NEW YORK STATE OF OPPORTUNITY. | Department of Environmental Conservation

PROPOSED STATEMENT OF BASIS

Lower Genesee River
Operable Unit 5 (OU-5) of Eastman Business Park

Environmental Response Trust
Site No. 828177
EPA ID No. NYD980592497
Rochester, Monroe County

October 2019

PREPARED BY
DIVISION OF ENVIRONMENTAL REMEDIATION

PROPOSED STATEMENT OF BASIS

Lower Genesee River (Operable Unit 5 of the Eastman Business Park)
DEC Site No. 828177
City of Rochester, Monroe County

October 2019

SECTION 1: INTRODUCTION

The New York State Department of Environmental Conservation (Department, or NYSDEC) has determined that hazardous wastes and/or hazardous constituents were released into the environment at the Lower Genesee River (Operable Unit 5 [OU-5] of the Eastman Business Park [EBP]) (the site). The Department, in consultation with the New York State Department of Health (NYSDOH), is proposing final corrective measures for the facility. The proposed corrective measure(s) is/are intended to attain the cleanup objectives identified for this site for the protection of public health and the environment. This Statement of Basis (SB) identifies the proposed corrective measure(s), summarizes the other alternatives considered, explains the reasons for selecting the proposed remedy, and solicits public involvement in the selection of corrective measure(s). The Department will select final corrective measure(s) only after the public comment period has ended and the information submitted during this time is reviewed and considered in the decision-making process.

The purpose of this SB is to provide an opportunity for the public to be informed of and to participate in the development of the remedial program for the site. Public input on all potential remedial alternatives, and on the information that supports the alternatives, is an important contribution to the corrective measure(s) selection process. The Department may modify the proposed remedy or select another remedy based on new information and/or public comments. The SB summarizes and highlights key information from the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and the Corrective Measures Study (CMS) reports but is not a substitute for these documents. The RFI and CMS reports and the administrative record are more complete sources of information regarding the corrective measure(s).

SECTION 2: CITIZEN PARTICIPATION

The Department encourages the public to review and comment on all the corrective measure alternatives described in this document and on any additional options not previously identified and/or studied. Public input on all potential remedial alternatives, and on the information that supports the alternatives, is an important contribution to the corrective measure selection process. The Department may modify the proposed remedy or select another remedy based on new information and/or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. The Department will address all comments received during the public comment period in the Response to Comments (RTC) document. The preferred remedy in the SB is a preliminary determination. Should another option be selected as the remedy based upon public comment, new information, or a re-evaluation of existing

information, any significant differences from this SB will be explained the in RTC. The RTC will be sent to each person who submits written comments and/or who requests such notice.

A public comment period has been set from:

October 2, 2019 to November 15, 2019

A public meeting is scheduled for the following date: October 23, 2019 from 6:00 -8:00 pm

Public meeting location:

Central Library, 115 South Avenue, Rochester New York

Rundel (Kusler-Cox) Memorial Auditorium

At the public meeting, the findings of the RFI and the CMS will be presented along with a summary of the proposed corrective measure(s). After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the SB.

All comments and/or requests for a public hearing must be submitted no later than **November 15, 2019,** addressed to:

Lisa A. Gorton, P.E.
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9574
E-mail: lisa.gorton@dec.ny.gov

Document Availability

This document summarizes information that can be found in greater detail in the administrative record for the site. The administrative record contains many reports, including investigations and sampling results which the Department used to select the proposed final corrective measures. A list of all reports is referenced in Appendix A of this SB, and the referenced reports are available for review. The public is encouraged to review these documents, which are available at the following repositories and through the file transfer link:

NYSDEC Region 8 Office **6274 E. Avon-Lima Road** **Avon, NY 14414** **Call 585-226-2466 for Appointment**	**NYSDEC Central Office** **625 Broadway – 12th Floor** **Albany, NY 12233-7017** **Call 518-402-9813 for Appointment**
Greece Public Library **2 Vince Tofany Boulevard** **Rochester, NY 14162**	**Maplewood Community Library** **1111 Dewey Avenue** **Rochester, NY 14613**

For more information about Kodak EBP and Environmental Trust activity, visit:
https://www.dec.ny.gov/permits/97804.html

Receive Site Citizen Participation Information by Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be

distributed for all sites in a particular county that are being investigated and cleaned up under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and RCRA Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html.

SECTION 3: SITE BACKGROUND

Site Description and History

The Lower Genesee River in Rochester, New York, consists of the area from the mouth of the river at Lake Ontario upstream to the Lower Falls. The Kodak EBP site has been divided into nine (9) operable units. An operable unit usually represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination.This SB addresses OU-5 of the EBP RCRA site (the site) and other operable units are or have been addressed under separable SBs. As shown on Figure 1, the site includes about four miles of the Lower Genesee River from its mouth at Lake Ontario to the State Route 104 (Veteran's Memorial) Bridge near the Kodak King's Landing Wastewater Treatment Plant (KLWWTP) and the adjoining wetland and floodplain areas. The study area averages approximately 300 feet wide and 15 feet deep along the deepest parts of the channel. The Department classifies the lower Genesee as a Class B waterbody, indicating that the river's most suitable uses are for primary (bathing) and secondary (incidental) contact, recreation and fishing, and wildlife propagation and survival.

Construction and manufacturing processes at the EBP began in 1891. The site encompasses approximately four square miles within the City of Rochester and the Town of Greece. Primary operations at the EBP have included manufacturing of various photographic materials and products and production of synthetic organic chemicals, dyes and couplers.

OU-5 is one of nine OUs associated with the main EBP site. The underwater footprint of OU-5 (hereafter called the lower Genesee River) covers approximately 280 acres. The EBP and associated KLWWTP are located downstream of the State Route 104 (Veteran's Memorial) Bridge on the western bank of the river. Industrial operations at the EBP have been ongoing for over 100 years. Many of these operations involved intensive use of various chemicals and occasional inadvertent releases from storage tanks, pipelines, and manufacturing units. There are other past and ongoing industrial operations along the river upstream of the lower Genesee River, primarily within the City of Rochester. KLWWTP is currently owned by Kodak and operated by RED-Rochester and continues to treat wastewater from EBP operations under a permitted discharge to the Lower Genesee River.

As shown on Figure 1, current land use along the lower Genesee River is primarily park land and cemeteries. Turning Point Park parallels the west bank of the lower Genesee River and is adjoined on its south end by Riverside Cemetery, which is in turn adjoined by St. Bernard's Park and King's Landing Cemetery north of the KLWWTP. Land along the east bank of the river is undeveloped at the Turning Basin and Seneca Park and upstream to the State Route 104 Bridge. Steep topography near the riverbank limits development along both riverbanks upstream of the Turning Basin.

The section of the lower Genesee River immediately downstream of the Route 104 Bridge includes several point sources: combined sewer overflow (CSO) outfalls, discharge from the KLWWTP, and the Merrill Street stormwater outfall. The river downstream of the EBP area to the Turning Basin (approximately 3.1 miles) receives relatively few point-source discharges.

From the Turning Basin downstream to its mouth, the river is characterized by reinforced banks and bulkheads, boat docks, and small embayments. Several recent civic improvement projects have been conducted along the river downstream of the Turning Basin; some of these are ongoing. In 2004, the Colonel Patrick O'Rourke drawbridge was installed. The drawbridge crosses the river upstream of the Port

of Rochester. Concurrently, a terminal building was built at the Port of Rochester, which is currently being upgraded. A 1.5-mile-long public recreational path placed along the water line between the Turning Basin and the Port of Rochester in 2008 is used for hiking, bicycling, and fishing.

The Port of Rochester includes a navigation channel that extends upstream from the mouth of the river to approximately 0.5 mile upstream of the Turning Basin (Figure 1). The navigation channel is dredged as necessary to accommodate commercial shipping traffic. Several marinas located between the Turning Basin and the river mouth frequently perform dredging to maintain access to their facilities. Sediment that is dredged from the navigation channel and adjoining boat slips is deposited in a designated underwater disposal area in Lake Ontario in accordance with permits issued by the United States Army Corps of Engineers (USACE).

This section of the Lower Genesee River is designated as an area of concern (AOC) in the Great Lakes region under the United States-Canada Great Lakes Water Quality Agreement (OU-5 lies within the designated Rochester Embayment area). Current efforts related to the Rochester Embayment AOC are led by the Monroe County Department of Public Health and the Department's Division of Water in consultation with USEPA Region 2.

SECTION 4: ENFORCEMENT STATUS

6 NYCRR (New York Codes, Rules and Regulations) Part 373 Hazardous Waste Management Permits include RCRA Corrective Action. This requires owners and/or operators of hazardous waste treatment, storage and disposal facilities to investigate and, when appropriate, remediate releases of hazardous wastes and/or constituents to the environment. For this site, as a consequence of Kodak's bankruptcy and related settlement agreements, the Kodak Environmental Response Trust was established to fund environmental response actions related to pre-existing contamination associated with historical releases from the EBP, including releases to the lower Genesee River. The Department has been designated the primary beneficiary of the EBP Environmental Response Trust and is responsible for administering trust obligations, including conducting this investigation. Corrective actions are enforced through the joint applicant Part 373 permit #8-2614-00205/00104. The Department will implement the remedy through the EBP Environmental Response Trust as a state-led remedial action.

SECTION 5: RCRA FACILITY INVESTIGATION (RFI)

The RCRA Corrective Action process began with investigations to evaluate potential areas of the site that may have been impacted by hazardous wastes and/or hazardous constituents. Based on the results of investigations, the Department has determined that hazardous wastes and/or hazardous constituents have been released at the site. The impact of releases of hazardous wastes and/or hazardous constituents at the site were characterized and evaluated. The Lower Genesee River RFI was issued as final in March 2017 is available at the following link: https://www.dec.ny.gov/permits/97804.html.

The analytical data collected for the site includes data for:

- Surface Water
- Groundwater
- Sediments
- Wetland/Floodplain Sediments and Soils
- Biota

The data have identified contaminants of concern (COCs). These are constituents that are sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. The RFI Report contains a full discussion of the data. Based on the results, the Department determined that

corrective measures were required to address some of the areas investigated. The nature and extent of contamination and environmental media requiring action are summarized in **Exhibit A**.

As illustrated in Exhibit A, the COCs exceed the applicable Standard, Criteria and Guidance (SCGs) for:

- Surface water
- Sediment
- Soil
- Biota

The compiled historical analytical data are presented in the RFI and were compared to applicable screening levels for each media to assess potential impacts to the lower Genesee River and develop an understanding of the distribution of environmental contaminants. COCs identified in the lower Genesee River based on exceedances of the Department's sediment criteria or guidance values (SGVs) include the following:

- Silver and other metals (cadmium, zinc, chromium [total])

The COC identified and addressed through site-specific cleanup objectives at this site is silver. Other metals (i.e., cadmium and zinc) that exceeded Class A and C SGVs could be attributable to EBP operations and are generally collocated with the silver impacts.

5.1: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water. Ecological resources are present in the study area and are collocated with various media exceeding criteria for contaminants of ecological concern in surficial soils and sediment. Exposure pathways between affected media and ecological receptors were evaluated in the RFI - Fish and Wildlife Resources Impact Analysis (FWRIA) report. The FWRIA presents a more detailed discussion of any existing and potential impacts from the site to fish and wildlife receptors. Complete exposure pathways for the contaminants exceeding SGVs were evaluated through the FWRIA. The remedy evaluation and selection are based on the site-specific potential toxicity threshold for silver.

Surface Water

The lower Genesee River is defined as a Class B surface water body, meaning that its most suitable uses are primary (bathing) and secondary (incidental) contact, recreation and fishing, and wildlife propagation and survival. Total silver concentrations downstream of the KLWWTP exceeded the Class B surface water criterion for silver; however, the criterion used for comparison is specific to ionic silver. Dissolved silver results were below the detection limit at all sample locations during the RFI. These results suggest that total silver detections in surface water collected from the lower Genesee River are related to the solids fraction.

River Sediments

- Silver concentrations exceeded the Class C SGV of 2.2 parts per million (ppm) throughout the study area, with the highest silver concentrations observed at and just downstream of the KLWWTP. Concentrations decrease with distance from the KLWWTP. In general, the concentrations of silver within sediments were lower in the center of the river channel and higher toward the banks. Silver concentrations also tended to be higher in depositional areas. The highest silver concentrations were typically located at a depth of 2 or more feet below ground surface (bgs).
- Silver porewater and Toxicity Characteristic Leaching Procedure (TCLP) concentrations were all non-detect.

Sediment Transport Modeling

- Two sediment bed types are generally present at the lower Genesee River: areas comprised of coarser sediments unlikely to erode during high flow events and areas that lack coarser sediments that are expected to erode only minimally due to cohesion. Areas lacking coarser sediments tend to be present along riverbanks and in the downstream portion of the lower Genesee River that is navigationally dredged.
- Overall, the physical properties of the riverbed (e.g., armoring, high bulk density, low moisture content, and clay content), combined with presence of contaminants buried at depth, suggest that widespread erosion is not likely even for a high velocity (30,000 cubic feet per second [cfs]) flood event. Estimated flows high enough to produce enough scour to re-expose sediments with peak silver concentrations are unlikely to occur at the lower Genesee River with the upstream dam and reservoir system currently in place.
- Although modelling shows that buried peak silver concentrations are unlikely to be resuspended even under high flow conditions, limited erosion and redeposition of the top 0.5 foot of sediments may occur.

Wetlands/Floodplain Sediments and Soils

- The wetland/floodplain areas within OU-5 have been observed to exhibit two primary conditions: constant/near constant inundation by the river and no/infrequent inundation. New York State-regulated freshwater wetlands within the OU-5 wetland/floodplain area are classified according to three primary designations: 1) palustrine emergent, 2) riverine low perennial unconsolidated shore (temporary flooded), and 3) palustrine scrub-shrub.
- Sediment is defined in state regulations as "unconsolidated particulate material found at the bottom of lakes, rivers, streams and other water bodies at bed elevations equal to or lower than the mean high-water level (MHWL)." Therefore, areas below the MHWL are defined as sediment, and sediments above the MHWL were defined as soils. Applicable standard cleanup objectives for each media are described in more detail in Exhibit B. Sediment and soils were screened through the RFI process and applied in the CMS to support remedy selection.
- Silver is the predominant, widespread COC in wetland/floodplain sediments and soils. Silver was found in excess of the Class A SGV and Soil Cleanup Objectives (SCOs) for the protection of ecological resources throughout the wetland/floodplain areas located along the length of the lower Genesee River. Higher concentrations of silver in wetland/floodplain samples occur downstream of the KLWWTP. Vertically, silver concentrations in the 0- to 2-foot zones generally tend to be higher than those in deeper (greater than 2 feet) sediments and soils, although silver concentrations in the 0.5- to 2-foot interval tend to exceed those in the top 0.5 foot. This is especially apparent in Wetlands A, C, and E, where lower concentrations in the top 0.5 foot compared to the 0.5- to 1-foot interval provide evidence of natural recovery. Silver concentrations within individual wetland/floodplain area sediments and soils varied, with the lowest average silver concentrations in Wetlands A and E. In general, Wetland C exhibited the highest average concentrations, as well as the highest overall average concentration.

Biota

Benthic Toxicity

Benthic toxicity testing was performed during the RFI to evaluate acute and chronic toxic effects to the sediment-dwelling amphipod, *Hyalella azteca*. Concentrations of silver in sediment collected for the toxicity testing were lower than those observed during the initial river sediment sampling, although still as high as 69 ppm. Only two samples exhibited statistically lower survival relative to the control after 42 days, an effect which appeared to be unrelated to sediment contaminant concentrations (sediment from these locations did not exceed the NYSDEC Class A SGV for metals or ammonia). Growth rates were lower for

several river sediment locations than for the control, which may have been caused in part by a lower male-to-female ratio. No statistically significant differences in reproduction rates were observed between river sediment and control samples.

