with a 2-foot-thick layer of 1- to 3-inch rock placed on the bottom and multiple perforations through the box's side walls to allow water to exit the box at a dissipated rate. These box(es) will be moved as work progresses.
- Turbidity Monitoring Station—EQ will establish turbidity monitoring station(s) to monitor the turbidity levels during removal operations.

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.

3.1.6 Access Road Construction

EQ's work area access to the creek will be limited to the eastern portion of the Kalamazoo Public Services facility from Stockbridge Avenue north to the south end of the Storage Building and from the west creek bank west to the east side of the Ice Rink Building, with the exception of the space between the Ice Rink Building and the Storage Building where sediment transport trucks

will be allowed to turn around. The access road will serve as a work bench for the excavators when removing sediments from the top of the creek bank, and as a service road to allow sediment transfer vehicles to enter the site, be loaded with sediment, and exit the site to transfer material back to the John Street TCRA support facility to stage and stabilize sediments prior to shipment for final disposal. Transfer trucks will enter and exit the sediment removal area through this access road.

The access roadway will be created parallel to the west bank of the creek channel. This access roadway will extend back to the southeast corner of the maintenance building, traversing over paved and vegetated covered areas. EQ will make no improvements to the roadway route when traversing over paved locations.

EQ will install an 8-ounce geotextile underlayment with a 6-inch-thick layer of 1- to 3-inch rock covered by a 2- to 3-inch layer of <1 inch gravel or utilize construction mats when traversing over vegetated areas. This roadway will be 20 feet wide where possible to allow for 2-way truck traffic, and a minimum of 12 feet wide where space is limited.

3.1.7 Dredging Area Isolation

EQ will install a series of sheet pile cofferdams to isolate the dredging areas and facilitate dredging area dewatering to permit “dredging-in-the-dry” of the contaminated sediments. EQ intends to subdivide SA6 dredging into four isolated sections to facilitate sediment removal operations. The proposed isolated sections are SA6 1-2, SA6 3-7, SA6 8-14, and SA6 8. EQ may modify this approach once the dredging activity has started if groundwater recharge conditions exceed waste water treatment system capacity. In addition to installing cofferdams across the creek channel, EQ may install smaller 3-sided cofferdams around storm drain outlets to further isolate the dredging areas from storm water drainage. There are four known outlets that will require cofferdams. EQ may set bypass pumps and appropriate hoses/piping to facilitate pumping from the storm outlets to downstream of the excavation areas.

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.

3.1.8 By-Pass Pumping

EQ will provide a dewatering subcontractor to perform bypass pumping operations and isolated dredging area dewatering. Bypass pumping will consist of rerouting three distinct sources of water away from the isolated dredging area and discharging it back into the creek below the downstream isolation cofferdam. The three water sources are listed below:

- Creek channel flow
- Storm water outlet flow
- Groundwater recharge to creek

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 the rock discharge pad installed by EQ. Bypass pumping capacity will be specified to exceed 2 times the average creek flow of approximately 45 cfm. The subcontractor will also be required to provide redundant pumps and ancillary equipment to allow for maintenance of the pumping systems without impacting dredging operations. There will be exceptions to this specification when performing bypass pumping around the SA6 1-2 isolation area where suitable work space is unavailable to operate multiple 24-inch discharge lines for redundant pumping systems. Bypass pumping operations will be described in the subsequent water management subsection. The bypass pumping systems will be installed concurrently with installation of the up/downstream isolation cofferdam.

Storm water outlet bypass pumping will be performed as needed from storm sewer outfall(s) that have been coffer dammed to prevent flow into an active excavation area. There are four known storm water outlets into the SA6 dredging area. One 30-inch and one 12-inch outlet will impact the isolated dredging area SA6 1-2. One 10-inch outlet will impact the isolated dredging area SA6 3-7, and one 24-inch outlet will impact dredging area SA6 9-14. Pumps and ancillary equipment will be sized to meet the maximum capacity of the storm sewer outlets into the SA6 dredging area.

Groundwater bypass pumping will be performed to minimize groundwater recharge to the isolated creek dredging areas to minimize dredging area sediment dewatering and subsequent waste water treatment. Groundwater bypass pumping will be accomplished by installing groundwater depression wells and pumping systems outside of the creek channel boundaries to depress the groundwater table below the maximum excavation depth. The size, number, and location of depression wells will be subject to land access outside the creek channel footprint. Groundwater will be direct discharged into the creek channel downstream onto the rock discharge pad.

