November 29, 2020

Phase I Field Investigation Work Plan
Morrow Lake Dam

Prepared for: STS Hydropower, LLC

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1. Introduction

In November 2019, the Morrow Lake Dam spillway gates required immediate emergency repairs and a partial lake drawdown was performed to relieve gate pressure and eliminate the risk of uncontrolled flooding. During inspection of the gates, they were found to be in need of replacement instead of repairs. Although the initial drawdown for repairs was expected to continue for four months the time needed for full replacement is expected to continue until December 2020. Return of Morrow Lake to its pre-drawdown water level is currently scheduled to begin in mid- to late December 2020 through early January 2021.

Following the drawdown, the Michigan Department of Environmental, Great Lakes, and Energy (EGLE) received reports of increased turbidity and fine sediment deposits downstream of the dam. STS Hydropower, LLC (STS) received Violation Notices citing increased downstream turbidity and sediment deposition, issued by EGLE on July 8, 2020 and September 16, 2020. The violation notices require STS to develop a plan to assess the volume, location, depth and composition of sediments downstream that were mobilized by the drawdown of Morrow Lake and to sample these sediments for polychlorinated biphenyls (PCBs) and hydrocarbons.

This field investigation plan presents a phased sampling approach to obtain the above requested data and develop procedures for subsequent delineation of fine sediment deposits identified downstream and review alternatives for remediation of these depositional areas (as needed). The first phase of this field investigation is described below.

2. Phased Sampling Approach

AECOM proposes a phased approach for the collection and characterization of sediment released downstream of Morrow Lake Dam, RM 73.5 to 76.5. Phase I sediment sampling is being conducted to:

- Complete bathymetric and topographic surveys of the Kalamazoo River from Morrow Lake Dam to the railroad bridge crossing.
- Sediment delineation (location and volume of sediment deposited) using tile probes downstream of Morrow Lake Dam to the railroad bridge and downstream of the superfund site operating units (OUs);
- Sediment sampling to physically characterize the material tentatively identified as post-drawdown sediment;
- Analyze post-drawdown sediment for targeted chemical constituents (i.e., PCBs, polycyclic aromatic hydrocarbons [PAHs] and metals); and
- Compare downstream sediment deposition area characteristics (initially to the railroad bridge crossing) to upstream source materials.

Results of Phase I sampling will be evaluated and subsequently used to refine additional sediment sampling plans and methods (Phase II), identify data gaps and evaluate feasibility of future sediment management alternatives and designs, if determined to be needed. Additionally, dewatering treatability tests will be performed after receipt of Phase I results to evaluate efficacy of ex situ sediment management alternatives including but not limited to gravity/stacking, passive and mechanical dewatering, solidification/stabilization and potential water treatment of the resulting filtrate.

A Phase II investigation may include additional sediment sampling to further define the extent of post-drawdown sediment, further characterize the physical and chemical composition of the post-drawdown sediments including bioavailability of constituents of concern and further identify and evaluate ex situ dewatering and sediment management methods to further refine Phase I results, if necessary. Phase II investigations may identify potential sediment management options including but not limited to removal, beneficial re-use and disposal, as well as leachability, associated risk and additional data required to support the most likely remedial management options.

3. Project-Specific Hazard Assessment, Planning and Coronavirus

The team will develop a project-specific Health and Safety Plan (HASP) for all elements of the field work using previous approved HASPs for work on the Kalamazoo River (AECOM 2020). The HASP will incorporate AECOM safety requirements for working over water, any applicable Client requirements and applicable COVID-19 safety requirements. A task-specific HASP will be refined for each field sampling task and will be available for review by EGLE. Prior to field work, a detailed Emergency Response Plan (ERP) and Job Safety Analysis (JSA) will also be prepared.

The HASP, ERP, and JSA will be reviewed at each field task kick-off-meeting and the JSA will be reviewed at the daily safety meetings. All field staff, subcontractors, and oversight personnel will attend the field safety meetings that are conducted at the beginning of each workday. All employees will be fit for duty, adhere to standards of conduct, and empowered and expected to "stop work" in the event that an unsafe condition exists in their work area, or if they observe any unsafe act being performed. The unsafe conditions and hazards will be documented and reported to the Health & Safety Manager and necessary controls and corrective actions will be taken.

The Team is pleased to share our lessons learned from previous field studies that could be incorporated into the project plans:

- Establish a clear communication plan between boat and shore personnel.
- Boats may shift as staff load/unload on shore. Keep three points of contact at all times.
- Use the buddy system; all personnel should be present and accounted for on a regular basis.
- Do not overcrowd boats with observers. The mission of the safety boat is life rescue, not to serve as a water taxi. Do not distract the boat operator.

On March 11, 2020, the World Health Organization declared the spread of Coronavirus (COVID-19) a pandemic, and the Coronavirus outbreak has affected the United States and Michigan, particularly through the issuance of multiple Executive Orders by Governor Whitmer. Given the uncertainties and impacts associated with the Coronavirus outbreak, the potential impact that the Coronavirus may have on AECOM's performance of the scope of work defined in this proposal cannot be determined at this time, but may include delays or impacts on the following tasks:

- Completion of field activities;
- In-person attendance at meetings; and/or
- Preparation of project deliverables that are dependent on the completion of field activities, travel, and data collection.

In accordance with customary industry standards, AECOM will exercise reasonable care to mitigate the potential impact of the Coronavirus to the extent within AECOM's reasonable control, AECOM will notify

the appropriate client personnel in accordance with the parties' Agreement in the event AECOM becomes aware of any potential impact to the work caused by the Coronavirus.

4. Field Sampling Plan, Sampling Analysis Plan and Quality Assurance Project Plan

This Field Sampling Plan (FSP) is being prepared using sample collection methods and procedures, laboratory analytical methods and procedures and quality assurance/quality control (QA/QC) procedures developed by Others for the work being conducted at the downstream Superfund site (AMEC 2013a; 2013b; AMEC 2016a; 2016b; AMEC 2018; GEI 2020a; 2020b; 2020c; EPA 2005; EPA 2020; GEI 2020a). These methods and procedures are being used to facilitate an expedited approval from EGLE to initiate field sampling in 2020.

The existing documents (provided by USEPA Region 5) contain USEPA-approved methodologies and requirements that can be revised for this FSP. We quickly reviewed these plans to identify consistencies between the tasks proposed for this SOW and what has been performed and accepted in previous QAPPs. Our Team's expertise in developing numerous QAPPs conforming to EGLE, Great Lakes National Program Office (GLNPO) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites allows us to efficiently and cost-effectively meet EGLE's objectives. A site-specific QAPP will be developed prior to future sampling efforts in accordance with the State's Quality Management Plan requirements, and both the QAPP and FSP will comply with MDEQ Policy 09.026.

5. Field Investigation/Data Collection

Data collection will be conducted using a phased approach to increasingly build the data sets immediately downstream of Morrow Lake Dam. Phase I will include bathymetric and topographic surveys and initial sediment sampling of targeted downstream depositional and upstream source areas. Priority areas of post-drawdown deposition will be identified by changes in bathymetry since the last survey, tile-rod probing as well as visual evidence of sediment deposition in Area 1 summarized by EPA and other stakeholders (Attachment A).

All work will be conducted in accordance with the AECOM site-specific Health and Safety Plan, that includes work over water procedures and procedures for work over water in cold weather. The sampling methods will comply with State of Michigan and US EPA sampling, documentation, and chain-of-custody procedures. Each task is described in detail below.

5.1 Bathymetric and Topographic Surveys

When considering methods to estimate the fate and transport of sediment volume released from the Morrow Lake Dam, our team will initially consider four (4) discrete river segments as follows:

Morrow Lake. We will utilize a volumetric difference approach between the 2010 single beam survey performed by Tetra Tech and a new single beam survey (to be contracted). This new single beam survey will be collected in the spring 2021. The results of this differential analysis would be an estimate of the sediment volume potentially released when Morrow Lake was lowered.

Morrow Lake Dam to the Upstream Limit of 2018 Bathymetric Data (i.e., Homer Stryker Ball Park). This area is currently being surveyed using multi-beam/LIDAR methods to capture below/above water sediment features. This area is more challenging to develop a clean volumetric analysis given the lack of historical data. Review of the river profile suggests that the first portion of the river can be classified as

"transportive" or "erosional". This means that it is unlikely to have accumulated any sediment from the release. However, once the first oxbow downstream of River Street is reached the river begins to be more transitional and depositional areas are observed. In this segment of the river, from River Street downstream to the Homer Stryker Ball Park, vertical probing of identifiable sediment deposition will be conducted in coordination with sediment core locations. This information (i.e., vertical probing and sediment cores) will be used to develop estimates of sediment volumes when coupled with the multi-beam/LIDAR survey currently being conducted by Eagle Creek Renewable Energy (ECRE).

Extent of 2018 Bathymetric Data (i.e., Homer Stryker Ball Park to RR Bridge by Lottie Ave.). Utilize a volumetric difference approach between the results of the 2018 multibeam survey and the new 2020 multibeam/LIDAR survey currently being collected by ECRE.

Downstream of Survey Extent (i.e., RR Bridge by Lottie Ave.). Use of a hydrodynamic model to assess what (if any) type of sediment would have moved outside this downstream limit and under what flow conditions. Our team will use this information, combined with the lines of evidence in the upper river segments, to estimate a volume of sediment leaving (if any) this downstream extent.

