REMEDIAL ACTION COMPLETION REPORT

HUDSON RIVER PCBs SUPERFUND SITE

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ABBREVIATIONS

AM	Adaptive Management
AOC	Administrative Orders on Consent
ARARs	Applicable or relevant and appropriate requirements
BA	Biological Assessment
BMP	best management practices
CARA	Cultural and Archaeological Resource Assessment
CD	Consent Decree
CDE	Critical Phase 2 Design Elements (Attachment A to SOW)
cfs	cubic feet per second
CFR	Code of Federal Regulations
CHASP	Community Health and Safety Plan
CM	Construction Manager
CMSA	Coarse Material Staging Area
CPR	Canadian Pacific Railway
CU	certification unit
cy	cubic yard
DAD	Dredge Area Delineation
DBH	diameter at breast height
DO	dissolved oxygen
DoC	Depth of Contamination
DQAP	Dredging Construction Quality Control/Quality Assurance Plan
DSR	Data Summary Report
EoC	elevation of contamination
EPA	United States Environmental Protection Agency
EPS	Engineering Performance Standards
FDR	Final Design Report
FML	flexible membrane liner
ft	foot / feet
g/m2	grams per square meter
GAC	granulated activated carbon

ABBREVIATIONS (cont'd)

GE	General Electric Company
GPS	global positioning system
H2S	Hydrogen sulfide
HASP	Health and Safety Plan
HDA	Habitat Delineation & Assessment
IDR	Intermediate Design Report
ITA	Isthmus Transload Area
mg/kg	milligrams per kilograms
MPA	mass per unit area
µg/100 cm^2	micrograms per 100 square centimeters
NAAQS	National Ambient Air Quality Standards
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NYSCC	New York State Canal Corporation
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSHPO	New York State Historic Preservation Officer
OM&M	Operation, Maintenance and Monitoring
OPRHP	Office of Parks, Recreation, and Historical Preservation
PAP	Property Access Plan
PCBs	polychlorinated biphenyls
PFOC	Processing Facility Operations Contractor
PPE	personal protective equipment
ppm	parts per million
PSCP	Performance Standards Compliance Plan
QA	quality assurance
QC	quality control
QoLPS	Quality of Life Performance Standards
RA	Remedial Action
RA CHASP	Remedial Action Community Health and Safety Plan

ABBREVIATIONS (cont'd)

RA HASP	Remedial Action Health and Safety Plan
RAM QAPP	Remedial Action Monitoring Quality Assurance Project Plan
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RFW	Riverine Fringing Wetland
RM	River Mile
ROD	Record of Decision
RS	River Section
RTK	Real Time Kinematic
RYOC	Rail Yard Operations Contractor
SAV	Submerged (and floating) Aquatic Vegetation
SBLA	Saratoga Barge Loading Area
SEDC	Supplemental Engineering Data Collection
SOW	Statement of Work for Remedial Action and Operations, Maintenance and Monitoring
SPF	Sediment Processing Facility
SSAP	Sediment Sampling and Analysis Program
TDP	Transportation and Disposal Plan
TID	Thompson Island Dam
TIP	Thompson Island Pool
TOC	total organic carbon
TPCBs	Total PCBs
Tri+ MPAs	Mass per Unit Area of Tri+ PCBs
Tri+ PCBs	PCBs with three or more chlorine atoms
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
UCB	unconsolidated river bottom
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service
WQ Requirements	Substantive Water Quality Requirements

SECTION 1

INTRODUCTION

This document constitutes the Remedial Action Completion Report for the Remedial Action (RA) selected by the United States Environmental Protection Agency (EPA) and performed by the General Electric Company (GE) to address polychlorinated biphenyls (PCBs) in sediments of the Upper Hudson River, located in New York State, as described in EPA's February 2002 Record of Decision (ROD) for the Hudson River PCBs Superfund Site (EPA 2002a). The RA was conducted pursuant to and in accordance with a Consent Decree (CD) executed by GE and EPA, which was filed in federal district court on October 6, 2005 (EPA and GE 2005) and was approved and entered by the court as a final judgment on November 2, 2006. Pursuant to Paragraph 57.a of the CD, GE has determined that the RA is complete; and inspections were held on November 10, 2016 for the project support areas and on November 30, 2016 for the sediment processing facility (with a follow-up inspection on December 16, 2016) following the demobilization and restoration of those properties, which GE considers to have satisfied the requirement of Paragraph 57.a for an RA Completion Pre-Final Inspection. Accordingly, GE is submitting this RA Completion Report pursuant to Paragraph 57.b of the CD, and it requests that EPA issue a Certification of Completion of the RA pursuant to Paragraph 57.d of the CD.

1.1 BACKGROUND AND OVERVIEW

The RA specified in the ROD involved the dredging and disposal of sediments from the Upper Hudson River containing PCBs above certain specified criteria. The ROD specified the following Remedial Action Objectives (RAOs) for that RA:

- Reduce the cancer risks and non-cancer health hazards for people eating fish from the Hudson River by reducing the concentrations of PCBs in fish;
- Reduce the risks to ecological receptors by reducing the concentrations of PCBs in fish;
- Reduce PCB levels in sediments in order to reduce PCB concentrations in river (surface) water that are above surface water Applicable or Relevant and Appropriate Requirements (ARARs);
- Reduce the inventory (mass) of PCBs in sediments that are or may be bioavailable; and
- Minimize the long-term downstream transport of PCBs in the river.

The ROD called for the RA to be conducted in two phases, designated Phase 1 and Phase 2. Phase 1 was to constitute the first year of the dredging project, to be performed at a reduced rate for evaluation purposes, and Phase 2 was to constitute the remainder of the dredging project. The ROD further provided that the sediments removed from the river would be transported to a land-based processing facility for dewatering and, if necessary, stabilization, and that the

dewatered and stabilized sediments would then be transported to a licensed disposal facility outside the Hudson River Valley for ultimate disposal. It specified that trucks could not be used for this transport. The ROD also required that the dredged areas must be backfilled with at least 1 foot of clean material and the affected habitats must be restored. The ROD directed that EPA would establish performance standards to govern the conduct of the remedy. Finally, the ROD provided that Phase 1 would be followed by an independent external peer review to evaluate the dredging with respect to the performance standards, and that Phase 2 would follow that peer review.

Following issuance of the ROD, GE and EPA entered into two Administrative Orders on Consent (AOCs): (1) a July 2002 AOC requiring GE to carry out an extensive Sediment Sampling and Analysis Program (SSAP) for the Upper Hudson River sediments to facilitate the design of the project (Sediment Sampling AOC; EPA 2002c); and (2) an August 2003 AOC requiring GE to perform Remedial Design (RD) of the remedy that EPA selected in the ROD (RD AOC; EPA 2003). GE commenced the SSAP and RD activities in accordance with those AOCs. In addition, in July 2004, in a decision in a dispute resolution proceeding relating to GE's initial Phase 1 Dredge Area Delineation Report, EPA issued a decision (EPA 2004a) specifying in more detail the sediment removal criteria, including criteria based on surface sediment PCB concentrations.

In accordance with the ROD, EPA issued two sets of Performance Standards. The first set, issued in April 2004, were the Engineering Performance Standards (EPS), consisting of a Resuspension Standard, a Residuals Standard, and a Productivity Standard (EPA 2004b). The second set, issued in May 2004, were the Quality of Life Performance Standards (QoLPS), consisting of standards governing air quality, odor, noise, lighting, and navigation impacts during dredging (EPA 2004c). In addition, in late 2004, EPA selected a site in Fort Edward adjacent to the Champlain Canal upstream of Lock 7 as a potential site for the land-based sediment processing facility, and it announced the final selection of that site in June 2005.

In January 2005, EPA, in consultation with New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH), issued a set of substantive water quality requirements governing: (1) in-river releases of constituents not subject to the EPS; and (2) discharges of treated water from the sediment processing facility to the Hudson River or the Champlain Canal (EPA 2005a). Further, in September 2006, EPA provided to GE a set of substantive requirements relating to non-contact stormwater discharges from the processing facility to Bond Creek (EPA 2006). These substantive water quality requirements are referred to jointly as the Substantive Water Quality Requirements (WQ Requirements).

In 2005, GE and EPA negotiated and executed the CD to govern the performance of the RA selected in the ROD. The CD provided that GE would carry out Phase 1 of the RA and that, after the post-Phase 1 peer review and EPA's decision on any changes to the performance

standards and the scope of the project for Phase 2, GE would elect whether to perform Phase 2 under the CD. The CD included, as Appendix B, a Statement of Work for Remedial Action and Operation, Maintenance, and Monitoring (SOW), which set forth general requirements and procedures for the RA and included several attachments specifying requirements for various aspects of the RA, as described further below.

As also discussed further below, based on extensive sediment sampling and other data collected by GE under the Sediment Sampling AOC and the RD AOC, GE completed and EPA approved Phase 1 and Phase 2 Dredge Area Delineation (DAD) Reports in 2005 and 2007, respectively (QEA 2005, 2007), delineating the horizontal and vertical extent of the dredge areas to meet the applicable removal criteria established by EPA and thereby to satisfy the requirements of the ROD for sediment removal. Dredge areas were then grouped into Certification Units (CUs) for purposes of dredging and evaluation. Additionally, as further discussed below, between March 2006 and May 2009, GE submitted and EPA approved a Final Design Report (FDR) for Phase 1 and Remedial Action Work Plans (RAWPs) for the construction of the sediment processing facility, an associated rail yard, and supplemental support facilities for on-river activities, and for the performance of Phase 1 dredging, processing facility operations, and subsequent habitat replacement/reconstruction in the Phase 1 dredge areas. During that period, GE also commenced construction of the sediment processing facility at the selected site in Fort Edward.

Construction of the sediment processing facility, as well as the on-river support facilities, was completed in early 2009. Phase 1 dredging, followed by placement of backfill and capping, was then conducted in 2009 in accordance with the CD and the approved Phase 1 design reports and RAWP. Phase 1 dredging was conducted in the northern portion of the project area and in an area of the river in the vicinity of Griffin Island – both located in the Thompson Island Pool (TIP), as discussed below. A total of 286,000 cubic yards (cy) of sediment was removed from the river in Phase 1 and was subsequently dewatered at the sediment processing facility and transported off-site for disposal.

Following the completion of Phase 1 dredging, as required by the ROD, an external peer review proceeding was conducted in 2010 to evaluate the dredging with respect to the EPS. As part of that proceeding, GE and EPA each prepared a Phase 1 Evaluation Report (Anchor QEA and Arcadis 2010; Louis Berger Group 2010), and an independent Peer Review Panel reviewed and evaluated those reports and supporting information provided by GE and EPA. In September 2010, the Peer Review Panel issued a report summarizing its conclusions and making recommendations for Phase 2 (Bridges et al. 2010). Subsequently, on December 17, 2010, in accordance with the CD, EPA issued a decision regarding the scope of and changes to the performance standards for Phase 2. This decision included revised EPS for Phase 2 (Phase 2 EPS; EPA 2010a), a technical memorandum regarding revised QoLPS (Ecology & Environment, 2010), and a Revised SOW and its attachments (EPA 2010b). Later in December 2010, GE

notified EPA that it had elected to perform Phase 2 under the CD. The revised EPS, QoLPS, and SOW and its attachments were subsequently incorporated into the CD.

GE submitted the required design reports and RAWP for the first year of Phase 2 dredging (referred to as Phase 2 Year 1) in early 2011. It then commenced the performance of Phase 2 dredging in the spring of 2011 and completed Phase 2 Year 1 in the 2011 dredging season. In addition, during 2011, GE completed the habitat replacement/reconstruction activities in the Phase 1 dredge areas; and in October 2011, GE submitted to EPA a Phase 1 Construction Completion Report (Parsons 2011a), demonstrating that Phase 1 Field Activities (as defined in the CD) had been completed in accordance with the CD. EPA subsequently accepted that report and issued a Certification of Completion of Phase 1 Field Activities on October 17, 2012.

The remainder of Phase 2 dredging was conducted in 2012, 2013, 2014, and 2015 – referred to as Phase 2 Years 2, 3, 4, and 5, respectively. For each of those years, GE submitted the required Final Design Reports and RAWPs, as well as numerous addenda to them, and obtained EPA approval of those documents. The dredging and backfilling/capping activities were then conducted during the dredging season in each of those years. In general, the habitat replacement/reconstruction activities were constructed in the Phase 2 dredge areas in the season following dredging and backfilling/capping. Phase 2 represented the completion of the dredging project required by the ROD and was conducted in accordance with the CD, the revised SOW and performance standards, the applicable design reports and RAWPs, and directives from and agreements with EPA. A total of 2,467,970 cy of sediment was removed from the river in Phase 2 and was subsequently dewatered at the sediment processing facility and transported off-site for disposal.

In accordance with the SOW, a specific procedure was implemented for documenting completion of the three-step process required for conducting the necessary work in each CU: (1) dredging to the horizontal and vertical extents specified in the approved design, consistent with performance standards established by EPA; (2) placement of backfill or caps in the dredged areas, as required by the approved design and EPA's performance standards; and (3) where necessary, replacement/reconstruction of the affected habitat in the dredged areas. At each CU, upon the completion of each of those steps and before proceeding to the next step, EPA approved the completed step through its signature on a set of approval forms, signifying that that step had been completed in accordance with the CD and the approved design. The final EPA approval for each CU was provided in a Final CU Construction Completion Certification Form for that CU, as discussed further in Sections 1.7 and 8.1. This process was followed for each of the 100 CUs in Phases 1 and 2 of the RA.

Following the completion of Phase 2 dredging, the dredging equipment was decommissioned, decontaminated as necessary, and removed from the river. Similarly, following the completion of sediment processing operations, the sediment processing facility was demobilized and restored in accordance with a plan approved by EPA (Arcadis 2015a) as

well as discussions with, and other submittals approved by, EPA. Those activities were completed in December 2016. The supporting facilities along the river were also demobilized and closed following completion of their use in the project.

The major events and milestones for the RA are summarized in Table 1-1.

Table 1-1 List of Major Events and Milestones in Remedial Action

Date	Event
February 2002	EPA issued ROD
September 2005	GE and EPA executed Consent Decree (CD) for RA
Early 2009	GE completed construction of sediment processing facility
May-December 2009	GE conducted Phase 1 of RA
September 2010	Peer review on Phase 1 Performance Standards was completed
December 2010	EPA issued decision on changes for Phase 2
December 2010	GE elected to perform Phase 2 under CD
Spring-Fall 2011	GE conducted Phase 2 Year 1 of RA
Spring-Fall 2012	GE conducted Phase 2 Year 2 of RA
October 2012	EPA issued Certification of Completion of Phase 1 Field Activities
Spring-Fall 2013	GE conducted Phase 2 Year 3 of RA
Spring-Fall 2014	GE conducted Phase 2 Year 4 of RA
Spring-Fall 2015	GE conducted Phase 2 Year 5 of RA
Spring-Fall 2016	GE conducted final habitat construction and demobilization of sediment processing facility and support facilities
December 2016	GE completed RA

Paragraph 57.a of the CD provides that, when GE determines that the Remedial Action (defined in the CD to exclude Operation, Maintenance, and Monitoring [OM&M]) is complete, it is to schedule with EPA and the State of New York an RA Completion Pre-Final Inspection. Paragraph 57.b provides that, after that inspection, if GE continues to believe that the RA is complete, it will submit to EPA, for review and approval, a Remedial Action Report demonstrating the completion of the RA in full satisfaction of the CD requirements and requesting EPA's Certification of Completion of the RA. Those same requirements are included in Section 5.6 of the SOW.

In 2016, in light of the extensive process described above for documenting and obtaining EPA approval of the completion of each step of the in-river activities (i.e., dredging, backfilling/capping, and habitat replacement/reconstruction) in each of the 100 CUs, GE and EPA agreed that the inspections conducted of each CU at the conclusion of each of those steps would satisfy the RA Completion Pre-Final Inspection requirement for those in-river activities and areas. As a result, an underwater inspection of each CU was not required by EPA. A river shoreline inspection was conducted as part of the support properties inspection completed on November 10, 2016, as described below.

GE and EPA also agreed in 2016 that, due to the termination of GE's leases, license agreements, use and occupancy permits, and other arrangements with the owners of properties used in the project, final early inspections would be conducted of those support properties prior to GE's determination that the overall Remedial Action was complete and would be considered to satisfy RA Completion Pre-Final Inspection requirement for those properties (subject to EPA's right to require further inspections if necessary). The final early inspections of all project support properties were conducted on November 10, 2016, attended by GE, EPA, NYSDEC, and the New York State Canal Corporation (NYSCC), with no items identified for follow-up actions. On November 30, 2016, the final early inspection was conducted at the sediment processing facility, attended by GE, EPA, NYSDEC, NYSCC, and the property owner. During that inspection, a few minor follow-up actions were identified; and those actions were subsequently completed, as confirmed by a follow-up inspection of the sediment processing facility by EPA and NYSDEC on December 16, 2016. On December 16, 2016, GE notified EPA of those inspections, as well as the completion of the follow-up actions, and asked EPA to advise GE if it believed that additional inspections were necessary. On December 22, 2016, GE determined that the Remedial Action had been completed. Further, GE considers the inspections held on November 10 and 30, 2016 (with the follow-up on December 16, 2016) as satisfying the RA Completion Pre-Final Inspection requirement of Paragraph 57.a. No additional inspections have been required.

Accordingly, GE is submitting this Remedial Action Completion Report (RA Completion Report) for EPA review and approval as the Remedial Action Report required by Paragraph 57.b of the CD and Section 5.6 of the SOW. This RA Completion Report documents the proper completion of the RA and requests EPA's issuance of a Certification of Completion of the RA pursuant to and in accordance with Paragraphs 57.d and 57.e of the CD.

1.2 PROJECT SETTING

The Hudson River is located in eastern New York and flows approximately 300 miles in a generally southerly direction from its source, Lake Tear-of-the-Clouds in the Adirondack Mountains, to the Battery, located in New York City. The Upper Hudson River is defined as the stretch of the Hudson River from Fenimore Bridge in Hudson Falls to the Federal Dam at Troy, New York. The ROD defined three sections of the Upper Hudson River for the sediment

remediation activities. Those River Sections and the river reaches within them (which are generally divided by dams and/or locks) are as follows:

- **River Section 1** extends from the former location of the Fort Edward Dam (which was removed in 1973) at river mile (RM) 194.8 to the Thompson Island Dam (TID) at RM 188.5, approximately 6.3 river miles. This River Section contains Reach 8, the TIP.
- **River Section 2** extends from the TID at RM 188.5 to the Northumberland Dam at RM 183.4, approximately 5.1 river miles. This River Section contains Reach 7, which is located between the TID and the Fort Miller Dam and is known as the "Landlocked Area" because it is not directly accessible by water from the navigable channel of the Hudson River and the Champlain Canal system; and it also includes most of Reach 6 (the Northumberland Pool).
- **River Section 3** extends from the Northumberland Dam at RM 183.4 to the Federal Dam at Troy at RM 153.9, approximately 29.5 river miles. This River Section contains the remainder of Reach 6 (to Lock 5), Reach 5 (the Stillwater Pool), Reach 4 (the Upper Mechanicville Pool), Reach 3 (the Lower Mechanicville Pool), Reach 2 (the Waterford Pool), and Reach 1 (the Troy Pool).

The above-described River Sections and river reaches are shown on Figures 1-1 through 1-5.

1.3 APPLICABLE REQUIREMENTS AND PERFORMANCE STANDARDS

The ROD established criteria to govern the removal of sediments. Those criteria were based on the mass per unit area (MPA) of PCBs with three or more chlorine atoms (Tri+ PCBs). They targeted removal of sediments with an MPA of 3 grams per square meter (g/m^2) or greater in River Section 1 and 10 g/m^2 or greater in River Section 2, and removal of selected sediments with high PCB concentrations and erosion potential in certain Hot Spots identified by NYSDEC (Hot Spots 36, 27, and the southern portion of 39) in River Section 3. In addition, EPA's July 2004 decision in a dispute resolution proceeding relating to GE's initial Phase 1 Dredge Area Delineation Report established additional removal criteria based on the concentrations of Tri+ PCBs in surface sediments (EPA 2004a). The application of both the MPA and the surface sediment criteria was to be based on sampling designed to identify areas of sufficient size exceeding the criteria to warrant removal from an engineering perspective (not to identify or

designate for removal every discrete location exceeding the criteria).[1] The ROD estimated that the RA would involve the removal of approximately 2.65 million cy of sediments.

The ROD also established other requirements for the RA. These included requirements for: (a) dredging of the navigation channel, as necessary, to implement the remedy and to avoid hindering canal traffic during implementation; (b) removal of PCB-containing sediments within areas targeted for remediation, with anticipated residuals of approximately 1 milligram per kilogram (mg/kg) Tri+ PCBs (prior to backfilling); (c) design to achieve the performance standards developed by EPA; (d) backfill of dredged areas with approximately 1 foot of clean material to isolate residual PCBs and to expedite habitat recovery, where appropriate; (e) use of environmental dredging techniques to minimize and control resuspension of sediments during dredging; (f) transport of dredged sediments via barge or pipeline to sediment processing/transfer facilities for dewatering and, as needed, stabilization; and (g) rail and/or barge transport of dewatered, stabilized sediments to an appropriate licensed offsite landfill for disposal.[2]

The performance standards issued by EPA in 2004 established additional requirements for the RA. The EPS (EPA 2004b) specified requirements relating to implementation of the dredging project itself, as follows:

- The Resuspension Performance Standard established criteria for total suspended solids (TSS) at near-field monitoring stations (within 300 meters or less of dredging operations), concentrations of total PCBs (TPCBs) at far-field monitoring stations (more than one mile downstream of dredging operations), and net loads (i.e., loads above baseline) of Tri+ PCBs at designated far-field monitoring stations. The criterion for TPCB concentrations at far-field stations was set at the level of the EPA drinking water standard of 500 ng/L.
- The Residuals Performance Standard required sampling of the residual sediments remaining after the design dredging pass and specified the actions to be taken in the dredged areas depending on the results of that sampling – i.e., backfilling with clean material, additional dredging, or installation of an engineered cap.
- The Productivity Standard specified annual minimum and target cumulative volumes of sediment to be removed, processed, and shipped off-site during each year of Phase 1 and Phase 2 so that the entire project could be completed in six years.

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[1] EPA's Responsiveness Summary accompanying the ROD explained that the criteria "were applied more as guidelines rather than absolute rules," and that "it is not appropriate to apply the criteria on a strict basis because of the high degree of variability of the sediment contamination; an isolated high value in the middle of a region of low remediation does not represent an appropriate remediation target" (EPA 2002b, p. 4-20). It also explained that other factors "such as sediment type, bathymetry, and proximity to shore" are also relevant (*id*.), and further that EPA's approach "serves to yield areas of sufficient size to permit an efficient dredging operation" (*id*., p. 4-21).

[2] The ROD also identified a number of existing federal and state environmental laws as ARARs for the remedy.

The QoLPS (EPA 2004c) specified requirements relating to impacts of the project on the local communities, as follows:

- The Air Quality Performance Standard established 24-hour average numerical standards and "concern levels" for PCBs in ambient air in residential areas and commercial/industrial areas, established a standard for opacity (the reduction of visibility from air emissions), and required an analysis of achievement of the National Ambient Air Quality Standards (NAAQS) for several other air pollutants.
- The Odor Performance Standard established a numerical standard for hydrogen sulfide (H_2S) released by decaying plants and other organic material found in the river sediments. It also set forth requirements for responding to odor complaints.
- The Noise Performance Standard established numerical criteria for noise levels from project equipment and operations, which varied depending on the duration of project operations (short-term or long-term), the type of area affected (residential or commercial/industrial), and the time of day (daytime or nighttime).
- The Lighting Performance Standard established numerical standards for light levels from the project, which varied depending on the type of area affected. It also referenced certain statutory and regulatory requirements pertaining to lighting.
- The Navigation Performance Standard was developed by EPA, in consultation with the NYSCC, to regulate project-related vessel movement on the river. It required that project vessels comply with the applicable provisions of federal and state navigation laws, rules, and regulations; and it contained a number of other requirements relating to the relationship between project-related vessel traffic and non-project vessels.

In addition, the substantive WQ Requirements issued by EPA in conjunction with NYSDEC and NYSDOH (EPA 2005, 2006) established the following additional water quality requirements:

- Requirements relating to in-river releases of constituents not subject to the EPS, including acute water quality standards for certain metals, as well as pH and dissolved oxygen (DO), at near-field stations, health-based standards for certain metals at far-field stations, and requirements pertaining to the observation of distressed, dying, or dead fish;[3]

[3] In addition to these requirements, the New York water quality regulations contain a standard of no increase in turbidity that would "cause a substantial visible contrast to natural conditions" (6 NYCRR § 703.2). Although this standard was not included in the WQ Requirements issued by EPA for this project, GE and EPA (after consultation with the NYSDEC) agreed that this standard would be satisfied through application of a turbidity limit of 350 nephelometric turbidity units (NTUs), as a 24-hour average measured at the near-field stations.

- Effluent limitations and other requirements for discharges of treated water from the sediment processing facility to the Champlain Canal; and
- Effluent limitations and other requirements for discharges of non-contact stormwater from the sediment processing facility to Bond Creek.

The initial SOW, which was an appendix to the CD, set forth a number of requirements for implementing Phase 1. It included several attachments that specified the requirements for Phase 1 in greater detail. These were:

- Critical Phase 1 Design Elements (Attachment A);
- Remedial Action (RA) Monitoring Scope (Attachment B);
- Performance Standards Compliance Plan Scope (Attachment C);
- Remedial Action Community Health and Safety Program Scope (Attachment D):
- Operation, Maintenance, and Monitoring Scope (Attachment E); and
- CU Completion/Certification Forms (Attachment F).

In January 2009, GE and EPA agreed to a modification to the CD (CD Modification No. 1; EPA and GE 2009) that, among other things, contained provisions relating to GE's reimbursement of certain costs incurred (and to be incurred) by EPA in providing an alternate water supply or water treatment to identified downstream water suppliers, and also set forth a revised scope of the water quality monitoring program for Phase 1.

Following the completion of Phase 1 dredging in 2009 and the Phase 1 peer review in 2010, EPA issued the Phase 2 EPS (EPA 2010a), as described below:

- The Phase 2 Resuspension Standard continued to include criteria for TSS at near-field stations, TPCB concentrations at far-field stations, and net Tri+ PCB loads at far-field stations; but it contained some modifications to the numerical values of those criteria, the methods for applying the criteria, and the required actions in the event of an exceedance of the criteria. The criterion for TPCB concentrations at far-field stations remained at 500 ng/L.[4]
- The Phase 2 Residuals Standard reflected several modifications to the Phase 1 standard, including a requirement to verify that the design depth of contamination (DoC), also known as the elevation of contamination (EoC), was achieved, and several amplifications or modifications of required response actions. It also included limits on the amount of the area dredged during Phase 2 that may be capped and on the amount

[4] A confirmed exceedance of this criterion, which could trigger an EPA requirements for response actions, was considered to occur if water column monitoring at a far-field station showed concentrations above this level for two consecutive days.

of such area that may be capped with PCB inventory present (defined as Tri+ PCB concentrations at or above 6 mg/kg in segments deeper than 6 inches).

- The Phase 2 Productivity Standard eliminated the annual minimum required dredging volumes, established an annual target removal volume of 350,000 cy, deemphasized the six-year schedule, and provided that this standard was subordinate to the Resuspension and Residuals Standards.

EPA also issued a technical memorandum (Ecology & Environment 2010) explaining that no changes to the QoLPS would be made for Phase 2, but describing certain changes to the monitoring requirements. Further, EPA modified its previously issued substantive WQ Requirements relating to in-river releases of constituents not subject to the EPS – notably, the associated monitoring requirements – as set forth in Section 6 of the Phase 2 EPS document (EPA 2010a).

In addition, EPA issued a revised SOW in December 2010 (EPA 2010b), which contained a revised set of general requirements for Phase 2 and a revised set of attachments, as follows:

- Critical Phase 2 Design Elements (Phase 2 CDE: Attachment A);
- Remedial Action Monitoring Scope for Phase 2 (Phase 2 RAM Scope; Attachment B);
- Phase 2 Performance Standards Compliance Plan Scope (Phase 2 PSCP Scope; Attachment C);
- Phase 2 Remedial Action Community Health and Safety Program Scope (Phase 2 CHASP Scope; Attachment D):
- Operation, Maintenance, and Monitoring Scope for Phase 2 of the Remedial Action (Phase 2 OM&M Scope; Attachment E); and
- CU Completion/Certification Forms (Attachment F).

In the summer of 2011, GE and EPA agreed to a second modification to the CD (CD Modification No. 2; EPA and GE 2011) that, among other things, incorporated the Phase 2 EPS, QoLPS, and substantive WQ Requirements, as well as the revised SOW and its attachments, into the CD.

Section 7 of the revised SOW provided that EPA would apply an adaptive management approach to the review and, as appropriate, modification of the Phase 2 EPS, the QoLPS, the Phase 2 remedial design, and monitoring, operational, and other planning documents. Consistent with that approach, throughout the course of Phase 2, EPA and GE agreed on a number of further modifications to the applicable requirements for Phase 2.

1.4 SUMMARY OF DESIGN SUPPORT ACTIVITIES

To support the design of the RA, GE conducted a number of activities. These included the following:

- GE conducted the SSAP pursuant to the Sediment Sampling AOC, involving the collection of numerous river sediment samples with analyses for PCBs and certain other parameters to obtain data to delineate dredge areas that would meet the applicable removal criteria.
- GE also conducted a Supplemental Engineering Data Collection (SEDC) program pursuant to the RD AOC to obtain supplemental data and other information to assist in designing the remedy. The studies performed under this program included infrastructure documentation, debris/obstruction surveys, geophysical studies (e.g., magnetometer, multi-beam bathymetry, and river velocity studies), geotechnical studies in certain areas, and the collection and PCB analysis of additional sediment samples to enhance or refine the dredge area delineation.
- GE conducted a Baseline Monitoring Program from 2004 through May 2009, consisting of the collection of: (a) water column monitoring data to establish baseline conditions for river water quality to which water column monitoring data during the RA could be compared; and (b) fish sampling data to establish baseline conditions for use in comparison to fish data collected during and after the RA.
- GE conducted a Habitat Delineation and Assessment program pursuant to the RD AOC and an attached Habitat Delineation and Assessment Work Plan (HDA Work Plan; BBL 2003) to identify, delineate, and assess the habitats that would likely be affected by the RA, as well as to identify reference habitat locations in areas that would not be affected by dredging, to be used for comparison. For this purpose, the Upper Hudson River was divided into four habitat types – unconsolidated river bottom (UCB), aquatic vegetation beds (consisting of submerged and/or floating aquatic vegetation and referred to as SAV), natural shorelines, and riverine fringing wetlands (RFW). The results of this program were presented in several documents, including a Habitat Delineation Report (QEA 2008), a Habitat Assessment Report for Candidate Phase 1 Areas (BBL and Exponent 2005), and a Habitat Assessment Report for Phase 2 Areas (Anchor QEA 2009a).
- GE conducted a Cultural and Archaeological Resource Assessment (CARA) program pursuant to the RD AOC and an attached Cultural and Archaeological Resource Assessment Work Plan (CARA Work Plan; URS 2003), developed in accordance with the National Historic Preservation Act, to identify and evaluate the potential presence of cultural, archaeological, and historical resources that could be affected by the RA, to assess whether those resources would meet the criteria for eligibility in the National

Register of Historic Places (NRHP), and, where necessary, to evaluate measures to avoid, minimize, or mitigate impacts on any such resources. This program is discussed further in Section 6.1.