Mussels

Silver in mussel tissue collected within the lower Genesee River between the KLWWTP and the Turning Basin was present at concentrations above the mussel body burden no-effects concentrations (NOECs). Silver exceeded the NOEC in most locations, and concentrations were highest slightly downstream of the KLWWTP.

Fish

Silver was detected most in whole body forage fish samples collected from the State Route 104 Bridge to the Turning Basin. Silver was rarely detected in forage fish upstream of the State Route 104 Bridge to the Lower Falls and was not detected in forage fish samples collected downstream of the Turning Basin or in the background area. Silver was not detected in game fish fillets and detected in only one predatory game fish fillet sample (collected near the Turning Basin).

The potential ecological impacts associated with the river and adjacent wetlands and floodplains were assessed in the RFI through the FWRIA:

- Benthic toxicity testing was completed in the laboratory by exposing benthic invertebrate species to river sediments across a range of silver concentrations. Based on the results, benthic toxicity is not anticipated for silver concentrations up to 69 ppm, the maximum river sediment concentration tested.
- Silver concentrations in mussel tissue exceeded the mussel tissue NOEC from downstream of the KLWWTP to the Turning Basin. Based on these results and the results of the benthic toxicity testing, the FWRIA concluded that organism-level impacts to benthic invertebrates due to silver in river sediments at select locations are possible. However, population-level, community-level, and ecosystem impacts to benthic macroinvertebrate communities from potential exposure to silver in river sediment are not expected.
- The benthic toxicity testing results discussed above for river sediments also apply to wetland sediments due to the similar nature of the substrates and the ecological communities expected to inhabit them. Based on sediment toxicity test results, benthic toxicity is not anticipated for silver concentrations up to 69 ppm.

5.2: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

People using the river for recreational purposes such as swimming and boating may come into direct contact with site-related contaminants in both surface water and shallow sediments. Consideration should also be given to NYSDOH's general health advisory for sportfish consumption of up to four, one-half pound meals a month of fish. Although the contamination in fish is not site related, specific health advisories for Lake Ontario fish should be considered for this site. These can be found at https://www.health.ny.gov/environmental/outdoors/fish/health_advisories/. The health advisories for Lake Ontario pertain to the Lower Genesee River from the Lower Falls to the mouth of the river at Lake Ontario.

5.3 Summary of the Remediation Objectives

The objectives for the corrective measures have been established through the remedy selection process. The goal of the corrective measures is to protect public health and the environment and achieve unrestricted use of the site to the extent feasible.

The remedial action objectives for this site are listed below.

Wetland Soils

Human Health

Prevent ingestion and/or direct contact with contaminated soil.

Environment

Prevent migration of contaminants that would result in groundwater or surface water contamination.

Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Sediment

Human Health

Prevent direct contact with contaminated sediments.

Prevent surface water contamination which may result in fish advisories.

Environment

Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulations through the marine or aquatic food chain.

Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of ambient water quality criteria.

SECTION 6: INTERIM CORRECTIVE MEASURES

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

Although no ICM has been completed at OU-5, several ICM(s) have been completed within the upland EBP OUs to provide hydraulic control and to monitor groundwater plumes.

Groundwater within EBP upland OUs has been shown to contain chlorinated and non-chlorinated volatile organic compounds, semi-volatile organic compounds, and metals. A groundwater pumping and collection system has been implemented at EBP to intercept contaminated groundwater. This system collects approximately 50 million gallons of groundwater per year, which is then treated at the KLWWTP. An additional approximately 30 million gallons of groundwater per year is collected by an underdrain system at the Weiland Road Landfill and is subsequently treated at the KLWWTP. Groundwater conditions within EBP are monitored using a network of approximately 800 wells. Samples are collected from select wells to monitor contaminant concentrations. The purpose of the monitoring program is to delineate the hydraulic capture of the system and assess contaminant mass recovery and contaminant concentrations through time.

SECTION 7: CORRECTIVE MEASURES STUDY (CMS)

Potential final corrective action measures for the site were identified, screened, and evaluated in the CMS report. To be selected, the proposed final corrective measures must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and use permanent solutions, alternative technologies, or resource recovery technologies to the maximum extent practicable. The final corrective action measures for the site must address potential routes of exposure to humans and the environment and attain the cleanup objectives identified for the site, which are presented in Exhibit B.

The corrective measure alternatives that were considered for the site are summarized in Exhibit C. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. The Proposed Corrective Measure Alternatives Costs are summarized in Exhibit D.

7.1: Evaluation of Corrective Measure Alternatives

A detailed discussion of the evaluation criteria and comparative analysis is included in the final CMS report.

The general performance standards for corrective measures that must be satisfied for an alternative to be considered for selection are listed below.

1. Protection of Human Health and the Environment – This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.
2. Achieve Cleanup Objectives for the Contaminated Media – This criterion evaluates the ability of alternatives to achieve the cleanup objectives established for the site.
3. Remediate the Sources of Releases – This criterion evaluates the ability of the alternatives to reduce or eliminate to the maximum extent possible further releases.
4. Comply with Standards for Management of Wastes – This criterion evaluates how alternatives assure that management of wastes during corrective measures is conducted in a protective manner.

The next five selection criteria are used to compare the positive and negative aspects of each of the remedial alternatives.

5. Long-term Effectiveness and Permanence – This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.
6. Reduction of Toxicity, Mobility or Volume – Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.
7. Short-term Impacts and Effectiveness – The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the cleanup objectives is also estimated and compared against the other alternatives.
8. Implementability – The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials, is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.
9. Cost-Effectiveness – Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

SECTION 8: ELEMENTS OF THE PROPOSED CORRECTIVE MEASURE(S)

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

The estimated present worth cost to implement the remedy is $14,900,000. The cost to construct the remedy is estimated to be $14,164,000, and the estimated average annual cost is $27,000. The present value of the annual cost is estimated to be $860,000.

The elements of the proposed corrective measure are summarized below.

1. **Remedial Design**

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

   - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
   - Reducing direct and indirect greenhouse gas and other emissions;
   - Increasing energy efficiency and minimizing use of non-renewable energy;
   - Conserving and efficiently managing resources and materials;
   - Reducing waste and increasing recycling and reuse of materials which would otherwise be considered a waste;
   - Maximizing habitat value and creating habitat when possible;
   - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
   - Integrating the remedy with the end use where possible and encouraging green and sustainable redevelopment.

2. **Dredging**

   Approximately 20,400 cubic yards (cy) of river sediments will be dredged over an approximately 4.1-acre area where there is potential for greater than 4 inches of scour during a 100-year flow event. Dredging will be conducted to a depth of approximately 2.5 feet to accommodate placement of an isolation cap over deeper sediments exceeding the site-specific toxicity action level of 70 ppm. Dredging will occur in two localized areas, one at the KLWWTP and a second localized area downstream of KLWWTP.

   Approximately 8,200 cy of sediments will be dredged from Wetland C where silver concentrations exceed the site-specific toxicity action level of 70 ppm. Sediment will be removed a minimum of 2 feet over an approximate 2-acre area followed by placement of a minimum 2-foot-thick clean backfill.

   Dredging boundaries are shown on Figures 1 through 4.

3. **Capping**

   Following dredging, an isolation cap will be placed in dredged areas within the riverbed remedial boundaries. The cap will consist of a minimum 6-inch-thick chemical isolation layer of sand with necessary erosion protection and a habitat layer. The erosion protection and habitat layers are separate and distinct cap layers, but for purposes of the conceptual cap design, it is assumed that the erosion protection and habitat layers would consist of fine gravel. Specific thickness and substrate material for each layer will be determined during design. Average cap placement thickness is anticipated to be 2.5 feet, restoring the riverbed to pre-dredge (existing bathymetry)

conditions. All activities associated with cap, cover and fill placement will meet the requirements of 6 New York Codes, Rules, and Regulations (NYCRR) Part 608. Cap placement boundaries coincide with the dredge boundaries shown on Figures 2 and 3.

4. Restoration

Placement of the cover system in removal areas of Wetland C (approximately 2 acres) is anticipated to be a minimum of 24 inches thick. The specific thickness and type of substrate material may vary and will be refined during the remedial design as part of the restoration plan. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to establish the designed backfill placement. Shoreline areas disturbed by the remedial effort be restored. Wetland cover areas coincide with the wetland remedial boundary shown on Figure 4.

5. Institutional Controls

Institutional controls will be implemented to prevent damage to the capped areas of the river from activities such as excavating and filling to prevent unacceptable disturbance of or exposure to residual silver contamination within remediated areas.

Implementation of controls including notification of appropriate government agencies with authority for permitting potential future activities which could impact the implementation and effectiveness of the remedy.

6. Site Management Plan.

A Site Management Plan is required, which includes a Monitoring Plan to assess the performance and effectiveness of the remedy and restoration success. A Restoration Plan will be developed to meet the substantive requirements of 6 NYCRR Parts 608 and 663. Habitat assessments performed as part of the RFI or any pre-design investigation will be used as the basis of design for restoration initiatives. The habitat restoration plan will include the necessary requirements for monitoring restoration success for 5 years after remedial action and for needed restoration maintenance. Specific monitoring requirements and success criteria will be determined during the design.

The plan will include, but may not be limited to:

- An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place. This plan includes, but may not be limited to:
    - Provisions for the management and inspection of the identified engineering controls;
    - The steps necessary for the periodic reviews and certification of institutional and engineering controls;
    - A monitoring plan to assess the performance and effectiveness of the remedy, including monitoring of cap integrity (bathymetry and coring) and reporting to assess the performance of the cover system;
    - A monitoring plan to assess restoration success and any necessary maintenance for 5 years after remedial action; and
    - A Sediment Management Plan that details the provisions for management of future excavations (or dredging) in areas of remaining contamination.

Lake Ontario

Wetland A

Wetland B

Wetland C

Wetland D

Wetland E

Route 104 (Ridge Road)

Lower Falls

Study Area Boundary

Approximate Boundaries of Proposed Work

Navigational Channel

New York State Wetland

N

0 0.5 1 2 Miles

FIGURE 1

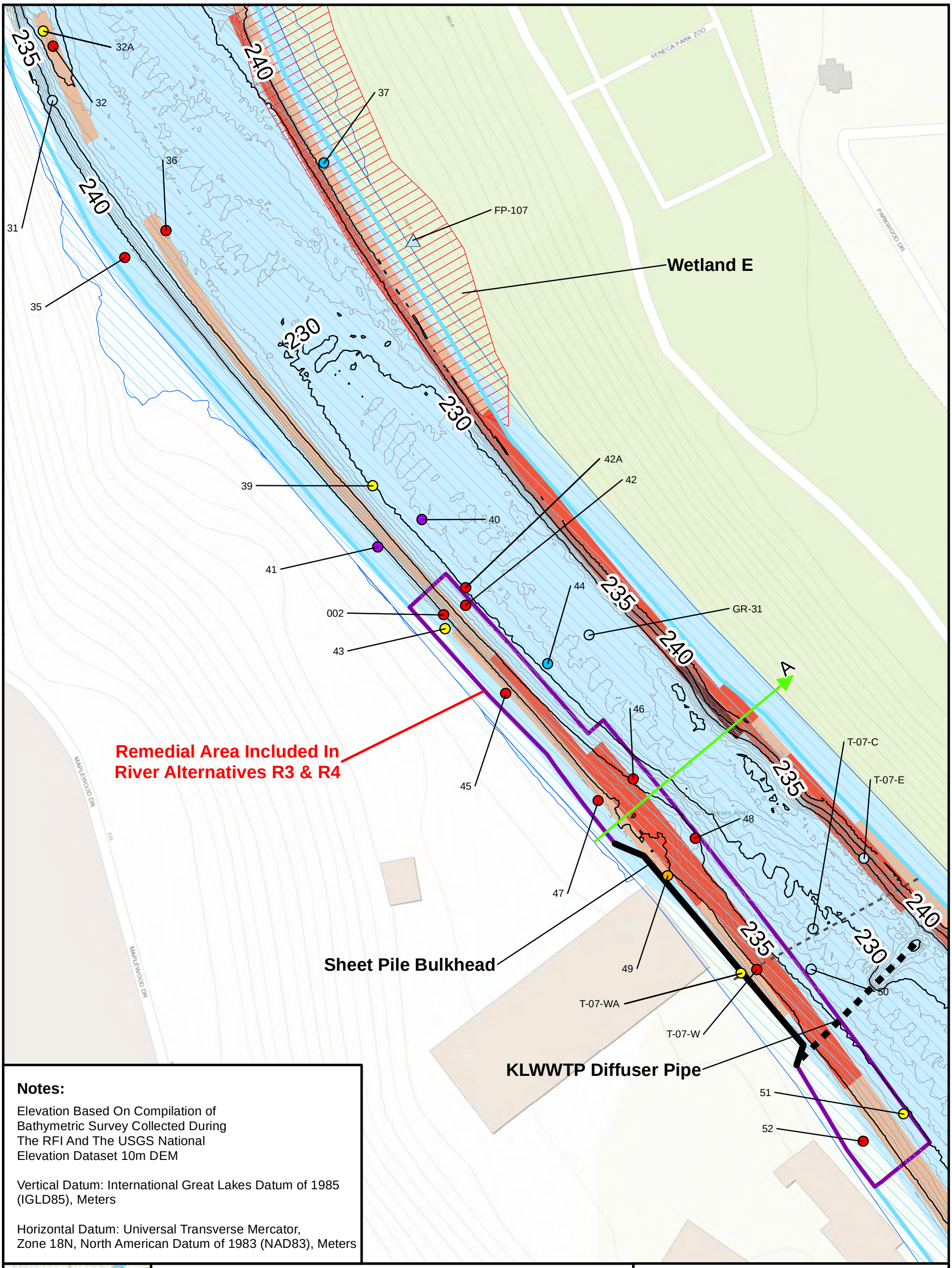
NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

LOWER GENESEE RIVER
Rochester, NY

LOWER GENESEE RIVER SITE LOCATION MAP

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

FILE NAME: Q:\GIS\NYSDEC\448923-Genesee River\MXDs\Figure 1 Site Location Map.mxd
DATE: 9/16/2019 CREATED BY: Sisson, Evan

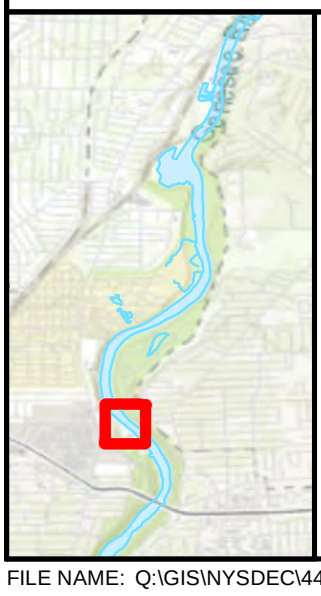


Notes:

Elevation Based On Compilation of Bathymetric Survey Collected During The RFI And The USGS National Elevation Dataset 10m DEM

Vertical Datum: International Great Lakes Datum of 1985 (IGLD85), Meters

Horizontal Datum: Universal Transverse Mercator, Zone 18N, North American Datum of 1983 (NAD83), Meters



- Floodplain/Wetlands Sample Locations (All Sample Depths)
- River Sample Locations (All Sample Depths)
- < 2.2 mg/kg
- 2.2 - 20 mg/kg
- 20 - 30 mg/kg
- 30 - 70 mg/kg
- 70 - 100 mg/kg
- > 100 mg/kg
- 12 Sample Location ID
- Cross Sections
- 5ft Contours
- 1ft Contours
- RFI Sample Transect
- National Hydrography Dataset Water Boundary
- Remediation Area Boundary
- New York State Wetland
- FEMA 100 Year Flood Zone

Max. Bed Scour (cm)