Full coverage surveys of the Kalamazoo River from just downstream of the Morrow Lake Dam to the railroad bridge crossing parallel to Lottie Avenue will include but is not limited to:

- Multi-beam, photogrammetry, and traditional hydrographic surveys to be compiled into a single dataset capable of generating accurate 1-foot contours. Multi-beam survey will be conducted in water depths greater than 3-feet. AECOM and Seaworks (licensed MI surveyor) will provide the following digital files associated with this data:
    a. Cleaned, joined point data point delineated file (.csv); and
    b. Cleaned, joined AutoCAD Civil 3D surface.
- Traditional hydrographic survey of the two oxbows downstream of the Morrow Lake Dam. Oxbow #1 is located between River Street Bridge and South Sprinkle Road Bridge. Oxbow #2 is located between the South Sprinkle Road Bridge and the King Highway Bridge. It is anticipated that these areas will not be accessible to a multi-beam survey boat and traditional hydrographic survey will be performed in these areas.

5.2 Sediment Delineation using Tile Probes

Poling to determine depth of sediments will be conducted prior to or in association with sampling activities in post-drawdown depositional areas.

In association with in-stream sediment cores in 10 high-priority depositional areas downstream of Morrow Lake Dam, poling will be conducted to determine the depth of soft sediments for each sampled location. These data will be used to estimate sediment volumes and to inform sediment transport models. The deepest penetration depth from the poling locations will be interpreted as the sediment thickness.

Poling involves the measurement of sediment thickness and water depth using specialized tooling, such as an AMS 7/16" x 4' Extendible Tile Probe. Each location will be logged with GPS at the time of poling. In addition to delineating the targeted sediment sampling locations, the probing team will delineate

post-drawdown sediment deposition areas working downstream from the King Highway Landfill OU (RM 72.5) to Crown Vantage Landfill (RM 68.5).

Prior to probing into the sediment, the water depth to top of sediment will be measured using the poling probe or a similar device with graduated markings at a maximum of 6-inch intervals and measuring tape or ruler. The probe will then be advanced into the riverbed, noting the depth of refusal and type of resistance met by the probe. The water level to the nearest exposed 6-inch interval on the device will be noted and the difference measured to calculate and record the estimated depth of water. The deepest penetration depth from the poling locations will be interpreted as the sediment thickness. Poling will be completed at each proposed sediment sampling location per procedures detailed in SOP P-005 of GEI's PDI Field Sampling Plan for OU5 Area 4 Time Critical Removal Action (GEI 2020d).

5.3 Sediment Sampling

Sediment samples (grabs and cores) will be collected from a maximum of 15 targeted locations both upstream (5 locations) and downstream (10 locations) of the Morrow Lake Dam. Representative sediment samples will be collected from previously identified and targeted, high priority deposition areas downstream of the Morrow Lake Dam (Figure 1). Sample collection, sample processing and quality assurance/quality control (QA/QC) procedures will be performed in both the field and laboratory settings to provide information regarding accuracy, precision, sensitivity, representation, completeness, and comparability associated with the sampling and analysis according to the QAPP developed by others for the downstream Superfund sites (GEI 2020a).

Sediment sampling will be expedited in collaboration with SWAT upstream of the Morrow Lake Dam. Upstream grab samples (3 locations) and one upstream core sample (one-foot horizons) will be collected, processed and characterized for geotechnical and chemical parameters. Core samples will be collected from the other two Morrow Lake sampling locations and frozen for future analyses, if needed. A sediment grab sample will be collected from the sediment management area used to dewater dredge material from the gate repairs effort. Additionally, a grab sample will be collected from a location upstream of Morrow Lake to be used as a background/reference site.

Downstream sediment sampling will be performed with SWAT to collect grab and core samples at all identified locations (Figure 1). Three cores will be initially characterized for geotechnical (composites) and chemical parameters (one-foot horizons) listed below and the remaining core samples frozen for future analyses.

Geotechnical and chemical analyses for both grab and core samples is summarized in Table 1. Analyses and methods include:

- Grain size analysis with hydrometer and sieve (ASTM D422);
- Moisture content (ASTM D2216);
- Specific gravity (ASTM D854);
- Total organic carbon (TOC) (ASTM D2974);
- Atterberg limits (ASTM D4318);
- PCBs as Aroclors – Kalamazoo SOP (EPA SW-846 Method 8082A (as described in the Superfund QAPPs));
- Total PCBs by congeners (M1668) (as recommended by EGLE);

- Polycyclic aromatic hydrocarbons (PAHs) – EPA Method 8270 SIM (grab samples only);
- Total Petroleum Hydrocarbons – Diesel Range Organics (Method 8015M); and
- Michigan metals (6010D) - upstream samples only.

Sediment cores will be simultaneously collected at all upstream and downstream locations. One upstream core and three downstream cores have been identified for initial processing and chemical and geotechnical analyses. The remaining cores (2 upstream and 7 downstream) will be frozen, stored at the GEI sample processing facility (Plainwell MI) and held for future analyses, as needed. Cores will extend into the pre-drawdown sediment (if possible) and be logged, sectioned and sampled at 1-ft horizons. If a sediment transition is observed within a core, additional horizons may be subsampled and analyzed. Additionally, homogenous, unconsolidated surficial sediment observed within a core may be composited as a single horizon in order to meet the laboratories quantity requirements.

5.3.1 Sample Collection Methods and Procedures

Surficial sediment (0 to 6-inches below surface) samples will be collected using a petite ponar clamshell dredge sampler or comparable equipment at each location (Attachment B). Additional sediment sample volume will be collected in five-gallon buckets for treatability testing or held for future analysis and/or evaluation including:

- Evaluation of ex situ dewatering approaches (e.g., stacking/draining, gravity [geotextile tubes], mechanical [belt filter press, plate and frame press], solidification/stabilization, and other methods).
- Evaluation of dewatered material to pass paint-filter testing for transportation.
- Beneficial reuse of material for fill material, shoreline placement, capping, ENMR, etc.

In-stream sediment core samples will be collected for geotechnical and contaminants of concern (CoC) testing using portable vibracore sampling equipment from boats operated by SWAT (Attachment B). Vibracore sampling can be completed using flat-bottom sampling boats or air boats and will be determined based on site conditions. The vessel will be anchored and positioned using spud polls or anchor points depending on flow conditions and water depths. A thin-walled vibracore tube (3" diameter) will be advanced into the soft sediment until a predetermined depth is reached or refusal to penetrate further. The core tube will be advanced at least 1 foot past the target depth or refusal to limit washout. Core keepers may also be used to retain material if necessary. If recovery is less than 80 percent, up to three additional cores will be attempted within a 15-foot radius of the target location. If unsuccessful, we will utilize the core(s) with the best recovery for processing and analysis. Core locations will be collected using a Trimble GPS or similar. Additional measurements taken at each sample location include water depth, depth of sediment, and water quality characteristics (e.g., pH, dissolved oxygen, conductivity and turbidity).

The vibracore tube will be slowly advanced back to the surface keeping the core as vertical as possible. A cap will be placed on the bottom of the core tube and secured with electrical tape. The top of the core will be removed from the vibracore head and overlying water will be removed prior to cap and taping. Total sediment recovery will be recorded along with any visual observations of the core. Sediment cores will be brought to the shore and transported to the processing facility. The cores will be cut open lengthwise, measured, photographed and logged by a geologist or engineer using the Unified Soil

Classification System (USCS). Notes on attributes such as color, odor, organic matter, and depth of interface between sediments and native material.

Based on visual observations in the field, sub-samples may be collected for additional analyses from specific horizons identified in the core (these samples will be collected in plastic bags) and the majority of the core sample will be placed into buckets and transported to the laboratory. Samples will be labeled with the depth from the top of the core and the thickness of the material collected (i.e., 8 to 12-inches). Multiple pushes may be required at each location. Samples of native underlying material will be collected, if encountered.

5.3.2 Sediment Chemistry

AECOM will comply with the sampling and testing requirements outlined in the GLLA Data Reporting Standard (April 2020) and the GLLA QA Considerations (April 2020) guidance documents. These requirements may be modified per task. Any modifications will come from technical direction from the EGLE Project Manager and be defined in the approved QAPP developed by others for the downstream Superfund sites (GEI 2020a).

AECOM will be responsible for procuring the laboratory for all project analyses (Pace Analytical). Laboratory data will be of known and documented quality as specified by the applicable EGLE and EPA guidance documents. All laboratory data will be compliant with EPA Order 5360.1 quality requirements, which require data to withstand independent review and confirmation. The procured laboratory will be a participant in the EPA's Contract Laboratory Program (CLP), but non-CLP methods (EPA approved methods SWA 846 or other appropriate methods) may be used to meet the program requirements. Where non-CLP methods are to be used the data deliverables will meet the level of detail and requirements outlined in the Great Lakes Legacy Act (GLLA) Data Reporting Standard.

There will be no deviation from these statements of work unless approved by the EGLE Project Manager. If requested, AECOM will draft project-specific improvements or modifications to the methods employed for sample testing. For PCB data, the AECOM procured laboratories will follow both the EGLE-recommended method (M1688) for total and congener concentrations as well as the modified SOP developed for PCB analysis of sediment collected from the Kalamazoo River by EPA GLNPO (modified 8082A) as defined in the approved QAPP.

Pace Analytical (Pace) will follow the GLNPO QMP, QAPP requirements, and Level IV data reporting requirements. AECOM will include these requirements in their agreements with the laboratories. All procedures are clearly defined in the QAPP:

- The laboratory will ensure that the reporting of batch information in an appropriate EDD format is included. The GLLA Data Reporting Standard includes specifications for batch information reporting.
- If the laboratory provides totals for certain classes of chemicals (i.e., total PCBs), the QAPP will state the summation scheme, including how non-detect results are handled, or include details on how totals will be interpreted from the chromatograms.
- The lab's EDDs will include the method detection limit (MDL), the contract-reported quantitation limit (CRQL) if applicable, and sample-specific quantitation limit (SSQL).
- The laboratory shall ensure that the SSQLs are met in order to be able to answer the study question.