- In addition, EPA conducted a Biological Assessment (BA) to evaluate the potential direct, indirect, and cumulative impacts of the RA on two threatened or endangered species identified as potentially present in the project area – the bald eagle and the shortnose sturgeon – and, where appropriate, to specify conservation measures to minimize impacts on those species. EPA's Final BA, issued in January 2006 (Ecology and Environment 2006), concluded that the project "may affect, but is not likely to adversely affect" these species. The relevant resource agencies, the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) Fisheries, concurred with that conclusion.[5]

1.5 REMEDIAL DESIGN/REMEDIAL ACTION SUBMITTALS

Based on the extensive sediment sampling and other data collected under the SSAP and the SEDC program, GE developed and submitted the Phase 1 and Phase 2 DAD Reports delineating the horizontal and vertical extent of the dredge areas to meet the applicable removal criteria (QEA 2005, 2007). Those DAD Reports were approved by EPA, with the Phase 1 DAD Report approved on March 30, 2005 and the Phase 2 DAD Report approved on November 16, 2007. The dredge areas were then grouped into CUs for purposes of dredging and evaluation. The identification of dredge areas and CUs is described further in Section 2.1.1.

For each year of dredging and processing facility operations, GE submitted design reports and RAWPs to describe the work to be conducted in the upcoming season, and received EPA approval of those submittals. The Phase 1 FDR and RAWPs for Phase 1 were described in the Phase 1 Construction Completion Report. For each dredging season of Phase 2, GE submitted an FDR (or equivalent) containing plans and technical specifications and drawings for the upcoming work; and it also submitted a RAWP describing the dredging and facility operations, as well as habitat construction activities, for the upcoming season. Each RAWP consisted of the main text plus appendices containing specific supporting plans required by the SOW. Those supporting plans were:

[5] The bald eagle was subsequently removed from the federal list of threatened and endangered species in August 2007, but remained protected by the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the New York State Environmental Conservation Law. As a result, the conservation measures specified in the Final BA for bald eagles remained in effect, and several such measures were implemented during the performance of the RA. The shortnose sturgeon was included in the Final BA only because it was found to occur near one of the two sites then being considered for a sediment processing facility. However, that site was not selected and this fish species was not identified in any other areas affected by the RA. Thus, no conservation measures for this species were applicable.

- Dredging Construction Quality Control/Quality Assurance Plan (DQAP; Appendix A to RAWP), describing the quality assurance/quality control (QA/QC) systems and procedures to verify compliance with the approved technical specifications and requirements;
- Facility Operations and Maintenance Plan (Facility O&M Plan; Appendix B to RAWP), describing the operation and maintenance of the sediment processing facility and associated requirements;
- Transportation and Disposal Plan (TDP; Appendix C to RAWP), describing the transport and disposal of dewatered sediments and debris, including the procedures to be followed in characterizing and handling the dredged material for purposes of transport and disposal, the means of transport, the waste destinations, sampling of waste materials for transport and disposal purposes, loading procedures, and the associated record-keeping;
- Performance Standards Compliance Plan (PSCP; Appendix D to RAWP), describing the actions to be taken by GE to implement the EPS, QoLPS, and substantive WQ Requirements;
- Property Access Plan (PAP; Appendix E to RAWP), identifying the procedures for obtaining access agreements, leases, easements, or title with respect to all properties to which access is needed for the work; and
- Community Health and Safety Plan (CHASP; Appendix F to RAWP), addressing potential community health and safety issues for the public in the vicinity of the work to be performed.

In a number of cases, modifications or additions to the FDR or RAWP for a given year were described in addenda to those documents, which were also submitted to EPA for approval. The FDRs, RAWPs, and addenda submitted by GE in each year of Phase 2 were listed and described in GE's Annual Progress Reports for those years (discussed in Section 1.7 below and provided in Appendix IV). In addition, the FDRs, RAWPs, and their addenda submitted for each year of Phase 2 – which constitute the primary documents submitted for Phase 2 of the RA – are listed in Table 1-2. All of the relevant documents submitted to EPA during Phase 2 of the RA describing the proposed activities, changes to those activities, and the activities conducted are referenced in GE's monthly progress reports submitted to EPA under the CD during Phase 2, which are provided in Appendix III.

Table 1-2 Phase 2 Remedial Design/Remedial Action Submittals

Submittals for 2011
Phase 2 Final Design Report for 2011 (2011 FDR; Arcadis 2011)
Remedial Action Work Plan for Phase 2 Dredging and Facility Operations in 2011 (2011 RAWP; Parsons 2011b)
Addenda to 2011 RAWP: • Addendum #1 (updated figures and tables for RAWP and DQAP) (June 21, 2011) • Addendum #2 (new section of PSCP, updated DQAP tables and attachment) (Sept. 2, 2011)
Submittals for 2012
Phase 2 Final Design Report for 2012 (2012 FDR; Arcadis 2012)
Addendum to 2012 FDR (design plans for West Griffin Island Area [WGIA]) (Aug. 13, 2012; revised Sept. 24 & Oct. 12, 2012)
Remedial Action Work Plan for Phase 2 Dredging and Facility Operations in 2012 (2012 RAWP; Parsons 2012a)
Addenda to 2012 RAWP • Addendum #1 (planting and seeding plans) (April 13, 2012) • Addendum #2 (2012 TDP and revised portions of 2012 RAWP) (May 25, 2012; revised June 13 & 22, 2012) • Addendum #3 (Section 3 of 2012 RAWP) (June 20, 2012; revised July 9 & 12, 2012) • Addendum #4 (dredging in WGIA) (Aug. 13, 2012; revised Sept. 24 & Oct. 12, 2012) • Addendum #5 (revised material source truck routes and topsoil material source) (Sept. 5, 2012) • Addendum #6 (further revised material source truck routes and topsoil material source) (Sept. 20. 2012) • Addendum #7 (revised mooring locations) (Oct. 1, 2012) • Addendum #8 (revised portions of 2012 DQAP and revised 2012 TDP) (Oct. 26, 2012)

Table 1-2 Phase 2 Remedial Design/Remedial Action Submittals (cont'd)
Submittals for 2013
Phase 2 Final Design Report for 2013 (2013 FDR; Arcadis 2013)
Addenda to 2013 FDR: • Addendum #1 (revised specifications for backfilling/capping) (May 29, 2013) • Addendum #2 (plans for dredging in CUs 97-100) (June 26, 2013; revised Oct. 25, 2013 & April 4, 2014) • Addendum #3 (design revisions for CUs 59 and 60) (Aug. 19, 2013; revised March 28, 2014) (later superseded) • Addendum #4 (backfill & habitat construction for CU 76) (August 26, 2013) (later withdrawn) • Addendum #5 (plans for dredging in CUs 79-84) (Aug. 22, 2013; revised Sept. 27, 2013 & April 4, 2014) • Addendum #6 (drawings and specifications for habitat planting in 2014) (Nov. 19, 2013; revised May 9, Aug. 13 & Dec. 18, 2014) • Addendum #7 (habitat designations in CUs 79-84) (Dec. 23, 2013; revised April 4, 2014) • Addendum #8 (habitat designations in CUs 97-100) (Dec. 23, 2013; revised April 4, 2014) • Addendum #9 (revised backfill drawings for CUs 97-99 (Oct. 15, 2014)
Remedial Action Work Plan for Phase 2 Dredging and Facility Operations in 2013 (2013 RAWP; Parsons 2013a), plus four addenda to the 2013 RAWP, as well as a revised CHASP (Appendix F to 2013 RAWP)
Addenda to 2013 RAWP • Addendum #1 (revised version of 2013 RAWP and 2013 PSCP) (June 13, 2013) • Addendum #2 (dredging operations in CUs 79-84) (Aug. 23, 2013; revised Sept. 27, 2013 • Addendum #3 (revisions to dredging operations in CUs 59 and 60) (Sept. 6, 2013) • Addendum #4 (dredging operations in CUs 97-100) (Sept. 11, 2013; revised Oct. 25, 2013) • Addendum #5 (revised CHASP to reflect work in CUs 79-84 and 97-100) (Sept. 23, 2013; revised Nov. 21, 2013)

Table 1-2 Phase 2 Remedial Design/Remedial Action Submittals (cont'd)
Submittals for 2014
Phase 2 Final Design Report for CU85 through CU96 (CU85-CU96 FDR; Arcadis 2014a), plus one addendum to that FDR
Addendum #1 to CU85-CU96 FDR (addressed EPA's comments on revised CU85-CU96 FDR) (Sept. 9, 2014)
Phase 2 Final Design Report for Reach 7 (the Landlocked Area) (Reach 7 FDR; Arcadis 2014b)
Remedial Action Work Plan for Phase 2 Dredging and Facility Operations in 2014 (2014 RAWP; Parsons 2014a)
Addenda to 2014 RAWP: • Addendum #1 (additional dredging in finger area of CU 51) (Sept. 10, 2014; supplemented by responses to comments on Oct. 30 and Dec. 16, 2014) • Addendum #2 (addressed EPA comments on 2014 RAWP) (Sept. 12, 2014; supplemented by Erratum on Nov. 6, 2014 and additional response to comments on Dec. 18. 2014) • Addendum #3 (described Rensselaer Barge Loading Area) (Sept. 17, 2014) • Addendum #4 (updated mooring and access dredging figures for CUs 97-99) (Oct. 14, 2015) • Addendum #5 (revised backfill and cap material sources and material source truck routes) (Nov. 6, 2014)
Remedial Action Work Plan for Reach 7 - Landlocked Area (Reach 7 RAWP; Parsons 2014b)
Addenda to Reach 7 RAWP: • Addendum #1 (updated design plans for 2015 work in Landlocked Area) (Feb. 5, 2015; revised April 10, 2015) • Addendum #2 (additional barge mooring locations for Reach 7) (March 26, 2015) • Addendum #3 (additional barge mooring locations for Reach 7) (May 4, 2015) • Addendum #4 (additional barge mooring locations for Reach 7) (July 10, 2015)

Table 1-2 Phase 2 Remedial Design/Remedial Action Submittals (cont'd)
Submittals for 2015
Supplemental Design Revisions for 2015 (2015 Design Revisions; Arcadis 2015b)
Addendum #1 to 2015 Design Revisions (revised boundaries for RFW planting areas) (Sept. 21, 2015)
Phase 2 Remedial Action Work Plan for Certification Unit 60 (CU 60 RAWP; Parsons 2015a)
Remedial Action Work Plan for Phase 2 Dredging and Facility Operations in 2015 (2015 RAWP; Parsons 2015b)
Addendum #1 to 2015 RAWP (updated figures and text for 2015 RAWP) (Aug. 20, 2015; revised Nov. 10, 2015)
Submittals for 2016
Phase 2 Habitat Construction Work Plan for 2016 (2016 HCWP: Parsons 2016a)
Design drawings and specifications for 2016 habitat construction (GE 2016)

In addition to the FDRs and RAWPs, GE submitted Remedial Action Monitoring Quality Assurance Project Plans (RAM QAPPs) describing the monitoring and sampling activities (including sample collection, analysis, and data handling activities) to be conducted by GE. For Phase 2, GE submitted a 2011 RAM QAPP (Anchor QEA 2011a) for the first year of Phase 2 and a Phase 2 RAM QAPP (Anchor QEA 2012a) covering the remainder of Phase 2. Further, for each year of Phase 2, GE submitted a Remedial Action Health and Safety Plan (RA HASP) describing potential hazards and impacts to project workers and the steps that GE and its contractors would take to prevent and respond to them.

1.6 EPA OVERSIGHT

Throughout the Remedial Design and Remedial Action, EPA conducted close oversight of GE's activities. In addition to routine review and approval of GE's design and work plans and other submittals, EPA established a field office in Fort Edward, and its representatives performed on-site oversight of GE's field activities, including field approval of approaches to various issues as they arose. During dredging and related activities, GE and EPA held regular coordination meetings, often daily, in which EPA was kept apprised of the progress of activities on a day-to-day basis and provided any necessary concurrences and approvals.

1.7 PRIOR SUMMARY REPORTS

Throughout the project, GE submitted reports to EPA summarizing the data collected and the work performed. These included the monthly progress reports required by Paragraph 39 of the CD, as well as numerous other reports required by the CD and/or SOW. In addition, as required by the SOW, GE provided EPA with CU-specific completion approval forms/

acceptance packages at the end of each stage of activities in a CU – a CU Dredging Completion Approval (Form 1) following dredging, a CU Backfill/Engineered Cap Completion Approval (Form 2) following installation of backfill or cap material, and a Final CU Construction Completion Certification (Form 3) following completion of all required remedial construction activities, including habitat replacement/reconstruction. The more general summary reports submitted are described below for each phase of the project

For Phase 1, in connection with the peer review required by the CD, GE submitted a Phase 1 Data Compilation (Anchor QEA 2009b) and a Supplement to Phase 1 Data Compilation (Anchor QEA 2010), which together presented the data collected during Phase 1 of the project, including water column monitoring data, sediment residuals sampling data, productivity data, the results of special studies conducted during Phase 1, QoLPS monitoring data, and fish sampling data. Using those data, both GE and EPA prepared Phase 1 Evaluation Reports for the peer review (Anchor QEA and Arcadis 2010; Louis Berger Group 2010). In addition, as noted above, GE submitted a Phase 1 Construction Completion Report in October 2011 (Parsons 2011a), demonstrating that the Phase 1 Field Activities had been completed in accordance with the CD. That report included the individual CU Completion Reports (required by the SOW) for the CUs dredged and restored in Phase 1 (CUs 1-8 and 17-18). EPA subsequently accepted that report and issued a Certification of Completion of Phase 1 Field Activities on October 17, 2012. The Phase 1 Data Compilation (with the Supplement) and the Phase 1 Construction Completion Report are provided in Appendices I and II, respectively.

For Phase 2, in addition to the monthly progress reports, GE submitted Annual Progress Reports in accordance with Section 5.5 of the revised SOW following the completion of each year of field activities. Each of those Phase 2 Annual Progress Reports summarized the dredging and related in-river activities and the processing facility operations conducted during the subject year, described and included relevant data summaries for that year, presented record (as-built) drawings for work completed during that year, and provided a certification that the work during that year was performed in accordance with the applicable Phase 2 DQAP and the approved design and other applicable requirements, with modifications agreed to by EPA and GE. Those Phase 2 Annual Progress Reports also included CU Completion Reports (required by the revised SOW) for the Phase 2 CUs in which the required work was completed during the subject year. The monthly progress reports submitted during Phase 2 are provided in Appendix III; and the Phase 2 Annual Progress Reports for Phase 2 Years 1 through 6 are included in Appendix IV.

1.8 SCOPE AND ORGANIZATION OF RA COMPLETION REPORT

Since the Phase 1 summary reports described above and included in Appendices I and II – i.e., the Phase 1 Data Compilation and Supplement and the Phase 1 Construction Completion Report – have previously documented the completion of Phase 1, and EPA has issued a Certification of Completion of Phase 1 Field Activities, this RA Completion Report focuses primarily on Phase 2 activities. However, it also provides summary information for the RA as a

whole, including both phases. Consistent with the CD definition of Remedial Action as excluding OM&M (CD ¶ 4), this report does not cover post-construction OM&M activities, including those that were initiated and performed in many CUs during the course of Phase 2 dredging and related construction activities in other CUs.

This report includes the following sections:

Section 1 – Introduction: provides a general introduction to this RA Completion Report. It includes background and an overview of the RA, a description of the project setting, a description of the applicable requirements and performance standards, summaries of the design support activities and RD/RA submittals, a discussion of prior summary reports on the project, a summary of the scope and organization of this report, and a description of the applicable contracts under which the RA was performed.

Section 2 – Dredging and Related Operations: provides narrative descriptions of the identification of dredge areas, dredging operations, dredged material transport to the processing facility, and special dredging procedures for unique areas. It also describes the dredging activities completed and provides a summary of overall dredging productivity and the PCB mass removed from the river. Further, it describes backfilling and capping operations, shoreline stabilization, and the QA/QC procedures followed.

Section 3 – Sediment Processing and Disposal: describes the sediment processing operations and the transport and disposal of processed sediments. It includes summary information on the amount of material processed and transported off-site for disposal throughout the RA, as well as information on the disposal facilities used.

Section 4 – Habitat Construction: summarizes the habitat construction activities for the various types of habitat affected by the RA, focusing primarily on Phase 2.

Section 5 – Compliance with Performance Standards and Other Monitoring: summarizes the routine controls utilized during Phase 2 to address the requirements of the Performance Standards; describes the monitoring performed during Phase 2 for the water column, sediment residuals, fish, QoLPS parameters (e.g., PCBs in air, noise, light, navigation), and discharges from the processing facility; discusses the PCB resuspension data collected and comparison of those data with the criteria in the Resuspension Performance Standard; describes GE's responses to exceedances of Performance Standard criteria and GE's responses to complaints; and identifies the special studies conducted during Phase 2, with references to the reports on those studies.[6]

Section 6 – Other Activities: provides an overview of the CARA activities conducted in preparation for and during the RA (both phases), including the cultural and archaeological

[6] This section focuses on these activities during Phase 2. As noted above, this information relating to Phase 1 was provided in the Phase 1 Data Compilation and Supplement.

resource assessments performed; the avoidance, protection, and mitigation actions taken; and unanticipated archaeological discoveries during dredging. It also presents an overview of the community outreach activities conducted and institutional controls implemented, including issuance of Community Health and Safety Plans (CHASPs), the community education and notification program, the complaint management program, activities to address both public and non-public water supplies, and continuation of the fish consumption advisory and fishing restriction on the Upper Hudson River.

Section 7 – Final Demobilization: describes the final demobilization and restoration of the main sediment processing facility and the demobilization and close-out of the support properties.

Section 8 – Completion Information: describes the CU completion approval forms/ acceptance packages, CU completion reports, and the RA Completion Pre-Final Inspection; and it provides signed certifications by a New York registered professional engineer and by GE's Project Coordinator, in accordance with Paragraph 57.b of the CD, confirming that the RA has been completed in satisfaction of the applicable requirements of the CD.

Section 9 – Conclusion: presents an overall conclusion regarding completion of the RA.

Section 10 – References: provides references to the documents cited in the body of this RA Completion Report.

Supporting information is presented in tables and figures, as well as in nine appendices and two exhibits (provided on a flash drive).

1.9 CONTRACTS AND KEY PERSONNEL

The Phase 2 RA activities were generally conducted under four primary contracts – Processing Facility Operations, Dredging Operations, Habitat Construction, and Rail Yard Operations, described below:

- The Processing Facility Operations contract, Contract 30, covered sediment processing facility operations and maintenance, including barge unloading, coarse material separation, sediment dewatering, loading of materials (i.e., debris, coarse material, and dewatered sediment) into empty rail cars, treatment of process water and storm water, site stormwater management, and staging area management and maintenance. The contractor that carried out these activities is referred to as the Processing Facility Operations Contractor (PFOC).
- The main Dredging Operations contracts, Contract 40 in 2010 and 2011 and Contract 42A from 2012 through 2015, covered shoreline vegetation pruning, dredging operations, the transport of loaded sediment barges to the sediment processing facility, supply and placement of appropriate backfill or cap materials, performance of appropriate shoreline stabilization measures, and associated activities. The contractor

that carried out these activities is referred to as the Dredging Contractor. In addition, a separate contract, Contract 43B, covered similar dredging-related operations in the Landlocked Area, which were performed by the Landlocked Dredging Operations Contractor (LDOC). Collectively, the Dredging Contractor and the Landlocked Dredging Operations Contractor are referred to as the Dredging Contractors.

- The Habitat Construction contracts, which varied over the course of Phase 2 (Contract 50 in 2011, Contract 52 in 2012, Contract 53A in 2013 through 2016, and Contract 54A in 2014), covered the supply and/or planting of SAV and RFW plants. The contractors that performed these activities varied with the contracts, but are generally referred to as the Habitat Contractor.
- The Rail Yard Operations contract, Contract 60, covered all activities required to operate and maintain the rail yard, including the setting up of outbound loaded trains and the receipt of inbound empty trains. The contractor that performed these activities is referred to as the Rail Yard Operations Contractor (RYOC).

In addition to the specific contractors described above, Parsons Engineering of New York, Inc. (Parsons) provided construction management services to GE throughout the RA and is referred to as the Construction Manager (CM).

The key GE, EPA, and New York State personnel and contractors involved in the RA are listed in Table 1-3, along with their addresses.

Table 1-3 Key GE, EPA, and New York State Personnel and Contractors Involved in Remedial Action

Name	Role	Address
Key GE Personnel and Contractors		
John Haggard	GE Project Coordinator	General Electric Co. 41 Farnsworth Street Boston, MA
Timothy Kruppenbacher	Operations Manager	General Electric Co. 41 Farnsworth Street Boston, MA
Robert Gibson	Environment, Health & Safety (EHS) Leader	General Electric Co. 1 River Road Schenectady, NY
Andrew Inglis	Leader-Dredging Operations	General Electric Co. 10 Victoria Street Bristol, United Kingdom
Parsons Engineering (A. Jeffrey Mirarchi)*	Construction Manager	Parsons Corporation 100 West Walnut Street Pasadena, CA
Anchor QEA	Environmental monitoring and evaluation contractor	Anchor QEA 4300 Route 50 Saratoga Springs, NY
Arcadis	Remedial design contractor	Arcadis 855 Route 146 Clifton Park, NY
Cashman Dredging	Dredging Contractor	Cashman Dredging 549 South Street Quincy, MA
Great Lakes Dredge & Dock Co.	Landlocked Dredging Operations Contractor	Great Lakes Dredge & Dock Co. 2122 York Road Oak Brook, IL
Shaw/CB&I	Processing Facility Operations Contractor	CB&I 680 US Route 130 Trenton, NJ
Finger Lakes Railway	Rail Yard Operations Contactor	Finger Lakes Railway 68 Boarder City Road Geneva, NY
Toadflax	Habitat Contractor	Toadflax Nursery, LLC 1621 US Route 9 South Glens Falls, NY
AECOM	Habitat Contractor	AECOM 40 British American Blvd Latham, NY

Name	Role	Address
URS Corporation (now AECOM)	Cultural and archaeological assessment consultant	AECOM 701 Corporate Center Drive Raleigh, NC
Key EPA Personnel and Contractors		
David King	Initial Director, Hudson River Field Office, & EPA Project Coordinator	U.S. EPA Hudson River Field Office 187 Wolf Road Albany, NY
Gary Klawinski	Subsequent Director, Hudson River Field Office, & EPA Project Coordinator	U.S. EPA Hudson River Field Office 187 Wolf Road Albany, NY
Lewis Berger Group (Bruce Fidler)*	EPA consultant and contractor	Louis Berger Group 412 Mt. Kemble Ave Morristown, NJ
Ecology & Environment (John Fazzolari)*	EPA consultant and contractor	Ecology & Environment 125 Wolf Road Albany, NY
Key New York State Personnel		
Kevin Farrar	NYSDEC Project Manager	NYS Dept. of Environmental Conservation Environmental Remediation Div. 625 Broadway Albany, NY 12233-7011
Deanna Ripstein	NYSDOH Project Manager	NYS Dept. of Health Bureau of Environmental Exposure Investigation Empire State Plaza Corning Tower Albany, NY 12238

* For the firms acting as Construction Manager and EPA oversight contractors, the key contact person during the RA is listed in parentheses.

SECTION 2

DREDGING AND RELATED OPERATIONS

This section provides a discussion of the RA dredging and related operations. Dredging operations centered around the dredging of sediment and debris, but also included associated activities such as mobilization and demobilization activities, shoreline vegetation pruning, dredged material transport, anchoring, placement of backfill and engineered caps, and shoreline stabilization.

2.1 DREDGING OPERATIONS AND DREDGED MATERIAL TRANSPORT

This section provides a summary of dredging operations, including identification of dredge areas, dredging equipment and procedures, dredged material transport to the processing facility, and special dredging procedures for unique areas. It also includes a summary of the dredging activities completed. As discussed above, since Phase 1 dredging activities were fully described in prior reports, including GE's Phase 1 Data Compilation and Supplement, Phase 1 Evaluation Report, and Phase 1 Construction Completion Report, this section focuses primarily on Phase 2.

2.1.1 Identification of Dredge Areas

The areas subject to dredging were defined through the dredge area delineation process that identified the horizontal and vertical boundaries of sediment removal in order to satisfy the removal criteria specified in the ROD, as amplified by EPA in its July 2004 decision (EPA 2004c). As discussed in Section 1.3 above, the applicable criteria were based on MPA of Tri+ PCBs (referred to herein as Tri+ MPA) and on the concentration of Tri+ PCBs in the surface sediments (defined as the top 12 inches of sediments). For Tri+ MPA, the criteria targeted removal of sediments in any area that had an MPA at or above 3 g/m^2 in River Section 1 or 10 g/m^2 in River Section 2, as well as sediments with high PCB concentrations and erosion potential in certain Hot Spots in River Section 3. For surface sediment concentrations, the criteria targeted removal of sediments in areas that had a Tri+ PCB concentration at or above 10 mg/kg in River Section 1 or 30 mg/kg in River Sections 2 and 3 anywhere in the top 12 inches of sediment. As required by EPA's 2004 decision, the dredge area delineation process relied on a weight-of-evidence approach, based primarily on the Tri+ MPA and surface sediment Tri+ PCB concentrations identified during the sampling, supplemented by consideration of ancillary information, including sediment texture, bathymetry, and underlying glacial clay or bedrock. Consistent with the ROD and EPA's accompanying Responsiveness Summary, this process was designed to delineate areas of sufficient size exceeding the criteria (and considering the ancillary information) to warrant removal from an engineering perspective, not to identify or designate for removal every discrete location exceeding the criteria.

In areas where sufficient data were present to perform geostatistical interpolations, the horizontal boundaries of removal were developed by establishing contours at the Tri+ MPA and surface Tri+ PCB concentration criteria values. For Phase 2, these contours were determined by the application of a statistical technique known as kriging to the Tri+ MPA and maximum Tri+ PCB concentrations in the 0- to 12-inch depth interval. Dredge areas were formed by the outer boundary of overlain Tri+ MPA and maximum surface Tri+ PCB concentration contours at the criteria values. This boundary was then adjusted to account for ancillary information that was not incorporated into the kriging, such as a significant bathymetric feature, a change in sediment texture, or a bedrock outcrop. In areas where there were insufficient data to develop a surface for the kriging, the horizontal boundaries were developed manually using sediment core Tri+ MPA, maximum surface Tri+ PCB concentrations, and ancillary information, including sediment texture, bathymetry, the existence of bedrock, and the location of the shoreline in some backwater areas where there was little variation in sediment texture or bathymetry. A more complete discussion of the establishment of the horizontal boundaries of dredge areas was provided in the Phase 2 DAD (QEA 2007). For some areas where data gaps were identified in either the Phase 2 DAD or after the Phase 1 dredging (i.e., during the Phase 1 evaluation), adjustments to the horizontal boundaries were made after the collection of additional sediment cores.

The horizontal boundaries resulted in large contiguous areas in some parts of the river (mainly in River Section 1) and, in some cases, less than 1-acre polygons spread across miles of river (primarily in River Section 3). For management of the dredging and tracking for residual compliance, the approximately 500 acres of dredge areas were divided into 100 5-acre units, termed CUs. The dredging production, residual compliance, backfill, capping, and habitat construction were all managed at the CU level. This included organization of the various completion forms to document completion of significant steps in the remedial implementation, including dredging, backfill/cap placement, and habitat construction. There were 60 CUs in River Section 1, 18 in River Section 2, and the remaining 22 in River Section 3. As GE completed dredging in each CU, it submitted a completion form to EPA for review and approval. The same process was followed after completion of backfill/cap placement and habitat construction. In this way, completion of all required activities was documented in each of the CUs as the project proceeded.

Once the horizontal boundaries were set, the vertical extent of dredging was developed, resulting in the definition of the total area to be dredged (referred to as the "dredge prism"). The vertical extent was defined by establishing a Depth of Contamination (DoC) for the targeted area.[7] The DoC was the depth at which the Total PCB concentration went below and stayed

[7] A given targeted area might have more than one DoC, depending on the variability of the PCB concentrations at depth within that area.

below 1 mg/kg. This DoC was then converted to an Elevation of Contamination (EoC) using bathymetry (i.e., the bathymetry minus the DoC resulted in the EoC). The Phase 2 CDE issued by EPA in 2010 required that GE develop an EoC surface at an elevation that captured the entire PCB inventory meeting the removal criteria within the targeted areas. The EoC surface was developed using primarily chemistry information (i.e., sediment core profiles of PCB concentrations), but sediment type, bathymetry, historical dredging information (when appropriate), probing information, and sub-bottom information (i.e., the existence of Glacial Lake Albany Clay or bedrock) also influenced its development. In areas dominated by incomplete cores (i.e., cores whose profiles did not reach the 1 mg/kg Total PCB horizon), conservative approaches were used to estimate the extent of the PCB inventory. These approaches included using historical dredging information and constant estimates of EoC in these areas to set the surface (as opposed to just relying on core-by-core profiles to produce a variable EoC surface). The final EoC surface was considered the best representation of the vertical and horizontal extent required to remove the sediments targeted using the criteria outlined in the ROD and EPA's 2004 decision.

In accordance with the Phase 2 CDE, in locations where the edge of the dredge area did not extend to the shoreline, the lateral limits of the dredge area were defined using stable slope extending beyond the sediments targeted for removal. In locations where dredging extended to the shoreline and there were no sediment cores along the shoreline, the design called for a sediment removal cut of two feet (vertical) at the shoreline and then extending along a stable slope until it intersected the dredge prism. For these purposes, a stable slope was defined as a slope with a maximum steepness of 3 (horizontal) to 1 (vertical), or based on the existing slope if it was steeper and stable.

The Phase 2 CDE allowed for the exclusion of some areas. Each dredge area developed in the Phase 2 DAD Report was evaluated using a set of criteria to assess whether it was a candidate exclusion area. These criteria included accessibility of the area for dredging equipment, the area's location and its impact on worker safety during dredging, the location of in-river structures relative to the dredge area, and the area's location relative to potential impacts on dredging efficiency due to issues such as thin sediment cover, the existence of bedrock, or shallow water. Based on these factors, GE proposed exclusion areas to EPA, and approved exclusion areas were not targeted for dredging even though they exceeded the removal criteria.

Following the setting of the EoC, the EoC surface was adjusted for engineering considerations to create the final dredge prisms. Engineering adjustments included internal slope adjustments to ensure stability after the sediment was removed; and offsets for in-water structures, including bridges, rip-rap, and dams. Adjustments also occurred to avoid significant archeological resources or historical artifacts in some cases. These offsets and adjustments were performed on the EoC surface and resulted in a final dredge prism that was passed to the

Dredging Contractor and was used to verify that the cut lines had been met for the initial dredging pass.

2.1.2 Dredging Equipment and Procedures

Prior to the beginning of each dredging season, the relevant project personnel, equipment, and other materials were mobilized to the site. Initial in-river activities in preparation for dredging included hydrographic surveys and tree trimming.

Table 2-1 provides a list of the major equipment available at the project site during the dredging process. The amount and specific type of equipment varied from season to season.