3.1.9 Dredging Area Dewatering

EQ will provide a dewatering subcontractor to perform isolated dredging area dewatering. The subcontractor will first pump standing water from the isolated section and discharge it into the 10-inch pipeline to transfer water to the waste water treatment plant located at the John Street TCRA Support Area. The subcontractor will install a series of 1-inch sipper wells using an excavator with jetting probe. The sipper wells will consist of 1-inch tubes covered by a geotextile sleeve jetted to an approximate depth of 10 feet below the creek bottom surface elevation. Tubing will connect the sipper wells through a valve control box at 100-foot intervals that will be connected to the manifold pipe. The manifold pipe will be connected to a vacuum pump that discharges into the 10-inch pipeline that transfers recovered water to the waste water treatment plant. 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. 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 purchase cost of solidification material.
- 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.
- Reduced use of solidification material reduces dust control issues associated with solidification.

The end result is a cost and safety benefit.

3.1.10 Pre-Excavation Toposurvey

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 Kinetics–Global Positioning System (RTK-GPS) equipment mounted in the excavators used for dredging to guide excavation/backfill efforts and ensure the lateral/vertical extent of contaminated sediment removal and backfill restoration is performed correctly.

3.2 Contaminated Sediment Removal

3.2.1 Water Management

Bypass pumping operations will begin subsequent to completion of the dredging area isolation and installation of the bypass pumping systems. Bypass pumping will operate 24 hours per day 7 days per 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 Substantial Requirements Document (SRD).

Isolation area dewatering operations will begin subsequent to installation of the pumping system equipment. The 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. Isolation area dewatering will be stopped during rain and associated flooding events that exceed pumping capacity, and the creek flow will be permitted to enter the isolated dredging area. Dewatering will resume subsequent to flood crest. Water from

the isolation area dewatering will be sent to the waste water treatment plant via pipeline at the John Street TCRA Support Area. The generated waste water will be processed through a series of settling tanks, and particulate and chemical filtration media to meet the requirements of the SRD. The treated waste water will be discharged in compliance with the SRD.

3.2.2 Dredging of SA6-1 to SA6-2

3.2.2.1 Sediment Removal

EQ will dredge contaminated sediments from the isolated Grid SA6-1 -2 area using a top-of-bank wet dredging approach subsequent to surface dewatering the isolated section. This is due to limited work space access along the western bank of the creek from Grids SA6-1 -2 to install a bypass pumping system and isolation dewatering system and still have room for excavation equipment. Therefore, only bypass pumping system components will be installed as depicted in Figure 4, SA6 Grids 1-2 Layout. EQ will install a sump in the northwest corner of SA6-2 to pump water from the isolated area and send water to the John Street TCRA Waste Water Treatment Plant (WWTP). EQ will dredge the area from atop the western bank with a long-reach excavator equipped with a real time kinetic-ground positioning system (RTK-GPS) and place the material into a sediment solidification box that will be pumped free of latent water before solidification. Water will be pumped into a holding tank to allow sediment to settle. Accumulated water from the holding tank will be periodically pumped into the 10-inch transfer pipeline to the John Street TCRA (WWTP). The long-reach excavator will use a smooth edge bucket to exhume sediments starting in the southeast corner. The excavator will dig to the target depth of 18 inches, clearing sediment from the east bank to the west bank as removal progresses to the north in a downstream direction.

EQ will then add solidification material to prepare the exhumed sediment for load-out and transfer to the John Street TCRA Staging Pad. EQ will use either a crystallized polymer absorbent media, Calciment® solidification media, or a combination of both media to expeditiously solidify exhumed saturated sediments. The polymer material is advantageous in that typically only 3% is required to absorb 300 times its weight in water. The crystalline media has a very minimal dust component. The disadvantages are cost and absorption time,