- The laboratory shall ensure that all detectable results are reported. If they are below the calibration limits or appropriate detection limits, they shall be reported as an estimated concentration and appropriately qualified as defined in the QAPP.

Deliverables from the procured laboratories will meet the GLLA's Electronic Data Deliverable format requirements as defined in the approved QAPP. AECOM will ensure that these EDDs are compatible with the Great Lakes Sediment Database (GLSED) and NOAA's Query Manager. EDDs will comply with the most recent version of the GLLA Data Reporting Standard.

Sediment samples will also be submitted to McDowell & Associates (Ferndale MI) for testing of geotechnical properties including, grain size analysis, bulk density, percent moisture solids, total organic carbon and Atterberg limits. These tests will be conducted on limited subset of the total number of samples collected, from the grab samples and composite of the core samples. If core samples can be further delineated by physical characteristic during processing, additional aliquots may be collected for geotechnical characterization.

5.3.3 Quality Assurance/Quality Control

AECOM will implement a workflow and field data management process to ensure that the sampling investigation yields high-quality data according to the objectives and requirements of the QAPP. Quality Assurance/Quality Control (QA/QC) procedures will be performed in both the field and laboratory to provide information regarding accuracy, precision, sensitivity, representation, completeness, and comparability associated with the sample collection and analysis. AECOM will collect field duplicates (1 per 10) and matrix spike/matrix spike duplicate (1 per 20) as dictated by the QAPP and use electronic data recording software to document field sampling activities. This approach will allow real-time receipt of completed data forms and electronic data, receipt of collected samples and early shipping to laboratories, and facilitation of rapid-response trouble shooting should any issues arise with field equipment or the sampling teams.

Field QA/QC will include the following procedures:

- Calibration of field equipment
- Field activities will be documented including any observations during sample collection or issues that may impact data quality
- Disposable sampling equipment will be used to minimize cross-contamination between samples
- Field duplicate samples will be collected to evaluate field sampling precision or reproducibility of the data
- Daily Trip Blanks
- Field Blanks
- Additional sample volume will be collected to allow Matrix Spike (MS) and Matrix Spike Duplicate (MSD) analyses to be performed by the laboratory
- Samples will immediately be placed on wet ice and maintained at 4° Celsius by the laboratory as method appropriate until analysis is completed
- Chain-of-Custody (COC) documentation will be completed to document custody from collection to delivery at the laboratory

- Samples will be delivered to the laboratory to ensure that all parameters are analyzed prior to the expiration of the applicable holding time

5.3.4 Sample Custody

Sample handling in the field will conform to appropriate sample custody procedures. Field custody procedures include proper sample identification, chain-of-custody (COC) forms, and packaging and shipping procedures. Sample labels will be attached to all sampling bottles before field activities begin to ensure proper sample identification. Each label will identify the sample location, date and time sampled, initials of the sampler, analysis to be performed, and the applicable preservative. Bubble wrap will be used to absorb shock and prevent breakage of sample containers. Wet ice will be used to maintain 4° Celsius during transport to the laboratory.

The Chain-of-custody (COC) forms to be prepared will include:

- Site name and address
- Sample identification
- Number of containers
- Date and time of collection
- Type of sample and sample matrix
- Preservation used (if any)
- Analyses to be performed on each sample

AECOM field personnel will sign and date the "Relinquished" blank on the COC form when the samples are delivered to the laboratory. A copy of the COC will be retained by the sampling group.

6. Bench-scale Dewatering Treatability Tests

A Treatability Study Work Plan (TSWP) will be prepared in accordance with EPA's "Guidance for Conducting Treatability Studies under CERCLA" (EPA 1992) and the "Remedial Design/Remedial Action Handbook" (EPA 1995). The TSWP will include the scope and procedures for treatability testing to address geotechnical considerations for cap design, water treatment to meet the specified discharge criteria, and in situ solidification/stabilization (s/s) of the material, if necessary. AECOM will conduct the treatability studies as described in the TSWP using our in-house treatability laboratory. AECOM's treatability staff has the experience and expertise not only to perform these tests according to industry standards and standard operating procedures, but also to work with our Remedial Design engineers to capture scalable observations and test endpoints not typically reported from third-party testing facilities. The ability to remove supplier bias, repeat experiments (as necessary), and perform tasks based on these initial observations without bias will further refine engineering and design assumptions typically not available from other vendors.

6.1 Chemical Conditioning for Passive and Mechanical Dewatering

Using typical industry testing equipment for a geotextile tube feasibility evaluation and standard operating procedures, AECOM will determine the dewatering characteristics of representative lime samples both with/without the use of a chemical conditioning program. In addition, AECOM will collect

filtrate samples for chemical analysis of total suspended solids (TSS), pH and other constituents of concern for use in wastewater treatment system design.

Sediment will be combined with site water to make a representative slurry with approximately 10% solids – consistent with the slurry solids anticipated from the excavation operation. The test slurry should also be analyzed for percent solids to confirm solids content of these evaluation samples. A full-breadth of chemical conditioning options including but not limited to anionic and cationic polymers in combination with inorganic and/or organic coagulants will be evaluated, as necessary. Selection of a chemical conditioning program(s) should be to optimize performance and will consider:

- Dose
- Mixing energy
- Shear
- Floc characteristics including size and strength
- Filtrate quality and quantity

6.2 Passive Dewatering Tests

Bench-scale filtration tests will be used to evaluate performance of the recommended chemical conditioning program(s) for facilitating dewatering of lime slurry from this site(s) with geotextile tubes. Slurry samples will be conditioned with the recommended conditioning program(s), flocculated, and subsequently poured through geotextile tube fabric samples. Percent solids of the conditioned solids captured on the fabric sample will be measured. Filtrate volume will be measured over the same 24-hour period and a filtrate sample will be collected and measured for TSS concentration.

6.3 Solidification/Stabilization Treatability Tests

The objective of the s/s treatability study is to identify a range of reagents and mix ratios that can be used to successfully dewater and/or stabilize the residual material prior to cap placement, if necessary. Study results will be used to develop the cost estimates included in the Remedial Design including, but not limited to, the following:

- Index Testing: Testing the physical characteristics of the untreated waste material for parameters such as moisture content, unit weight, particle size, density and/or percent organics.

- Sample Screening: Mixing and screening the samples with different reagents and mix ratios. It is expected that the material will be mixed with three or more of a combination of lime, lime kiln dust, fly ash, Portland cement and/or others. AECOM may also evaluate the effectiveness of mixing with surrounding soils or other low-cost additives that are readily available. The mixtures will be screened for ability to pass paint-filter testing, relative strength at specified time intervals and a subset of the mixes will be identified for optimized mix testing.

- Optimized Mix Development: Successful mixes from the screening phase will be mixed again and tested further for moisture content and unconfined compressive strength. The planned final disposition of the material will determine performance requirements for this treatability testing. Other criteria may include cure time (which would define how quickly the material can be moved after mixing), workability and strength.

6.4 Water Treatability Tests

AECOM will conduct water treatability studies to assess the effectiveness of various technologies to meet POTW-specified criteria for discharge, and to determine full-scale treatment system design parameters. Treatability testing will be performed to demonstrate best available technology economically achievable. At a minimum, the TSWP will include the following components:

- Treatability testing objectives;
- Water treatment objectives for alternate discharge locations such as surface water or local POTW; and
- Methods to collect and prepare samples for treatability testing. This is critical such that the data generated by the treatability tests are representative of the range of pH, waste types and other conditions that may be encountered during full-scale dewatering and material removal operations.

  Untreated and treated water samples will be subsequently analyzed by a certified analytical laboratory. Results will be summarized, including treatment performance and full-scale design considerations. It may be desirable to repeat some of the tests to further explore unexpected test results.

7. Data Management and Validation

AECOM's full suite of data management and geospatial services will provide timely and effective organization, visualization and evaluation of large and complex data systems. We have extensive experience in data management support for environmental projects across the country as well as in natural disaster scenarios and catastrophic spills. AECOM's proposed data management and GIS personnel have successfully incorporated historic and current data streams into comprehensive project-wide databases in support of planning activities, work plans, permits, reports, and public presentations for many projects.

AECOM will develop a robust GIS platform (or adapt an existing GIS) to manage data collected over the duration of the contract. The database will include sampling locations and laboratory results, and features from the shoreline and in-river structure survey, utility investigation, and source evaluation study. The GIS platform will include features such as multi-user data entry forms, input processing and QA/QC routines, data query options, maps, and summary reports.

AECOM will manage the master database and provide data management support to requirements for both field and analytical data as part of the project deliverables. The support will primarily involve transfer of tabular and geospatial data from/to the Project Database and Geospatial Repository following procedures defined in the QAPP. The support is expected to include: export and packaging of file geodatabases and tabular data sets including location point data, sample information, analytical chemistry, and other field data from historical or the current investigation. The information transfer process will be fully defined in the QAPP and is expected to involve standardized data transmittal/request form(s), the Project SharePoint site, email, and for large data sets, portable hard drives. The support is anticipated for the duration of this task.

The quality of the historical data will be assessed in terms of geospatial location and analytical content. From a geospatial perspective, it is anticipated that some data clean-up actions may be necessary to

properly join the analytical tabular datasets with their corresponding geospatial locations. From an analytical content perspective, a quality review will be needed to determine if the data meet the data quality objectives associated with those developed for the RI using EPA and GLNPO guidance (e.g., older dataset may have higher method detection limits thereby minimizing their usability). Based on the assessment of the geospatial and analytical quality, the datasets will be parsed and organized for appropriate use and blending with data collected for the current investigation.