Table 2-1 List of Major Dredging Equipment

Construction Equipment	Used for
Dual-purpose dredge or backfill/cap platforms (barge-mounted excavators)	Dredging and/or backfill/cap material placement
Tele-belt backfill placement barge	Placement of backfill/cap material in the Landlocked Area
Tree trimming barges	Tree trimming and removal from the shoreline
Regular hopper barges	Transport of dredged material
Large hopper barges	Transport of dredged material
Shallow-draft hopper barges	Transport of dredged material
Material barges	Transport of backfill/cap material
Tugboats	Marine transportation, tending of work platforms, and tending at barge loading and unloading wharfs – all in connection with dredging and backfill/cap placement

Shoreline vegetation that overhung the dredge areas was pruned from the river as necessary to allow safe and effective operation of dredge and shoreline stabilization equipment and minimize incidental damage to trees. Tree removal and vegetation pruning was conducted under the oversight of a Certified Arborist. Vegetation removal and pruning was accomplished using chain saws, pruning shears, and other similar cutting equipment provided by the Dredging Contractors.

The Dredging Contractors chipped the tree trimming debris on barges and into hoppers located on barges. Wood chips and logs were off-loaded from barges at staging areas approved by EPA.

Dredging was accomplished mechanically utilizing hydraulically operated excavators. The dredge bucket, when closed, was fully enclosed to minimize the loss of sediment from the bucket when raised from the river bottom until opened in the sediment barge hopper. All dredges were equipped with a bucket positioning system to allow the dredge operator to accurately control the dredge operations horizontally and vertically.

A dredging "pass" was defined as the removal of all sediment within a CU to the elevations defined by the dredge prism for that CU. The design dredge prisms were established to an EoC surface, with any modifications to account for offsets and setbacks, as described in the applicable FDR and approved by EPA. The dredging pass to the elevation defined by that initial prism was referred to as the "initial dredging pass." Following the initial dredging pass, sediment cores of the remaining sediments at depths below that prism were collected and analyzed to assess the appropriate response actions in accordance with the Residuals Performance Standard criteria, as set forth in the applicable PSCP. Where additional dredging was required based on that sampling – either to remove additional PCB inventory (i.e., sediments deeper than 6 inches requiring removal) or to remove certain elevated residual PCB concentrations following the initial dredge cut – a re-dredge prism was developed using those sampling data, reviewed with EPA and additional dredging was performed. This sampling and evaluation process was repeated as necessary in accordance with the conditions set forth in the applicable PSCP for backfilling or capping the CU.

For each CU dredged in Phase 2, a description of how this process was applied – including the results of the residual sampling data, a comparison of those data to the Residuals Performance Standard criteria, the response actions taken, the number of dredge passes completed, and any agreements reached by GE and EPA related to re-dredging – was documented in the CU Dredging Completion Approval Form (Form 1) package submitted by GE to EPA for that CU. EPA then reviewed and approved the Form 1 package, documenting completion of dredging in that CU in accordance with the ROD criteria and the Residuals Performance Standard.

During the last four dredging seasons of Phase 2 (2012-2015), GE utilized a process (set forth in the 2012 and 2013 TDPs) of separately dredging, transporting, and unloading sediments that were characterized *in situ* as containing Total PCBs at concentrations at or above 50 parts per million (ppm) and those characterized as containing less than 50 ppm. This segregation process was followed to support the subsequent separate processing, testing, transport, and disposal of such materials, as discussed in Section 3.2 below, to ensure that any materials that could contain PCBs at or above 50 ppm were handled and transported for disposal in accordance with regulations under the Toxic Substances Control Act (TSCA) and that only materials confirmed to contain less than 50 ppm *in situ* PCBs were sent to a permitted non-TSCA disposal facility meeting the requirements of Subtitle D of the Resource Conservation and Recovery Act (RCRA).

2.1.3 Dredge Material Transport

Following dredging, sediments were placed into hopper barges for transport to the sediment processing facility. Barges used to transport sediments were certified as fit for duty, clearly marked for identification purposes, and also marked to record draft depth in the water (draft markings). Each barge was loaded only to the capacity that would ensure safe transport from the dredge location to the off-load location and prevent potential loss of sediment by overflowing of the barge hopper. Barge dimensions varied, with a maximum of 42 feet in width in order to fit within Locks 1 through 7 of the Champlain Canal.

Before dredging in a given area, an empty sediment barge was positioned adjacent to the dredge by tugboats. In very shallow or confined areas (e.g., east of Quack Island), shallow draft hopper barges with a capacity of approximately 100 cy were used, and the material from those smaller barges was then transferred to larger, standard-sized hopper barges in deeper water for transport to the sediment processing facility. In other areas, standard-sized hopper barges with nominal maximum capacities of approximately 750 cy were used.

Once loaded with sediments, the hopper barges were moved by tugboats up the Hudson River and through the locks on the Champlain Canal to the sediment processing facility. Loaded sediment barges were moored to the wharf at the sediment processing facility for sediment unloading and processing.

2.1.4 Special Dredging Procedures for Unique Areas

During the RA, special dredging procedures were identified for certain unique areas along the river – specifically, the Landlocked Area containing CUs 61 through 66, CU 60 close to the Thompson Island Dam, and CU 95 subunits 2 and 3 (CUs 95-2 and 95-3) east of Quack Island.

Landlocked Area

Dredging and related sediment handling operations for the Landlocked Area in Reach 7 of the river (part of River Section 2), containing CUs 61 through 66, presented a number of operational challenges different from those in the main stem of the river, particularly due to the fact that the Landlocked Area was not directly accessible from the navigable channel of the Hudson River and Champlain Canal system. As a result, dredging, material transport, and transloading of sediment into barges situated in the Champlain Canal were addressed in a separate Reach 7 FDR (Arcadis 2014b) and RAWP (Parsons 2014b), both of which were approved by EPA.

The dredging approach developed and detailed in the Reach 7 FDR and RAWP included: (a) construction and use of an Isthmus Transload Area (ITA) on a narrow strip of land in the northern part of Reach 7 to transload dredged materials from the Landlocked Area into barges in the "land-cut" section of the Champlain Canal for transport to the Fort Edward sediment processing facility; and (b) construction and use of a Landlocked Barge Loading Area (LBLA)

to provide river access for transferring backfill/cap material into the Landlocked Area and for mobilizing equipment and materials.

CU 60

CU 60 was located in the southern part of the TIP in the vicinity of the Thompson Island Dam and consisted of two sub-units – one along the western shoreline, referred to as CU 60-1, and one along the eastern shoreline, referred to as CU 60-2. Both of these sub-units presented some operational challenges and safety concerns due to their proximity to the Thompson Island Dam. To address these concerns in CU 60-1, a few modifications were made to the normal dredging and associated procedures, as described in the 2015 Design Revisions (Arcadis 2015b) and the CU 60 RAWP (Parsons 2015a). For CU 60-2, which was very close to the eastern portion of the dam, a land-based approach to dredging and backfill placement was implemented to avoid placing waterborne equipment and personnel too close to the dam. This approach included: (a) construction and use of a staging area on the eastern side of the Champlain Canal (Route 4 Staging Area); (b) construction and use of a designated CU 60-2 access road; (c) construction and use of a material staging area and a transload station on the western side of the Canal; (d) incremental dredging and backfill placement by a long-reach excavator operating from a shoreline access road with finger piers extending into the dredge area, which were constructed incrementally from shore, using backfill material, as dredging proceeded; (e) dredging to the practicable reach of the excavator and to a depth of 12 inches deeper than the EoC, in lieu of confirmatory surveying or residual sediment sampling and evaluation; and (f) transfer of the dredged sediments by truck to the transload station, where they were loaded into barges situated in the Champlain Canal for transport to the Fort Edward sediment processing facility. The procedures used for dredging, material transport, transloading of sediments, and backfill placement in CU 60-2 were described in the 2015 Design Revisions and the CU 60 RAWP, both of which were approved by EPA.

CUs 95-2 and 95-3

CUs 95-2 and 95-3, located east of Quack Island, had restricted access due to rock outcroppings that created shallow water depths and thus precluded accessing the dredge areas from both the north and south access channels with large equipment and vessels. Thus, a combined land- and water-based approach to dredging in CUs 95-2 and 95-3 was developed and presented in the 2015 RAWP (Parsons 2015b).

For CU 95-3, the sediments were removed and backfill materials were placed using a regular floating dredge/backfill placement platform, which had its heavy equipment removed during access to the dredge area and then re-installed. For CU 95-2, a land-based approach similar to that used in CU 60-2 was implemented. That approach involved: (a) construction and use of a staging area, access road, and transload station; (b) incremental dredging and backfill placement by a long-reach excavator operating from the access road with finger piers extending into the

dredge area, which were constructed incrementally from shore, using backfill material, as dredging proceeded; (c) dredging to the practicable reach of the excavator and to a depth of 12 inches deeper than the EoC, in lieu of residual sediment sampling and evaluation; and (d) transfer of the dredged sediments by truck to the transload station, where they were loaded into barges in the Champlain Canal for transport to the sediment processing facility. The procedures used for dredging, material transport, transloading of sediments, and backfill placement in CUs 95-2 and 95-3 were described in detail in the 2015 RAWP.

In addition, special precautions and conservation measures were implemented during the dredging of these sub-units due to the identification of an active bald eagle nest in the vicinity. These measures included certain restrictions on activities within buffer zones of 330 feet and 660 feet around the nest, in considerations of recommendations of the U.S. Fish and Wildlife Service (USFWS) in the *National Bald Eagle Management Guidelines* (USFWS 2007).

2.1.5 Dredging Activities Completed

As discussed in the Phase 1 Construction Completion Report, Phase 1 dredging was conducted in CUs 1 through 8 and CUs 17 and 18 in 2009, involving the removal of 286,000 cy of sediment. Phase 2 dredging was conducted in CUs 9 through 16 and 19 through 100, as well as an additional area adjacent to CU 1, during the five-year period of 2011 through 2015. The CUs that were subject to dredging as well as backfill/cap placement during each year of Phase 2 are listed in Table 2-2 and are shown on Figures 2-1 through 2-31. In addition, in areas where the river was too shallow to allow access by dredges and even smaller hopper barges (e.g., the area east of Quack Island, as noted above), access dredging was proposed by GE and approved by EPA to facilitate dredging. All access dredging conducted was documented in the relevant CU Completion Forms.

At EPA's request, a shapefile and CADD drawings showing the locations of all Phase 1 and Phase 2 dredge areas are provided electronically as Exhibit A.

Table 2-2 Phase 2 Dredge Areas

Phase 2 Dredging Season	CUs Completed	Sediment Removed (cy)	Reference Document
Year 1 (2011)	CUs 9 - 16 and 19 - 25	363,332	Phase 2 Year 1 Annual Progress Report (Parsons 2012b)
Year 2 (2012)	CU 26 - 48	663,265	Phase 2 Year 2 Annual Progress Report (Parsons 2013b)
Year 3 (2013)	CUs 49-59, 67-79, 84, and 100 (and portions of CUs 83 and 99)	628,057	Phase 2 Year 3 Annual Progress Report (Parsons 2014c)
Year 4 (2014)	CUs 61-63, 80-83, 85-93, and 97-98 (and portions of CUs 64, 65, and 99) [1]	582,917	Phase 2 Year 4 Annual Progress Report (Parsons 2015c)
Year 5 (2015)	CUs 60, 64-66, 94-96, and 99 [2]	230,399	Phase 2 Year 5 Annual Progress Report (Parsons 2016b)
Total Volume Removed		**2,467,970 cy**	

Notes:

[1] Dredging in 2014 also included a small cove or "finger" area in CU 51 that was not dredged in 2013.

[2] Dredging in 2015 also included an area adjacent to CU 1 per agreement with EPA.

The Phase 2 dredging conducted in each of these years is described in the Annual Progress Reports for those years (provided in Appendix IV). More details on the dredging for each CU were presented in the CU Dredging Completion Approval Form (Form 1) package provided to and approved by EPA for that CU.

2.2 SUMMARY OF OVERALL PRODUCTIVITY AND PCB MASS REMOVED

As shown in Table 2-2, dredging in Phase 2 removed a total of 2,467,970 cy of *in situ* sediments, which, when added to 286,354 cy removed in Phase 1, resulted in the total removal of 2,754,324 cy of sediment. Tables included in Appendix A to the Annual Progress Reports (included in Appendix IV hereto) provide summaries, by week, of the productivity information

for Phase 2.[8] Table 1 of that appendix is a summary, on a weekly basis, of dredging activities (including CUs dredged, hours spent dredging, and gross volumes dredged in both the initial dredging pass and additional dredging passes [re-dredging]), barge unloading activities (including number of barges unloaded, total time of barges at the wharf, and total barge unloading time), and sediment processing and shipping activities (including tonnage of material shipped off-site, volume of process water treated, and volume of water treated and discharged to the Champlain Canal). Table 2 of Appendix A to the Annual Progress Reports summarizes, also on a weekly basis, the delays to dredging encountered in the project, expressed in lost hours, in various categories such as weather, waiting for scows, equipment repair, moving dredges, transloading sediments, etc. Table 3 of that appendix presents the gross volume of sediments dredged each week and for each 4-week period, compared to the target design dredge volumes for that 4-week period based on design dredge prisms. Appendix A to the Annual Progress Reports also contains graphs for each season showing the actual volumes dredged over the five Phase 2 seasons compared to the target design dredge volumes. The actual volume of sediments dredged exceeded the target for every year of Phase 2 dredging, as summarized in Table 2-3.

Table 2-3 Target vs. Actual Dredging Productivity in Phase 2

Phase 2 Dredging Season	Target Removal Volume (cy)	Actual Removal Volume (cy)
Year 1 (2011)	350,000	363,332
Year 2 (2012)	350,000	663,265
Year 3 (2013)	426,900	628,057
Year 4 (2014)	479,400	582,917
Year 5 (2015)	188,000	230,399

During Phase 2, GE took various steps to overcome any identified delays. These steps were successful, as evidenced by the fact that the total volume dredged exceeded the target volume for every year of Phase 2.

[8] These tables provide cumulative information from the weekly productivity progress reports submitted during the course of the season.

The Annual Progress Reports also provide, in Appendix D, tables showing the mass of Total and Tri+ PCBs removed from the River in the subject year and prior years.[9] That information is summarized by year and for the overall dredging project in Table 2-4.

Table 2-4 Total and Tri+ PCB Mass Removed

Dredging Season	Mass Removed (kg)[1]	
	Total PCB	Tri+ PCB
Phase 1 (2009)	18,230	5,350
Phase 2 Year 1 (2011)	27,020	9,070
Phase 2 Year 2 (2012)	33,370	10,080
Phase 2 Year 3 (2013)	32,460	9,275
Phase 2 Year 4 (2014)	26,570	8,915
Phase 2 Year 5 (2015)	8,185	2,991
Total for Project	**145,835**	**45,681**

Note:

1. PCB mass removed was calculated using SSAP and SEDC data for the initial dredging pass and residual data for re-dredging passes. Phase 1 (2009) PCB mass was calculated using Thiessen polygons; Phase 2 (2011-2015) mass was based on the method outlined in the Phase 2 EPS, with minor modifications approved by EPA.

2.3 BACKFILL AND CAPPING OPERATIONS

Once dredging was complete in a given CU, the process of placing backfill or cap material in accordance with the applicable FDR and RAWP and their appendices was initiated. The decision whether to place backfill or install a cap was based on an evaluation of the post-dredging sediment concentrations in accordance with the Phase 2 Residuals Standard criteria as set forth in the applicable PSCP (as modified in certain cases by agreement of EPA and GE). In general, those criteria provided for placement of an engineered cap where: (a) after the initial dredging pass, the average Tri+ PCB concentration in the top 6 inches of sediment was greater than 1 mg/kg (unless re-dredging was required to address inventory or a residual surface Tri+ concentration at or above 27 mg/kg); and (b) after the second dredging pass, inventory (as defined above) was still present or the average Tri+ PCB concentration in the top 6 inches was

[9] The tables in Appendix D to the Annual Progress Reports also present information on the cumulative net mass of Total and Tri+ PCBs transported past Waterford to the Lower Hudson River, the percent of Total and Tri + PCB mass removed that was transported past Waterford, and the daily PCB load to the Lower Hudson River. That information is discussed in Section 5.3 below.

greater than 1 mg/kg (unless further re-dredging was required to address Total PCB concentrations at or above 500 mg/kg at any depth). In other areas, when the initial dredging or re-dredging was complete, backfill was placed.[10]

In Phase 2 areas where backfill was placed, three types of backfill were used:

- In the absence of any other requirement, 1 foot of backfill ("one-foot backfill") was placed on the river bottom following the completion of dredging.
- In certain areas of the river that were designated for planting or natural recolonization of SAV or for construction of RFW, "habitat backfill" was placed to raise the elevation of the areas to support vegetation. The SAV areas where such backfill was placed were selected to meet the requirement in Section 2.7.1 of the Phase 2 CDE for placement of additional backfill in previously delineated SAV areas where the pre-dredging water depth was between 2 feet and 8 feet and the water depth after dredging and backfill placement would be greater than 8 feet. (This requirement is discussed further in Section 4.2 below.) Additional backfill was also placed in the RFW construction areas to restore pre-dredge bathymetry.
- "Near-shore backfill" was placed in near-shore areas such that areas between the shoreline and near-shore elevations shown in Table 2-5 were returned to the pre-dredging bathymetry, as defined in the applicable FDRs and their appendices.

Table 2-5 Near-Shore Backfill Elevations

Reach	Certification Unit(s)	Shoreline Elevation (feet, NAVD88)	Near-shore Elevation (feet, NAVD88)
Reach 8	CUs 9 - 60	119	117.5
Reach 7	CUs 61 - 66	114.9	114.5
Reach 6	CUs 67 - 78	102.1	100.9
Reach 5	CU 79, 83 & 84	84.1	82.5
	CU 80	84.1	82.5
	CUs 81-83, 85-91	83.6	82.2
Reach 4	CUs 92 & 93	70.0	68.9

[10] The relevant criteria included some exceptions to this general rule. For example, backfill could not be placed in the navigation channel if it would cause the water depth to be less than 14 feet (or 12 feet under certain conditions) at the minimum pool elevation, and any cap placed in the navigation channel had to allow for a minimum of 14 feet of water depth at the minimum pool elevation.

Reach	Certification Unit(s)	Shoreline Elevation (feet, NAVD88)	Near-shore Elevation (feet, NAVD88)
Reach 3	CUs 94 - 96	47.8	46.2
Reach 2	CUs 97 & 98	29.6	28.0
Reach 1	CU 99	16	13.5
	CU 100	15.2	13.5

Where engineered caps were required, the caps met the design requirements specified in the Phase 2 CDE for isolation caps to act as a physical barrier that both isolates and stabilizes the residual sediments. Two types of cap designs were used in Phase 2 areas:

- Medium-velocity Type C isolation caps, consisting of a minimum of a 9-inch isolation layer of granular material with a total organic carbon (TOC) content of at least 2%, overlain by a 6-inch armor layer of coarse gravel, to be used outside the navigation channel in areas with water velocities ≤ 5 feet/second based on a 100-year flow event; and
- High-velocity Type C isolation caps, consisting of a minimum of a 9-inch isolation layer of granular material with a TOC content of at least 2%, overlain by a 6-inch armor layer of large-size cobble, to be used within the navigation channel or in other areas with water velocities > 5 feet/second based on a 100-year flow event.

The information relating to the placement of backfill or cap material in each CU dredged in Phase 2, including any agreements reached by GE and EPA relating to backfill or cap material placement, was documented in the CU Backfill/Engineered Cap Completion Approval Form (Form 2) package provided to and approved by EPA for that CU.

It should be noted that, in late April 2011, river flows in excess of the 100-year design flow event occurred on the Upper Hudson River. Bathymetric surveys were conducted in June 2011 to assess the impact of that flow event on the caps that had been placed in Phase 1 areas in 2009. Those surveys showed that there had been no Measurable Loss of cap material (as defined in the OM&M Scope) in any of the Phase 1 capped areas.

The total area during the project (including both Phase 1 and Phase 2) that received backfill and/or cap material amounted to 493 acres with 111 of those acres receiving cap materials. At EPA's request, a single set of shapefiles showing the locations of all engineered caps installed during both Phase 1 and Phase 2 is provided electronically as Exhibit B.

As part of the Phase 2 EPS issued in December 2010, EPA established limits on the amount of capping that would be allowed in Phase 2. Those limits provided that, after excluding certain types of capped areas (namely, locations capped due to structural offsets, the presence of cultural

resources, or the presence of exposed bedrock or glacial Lake Albany clay or capped locations in shoreline areas – collectively, the non-counted capping areas), the total area capped at the completion of Phase 2 may not exceed 11% of the total area dredged during Phase 2. The capping limits provided further that, within that overall limit, the total area capped at the completion of Phase 2 due to the presence of inventory (i.e., Tri+ PCB contamination greater than or equal to 6 mg/kg in a segment below the top 6 inches) may not exceed 3% of the total area dredged during Phase 2. These limits were measured by a Nodal Capping Index (NCI) under which the percentage of nodes capped served as a surrogate for the percentage of dredged area capped. The NCI metrics were calculated and compared to the applicable capping limits (which included an Evaluation Level and a Control Level) at various points during Phase 2, including at the end of dredging in each season and at the completion of Phase 2. The results of those comparisons are shown in Table 2-6.

Table 2-6 Comparison of Capped Areas to Capping Limits

Time of Comparison	% of Dredged Nodes Capped*	% Capping Limits (Total)		% of Dredged Nodes Capped with Inventory*	% Capping Limits (Inventory Only / Subset of Total)	
		Evaluation Level (%)	Control Level (%)		Evaluation Level (%)	Control Level (%)
End of Phase 2 Year 1 (2011)	3.05	13.0	14.4	0	3.5	3.9
End of Phase 2 Year 2 (2012)	4.90	12.0	12.9	0.16	3.3	3.5
End of Phase 2 Year 3 (2013)	6.09	11.0	11.5	0.34	3.0	3.1
End of Phase 2 Year 4 (2014)	7.28	11.0	11.0	0.50	3.0	3.0
End of Phase 2 (2015)	7.77	NA	11.0	0.50	NA	3.0

* Measured by NCI; excludes non-counted capping areas (as described above).

As shown in the above table, at the end of each Phase 2 dredging season and upon the completion of Phase 2, the percentage of the total Phase 2 nodes dredged that had been capped (excluding non-counted capping areas, as described above) and the percentage of the total Phase 2 nodes dredged that had been capped with inventory present (again excluding non-counted capping areas) were well below the applicable capping limits specified by EPA for Phase 2.

2.4 SHORELINE STABILIZATION AND REPAIR

In areas where dredging was performed up to the designated shoreline elevation (listed in Table 2-5 above), shoreline stabilization measures were installed on the riverbank at or immediately below that elevation. These measures involved the installation of near-shore backfill and "Type P" armor stone (as well as construction of RFW where appropriate, as described in Section 4), using the methods identified in the approved FDR and contract Specifications and drawings. These shoreline stabilization measures included both short-term measures (in areas where the Dredging Contractor or the CM observed or suspected that shoreline stabilization issues may occur) and long-term stabilization measures. The areas where shoreline stabilization measures were implemented were documented in the CU Acceptance Form 2 packages.

In addition, in limited areas above the shoreline elevation where dredging-related activities disturbed or damaged those areas, the Dredging Contractor performed the necessary repairs or reconstruction of the shoreline. The restoration of areas above the shoreline, including the finger area of CU 51, the area east of Quack Island used for support activities for dredging in CU 95-2, and other support areas, is described below in Sections 4.3 and 4.4.

2.5 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES

The applicable QA/QC requirements for Phase 2 in-river activities were specified in the Phase 2 DQAPs. These requirements were met during Phase 2, and certifications of compliance with the applicable DQAPs were included in the Phase 2 Annual Progress Reports (in Appendix IV).

SECTION 3

SEDIMENT PROCESSING AND DISPOSAL

3.1 SEDIMENT PROCESSING OPERATIONS

Dredged material from the Upper Hudson River was dewatered and processed at the sediment processing facility in Fort Edward. The operations conducted at the processing facility were described in detail in the Phase 2 Facility O&M Plan, which was Appendix B to the applicable RAWP for each dredging season. This section summarizes those operations.

Dredged materials consisted of a mixture of debris, coarse and fine sediment solids, and water. The handling and processing of those materials at the processing facility involved the following steps:

- Off-loading of the dredged material from barges at the unloading wharf;
- Separation of large debris and coarse solids from fine sediments and water to facilitate dewatering;
- Dewatering of fine sediments to generate a solid waste (filter cake) for disposal;
- Treatment of the water recovered from size separation and dewatering processes and the water collected in the facility's storm water collection system to remove contaminants from that water; and
- Staging, transportation, and disposal of debris, coarse solids, and filter cake.

These steps are described further below. A layout of the processing facility, showing the locations of the barge unloading facilities and the major processing equipment, including size separation equipment, gravity thickeners, filter presses, and the water treatment plant, as well as the rail facilities, is depicted on Figure 3-1.

Barges filled with dredged material were delivered to the waterfront at the processing facility. The waterfront consisted of a staging slip in front of the work wharf, two dewatering stations, and two unloading stations. Upon arrival, the barges were dewatered (with pumps) prior to unloading to remove free water. The debris and sediments were then unloaded from the barges, using a large mechanical unloader. Debris was removed and transferred to a debris storage area, and a portion of the sediments that was dry enough was off-loaded directly into trucks and transported to the Coarse Material Staging Areas (CMSAs). The remaining sediments were off-loaded into a size separation system.

The size separation process was used to remove the remaining coarse materials from the finer sediments and water and to pump fine materials to the dewatering area. Two size separation areas were used to process sediments – the South Size Separation Area, which was used in Phase

1 and continued to be used each season in Phase 2, and the North Size Separation Area, which was constructed and first used in 2012. Each size separation system consisted of large screening equipment (including a large filter grating or "grizzly" for removing large materials, a large rotating drum screen or "trammel," vibratory ¼-inch screens, and hydrocyclones), which were used to sort out additional debris, gravel, and sand. The coarse materials separated in this system were transferred by dump truck to the CMSAs. The remaining slurry of fine material from the hydrocyclones in both the North and South Size Separation Areas was pumped through force mains to the sediment thickening and dewatering area for further processing.

In the dewatering area, the slurry from the hydrocyclone overflow was dewatered to produce a solid cake (with no free liquid) so that it could be disposed of off-site. Initial dewatering took place in a gravity thickening tank equipped to promote settling. Gravity settling was enhanced by the addition of coagulants and flocculants to promote the agglomeration of the fine particles. Gravity-thickened solids were then mechanically dewatered through filter presses to remove additional water from the sediments. Recovered water from gravity settling and filter pressing was collected and either recycled or treated in the on-site water treatment plant. The dewatered solid material (filter cake) from the filter presses was transported by truck in containers to one of two filter cake staging enclosures to await loading into rail cars for off-site shipment. The water separated from the solids by the filter presses was collected and treated in the on-site water treatment plant.

Following processing, the debris, coarse material, and filter cake were temporarily staged in the debris storage area, CMSAs, and filter cake enclosures, respectively, until they could be loaded into rail cars for off-site transport (as described in Section 3.2). This temporary staging was subject to limits on the volume of material that could be staged at any given time and on the height of the staged material piles at the CMSAs.

All process water from the sediment processing operations, as well as stormwater from areas where sediment was managed, was collected and treated in the on-site water treatment plant. Treated water was discharged to the Champlain Canal in accordance with the discharge requirements specified in the substantive WQ Requirements, or was reused in filter backwash and plant process water systems.

The estimated volume of material processed in Phase 1 was given in Appendix A of the Phase 1 Construction Completion Report as 370,680 tons. That report also listed the volume of material treated and discharged to the Champlain Canal from the beginning of Phase 1 through the end of 2010 as 129.71 million gallons. For Phase 2, the estimated volumes of material processed (in tons), as well as the estimated volumes of water treated and treated water discharged to the Champlain Canal (in gallons), are given, by year and in total, in Table 3-1.

Table 3-1 Phase 2 Sediment Processing Summary[a]

Phase 2 Dredging Season	Total Material Processed (tons)	Volume of Water Treated (MGals)	Volume of Treated Water Discharged (MGals)
Year 1 (2011)	463,282	Not Determined[b]	150.33
Year 2 (2012)	787,957	357.05	183.36
Year 3 (2013)	664,182	270.15	165.27
Year 4 (2014)	663,883	226.15	110.74
Year 5 (2015)	258,295	109.81	51.18
Year 6 (2016)[c]	0	26.159	26.159
Total	**2,837,599**	**1,087.859**	**687.039**

Notes:

a. The volume of water reported during each year of dredging covers the period from the initiation of dredging to the end of the processing and transport season (mid to late December). The volume of stormwater treated during the off-season is not included in these volumes.

b. Total Volume of Water Treated was not tracked as a productivity metric until Phase 2 Year 2.

c. The volumes of water given for Year 6 (2016) are those that were treated and discharged during demobilization activities until the water treatment plant was shut down in November 2016. See Section 7.1 below.

Thus, for the project as a whole (Phases 1 and 2 together), the total volume of material processed was approximately 3,208,279 tons, and the total volume of treated water discharged to the Champlain Canal was approximately 816.75 million gallons.

The applicable QA/QC requirements for sediment processing operations were specified in the applicable DQAPs. Specifically, Table A2-1 of applicable DQAPs details Processing Facility Operations Inspections and Tests. Certifications of compliance with the applicable DQAPs were included in the Phase 2 Annual Progress Reports (in Appendix IV).

3.2 TRANSPORTATION AND DISPOSAL OF PROCESSED SEDIMENTS

Following the dewatering and processing of the dredged sediments, the processed sediments were loaded into rail cars at the sediment processing facility and transported via commercial rail carriers to the selected disposal facilities, all in accordance with the applicable TDP. Rail cars were fitted with a waste-enveloping liner. Each rail car was weighed before leaving the processing facility to ensure that it was within commercial rail carrier weight restrictions. In most cases, the rail cars were formed into units trains, comprising 56 to 98 rail cars each, for transport to the disposal facilities. Upon arrival of the units trains at the disposal facilities, the rail cars were unloaded, cleaned, and returned to the sediment processing facility. Upon return

to the sediment processing facility, rail cars were kept in a secure area of the railyard with restricted access prior to their reuse.

As discussed in the Phase 1 Construction Completion Report, the dredged and processed sediments from Phase 1 were transported to the off-site disposal facilities between June 2009 and November 2010. The Phase 2 PSCP Scope issued in 2010 required that all dredged materials from a given dredging season must be processed and shipped off-site by the end of that calendar year unless doing so was prevented by delays attributable to disposal facilities or rail carriers. During Phase 2 Year 1 (2011), due to delays attributable to the rail carriers (exacerbated by severe storms and high flow events in last August and early September 2011), GE was unable, despite its best efforts, to complete off-site shipments of all processed sediments from the processing facility by the end of 2011, and EPA was so notified. However, as of that date, only a relatively small volume of sediments remained in staging areas at the facility, and all of those remaining sediments were shipped off-site by January 10, 2012. In Phase 2 Years 2, 3, and 4, GE shipped the processed sediments from that season off-site before the end of the calendar year. At the end of Phase 2 Year 5 (2015), due to rail car logistical issues, there was a slight delay in shipping the final remaining processed sediments (which constituted a small amount that was being used as bedding material for demobilization waste in the rail cars); and EPA approved an extension of the time for shipping that final material off-site until mid-January 2016. The final shipment of processed sediments departed the processing facility on January 21, 2016.