- 20 - 30
- 10 - 20
- 5 - 10

N

0 75 150 300 Feet

FIGURE 2

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

LOWER GENESEE RIVER
Rochester, NY

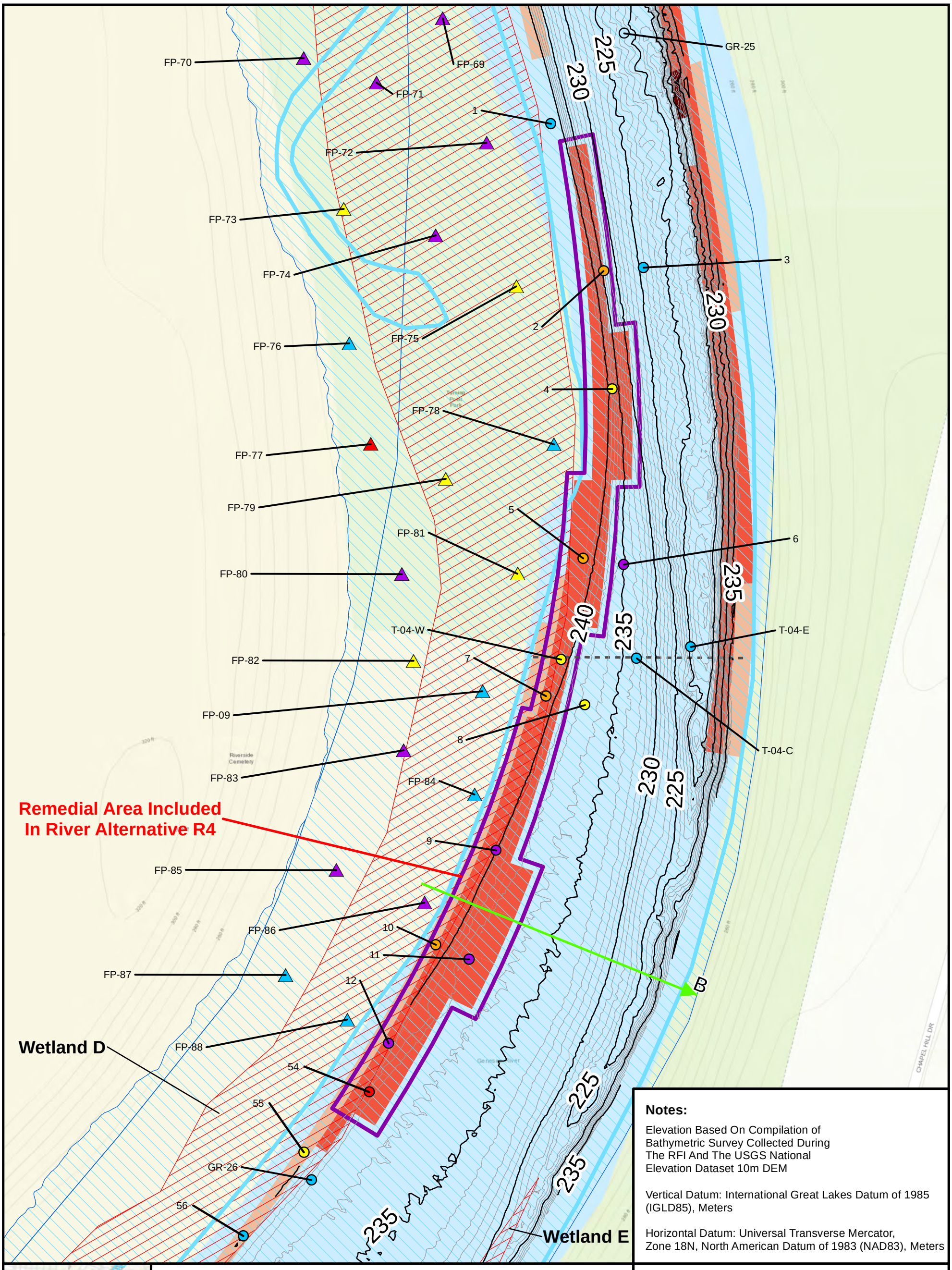
PROPOSED CORRECTIVE MEASURE (R4B)
REMEDIAL AREA ADJACENT TO KLWWTP

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

CREATED BY: Sisson, Evan

DATE: 8/26/2019

FILE NAME: Q:\GIS\NYSDEC\448923-Genesee River\MXDs\NYSDEC LGR ES Figure 2.mxd



Notes:

Elevation Based On Compilation of Bathymetric Survey Collected During The RFI And The USGS National Elevation Dataset 10m DEM

Vertical Datum: International Great Lakes Datum of 1985 (IGLD85), Meters

Horizontal Datum: Universal Transverse Mercator, Zone 18N, North American Datum of 1983 (NAD83), Meters

FIGURE 3

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

LOWER GENESEE RIVER
Rochester, NY

PROPOSED CORRECTIVE MEASURE (R4B)
REMEDIAL AREA ADJACENT TO WETLAND D

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

DATE: 8/26/2019 CREATED BY: Sisson, Evan

FILE NAME: Q:\GIS\NYSDEC\448923-Genesee River\MXDs\NYSDEC LGR ES Figure 3.mxd

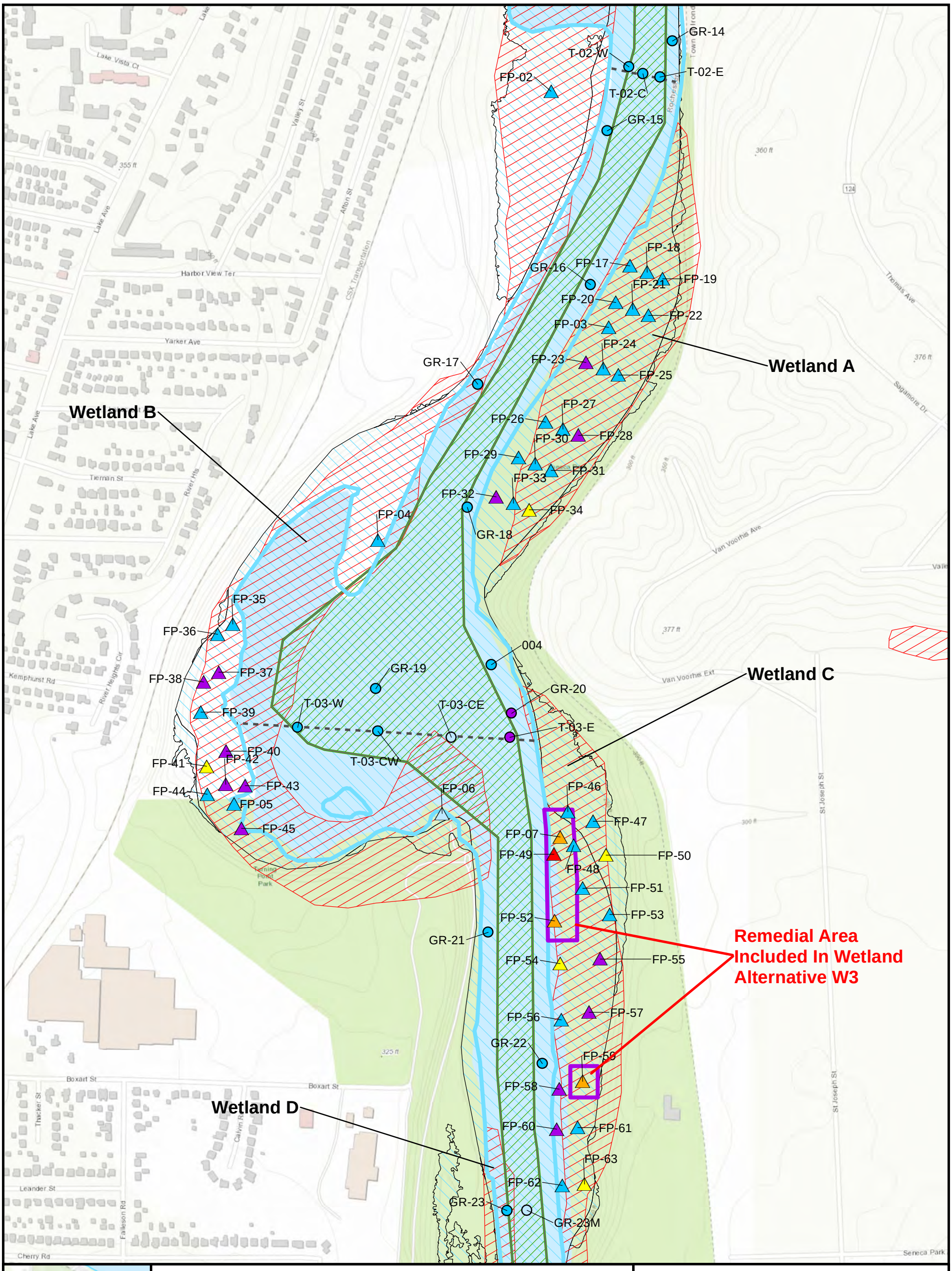


FIGURE 4

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

LOWER GENESEE RIVER
Rochester, NY

PROPOSED CORRECTIVE MEASURE (W3)
REMEDIAL AREA WETLAND C

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

FILE NAME: Q:\GIS\NYSDEC\448923-Genesee River\MXDs\NYSDEC LGR ES Figure 4.mxd
DATE: 8/26/2019 CREATED BY: Sisson, Evan

STATEMENT OF BASIS

Exhibits A through E

Kodak Eastman Business Park – Operable Unit 5
Lower Genesee County
Rochester, Genesee
RCRA EPA No. NYD980592497 / Site No. 828177

October 2019

Exhibit A

NATURE AND EXTENT OF CONTAMINATION

This section describes the findings of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Corrective Measures Study (CMS) for all environmental media that were evaluated. As described in Section 5, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium, a table is included that summarizes the findings of the investigations. The tables present the range of contamination found for site-related COCs. The tables compare COC concentrations against the applicable standards and guidance values for each medium.

Sediments

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

- Class A - Sediment concentrations (1 part per million [ppm] silver) in this class present little or no potential risk to aquatic life. This represents a pre-release condition that was evaluated under the RFI.
- Class B - Concentrations between the Class A and Class C (1 ppm – 2.2 ppm silver) thresholds present a reasonable probability of chronic toxicity to aquatic life. For this discussion, a "Class A exceedance" means that the sediment is categorized as Class B unless subsequent text explicitly indicates the material is Class C (concentration also exceeds the Class C threshold).
- Class C - Sediment concentrations (2.2 ppm silver) in this class present a significant potential risk of acute toxicity to aquatic life. For this site, Class C silver concentrations are closely correlated with the Part 375, ecological use soil cleanup objective of 2.0 ppm.

Samples from 29 sediment cores from within the RFI study area were submitted for chemical analysis as part of the RFI. Based on sample recovery volumes, between three and seven sample intervals were selected from each sediment core for a total of 175 river sediment samples analyzed. Sediment samples were analyzed for Target Analyte List (TAL) metals, Target Compound List (TCL) semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), TCL pesticides, TCL herbicides, and total organic carbon (TOC). Fifty-four sediment samples (approximately one third of the total number of samples) were also analyzed for volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), and dioxins/furans. As indicated above, sediment sample results were compared to NYSDEC Sediment Guidance Values (SGVs) in accordance with NYSDEC's Screening and Assessment of Contaminated Sediment.

Overall, metals, polycyclic aromatic hydrocarbons (PAHs), PCBs, dioxins/furans, and pesticides were detected in exceedance of their respective SGVs as reported in the RFI Most of these contaminants (with the exception of silver and possibly cadmium, zinc and chromium [total]), were unlikely to be attributable to historical operations at the EBP based on the following observations:

- Most contaminants were found at consistent concentrations both up- and downstream of the EBP;
- Other sources exist for certain contaminants (e.g., marinas may contribute PAHs to river sediment); and
- Some contaminants were detected only in limited locations.

Silver was identified as the primary contaminant of concern for sediments within the lower Genesee River since silver exceeded the Class C SGV at all transects downstream of the King's Landing Wastewater Treatment Plant (KLWWTP). An additional 300 sediment samples from 60 cores were submitted for silver analysis subsequent to the RFI. These results further supported the RFI conclusions (Figures A-1 through

A-4). A separate evaluation of cadmium and zinc was performed and concluded that the locations where the highest concentrations of cadmium and zinc were observed were also collocated with sediments that exhibited elevated silver concentrations.

Silver and other metals were used historically in the photographic film and papermaking operations at EBP. The KLWWTP treated wastewater generated by operations at the EBP and discharged treated water directly to the lower Genesee River. In samples collected from a variety of sediment depths, silver exceeded the Class A screening SGV of 1 ppm and the Class C screening SGV of 2.2 ppm throughout the lower Genesee River. Higher silver concentrations were observed at and just downstream of the KLWWTP, with the highest concentration observed adjacent to KLWWTP at a depth of 4 to 6 feet. Silver concentrations upstream of the KLWWTP are generally lower than downstream concentrations. Throughout the lower Genesee River, from upstream of the State Route 104 Bridge to approximately the Turning Basin, silver concentrations are generally lower in the center of the channel and higher toward the riverbanks. Where the river bends, silver concentrations are higher in the depositional areas as opposed to the erosional areas, although concentrations in many cases remain elevated. The highest silver concentrations were typically located at a depth of 2 or more feet.

From the Turning Basin to the mouth of the river, concentrations of silver among sample locations are generally similar with depth. This portion of the river is subject to navigational dredging and is more channelized than upstream sections. Elevated silver concentrations throughout this portion of the river are observed in sediments below 0.5 foot.

Porewater and Toxicity Characteristic Leaching Procedure (TCLP) samples were also collected during the 2018 Data Gap field investigation to assess silver concentrations in the porewater and sediments for characteristic hazardous waste determination. All silver porewater and TCLP sample concentrations were non-detect. The highest collocated sediment concentration associated with a porewater sample was 68 ppm, indicating that silver is unlikely to be present in detectable concentrations in porewater in most river sediments. The highest sediment silver concentration associated with an interval for which TCLP sampling was performed was 190 ppm.

Geochronology analysis used to determine the age and sedimentation rate of river sediments within the lower Genesee River sediment from each selected sample interval. Sediment samples were analyzed for lead-210, radium-226, and cesium-137 isotopes as part of this evaluation. Based on known half-lives of these three radioisotopes and atmospheric release history of cesium-137, analytical results may be used to date sediments, estimate deposition rates, and provide information regarding contaminant discharge history. Results from these analyses generally show a surficial layer enriched with cesium-137 (indicating deposition around 1960) overlaying a deeper layer of more highly contaminated sediments with relatively unmixed depth profiles. This suggests that the 1972 Hurricane Agnes flood event with a flow of approximately 30,000 cubic feet per second (cfs) – the largest flood event experienced at the lower Genesee River since the construction of the Mt. Morris dam – did not cause significant widespread scour of the lower Genesee River sediments. Future erosion of a buried peak silver concentration layer is therefore not likely. This conclusion was also supported by hydrodynamic and sediment transport modeling conducted for the lower Genesee River.