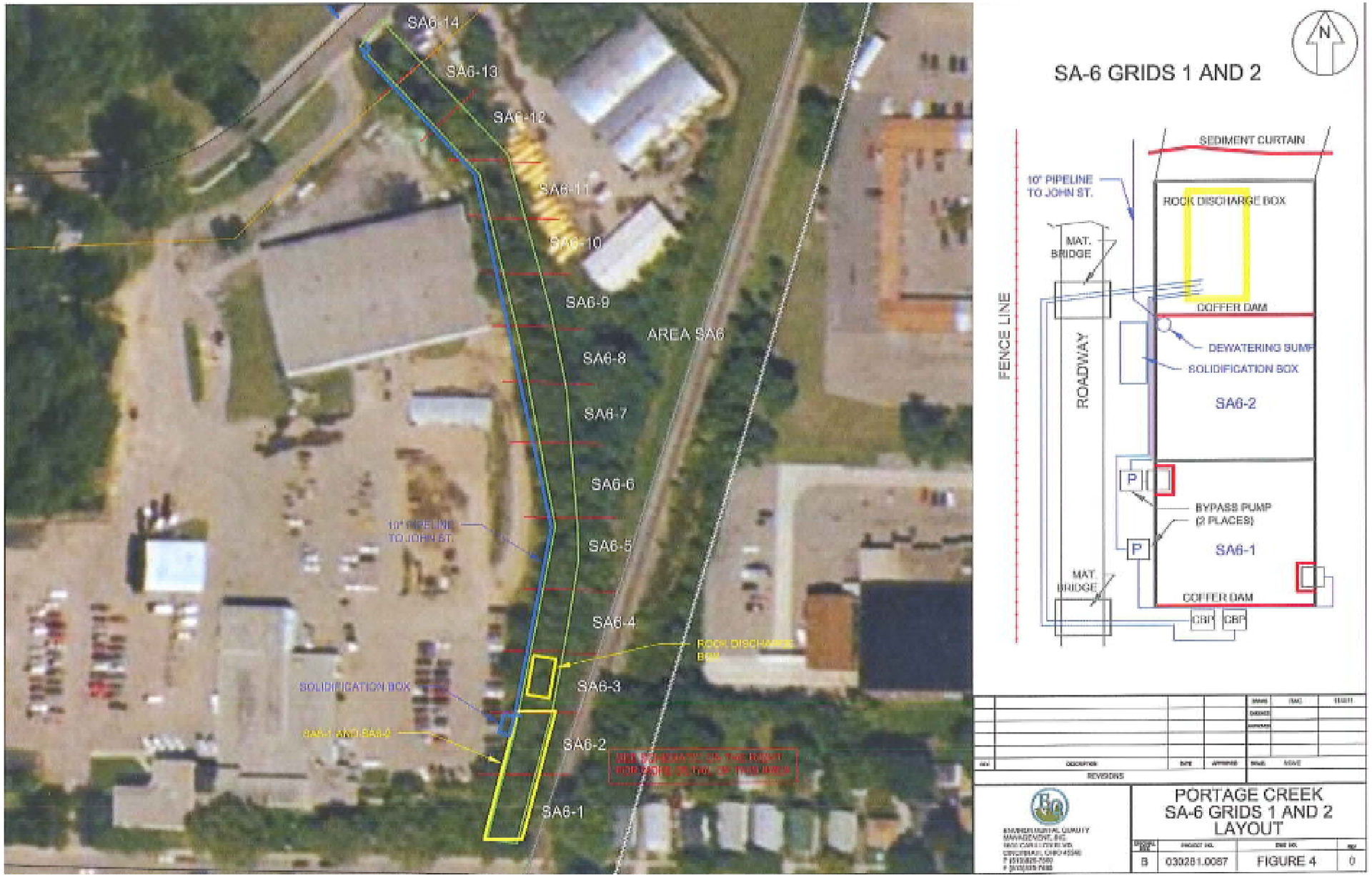

Figure 4. SA6 Grids 1-2 Layout

and the end matrix is a gel that creates material handling issues at the disposal facility. Therefore, Calciment® may be added to expedite solidification and create better load-bearing material for landfill burial. Calciment® in 1-cy super sacks will be staged near the solidification box so that the solidification material can be added to wet sediment in a controlled manner with minimal dust emissions. Once sediments are sufficiently cleared, the excavator operator will load transfer dump trucks, and material will be sent to the John Street TCRA Staging Pad.

3.2.2.2 Contaminated Sediment Removal and Transfer to Staging Area

Dump trucks will access the site from Stockbridge Avenue and proceed to the load-out area where they will be loaded with exhumed sediment. 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. Truck drivers will cover their loads and brush off loose material accumulations onto the plastic sheeting before proceeding to the truck tire wash. Truck drivers will complete a bill-of-lading shipping document prior to departing the Kalamazoo Public Services Facilities from the Stockbridge Street exit. Trucks will follow the path over Kalamazoo City streets described in the 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 QAPP and FSP prepared by EQ for the site dated September 2011 and August 2011, respectively. Sampling locations will be marked in order to document locations during post-excavation survey operations. Turnaround time for sample analyses will be determined at/or near the time of collection subject to time constraints with other site operations. If cleanup performance standards/goals are met in all areas of contaminated soil removal, work will proceed to close out the excavation. If a portion of any area and/or all areas fail to meet performance standards/goals, an additional 6 inches will be excavated and the area re-sampled. The sampling

and excavation process will be repeated as needed (or as directed by the EPA OSC) until the entire excavation area meets cleanup performance standards/goals before proceeding with excavation closeout activities.

3.2.2.4 Post-Excavation Survey

EQ will coordinate with the EPA OSC and EPA FIELDS Group to conduct post-excavation surveying as described in the post-excavation surveying of SA6, and EQ will prepare as-built drawings and make required volume removal calculations.

3.2.2.5 Toe of Bank Restoration

Toe of banks will be restored as described in EQ's Restoration Plan dated September 2011.

3.2.2.6 Backfill of Creek Bottom

Subsequent to toe of bank restoration (if required), EQ will begin deploying a sand and gravel mix (bank run) to backfill the creek bottom in accordance with EQ's Restoration Plan dated September 2011.