The processed materials dredged during Phase 1 in 2009 and those during Phase 2 Year 1 in 2011 were all transported to facilities authorized to receive TSCA-regulated waste, regardless of their PCB concentrations. During the 2011 dredging season, GE conducted a pilot study to evaluate the PCB concentrations of dewatered sediments and the practicality of managing TSCA-regulated and non-TSCA sediments separately. The pilot study demonstrated the practicality of handling these sediments separately (Anchor QEA 2012b). Therefore, in 2012, GE proposed and EPA approved an approach involving the separate dredging, handling, transport, and disposal of: (a) materials to be disposed of at TSCA-authorized facilities (referred to herein as TSCA materials) and (b) materials that were confirmed to contain Total PCBs at concentrations less than 50 ppm *in situ* and thus were appropriate for disposal at a non-TSCA solid waste landfill regulated under Subtitle D of RCRA (referred to herein as non-TSCA materials). EPA's regulations specifically authorize the disposal of dewatered bulk PCB remediation waste containing PCBs at concentrations less than 50 ppm at a permitted non-hazardous industrial waste facility subject to regulation under Subtitle D of RCRA (40 Code of Federal Regulations [CFR] §§ 761.61(a)(5)(i)(B)(*2*)(*ii*) & (a)(5)(v)(A)). GE embodied this approach in the 2012 TDP (submitted as an addendum to the 2012 RAWP) and in the 2013 TDP and utilized it from July 2012 through the remainder of Phase 2.

Under this approved approach, GE delineated the areas subject to dredging as TSCA or non-TSCA based on existing sediment core data. Areas where those data indicated that the sediments

contained less than 50 ppm PCBs *in situ* were characterized as non-TSCA. GE then dredged and handled the sediments from those areas separately throughout the dredging, on-river transport, barge unloading, and sediment processing and staging activities. Finally, GE conducted sampling of those segregated processed sediments to confirm that they contained PCBs at concentrations below 50 ppm. The processed materials that were confirmed to contain PCBs less than 50 ppm were designated as non-TSCA materials and were transported off-site to a RCRA Subtitle D disposal facility. All remaining materials were transported off-site to a TSCA-authorized facility. As required by Paragraph 23 of the CD, GE notified EPA annually of the disposal facilities selected for receipt of processed materials and/or other waste materials for the subject year, and it obtained EPA's approval of those facilities.

The Phase 1 Construction Completion Report explained that GE transported approximately 328,000 tons of dredged and processed sediments from Phase 1 to off-site disposal facilities; and it included in Appendix D the disposal facility certificates and manifests for those shipments. During Phase 2, GE transported a total of 2,837,599 tons of dredged and processed sediments to the off-site disposal facilities, of which 2,293,962 tons were transported to TSCA-authorized facilities and 543,637 tons were transported to a non-TSCA RCRA Subtitle D facility. The approved TSCA and non-TSCA disposal facilities used and the amounts shipped to TSCA and non-TSCA disposal facilities during Phase 2 are shown by year in Table 3-2.[11] All disposal facility certificates of disposal for Phase 2 are provided in appendices to the Phase 2 Annual Progress Reports (in Appendix IV hereto).

[11] These numbers do not include the off-site shipments of waste materials that were generated during demobilization activities in 2016, which are summarized in Section 7.1.9 below.

Table 3-2 Phase 2 Transport Summary

Phase 2 Dredging Season	Disposal Facilities	Amount Shipped Off Site (tons)	
		To TSCA Facility(ies)	To non-TSCA Facility
Year 1 (2011)	Environmental Quality, Wayne Disposal Site #2, MI (TSCA) US Ecology, Idaho Inc., ID (TSCA)	463,282	NA
Year 2 (2012)	Environmental Quality, Wayne Disposal Site #2, MI (TSCA) Clean Harbors Lone Mountain Landfill, OK (TSCA) Tunnel Hill Reclamation Landfill, OH (non-TSCA)	592,554	195,403
Year 3 (2013)	Clean Harbors Lone Mountain Landfill, OK (TSCA) Tunnel Hill Reclamation Landfill, OH (non-TSCA)	552,865	111,317
Year 4 (2014)	Environmental Quality, Wayne Disposal Site #2, MI (TSCA) Clean Harbors Lone Mountain Landfill, OK (TSCA) Tunnel Hill Reclamation Landfill, OH (non-TSCA)	516,179	147,704
Year 5 (2015)	Clean Harbors Lone Mountain Landfill, OK (TSCA) Tunnel Hill Reclamation Landfill, OH (non-TSCA)	169,082	89,213
	Total	**2,293,962**	**543,637**

SECTION 4

HABITAT CONSTRUCTION

During the course of the RA, GE conducted a habitat replacement/reconstruction (sometimes referred to generally as habitat construction) program to replace or reconstruct the habitats in the areas affected by dredging. As stated in the HDA Work Plan (BBL 2003, p. 1-2), which was part of the RD AOC, and reiterated in the original and Phase 2 OM&M Scopes, "[t]he primary goal of the habitat program is to replace the functions of the habitats of the Upper Hudson River to within the range of functions found in similar physical settings in the Upper Hudson River, in light of changes in river hydrology, bathymetry, and geomorphology that will result from implementation of the EPA selected remedy." The habitat construction program was designed to include replacement or reconstruction of the four habitat types identified: UCB, aquatic vegetation beds consisting of SAV, natural shorelines (river banks) where necessary, and riverine fringing wetlands (RFW). The Phase 1 and Phase 2 habitat assessments conducted during remedial design, as described in Section 1.4 above, established the range of functions found in these habitat types by measuring certain structural parameters both in areas that would be affected by dredging and those that would not. Based on those data, the specific parameters to be used as design criteria for the habitat construction program were selected. The design then established the mix of habitats to be constructed and specifically identified the areas targeted for construction of each type of habitat (or, in some areas, for natural recolonization by SAV).

The Phase 1 Construction Completion Report described the habitat construction in Phase 1 dredge areas. It explained that: (a) the placement of backfill and cap material in Phase 1 UCB areas in 2009 in accordance with the applicable specifications for type and thickness of backfill and cap material met the requirement for replacement/reconstruction of UCB habitats; (b) no shoreline habitats (defined as river banks above the designated shoreline elevation of 119 ft [NAVD88]) were affected in Phase 1, and thus no replacement/reconstruction of shoreline habitats was necessary; and (c) the replacement/reconstruction of SAV and RFW habitats in Phase 1 dredge areas was performed in 2010 and 2011, including the construction of SAV habitat in certain areas in CUs 3 through 8 and RFW habitat in certain areas in CUs 2, 7, and 8. In addition, areas of SAV natural recolonization were designated in CUs 2 through 8 and CUs 17 and 18. As noted in the Phase 1 Construction Completion Report, the habitat construction activities in each of the Phase 1 CUs were documented in the Final Construction Completion Certification Form (Form 3) packages for those CUs, which were included in an appendix to that report.

This section focuses on the habitat construction activities in Phase 2 areas. In this regard, the Phase 2 OM&M Scope provided that "[f]or Phase 2 natural shoreline [SHO] areas, replacement and reconstruction shall consist of installation of backfill and other stabilization

measures and shall continue with subsequent evaluations of the physical and vegetative integrity, as appropriate, of all installed measures under OM&M" (p. 4-1). As such, the installation of any shoreline replacement/reconstruction measures in Phase 2 areas was described in Section 2.4 (Shoreline Stabilization); and the ongoing and future OM&M of such measures is beyond the scope of this RA Completion Report. The following sections discuss the replacement/reconstruction of UCB, SAV, and RFW habitats in Phase 2 dredge areas, followed by a brief discussion of the habitat restoration of other affected areas (including disturbed areas above the shoreline elevations).

The habitat construction activities performed by GE as part of the RA consisted of the initial installation of the active habitat replacement/reconstruction measures. They do not include the OM&M of the replaced/reconstructed SAV and RFW habitats or the habitat adaptive management (AM) activities for such habitats, which are ongoing and are not part of the RA as defined in the CD. Thus, this report does not discuss those OM&M and habitat AM activities.

4.1 UNCONSOLIDATED RIVER BOTTOM

For areas designated as UCB habitats, the placement of backfill and/or cap material, as described in Section 2.3, constituted the construction of such habitats; and the verification that the required type and thickness of backfill and cap material were successfully placed in accordance with the applicable Phase 2 design, as recorded in the Backfill/Engineered Cap Completion Approval Form (Form 2) package for each CU, met the requirement for replacement/reconstruction of UCB habitats.

4.2 AQUATIC VEGETATION BEDS

The dredge areas subject to SAV planting or natural recolonization were selected during design in accordance with requirements specified in the Phase 2 CDE and the approved design reports. The Phase 2 CDE established the approach for identifying Phase 2 dredge areas where additional habitat backfill (as described in Section 2.3) would be placed to support the designation of those areas as SAV areas. That approach focused on pre-dredging SAV areas that were delineated in water depths between 2 feet and 8 feet (based on the shoreline elevations established using a design flow of 5,000 cubic feet per second [cfs] at the USGS gage in Fort Edward) and that would be in water depths greater than 8 feet after dredging and backfill placement. The Phase 2 CDE provided that, "[f]or areas in the river that currently support SAV and that exhibit a post-dredging and backfill placement water depth of greater than 8 feet below the design water surface elevation (w.s.e.), an evaluation shall be made using the Phase 2 SAV model to determine if post-dredging water depth will increase to a point where SAV would no longer be supported (*i.e.*, deeper than 8 feet)" (p. 2-16). It provided further that SAV areas that have pre-dredging elevations equivalent to a water depth of 8 feet or less but would have lower elevations (i.e., be deeper) after dredging and initial backfill placement would be brought back

up to either their pre-dredging bathymetry (for areas with pre-dredging water depths of 5 to 8 feet) or an elevation equivalent to a water depth of 5 feet or less (for areas with pre-dredging depths between 2 and 5 feet), so that they could support SAV. The Phase 2 CDE also stated that GE and EPA would meet each year to discuss the results of the SAV model and determine the locations, limits, and elevations of the required SAV replacement/reconstruction areas. In addition, a habitat decision matrix included in the Phase 2 Intermediate Design Report (Phase 2 IDR; Arcadis 2008) was used to identify those areas where SAV would be planted and those to be designated as SAV natural recolonization areas. These results were also discussed with EPA and subject to EPA approval.

Based on the applicable design criteria specified in the Phase 2 FDRs, SAV planting and natural recolonization areas were identified and defined within the CUs. SAV contingency areas were also identified from a subset of natural recolonization areas, to be used in case a planting area was determined to be unsuitable for planting based on a pre-planting survey. The final SAV replacement/reconstruction areas for a given CU were then determined using the elevations and conditions in that CU after dredging and backfilling/capping were completed.

When planting occurred in the season after the completion of the backfill/cap material placement in a given CU, a pre-planting bathymetric survey of the SAV planting area was conducted after the spring high-flow to confirm that suitable planting elevations were available; and if not, nearby contingency planting areas were selected to replace the lost planting areas. These areas were then planted with native SAV species in accordance with the applicable design specifications, as well as the requirements set forth in the pertinent RAWP sections on habitat construction for the subject year, with any modifications agreed upon by GE and EPA. Up to three native species were planted in each SAV planting area, generally on 2-foot centers Those areas were subsequently inspected later in the same year (typically in September) to confirm that the SAV planting activities had been performed in accordance with the applicable requirements.[12] In addition, the SAV natural recolonization areas were designated as such. Completed SAV construction or designation activities within each CU were documented in the Final Construction Completion Certification Form (Form 3) package for that CU.

During Phase 2, SAV habitat was constructed by planting in 48 CUs and SAV natural recolonization areas were designated in 77 CUs. The Phase 2 SAV planting and natural recolonization areas are identified by CU in Table 4-1, which lists all Phase 2 CUs in which SAV habitats were constructed or designated for natural recolonization (as well as those in which RFW habitats were constructed, as discussed below) and shows the type of habitat constructed

[12] Where this inspection indicated that the SAV plants installed had not survived or were otherwise not present in the planting areas, those areas were designated for re-planting during the following early summer, and re-planting was conducted as necessary.

or designated in each and (in parentheses) the year in which the planting or designation was completed (i.e., the year in which the Form 3 was submitted). More details on the SAV construction in each year of Phase 2, including the approved Form 3 packages for the CUs in which such construction was completed in that year, are provided in the Phase 2 Annual Progress Reports in Appendix IV.

In addition to the SAV planting and natural recolonization areas within CUs, delineated SAV areas affected by access dredging outside the CU limits were designated as natural recolonization areas.

4.3 RIVERINE FRINGING WETLANDS

GE agreed that, where the RA disturbed existing RFW habitats, those RFW habitats would be replaced or reconstructed in the same or substitute locations agreed upon with EPA. Consistent with this agreement, the affected RFW habitats were identified and the areas in which RFW habitat would be constructed following dredging and backfilling/capping were designated during design. For CUs in which RFW habitats would be constructed, the final RFW construction areas were then determined using the elevations and conditions in those CU after dredging and backfilling/capping were completed.

As with SAV habitats, when RFW planting occurred in the season after the completion of the backfill/cap material placement in a given CU, a pre-planting elevation survey of the RFW construction area was conducted after the spring high-flow to confirm that the necessary planting elevations were available; and if not, substitute areas were selected for RFW planting. These RFW habitats were then constructed by planting and seeding with native RFW species in accordance with the applicable design specifications, as well as the requirements set forth in the pertinent RAWP sections on habitat construction for the subject year, with any modifications agreed upon by GE and EPA.[13] The RFW planting areas were inspected later in the year of planting (typically in September) to confirm that the RFW planting activities had been performed in accordance with the applicable requirements.[14] Completed RFW construction activities within each CU subject to such construction were documented in the Final Construction Completion Certification Form (Form 3) package for that CU.

During Phase 2, RFW habitat was constructed in 41 CUs (including the finger area in CU 51 that was above the shoreline). Those constructed RFW areas are also identified by CU in

[13] Several of the RFW construction areas were divided into two zones – Zone A, which had a higher elevation and was planted and seeded as appropriate; and Zone B, which had a lower elevation and was more frequently flooded and which was planted with plugs and seeded (late in the year) with wild rice.

[14] Where this inspection indicated that the RFW plants installed had not survived or were otherwise not present in the RFW planting areas, those areas were re-planted.

Table 4-1, which shows all Phase 2 CUs in which RFW habitat was constructed and the year in which that construction was completed (i.e., the year of the Form 3 submittal). More details on the RFW construction in each year of Phase 2, including the approved Form 3 packages for the CUs in which such construction was completed in that year, are provided in the Phase 2 Annual Progress Reports in Appendix IV.

4.4 HABITAT RESTORATION OF OTHER AFFECTED AREAS

This section summarizes the habitat restoration in other areas affected by the dredging project. The barge loading areas used in the project were restored as appropriate, including the placement of backfill in the Saratoga Barge Loading Area, designation of the Moreau Barge Loading Area as UCB, planting of SAV in the Rensselaer Barge Loading Area, and planting of RFW vegetation in areas at and adjacent to the Landlocked Barge Loading Area with delineated wetlands.

The area above the shoreline east of Quack Island that was used as a support area for dredging in CU 95-2, as described in Section 2.1.4, had wetland vegetation present, and consequently was restored by the construction of RFW habitat. The other support areas used in the project were restored consistent with agreements with the property owners and any applicable restoration requirements in the pertinent RAWPs and subject to EPA approval, as described further in Section 7.2 below.

Table 4-1 Phase 2 SAV and RFW Construction by Certification Unit

Reach	Certification Unit	SAV Planted	SAV Nat. Recoloniz.	RFW
8	CU 9	√ (2012)	√ (2012)	√ (2012)
	CU 10	√ (2013)	√ (2013)	√ (2012)
	CU 11	√ (2012)	√ (2012)	
	CU 13		√ (2012)	
	CU 16		√ (2012)	
	CU 19	√ (2012)	√ (2012)	√ (2012)
	CU 20	√ (2013)		
	CU 21	√ (2013)	√ (2013)	
	CU 22	√ (2013)	√ (2013)	
	CU 23	√ (2013)		
	CU 24	√ (2013)		
	CU 25	√ (2013)		
	CU 26	√ (2013)	√ (2013)	
	CU 27	√ (2013)	√ (2013)	
	CU 28	√ (2014)		
	CU 29	√ (2014)	√ (2014)	
	CU 30		√ (2014)	
	CU 31		√ (2014)	
	CU 32		√ (2014)	
	CU 33		√ (2014)	
	CU 35		√ (2014)	√ (2014)
	CU 36		√ (2014)	
	CU 37	√ (2014)	√ (2014)	√ (2014)
	CU 38	√ (2014)	√ (2014)	√ (2014)
	CU 39		√ (2014)	
	CU 40	√ (2014)	√ (2014)	
	CU 41	√ (2014)	√ (2014)	
	CU 42		√ (2014)	
	CU 43		√ (2014)	
	CU 44	√ (2014)	√ (2014)	
	CU 45	√ (2014)	√ (2014)	
	CU 46	√ (2014)	√ (2014)	
	CU 47	√ (2014)	√ (2014)	√ (2014)
	CU 48	√ (2014)	√ (2014)	
	CU 49		√ (2014)	

Reach	Certification Unit	SAV Planted	SAV Nat. Recoloniz.	RFW
	CU 50	√ (2014)	√ (2014)	√ (2014)
	CU 51	√ (2014)	√ (2014)	√ (2014)*
	CU 52	√ (2014)	√ (2014)	√ (2014)
	CU 53	√ (2014)	√ (2014)	√ (2014)
	CU 54	√ (2014)	√ (2014)	√ (2014)
	CU 55	√ (2014)		√ (2014)
	CU 56	√ (2014)	√ (2014)	√ (2014)
	CU 57	√ (2014)	√ (2014)	√ (2014)
	CU 58	√ (2014)	√ (2014)	
	CU 59		√ (2014)	
	CU 60		√ (2016)	√ (2016)
7	CU 61		√ (2015)	√ (2015)
	CU 62		√ (2015)	√ (2015)
	CU 63	√ (2015)	√ (2015)	√ (2015)
	CU 64		√ (2015)	√ (2015)
	CU 65		√ (2015)	√ (2015)
	CU 66		√ (2015)	√ (2015)
6	CU 67	√ (2014)	√ (2014)	
	CU 68		√ (2014)	√ (2014)
	CU 69	√ (2014)	√ (2014)	√ (2014)
	CU 70	√ (2014)	√ (2014)	√ (2014)
	CU 71		√ (2014)	√ (2014)
	CU 72	√ (2014)	√ (2014)	
	CU 73	√ (2014)	√ (2014)	
	CU 74	√ (2014)	√ (2014)	√ (2014)
	CU 75		√ (2014)	√ (2014)
	CU 76	√ (2014)	√ (2014)	√ (2014)
	CU 77		√ (2014)	√ (2014)
5	CU 79	√ (2014)	√ (2014)	√ (2014)
	CU 80		√ (2014)	√ (2015)
	CU 81		√ (2014)	√ (2015)
	CU 82	√ (2015)	√ (2015)	√ (2015)
	CU 83		√ (2014)	√ (2015)
	CU 84	√ (2014)	√ (2014)	
	CU 85	√ (2015)	√ (2015)	
	CU 86		√ (2014)	
	CU 87		√ (2014)	

Reach	Certification Unit	SAV Planted	SAV Nat. Recoloniz.	RFW
	CU 88		√ (2014)	
	CU 89		√ (2014)	
	CU 90		√ (2014)	
	CU 91	√ (2015)	√ (2015)	√ (2015)
4	CU 92		√ (2014)	
3	CU 94		√ (2016)	√ (2016)
	CU 95	√ (2016)	√ (2016)	√ (2016)
	CU 96		√ (2016)	√ (2016)
2	CU 97		√ (2015)	√ (2015)
	CU 98		√ (2015)	
1	CU 99	√ (2016)	√ (2016)	√ (2016)
	CU 100	√ (2016)		

* The RFW in the finger area of CU 51 was constructed in 2015.

SECTION 5

COMPLIANCE WITH PERFORMANCE STANDARDS AND OTHER MONITORING

A detailed description of the monitoring and sampling activities during Phase 1 and the other actions taken during Phase 1 to comply with the original EPS, QoLPS, and substantive WQ Requirements, including the performance of special studies, was provided in the Phase 1 Data Compilation and Supplement (Appendix I hereto) and summarized in the Phase 1 Construction Completion Report (Appendix II hereto). This section focuses on such activities during Phase 2.

5.1 ROUTINE CONTROLS AND BEST MANAGEMENT PRACTICES

A number of routine engineering controls and best management practices (BMPs) were built into the design and implemented during Phase 2 to address the Phase 2 EPS (notably the Resuspension Standard) and the QoLPS. These routine controls and BMPs were specified for each year of Phase 2 in the FDR and the PSCP applicable to that year.

To reduce PCB resuspension, the dredging contractor(s) routinely implemented a variety of BMPs set forth in the Phase 2 CDE and the design specifications in all dredge areas (such as minimizing bucket bites, maintaining bucket closure unless prohibited by debris, maintaining expeditious movement of the closed bucket to the receiving barge, avoiding re-handling of material on the river bottom and dragging the bucket, avoiding the grounding of barges and barge overflow, deploying oil/sheen control measures proactively in areas with higher PCB concentrations, etc.).[15] In addition, efforts were made to "balance" dredging of high PCB concentration areas with concurrent dredging in lower PCB concentration areas where practicable. Information on resuspension during Phase 2, including comparisons to the Resuspension Standard criteria, is provided in Section 5.3 below.

Routine controls and BMPs were also implemented to address PCB emissions to the ambient air. As required by the Phase 2 CDE, for each year of Phase 2 dredging, dredge areas with the potential to emit PCBs to the air at levels close to exceeding the QoLPS for PCBs in air were identified as part of the design using the following criteria: (a) areas with an average total PCB concentration in the sediments of greater than 150 mg/kg over a one-acre area: (b) areas with low

[15] As discussed in the Phase 2 CDE, physical resuspension containment systems (i.e., silt curtains) were found during Phase 1 to be relatively ineffective for containing dissolved-phase PCBs, and such barriers were not used in Phase 2. In addition, although the Phase 2 CDE provided that GE would promptly apply an initial 3- to 6-inch layer of sand or backfill cover after the final dredging pass has been completed in a CU sub-unit and post-dredging samples have been collected, GE and EPA agreed that placement of such an initial cover layer would not be required and that, instead, the dredging contractor would place backfill or cap material (as required) in the CU promptly after receipt and review of the post-dredging residual sampling results except where additional dredging was required.

water velocities (i.e., near the shore or in backwater areas); and (c) areas within 1,000 feet of a receptor. For such areas, in accordance with the Phase 2 CDE, a number of specific routine BMPs were implemented to reduce PCB emissions. These BMPs were specified in the design for each year of Phase 2 and included, at a minimum, the following:

- Fully covering sediments contained in a barge with water;
- Alternatively, for sediments from areas with average total PCB concentrations greater than 150 mg/kg over a one-acre area, fully covering those sediments in a barge with sediments from areas with lower PCB concentrations (i.e., less than 150 mg/kg);
- Retaining 5 feet of freeboard on the barge (i.e., distance between the sediment/water level in the barge and the top of barge coaming), or else using a wind screen; and
- Designating barges that contain sediments with an overall weighted average total PCB concentration greater than 150 mg/kg as priority barges and prioritizing those barges for transport to and unloading at the processing facility.

Routine restrictions and controls were also implemented to address potential noise, lighting, and navigation impacts, as set forth in the applicable design specifications. Those relating to noise required the contractors to implement noise control plans to control or reduce noise during dredging and facility operations, and to conduct routine noise monitoring to verify compliance with contract specifications. Those relating to lighting required the contractors to implement lighting control plans to prevent exceedances of the Lighting Performance Standards, to direct lighting away from neighboring properties, and to conduct light monitoring as necessary to verify compliance with standards. Finally, those relating to navigation required, among other things, that: (a) to the extent practicable and consistent with other goals, project vessels would not be tied up or anchored in the navigation channel in a manner that would prevent or obstruct passage of other vessels; (b) project vessels would comply with federal and state regulations regarding lighting, signaling, and piloting; (c) non-project access to active work areas would be restricted in coordination with the NYSCC; (d) project vessels would be tracked to optimize productivity while minimizing interference with non-project-related vessels; (e) use of locks would be coordinated with the NYSCC; (f) buffer zones and temporary aids to navigation would be used to facilitate safe and efficient navigation near active project areas; and (g) the NYSCC and the U.S. Coast Guard (USCG) would be provided routine notices regarding project schedules, allowing those agencies to issue appropriate Notices to Mariners.

5.2 MONITORING AND SAMPLING

GE conducted extensive monitoring and sampling during Phase 2 to assess achievement of the Phase 2 EPS, the QoLPS, and the substantive WQ requirements, as well as to continue to evaluate PCB levels in fish. This monitoring and sampling was conducted in accordance with the 2011 RAM QAPP (in Phase 2 Year 1) and the Phase 2 RAM QAPP (in the remaining years of

Phase 2), with revisions to Attachment A (analytical procedures) and its appendices (standard operating procedures) submitted in June 2014 and again in March and September 2016.

It should also be noted that, as required by the Phase 2 PSCP Scope and the Phase 2 CHASP Scope, GE evaluated the need to revise the Phase 1 design analysis demonstrating compliance with the National Ambient Air Quality Standards (NAAQS) to reflect any operational or equipment changes in Phase 2 that could produce emissions of the pollutants subject to the NAAQS. That evaluation, documented in the annual PSCPs, concluded that there was no need for a more detailed revised NAAQS analysis for the Phase 2 seasons. As a result, no monitoring or control activities for the pollutants subject to the NAAQS were implemented during Phase 2. In addition, no opacity or odor monitoring was necessary or conducted during Phase 2. The remaining monitoring and sampling programs implemented during Phase 2 are summarized in the following sections.

5.2.1 Water Column Monitoring

During Phase 2 (as during Phase 1), the water column was sampled at near-field stations (downstream of and relatively near dredging operations) and far-field stations (more than one mile downstream of active dredge areas) in accordance with the applicable RAM QAPP.

Near-field monitoring locations were associated with individual remedial operations and moved as the dredging operations moved. Generally, for each dredging operation, water monitoring was conducted at a near-field cross-channel transect consisting of up to four floating monitoring buoys downstream of the dredge, as well as at a background buoy upstream of the dredging operations. The near-field monitoring was conducted daily during all in-river operations, including debris removal, dredging, capping, backfilling, etc. Water samples from these monitoring stations were routinely analyzed for PCBs, TSS, and total organic carbon (TOC), as well as general water quality parameters (such as DO, pH, temperature, etc.).

Far-field stations (except for background stations) were located more than one mile downstream of active dredge areas. Far-field stations were established at the following locations (although some were discontinued when they were no longer more than one mile downstream of dredging):

- Bakers Falls (background station);
- Rogers Island (also used as a background station to calculate PCB loading originating upstream of dredging);
- Thompson Island;
- Lock 5 (in Schuylerville);
- Stillwater;
- Waterford;

- Albany; and
- Poughkeepsie.

The background stations were sampled at monthly intervals for PCBs, TSS, and general water quality parameters (e.g., turbidity, DO, pH, temperature). The Thompson Island, Lock 5, Stillwater, and Waterford stations were used at various times to assess attainment of the applicable criteria. Specifically, such attainment monitoring was conducted at the closest far-field station that was at least one mile downstream of dredging (which varied among these stations from year to year) and at the Waterford station (to assess transport to the Lower Hudson River). During those times, continuous monitoring was conducted for water quality parameters and daily composite samples were collected from automated samplers (or, in some cases, manually) for analysis of PCBs and TSS (as well as general water quality parameters). (GE also agreed on some occasions to conduct weekly monitoring for informational purposes at stations that were not used for attainment monitoring.) The Lower Hudson River stations (Albany and Poughkeepsie) were generally sampled monthly for PCBs, TSS, TOC, and water quality parameters.

During the off-seasons (i.e., during the periods from the completion of dredging in a given year until the initiation of dredging for the following year), water column sampling was conducted weekly at Thompson Island, Lock 5 and Waterford, and monthly at Bakers Falls, Rogers Island, Albany, and Poughkeepsie.

The water column monitoring data were provided to EPA in daily exports and in the monthly progress reports (in Appendix III). The monitoring data were compared to the applicable criteria specified in the Resuspension Performance Standard and the substantive WQ Requirements to assess the need for additional action.[16] In addition, yearly summaries of the water column monitoring activities and data were provided in annual Data Summary Reports (DSRs; Anchor QEA 2012c, 2013, 2014, 2015, 2016), copies of which (for the years 2011 through 2015) are included in Appendix V (specifically, Appendices V-1 through V-5).

5.2.2 Sediment Residuals Sampling

Following the completion of each dredging pass in a CU or sub-unit, post-dredging cores were collected from the residual sediments and analyzed for TPCBs and Tri+ PCBs in order to provide data for determining the appropriate response actions (i.e., re-dredging, backfilling, capping) in accordance with the Residuals Performance Standard and applicable PSCP. These sediment sampling and analyses activities were conducted in accordance with the procedures and requirements specified in the applicable RAM QAPP and PSCP for the given year. They

[16] The water column monitoring data, including comparisons to the Resuspension Standard criteria, are summarized in Section 5.3. Exceedances of the criteria in the Resuspension Standard and WQ Requirements and responses to those exceedances are discussed in Section 5.4.

generally included sampling in each CU on a grid, with additional samples collected from shoreline areas. The analytical results from this sampling were provided to EPA in digital and electronic forms as soon as available (to facilitate evaluation of the appropriate response actions); and the data were summarized in the CU Dredging Completion Approval (Form 1) packages provided to EPA.

5.2.3 Fish Sampling

During Phase 2, GE continued its program of annual fish sampling. In each year from 2011 through 2016, fish collections were conducted in spring (May/June) and late summer/fall (late August/September) in accordance with the 2011 and Phase 2 RAM/QAPP (as applicable). Fish were collected from the Upper Hudson River at four stations: (1) Feeder Dam Pool (representing reference conditions); (2) Thompson island Pool (representing River Section 1); (3) Northumberland/Fort Miller Pools (representing River Section 2); and (4) Stillwater Pool (representing River Section 3). Black bass, bullheads (or catfish), and yellow perch were collected in the spring from each of these stations, and yearling pumpkinseed and forage fish were collected in the late summer/fall at these stations, with target numbers of each species as specified in the applicable RAM QAPP, to the extent available. Fish were also collected from the Lower Hudson River at three stations: (1) Albany/Troy; (2) Catskill; and (3) Tappan Zee. During the spring sampling, striped bass, black bass, bullheads, and perch were collected at Albany/Troy; striped bass, black bass, and bullheads were collected at Catskill; and striped bass were collected at Tappan Zee.[17] During the late summer/fall sampling, yearling pumpkinseed and forage fish were collected at Albany/Troy.

These fish samples were analyzed for total PCBs and lipid content, using fillet samples for the larger fish and whole-body composites for the yearling pumpkinseed and forage fish. The results of these sampling activities were provided in the monthly reports (in Appendix III), and annual summaries of the fish sampling activities and results were presented in the annual DSRs that are included in Appendix V (or, for the 2015 fish sampling results, an addendum to the 2015 DSR, which is also included in Appendix V).