Table 1 – Sediment

Detected Constituents	Concentration Range Detected (ppb)	Class C Freshwater SGVs[1] (ppb)	Frequency Exceeding SGVs
VOCs/SVOCs			
Isopropylbenzene (Cumene)	ND-7	1350[2]	0 of 29
O-Xylene (1,2-Dimethylbenzene)	ND-4	5430[2]	0 of 29
Bis(2-Ethylhexyl) Phthalate	ND-10000	270000[2,3]	0 of 29
Pentachlorophenol	ND-67	14250[2]	0 of 29

Detected Constituents	Concentration Range Detected (ppb)	Class C Freshwater SGVs[1] (ppb)	Frequency Exceeding SGVs
Total PAHs	ND-507600	35000	7 of 29
Pesticides/PCBs			
Gamma Bhc (Lindane)	ND-35	58.5[2]	0 of 29
Beta Endosulfan	ND-5.3	20	0 of 29
cis-Chlordane	ND-7.8	38000	0 of 29
trans-Chlordane	ND-14	38000	0 of 29
Dieldrin	ND-16	585[2]	0 of 29
Endrin	ND-19	165[2]	0 of 29
Heptachlor	ND-100	7500[2]	0 of 29
Heptachlor Epoxide	ND-33	1575[2]	0 of 29
Methoxychlor	ND-18	59[3]	0 of 29
Sum of DDT	ND-139	36000[2]	0 of 29
Dicamba	ND-150	9750[2]	0 of 29
Total PCBs	ND-2800	1000	1 of 29
Dioxin/Furans	**Concentration Range Detected (ppt)**	**Class C Freshwater SGVs (ppt)[1]**	**Frequency Exceeding SGVs**
Sum of 2,3,7,8-TCDD and Equivalents	0.0001706-1.53955	0.375[2,3]	11 of 29
Metals	**Concentration Range Detected (ppm)**	**Class C Freshwater SGVs (ppm)[1]**	**Frequency Exceeding SGVs**
Arsenic	2.15-72.9	33	3 of 29
Cadmium	ND-31.8	5	13 of 29
Chromium, Total	5.03-141	110	1 of 29
Copper	6.66-309	150	1 of 29
Lead	3.44—306	130	3 of 29
Mercury	ND-5.89	1	5 of 29
Nickel	6.83-129	49	1 of 29
Silver[4]	ND-1550	2.2	73 of 89
Zinc	22.7-1400	460	1 of 29

[1] NYSDEC Freshwater SGVs

[2] NYSDEC Freshwater SGVs – based on 1.5% TOC

[3] NYSDEC Class A Freshwater SGVs – used for compounds that do not have a Class C SGV

[4] Silver was also compared to the site-specific toxicity-based action level of 70 ppm, for which there were exceedances at 19 of 89 river locations, and the commercial use Soil Cleanup Objective (SCO) of 1500 ppm, for which there was an exceedance at one of 89 locations.

ppb – part(s) per billion; ppt – part(s) per trillion

Based on the RFI and CMS findings, river sediments have been contaminated by silver associated with historical EBP operations. Silver was found above the Class C SGV of 2.2 ppm throughout the river. Concentrations above the site-specific, toxicity-based action level of 70 ppm tended to be located downstream and relatively near the KLWWTP. Silver is the primary contaminant of concern to be addressed by the remedy selection process.

Wetlands/Floodplain Soil and Sediment

Results of the wetland/floodplain sediment investigation led to similar conclusions as those made for river sediment. Silver is the predominant, wide-spread COC in wetlands/floodplain sediments and soils

(Figures A-1 through A-4). A total of 567 samples were analyzed for silver from 107 wetland/floodplain sample locations. Silver concentrations in excess of the Class C SGV were found throughout the wetland/floodplain areas located along the length of the lower Genesee River. Higher concentrations of silver in wetland/floodplain samples occur downstream of the KLWWTP. Vertically, silver concentrations in the 0- to 2-foot zones generally tend to be higher than those in deeper (greater than 2 feet) sediments and soils, although silver concentrations in the 0.5- to 2-foot interval tend to exceed those in the top 0.5 foot. This is especially apparent in Wetlands A, C, and E, where lower concentrations in the top 0.5 foot compared to the 0.5- to 1-foot interval are evidence of natural recovery occurring within wetland/floodplain areas of the lower Genesee River. Silver concentrations within individual wetland/floodplain area sediments and soils varied, with the lowest average silver concentrations in Wetlands A and E. In general, Wetland C exhibited both the highest average concentrations and the highest overall average concentration. Silver was found above the site-specific toxicity-based action level of 70 ppm in five locations. Four of those locations, all located in Wetland C, exhibited these exceedances within the top 2 feet.

In addition, 53 samples from 16 locations were also submitted for SVOCs, pesticides, herbicides, PCBs, and metals analyses. Select intervals from this subset were analyzed for dioxins/furans. These other compounds were detected in wetlands/floodplain sediments and soils in exceedance of their Class A SGVs, as shown in Table 2 below. However, as discussed for river sediments, most of the contaminants were unlikely to be attributable to historical operations at the EBP based on similar observations to those in river sediment.

The wetland/floodplain areas within OU-5 have been observed to exhibit two primary conditions: constant/near constant inundation by the river and no/infrequent inundation. Within 6 NYCRR Part 375, sediment is defined as "unconsolidated particulate material found at the bottom of lakes, rivers, streams and other water bodies at bed elevations equal to or lower than the mean high-water level." Therefore, areas below the mean high-water level are defined herein as sediment. In the RFI some wetlands/floodplain samples were compared to Part 375 SCOs and others were compared to SGVs for freshwater sediment listed in NYSDEC Screening and Assessment of Contaminated Sediment Guidance. During the CMS, silver concentrations in areas below the mean high-water level were compared to the silver SGV of 2.2 ppm consistent with river sediments.

For soils, 6 NYCRR Part 375 includes a silver SCO of 2.0 ppm based on protection of ecological resources that are anticipated to inhabit or forage in soil habitats. This value was developed based on potential impacts to plants. The Fish and Wildlife Resources Impact Analysis (FWRIA) conducted as part of the RFI concluded that adverse impacts to individual wetland and floodplain plants due to silver in surface soil and sediments are not expected. In addition, there is currently insufficient information to accurately delineate the area that would be inundated under mean high-water conditions, which, as discussed above, would form the basis for differentiating between sediment and soil. However, it is expected that most or all the wetlands are below the mean high-water elevation given their identification as wetlands. Therefore, for convenience within the CMS and this Statement of Basis, and to provide the most accurate depiction of the substrates within the OU-5 wetland-floodplain, the sediment SGVs (2.2 ppm) will be considered for evaluating all wetland and floodplain substrates.

A more detailed discussion of the distribution of silver in wetlands/floodplain sediments and soil follows.

Table 2 – Wetlands/Floodplains Sediment

Detected Constituents	Concentration Range Detected (ppb)	Class C Freshwater SGVs (ppb)[1]	Frequency Exceeding SGVs
VOCs/SVOCs			
Bis(2-Ethylhexyl) Phthalate	ND-570	324000[2,3]	0 of 16
Total PAHs	ND-19656	35000	0 of 16

Detected Constituents	Concentration Range Detected (ppb)	Class C Freshwater SGVs (ppb)[1]	Frequency Exceeding SGVs
Pesticides/PCBs			
cis-Chlordane	ND-13	38000	0 of 16
Beta Endosulfan	ND-1.5	20	0 of 16
trans-Chlordane (a)	ND-1.4	38000	0 of 16
Dieldrin	ND-2.5	702[3]	0 of 16
Endrin	ND-8.1	198[3]	0 of 16
Gamma Bhc (Lindane)	ND-7	70.2[3]	0 of 16
Heptachlor	ND-4.3	9000[3]	0 of 16
Heptachlor Epoxide	ND-2	1890[3]	0 of 16
ΣDDT	ND-15	43200[3]	0 of 16
Total PCBs	ND-2000	1000	1 of 16
Dioxin/Furans	**Concentration Range Detected (ppt)**	**Class C Freshwater SGVs (ppt)[1]**	**Frequency Exceeding SGVs**
Sum of 2,3,7,8-TCDD and Equivalents	0.741-35.97	0.45[3]	13 of 13
Metals	**Concentration Range Detected (ppm)**	**Class C Freshwater SGVs (ppm)[1]**	**Frequency Exceeding SGVs**
Arsenic	2.21-22.8	33	0 of 16
Cadmium	ND-20.2	5	4 of 16
Chromium, Total	7.51-91.2	110	0 of 16
Copper	9.32-255	150	1 of 16
Lead	4.99-701	130	3 of 16
Mercury	0.0234-1.57	1	2 of 16
Nickel	8.97-60.2	49	3 of 16
Silver[4]	ND-210	2.2	105 of 107
Zinc	26.8-478	460	1 of 16

[1] NYSDEC Freshwater SGVs
[2] NYSDEC Class A Freshwater SGVs – used for compounds that do not have a Class C SGV
[3] NYSDEC Freshwater SGVs – based on 1.8% TOC
[4] Silver was also compared to the site-specific toxicity-based action level of 70 ppm, for which there were exceedances at five of 107 wetland/floodplain locations, and the commercial use SCO of 1500 ppm, for which there were no exceedances.

Based on the RFI and CMS findings, the presence of silver associated with historical EBP operations has resulted in the contamination of wetlands/floodplain sediments/soil. Silver was found above the Class C SGV of 2.2 ppm throughout the wetlands/floodplains of the lower Genesee River and above the site-specific toxicity-based action level of 70 ppm in the top 2 feet within areas of Wetland C. Silver is the primary contaminant of concern to be addressed by the remedy selection process.

Passive recreational use (boating, fishing, and/or hiking) is the primary current and anticipated future use for the lower Genesee River, including its floodplains and wetlands. The Department considers soil action levels for a commercial scenario to be protective of passive recreational use (6 NYCRR Part 375). Therefore, the human health commercial silver SCO of 1,500 ppm was considered as a guidance value for human health protection. Silver concentrations in the top 2 feet of river sediment and in the top 1 foot of wetland/floodplain sediments were less than 1,500 ppm.

Biota

Benthic toxicity testing was performed during the RFI to evaluate acute and chronic toxic effects to the sediment-dwelling amphipod, Hyalella azteca. Concentrations of silver in sediment collected for the toxicity bioassay were lower than those observed during the initial river sediment sampling, although still as high as 69 ppm. Only two samples exhibited statistically lower survival relative to the control after 42 days, an effect which appeared to be unrelated to sediment contaminant concentrations (sediment from these locations did not exceed the NYSDEC Class A SGV for metals or ammonia). Growth rates were lower for several river sediment locations than for the control, which may have been caused in part by a lower male-to-female ratio. No statistically significant differences in reproduction rates were observed between river sediment and control samples.

Benthic macroinvertebrate (mussel) tissue was tested for polycyclic aromatic hydrocarbons (PAHs), pesticides, herbicides, PCBs, and metals as reported in the RFI. Silver in mussel tissue collected within the lower Genesee River between the KLWWTP and the Turning Basin was at concentrations above the mussel body burden no-observed effect concentrations (NOECs). Silver exceeded the NOEC in most locations, and concentrations were highest slightly downstream of the KLWWTP.

Fish tissue sampling was also conducted during the RFI, consisting of whole-body samples for forage fish and fillet samples for benthic game and predatory game fish (Tables 4, 5, and 6). Samples were analyzed for pesticides, herbicides, PCBs, and metals, as well as dioxins/furans in forage and benthic game fish. Silver was most often detected in whole body forage fish samples collected from the State Route 104 Bridge to the Turning Basin. Silver was rarely detected in forage fish upstream of the State Route 104 Bridge to the Lower Falls and was not detected in forage fish samples collected downstream of the Turning Basin or in the background area. Silver was not detected in benthic game fish fillets and detected in only one predatory game fish fillet sample (collected near the Turning Basin). The qualitative human health exposure assessment (QHHEA) completed during the RFI did not identify any unacceptable human health impacts due to potential exposure to silver in fish tissue. This conclusion was based on fish tissue analytical results.

Table 3 – Benthic Macroinvertebrate Tissue

Detected Constituents	Concentration Range Detected (ppb)	Benthic Invertebrate Effect Concentration[1] (ppb)	Frequency Exceeding Benthic Invertebrate Effects Concentration
VOCs/SVOCs			
Anthracene[2]	ND-1.8	3400	0 of 9
Benzo(A)Anthracene[3]	ND-6.5	20	0 of 9
Benzo(A)Pyrene[4]	9.3-28	1250	0 of 9
Chrysene[3]	5.7-17	20	0 of 9
Fluoranthene[3]	8.4-29	20	2 of 9
Phenanthrene[3]	ND-6.8	20	0 of 9
Pyrene[3]	4.9-17	120	0 of 9
Pesticides/PCBs			
trans-Chlordane[3,5]	ND-0.49	5	0 of 9
P,P'-DDE[3,5]	ND-0.67	10	0 of 9
P,P'-DDT[3,5]	ND-4.8	2	1 of 9

Metals	Concentration Range Detected (ppm)	Benthic Invertebrate Effect Concentration[1] (ppm)	Frequency Exceeding Benthic Invertebrate Effects Concentration
Arsenic[3]	ND-1.24	1.4	0 of 9
Copper[3]	1.32-5.48	12	0 of 9
Lead[3]	0.692-1.44	1.4	1 of 9
Mercury[3]	ND-0.0162	0.04	0 of 9
Nickel[3]	ND-0.429	2.4	0 of 9
Silver[3]	0.992-9.9	1.0-2.0	8 of 9
Zinc[3]	17.9-90.2	60	2 of 9

[1] Division of Water SOP – Mollusks (unless otherwise noted)
[2] Whole body NOEC based on survival for *Lumbriculus variegatus* (California blackworm). Source: Jarvinen, A.W. and G.T. Ankley (1999).
[3] Effect value converted to weight wet assuming 80% moisture.
[4] Whole body NOEC based on mortality for *Sphaerium corneum* (European fingernail clam). Source: Environmental Residue Effects Database (ERED).
[5] NYSDEC Technical Memorandum (Sinnott 12/30/15)
NA No effect concentration available

Table 4 – Forage Fish Tissue

Detected Constituents	Concentration Range Detected (ppb)	Effect Concentration[2] (ppb, forage fish)	Frequency Exceeding Effect Concentration
Pesticides/PCBs			
Aldrin	ND-7	157	0 of 50
Alpha Bhc (Alpha Hexachlorocyclohexane)	ND-9.4	25000	0 of 50
Dieldrin	ND-5.2	2130	0 of 50
Heptachlor	ND-8.4	5300	0 of 50
Heptachlor Epoxide	ND-2	3700	0 of 50
ΣDDT	5.5-34.6	7600	0 of 50
Chlordane (Total)	ND-8.5	10	0 of 50
Endosulfan (Total)	ND-2.5	38	0 of 50
Total PCBs	42-200	1600	0 of 50
Dioxin/Furans	**Concentration Range Detected (ppt)**	**Effect Concentration[1,2] (ppt, piscivorous wildlife)**	**Frequency Exceeding Effect Concentration**
Dioxins/Furans (Total)	18.4-172.3	2.3	10 of 10
Metals	**Concentration Range Detected (ppm)**	**Effect Concentration[2] (ppm, forage fish)**	**Frequency Exceeding Effect Concentration**
Arsenic	ND-1.86	5.5	0 of 50
Cadmium	ND-0.069	5	0 of 50
Copper	0.596-3.01	7.53	0 of 50
Lead	ND-1.89	5.1	0 of 50
Mercury	ND-0.0106	2.84	0 of 50
Nickel	ND-1.47	4.02	0 of 50

Metals	Concentration Range Detected (ppm)	Effect Concentration[2] (ppm, forage fish)	Frequency Exceeding Effect Concentration
Silver[25]	ND-1.28	0.06	19 of 50
Zinc[26]	9.24-26.5	480	0 of 50

[1] Effect concentrations from Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorous Wildlife - NYSDEC Technical Report 87-3 (Table 26), unless otherwise noted.
[2] Concentrations are in units of wet weight.
[3] Evaluated in conjunction with other like compounds.