3.2.2.7 Post Backfill Survey

EQ will coordinate with the EPA OSC and EPA FIELDS Group to conduct post-excavation surveying of SA6 grids subsequent to successful removal of contaminated soil to cleanup performance standards/goals. The EPA FIELDS Group will perform post-excavation surveying to document removal depths. The EPA FIELDS Group will provide survey data to EQ to generate as-built drawings and make cut-to-fill calculations to determine the volume of contaminated soil removed.

3.2.3 Excavate Grids SA6-3 to SA6-7

EQ will excavate contaminated sediments from Grids SA6-3 through SA6-7 by using a long-reach excavator from atop the western bank of Portage Creek to dredge the grid areas in the dry. Figure 5, SA6 Grids 3-7 layout, depicts the installation of water management controls to be utilized to facilitate dredging in the dry.

EQ will leave the previously installed coffer dam between Grids SA6-2 and SA6-3 and install a second cofferdam across the stream channel at the downstream end of SA6-7 to isolate the removal grid area from the upstream and downstream creek flow. A 3-sided cofferdam may be constructed around the 12-inch storm water outlet into the SA6-6 grid area. EQ will reuse sheet piling used for the upstream cofferdam and storm water outlet cofferdams from removal grids SA6 1-2.

The dewatering subcontractor will install a creek bypass pumping system just upstream from the SA6-3 cofferdam. The discharge lines will be routed out and around the work area to maximize the work space adjacent to the creek. EQ will install temporary timber mat bridges over the discharge lines where they cross the access road parallel to the creek so that sediment transfer trucks can pass over. The mat bridges will be relocated as necessary as dredging work progresses. The dewatering contractor may also install a storm water bypass pump at the 3-sided cofferdam in Grid SA6-6. These discharge lines will be directed into rock-filled miser boxes positioned in the creek channel downstream of the isolated removal area. They are referred to in Figure 5, SA6 3-7 Layout, as rock discharge boxes. These used stone miser boxes will be 16 to 20 cy in capacity. EQ will make numerous sidewall perforations to allow water to drain from the boxes, and EQ will partially fill the rock boxes with 1-3-inch mean rock. The rock and perforations will reduce discharge stream velocity and disperse discharge flow back into the creek to minimize the pump discharge impact on in-stream sediment. A sediment curtain and turbidity monitoring station will be positioned downstream of the rock discharge boxes as additional sedimentation control measures as described in Section 3.1.5.

The dewatering contractor will install groundwater depression wells along the west side of the creek channel to bypass groundwater infiltration into the isolated removal grid area. Details of the construction of the groundwater depression wells and associated pumping system will be determined subject to procurement of a dewatering subcontractor. Intercepted groundwater