The laboratory reports will be EPA Stage 4 compliant and include all raw data necessary to report all levels of data validation. All laboratory analytical results will be loaded into the Project Database (EQuIS) and data validation will be performed using AECOM's automated data validation tools. Unless otherwise stated in the final governing QAPP approved by EGLE and EPA, all data will be submitted and validated following the GLLA Data Reporting Standard (April 2020), and conform to the outline specified in the Quality Assurance Considerations for the Great Lakes Legacy Act (April 2020).

8. References

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Figure 1. Proposed Sediment Sampling Locations

DRAFT

AECOM

Project: 60644031

Prepared: 11/29/2020

Map Location

Legend

- Proposed Sediment Grab Sampling Location (16 locations)
- Proposed Sediment Core Sampling Location (4 locations, will be analyzed)
- Proposed Sediment Core Sampling Location (10 locations, will be frozen)

N

0 300 600 1,200 Feet

DRAFT

FIGURE 1
PROPOSED SEDIMENT SAMPLING LOCATIONS
SHEET 1 OF 6

STS MORROW LAKE DAM

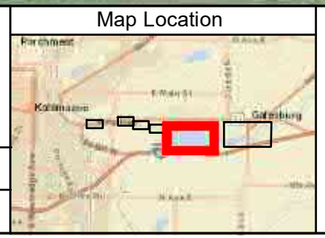
Aerial: 2018 NAIP Imagery

AECOM

Project: 60644031

Prepared: 11/29/2020

Map Location



Legend

- Proposed Sediment Grab Sampling Location (16 locations)
- Proposed Sediment Core Sampling Location (4 locations, will be analyzed)
- Proposed Sediment Core Sampling Location (10 locations, will be frozen)

N

0 300 600 1,200 Feet

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FIGURE 1
PROPOSED SEDIMENT SAMPLING LOCATIONS
SHEET 2 OF 6

STS MORROW LAKE DAM

Aerial: 2018 NAIP Imagery

AECOM

Project: 60644031

Prepared: 11/29/2020

Map Location

Legend

- Proposed Sediment Grab Sampling Location (16 locations)
- Proposed Sediment Core Sampling Location (4 locations, will be analyzed)
- Proposed Sediment Core Sampling Location (10 locations, will be frozen)

N

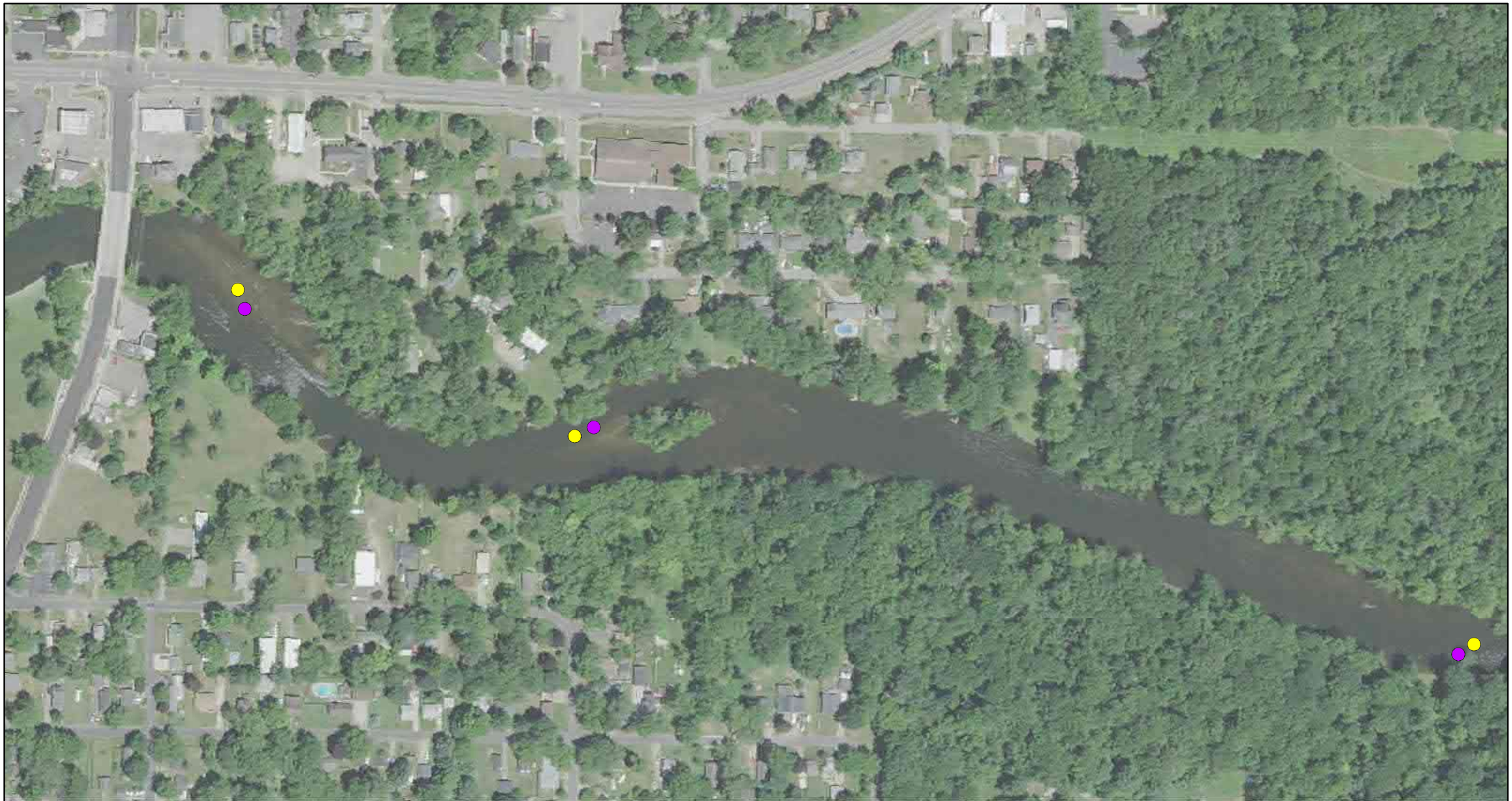
0 100 200 400 Feet

DRAFT

FIGURE 1
PROPOSED SEDIMENT SAMPLING LOCATIONS
SHEET 3 OF 6

STS MORROW LAKE DAM

Aerial: 2018 NAIP Imagery

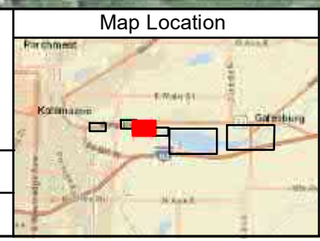


AECOM

Project: 60644031

Prepared: 11/29/2020

Map Location



Legend

- Proposed Sediment Grab Sampling Location (16 locations)
- Proposed Sediment Core Sampling Location (4 locations, will be analyzed)
- Proposed Sediment Core Sampling Location (10 locations, will be frozen)

N

0 100 200 400 Feet

DRAFT

FIGURE 1
PROPOSED SEDIMENT SAMPLING LOCATIONS
SHEET 4 OF 6

STS MORROW LAKE DAM

Aerial: 2018 NAIP Imagery

AECOM

Project: 60644031

Prepared: 11/29/2020

Map Location

Legend

- Proposed Sediment Grab Sampling Location (16 locations)
- Proposed Sediment Core Sampling Location (4 locations, will be analyzed)
- Proposed Sediment Core Sampling Location (10 locations, will be frozen)

N

0 100 200 400 Feet

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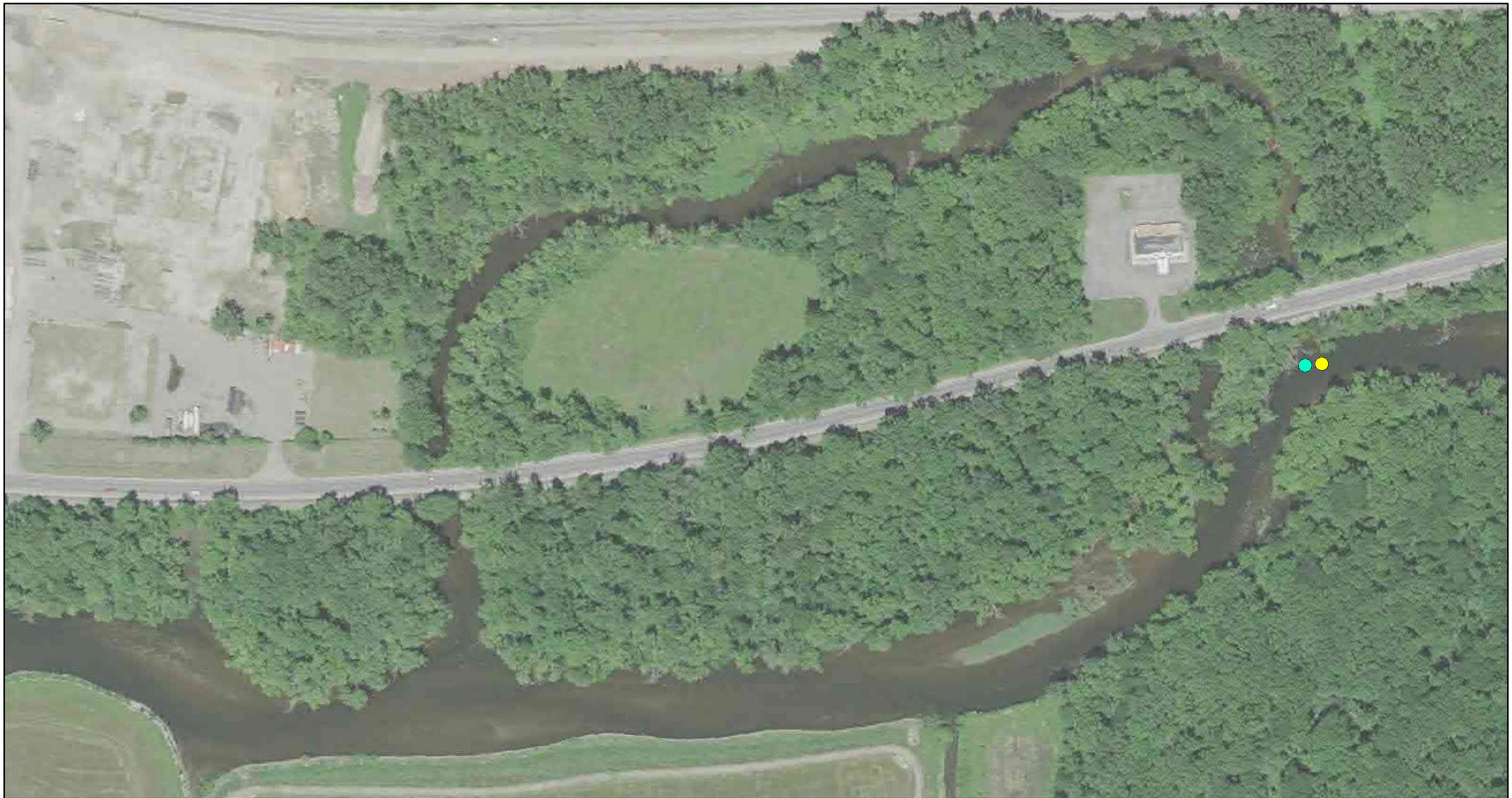
FIGURE 1
PROPOSED SEDIMENT SAMPLING LOCATIONS
SHEET 5 OF 6