Table 5 – Benthic Game Fish Tissue

Detected Constituents	Concentration Range Detected (ppb)	Effect Concentration[2] (ppb, benthic game fish)	Frequency Exceeding Effect Concentration
Pesticides/PCBs			
Aldrin	ND-4.9	5000	0 of 24
Alpha Bhc (Alpha Hexachlorocyclohexane)	ND-4.3	42000	0 of 24
Dieldrin	ND-25	1050	0 of 24
Endrin	ND-10	310	0 of 25
Heptachlor	ND-1.6	5300	0 of 24
Heptachlor Epoxide	ND-11	3700	0 of 24
ΣDDT	12.4-389	7600	0 of 24
Chlordane (Total)	ND-22	1380	0 of 24
Total PCBs	47-1830	11900	0 of 25
Dioxin/Furans	**Concentration Range Detected (ppt)**	**Effect Concentration[1,2] (ppt, piscivorous wildlife)**	**Frequency Exceeding Effect Concentration**
Dioxins/Furans (Total)	4.5-78.9	2.3	15 of 15
Metals	**Concentration Range Detected (ppm)**	**Effect Concentration[2] (ppm)**	**Frequency Exceeding Effect Concentration**
Arsenic	ND-1.69	0.76	4 of 25
Copper	ND-1.14	0.3	20 of 25
Lead	ND-0.447	5.1	0 of 25
Mercury	0.0313-0.309	0.28	1 of 25
Zinc	5.63-56.3	34	2 of 25

[1] Effect concentrations from Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorous Wildlife - NYSDEC Technical Report 87-3 (Table 26), unless otherwise noted.
[2] Concentrations are in units of wet weight.
[3] Evaluated in conjunction with other like compounds.

Table 6 – Predatory Game Fish

Detected Constituents	Concentration Range Detected (ppb)	Effect Concentration[2] (ppb)	Frequency Exceeding Effect Concentration
Pesticides/PCBs			
Aldrin	ND-0.69	5	0 of 22
Alpha Bhc (Alpha Hexachlorocyclohexane)	ND-0.57	42	0 of 22
Dieldrin	ND-4.4	1050	0 of 22

Detected Constituents	Concentration Range Detected (ppb)	Effect Concentration[2] (ppb)	Frequency Exceeding Effect Concentration
Heptachlor	ND-1.5	5300	0 of 22
Heptachlor Epoxide	ND-2.2	3700	0 of 22
ΣDDT	3.3-91.9	200[1,2]	0 of 22
Chlordane (Total)	ND-1.47	1380	0 of 22
Endosulfan (Total)	ND-0.55	75	0 of 22
Total PCBs	ND-278	760	0 of 22
Metals	**Concentration Range Detected (ppm)**	**Effect Concentration[2] (ppm)**	**Frequency Exceeding Effect Concentration**
Arsenic	ND-1.36	5.5	0 of 23
Copper	ND-1.96	3.4	0 of 23
Lead	ND-0.709	5.1	0 of 23
Mercury	0.0631-0.373	12.5	0 of 23
Nickel	ND-0.444	58	0 of 23
Silver	ND-0.265	3	0 of 23
Zinc	4.62-18.3	60	0 of 23

[1] Effect concentrations from Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorous Wildlife - NYSDEC Technical Report 87-3 (Table 26), unless otherwise noted.
[2] Concentrations are in units of wet weight.
[3] Evaluated in conjunction with other like compounds.

Surface Water

During the RFI, depth integrated surface water samples were collected in three rounds at five river transects to assess potential contaminant loading to the surface water during different flow events. The lower Genesee River is defined as a Class B surface water body, meaning that its most suitable uses are primary (bathing) and secondary (incidental) contact, recreation and fishing, and wildlife propagation and survival (6 NYCRR Part 701). Total silver concentrations downstream of the KLWWTP exceeded Class B surface water criterion; however, the criterion used for comparison is specific to ionic silver. Silver was not speciated during the RFI; therefore, exceedances observed assumed that silver detected by the total silver (unfiltered) test method was present in ionic form, which may not be the case. Further, dissolved silver results were below the detection limit at all sample locations during the RFI. These results suggest that total silver detections in surface water collected from the lower Genesee River are related to the solids fraction. Reducing the potential for migration of silver contamination by remediating river sediments is therefore likely to reduce silver contamination in surface water and will be addressed by the remedy selection process.

Table 7 – Surface Water

Detected Constituents	Concentration Range Detected (ppb)	SCG (ppb)	Frequency Exceeding SCG
VOCs/SVOCs			
Naphthalene	ND-0.062	13 (G)	0 of 15
Pyrene	ND-0.013	4.6 (G)	0 of 15
Metals			
Arsenic – Total	0.72-7.6	150[2]	0 of 15
Chromium – Total	ND-13.3	118[1]	0 of 15
Cobalt – Total	ND-6.2	5	3 of 15

Detected Constituents	Concentration Range Detected (ppb)	SCG (ppb)	Frequency Exceeding SCG
Copper – Total	1.4-16.2	15[1]	1 of 15
Iron – Total	519-14800	300	15 of 15
Lead – Total	0.54-11.1	7[1]	4 of 15
Mercury – Total	ND-0.0245	0.0007	11 of 15
Nickel – Total	ND-14.4	84[1]	0 of 15
Silver – Total	ND-3.5	0.1	5 of 15
Vanadium – Total	ND-15.8	14	4 of 15
Zinc – Total	ND-54.2	134[1,2]	0 of 15
Arsenic – Dissolved	ND-5.1	150[2]	0 of 15
Chromium – Dissolved	ND-10.7	118[1]	0 of 10
Cobalt – Dissolved	ND-3.1	5	0 of 10
Copper – Dissolved	2.3-10.3	15[1]	0 of 15
Iron – Dissolved	45.1-9390	300	5 of 10
Lead – Dissolved	ND-6	7[1]	0 of 15
Mercury – Dissolved	ND-0.0193	0.0007	6 of 15
Nickel – Dissolved	ND-10.2	84[1]	0 of 10
Vanadium – Dissolved	1.6-16.1	14	1 of 5
Zinc - Dissolved	ND-34.4	134[1,2]	0 of 15
Pesticides/PCBs			
Total PCBs	ND-0.027	0.000001	1 of 15

Standards from 6 NYCRR Part 703.
[1] based on an average hardness value of 176
[2] based on dissolved form
(G) – guidance value
NS – No standard
ND – Not detected

Groundwater

Existing monitoring wells at the KLWWTP were sampled during the RFI because the KLWWTP is directly adjacent to the lower Genesee River. Samples were analyzed for TCL VOCs, TCL SVOCs, TAL metals, PCBs, total dissolved solids (TDS), and total suspended solids (TSS). Groundwater sample analytical results are compared to the 1998 NYSDEC Ambient Water Quality Class GA Groundwater Standards/Guidance Values. No VOCs, SVOCs, or PCBs were detected in exceedance of their Class GA Groundwater standards/guidance values. Seven metal constituents (barium, iron, lead, magnesium, manganese, selenium, and sodium) were detected in exceedance of their Class GA Groundwater criteria at least once in groundwater samples collected at the KLWWTP. Iron, magnesium, manganese, and sodium are naturally occurring compounds that are often found at elevated concentrations in bedrock groundwater in the Rochester area.

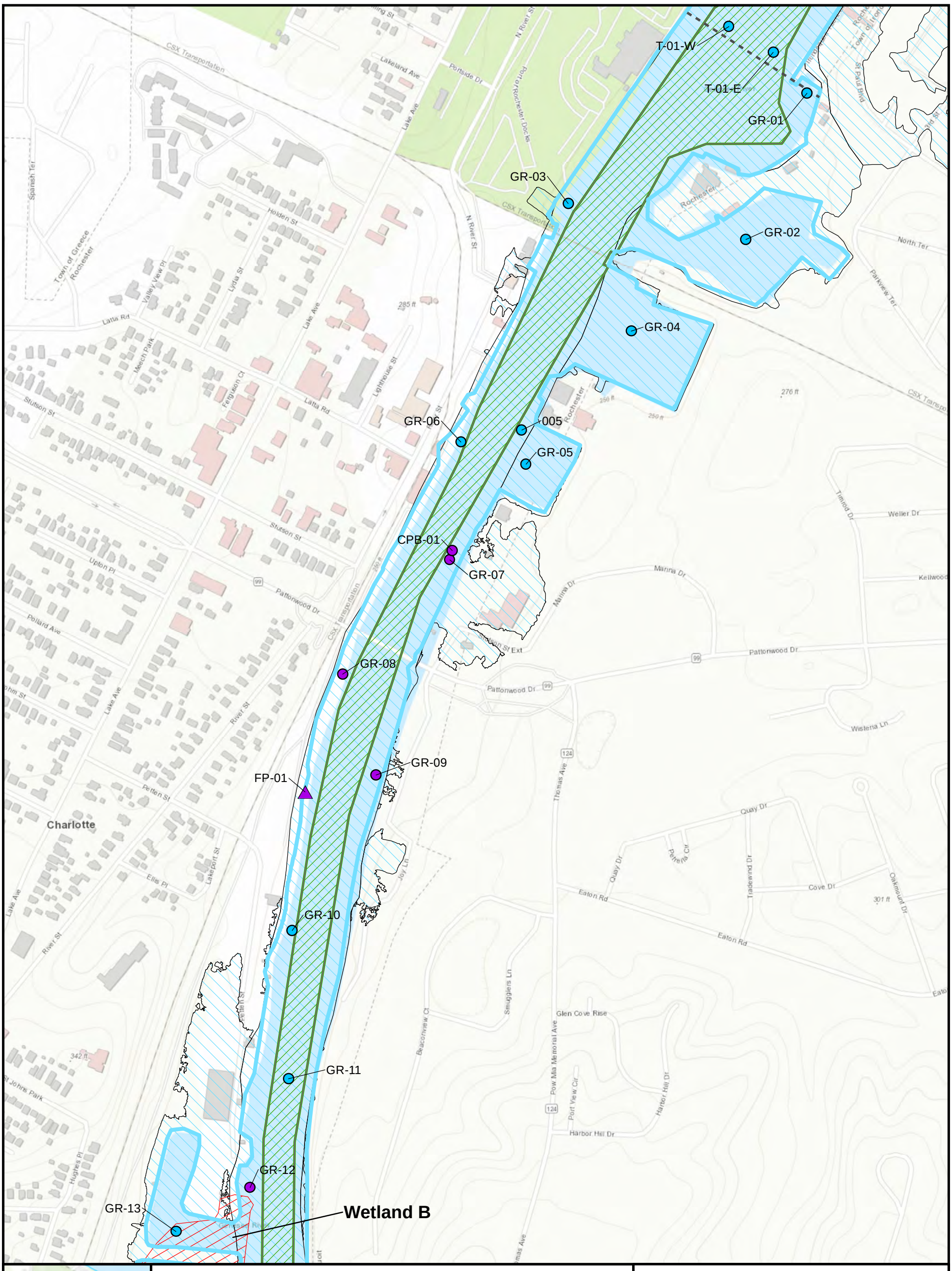
Table 8 – Groundwater

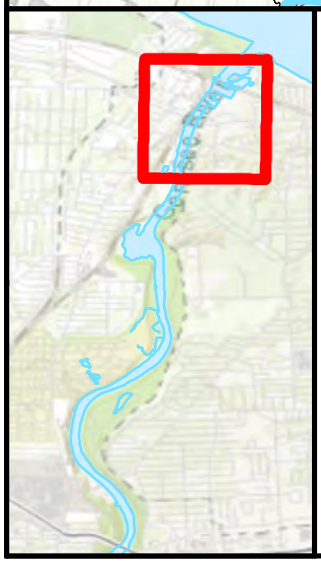
Detected Constituents	Concentration Range Detected (ppb)	Class GA Groundwater Standards/Guidance Values (ppb)[1]	Frequency Exceeding Class GA Standards/Guidance Values
VOCs/SVOCs			

Detected Constituents	Concentration Range Detected (ppb)	Class GA Groundwater Standards/Guidance Values (ppb)[1]	Frequency Exceeding Class GA Standards/Guidance Values
1,2-Dichloropropane	ND-0.2	1	0 of 9
Acetone	ND-34	50 (G)	0 of 9
Benzene	ND-0.7	1	0 of 9
Carbon Disulfide	ND-0.5	60 (G)	0 of 9
Chloroform	ND-1.2	7	0 of 9
Cis-1,2-Dichloroethylene	ND-0.4	5	0 of 9
M,p-Xylene	ND-0.1	5	0 of 9
Tert-Butyl Methyl Ether	ND-0.1	10 (G)	0 of 9
Tetrachloroethylene (PCE)	ND-0.1	5	0 of 9
Trichloroethylene (TCE)	ND-0.5	5	0 of 9
Vinyl Chloride	ND-0.3	2	0 of 9
4-Methylphenol (P-Cresol)	ND-0.9	1	0 of 9
Acenaphthene	ND-0.038	20 (G)	0 of 9
Anthracene	ND-0.019	50 (G)	0 of 9
Fluoranthene	ND-0.014	50 (G)	0 of 9
Fluorene	ND-0.033	50 (G)	0 of 9
Naphthalene	ND-0.11	10 (G)	0 of 9
Pyrene	ND-0.023	50 (G)	0 of 9
Pesticides/PCBs			
Total PCBs	ND-0.015	0.09	0 of 9
Metals			
Antimony	ND-1.3	3	0 of 9
Arsenic	ND-19	25	0 of 9
Barium	122-3120	1000	2 of 9
Chromium, Total	1.6-12.8	50	0 of 9
Copper	ND-105	200	0 of 9
Iron	ND-71500	300	6 of 9
Lead	ND-30.9	25	1 of 9
Manganese	28.2-1490	300	6 of 9
Nickel	ND-11.1	100	0 of 9
Selenium	ND-10.3	10	1 of 9
Silver	ND-7.3	50	0 of 9
Sodium	308000-5680000	20000	9 of 9
Zinc	ND-44.5	2000 (G)	0 of 9

[1] Class GA Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

Groundwater from the EBP does not appear to be an ongoing source of contamination to the lower Genesee River. In addition, the EBP remedy includes a groundwater migration control system, pumping wells in the source area, other engineering and institutional controls, and performance monitoring. These remedies limit groundwater movement, discharge, and exposure. Current performance and effectiveness evaluations indicate that groundwater from the EBP does not appear to be an ongoing source of contamination to the lower Genesee River. No site-related groundwater contamination of concern was identified during the RFI. Therefore, no remedial alternatives were evaluated for groundwater.