5.2.4 PCB Air Monitoring

Extensive monitoring of PCBs in ambient air was conducted during Phase 2 work activities to assess and verify attainment of the QoLPS for PCBs in air. This monitoring used samplers operating continuously for 24 hours a day, and was conducted at locations along the dredging corridor, at unloading areas, and around the sediment processing facility, as follows:

[17] In 2016, at the request of EPA and NYSDEC, collection of black bass at Albany/Troy and Catskill was discontinued.

- Representative stations within the dredging corridor and at various locks based on operations were sampled during dredging. Samples over 24-hour periods were collected regularly at each station during dredging and were analyzed for PCBs.
- Five permanent monitoring stations were established around the perimeter of the sediment processing facility and in the wharf unloading area. These stations were sampled continuously during processing facility operations. A 24-hour sample was collected daily at each station during operations, and two or more of those samples were analyzed each day for PCBs based on meteorological data and operational activities.
- A permanent monitoring station was established to collect background data at a location upwind of all project activities. This station was sampled during dredging and processing facility operations. A 24-hour sample was collected daily and analyzed for PCBs.

The analytical results of this PCB air monitoring were provided to EPA in daily exports and in the monthly progress reports (in Appendix III). Those results were compared with the applicable criteria in EPA's QoLPS for PCBs in ambient air in assess the need for response.[18]

5.2.5 Noise and Light Monitoring

During Phase 2, the dredging and processing facility operations contractors conducted noise and light monitoring at the initial start-up of any operation or equipment that was different from those performed or used previously and that could result in increased noise or night-time light levels. This contractor monitoring was not considered monitoring for compliance with the QoLPS for noise or light, but the recorded levels were evaluated against the noise and light criteria in those QoLPS to determine if compliance monitoring was warranted. In addition, noise and light monitoring for compliance purposes was conducted in response to any noise or lighting complaints, and the results were compared with the applicable criteria in the QoLPL for noise or lighting. This monitoring was performed in accordance with the procedures and methods specified in the 2011 or Phase 2 RAM QAPP, as applicable. Such monitoring was conducted much more frequently for noise than for light. The results of compliance monitoring for noise and light were provided in the monthly progress reports (in Appendix III).[19]

[18] Exceedances of the applicable QoLPS criteria for PCBs in ambient air and responses to those exceedances are discussed in Section 5.4. As noted there, beginning in 2012, at EPA's request, the exceedances reported were limited to exceedances of a Standard Level set forth in the QoLPS for PCBs in ambient; exceedances of a "concern level" were not formally reported.

[19] Exceedances of the applicable QoLPS criteria for noise and light and responses to those exceedances are discussed in Section 5.4.

5.2.6 Navigation Monitoring

During each canal season of Phase 2, GE routinely provided project-related information to the NYSCC for its weekly Notice to Mariners, and kept the public advised of anticipated project activities through various types of communications. In addition, in accordance with the QoLPS for navigation, marine traffic on the river was routinely monitored during in-river operations, and information about river navigation activities in the vicinity of in-river project operations was recorded in daily logs. Monthly navigation reports were included in the monthly progress reports (in Appendix III).

5.2.7 Discharge Monitoring

The discharge of treated water from the water treatment plant at the sediment processing facility (via Outfall 001) was monitored weekly during Phase 2 processing facility operations and monthly during the off-seasons. At times when there were discharges of non-contact stormwater from the non-contact stormwater sedimentation basins at the processing facility (via Outfalls 002 and 003), those discharges were also monitored. These monitoring activities were performed in accordance with the applicable RAM QAPP, and the results were compared to the effluent limitations in the substantive WQ Requirements for such discharges. The discharge monitoring data were provided in discharge monitoring reports included in the monthly progress reports (in Appendix III).

5.3 RESUSPENSION INFORMATION

As previously indicated, the resuspension information from Phase 1 was discussed in detail in the Phase 1 Data Compilation Report and Supplement and in GE's Phase 1 Evaluation Report. Throughout Phase 2, resuspension monitoring was conducted at various far-field stations to obtain data on the two PCB-related prongs of the Phase 2 Resuspension Performance Standard – total PCB concentrations and PCB load (as measured by percent release of the Tri+ PCB mass removed). As noted in Section 5.2.1, daily monitoring to assess attainment of these prongs of the Resuspension Standard was conducted at the closest far-field station that was at least one mile downstream of dredging (which varied among the Thompson Island, Lock 5, Stillwater, and Waterford stations from year to year) and at the Waterford station (to assess transport to the Lower Hudson River); and weekly monitoring for informational purposes was sometimes conducted at some of these stations that were not used for attainment monitoring. Table 5-1 shows the far-field stations monitored for attainment (as well as those monitored weekly for informational purposes) for all of part of each year of Phase 2.

Table 5-1 Upper Hudson Far-Field Stations Monitored Daily or Weekly During Phase 2

Phase 2 Dredging Season	Thompson Is.	Lock 5	Stillwater	Waterford
Year 1 (2011)	A	A		A
Year 2 (2012)		A		A
Year 3 (2013)		A and I	A	A
Year 4 (2014)		A	A	A
Year 5 (2015)	A*	A	I	A

A = monitored to assess attainment of Resuspension Standard criteria.

A* = monitored for attainment purposes on only 4 occasions in 2015 to assess impacts from dredging in the area adjacent to CU 1.

I = monitored and reported for informational purposes.

Total PCB concentrations over each Phase 2 dredging season at the attainment and informational far-field stations are shown on Figures 5-1a through 5-1e.[20] Daily monitoring data are presented for the attainment stations. When stations were monitored for informational purposes, weekly monitoring data are presented and the concentrations were not used to assess attainment. As shown on those figures, there were five days in Phase 2 when a total PCB concentration above the criterion of 500 n/L was recorded during attainment monitoring of dredging operations (four at Lock 5 in 2012 and one at Stillwater in 2013).[21] However, a "confirmed exceedance" of that criterion (i.e., measurements of total PCB concentrations at or above 500 ng/L for two consecutive days) occurred during Phase 2 dredging only during one 3-day period (at Lock 5 on August 2-4, 2012; see Figure 5-1b).

For Tri+ PCB load, the Phase 2 Resuspension Standard established seasonal net load criteria of 2 percent (at the first far-field station downstream of dredging) and 1 percent (at the Waterford station) of the Tri+ PCB mass removed during the dredging season. It provided that these criteria would be applied through use of daily Tri+ PCB percent release criteria, which varied from 1 percent to 3 percent of the Tri+ PCB mass removed (depending on the monitoring station and the river flow rate measured at the USGS gage at Fort Edward) and were determined based on a 7-day running average. To apply these daily criteria, the 7-day running average percent release was

[20] Due to the very limited use of the Thompson Island station in 2015 as a far-field attainment station, as noted above, the 2015 data from that station are not included in Figure 5-1e.

[21] There were also six measurements of total PCBs above 500 ng/L at the far-field stations in 2011, but they occurred before any dredging began (results not shown).

calculated at the same far-field stations at which attainment of the total PCB concentration standard was measured. An exceedance was considered to occur if the 7-day average percent release was higher than the applicable criterion for 14 or more consecutive days at the first far-field station downstream of dredging operations or 21 or more consecutive days at the Waterford station. The results of the 7-day average percent release calculations for each year of Phase 2 dredging are shown on Figures 5-2a through 5-2e. The dotted line on each figure is the applicable percent release criterion, depending on the flow rate at the Fort Edward gage. As indicated on those figures, there was only a limited number of days on which the 7-day average percent release was higher the applicable percentage criterion; and there was only one instance (at the beginning of the 2011 season) in which the 7-day average was above the criterion for 14 or more consecutive days at the first far-field station (which thus constituted an exceedance) and no instances in which the 7-day average was above the criterion for 21 or more days at the Waterford station.

Table 5-2 provides a summary of the net Total and Tri+ PCB load to the Lower Hudson River as measured at the Waterford station, as well as the Total and Tri+ PCB mass removed and the final percent release of the mass removed, for each year of Phase 2 and for Phase 2 as a whole.[22] Figure 5-3 presents a depiction of the overall cumulative net Tri+ PCB load at the first far-field station and at the Waterford station across the Phase 2 dredging seasons, compared to a line representing (in kg) the cumulative net load criterion at each station, calculated based on the applicable annual percent release criteria of 2 percent at the first far-field station and 1 percent at the Waterford station. As indicated on that figure, the net cumulative loads at both of these stations across the entirety of Phase 2 remained below the allowable net loads.

[22] More detailed information was provided in Appendix D of each Annual Progress Report that covered Phase 2 dredging (included in Appendix IV hereto), Table 1 in that appendix showed, for each year of the project through the subject year: (a) net Total and Tri+ PCB load transported past Waterford to the Lower Hudson River; (b) Total and Tri+ PCB mass removed and remaining in the CUs dredged; and (c) percent release of the Total and Tri+ PCB mass removed that passed Waterford to the Lower Hudson River. Table 2 in Appendix D provided a daily summary of the daily PCB load to Lower Hudson River (i.e., past Waterford) during the subject dredging season.

Table 5-2 Total and Tri+ PCB Loads and Percent Release Past Waterford for Phase 2[a]

Phase 2 Year	Dredge Season	Duration (days)	Net Load Past Waterford (kg)		Mass Removed (kg)[c]		% Release Past Waterford	
			Total PCB	Tri+ PCB	Total PCB	Tri+ PCB	Total PCB	Tri+ PCB
2011	Jun 6 - Nov 8	156	144	29.8	27,020[d]	9,070	0.53%	0.33%
2012	May 9 – Nov 16	192	190	30.6	33,370	10,080	0.57%	0.30%
2013	April 29 – Nov 5[b]	191	511	99.3	32,460	9,275	1.57%	1.07%
2014	May 7 – Nov 4	182	245	39.8	26,570	8,915	0.92%	0.45%
2015	May 7 – Oct 3	150	148	44.7	8,185	2,991	1.80%	1.49%
Total for Phase 2		**871**	**1,238**	**344.2**	**127,605**	**40,331**	**0.97%**	**0.61%**

Notes:

a. Table prepared by Anchor QEA, LLC.

b. Monitoring data from Green Island were used to calculate net loads in place of Waterford from November 2 through November 5, 2013, while dredging activities took place in CU 100.

c. PCB mass removed for Phase 2 was calculated using SSAP and SEDC data for the initial dredging pass and residual data for re-dredging passes, based on the method outlined in the Phase 2 EPS, with minor modifications approved by EPA.

d. Due to a typographical error, the Total PCB mass removed in 2011 was incorrectly reported as 27,200 kg in the summary tables on PCB load and percent release past Waterford in appendices to the Phase 2 Annual Progress Reports contained in Appendix IV hereto. This error also affected the cumulative totals given in those tables for Total PCB mass removed. The mass of 27,020 kg for 2011 given in this table is correct, as is the overall cumulative total of Total PCB mass removed for Phase 2.

5.4 RESPONSES TO EXCEEDANCES

In instances where exceedances of the applicable criteria in the Resuspension Performance Standard, the QoLPS, or the WQ Requirements occurred, GE notified EPA and took appropriate response actions (where warranted), in consultation with EPA, in accordance with the applicable PSCP for the subject year.[23] The majority of the exceedances that occurred in Phase 2 were related to the QoLPS for PCBs in air. Beginning in July 2012, at EPA's request, the air exceedances that were formally reported were limited to exceedances of the Air Quality Standard Level (0.11 µg/m^3 in residential areas).[24] In total, approximately 200 individual exceedances of that Standard Level for PCBs in air were reported during Phase 2, over half of which occurred in 2012. In addition, during Phase 2 operations, there were limited exceedances of other criteria – namely: five reported total PCB levels above the Resuspension Standard's concentration criterion of 500 ng/L (plus two

[23] As indicated above, exceedances during Phase 1 were discussed in detail in the Phase 1 Data Compilation

[24] Prior to that time, GE had reported exceedances of both Standard Levels and "Concern Levels."

such measurements in spring 2011 before any dredging activities began), but a confirmed exceedance of that criterion only during one 3-day period in 2012 (as noted in Section 5.3); one exceedance of the Resuspension Standard's load criterion based on percent release of Tri+ PCB mass removed (at the beginning of the 2011 season, as also noted in Section 5.3); seven exceedances of certain of the substantive WQ Requirements (all in 2011); and five exceedances of the Noise Standard criteria. (There were no reported exceedances of the QoLPS for opacity, odor, lighting, or navigation during Phase 2.)

Descriptions of each of these exceedances, including its date, location, measurement, activities being conducted, date on which EPA was notified, and response actions taken (where required), were presented to EPA in weekly exceedance reports in accordance with the applicable PSCPs, and were included again in the monthly progress reports (in Appendix III).

5.5 RESPONSES TO COMPLAINTS

During Phase 2, GE continued its complaint management program (initiated during Phase 1) in which a toll-free hotline and e-mail address were provided to the public and continuously staffed during project activities[25] so that members of the public could make inquiries or register any complaints about those activities. In most cases, project inquiries requesting information about the project were addressed during the initial communications. In the case of complaints (defined as communications requesting some type of corrective action), the complaints were logged and investigated. During that investigation, a determination was made as to whether the complaint was project-related. If so, GE conducted an evaluation (including monitoring, as appropriate, where the complaint related to a subject for which there were numerical standards, such as noise) to assess the need for and type of mitigation measures, including consultation with EPA as appropriate; and it implemented mitigation measures where warranted. The complainant was then notified of the results of the investigation and any mitigation measures implemented.

The complaints received and response actions taken during each month of Phase 2 were summarized in monthly complaint reports, which were initially submitted to EPA separately and, beginning in May 2013, were included in the monthly progress reports (Appendix III).

5.6 SPECIAL STUDIES

The special studies conducted during Phase 1 were described in detail in Section 2.8 of the Phase 1 Data Compilation (Appendix I). During Phase 2, GE conducted a number of additional (or continued) special studies, which were outlined in the 2011 or Phase RAM QAPP. Those

[25] During the limited habitat construction activities performed in 2016, the hotline was staffed only during working hours.

special studies are listed below, along with references to reports where the studies performed are described and the results presented:[26]

- Dam Volatilization Study, described in Technical Memorandum entitled "Dam Volatilization Special Study Results," dated November 28, 2011 (Anchor QEA 2011b);
- Study on Tributary Inputs of Solids and PCBs, described in Technical Memorandum entitled "Results of Special Study on Tributary Inputs of Solids and PCBs," dated November 29, 2011 (Anchor QEA 2011c);
- Study on EoC, Residuals, and Missed Inventory, described in Technical Memorandum entitled "EoC, Residuals, and Missed Inventory Special Study Results," dated December 6, 2011 (Anchor QEA 2011d);
- Study on PCB Release, Fate, and Transport, described in Technical Memorandum entitled "Results of Special Study on PCB Release, Fate, and Transport," dated December 21, 2011 (Anchor QEA 2011e);
- Far-Field Station Diagnostic Testing Studies, described in Technical Memorandum entitled "Results of Diagnostic Testing Special Studies," dated January 3, 2012 (Anchor QEA 2012d);
- Baseline Surface Sediment Concentration Study, described in Technical Memorandum entitled "Results of Baseline Surface Sediment and Downstream PCB Deposition Special Studies," dated January 27, 2012 (Anchor QEA 2012e), and in the annual DSRs for 2012 (Anchor QEA 2013) and 2013 (Anchor QEA 2014) (copies included in Appendix V);
- Downstream PCB Deposition Study, also described in the January 27, 2012 Technical Memorandum entitled "Results of Baseline Surface Sediment and Downstream PCB Deposition Special Studies" (Anchor QEA 2012e), and in the annual DSRs for 2012 (Anchor QEA 2013) and 2013 (Anchor QEA 2014) (copies included in Appendix V);
- Stillwater Buoy-Based Testing Study, described in Technical Memorandum entitled "Evaluation of Buoy-based Far-field Monitoring Station at Stillwater," dated December 13, 2012 (Anchor QEA 2012f);
- Pumpkinseed Age Fish Study, described in Section 4.2.5 of the annual DSR for 2011 (Anchor QEA 2012c) (copy included in Appendix V); and

[26] In a letter dated August 15, 2012, EPA stated that it had completed its review of the reports on the first seven special studies listed below and that it accepted those reports with certain attached comments. That letter also noted that, based on discussions between EPA and GE, EPA understood that the Sediment NAPL Study, which was called for in the 2011 RAM QAPP to characterize the NAPL in certain sediments slated for removal in 2011, could not be completed, and that thus no report would be submitted on that study.

- Black Bass Fillet Ribcage Study, proposed in a letter to EPA dated April 23, 2014, with the results reported in Section 4.6.5 of the annual DSR for 2014 (Anchor QEA 2015) (copy included in Appendix V).

SECTION 6

OTHER ACTIVITIES

This section describes two additional sets of activities that GE performed during the dredging project: (1) cultural and archaeological resource assessments and associated avoidance, protection, or mitigation actions; and (2) community outreach activities.

6.1 CULTURAL AND ARCHAEOLOGICAL RESOURCE ASSESSMENTS AND ASSOCIATED ACTIVITIES

As noted in Section 1.4, GE conducted a CARA program during the RA in accordance with the approved CARA Work Plan (URS 2003) and numerous other EPA-approved work plans and consistent with Section 106 of the National Historic Preservation Act and its implementing regulations (36 CFR Part 800), as well as the Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State, adopted by the Office of Parks, Recreation, and Historic Preservation (OPRHP 1994). This program included the performance of assessments prior to dredging to identify and evaluate the potential presence of cultural, archaeological, and historical resources that could be affected by the RA, to assess whether those resources would meet the criteria for eligibility in the National Register of Historic Places (NRHP), and, where necessary, to evaluate measures to avoid, minimize, or mitigate impacts on any such resources. In a number of instances where potentially eligible resources were identified, GE undertook actions to avoid impacting those resources or to mitigate impacts on such resources. In addition, during the course of dredging, various unanticipated archaeological items were discovered, and GE took actions, as appropriate. in response to those discoveries. To address some of the impacted resources and unanticipated discoveries, EPA entered into Memoranda of Agreement (MOAs) with NYSDEC, the New York State Historic Preservation Office (NYSHPO), and other relevant entities (not including GE) specifying certain mitigation or response tasks, some of which GE performed under EPA oversight and some of which were performed by the Lake Champlain Maritime Museum (LCMM) with GE funding.

This section summarizes these activities. Since the Phase 1 Data Compilation and Phase 1 Construction Completion Report did not describe CARA activities or data during Phase 1, this section discusses those activities and results for both Phase 1 and Phase 2.

6.1.1 Cultural and Archaeological Resource Assessments

In accordance with the CARA Work Plan and other, specific work plans, GE conducted numerous and extensive pre-dredging assessments of both aquatic areas and terrestrial shoreline areas that could be affected by the planned dredging activities, as well as support activities, to evaluate: (a) the potential for such areas to contain cultural, archaeological, and/or historical

resources; (b) whether such resources would likely be affected by project activities; and (c) whether any affected resources would be considered significant – i.e., would meet the criteria for eligibility for listing on the NRHP. These assessments involved various techniques, including literature research, review of remote geophysical survey results, on-site visual reconnaissance, land-based photography and underwater photography and videography, diver investigations of underwater resources, land-based field excavations such as shovel test pits and/or test units, and laboratory analysis of recovered artifacts. Based on these assessments, archaeological resources (also referred to as archaeological sites) associated with the dredge or support areas were identified, and a determination was made as to whether those resources met the eligibility criteria for the NRHP and whether they would be impacted by dredging or support activities. For resources that met the eligibility criteria and would be impacted, GE proposed and EPA determined, in consultation with the NYSHPO, the appropriate action to address such resources – e.g., avoidance or protection of the resources or, for resources that could not be avoided or protected, the implementation of mitigation actions.

Numerous reports were submitted on these assessments. Those reports are listed, for both Phase 1 dredge areas and Phase 2 dredge areas, in the List of Archaeological Sites Investigated and Archaeological Reports Prepared for Upper Hudson Dredging Project, which is attached as Appendix VI. That document also lists, for Phase 1 and Phase 2 areas, respectively, the archaeological sites identified, their eligibility for the NRHP, and their treatment during the dredging project.

6.1.2 Avoidance, Protection, and Mitigation Actions

As indicated above, when archaeological resources were identified that met the criteria for eligibility for the NRHP and would be impacted by project activities, actions were taken to avoid those resources during dredging or related activities (e.g., through dredging offsets incorporated into the design) or to protect them during such activities, or, in situations when that was not feasible, actions were taken to mitigate the impact to the resources. As indicated above, EPA entered into MOAs with NYSDEC, the NYSHPO, and other interested parties (but not GE) to specify certain mitigation or other response actions for affected NRHP-eligible archaeological resources. There was one such MOA for Phase 1, effective February 18, 2009, and one for Phase 2, effective May 19, 2015. GE conducted some of the activities specified in these MOAs under EPA oversight. Other specified activities were conducted by the LCMM under agreements between GE and the LCMM, with funding provided by GE in lump-sum payments of specified amounts agreed upon with EPA and the LCMM for each MOA.

The avoidance, protection, and mitigation actions taken during Phases 1 and 2 to avoid or protect, or mitigate impacts to, significant archaeological resources that met the eligibility criteria for the NRHP are summarized in Table 6-1.

6.1.3 Unanticipated Discoveries

During the course of dredging, a number of unanticipated archaeological items were discovered. For Phase 2, GE prepared and submitted annual reports describing the unanticipated discoveries during each year of dredging and the actions taken in response to those discoveries.[27] Those Unanticipated Discoveries Reports for each Phase 2 year from 2011 through 2015 are provided in Appendix VII. In some cases, archaeological items discovered during dredging were conserved by the LCMM under the pertinent agreements between GE and the LCMM, as noted in the notes in Table 6-1.

Table 6-1 Avoidance, Protection, and Mitigation Measures Taken for Significant (or Potentially Significant) Archaeological Resources

Resource Description	State Site #	Action Taken
Phase 1		
Sailing boat shipwreck located near Rogers Island (URS Resource U-2)	A115.42.000330	Data recovery prior to removal
Wooden barge/canal boat shipwrecks (URS Resources U-8, U-9, U-10)	A115.42.000336	Dredge design modified to avoid these resources
Timbers associated with historic Fort Edward (URS Resource H-2)	A115.42.00003	Data recovery for some after inadvertent impact; others protected in place by backfill and riprap; also covered by Phase 1 LCMM agreement*
Multi-component archaeological site, including foundation of 19th century Jones-Rogers estate (URS Resource L)	A091.13.00072	Protected in place through design specifications
Jones/Rogers Site, including remnants of historic mansion plus prehistoric site (associated with Work Support Marina)	A09113.000059	Dredge design modified to avoid remnants of former mansion; focused data recovery for rest
Champlain Barge Canal (including Lock 8 and East Street Highway Bridge)	Part of NRHP # 14000860	Covered by Phase 1 LCMM agreement*

[27] Such a report was not required for Phase 1.

Resource Description	State Site #	Action Taken
Phase 2		
Remains of training dike near Three Sisters Islands (also known as Belle Island dike), which was part of historic Barge Canal system (in CUs 31- 33)	A115.06.000675	Dredge design modified to avoid this resource
Remains of early 19th century wooden revetment related to construction of Champlain Canal (in CUs 40-42)	A115.06.000676	Dredge design modified to avoid this resource
Shoreline archaeological site near Moses Kill containing prehistoric components (URS Resource GI-e) (adjacent to CUs 56 and 57)	A115.06.000667	Dredge design modified to avoid this resource
Site of historic Fort Miller (URS Resource LL-H) (associated with Landlocked Barge Loading Area)	A091.14.000009	Key area with intact fort-related features (Zone C) avoided; resources in area with some artifacts (Zone B) protected
Timber cribwork structure that was component of Lock 6 (likely pier) and thus the historic Barge Canal system (in CU 67)	A115.06.000677	Dredge design modified to avoid this resource
Remnants of stone cribwork log boom used during 20th century logging operations (in CUs 73 – 75)	A115.08.000652	Dredge design modified to avoid this resource.
Remnants of 19th century Billings Boatyard (adjacent to CU 77)	A091.14.000021	Dredge design modified to ensure avoidance of this resource.
Archaeological site near Lock 5 with prehistoric and historic components, known as Hudson Crossing property (northern portion of URS Resource Area B) (evaluated as potential work support facility)	A091.14.000025	Not used as work support facility or for any project activities

Resource Description	State Site #	Action Taken
Site with historic and prehistoric artifacts at location of Rensselaer Barge Loading Area (URS Resource MBLA-1)	Pending	Facility design modified to avoid this resource; then resource protected (fenced off)
Historic stone and wooden cribs in CU 96-2 associated with historic Mechanicville Hydroelectric Dam and Power Plant	Associated with # A091.16.000155 (NRHP # 91NR00034)	Data recovery prior to and during removal; off-site mitigation per Phase 2 LCMM agreement**.
Barge wreck located in CU 99	A091.118.000239	Data recovery prior to and during removal; off-site mitigation per Phase 2 LCMM agreement**
Historic 19th century structural features at site of support area for CU 60-2	Pending	Support area facilities redesigned to avoid these resources; then resources protected (fenced off)

* The Phase 1 LCMM agreement called for the LCMM to: (a) conduct a survey of the section of the Champlain Canal near Fort Edward to inventory and record structural features of the Canal; (b) compile an oral history of the Phase 1 dredge areas in the historic Hudson River corridor; (c) create an exhibit dedicated to riverine culture and technology of the Upper Hudson River/Champlain Canal; (d) provide detailed documentation supporting the establishment of a Rogers Island historic district including URS Resources U-3, U-4 & U-4A, U-8, U-9, and U-10; (e) conserve five timbers from historic Fort Edward that were inadvertently dislodged; and (f) conserve a cast-iron propeller recovered during Phase 1 dredging.

** The Phase 2 LCMM agreement called for the LCMM to: (a) conduct an underwater archaeological investigation of an off-site historic shipyard; (b) conserve a barrel buoy recovered during Phase 2 dredging; (c) facilitate modifications to the NYS Cultural Resource Information System (CRIS); and (d) input information on submerged resources into the CRIS database.

6.2 COMMUNITY OUTREACH ACTIVITIES AND INSTITUTIONAL CONTROLS

Throughout the performance of both Phase 1 and Phase 2, GE conducted substantial community outreach activities in accordance with the original and the Phase 2 CHASP Scopes. These activities were described in the Community Health and Safety Plans (CHASPs) issued for each year of dredging. Those CHASPs described the project operations planned for the year in question, actions to be taken to address the QoLPS and the Resuspension Standard (as well as the substantive WQ Requirements), the management of other potential hazards, site safety personnel responsibilities, release/spill reporting and response, and emergency response measures (including a listing of all local community, state, and other emergency response organizations and their roles and all local medical facilities). The CHASPs also described the measures implemented (or to be

implemented) to protect public and private water supplies, the community education and notification program, and the complaint management program – each of which is summarized below. This section also summarizes the continuation of the fish consumption advisory and fishing restriction on the Upper Hudson River during the RA.

Protection of Water Supplies: During the RA, GE implemented a number of contingency measures and institutional controls to protect public and private water supplies. These measures and institutional controls are described in this section.

For the protection of public water supplies, EPA selected contingency measures prior to Phase 1 for the municipal water supply intakes that could potentially be affected by GE's dredging-related activities. For the two municipal water intakes in the vicinity of the project that could draw water directly from the Hudson River – namely, the Town of Halfmoon's municipal water supply intake and the Town of Waterford's municipal water supply intake – the contingency selected by EPA was provision of an alternative water supply through the connection of those water supply intakes to the City of Troy's water supply. Prior to the start of Phase 1 dredging, EPA (with federal and GE funding) constructed the water supply lines and associated facilities to convey water from the City of Troy to those Towns' water supply systems, and it put in place an arrangement to pay those Towns' increased costs of purchasing water from Troy during dredging if certain criteria established by EPA were triggered. Those Towns obtained their water from the City of Troy's water supply throughout the Phase 1 and all Phase 2 dredging seasons.[28]

In addition, EPA and NYSDOH determined that the water supply system of the Village of Stillwater, which used groundwater from a well field near the Hudson River for its municipal water supply and for a portion of the Town of Stillwater's water supply, was under the influence of the Hudson River. As a contingency measure for that system, EPA installed and operated a granulated activated carbon (GAC) system prior to the start of Phase 1. That GAC system operated continuously following installation, including during non-dredging periods, until an alternate water supply connection from the Saratoga County Water Authority to the Village of Stillwater system could be constructed and put into operation. Following design and construction, that water supply connection became operational in the spring of 2012 and remained in operation through the remainder of Phase 2 dredging.

For other municipal water supplies that draw water from the Hudson River or from well fields located near the river, including those of Schuylerville, Green Island, Rhinebeck, Port Ewen, and Poughkeepsie, EPA determined that no contingency measures were necessary apart from the

[28] The Phase 2 PSCPs and CHASPs specified additional contingency measures (including expedited sampling and notification) in the event that, at any time during dredging, either the Town of Halfmoon or the Town of Waterford was unable to obtain water supplies from the City of Troy and reverted to using Hudson River water. Those additional contingency measures, however, did not have to be implemented.

contingency monitoring and response actions described in the annual PSCPs to meet the requirements of the Resuspension Performance Standard and the substantive WQ Requirements.

For private water supplies, EPA and GE undertook surveys and investigations to identify the properties with water intakes from the Hudson River. The households identified with intakes used to provide river water for drinking or other household uses were offered bottled water delivery service and/or bulk potable water delivery. For households where river water was reportedly being used for various outdoor activities (e.g., filling swimming pools, watering lawns or gardens) and for commercial agricultural users of river water for crop irrigation, GE informed those water users when project activities upstream of their intakes were scheduled to begin, and it coordinated with NYSDOH to inform those property owners of NYSDOH's recommendations regarding their water use during implementation of the dredging.

Community Education and Notification Program: GE implemented a community education and notification program during the dredging project. This program included the issuance of periodic progress reports on the project, the maintenance of a project website to provide information about the project, the establishment of a toll-free hotline for inquiries about the project, participation in public meetings (including meetings of the Community Advisory Group established by EPA) as requested by EPA, communications and meetings with shoreline property owners to explain upcoming dredging-related activities and/or the establishment of support facilities in their area, communications with private river water users regarding the provision of alternate water supplies or the schedule of project activities upstream of their properties (as described above), communications with local elected officials about the project, provision of project-related information to the NYSCC for its weekly Notices to Mariners, and the holding of drills for local emergency responders and project personnel.

Complaint Management Program: GE also implemented a complaint management program during both phases of the dredging project. That program involved the provision of a toll-free hotline and e-mail address to the public, staffed 24 hours per day during project activities (or during working hours in 2016), so that members of the public could make complaints (defined as communications requesting some type of corrective action) about project activities. As discussed in Section 5.5 above, all complaints were logged and investigated; and if a complaint was determined to be project-related, an evaluation was made regarding the need for and type of mitigation measures, mitigation measures were implemented where warranted, and the complainant was notified of the results of the investigation. As also noted in Section 5.5, the complaints received and response actions taken were summarized in monthly complaint reports, which were initially submitted to EPA separately and, beginning in May 2013, were included in the monthly progress reports (in Appendix III).