STS MORROW LAKE DAM

Aerial: 2018 NAIP Imagery



AECOM

Project: 60644031

Prepared: 11/29/2020

Map Location

Legend

- Proposed Sediment Grab Sampling Location (16 locations)
- Proposed Sediment Core Sampling Location (4 locations, will be analyzed)
- Proposed Sediment Core Sampling Location (10 locations, will be frozen)

N

0 100 200 400 Feet

DRAFT

FIGURE 1
PROPOSED SEDIMENT SAMPLING LOCATIONS
SHEET 6 OF 6

STS MORROW LAKE DAM

Aerial: 2018 NAIP Imagery

Table 1. Sample Matrix and Analytical Table

Location	Samples #	Matrix	Type	Analysis	QA/QC
Upstream	3	Sediment	Surface Grab	• PCB (8082A) • PCB (EPA M1688) • TPH (8015M) • PAHs (8270 SIM) • MI metals (6010D) • Geotechnical	Field Duplicate (1) MS/MSD (1/1)
Upstream	1	Sediment	DMA - Grab	• PCB (8082A) • PCB (EPA M1688) • MI metals (6010D) • Geotechnical	
Upstream	1	Sediment	Reference/Background - Grab	• PCB (8082A) • PCB (EPA M1688) • TPH (8015M) • PAHs (8270 SIM) • MI metals (6010D) • Geotechnical	
Upstream	1 1-ft horizons	Sediment	Core (8-ft)	• PCB (8082A) • PCB (EPA M1688) • TPH (8015M) • MI metals (6010D) • Geotechnical (1 composite/core*)	Field Duplicate (1) MS/MSD (1/1)
Upstream	2	Sediment	Core (8-ft)	Frozen	Field Duplicate (2) MS/MSD (1/1)
Downstream	10	Sediment	Surface Grab	• PCB (8082A) • PCB (EPA M1688) • TPH (8015M) • PAHs (8270 SIM) • Geotechnical	Field Duplicate (1) MS/MSD (1/1)

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Location	Samples #	Matrix	Type	Analysis	QA/QC
Downstream	3 1-ft horizons	Sediment	Core (10-ft)	• PCB (8082A) • TPH (8015M) • Geotechnical (1 composite/core*)	Field Duplicate (1) MS/MSD (1/1)
Downstream	7	Sediment	Core (10-ft)	Frozen	Field Duplicate (7) MS/MSD (3/3)

*Subsample cores into horizons for geotechnical analysis based on visual observations

Geotechnical analyses:

- Sieve analysis for grain size (ASTM D422)
- Moisture content (ASTM D2216)
- Specific gravity with hydrometer (ASTM D854)
- Total organic carbon (TOC) (ASTM D2974)
- Atterberg limits (ASTM D4318)

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Attachment A – Sediment Deposit & Photograph Locations (TetraTech)

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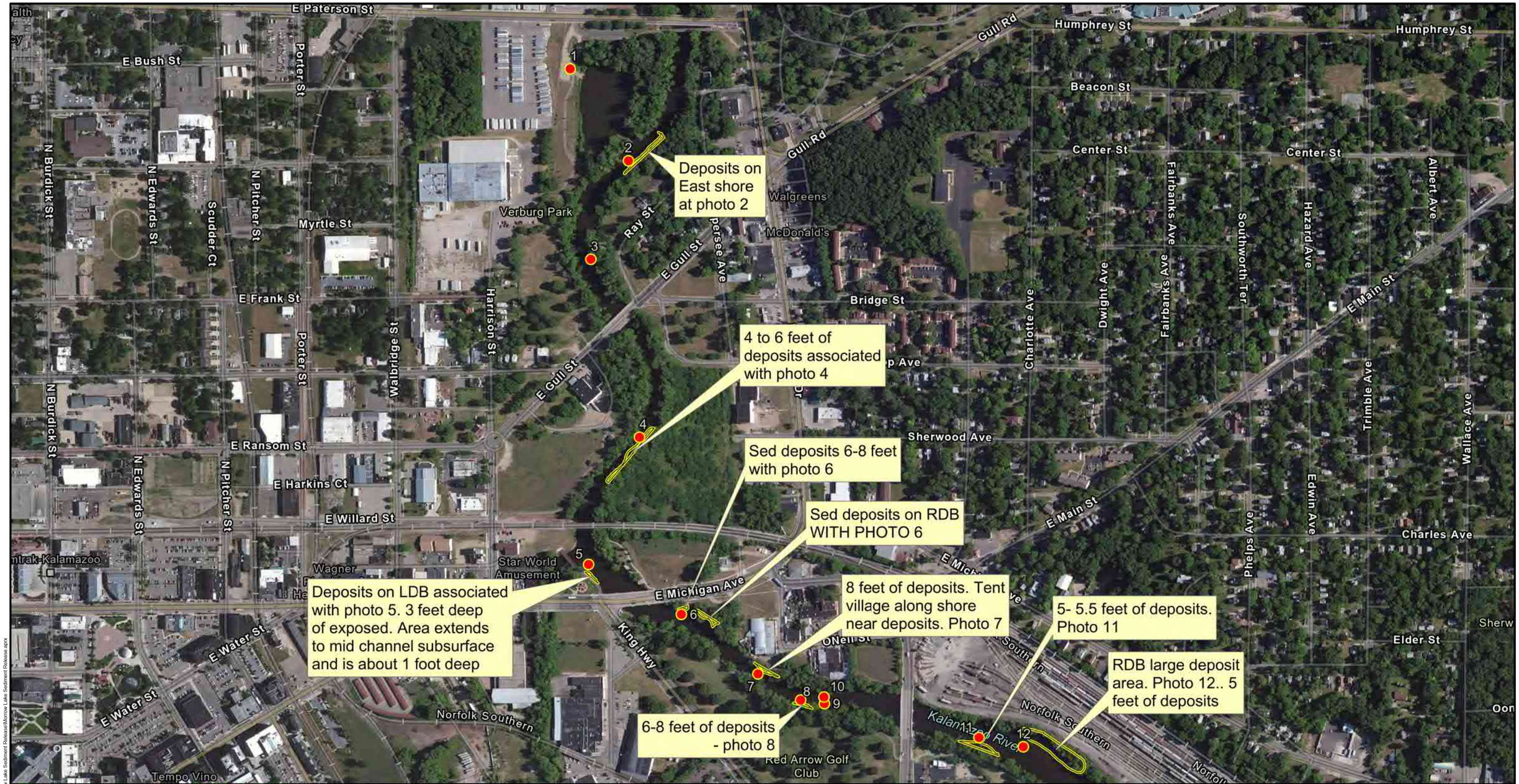
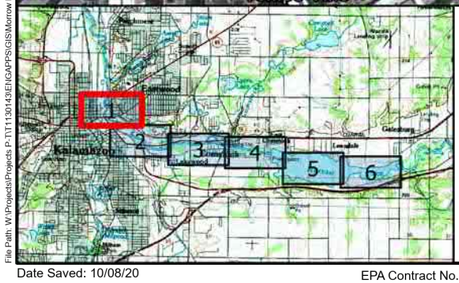




Observations (10/05/2020 & 10/06/2020)

- Photograph Location
- Sediment Deposit Area

N

0 500

Feet

Base Map Source: ESRI World Imagery (Clarity)

Morrow Lake Sediment Release
Kalamazoo River, Michigan

Figure 1 of 6

SEDIMENT DEPOSIT & PHOTOGRAPH LOCATIONS

TETRA TECH

Prepared For: USEPA | Prepared By: KRB

Date Saved: 10/08/20

EPA Contract No.:

TDD No.:

File Path: W:\Projects\Projects P-T\T113013431\GIS\APPS\GIS\Morrow Lake Sediment Release\Morrow Lake Sediment Release.aprx

Greater than 10 feet of deposits photo 13

1-5 feet of deposits on downstream end of island. Photo 14 and 15

Photo 16

2 feet deposits. Photo 17

LDB along landfill. 3-4 feet. Photo 18

LDB offshore bar. 4 FEET deposit. Photo 19

Photo 20. Bar extension of island. 7 FEET thick

Photo 21. 3-5 feet thick

RDB at upstream end of oxbow. 1-1.5 feet thick photo 23

Large LDB deposit along Willow Street Landfill. Photo 20

RDB offshore. Photo 22. 2.5 feet thick

Observations (10/05/2020 & 10/06/2020)