Floodplain/Wetlands Sample Locations (All Sample Depths)

River Sample Locations (All Sample Depths)

< 2.2 mg/kg
2.2 - 20 mg/kg
20 - 30 mg/kg
30 - 70 mg/kg
70 - 100 mg/kg
> 100 mg/kg

Max. Bed Scour (cm)

20 - 30
10 - 20
5 - 10

12 Sample Location ID

RFI Sample Transect

National Hydrography Dataset Water Boundary

Area Subject To Navigational Dredging

New York State Wetland

FEMA 100 Year Flood Zone

0 250 500 1,000 Feet

FIGURE A-1

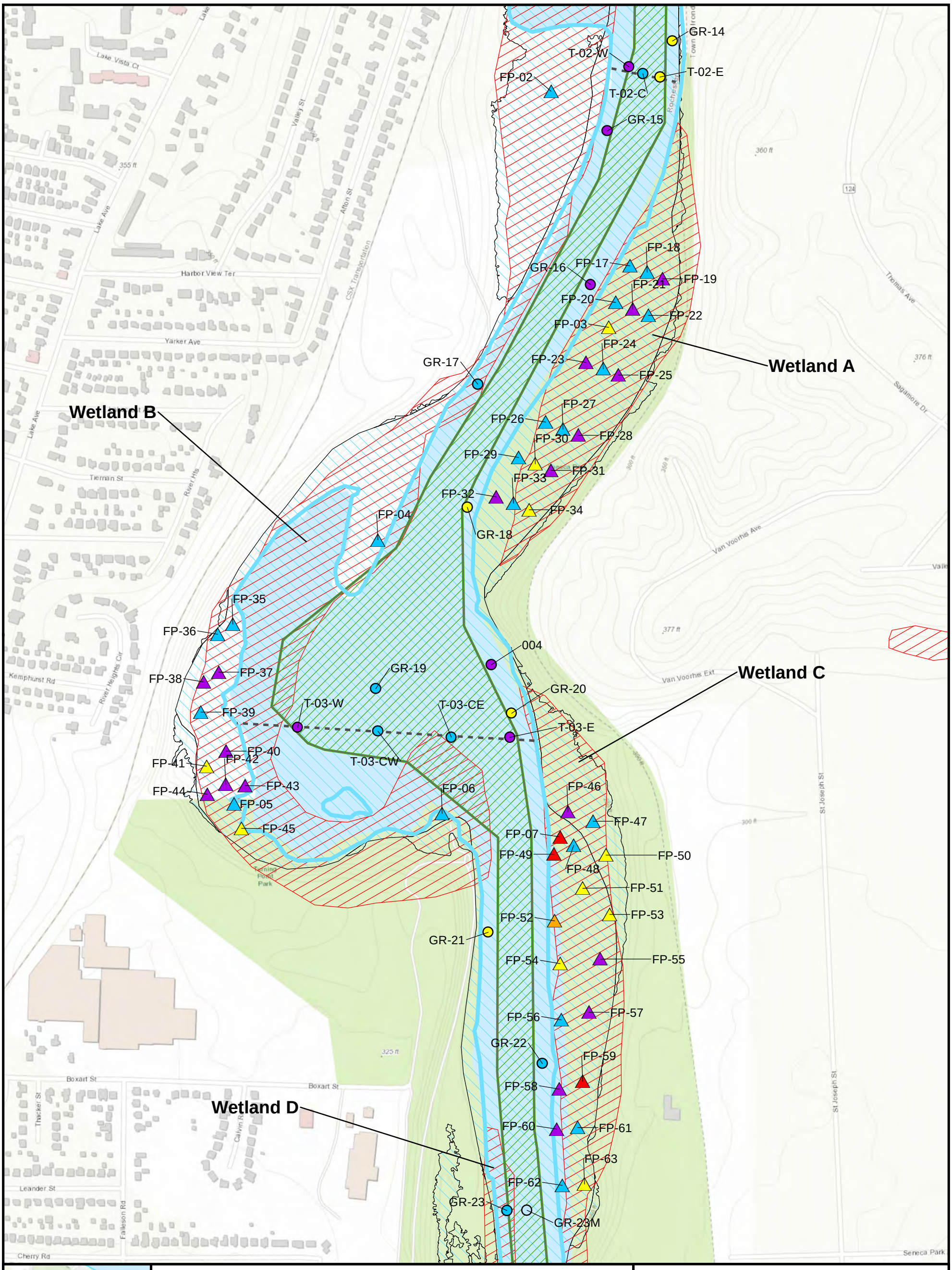
NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

LOWER GENESEE RIVER
Rochester, NY

MAXIMUM SILVER CONCENTRATION ALL SAMPLE DEPTHS LOWER GENESEE RIVER AND WETLANDS/FLOODPLAINS

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

FILE NAME: Q:\GIS\NYSDEC\448923-Genesee River\MXDs\NYSDEC LGR Figure A-1.mxd
DATE: 8/23/2019 CREATED BY: Sisson, Evan



Floodplain/Wetlands Sample Locations (All Sample Depths)

River Sample Locations (All Sample Depths)

< 2.2 mg/kg	30 - 70 mg/kg
2.2 - 20 mg/kg	70 - 100 mg/kg
20 - 30 mg/kg	> 100 mg/kg

Max. Bed Scour (cm)

- 20 - 30
- 10 - 20
- 5 - 10

12 Sample Location ID

RFI Sample Transect

National Hydrography Dataset Water Boundary

Area Subject To Navigational Dredging

New York State Wetland

FEMA 100 Year Flood Zone

0 250 500 1,000 Feet

FIGURE A-2

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

LOWER GENESEE RIVER
Rochester, NY

MAXIMUM SILVER CONCENTRATION ALL SAMPLE DEPTHS LOWER GENESEE RIVER AND WETLANDS/FLOODPLAINS

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

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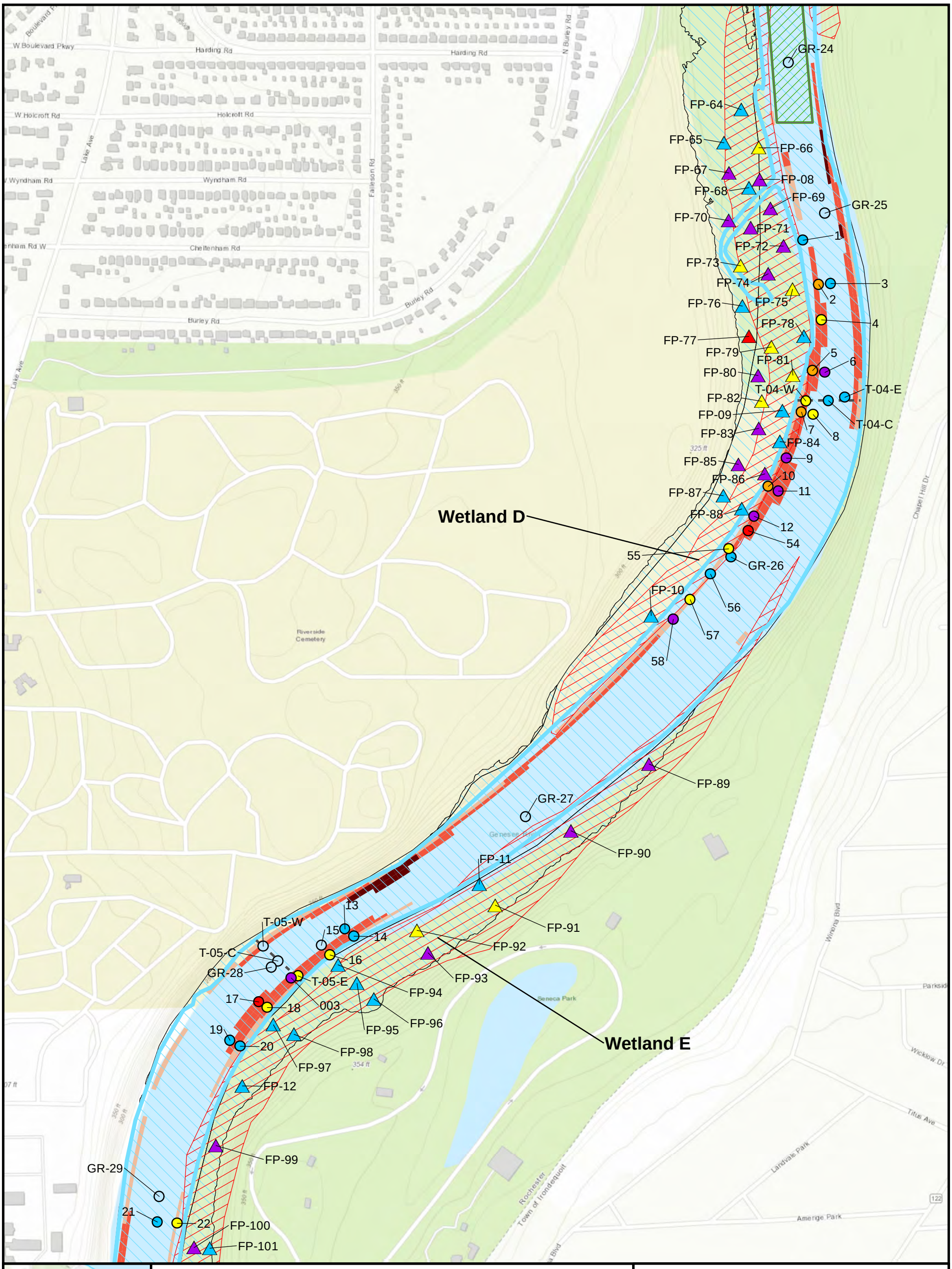
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FP-74
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2
FP-76
FP-75
4
FP-78
FP-77
FP-79
5
6
FP-81
FP-80
T-04-W
T-04-E
FP-82
FP-09
T-04-C
7
8
FP-83
FP-84
9
FP-85
FP-86
10
11
FP-87
FP-88
12
54
55
GR-26
FP-10
56
57
58
Wetland D
FP-89
GR-27
FP-90
FP-11
FP-91
13
T-05-W
15
14
FP-92
T-05-C
16
GR-28
T-05-E
FP-94
FP-93
17
18
003
FP-95
FP-96
19
20
FP-98
FP-97
FP-12
FP-99
GR-29
21
22
FP-100
FP-101
Wetland E
Floodplain/Wetlands Sample Locations (All Sample Depths)
River Sample Locations (All Sample Depths)
< 2.2 mg/kg
2.2 - 20 mg/kg
20 - 30 mg/kg
30 - 70 mg/kg
70 - 100 mg/kg
> 100 mg/kg
Max. Bed Scour (cm)
20 - 30
10 - 20
5 - 10
12 Sample Location ID
RFI Sample Transect
National Hydrography Dataset Water Boundary
Area Subject To Navigational Dredging
New York State Wetland
FEMA 100 Year Flood Zone
N
0 250 500 1,000
Feet
FIGURE A-3
NEW YORK STATE OF OPPORTUNITY
Department of Environmental Conservation
LOWER GENESEE RIVER
Rochester, NY
MAXIMUM SILVER CONCENTRATION
ALL SAMPLE DEPTHS
LOWER GENESEE RIVER AND
WETLANDS/FLOODPLAINS
PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560
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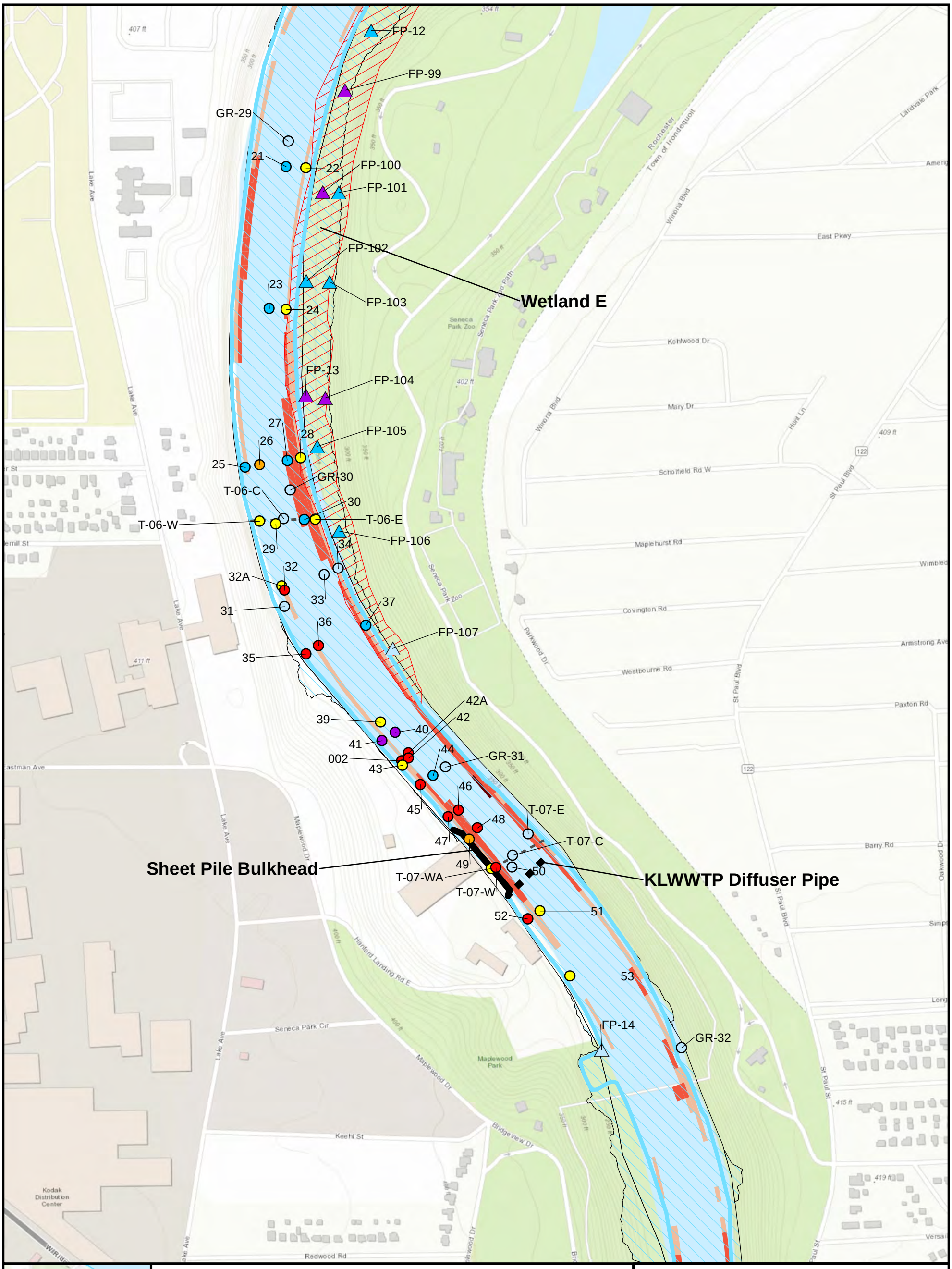
DATE: 8/23/2019 CREATED BY: Sisson, Evan



Floodplain/Wetlands Sample Locations (All Sample Depths)

River Sample Locations (All Sample Depths)

< 2.2 mg/kg	30 - 70 mg/kg
2.2 - 20 mg/kg	70 - 100 mg/kg
20 - 30 mg/kg	> 100 mg/kg

Max. Bed Scour (cm)

- 20 - 30
- 10 - 20
- 5 - 10

12 Sample Location ID

RFI Sample Transect

National Hydrography Dataset Water Boundary

Area Subject To Navigational Dredging

New York State Wetland

FEMA 100 Year Flood Zone

0 250 500 1,000 Feet

FIGURE A-4

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

LOWER GENESEE RIVER
Rochester, NY

MAXIMUM SILVER CONCENTRATION ALL SAMPLE DEPTHS LOWER GENESEE RIVER AND WETLANDS/FLOODPLAINS

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

FILE NAME: Q:\GIS\NYSDEC\448923-Genesee River\MXDs\NYSDEC LGR Figure A-4.mxd
DATE: 8/23/2019 CREATED BY: Sisson, Evan

Exhibit B

SUMMARY OF THE CLEANUP OBJECTIVES

The goal for the corrective measure program is to achieve unrestricted use of the site to the extent feasible. At a minimum, the corrective measure(s) shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles. Clean-up objectives and action levels applied during the development of the CMS are summarized below

Compound	Sediment Cleanup Objective/Action Level
Metals	
Silver	Sediment Class C Guidance Value - 2.2 ppm[1] Toxicity-Based Action Level- 70 ppm[2] River-Based Action Level - 100 ppm [3] Wetland-Based Action Level - 30 ppm [4] Soil SCO - 1500 ppm[5]

[1]NYSDEC Freshwater Sediment Class C Guidance Value (2.2 parts per million [ppm]) was applied for the development of full removal river and wetland alternatives. To provide the most accurate depiction of the substrates within the OU-5 wetland-floodplain, the sediment SGVs (2.2 ppm) were considered for evaluating all sediment, wetland and floodplain substrates. Class A SGV (1.0 ppm) was applied as a screening comparison to a pre-release condition in the RFI.

[2] Site-Specific Action Level (Selected under the Proposed Alternative), 70 ppm silver is a toxicity-based action level applied to both river and wetland sediment. Based on the RFI (FWRIA) findings, benthic toxicity is not anticipated for silver concentrations up to 69 ppm. The potential of toxicity above 69 ppm is uncertain; thus, a toxicity action level of 70 ppm was selected for the development of remedial focus areas.