Continuation of Fish Consumption Advisory and Fishing Restriction: In addition to the institutional controls relating to water supplies (as described above), the fish consumption advisory

issued by NYSDOH and the fishing restriction issued by NYSDEC remained in place as institutional controls during the RA to protect public health in the Upper Hudson River. The fish consumption advisory advises people not to eat fish from the section of the Upper Hudson River subject to the RA, and the fishing restriction limits fishing to catch-and-release in that section. In accordance with the CD, GE provided $4 million in funding to Health Research, Inc. of Rensselaer, New York, to support the State's implementation of that fish consumption advisory and fishing restriction. That advisory and restriction continue to remain in place after completion of the RA.

SECTION 7

FINAL DEMOBILIZATION

At the end of each dredging season, the equipment used for dredging and other on-water operations during that season was demobilized, and the equipment that had come into contact with PCB-containing sediments was decontaminated in accordance with the procedures specified in the applicable RAWP. There were two levels of equipment contamination – one for equipment that would remain for potential project use in future years, and the other for equipment that would no longer be used on the project. In addition, the sediment processing facility and associated rail yard, as well as temporary land-based support facilities, were shut down and winterized for the upcoming off-season. Upon the final completion of use for the project, the equipment and facilities were permanently demobilized and restored. This section summarizes the final demobilization and restoration of the main sediment processing facility at the conclusion of the project, as well as the final demobilization and close-out of the support facilities used in the project.

7.1 DEMOBILIZATION AND RESTORATION OF SEDIMENT PROCESSING FACILITY

Paragraph 36.e of the CD required GE to restore the property used for the sediment processing facility and associated areas following their use in the RA, and Section 3.1.4 of the SOW required GE to submit a plan for the demobilization and restoration of that facility. In 2015, in accordance with those requirements, GE submitted a *Phase 2 Sediment Processing Facility Demobilization and Restoration Plan* (SPF Demobilization Plan; Arcadis 2015a), presenting a detailed description of GE's plans for final demobilization and restoration of the sediment processing facility. The activities described in that plan included: facility decontamination; post-decontamination sampling of equipment, structures, and other materials used in the facility; removal, demobilization, and off-site disposition of equipment, structures, and materials; post-decontamination environmental sampling; and property restoration. The demobilization and restoration activities took into account assumed future uses of the equipment, structures, and property, which were developed in consultation with EPA, the local municipalities, the NYSCC, and the other applicable property owners (i.e., WCC, LLC [WCC] and the Canadian Pacific Railway [CPR]). EPA provided approval for individual demobilization activities on a periodic basis in 2015; and after providing an opportunity for public review, EPA approved the overall SPF Demobilization Plan by letter dated November 12, 2015, subject to a number of comments attached to EPA's letter.

GE commenced facility demobilization activities in late summer 2015 and continued those activities through November 2016, with final sampling results received and a final shipment of

decontamination waste in early December 2016. The post-decontamination environmental sampling program was likewise conducted between late 2015 and November 2016, and restoration activities were completed in December 2016. During the course of these activities, GE submitted and EPA approved various additional plans for specific activities (e.g., reconstruction of the stormwater basins to remain at the facility after demobilization); and GE discussed with EPA, and received EPA concurrence with, other aspects of the demobilization and restoration. The demobilization, sampling, and restoration activities were conducted in accordance with the approved SPF Demobilization Plan and other EPA-approved plans and concurrences. During the course of these activities, EPA's comments in its November 12, 2015 approval letter were addressed. Further, the water treatment plant continued to operate during demobilization activities to treat stormwater and decontamination water (with reduced equipment toward the end of the demobilization period) until November 17, 2016, when it was totally shut down, with the final discharge of treated water on November 22-23, 2016. Decontamination water generated after the WTP was shut-down, was collected in a frac-tank and transferred to GE Hudson Falls treatment plant for treatment and discharge under EPA and NYSDEC approval.

Subsections 7.1.1 through 7.1.7 below describe the decontamination, sampling, demolition, and final disposition of the following key elements of the facility:

- Equipment, tanks, and piping;
- Structures;
- Asphalt and concrete surfaces;
- Stormwater drainage piping and structures;
- Stormwater basins, pump stations, and force main piping;

A more detailed description of the decontamination activities and results for equipment, structures, piping, asphalt and concrete surfaces, and other items intended for potential reuse or salvage/recycling, all in accordance with the SPF Demobilization Plan, are presented in the Sediment Processing Facility Decontamination Report (SPF Decontamination Report) in Appendix VIII. The PCB criteria used to determine the appropriate use of the decontaminated materials, equipment, and structures were provided in a table presented as Appendix B to the SPF Demobilization Plan, which had been previously reviewed and approved by EPA in consultation with NYSDEC and which is included as Attachment A to the SPF Decontamination Report in Appendix VIII. These included criteria for unrestricted use, which generally involved PCB concentrations below 10 micrograms per 100 square centimeters ($\mu g/100\ cm^2$) for surfaces sampled by wipe sampling and below 1 ppm for materials sampled in bulk (or, for some items, appropriate cleaning).

Additionally, GE conducted a post-decontamination environmental sampling program for soil, groundwater, sediment, and surface water at and immediately adjacent to the facility. That program is summarized in Section 7.1.8 below, with additional details presented in the Sediment Processing Facility Environmental Sampling Data Summary Report (SPF Environmental Sampling Report) provided in Appendix IX. A description of the final inspection and turn-over of property ownership is presented in Section 7.1.9.

7.1.1 Equipment Tanks, and Piping

The processing equipment (e.g. equipment, tanks, piping, pumps, supports, and associated appurtenances) as well moveable equipment (e.g., unloaders, trucks, skidsteers, loaders) within the exclusion zone that came into contact with PCB-containing materials, process water, or stormwater were decontaminated and demobilized from the site as described in Section 3.5 of the SPF Demobilization Plan. Specifically, the processing equipment and moveable equipment within the unloading/size separation area at the wharf, dewatering building, water treatment building, filter cake storage buildings, CMSAs, and rail yard loading area were decontaminated, sampled as described in Appendix A of the SPF Demobilization Plan, and properly disposed of at a TSCA landfill, or demobilized from the site for unrestricted re-use and/or salvage/recycling per Appendix B of the SPF Demobilization Plan. Certain equipment, such as electrical substations and switchgear, filter presses, and water treatment units, meeting the criteria for unrestricted use as described above will remain at the Facility until removed from the Facility for unrestricted re-use and/or salvage/recycling.

7.1.2 Structures

The water treatment plant, dewatering building, and filter cake enclosures were decontaminated as described in Section 3.6 of the SPF Demobilization Plan and sampled as described in Appendix A of that plan. The rail yard support building and administrative area trailers, which were located outside the exclusion zone and did not come into contact with PCB containing sediment, were not subject to decontamination or sampling.

The post-decontamination sampling results for the water treatment plant met the criteria for unrestricted use as described above. The structural components, appurtenances, and floor slab of the water treatment plant will remain in place. The discharge piping was plugged at the Canal and at the WTP with mechanical plugs. The discharge outlet structure at the Champlain Canal remains in place.

The post-decontamination sampling results for the dewatering building met the criteria for unrestricted use as described above. The structural components, appurtenances, and floor slab of the dewatering building will remain in place. The underground piping beneath the dewatering building was decontaminated, and the entire length was grouted with flowable fill and abandoned in place

The post-decontamination sampling results for all components of the filter cake enclosures except for the fabric and asphalt floor surfaces met the criteria for unrestricted use as described above. Bulk samples of the building fabric exceeded the criteria for unrestricted use, and the fabric was removed from the structures for off-site disposal. Bulk samples of the top surface of the asphalt floor exceeded the criteria for unrestricted use, and the top 1 to 1½ inches of the asphalt floor were milled and shipped off-site for proper disposal. Following removal, the areas were re-paved with an asphalt top-coat to meet surrounding grades. The structural frame and appurtenances of the filter cake enclosures (e.g. lighting system, doors, exhaust hoods, connectors) met the criteria for unrestricted use and were removed from the site for unrestricted re-use. The concrete knee walls supporting the structural frame met the criteria for unrestricted use and will remain in place.

7.1.3 Asphalt and Concrete Surfaces

Asphalt and concrete surfaces within the exclusion zone (e.g., unloading wharf, size separation areas, CMSAs, haul roads, concrete containment walls, rail yard loading platform along the railroad track (Track 7), and tank/equipment foundations) were decontaminated as described in Section 3.7 of the SPF Demobilization Plan and sampled as described in Appendix A of that plan. To access the rail components in the Track 7 loading area, the concrete panels were removed, and the underlying gross sediments and debris were sampled and removed. A summary of the decontamination procedures and verification sampling results for the asphalt and concrete surfaces (as well as associated and sub-base materials) is presented in the SPF Decontamination Report in Appendix VIII.

Apart from the floors of the structures discussed in Section 7.1.2, the post-decontamination sampling results for the asphalt and concrete surfaces met the criteria for unrestricted use as described above and will largely remain in place. In discrete areas, such as around equipment at the wharf and the swales associated with the stormwater basins, asphalt was removed as necessary to facilitate other demobilization and restoration activities, and was shipped off-site for beneficial re-use.

7.1.4 Stormwater Drainage Piping and Structures

Stormwater HDPE piping, and associated catch basins, manholes, and under-drain system in the exclusion zone were decontaminated as described in Section 3.8 of the SPF Demobilization Plan and sampled as described in Appendix A of that plan. A summary of the decontamination procedures and verification sampling results for the stormwater drainage piping, structures, and under-drain system is presented in Appendix VIII.

The post-decontamination sampling results for the stormwater drainage piping and structures met the criteria for unrestricted use as described above and will remain in place.

The post-decontamination sampling results for the stormwater under-drain system met the criteria for unrestricted use as described above. That system will remain in place in its current condition, except for the pump-out/monitoring risers. The under-drain pump-out/monitoring risers were abandoned by drilling to penetrate about 2 feet below the exclusion zone flexible membrane liner (FML). The boring was backfilled with granular drainage material from about 2 feet below the FML to about 2 feet above the FML to minimize perching of water above the liner system. Above the granular backfill, the remainder of the pump-out/monitoring risers was backfilled with bentonite and sealed at the surface with a concrete grout mix.

7.1.5 Stormwater Basins and Pump Stations

The three stormwater basins (the Waterfront Basin, South Basin, and North Basin) and the associated pump stations were decontaminated as described in Section 3.9 of the DRP and sampled as described in Appendix A of the SPF Demobilization Plan. A summary of the decontamination procedures and verification sampling results for the stormwater basins and pump stations is presented in Appendix VIII.

The post-decontamination sampling results for the stormwater basins and pump stations met the criteria for unrestricted use as described above. The concrete liner was removed from each basin, crushed, and shipped-off-site for beneficial re-use. The underlying geotextile and FML components of the liner system were removed and shipped off-site for proper disposal. The pumps station vaults, pumps, and appurtenances were removed for re-use or transported off-site for proper disposal. After removal of the liner system, each basin was reconstructed in accordance with designs approved by EPA and will remain for the continued management of site stormwater runoff.

7.1.6 Stormwater Force Main Piping

The stormwater force main piping from the stormwater basins to the water treatment plant was decontaminated as described in Section 3.10 of the SPF Demobilization Plan. A summary of the decontamination procedures is presented in Appendix VIII. After decontamination, each of the three stormwater force main piping systems was grouted and the piping was abandoned in place.

7.1.7 Subsurface Sub-Base Layer and Sand Layer

The sub-base layer and sand layer installed beneath asphalt and concrete pavement surfaces and above the FML within the exclusion zone was sampled as described in Section 3.11 of the SPF Demobilization Plan. A summary of the verification sampling results for the subsurface sub-base and sand layers is presented in Appendix VIII, demonstrating these materials meet the criteria for unrestricted as described in Appendix B of the SPF Demobilization Plan.

In discrete areas, such as around equipment foundations at the wharf and the swales associated with the stormwater basins, subsurface sub-base and sand layer materials were

excavated as necessary to facilitate other demobilization and restoration activities. These excavated materials were re-used as backfill within the original excavation or elsewhere on-site.

7.1.8 Post-Decontamination Environmental Sampling

A post-decontamination environmental sampling program was implemented at the facility as described in Section 5 of the SPF Demobilization Plan. Results of the post-decontamination sampling program were compared to data generated during the baseline characterization sampling efforts undertaken prior to the construction and operation of the facility, as well to NYSDEC guidance values and standards (as applicable), as agreed with EPA. The results of the post-decontamination sampling program and comparison of those results to the baseline characterization results and NYSDEC guidance values or standards are provided in the SPF Environmental Sampling Report in Appendix IX.

The post-decontamination environmental sampling program consisted of the collection and analysis of surface soil, subsurface soil, surface water, sediment, and groundwater samples near baseline characterization sampling locations and other selected location at and immediately adjacent to the facility. In addition to GE's sampling, EPA collected soil samples along the edges of the exclusion zone. Although the results from those samples were all less than 1 mg/kg, EPA requested GE to conduct additional sampling in two areas, and GE did so.

As more fully described in Appendix IX, the comparison of the results of the post-decontamination environmental sampling program to the baseline characterization results, as well as to applicable NYSDEC guidance values and standards, identified that no additional sampling or other actions were required, except at four isolated areas where the levels of PCBs in surface soils exceeded the soil criterion required by EPA in consultation with NYSDEC. Specifically, PCBs exceeding that criterion were detected in the surface soils at the following locations and concentrations:

- At sample location SS-301-at the southwest corner of the wharf, total PCBs were detected in the top 2 inches at 1.0 mg/kg;
- At sample location SS-306 at the western shoulder of the intersection of the Route 196 Access Road and the Main Haul Road, total PCBs were detected at 2.1 mg/kg in the top 2 inches and 2.8 mg/kg at 2 to 6 inches;
- At sample location SS-329 at the eastern shoulder of the intersection of the Route 196 Access Road and the Main Haul Road, total PCBs were detected at 1.7 mg/kg in the top 2 inches and 2.9 mg/kg at 2 to 6 inches; and
- At sample locations at the northern edge of the exclusion zone along Track 7, total PCBs were detected in the top 2 inches at 4.2 mg/kg (with a duplicate of 4.6 mg/kg) at SS-340, 1.0 mg/kg (with a duplicate of 1.6 mg/kg) at SS-341, and 1.5 mg/kg at SS-342.

In each of the four areas where the PCB concentrations exceeded the applicable soil criterion, the soil from the top 6 inches to 1 foot was removed for proper off-site disposal. Post-excavation sampling confirmed that total PCB concentrations were less than the applicable soil criterion required by EPA in consultation with NYSDEC. These four areas were backfilled to meet existing grades and restored with topsoil, seed, and mulch.

7.1.9 Waste Disposal

During the course of the demobilization activities, various waste materials resulting from those activities were shipped to appropriate off-site disposal facilities via rail with the final sediment shipments in 2015 and via truck in 2016 with EPA approval. Approximately 2,178 tons of such materials were shipped to off-site disposal facilities in 2016. These included 13 tons of material with PCB concentrations at or above 50 ppm, which were shipped to a TSCA-authorized facility, and 2,155 tons of material with PCB concentrations below 50 ppm, which were shipped to authorized non-TSCA facilities.

7.1.10 Final Inspection and Close-out

On November 30, 2016, a final inspection was conducted at the sediment processing facility site, attended by GE, EPA, NYSDEC, NYSCC, and WCC. During that inspection, it was determined that, in general, the processing facility had been demobilized and restored in accordance with applicable requirements and to the satisfaction of EPA, NYSDEC, NYSCC, and WCC. A few minor follow-up action items were identified, and those actions were subsequently completed. On December 16, 2016, EPA and NYSDEC conducted a follow-up inspection of the processing facility and confirmed that all identified follow-up actions had been completed. Also on December 16, 2016, GE notified EPA of that inspection, as well as the completion of the follow-up actions, and asked EPA to advise GE if it believed that any additional inspections were necessary. GE also notified EPA that it no longer had a need for access to or the lease for the WCC property, and was terminating that lease and returning the property to WCC. It further notified EPA that it no longer had a need or for access to the former NYSCC property that had been taken by EPA or the agreement with EPA regarding that property.

7.2 DEMOBILIZATION AND CLOSE-OUT OF SUPPORT FACILITIES

In addition to the sediment processing facility, numerous properties were used during the dredging project to provide support facilities and activities. These included several barge loading areas, a Work Support Marina, a General Support Property, boat launch areas, crew parking areas, and properties used to provide other, miscellaneous support activities. In addition, land-based support areas were developed to provide supporting facilities and activities for dredging in the unique areas described in Section 2.1.4; these included the ITA for the Landlocked Area and the support areas for CU 60-2 and CUs 95-2 and 95-3. EPA agreed that separate

demobilization/restoration plans were not necessary for each of these support areas, although demobilization/restoration plans for the dredging support areas for CU 60-2 and CUs 95-2 and 95-3 were included in the RAWPs covering those areas. The support areas that were used for handling PCB-containing materials, as well as the other key support areas that were used for significant project activities, were demobilized and restored through removal of equipment and temporary foundations and facilities, decontamination of equipment as necessary, grading and stabilization of the sites, and other appropriate restoration (including wetlands restoration where applicable) – all consistent with agreements with the property owners and with demobilization/restoration requirements in the pertinent RAWPs (where applicable) and subject to EPA approval. Other support areas had minimal disturbance, were used for a relatively short duration, and were not used for handling PCB-containing materials – such as boat launches, temporary crew parking areas, and the like. At each of these properties, when the project use was completed, GE's CM reviewed the property to ensure that there were no remaining project-related issues and that the property was in a condition that was satisfactory to the property owner. The project use was then terminated.

Final inspections of all of these support properties were conducted by GE, EPA, NYSDEC, and NYSCC on November 10, 2016. During these inspections, no items were identified as requiring further action. In its above-mentioned December 16, 2016 letter, GE notified EPA of these inspections.

Table 7-1 lists the support properties and shows, for each such property, the activity conducted, the improvements made, the date of completion of demobilization and restoration or other close-out actions, the status of the property, the final inspection date, and any follow-up items.

Table 7-1. Close-Out of Project Support Properties

Tax ID(s)	Address	Support Activity	Improvements	Demobilization Completed*	Status of Property	Inspection Date	Follow-up
Key Support Properties							
65-1-9	1608-1618 West River Road, Moreau	Moreau Barge Loading Area	Stormwater Pollution Prevention Plan (SWPPP), dense grade, sheeting, electric	By end of 2014	Returned to owner effective 12/31/2014	11/10/16	None
65-1-10	1604 West River Road, Moreau	Work Support Marina	SWPPP, pavement, fence, electric, phone	March 2016	Owned by EPA; no longer needed for project	11/10/16	None
179.-1-7.1	State Route 4 – GE property	General Support Property	Dense grade, electric, SWPPP	June 2016	Returned to owner effective 6/29/2016	11/10/16	None
179.-1-21 (NYSCC)	Old Canal property under Henderson Way		Dense grade, driveway				
179.-1-21 (NYSCC)	Between GE property and River		Dense grade, SWPPP, concrete wall				
195.1-27 (NYSCC)	Along Route 4, Fort Edward	Crocker's Reef crew change parking area	Dense grade, SWPPP, electric	May 2016	Returned to owner effective 6/29/2016	11/10/16	None
195.1-27 (NYSCC)	Crocker's Reef Isthmus – CU 60-2 land	CU 60-2 support area	Dense grade, SWPPP, PCB handling	June 2016	Returned to owner effective 6/29/2016	11/10/16	None
195.1-27 (NYSCC)	State Route 4 north of guard gate		Minor grading, dense grade				
195.-1-27 (NYSCC)	1495 State Route 4	Isthmus Transload Area	Dense grade, concrete, SWPPP, PCB handling	June 2016	Returned to owner effective 6/29/2016	11/10/16	None
118.-1-41.3	West River Road, Northumberland	Entrance to Landlocked Barge Loading Area	Grading, dense grade, SWPPP	May 2016	Returned to owner effective 6/15/2016	11/10/16	None

* Demobilization includes stabilization and restoration as necessary

Tax ID(s)	Address	Support Activity	Improvements	Demobilization Completed*	Status of Property	Inspection Date	Follow-up
118.1-41-2	West River Road, Northumberland	Road leading to Landlocked Barge Loading Area	Grading, dense grade, SWPPP	May 2016	Returned to owner effective 6/15/2016	11/10/16	None
118.-1-9.112	West River Road, Northumberland	Landlocked Barge Loading Area	Grading, dense grade, SWPPP	June 2016	Returned to owner effective 8/16/2016	11/10/16	None
157.1-47	Route 4N, Northumberland	Saratoga Barge Loading Area	Grading, dense grade, SWPPP	June 2016	Returned to owners effective 6/30/2016	11/10/16	None
157.1-12			Dense grade				
157.1-10			Dense grade, grading, SWPPP				
157.1-9.23			Dense grade, grading, SWPPP, electric				
157.-1-9.221	165 Route 4N, Northumberland	Saratoga Barge Loading Area	None	August 2016	Returned to owner effective 8/16/2016	11/10/16	None
30.-3-6	River Road, Schaghticoke	Rensselear Barge Loading Area	Dense grade, grading, SWPPP, electric	May 2016	Returned to owner effective 5/31/2016	11/10/16	None
30.-3-36	River Road, Schaghticoke	Support area for CUs 95-2 and 95-3	Grading, dense grade, SWPPP	May 2016	Returned to owner effective 5/31/2016	11/10/16	None

* Demobilization includes stabilization and restoration as necessary.

Tax ID(s)	Address	Support Activity	Improvements	Project Use Completed**	Status of Property	Inspection Date	Follow-up
Other Support Properties							
92.1-9	1442 West River Rd., Northumberland	Right-of-way access to West Griffin Island remedial work area	None	August 2014	Closed	11/10/16	None
203.-1-6	45 North River Rd., Fort Edward	Boat launch	Grading, dense grade	September 2016	Privately owned boat launch	11/10/16	None
118.1-1.111	847 West River Road, Northumberland	Boat launch	Grading, concrete, dense grade	Summer 2014	Privately owned boat launch	11/10/16	None
211.7-1-10	88 Fort Miller Road, Greenwich	Boat launch and dock for loading plants for habitat construction	Dense grade	Fall 2014	Closed	11/10/16	None
157.72-1-24	1 Ferry Street, Schuylerville	Crew parking & docks	None	Fall 2014	Active commercial marina	11/10/16	None
243.-1-6.1	2349 County Rt. 113, Easton	Temporary wood chip off-loading area	None	Summer 2013	Closed	11/10/16	None
243.84-2.14	842 Hudson Ave., Stillwater	Temporary crew parking and docks	None	Fall 2014	Active commercial marina	11/10/16	None
259.-1.32	1664 County Rt. 113, Easton	Temporary crew parking	Dense grade	Summer 2014	Closed	11/10/16	None
20-21-12	Champlain Canal Lock 3	Temporary crew parking	None	Fall 2014	NYSCC public parking area	11/10/16	None
262.62-1-2	Mechanicville City Dock	Boat dock for loading plants for habitat construction	None	Summer 2015	Public parking area and boat launch	11/10/16	None

** Property was reviewed by CM to ensure that there were no remaining project-related issues and that the property was in a condition that was satisfactory to the owner.

Tax ID(s)	Address	Support Activity	Improvements	Project Use Completed**	Status of Property	Inspection Date	Follow-up
21.13-1-3	Waterford Boat Launch	Temporary crew parking	None	Fall 2012	NYSCC public parking area	11/10/16	None
183-1-19	Alcove Marina, 886 US Route 4	Crew parking and docks	None	Fall 2012	Active commercial marina	11/10/16	None
203.-1-2.3	Senecal Lane	Emergency access to Isthmus Transload Area	None	Summer 2016	Closed	11/10/16	None
286.1-48	Champlain Canal Lock 1	Temporary crew parking and boat launch	None	Fall 2015	NYSCC public parking area and boat launch	11/10/16	None

** Property was reviewed by CM to ensure that there were no remaining project-related issues and that the property was in a condition that was satisfactory to the owner.

SECTION 8

COMPLETION INFORMATION

8.1 CU ACCEPTANCE PACKAGES AND RECORD DRAWINGS

All CU completion/acceptance packages, as described in Section 5.2 of the SOW, have been submitted to and approved by EPA. These include the CU Dredging Completion Approval Form (Form 1) packages, the CU Backfill/Engineered Cap Completion Approval Form (Form 2) packages, and the Final CU Construction Completion Certification Form (Form 3) packages. Those for Phase 1 were listed, by CU and date, in the Phase 1 Construction Completion Report (Appendix II hereto), and the Form 3s were included in an attachment to that report. For the first year of Phase 2, the record drawings provided to EPA as part of the CU Form 2 packages in 2011 were included in the Annual Progress Report for Phase 2 Year 1 (Appendix IV-1 hereto), and the complete Form 1 and Form 2 packages for the Phase 2 Year 1 CUs are provided in an Annex to Appendix IV-1.[29] For the remaining years of Phase 2, all CU acceptance packages (including record drawings) provided to EPA for the CUs where the activities involved were performed in the subject year are included in the Annual Progress Reports for Phase 2 Years 2 through 6 (Appendices IV-2 through IV-6).

8.2 CU COMPLETION REPORTS

Section 5.2 of the SOW also required (in Section 5.2.4) that, following the signing by both GE and EPA of a Final CU Construction Completion Certification Form (Form 3) for a given CU, GE must prepare and submit to EPA a CU Completion Report. CU Completion Reports have been completed for all CUs in the project. Those for Phase 1 were included in the Phase 1 Construction Completion Report (Appendix II hereto), and those for Phase 2 were provided in the Annual Progress Reports for Phase 2 Years 2 through 6 (Appendices IV-2 through IV-6).

8.3 FINAL COMPLETION INSPECTIONS

As discussed in Section 1.1, GE and EPA agreed in 2016 that, given the detailed process for documenting and obtaining EPA approval of the completion of each step of the in-river activities (i.e., dredging, backfilling/capping, and habitat replacement/reconstruction) in each CU, the inspections conducted of each CU at the conclusion of each of those steps would satisfy RA Completion Pre-Final Inspection requirement for those in-river activities and areas. As a result, an underwater inspection of each CU was not required by EPA. A river shoreline inspection was

[29] This Annex is included because those form packages for Phase 2 Year 1 were not included in the Annual Progress Report for Phase 2 Year 1.

conducted as part of the support properties inspection completed on November 10, 2016, as described below.

GE and EPA also agreed in 2016 that, due to the termination of GE's leases, license agreements, use and occupancy permits, and other arrangements with the owners of various properties used in the project, final early inspections would be conducted of those properties prior to GE's determination that the overall Remedial Action was complete and would be considered to satisfy RA Completion Pre-Final Inspection requirement in Paragraph 57.a of the CD for those properties (subject to EPA's right to require further inspections if necessary). The final early inspections of all project support properties were conducted on November 10, 2016, as shown in Table 7-1 in Section 7.2, and were attended by representatives of GE, EPA, NYSDEC, and NYSCC, with no items identified for follow-up actions. As noted in Section 7.1.10, the final early inspection of the sediment processing facility was conducted on November 30, 2016, attended by representatives of GE, EPA, NYSDEC, NTYSCC, and WCC; and the few minor follow-up actions identified during that inspection were subsequently completed, as confirmed by the follow-up inspection by EPA and NYSDEC on December 16, 2016. On December 22, 2016, GE determined that the Remedial Action had been completed. Further, GE considers that the inspections held on November 10 and 30, 2016 (with the follow-up on December 16, 2016) satisfied the RA Completion Pre-Final Inspection requirement of Paragraph 57.a, given that no additional inspections have been required.

8.4 SIGNATURES AND CERTIFICATION OF COMPLETION

This section provides the signature by a New York registered professional engineer and the certification by GE's Project Coordinator that are required by Paragraph 57.b of the CD.

PROFESSIONAL ENGINEER SIGNATURE

I am a registered professional engineer licensed in the State of New York. This report and its attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted.

Name: A. Jeffrey Mirarchi, P.E. Title: Operations Manager

P.E. Registration: State: New York Number: 066542

Signature: _____

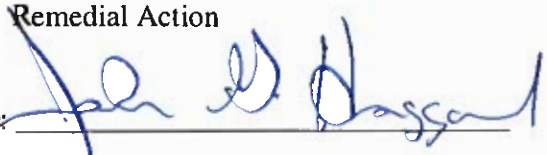
Date: March 1, 2019

GENERAL ELECTRIC CERTIFICATION

I am the General Electric Company's Project Coordinator for the Upper Hudson River Remedial Action Project. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained in or accompanying this submission is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Name: John G. Haggard

Title: GE Leader, Global Remediation, and Project Coordinator for Hudson River Remedial Action

Signature: 

Date: March 1, 2019

SECTION 9

CONCLUSION

Based on the Phase 1 Construction Completion Report and the present report, the Remedial Action for the Upper Hudson River, as described in the 2002 ROD, has been completed in full satisfaction of the requirements of the CD. Accordingly, GE requests EPA's Certification of Completion of the Remedial Action.

SECTION 10

REFERENCES

(Note: Nearly all of the following documents contain a reference in their title to the "Hudson River PCBs Site" or "Hudson River PCBs Superfund Site." To avoid repetition, those words have been omitted from the following list of References.)