Photograph Location

Sediment Deposit Area

N

0 500

Feet

Morrow Lake Sediment Release
Kalamazoo River, Michigan

Figure 2 of 6

SEDIMENT DEPOSIT & PHOTOGRAPH LOCATIONS

TETRA TECH

Prepared For: USEPA

Prepared By: KRB

Base Map Source: ESRI World Imagery (Clarity)

Date Saved: 10/08/20

EPA Contract No.:

TDD No.:

File Path: W:\Projects\Projects P-T\117130143\EIG\GAPPS\GIS\Morrow Lake Sediment Release\Morrow Lake Sediment Release.aprx

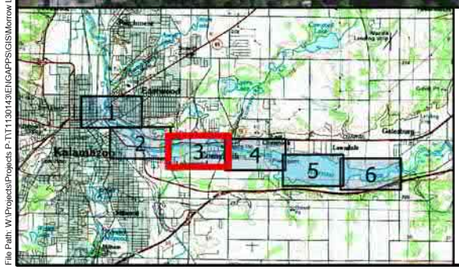
Photo 59 at North Wenke Park

Photo 58 at North Wenke Park

Photos 60 and 61

3 feet thick - photo 24

E Michigan Ave
Josephine St
S Victor Ave
S Sprinkle Rd
King Hwy
Kalamazoo River
Zimmerman Plumbing & Heating Servic
Comstock Dollar & Discount
Merrill Park
Sullivan Dr
Knight
Comstock Ave
Larch Ave
Azuba Ave
Harway Ave
Ferris St
Alger St
Blair St
Cass St
Pingree St
Sleeper St
Moline St
Higgins Ave
River St
Ripley St
Lake St
Olmstead Rd
Crossfield Ave
Foster Ave



Observations (10/05/2020 & 10/06/2020)

- Photograph Location
- Sediment Deposit Area

N

0 500
Feet

Base Map Source: ESRI World Imagery (Clarity)

Morrow Lake Sediment Release
Kalamazoo River, Michigan

Figure 3 of 6

SEDIMENT DEPOSIT & PHOTOGRAPH LOCATIONS

TETRA TECH

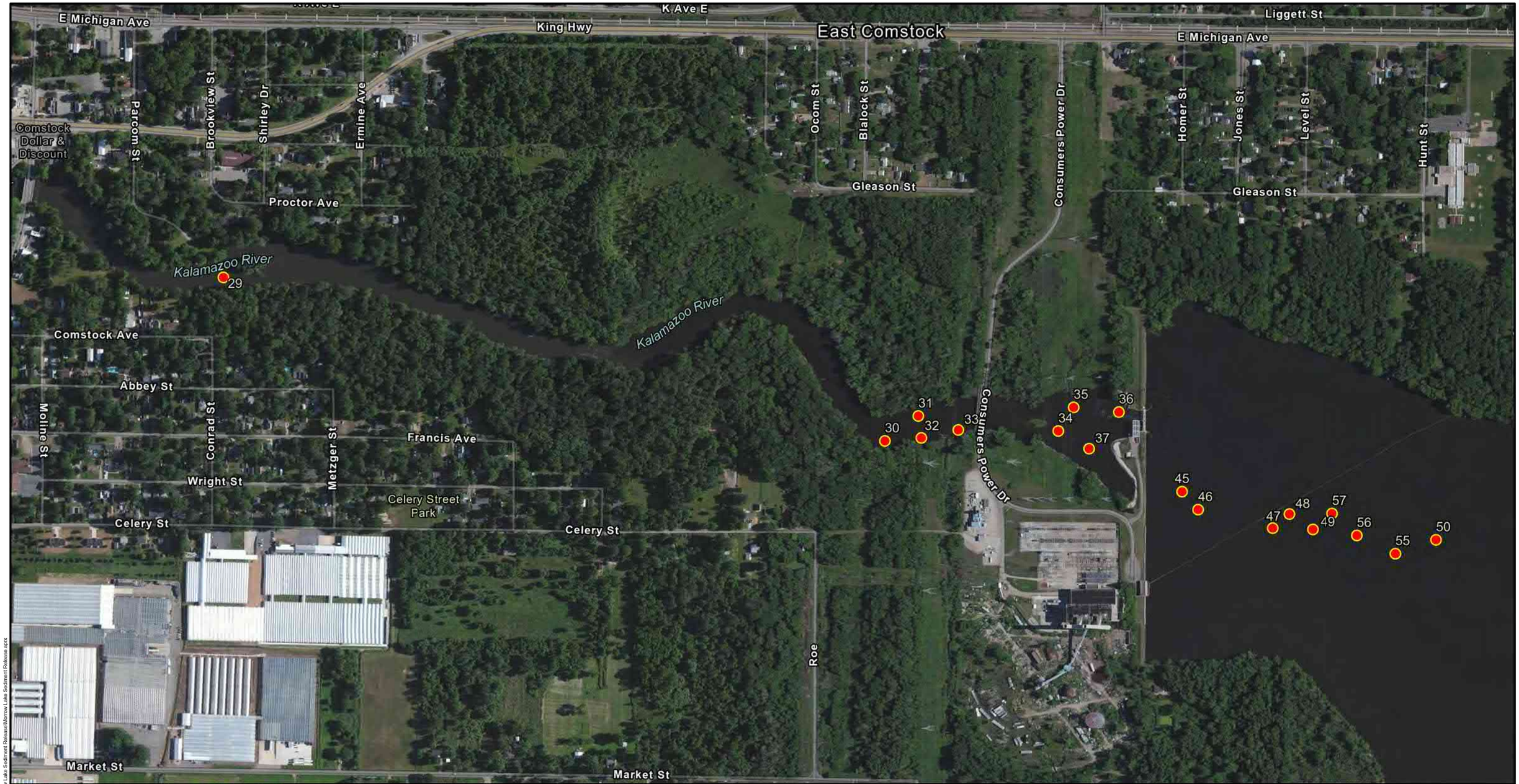
Prepared For: USEPA | Prepared By: KRB

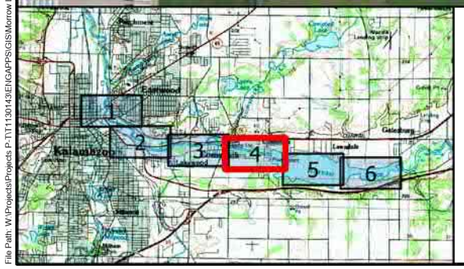
Date Saved: 10/08/20

EPA Contract No.:

TDD No.:

File Path: W:\Projects\Projects P-T\T110134143\EIG\APPS\GIS\Morrow Lake Sediment Release\Morrow Lake Sediment Release.aprx





Observations (10/05/2020 & 10/06/2020)

- Photograph Location
- Sediment Deposit Area

N

0 500

Feet

Morrow Lake Sediment Release
Kalamazoo River, Michigan

Figure 4 of 6

SEDIMENT DEPOSIT & PHOTOGRAPH LOCATIONS

TETRA TECH

Prepared For: USEPA

Prepared By: KRB

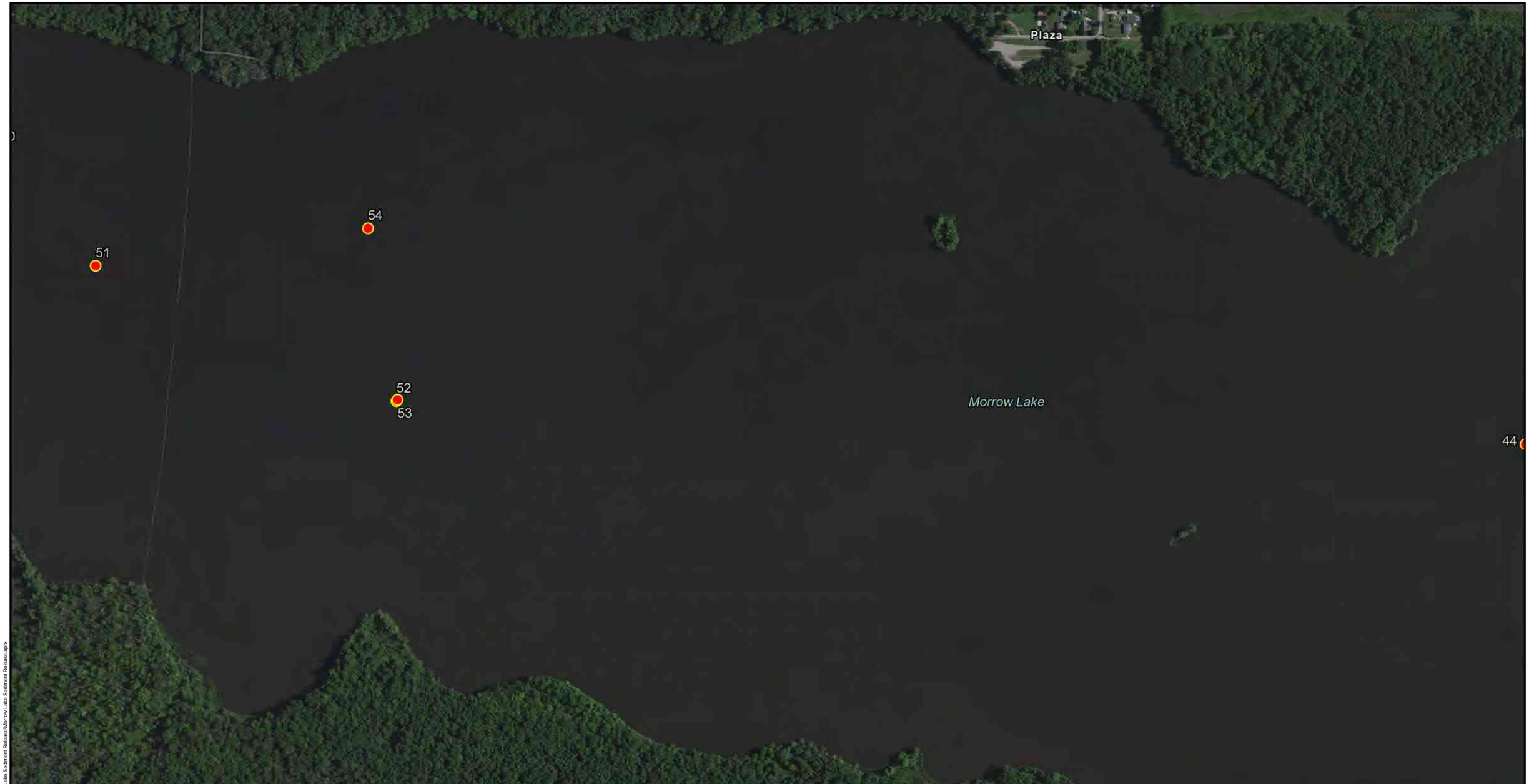
Base Map Source: ESRI World Imagery (Clarity)