[3] Site-Specific Action Level, 100 ppm, represents a silver concentration that is significantly higher than the average concentrations within the riverbed study area, specifically in the top two feet where the potential for exposure is the highest under scour events.

[4] Site-Specific Action Level, 30 ppm, represents a silver concentration that is significantly higher than the average concentrations within the wetland study area, specifically in the top two feet where potential for exposure is the highest.

[5] The Department considers soil action levels for a commercial scenario to be protective of passive recreational use (6 NYCRR Part 375). Therefore, the human health commercial silver Soil Cleanup Objective (SCO) of 1,500 ppm was considered as a guidance value for human health protection. QHHEA conclusions were based on findings that all silver concentrations in the top 2 feet of river sediment and in the top 1 foot of wetland/floodplain sediments were less than 1,500 ppm.

Exhibit C

Description of Remedial Alternatives

The following alternatives were considered based on the cleanup objectives (see Exhibit B) to address the contaminated media identified at the site as described in Exhibit A:

River Alternatives

Alternative R1: No Action

The no action alternative would consist of taking no specific remedial action and allowing the waterways to continue to recover naturally. This alternative would include neither institutional controls (ICs) nor monitoring the progress of natural recovery.

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

Alternative R2: Monitored Natural Recovery

The monitored natural recovery (MNR) alternative would consist of allowing the waterways to continue to recover naturally while monitoring site conditions for 20 years. Site conditions would be re-evaluated after 20 years to determine the effectiveness of natural recovery and whether additional monitoring and/or active remediation would be appropriate. Cost estimates are based on a 30-year monitoring period consisting of a comprehensive baseline event, annual monitoring for the first five years, and subsequent monitoring on 5-year intervals. Monitoring would include sampling and analysis for silver in surface and near-surface sediments. This alternative would also include ICs to prevent future disturbance of and exposure to remaining contaminated sediment.

Present Worth: *$1,870,000*
Capital Cost: *$0*
Annual Costs: *$62,300*

Alternative R3A: Capping Sediments Exceeding 100 ppm Silver in Scour Prone Areas

This alternative would consist of placing a multi-layer isolation cap over the remedial area which, under this alternative, is defined based on potential scour and the action level of 100 parts per million (ppm) where potential for exposure is the highest under potential scour events. The isolation cap for this and all other capping alternatives would consist of a chemical isolation layer overlain by an erosion protection layer and a habitat layer. The average cap thickness is 28 inches in water depths of less than 4 feet and 26 inches in water depths greater than 4 feet. The cap chemical isolation layer will consist of a minimum of 6 inches of sand.

The erosion protection and habitat layers are separate and distinct cap layers, but for purposes of the conceptual cap design, it is assumed that the erosion protection and habitat layers would consist of fine gravel. Specific thickness and substrate material for each layer will be determined during design.

Dredging in shallow shoreline areas may be conducted prior to cap placement in order to help protect the cap from ice scour and to ensure no loss of river surface area. The remedial area is an approximately 1.9-acre

area adjacent to the King's Landing Wastewater Treatment Plant (KLWWTP) where multiple exceedances of the 100-ppm action level are exceeded over the area, and hydrodynamic modeling has indicated that there is the potential for greater than 4 inches of scour of surface sediments during an extreme flow event. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$1,640,000*
Capital Cost: *$1,190,000*
Annual Costs: *$15,000*

Alternative R3B: Dredging to Facilitate Capping of Sediments Exceeding 100 ppm Silver – Restoration to Existing Bathymetry

Under this alternative, dredging would be completed to a uniform average depth equal to the average thickness of the cap resulting in minimal change in bathymetry following cap placement. Cap thickness determination is consistent with Alternative R3A. The remedial area is an approximately 1.9-acre area adjacent to the KLWWTP where multiple exceedances of the 100-ppm action level over the area and hydrodynamic modeling has indicated that there is the potential for greater than 4 inches of scour of surface sediments during an extreme flow event. Best engineering management practices (e.g., appropriate sloping) would be implemented to avoid impacts to shoreline features including the KLWWTP bulkhead and diffuser pipe features. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$4,930,000*
Capital Cost: *$4,480,000*
Annual Costs: *$15,000*

Alternative R3C: Dredging Sediments exceeding 100 ppm /Capping Residual Sediments Exceeding 100 ppm > 6-feet

This alternative would consist of dredging and placing a multi-layer isolation cap over the remedial area, which under this alternative is defined based on potential scour and the action level of 100 ppm for the river sediments. Dredging would be conducted to a depth of 6 feet over the entire area to remove all sediments with silver concentrations exceeding the action level. An isolation cap would be placed following dredging to contain dredge residuals and remaining contaminated sediment, with the final restored depth deeper than current bathymetry. The remedial area is an approximately 1.9-acre area adjacent to the KLWWTP where multiple exceedances of the 100-ppm action level action levels and hydrodynamic modeling has indicated a potential for greater than 4 inches of surface sediment scour during an extreme flow event. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$9,000,000*
Capital Cost: *$8,550,000*
Annual Costs: *$15,000*

Alternative R4A: Capping Sediments Exceeding 70 ppm Silver within Scour Areas (> 10cm)

This alternative would consist of placing a multi-layer isolation cap over scour and site-specific toxicity action level of 70 ppm. Based on the results of the RFI sediment toxicity testing, silver concentrations up to 69 ppm in site sediments do not result in toxicity to benthic organisms.

Dredging limited to shallow shoreline areas may be conducted prior to cap placement in order to help protect the cap from ice scour and to ensure no loss of river surface area. The remedial area totals approximately 4.1 acres and consists of an area adjacent to the KLWWTP and an area adjacent to Wetland D. In these areas, there are multiple exceedances of the 70-ppm action level, and hydrodynamic modeling has indicated that there is the potential for greater than 4 inches of scour of surface sediments during an extreme flow event. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$3,030,000*
Capital Cost: *$2,570,000*
Annual Costs: *$15,000*

Alternative R4B: Dredging to facilitate Capping of Sediments Exceeding 70 ppm -Restoration to Existing Riverbed Elevations

This alternative would consist of uniform dredging across the remedial boundary with placement of multi-layer isolation cap within primary potential scour zones where sediments exceed the action level action level of 70 ppm. Dredging would be completed to a uniform average depth equal to the average thickness of the cap such that there is minimal change in bathymetry following cap placement. Dredging will be performed within the entire remedial area (approximately 4.0 acres), which consists of an area adjacent to the KLWWTP and a riverbed area downstream, adjacent to Wetland D. In these areas there are multiple exceedances of the 70-ppm, site-specific toxicity-based action level, and hydrodynamic modeling has indicated that there is the potential for greater than 4 inches of scour of surface sediments during an extreme flow event. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$9,990,000*
Capital Cost: *$9,540,000*
Annual Costs: *$15,000*

Alternative R4C: Dredge Full Depth and Isolation Cap Sediments Exceeding 70 ppm at depth > 6' / Restoration to Achieve Capping Objective

This alternative would consist of dredging and placing a multi-layer isolation cap over the remedial area, which under this alternative is defined based on potential scour and the action level action level of 70 ppm. The remedial area totals approximately 4.0 acres and consists of an area adjacent to the KLWWTP and an area adjacent to Wetland D. In these areas, there are multiple exceedances of the 70-ppm site-specific toxicity-based action level, and hydrodynamic modeling has indicated that there is the potential for greater than 4 inches of scour of surface sediments during an extreme flow event. Dredging would be conducted to a depth of 6 feet over the remedial boundary adjacent to KLWWTP and 5 feet over the remedial boundary

adjacent to Wetland D to remove all sediments with silver concentrations exceeding the site-specific toxicity-based action level. An isolation cap would be placed following dredging to contain dredge residuals and remaining contaminated sediment, with the final restored depth deeper than current bathymetry. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$17,500,000*
Capital Cost: *$17,100,000*
Annual Costs: *$15,000*

Alternative R5A: Primary Scour Areas (>4 inches) – Armored Thin-Layer Cap

This alternative would consist of placing an armored thin-layer cap over the remedial area, which under this alternative is defined based solely on potential scour. The armored thin-layer cap is estimated to consist of a minimum 2-inch-thick sand filter layer and a minimum 2-inch-thick fine gravel layer designed to provide erosion protection, although the need for multiple layers would be further evaluated during the design. Both layers are assumed to have an average over-placement thickness of 4 inches, resulting in an overall average thickness of 12 inches for the armored thin-layer cap. To ensure there is no loss of river surface area, no cap placement would occur along the river shoreline in water depths of less than 1 foot. The remedial area totals approximately 7 acres (including the remedial areas adjacent to KLWWTP and Wetland D) where hydrodynamic modeling has indicated there is the potential for greater than 4 inches of scour of surface sediments during an extreme flow event. It is assumed that a cap can be effectively placed on slopes no greater than 3 horizontal to 1 vertical. Detailed geotechnical stability evaluations would be completed as part of the remedial design to address constructability concerns. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$1,940,000*
Capital Cost: *$1,490,000*
Annual Costs: *$15,000*

Alternative R5B: Capping Primary Scour Areas

This alternative would consist of placing an isolation cap over the remedial area, which under this alternative is defined based solely on potential scour. Dredging in shallow shoreline areas may be conducted prior to cap placement to help protect the cap from ice scour and to ensure no loss of river surface area. The remedial area totals approximately 7 acres (including the remedial areas adjacent to KLWWTP and Wetlands E and D) where hydrodynamic modeling has indicated there is the potential for greater than 4 inches of scour of surface sediments during an extreme flow event. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$4,870,000*
Capital Cost: *$4,420,000*
Annual Costs: *$15,000*

Alternative R5C: Dredging and Capping Primary Scour Areas 4 inches

This alternative would consist of dredging and placing an isolation cap over the remedial area, which under this alternative is defined based solely on potential scour. Dredging would be completed to a uniform average depth equal to the average thickness of the cap such that there is minimal change in bathymetry following cap placement. The remedial area totals approximately 7 acres (including the remedial areas adjacent to KLWWTP and Wetlands E and D) where hydrodynamic modeling has indicated there is the potential for greater than 4 inches of scour of surface sediments during an extreme flow event. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$16,700,000*
Capital Cost: *$16,300,000*
Annual Costs: *$15,000*

Alternative R6A: Thin Layer Capping - River-Wide

This alternative would consist of placing an armored thin-layer cap over all areas of the river that exceed the NYSDEC Class C Sediment Guidance Value (SGV) for silver of 2.2 ppm, excluding areas that are regularly navigationally dredged and areas where steep slopes would make capping impractical. The armored thin-layer cap consists of a sand filter layer and a fine gravel layer designed to provide erosion protection, although the need for multiple layers would be further evaluated during the design. To ensure there is no loss of river surface area, no cap placement would occur along the river shoreline in water depths of less than 1 foot. The total remedial area under this alternative would be approximately 56 acres. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent future disturbance of and exposure to remediated areas and remaining contaminated sediment, and long-term monitoring to ensure remedial components such as caps remain protective.

Present Worth: *$16,600,000*
Capital Cost: *$15,200,000*
Annual Costs: *$45,000*

Alternative R6B: Dredging and Backfill - River-Wide

This alternative would involve removal of all sediments within the river that exceed the NYSDEC Class C SGV of 2.2 ppm. Following removal, it is assumed a minimum of 1 foot of backfill would be placed to cover any residual contaminated sediment and to restore habitat. An isolation cap would be placed in areas where complete removal could not be implemented due to factors such as utilities and shoreline stability concerns. Based on sediment core data, it is estimated that the average depth of removal within the area subject to periodic navigational dredging is approximately 11 feet, while the average depth of removal in the remainder of the area would be approximately 5 feet, including a 6-inch average over-dredge allowance. This results in an overall estimated remedial area of 219 acres and an estimated removal volume of 3,200,000 cubic yards. Significant uncertainty exists in these estimated dredge depths and the resulting estimated dredge volume given the relatively sparse density of cores where the depth of exceedance was delineated and the variability of conditions within the river. Actual required dredge depths and removal volumes could be significantly greater.

Present Worth: *$976,000,000*
Capital Cost: *$974,000,000*

Annual Costs: *$45,000*

Wetlands/Floodplain Alternatives

Alternative W1: No Action

The no action alternative would consist of taking no specific remedial action and allowing the wetlands and floodplains to continue to recover naturally. This alternative would include neither ICs nor monitoring the progress of natural recovery.

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

Alternative W2A: Monitored Natural Recovery (MNR) – All Wetlands

The MNR alternatives would consist of allowing the wetlands and floodplains to continue to recover naturally while monitoring site conditions for 20 years. MNR relies on ongoing, naturally occurring processes to contain or reduce bioavalibility or toxicity of sediment contaminants. Burial by clean sediment is the primary mechanicsm by which natural recover occurs in riverine systems. Site conditions would be re-evaluated after 20 years to determine the effectiveness of natural recovery and whether additional monitoring and/or active remediation would be appropriate. Cost estimates were based on a 30-year monitoring period consisting of a comprehensive baseline event, annual monitoring for the first five years, and subsequent monitoring on 5-year intervals. Monitoring would include sampling and analysis for silver in surface and near-surface sediments and soils. Alternative W2A would involve conducting monitoring in all wetlands/floodplain areas considered in the CMS. This alternative would also involve the use of ICs to prevent unacceptable disturbance of and exposure to sediments and soils.

Present Worth: *$1,860,000*
Capital Cost: *$0*
Annual Costs: *$62,000*

Alternative W2B: Monitored Natural Recovery – Wetland C

This alternative, like Alternative W2A, would consist of allowing the wetlands and floodplains to continue to recover naturally while monitoring Wetland C, which had the highest average silver concentration of the any of the wetlands and which is the only wetland to exhibit exceedances of the 70-ppm, site-specific toxicity-based action level action level for silver in the top 2 feet. Monitoring would consist of a comprehensive baseline event, annual monitoring for the first five years, and subsequent monitoring on 5-year intervals and would include sampling and analysis for silver in surface and near-surface sediments and soils.

Present Worth: *$540,000*
Capital Cost: *$0*
Annual Costs: *$18,000*

Alternative W3: Full Removal Wetland Sediments > 70 ppm Silver in Top 2-feet,Backfill and Restoration

Under this alternative, areas of the wetlands/ floodplains where silver concentrations in sediment and soil exceed the site-specific, toxicity-based action level action level of 70 ppm in the top 2-foot interval of wetland sediment/soils. The remedial area is approximately 1.9 acres over two distinct areas within Wetland C. Excavation would be to a minimum depth equal to the average thickness of the backfill/cover such that there is minimal change in surface elevation following placement of a 2-foot-thick backfill/cover. The backfill/cover for this and all other wetlands alternatives is assumed to consist of a subgrade layer and topsoil habitat layer, although the exact composition of the backfill/cover would be determined during design. Following backfilling, vegetation would be restored through planting of appropriate species. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent unacceptable disturbance of and exposure to impacted sediments and soils, and long-term monitoring to ensure remedial components remain protective, or in the case of MNR, to document natural recovery.

Present Worth: *$4,920,000*
Capital Cost: *$4,630,000*
Annual Costs: *$10,000*

Alternative W4A: Excavation and Backfilling of Wetland C Soil Exceeding 30 ppm Silver

This alternative involves excavation and placement of backfill/cover in areas of the wetlands/ floodplains where sediment and soil exceed the focused action level of 30 ppm in the top 2 feet of wetland soils and sediment across a 3.1 acres and located entirely within Wetland C. Excavation would be to a minimum depth equal to the average thickness of the backfill/cover such that there is minimal change in surface elevation following placement of a minimum 2-foot-thick backfill/cover. Following backfilling, vegetation would be restored through planting of appropriate species. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent unacceptable disturbance of and exposure to impacted sediments and soils, and long-term monitoring to ensure remedial components remain protective, or in the case of MNR, to document natural recovery.