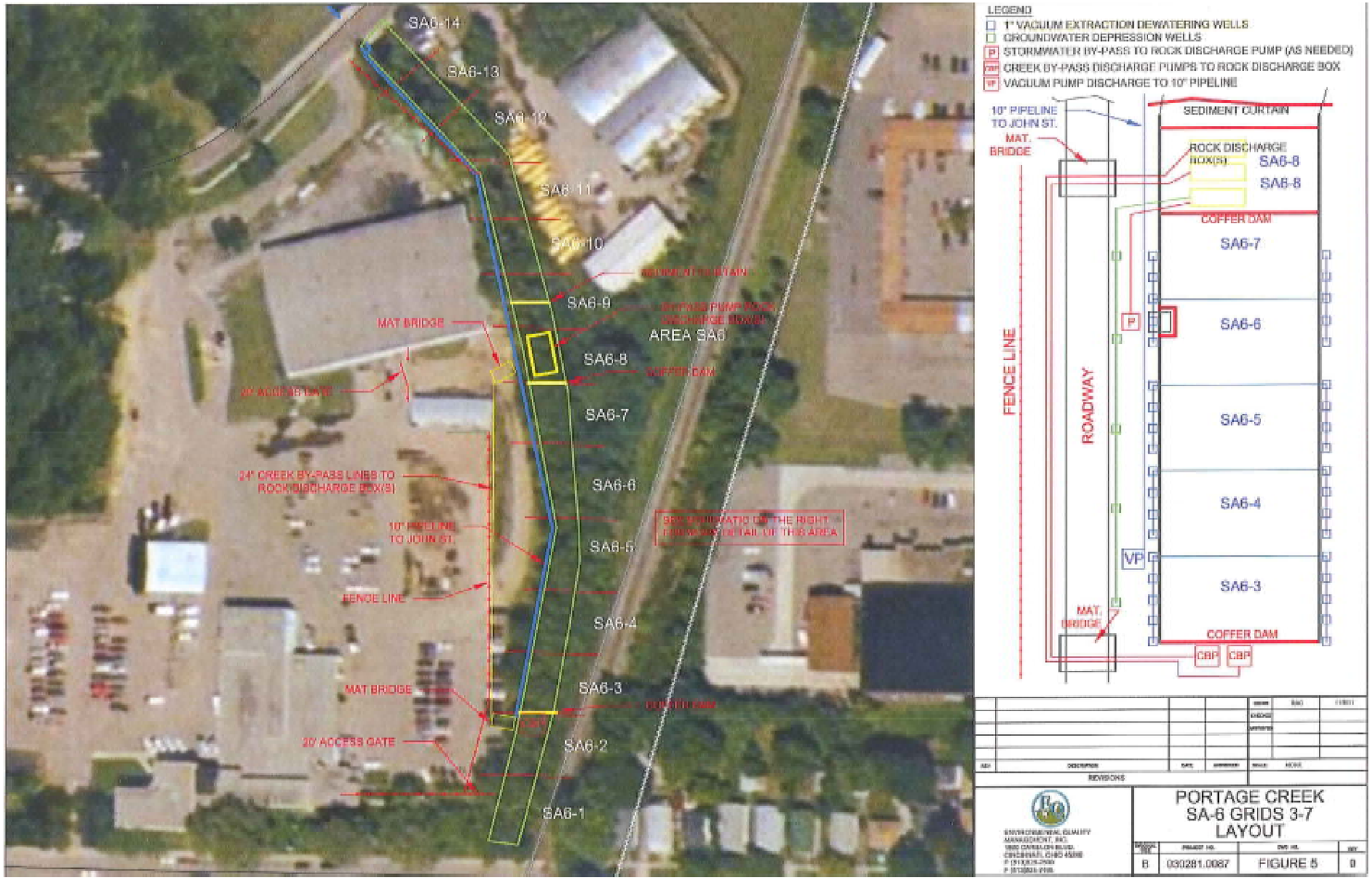

Figure 5. SA6 Grids 3-7 layout

recovered from the depression of the groundwater table will be discharged back into the creek through rock discharge box(es) located downstream of the SA6-7 isolation dam. A conceptual view of the groundwater depression system pumping operations is depicted in Figure 6, Conceptual View of Isolation Water Management.

The dewatering subcontractor will install isolation area sediment dewatering well points to maximize water removal from the sediment prior to excavation. This operation is also depicted in Figure 6.

Once water management controls are in place, the long-reach excavator with RTK-GPS and smooth bucket will begin excavating contaminated sediments from the southeast corner of SA6-3 and continue working to the north. The use of the solidification box and solidification media will be incorporated as needed. The remainder of the operations will be performed in a similar manner as those presented in Section 3.2.2.

3.2.4 Excavate SA6-9 to SA6-14

SA-9 through SA-14 will be excavated by using smaller excavation equipment in the creek channel to remove sediment from SA6-14 south back to SA6-9. Material handling and transfer operations will be conducted in SA6-8. Sediment removal operations for SA6-8 will be described in the following section. To prevent cross contamination from conducting sediment removal operations and creek channel restoration activities from SA6-8, the grid will be covered with geotextile filter fabric and HDPE road mats. Sediment removal operations will be conducted from primarily within the creek because the Storage Building along the west bank of the creek, does not permit sufficient working room to conduct sediment removal with a long-reach excavator except at Grid SA6-14 and some of Grid SA6-13. Dredging will still be performed in the dry with cofferdam isolation and dewatering. Dredging will be conducted from within the creek by constructing a temporary access road using HDPE road mats such as the Durabase ® road mat system or equivalent. EQ will remove contaminated sediment by using smaller equipment from within the creek channel working from north to south.