File Path: W:\Projects\Projects P-T\113014301\GAPPS\GIS\Morrow Lake Sediment Release\Morrow Lake Sediment Release.aprx

Date Saved: 10/08/20

EPA Contract No.:

TDD No.:



Observations (10/05/2020 & 10/06/2020)

- Photograph Location
- Sediment Deposit Area

N

0 500

Feet

Morrow Lake Sediment Release
Kalamazoo River, Michigan

Figure 5 of 6

SEDIMENT DEPOSIT & PHOTOGRAPH LOCATIONS

TETRA TECH

Prepared For: USEPA | Prepared By: KRB

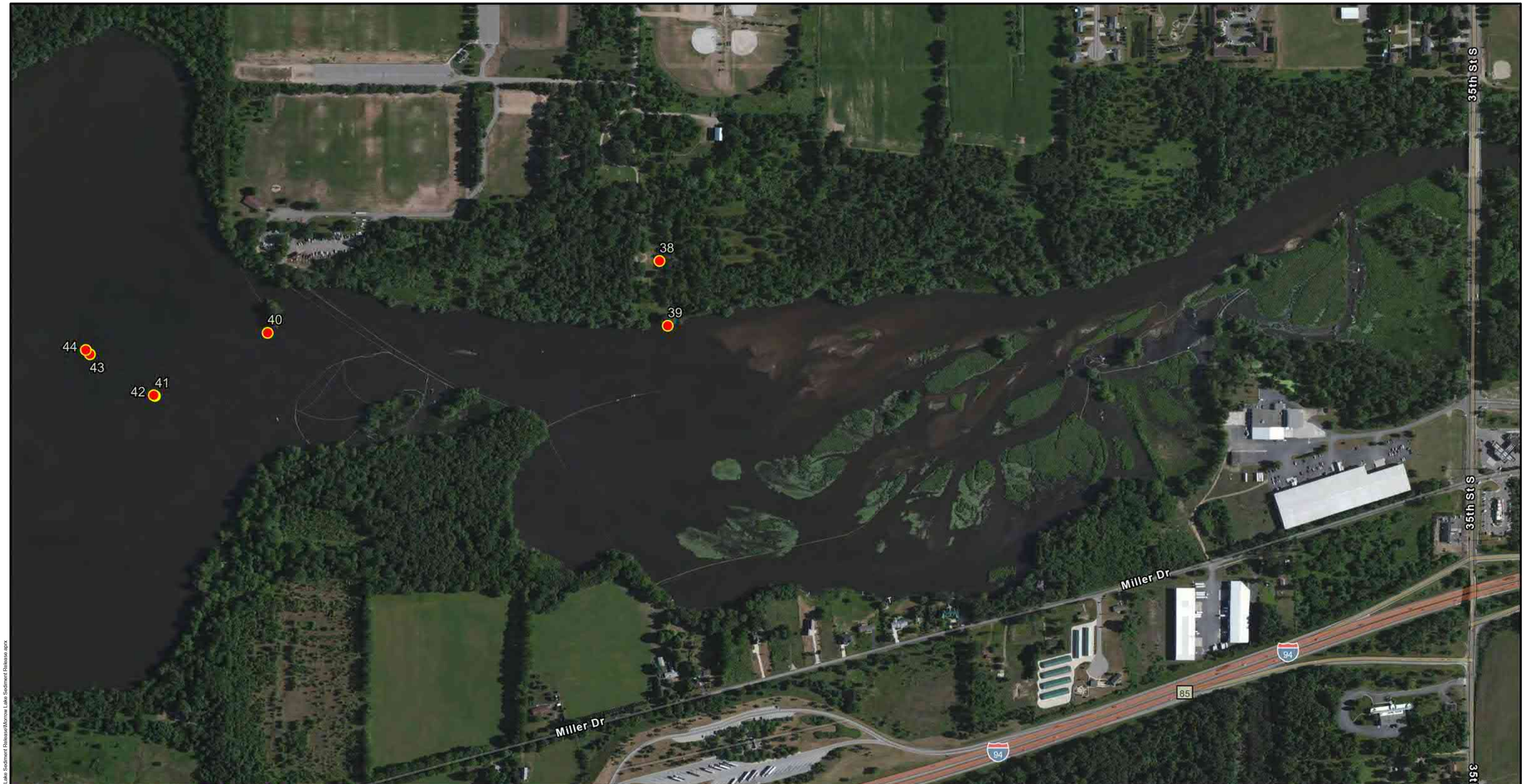
Base Map Source: ESRI World Imagery (Clarity)

Date Saved: 10/08/20

EPA Contract No.:

TDD No.:

File Path: W:\Projects\Projects P-T\117130143\ENGAPPS\GIS\Morrow Lake Sediment Release\Morrow Lake Sediment Release.aprx



Observations (10/05/2020 & 10/06/2020)

- Photograph Location
- Sediment Deposit Area

N

0 500

Feet

Morrow Lake Sediment Release
Kalamazoo River, Michigan

Figure 6 of 6

SEDIMENT DEPOSIT & PHOTOGRAPH LOCATIONS

TETRA TECH

Prepared For: USEPA

Prepared By: KRB

Base Map Source: ESRI World Imagery (Clarity)

Date Saved: 10/08/20

EPA Contract No.:

TDD No.:

File Path: W:\Projects\Projects P-T\T113014\3E\GAPPS\GIS\Morrow Lake Sediment Release\Morrow Lake Sediment Release.aprx

Attachment B – Standard Operating Procedures

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SOP ML-1
SEDIMENT SAMPLE COLLECTION

SEDIMENT SAMPLING

The following procedures are designed to be used to collect cores and surficial sediments to a specified depth as detailed in the sampling plan. Vibracore techniques will be conducted from vessels including a flat bottom shallow draft boat and air boats. Sediment samples should be collected from areas having lower levels of constituents of interest first, followed by stations with higher expected levels of constituents of interest or if collected from a flowing stream or river from downstream to upstream where possible. The procedures listed below may be modified in the field by the agreement of the lead site sampler and field personnel, based on field and site conditions, after appropriate annotations have been made in the appropriate field logbook.

EQUIPMENT

- Boat with sampling frame/davit
- Vibracore device with power supply
- SS sampling tools
- Al or polycarbonate core tubes
- Coring supplies (caps, tape, keepers, etc.)
- Decon equipment
- Safety equipment
- Camera
- Tape measure
- Pens, markers, whiteboard
- GPS
- Field logbook

VIBRACORE SAMPLING PROCEDURES

To collect core samples into sediment or sludge matrices a vibracore barge unit will be used. The vibracore barge unit consists of a pontoon sampling barge equipped with a tripod and a vibrating head. The vibrating head advances the sample core into the sediment or sludge material. Three-inch diameter thin walled aluminum tubing is used for the core barrel. The following procedures are used:

1. Position and anchor the sampling barge over the designated sampling location. Record sample location with GPS. Collect depth to water from center of barge to top of water surface.
2. Position a stick of 3-inch diameter aluminum pipe (typically 10 to 20- feet long) over the opening in the center of the barge. Lock the stick of pipe into the vibrating head using a hand tightened collar. Turn the motor that runs the vibrating head on and guide the agitator in a downward vertical motion to collect the sample. Repeat the procedures until the required depth is reached or the length of the pipe is reached.

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3. Fill the core barrel with water and insert rubber stopper or similar plug in the top to create a vacuum, thus enabling retention of the core as it is extracted from the sediment/sludge.
4. Unhook the collar around the pipe, label the core with the total depth, top orientation and cut the core pipe above the sediment/sludge height.
5. Store the core vertically tied off to the barge railing.
6. Transfer sample core to onshore processing area. Place core on sampling table lined with plastic sheeting.
7. Cut core pipe with metal shears by making two lengthwise cuts along opposite sides of the core pipe to permit splitting of the sample with a wire saw.
8. Open core to yield two core halves.
9. Record core lithology.
10. Label scale, core number, core orientation, and core length with a broad-tip permanent marker on plastic sheeting beside the core.
11. Photograph core.
12. Collect discrete sample at designated sample locations from the interior of the core section (not in contact with core pipe) and place in sample containers as described in work plan.
13. Complete all pertinent field QA/QC documentation, logbooks, sample labels, and field data sheets.
14. Complete the appropriate field books and QA/QC documentation.
15. Decontaminate all sampling equipment.