Anchor QEA, 2009a. *Habitat Assessment Report for Phase 2 Areas*. Prepared for General Electric Company. Revised December 2009

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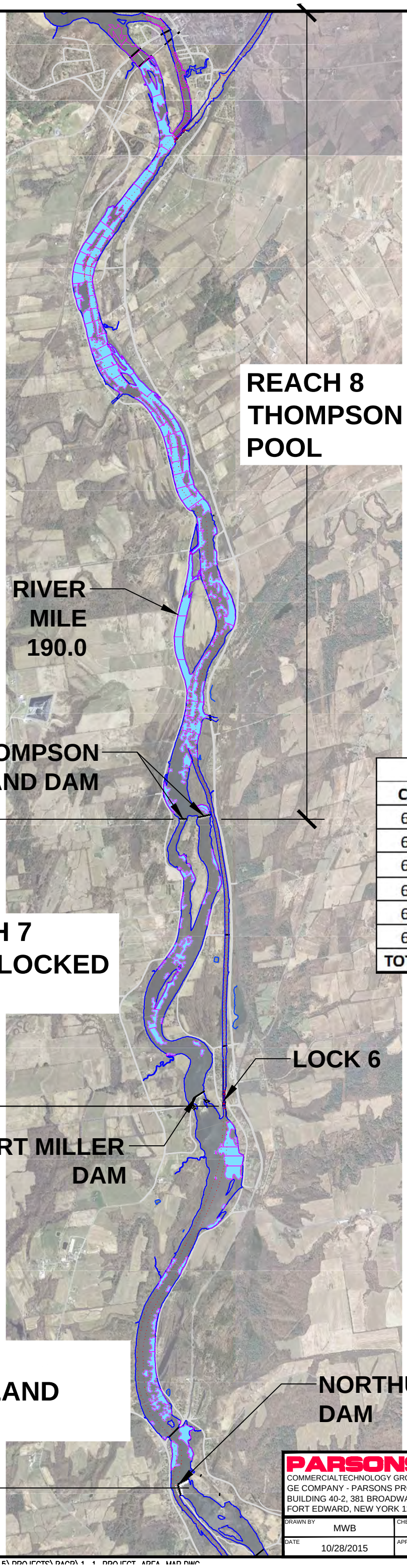
FIGURES

REACH 8	
CU	ACRES
9	4.987
10	4.861
11	4.925
12	4.944
13	4.863
14	5.000
15	4.874
16	5.502
19	4.976
20	5.060
21	4.987
22	5.029
23	5.006
24	5.028
25	5.039
26	4.240
27	4.178
28	4.723
29	4.950
30	4.951
31	4.813
32	4.936
33	5.491
34	3.969
35	5.380
36	5.740
37	6.688
38	5.570
39	5.565
40	5.549
41	5.612
42	5.321
43	5.423
44	4.995
45	4.978
46	5.165
47	3.946
48	5.517
49	6.479
50	5.237
51	5.308
52	5.358
53	5.466
54	5.928
55	5.160
56	5.813
57	5.445
58	6.028
59	4.025
60	5.410
TOTAL	258.437



LEGEND

- CU BOUNDARY
- SHORELINE EL. VARIES PER REACH
- DAM
- PHASE 2 CERTIFICATION UNIT AREA

N

1000 500 0 1000 2000

SCALE: 1"=1000'

REACH 7	
CU	ACRES
61	4.935
62	4.102
63	6.272
64	4.528
65	4.772
66	4.649
TOTAL	29.257

REACH 6	
CU	ACRES
67	5.301
68	5.275
69	5.294
70	5.347
71	4.408
72	5.510
73	5.900
74	4.983
77	4.171
78	2.659
TOTAL	48.847

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DRAWING TITLE
REMEDIAL ACTION COMPLETION PLAN
PHASE 2 DREDGE AREAS
GENERAL SITE MAP
REACH 8-6
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
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DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

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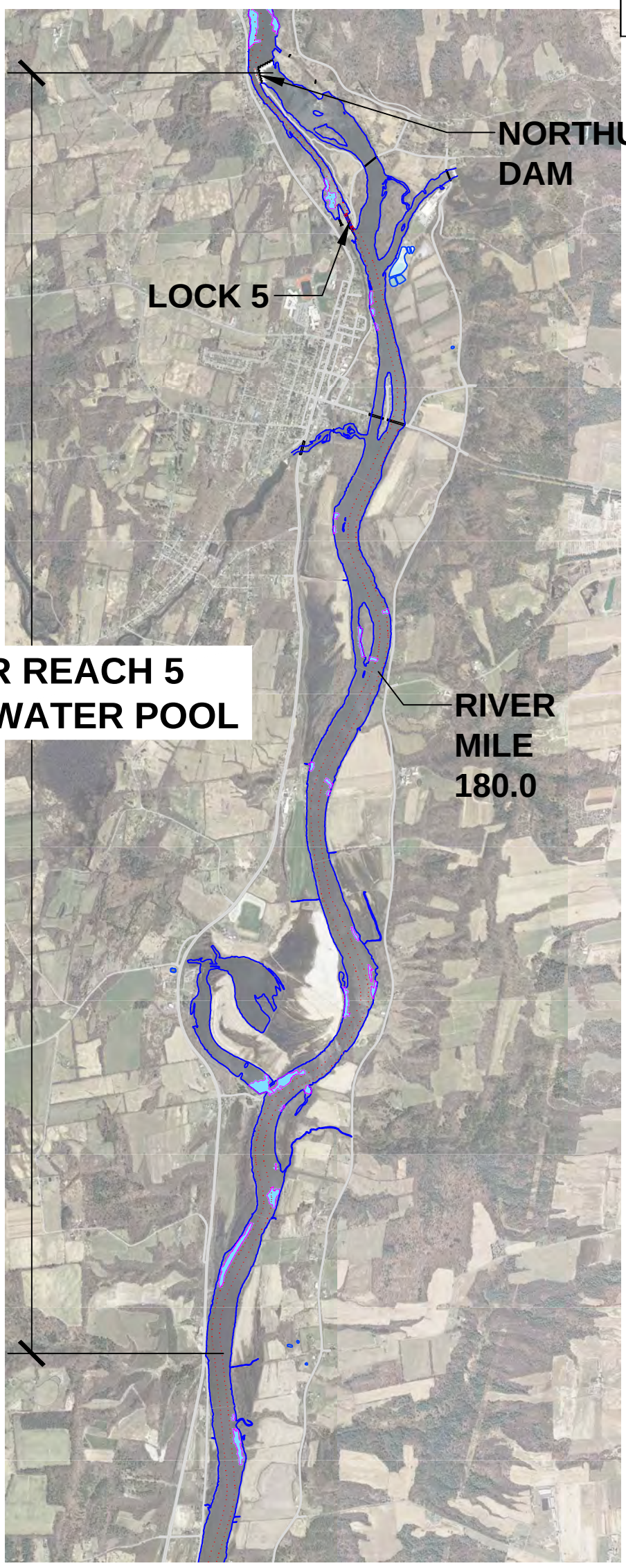
LEGEND

- CU BOUNDARY
- SHORELINE EL. VARIES PER REACH
- DAM
- PHASE 2 CERTIFICATION UNIT AREA



UPPER REACH 5	
CU	ACRES
79	1.126
80	2.520
81	1.218
82	6.875
83	6.598
84	4.593
TOTAL	22.930

N

1000 500 0 1000 2000

SCALE: 1"=1000'

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REMEDIAL ACTION COMPLETION PLAN
PHASE 2 DREDGE AREAS
GENERAL SITE MAP
REACH 5
HUDSON RIVER PCBs SUPERFUND SITE

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LEGEND

- CU BOUNDARY
- SHORELINE EL. VARIES PER REACH
- DAM
- PHASE 2 CERTIFICATION UNIT AREA

N

1000 500 0 1000 2000

SCALE: 1"=1000'

LOWER REACH 5	
CU	ACRES
85	2.691
86	1.541
87	7.097
88	6.126
89	7.293
90	4.825
91	5.530
TOTAL	35.103

LOWER REACH 5 STILLWATER POOL

RIVER MILE 170.0

STILLWATER DAM

LOCK 4

REACH 4 UPPER MECHANICVILLE POOL

REACH 4	
CU	ACRES
92	7.910
93	5.164

LOCK 3

UPPER MECHANICVILLE DAM

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REMEDIAL ACTION COMPLETION PLAN
PHASE 2 DREDGE AREAS
GENERAL SITE MAP
REACH 5-4
HUDSON RIVER PCBs SUPERFUND SITE

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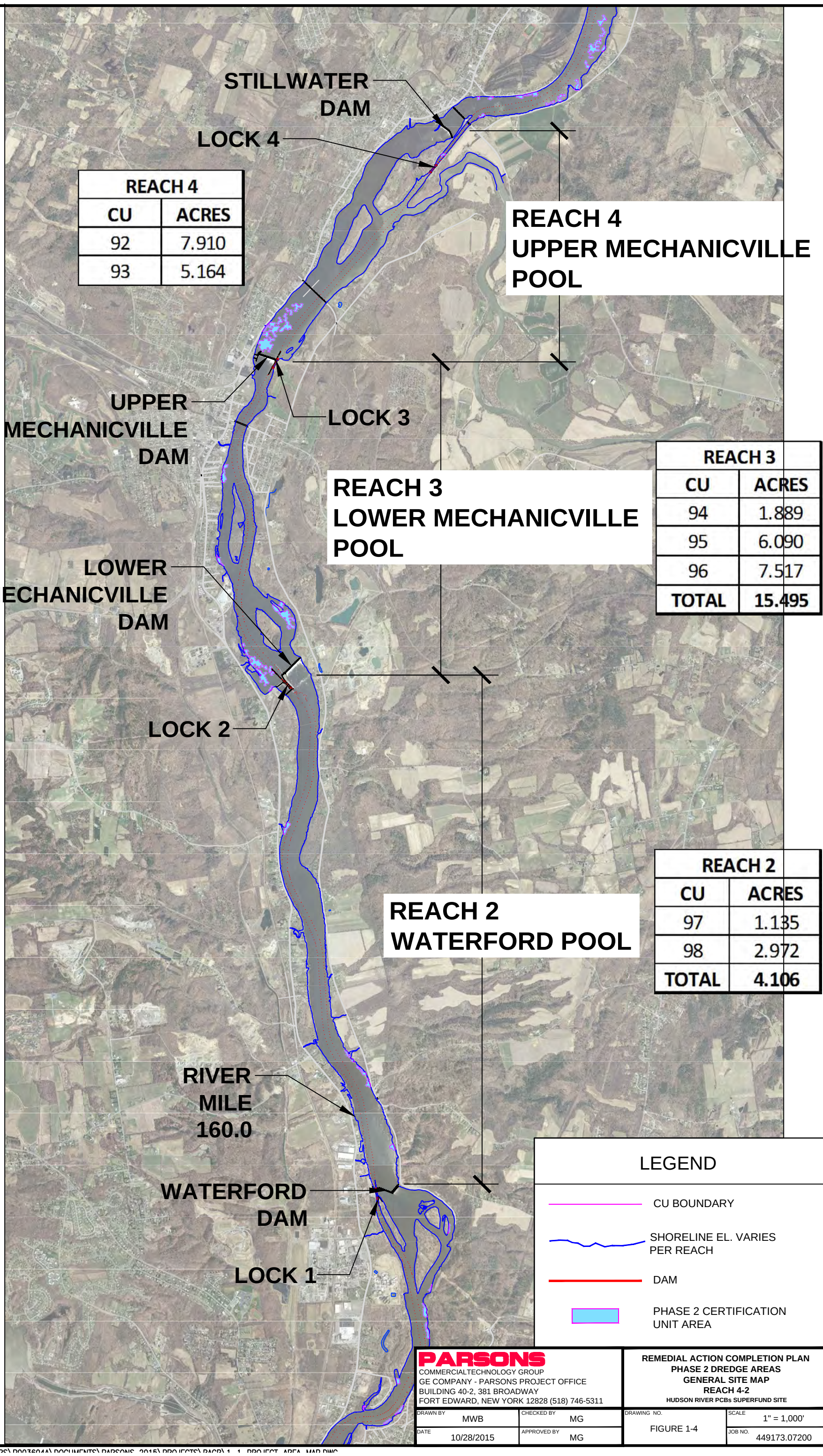

REACH 4	
CU	ACRES
92	7.910
93	5.164

REACH 3	
CU	ACRES
94	1.889
95	6.090
96	7.517
TOTAL	15.495

REACH 2	
CU	ACRES
97	1.135
98	2.972
TOTAL	4.106

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REMEDIAL ACTION COMPLETION PLAN
PHASE 2 DREDGE AREAS
GENERAL SITE MAP
REACH 4-2
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
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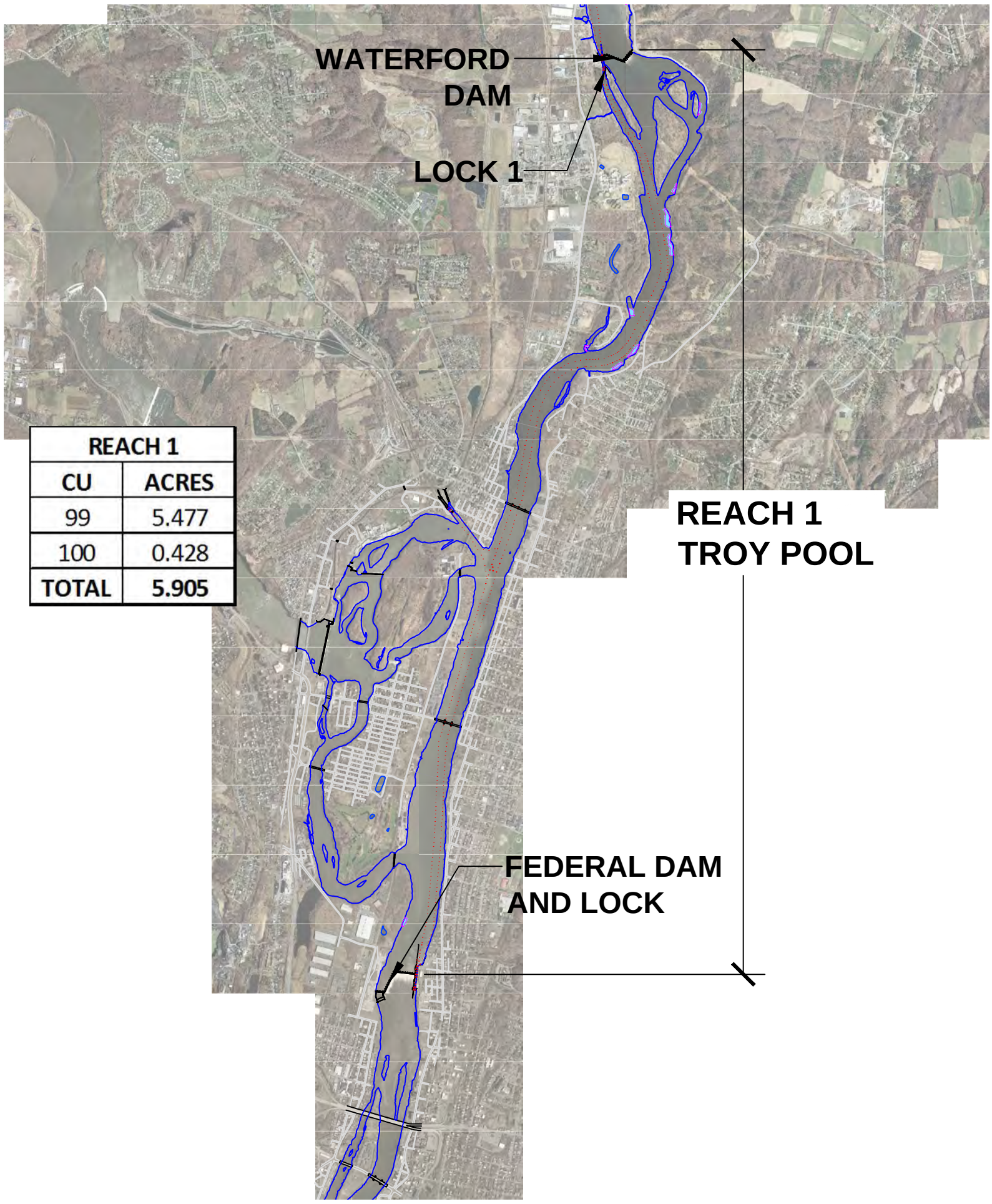

REACH 1	
CU	ACRES
99	5.477
100	0.428
TOTAL	5.905

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REMEDIAL ACTION COMPLETION PLAN
PHASE 2 DREDGE AREAS
GENERAL SITE MAP
REACH 1
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
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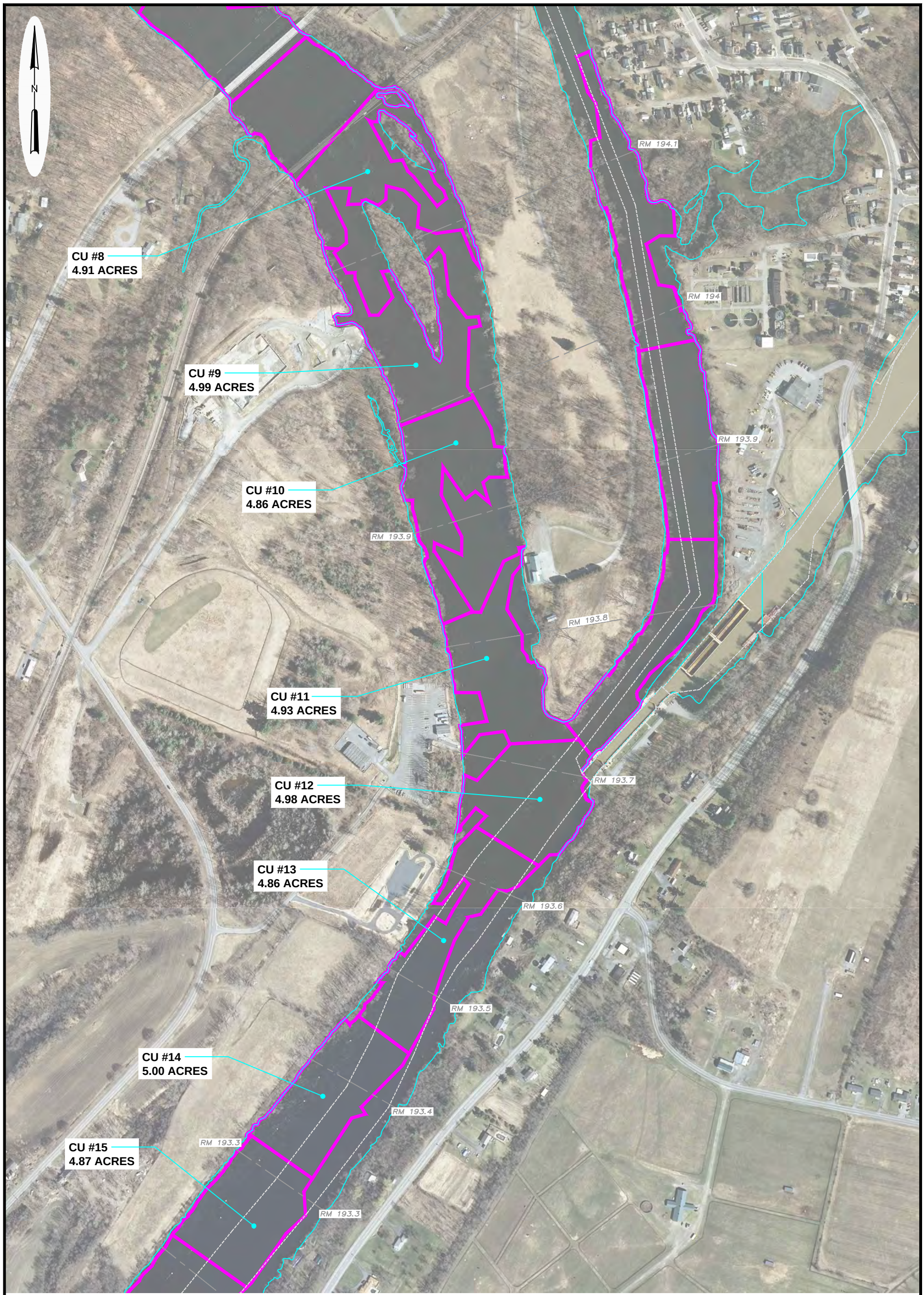

LEGEND

- CU # — CU BORDER
- SHORELINE
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 8-15
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
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DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

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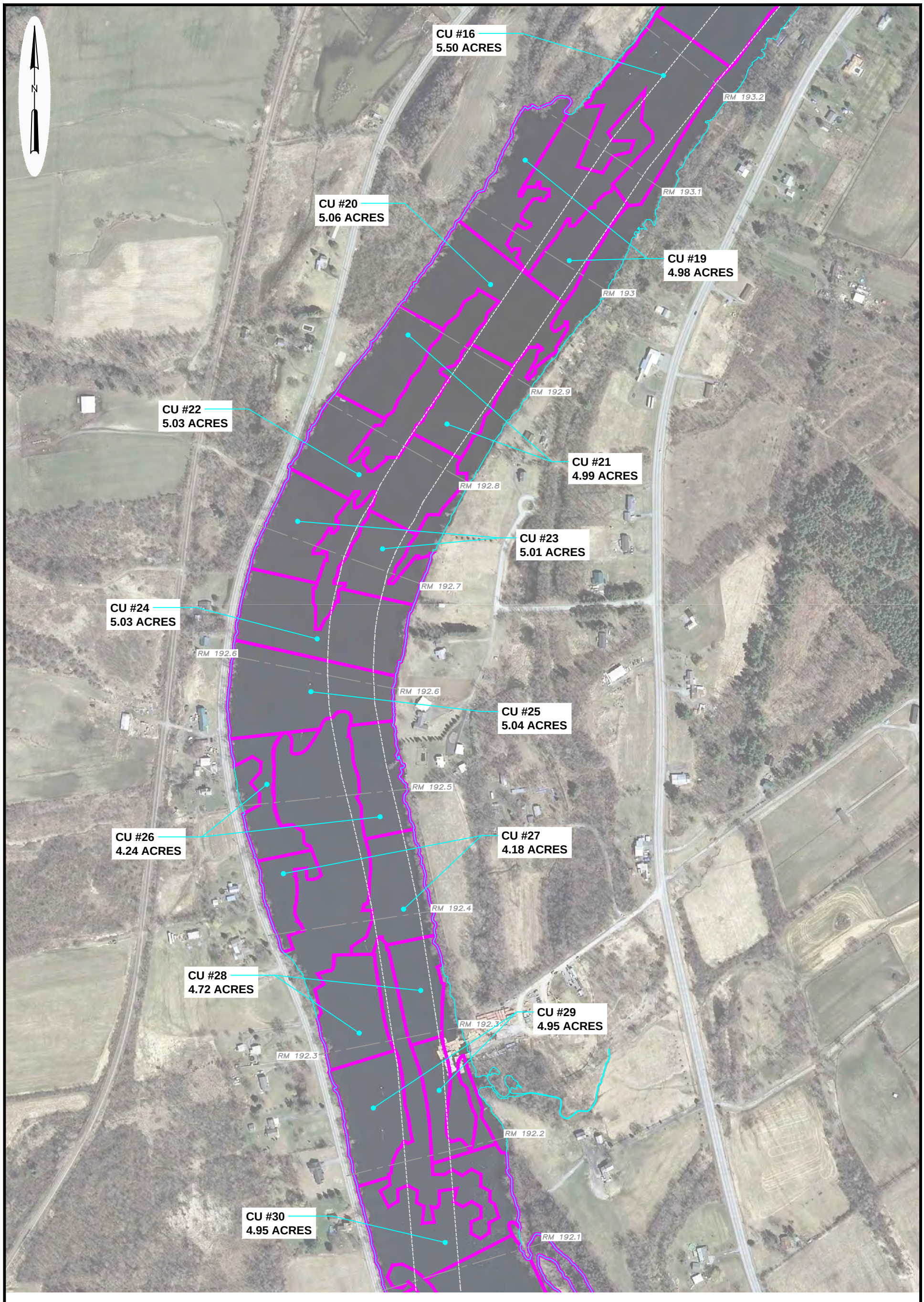

LEGEND

- CU # — CU BORDER
- SHORELINE
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

PARSONS
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DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 16, 19-30
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-2	AS SHOWN
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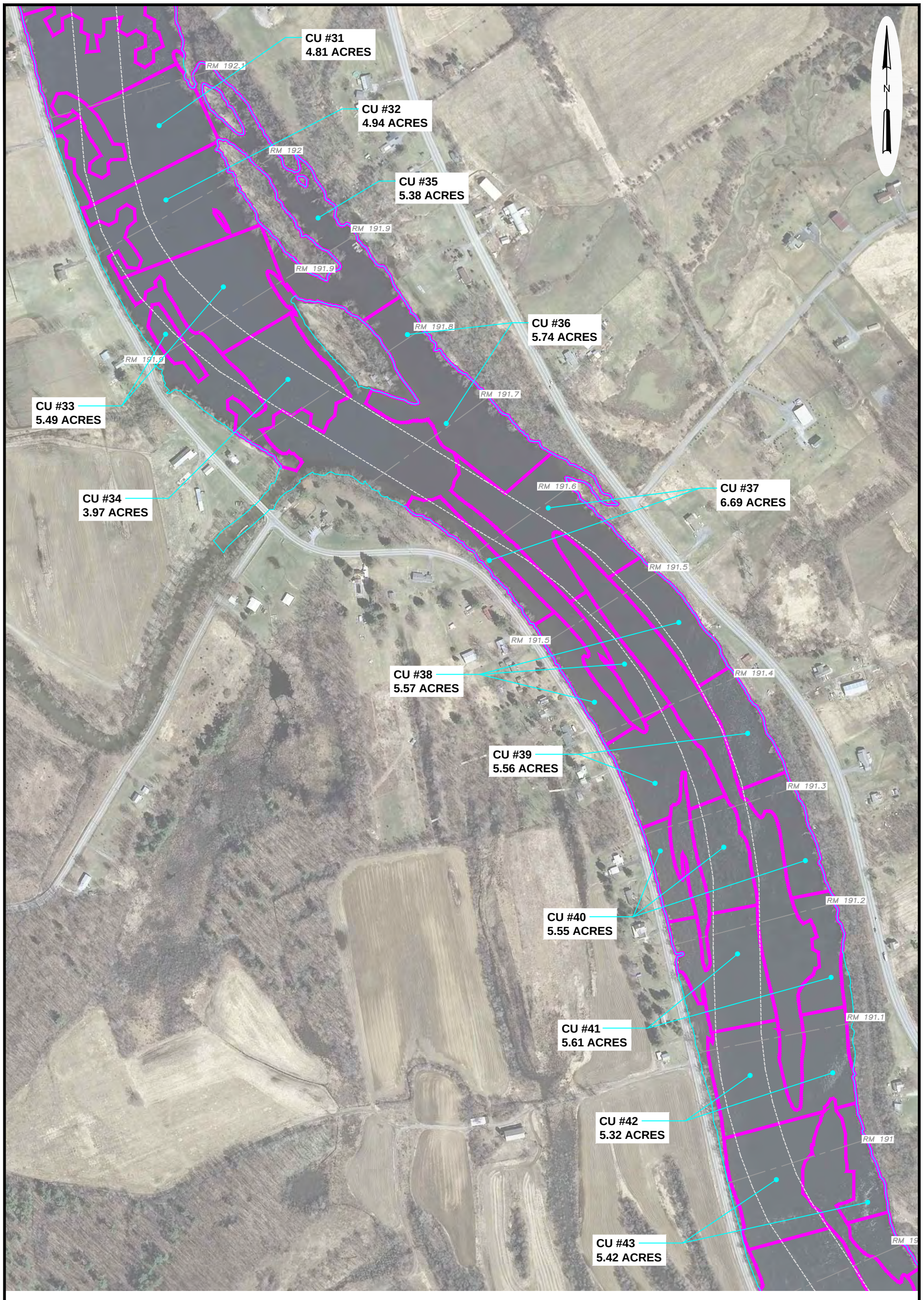

LEGEND

- CU # — CU BORDER
- SHORELINE
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

PARSONS COMMERCIALTECHNOLOGY GROUP GE COMPANY - PARSONS PROJECT OFFICE BUILDING 40-2, 381 BROADWAY FORT EDWARD, NEW YORK 12828 (518) 746-5311	DRAWING TITLE REMEDIAL ACTION COMPLETION REPORT PHASE 2 DREDGE AREAS CERTIFICATION UNITS 31-43 HUDSON RIVER PCBs SUPERFUND SITE
DRAWN BY: MWB; CHECKED BY: MG DATE: 10/28/2015; APPROVED BY: MG	DRAWING NO.: FIGURE 2-3 SCALE: AS SHOWN JOB NO.: 449173.07200

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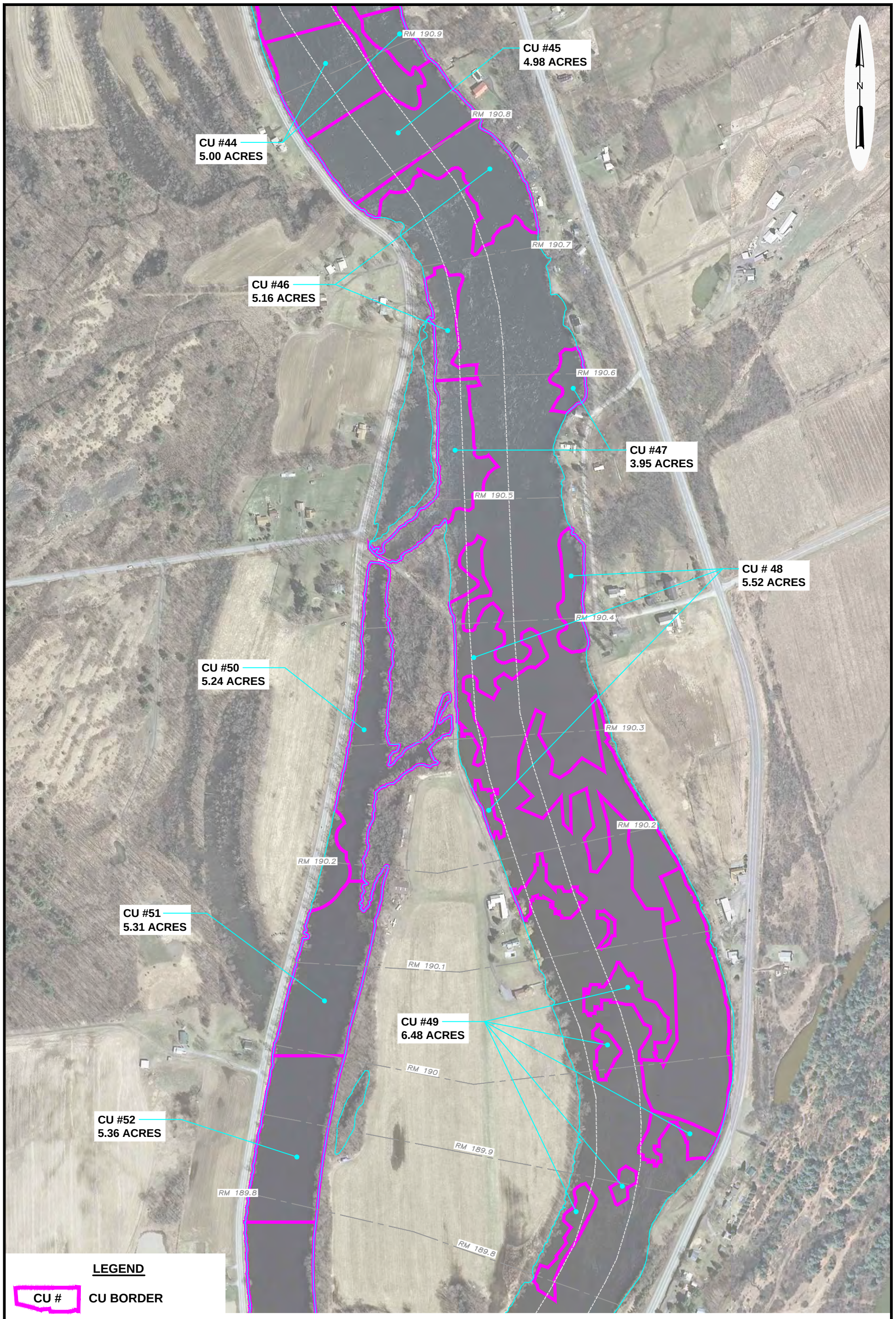

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 44-52
HUDSON RIVER PCBs SUPERFUND SITE