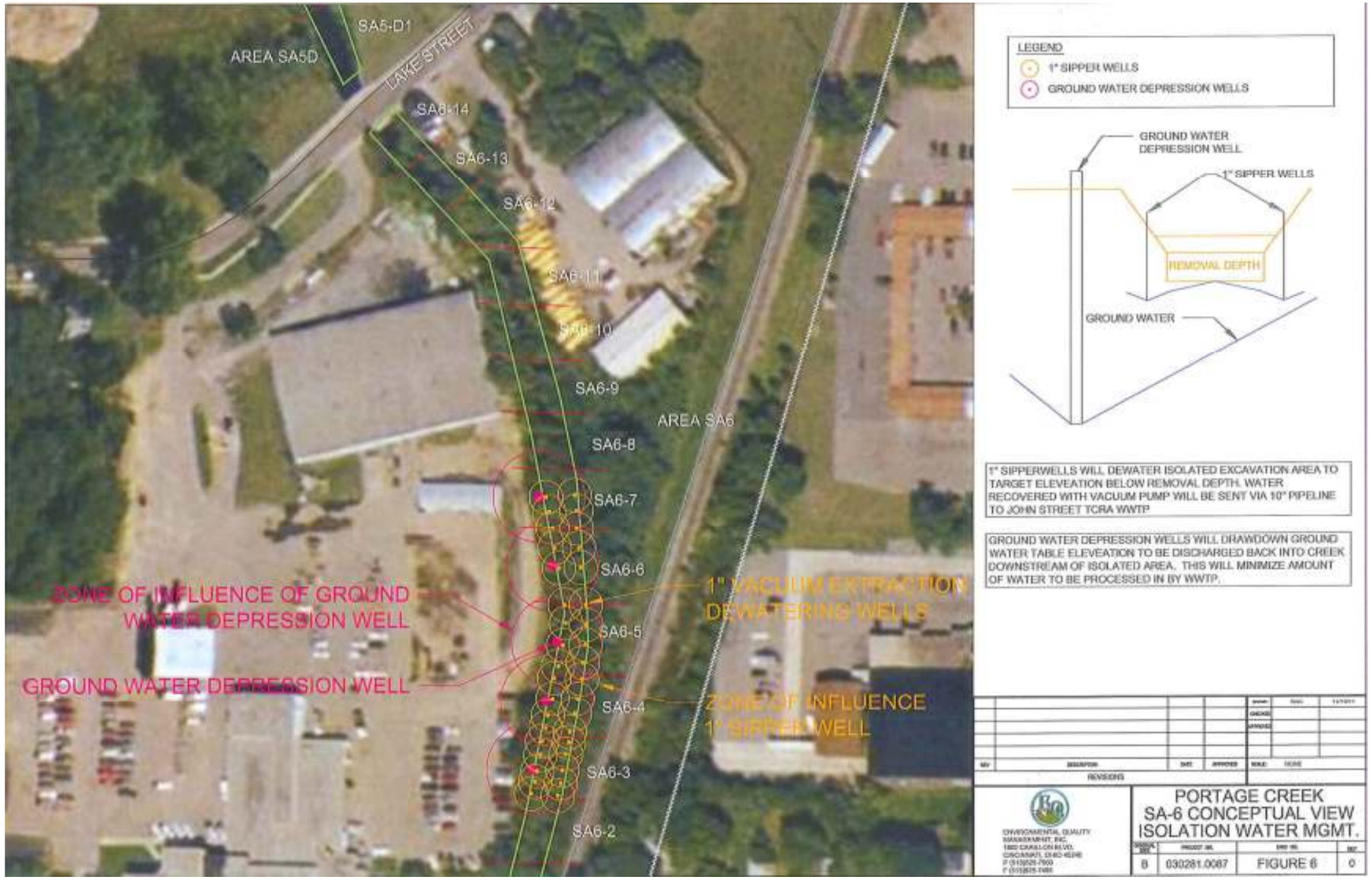

Figure 6. Conceptual View of Isolation Water Management

EQ will dredge sections SA6 9-12 and a portion of SA6 13 from within the creek channel, and dredge the remainder of SA6 13-14 with a long-reach excavator from the top of the creek bank. During the excavation of SA6 13-14, removed sediments will be placed in crawler carrier tracked dump trucks to transfer material back to SA6-8 for solidification as needed and load-out into over-the-road transfer trucks. EQ will establish water management practices in a similar manner as those described in Section 3.2.3 and as depicted in Figure 7, SA6 Grids 9-14 Layout, to facilitate sediment removal operations.

EQ will need to cut a ramp into the SA6-8 area to facilitate access to the creek channel so that excavation equipment can work within the footprint of the creek channel. EQ will extend an HDPE mat roadway down the center of the channel from the ramp location to within 25 feet of the north end of SA6-14. The HDPE mat roadway will be 13 ft wide from installing the 7-ft-wide by 14-ft-long mats side by side and end to end and pinning them together at their overlapping sections. EQ will first use a long-reach excavator equipped with RTK-GPS and a smooth bucket to remove TSCA-contaminated sediments in the center of the creek channel. TSCA sediments will be segregated from the non-TSCA sediments at the John Street TCRA Staging Pad. The long-reach excavator will work from atop the west bank and load exhumed sediments into crawler carriers for transfer to the load-out area.

EQ will then use a smaller low-ground-pressure excavator in the 25,000-pound class equipped with an RTK-GPS system to direct/monitor excavation progress to excavate from within the creek once the long-reach excavator has attained the extent of its removal reach. Dredging of the sediments will progress from the north back to the access ramp location in SA6-8. HDPE road sections will be periodically removed as dredging progresses to the south. The excavator will be positioned at the end of the HDPE roadway to dredge the sediment. The excavator will place exhumed sediment into the dump box of crawler carriers (tracked dump trucks) that will transfer material to the south end of the roadway. The sediments will be dumped along the creek bank or into a dewatering/stone miser box to facilitate load-out into over-the-road transfer trucks. A second excavator will be used to load sediment into over-the-road transfer dump trucks. If