1. Locate the sampling point as directed in the work plan or SAP. Containers will be labeled with sample tags prior to filling. If analytical testing will be performed for volatile organic compounds (VOCs), the VOC sample will be collected first (with a minimum of disturbance) by placing the sample into the container with a minimum amount of headspace and sealed tightly.
2. Surface sediments are typically collected in the biotic zone (0 to 4-inches deep). The sediment samplers identified above are designed to retrieve sediments from the upper 4-inches of the sediment bed. Surface sediments are typically collected from ponds, lakes, rivers or streams. A boat may be required to access the sampling locations without disturbing the sediments. Surface sediments from flowing streams, rivers, creeks, bayous, etc. should be collected from downstream to upstream.
3. When using a clam-type sampler lower to the water/sediment interface and release the messenger to activate the closure mechanism. The sampler will close and excavate the surface sediments. If using a decontaminated stainless-steel or disposable plastic sampling tool, remove sediment to the depth specified in the work plan or SAP.
4. After retrieval of the sampler, decant the excess water from the sampler and place the sediments into a decontaminated stainless steel or disposable plastic bowl.
5. If required for analysis, first collect VOC samples (prior to any homogenization), placing the samples in the appropriate-size containers.
6. Thoroughly mix and homogenize the sample using disposable equipment or a decontaminated stainless-steel spoon.
7. Remove samples of the homogenized sediment from the mixing bowl and place in the appropriate size sample container. The sample container should be filled to just below the container lip, and the container should be sealed tightly.

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8. Complete all pertinent field QA/QC documentation, logbooks, sample labels, and field data sheets.
9. Mark the sampling site with a wire flag, wooden stake, metal rebar, or flagging, as appropriate.
10. Decontaminate all sampling equipment.
11. After collection of samples either Encore Sampler or other containers must be stored in ice chest and cooled.
12. Package and ship samples.

GRAB SAMPLE PROCEDURES

1. Locate the site as directed in the work plan or SAP. Containers will be labeled with sample tags prior to filling. If analytical testing will be performed for VOCs, the VOC sample will be collected first (with a minimum of disturbance) by placing the sample into the container with a minimum amount of headspace and sealed tightly.
2. The boat or barge should be positioned over the sample location. Collect and record the location using GPS.
3. Lower the Ekman/Ponar dredge to the water/sediment/sludge interface. Release the messenger to activate the closure mechanism and excavate the sediments/sludge.
4. Slowly pull the sampler up into the boat and decant the excess water. Empty the sediment/sludge material into a large decontaminated stainless steel bowl or disposal plastic bucket.
5. If required for analysis, first collect VOC samples (prior to any homogenization), placing the samples in the appropriate-size containers.
6. Thoroughly mix and homogenize the sample using a decontaminated plastic or stainless-steel spoon.
7. Remove samples of the homogenized sediment from the mixing bowl and place in the appropriate size sample container. The sample container should be filled to just below the container lip, and the container should be sealed tightly.
8. Complete all pertinent field QA/QC documentation, logbooks, sample labels, and field data sheets.
9. Complete the appropriate field books and QA/QC documentation.
10. Decontaminate all sampling equipment.

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SOP ML-2
SEDIMENT SAMPLE PROCESSING

SEDIMENT CORE PROCESSING

The following procedures are designed to be used for processing sediment cores collected with dedicated core liners using vibracore or manual advancement techniques. Processing includes logging sediments and collecting material for laboratory analysis. Processing will be completed following site-specific sampling plans.

EQUIPMENT

- Processing table
- Vertical core stand
- Core liner cutting tools
- Plastic sheeting
- Disposable spoons/scoops
- Disposable Al pans, spatula, sheeting
- Laboratory bottle ware
- Sample coolers
- Trash bags
- COC' s, custody seals
- Decontamination supplies
- Tape measure
- Datasheet
- PPE

PROCEDURES

The procedures outlined below are to be used when processing sediments within a sampling core. All equipment used to process sediments should be decontaminated between sampling intervals or disposable.

Obtain sediment core and confirm sample identification

Keeping the core upright, remove the top cap and measure and record the length of sediment in the core. Check for settling, noting any measurable difference between the top of sediment and the "mud line" marked on the core liner by the boat crew.

If sediment is firm cap the core and transfer to the core cutting area. If sediment is flowable, collect the top interval specified in the sampling plan while in a vertical position. Prior to removing sediment, dry the outside of the liner and use a permanent marker to indicate the bottom of the interval to be processed vertically. Use a dedicated or decontaminated spoon/spatula to scoop out the sediment to the line drawn for that interval.

Confirm top versus bottom of each core and align the core(s) horizontally.

Cut cores length-wise on opposite sides using electric cutting sheers or other methods with appropriate PPE.

Wearing clean nitrile gloves, open the core tube and separate the core into two halves using putty knives or flat spatulas if need to separate the core. Measure the length of the material in the core and compare it to the field measurement noted on the end cap. Discard slough. Begin measurement at the surface of the core material after the slough is discarded. Note drive depth; record percent

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recovery as: (length of material in core) / (drive depth). For example, if the field crew documented a drive of 4.0 ft, and 3.6 ft was recovered, the percent recovery would be 3.6/4.0 – 90% recovery.

Use a white board to identify the core identification number, drive length, and recovery length. Photograph the exposed surface of the core. Mark the top and bottom depths at each end and include a ruler or scale along the length of the core. Include the core ID, sample date, and depth interval in the photograph. Remember to include a photograph of any high fluid (saturated) intervals previously removed and placed in bowls/pans prior to homogenization.

Visually log the core using the Unified Soil Classification System (USCS) and record detailed information. Note attributes such as cementation, color and mineralogy (if it can be determined). The presence of iron-staining, or other staining, presence of organic matter, shells, or debris will be recorded. Any odors (i.e., organic, hydrogen sulfide, fuel oil-like, etc.) will be recorded. Also note the depth of contact between bottom of sediment and native material, if distinguishable.

The sample processor will put the material for each sample interval into a clean (unused) aluminum pan for homogenization. Be sure to include the entire interval length (no more, no less), and homogenize all of the interval material from the core (i.e., do not just scrape material from along the interval, leaving a significant amount behind). Wearing clean nitrile gloves over Kevlar cut-resistant gloves, mix the material until it is visibly homogeneous. Break up silt aggregates. Discard easily retrievable, obviously non-native material (e.g., brick, concrete, angular gravel) and material that is not soil or sediment (e.g., shells, worms). Also remove large vegetated material that is not obviously decomposed (e.g., root wads/mats, wood debris, green plant material). Homogenization will follow the USEPA quartering procedure (USEPA, 2014) where the sample material is divided into equal quarters in the mixing pan, each quarter is mixed individually, the quarters are then combined in two halves that are individually mixed followed by the entire sample being mixed again. This procedure will be repeated several times until the sample is adequately mixed. Care will be taken to avoid material in contact with the core liner to the extent practicable.

Partition the core into each sample interval by placing a clean (unused) paint stick (or similar) in the core material at the boundary between each sample interval. Do not use sample intervals to log or account for missing material; intervals are for sampling purposes only.

If a sample is being split, pat down the material into uniform thickness after homogenizing and divide the material into equal parts using the alternate shoveling method from the USEPA (USEPA, 2014). This method involves repetitively placing an aliquot of soil in each sample container in sequence until the material or the sample volume are exhausted. The purpose is to create splits of the same material.

Use clean gloved hands (nitrile over Kevlar gloves) and/or an alternate, but compatible mixing tool to scoop the homogenized material into a sample container (e.g., jar or resealable plastic bag).

Record the appropriate sample information (i.e., project name or number, sample identification, collection date and time, analysis requested, preservative, sampler's initials) on the sample label and on the core sampling form.

Sampling tools and pans/bowls will be dedicated to one sample interval, these items will not be used for processing any other core intervals. Non-dedicated sampling tools will be decontaminated between sample intervals. When the entire core has been processed, discard the core tubes and contents of the bucket (pans, nitrile gloves, paint sticks, tape, end caps, and excess material) into the roll-off. Use a damp paper towel to collect spilled material and discard the collected material in the bucket or roll-off. Materials that have not contacted core material may be disposed with general refuse (i.e., in trash can or dumpster).

Collect QA/QC samples at the rate specified

Place samples in cold storage pending packing for shipment or courier pickup

REFERENCES

United States Environmental Protection Agency, Soil Sampling SOP, USEPA Region 4, SESDPROC-300-R3. August 21, 2014.

Kalamazoo River Cleanup Group. PDI FSP OU5 Area Time Critical Removal Action. June 15, 2020.

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SOP ML-3
EQUIPMENT DECONTAMINATION

SEDIMENT EQUIPMENT DECON.

The following procedures are designed to be used for decontamination of core collection equipment and reusable sampling equipment for collection of analytical samples. The goal is to minimize the potential for cross-contamination between samples.

PROCEDURES

These procedures will be used to decontaminate sediment core collection equipment and support vessels, including anchors, vibracoring equipment, lines/ropes, etc.

- Personnel will don appropriate PPE for decontamination to reduce exposure to contaminants.
- Residual bulk material will be brushed or scraped off the equipment.
- Equipment will be washed down or rinsed with river water onboard the vessel, at the sampling location where appropriate and feasible, to remove any remaining sediment.
- Rinse water will not be contained.
- Boat decks will be washed down daily with river water at the conclusion of work for the day.

These procedures will be used to decontaminate sampling equipment including but not limited to core catchers and cutting heads, split-spoons, hand augers, and sample processing equipment.

- Personnel will don appropriate PPE for decontamination to reduce exposure to contaminants.
- Remove residual material by brushing or scraping.
- Place equipment in a wash tub or bucket containing Alconox (or equivalent non-phosphate detergent) and potable water. Scrub with a brush or similar tool to remove visible contamination or dirt from sampling devices.
- Rinse with potable water.
- Rinse with distilled water.

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