Present Worth: *$7,660,000*
Capital Cost: *$7,350,000*
Annual Costs: *$10,300*

Alternative W4B: Excavation and Backfilling of Wetland C and D Sediment Exceeding 30 ppm Silver

This alternative involves excavation and placement of backfill/cover in areas of the wetlands/ floodplains where sediment and soil exceed the focused action level of 30 ppm in the top 2 feet. The remedial area is approximately 6.8 acres and located within Wetlands C and D. Excavation would be to a minimum depth equal to the average thickness of the backfill/cover such that there is minimal change in surface elevation following placement of a minimum 2-foot-thick backfill/cover. Following backfilling, vegetation would be restored through planting of appropriate species. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent unacceptable disturbance of and exposure to impacted sediments and soils, and long-term monitoring to ensure remedial components remain protective, or in the case of MNR, to document natural recovery.

Present Worth: *$16,400,000*
Capital Cost: *$16,000,000*
Annual Costs: *$14,000*

Alternative W5A: Wetland Wide –Shallow Excavation (2-feet), Backfill and Restoration Sediments Exceeding 2.2 ppm Silver

This alternative involves excavation and placement of backfill/cover in areas of the wetlands/ floodplains where sediment and soil exceed the NYSDEC Class C SGV of 2.2 ppm in the top 2 feet. The remedial area is approximately 118 acres and encompasses all the wetlands discussed in the CMS report. Excavation would be to a minimum depth equal to the average thickness of the backfill/cover such that there is minimal change in surface elevation following placement of a minimum 2-foot-thick backfill/cover. Following backfilling, vegetation would be restored through planting of appropriate species. This alternative would also include natural recovery of those areas where active remediation is not implemented, ICs to prevent unacceptable disturbance of and exposure to impacted sediments and soils, and long-term monitoring to ensure remedial components remain protective, or in the case of MNR, to document natural recovery.

Present Worth: *$280,000,000*
Capital Cost: *$277,000,000*
Annual Costs: *$115,000*

Alternative W5B: Wetland Wide – Full Depth Excavation, Backfill and Restoration Sediments Exceeding 2.2 ppm Silver

This alternative involves excavation of the full depth of exceedances in areas of the wetlands/floodplains where sediment and soil exceed the NYSDEC Class C SGV of 2.2 ppm. Excavation would be followed by backfilling excavated areas. The remedial area is approximately 118 acres and encompasses all the wetlands discussed in the CMS report. Under this alternative, enough backfill, including 1 foot of topsoil, would be placed to restore the wetlands/floodplains to their current elevations prior to habitat restoration. Vegetation would be restored through planting of appropriate species.

Present Worth: *$459,000,000*
Capital Cost: *$457,000,000*
Annual Costs: *$83,300*

Exhibit D

Corrective Measure Alternative Costs

Corrective Measure Alternative	Capital Cost (2018 $)	Annual Costs (2018 $)	Total Present Worth (2018 $)
River Alternatives			
R1	-	-	-
R2	-	62,300	1,870,000
R3A	1,190,000	15,000	1,640,000
R3B	4,480,000	15,000	4,930,000
R3C	8,550,000	15,000	9,000,000
R4A	2,570,000	15,000	3,030,000
R4B	9,540,000	15,000	9,990,000
R4C	17,100,000	15,000	17,500,000
R5A	1,490,000	15,000	1,940,000
R5B	4,420,000	15,000	4,870,000
R5C	16,300,000	15,000	16,700,000
R6A	15,200,000	45,000	16,600,000
R6B	974,000,000	45,000	976,000,000
Wetlands/Floodplains Alternatives			
W1	-	-	-
W2A	-	62,000	1,860,000
W2B	-	18,000	540,000
W3	4,630,000	10,000	4,920,000
W4A	7,350,000	10,300	7,660,000
W4B	16,000,000	14,000	16,400,000
W5A	277,000,000	115,000	280,000,000
W5B	457,000,000	83,300	459,000,000

A more detailed breakdown of costs associated with each alternative can be found in Appendix C of the Corrective Measures Study Report for the Lower Genesee River.

X Present Worth is calculated by adding the capital cost (e.g., engineering cost, development of site management plan, installation of the monitoring network, or) to the present worth of the annual costs (e.g., operation, maintenance, monitoring, and periodic review) computed for the expected duration of the operation of the remedy or 30 years, whichever is less.

X Capital Cost is the cost to engineer and construct the remedy.

X Annual Cost is the average annual Site Management cost over the duration of the operation of the remedy or 30 years, whichever is less. It does not vary for different years.

X A 5% interest rate will normally be used to calculate present worth.

X Limit dollar values to three significant figures. For example, $201,000 not $200,875.

Exhibit E

SUMMARY OF THE PROPOSED FINAL CORRECTIVE MEASURE(S)

The Department is proposing Alternatives R4B and W3 as the final corrective measures for this site. These elements are described in Section 8. The proposed final corrective measures are depicted in Figures 2 through 4.

Basis for Selection

The proposed final corrective measures are based on the results of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), Corrective Measures Study (CMS) and evaluation of alternatives considered based on the cleanup objectives (see Exhibit C).

River Alternative R4B involves remediation adjacent to King's Landing Wastewater Treatment Plant (KLWWTP) and adjacent to Wetland D where silver concentrations exceed the site-specific, toxicity-based action level action level of 70 parts per million (ppm), and there is the potential for greater than 4 inches of scour during a 100-year flow event. This alternative includes dredging approximately 20,400 cubic yards over a 4.1-acre area to the depth needed to accommodate placement of an isolation cap to maintain current river bathymetry. Silver has not been detected in any sediment porewater samples, indicating minimal potential for silver migration via porewater from underlying sediments into the cap. Thus, the primary function of the cap is to provide physical isolation. The cap will include a dedicated chemical isolation layer with a minimum thickness of 6 inches, underlying an erosion protection layer and habitat layer. The erosion protection layer, is designed to provide protection from erosive forces such as ice scour and wave action and to ensure long-term physical isolation of underlying sediments. The cap will consist of a minimum 6-inch-thick chemical isolation layer of sand with necessary erosion protection and habitat layer. The erosion protection and habitat layers are separate and distinct cap layers, but for purposes of the conceptual cap design, it is assumed that the erosion protection and habitat layers would consist of fine gravel.

Specific thickness and substrate material for each layer will be determined during design. Average cap placement will be designed to restore the riverbed to pre-existing (existing bathymetry) conditions. Wetland Alternative W3 involves the excavation and backfilling of areas in Wetland C where silver concentrations exceed the site-specific, toxicity-based action level of 70 ppm in the top 2 feet of sediments and soils. Two small areas in Wetland C would be excavated to a minimum depth equal to the average thickness of the cover (26 inches), such that there is minimal change in surface elevation following placement of a clean backfill with a minimum thickness of 2 feet. This alternative also involves restoration of vegetation through planting of appropriate species following backfilling. An estimated 2-acre area with an excavation volume of 8,200 cubic yards is associated with this alternative.

Remedy Selection Criteria – River Alternatives

Performance Standards

Protection of Human Health and the Environment

The remedial action objectives (RAOs) established for the lower Genesee River focus on reducing the potential for migration of silver contamination and for adverse impacts to biota from exposure to silver. All the alternatives, including R1 and R2, would result in some long-term reductions in these potentials due to natural recovery, while the remaining alternatives would result in both short- and long-term reductions. Of the remaining alternatives, Alternative R4B provides the necessary degree of protection to the environment by reducing the potential for migration of silver or exposure of biota to silver at concentrations above the site-specific toxicity-based action level action level of 70 ppm in sediment. The R5 and R6 alternatives that

remediate larger areas do not provide substantially greater protection to the environment since they focus on areas with lower silver concentrations (generally below the site-specific toxicity-based action level action level) and, under the R6 alternatives, areas with reduced potential for scour.

Achievement of Media Clean Up Objectives

Alternative R4B complies with the site-specific toxicity-based action level of 70 ppm within primary scour zones. Although other alternatives address sediments with lower silver concentrations, 70 ppm represents a concentration where remediation will address sediments with the highest risk of exposure.

Remediation of the Sources of Release

This criterion has in part already been met for all alternatives as it pertains to sources of contamination that have been addressed through reduced discharge of silver from the KLWWTP and remediation of upland sources. Sediments with relatively higher silver concentrations within scour areas are also considered recontamination source areas within the river. Alternative R4B remediates potential sources of release by dredging and installation of an isolation cap over both the remedial boundaries adjacent to KLWWTP and adjacent to Wetland D. In comparison, the R3 alternatives only remediate the area adjacent to KLWWTP, while the R5 and R6 alternatives do not provide additional remediation of potential source areas beyond the area adjacent to KLWWTP and Wetland D.

Balancing Criteria

Long-Term Effectiveness

All the evaluated alternatives provide some degree of long-term reliability and effectiveness through continued natural recovery of waterways and, under the R3, R4, R5, and R6 alternatives, through placement of isolation caps over and/or dredging of contaminated sediments. All the R4 alternatives provide a high degree of long-term effectiveness by preventing remobilization of sediments with high silver concentrations in areas adjacent to KLWWTP and Wetland D. Sediment caps have been effectively implemented at numerous sites with similar conditions to the lower Genesee River. R4B provides additional effectiveness over a cap-only alternative by eliminating the river bottom elevation change associated with the cap-only option.

Toxicity, Mobility, and Volume Reduction

Each of the alternatives provides some reduction in the mobility of silver through containment, including through natural recovery by deposition of cleaner sediments over more highly contaminated ones. Placement of a thin-layer or isolation cap provides greater isolation and reduction in mobility than alternatives relying solely on natural recovery. The R4 alternatives involve capping in areas adjacent to KLWWTP and Wetland D, providing greater reduction in mobility than the R3 alternatives. The R5 and R6 alternatives involve capping additional areas outside areas adjacent to KLWWTP and Wetland D, thereby providing greater reduction in mobility than the R4 alternatives, although the reduction in mobility occurs in areas with significantly lower silver concentrations. Alternative R4B reduces the mobility of sediments exceeding the site-specific toxicity-based action level of 70 ppm that are in areas with significant potential for mobility. The selection of this alternative expands the remedial boundary significantly relative to the R3 alternative, however, does not offer additional benefits relative to reduction in toxicity or mobility.

Short-Term Effectiveness

Short-term effectiveness considers the required timeframe to achieve remedial goals as well as potential impacts and risks associated with remedy implementation. Alternative R4B provides a good balance of these two components of short-term effectiveness. Compared to the R4C, R5, and R6 alternatives, the R4B alternative poses significantly reduced impact to the environment and surrounding community from factors such as river turbidity, greater potential for spread of contamination from resuspension during dredging,

additional truck traffic, and nuisance noises. Alternative R4B also offers significantly greater short-term progress toward meeting remedial goals than Alternatives R1, R2, or R3 by dredging and placing an isolation cap in remedial areas adjacent to KLWWTP and Wetland D. Alternative R4B could also likely be completed within a single construction season, which further reduces impacts to the surrounding community and environment.

Implementability

Alternative R4B is readily implementable, as are most of the evaluated alternatives. Alternative R6B poses significant implementability challenges due to the volume of dredging and capping required. Alternatives R6B, R3C and R4C may pose some difficulties in dredging to the full depth of contaminated sediments. All alternatives except R1 and R2 face some implementability challenges relating to dredging and capping near riverbanks and infrastructure located near the KLWWTP. These issues could be mitigated by establishing offset distances where no dredging and/or capping would occur.

Cost

Alternative R4B has an estimated total present worth cost of $9,990,000.

Remedy Selection Criteria – Wetlands/Floodplain Alternatives

Performance Standards

Protection of Human Health and the Environment

The RAOs established for the lower Genesee River focus on reducing the potential for migration of silver contamination and for adverse impacts to biota from exposure to silver. The lower Genesee River wetlands/floodplains are low-energy environments and generally well vegetated. This means that sediments in the wetlands/floodplains will not migrate significantly to other areas within the system. Therefore, the alternatives evaluation in the wetlands/floodplains focused on the second RAO and potential for impacts to biota.

All the alternatives, including W1, W2A, and W2B, result in some long-term reduction in risk to biota due to natural recovery. Alternatives W3, W4A, W4B, W5A, and W5B result in both short- and long-term reductions. Alternative W3 provides the necessary degree of protection to the environment by reducing the potential for exposure of biota to silver at concentrations above the site-specific action level action level of 70 ppm in sediment. The W4 and W5 alternatives that remediate larger areas do not provide substantially greater protection to the environment since they focus on areas with lower silver concentrations below the site-specific toxicity-based action level.

Achievement of Media Clean Up Objectives

Alternative W3 provides compliance with the site-specific action level of 70 ppm. Although other alternatives address sediments with lower silver concentrations, including up to the Class C SGV of 2.2 ppm, it does not represent a greater protectiveness to potential exposure.

Remediation of the Sources of Release

Control of primary sources has already been met for all alternatives since the input of silver to the lower Genesee River has decreased over time. No source material is located within the wetlands/floodplains of the lower Genesee River given that these sediments and soils are stable and not subject to remobilization such that they could serve as an internal source of contamination.

Balancing Criteria

Long-Term Effectiveness

All the evaluated alternatives provide some degree of long-term reliability and effectiveness through continued natural recovery of wetlands/floodplains, and for the case of the W3, W4, and W5 alternatives, through excavation of and placement of cover over contaminated sediments. Alternative W3 provides the necessary degree of long-term effectiveness by excavating or covering all areas with sediment silver concentrations exceeding the site-specific action level of 70 ppm.

Toxicity, Mobility, and Volume Reduction

Each of the wetland/floodplain alternatives provides some reduction in the mobility of silver. .. Alternatives W1, W2A, and W2B may result in some reduction in mobility of silver due to deposition of cleaner sediments over more highly contaminated sediments, although the rate at which this would occur is uncertain. Alternatives W3, W4A, and W4B provide progressively greater reductions in mobility of silver by removing areas with the highest silver concentrations, although the wetlands are generally depositional, and substrates are not expected to be highly mobile. The W5 alternatives provide greater reduction in mobility than the W4 and W3 alternatives, although the reduction in mobility occurs in areas with significantly lower silver concentrations in the W5 alternatives. Alternative W3 reduces the mobility of sediments in areas exceeding the site-specific action level of 70 ppm in the top 1 foot.

Short-Term Effectiveness

Short-term effectiveness considers the required timeframe to achieve remedial goals as well as potential impacts and risks associated with remedy implementation. Compared to the W4 or W5 alternatives, Alternative W3 provides a good balance of these two components of short-term effectiveness by posing significantly reduced impact to the environment and surrounding community from factors such as removal or disruption of habitat and established plant communities, additional truck traffic, and nuisance noises. Alternative W3 also offers significantly greater short-term progress toward meeting remedial goals than Alternatives W1, W2A, or W2B by excavating and backfilling areas exceeding the site-specific action level of 70 ppm.

Implementability

Most of the evaluated alternatives are readily implementable, including Alternative W3. Alternatives W5A and W5B pose significant implementability challenges due to the volume of excavation and backfilling required, but W3 does not face similar problems. Any alternative involving excavation and backfill in the lower Genesee River wetlands/floodplains requires careful construction and logistical planning due to the limited access to these areas. Access issues include steep slopes present along the wetlands/floodplain areas, equipment reach capacity, and stability.

Cost

Alternative W3 has an estimated total present worth cost of $4,920,000.

APPENDIX A

ADMINISTRATIVE RECORD

Administrative Record

Facility
City, County
EPA No. / Site No.

October 2019

Documents

Kodak. 2005. RCRA Correction Action Environmental Indicator (EI) RCRIS code (CA750) Migration of Contaminated Groundwater Under Control.

NYSDEC. 2002. Final Statement of Basis for Kodak Park Investigation Area Northwest Kodak Park East Final Corrective Measures Selection. Division of Solid and Hazardous Materials. May.

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