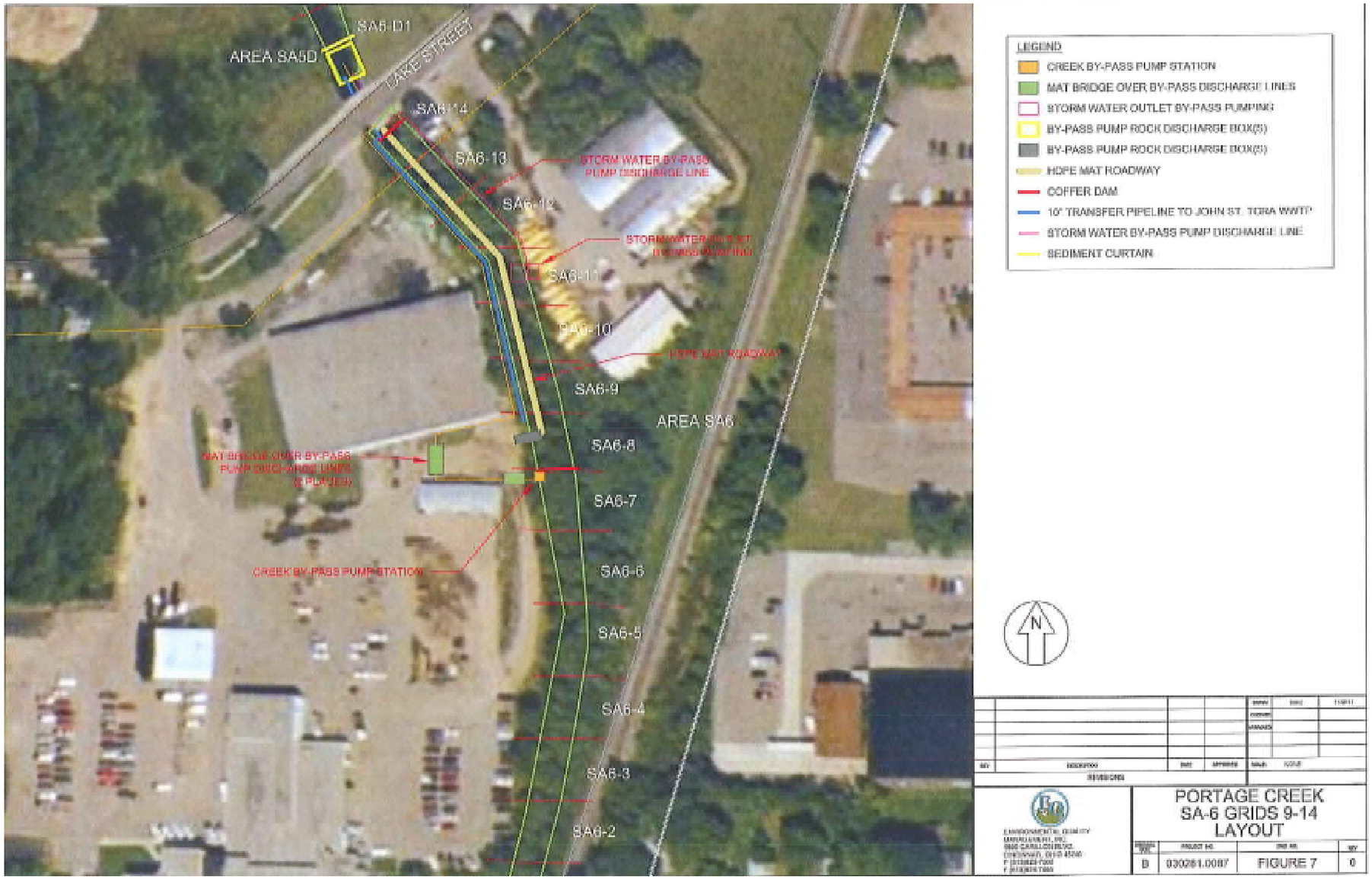

Figure 7. SA6 Grids 9-14 Layout

additional solidification is needed to dry sediment sufficiently to facilitate transfer to the John Street TCRA staging pad, it will be mixed in prior to loading using absorbent polymer crystals and/or Calciment® as described earlier in Section 3.2.2.

The remainder of the steps will be performed in a similar manner as described in Section 3.2.2.

3.2.5 Excavate SA6-8

EQ will complete sediment removal at Grid SA6-8 using a long-reach excavator operated from atop the bank. Water management controls used for excavating SA6 9-14 will be modified for SA6-8 as depicted in Figure 8, SA6 Grid 8 Layout. Sediment will be removed and the creek channel restored as described in Section 3.2.4, once the infrastructure improvements such as geotextile and HDPE road mats for sediment transfer operations are removed.

3.2.6 Site Restoration

3.2.6.1 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 tank, excavation equipment, tire wash station, cofferdams, pumps, pipelines, etc., will be removed.

3.2.6.2 Restoration Planting

EQ will perform restoration planting as described in EQ's Restoration Plan dated September 2011. The final restoration design plan will include stakeholder input accepted by EPA and directed to EQ.

3.2.6.3 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 dated September 2011. EQ will also maintain erosion sediment controls until re-vegetation planting is accepted or as directed by EPA.

3.2.6.4 Facility Impact Repair

EQ will make repairs to the Kalamazoo public services facility caused by sediment removal operations. EQ, EPA, and City of Kalamazoo Public Services management personnel will review pre-existing photo-documentation to develop a punch list of repair items to be addressed prior to complete demobilization from the SA6 contaminated sediment removal area. EQ anticipates at a minimum that this will include perimeter fence repair/replacement, lawn repair and landscaping of disturbed areas, asphalt/concrete patching, and general housekeeping.

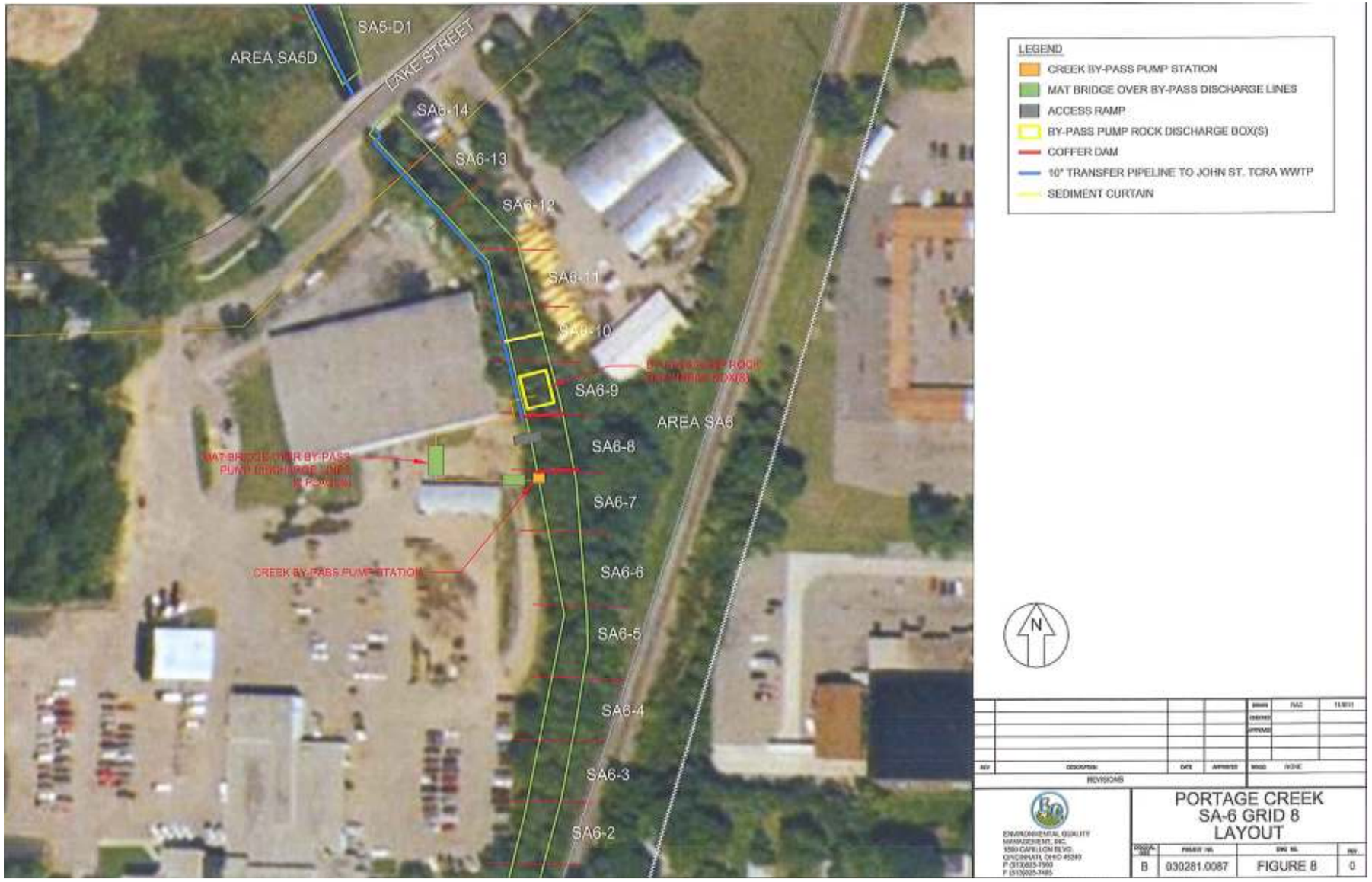

Figure 8. SA6 Grid 8 Layout