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MWB	MG	FIGURE 2-4	AS SHOWN
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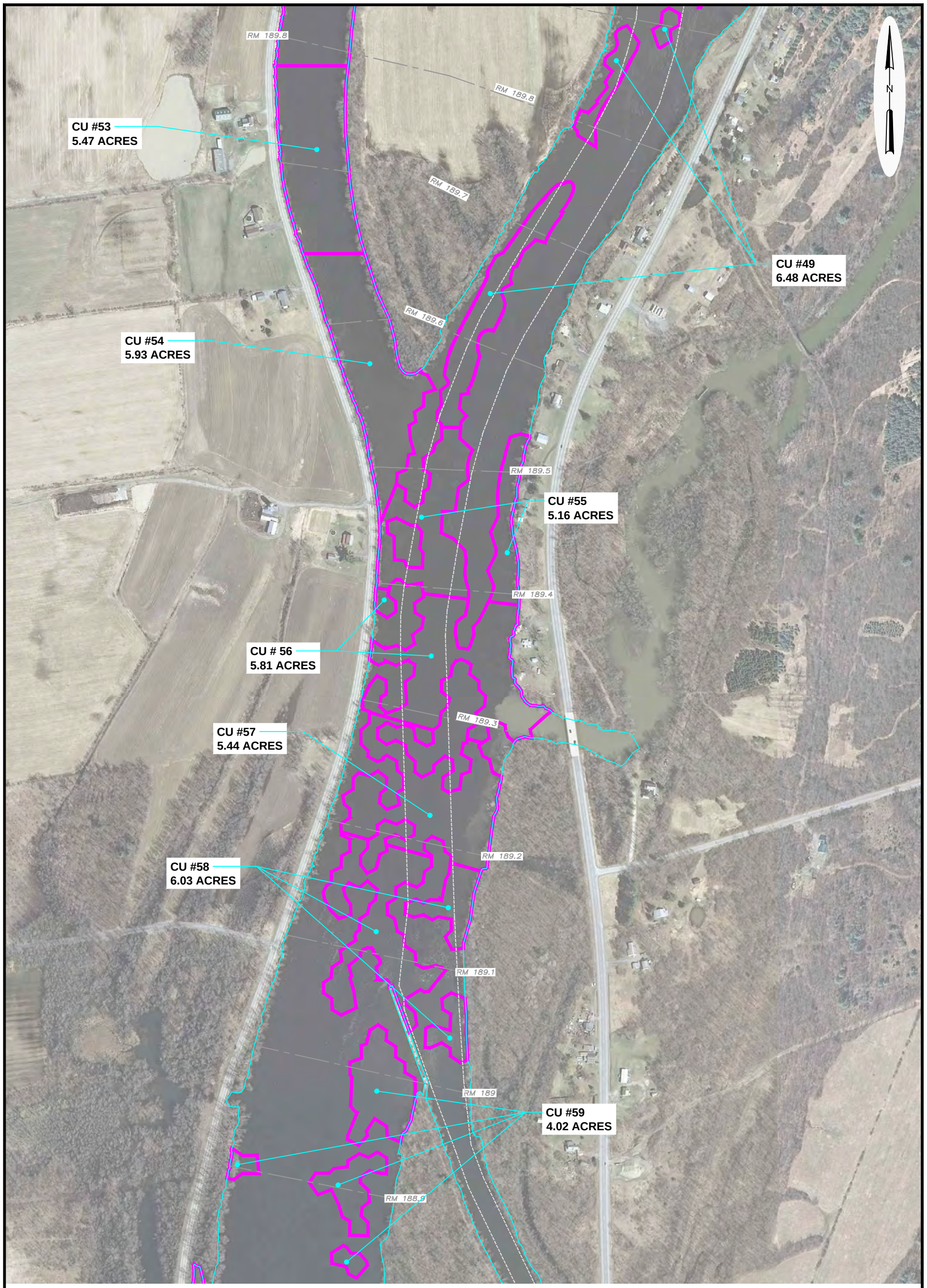

LEGEND

- CU # — CU BORDER
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- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 49, 53-59
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-5	AS SHOWN
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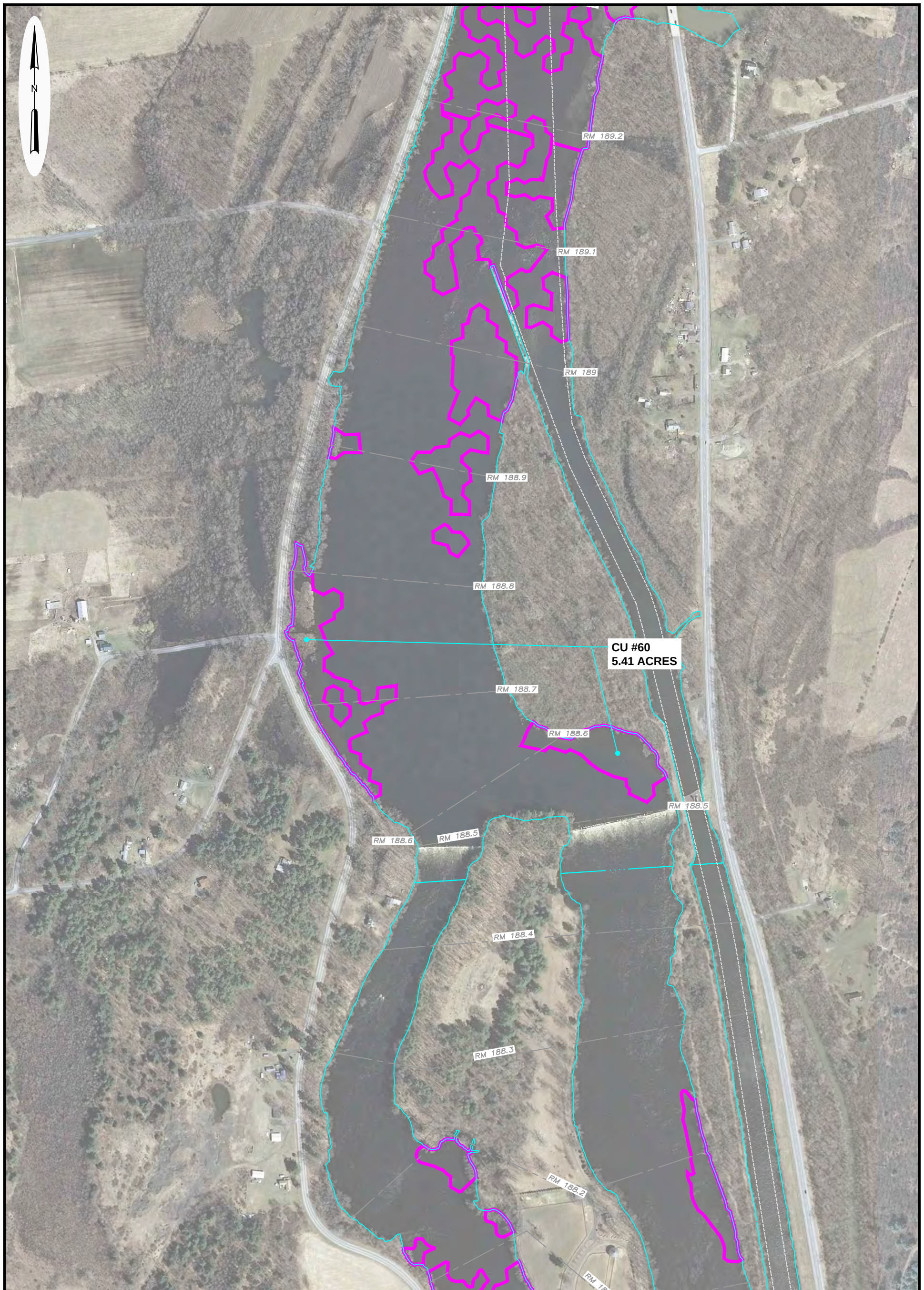

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- CU # — CU BORDER
- SHORELINE
- NAV CHANNEL
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400 200 0 400

BAR SCALE

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DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 60
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-6	AS SHOWN
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N

RM 188.3
RM 188.2
RM 188.1
RM 188
RM 187.9
RM 187.8
RM 187.7
RM 187.6
RM 187.5
RM 187.5
RM 187.4
RM 187.3
RM 187.2
RM 187.2

CU #61
4.93 ACRES

CU #62
4.10 ACRES

CU #63
6.27 ACRES

LEGEND

CU # — CU BORDER

SHORELINE

NAV CHANNEL

RM 192.1 — RIVER MILE MARKER

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BAR SCALE

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 61-63
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-7	AS SHOWN
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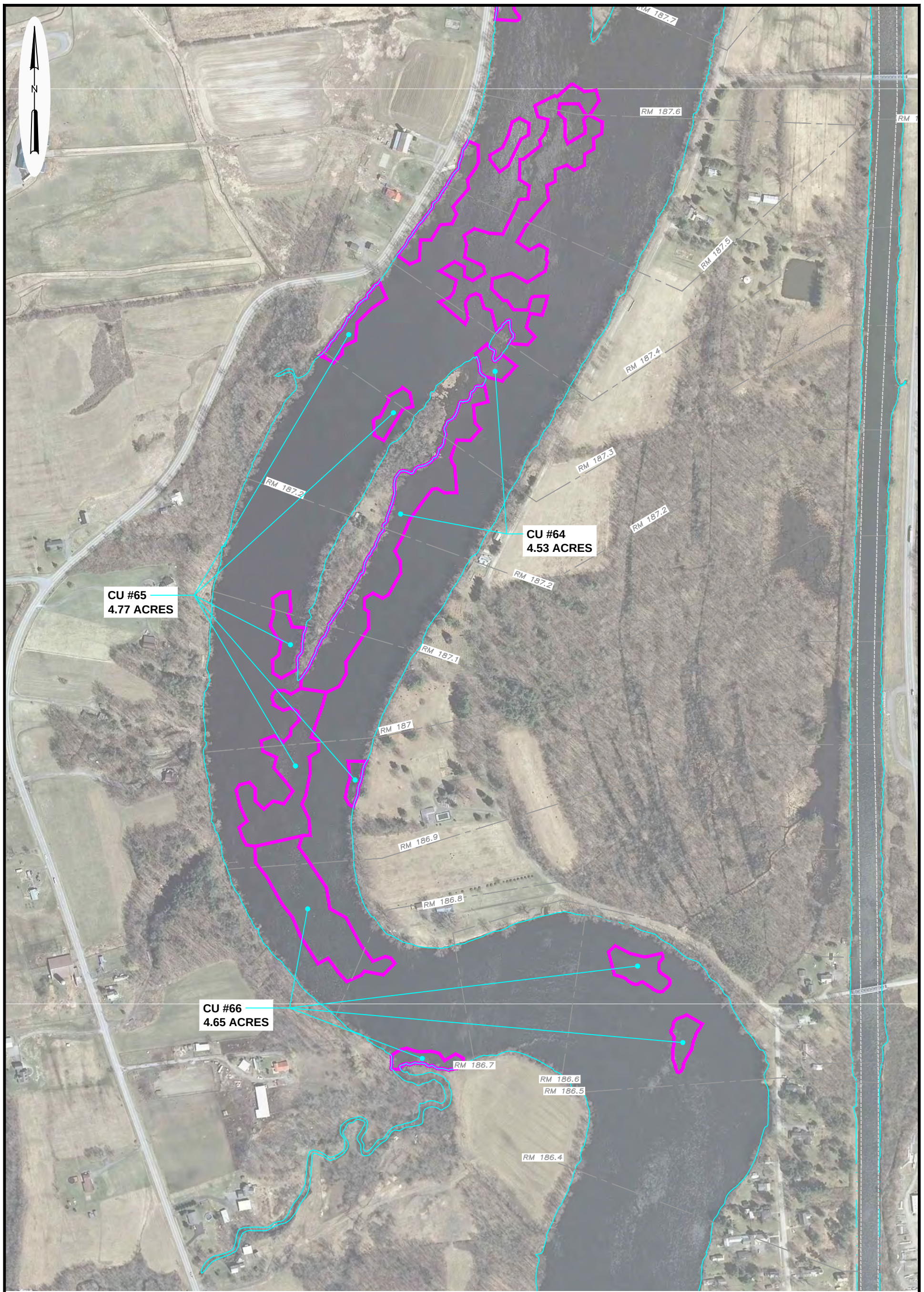

LEGEND

- CU # — CU BORDER
- SHORELINE
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 64-66
HUDSON RIVER PCBs SUPERFUND SITE

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MWB	MG	FIGURE 2-8	AS SHOWN
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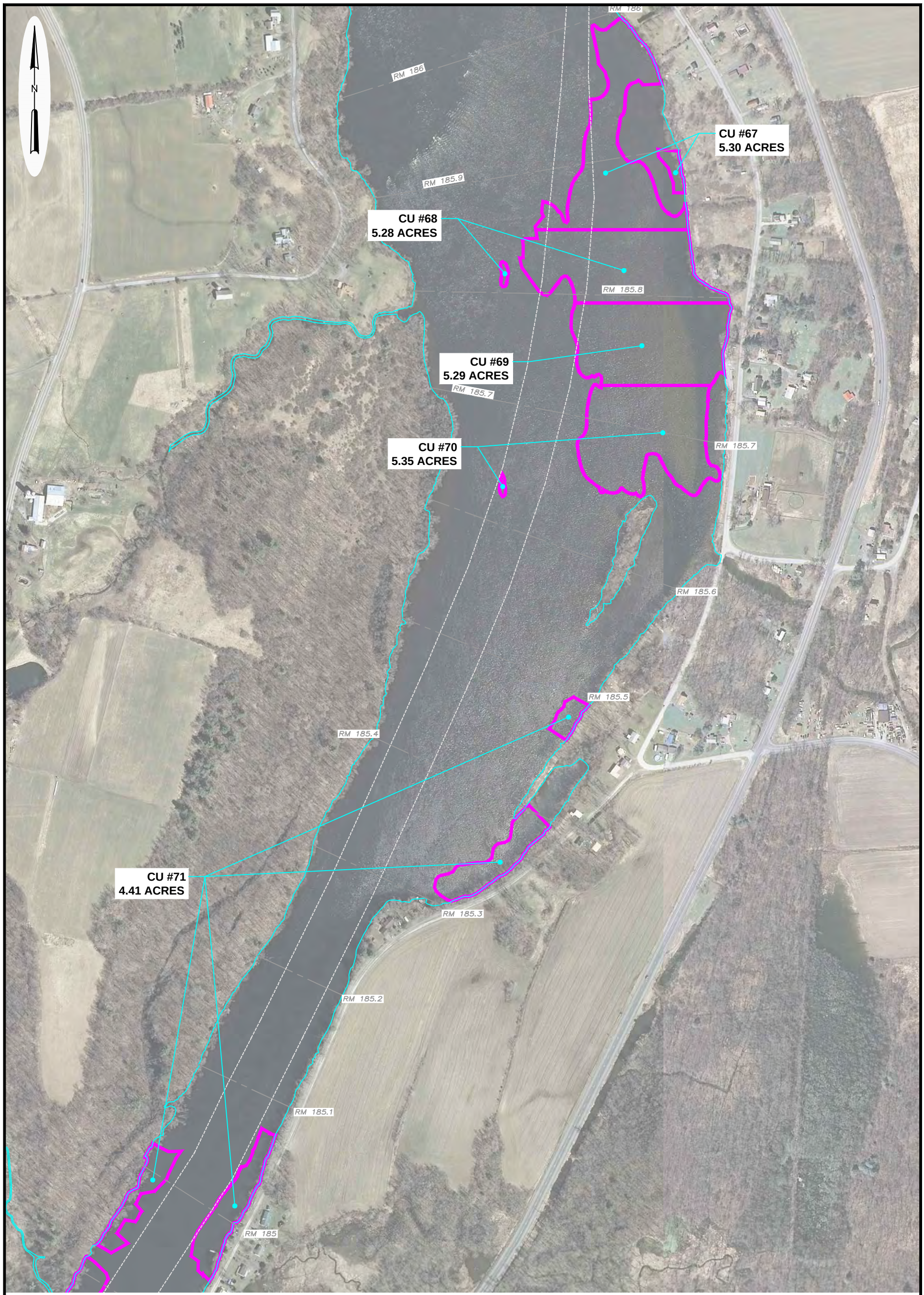

LEGEND

- CU # — CU BORDER
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- NAV CHANNEL
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400 200 0 400

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 67-71
HUDSON RIVER PCBs SUPERFUND SITE

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MWB	MG	FIGURE 2-9	AS SHOWN
DATE	APPROVED BY		JOB NO.
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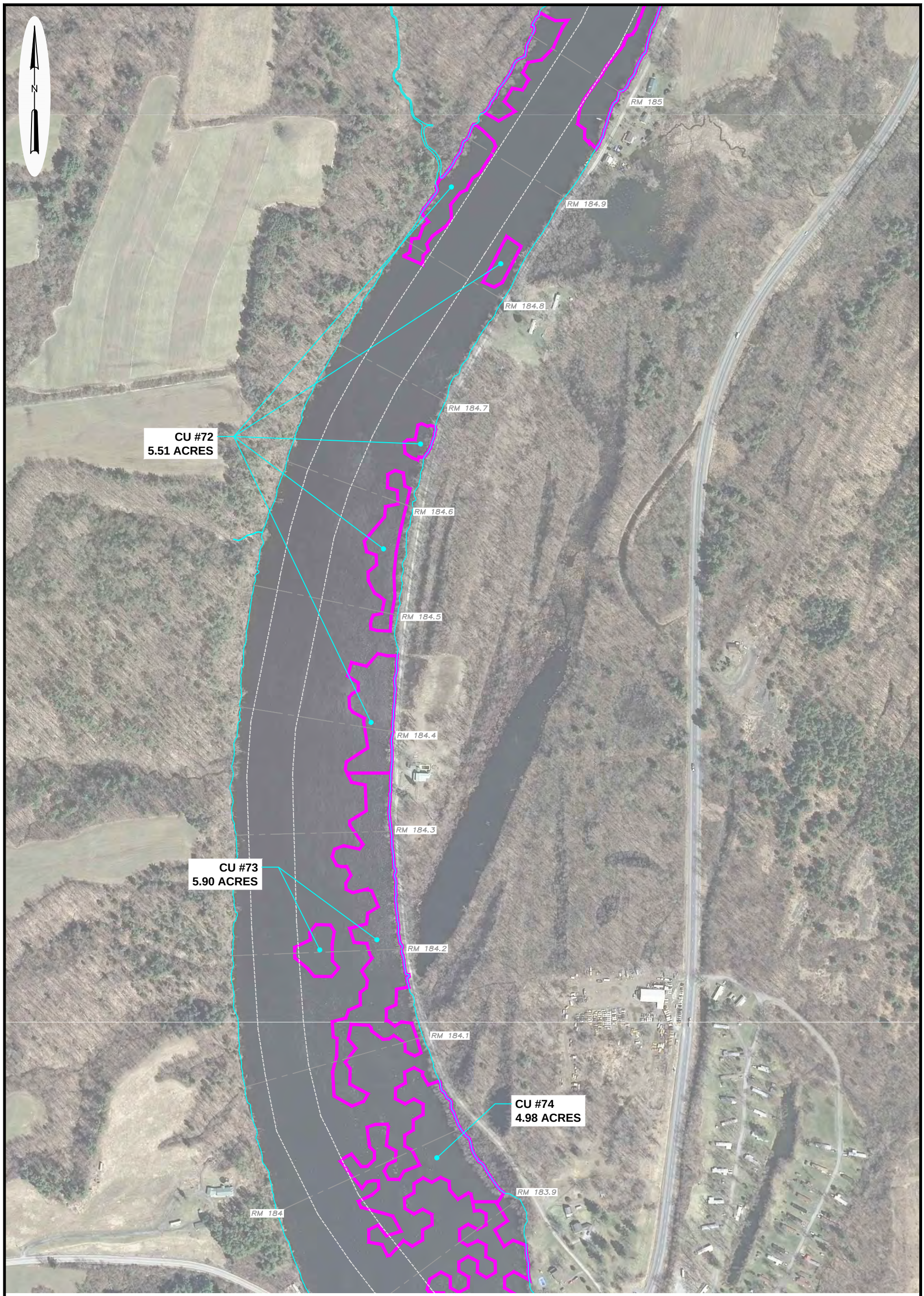

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 72-74
HUDSON RIVER PCBs SUPERFUND SITE

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MWB	MG	FIGURE 2-10	AS SHOWN
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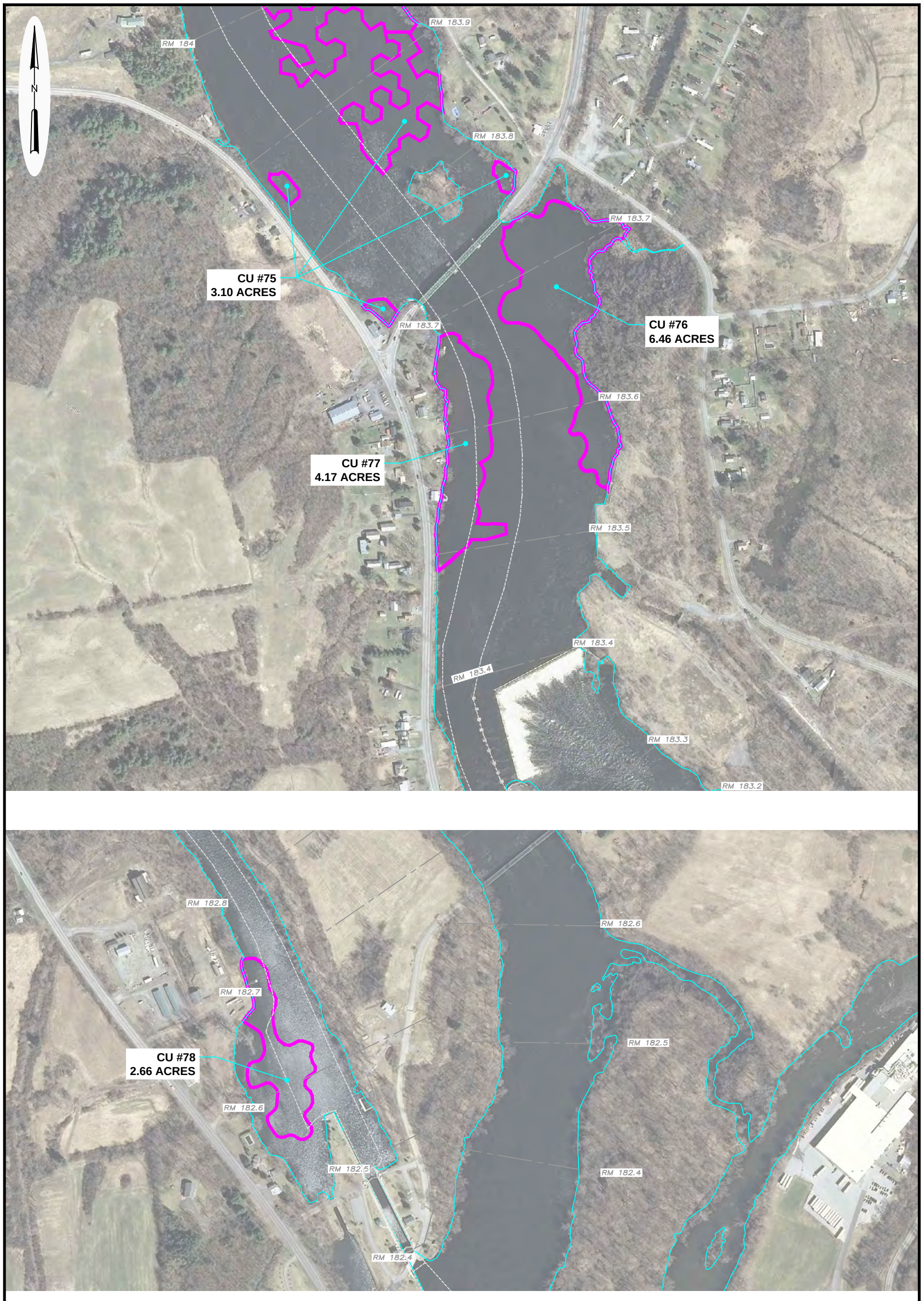

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 75-78
HUDSON RIVER PCBs SUPERFUND SITE

DRAWING NO.	SCALE
FIGURE 2-11	AS SHOWN
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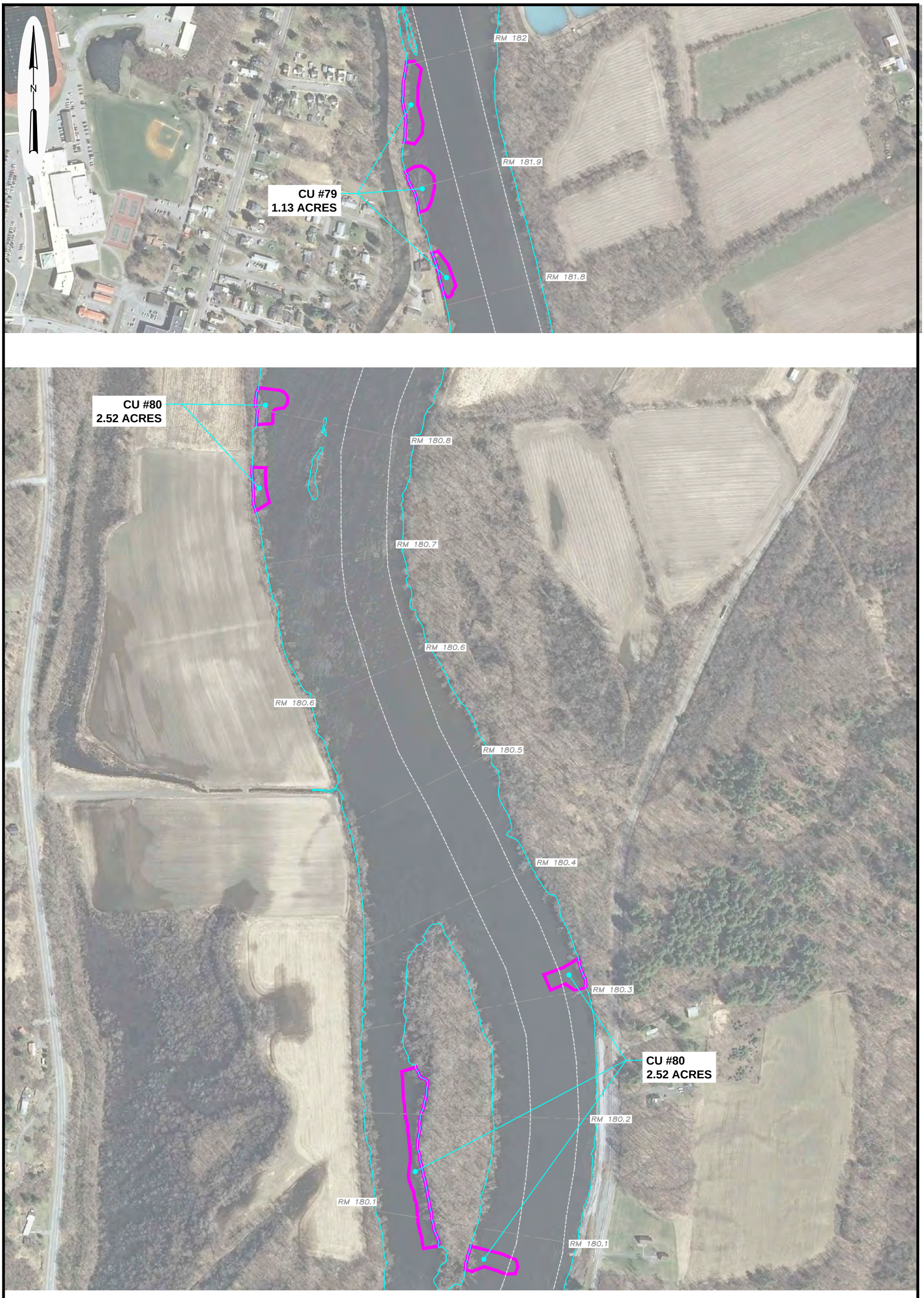

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- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 79-80
HUDSON RIVER PCBs SUPERFUND SITE

DRAWING NO.	SCALE
FIGURE 2-12	AS SHOWN
	JOB NO. 449173.07200

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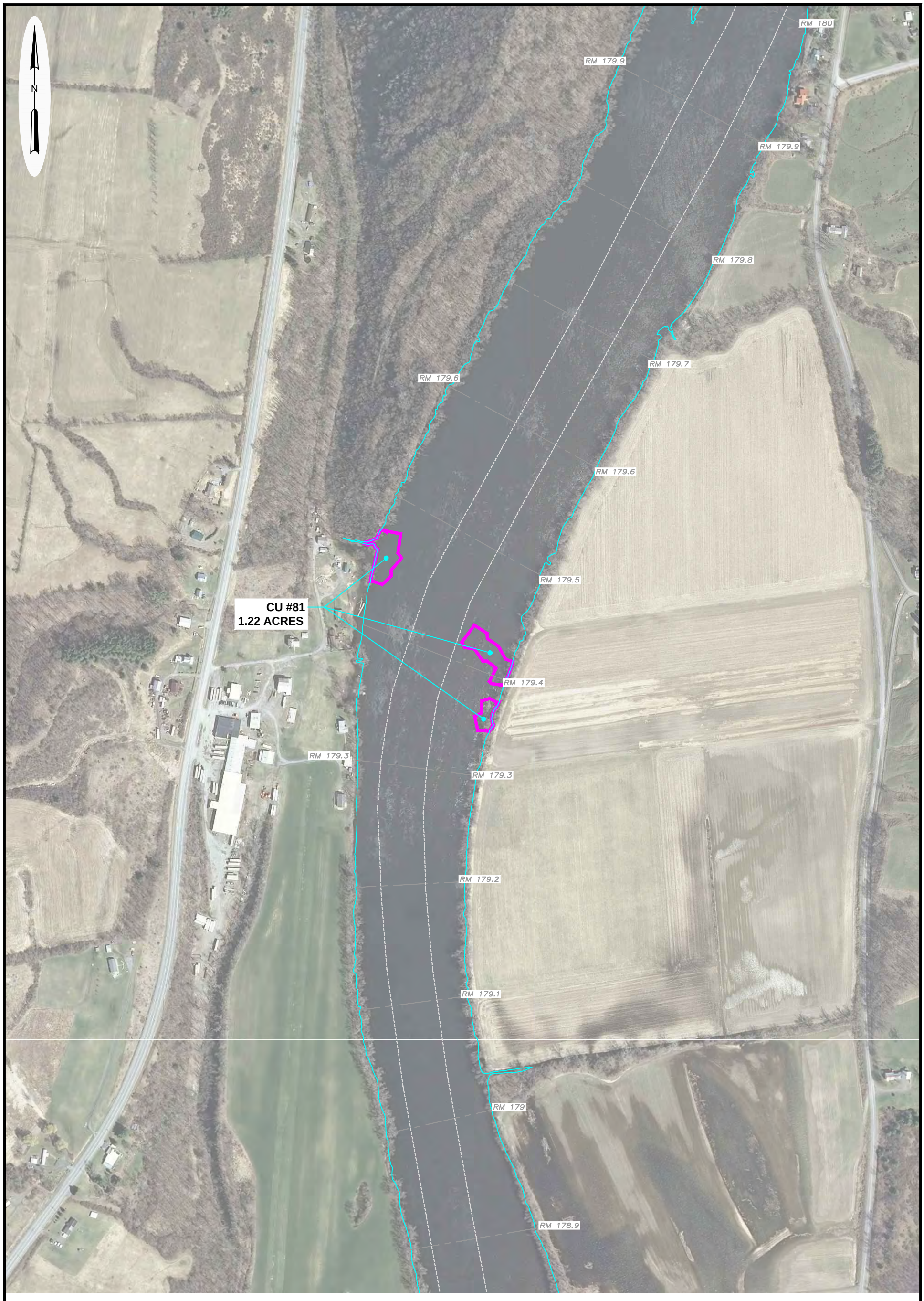

LEGEND

- CU # — **CU BORDER**
- **SHORELINE**
- **NAV CHANNEL**
- RM 192.1 — **RIVER MILE MARKER**

400 200 0 400

BAR SCALE

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 81
HUDSON RIVER PCBs SUPERFUND SITE

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MWB	MG	FIGURE 2-13	AS SHOWN
DATE 10/28/2015	APPROVED BY MG		JOB NO. 449173.07200

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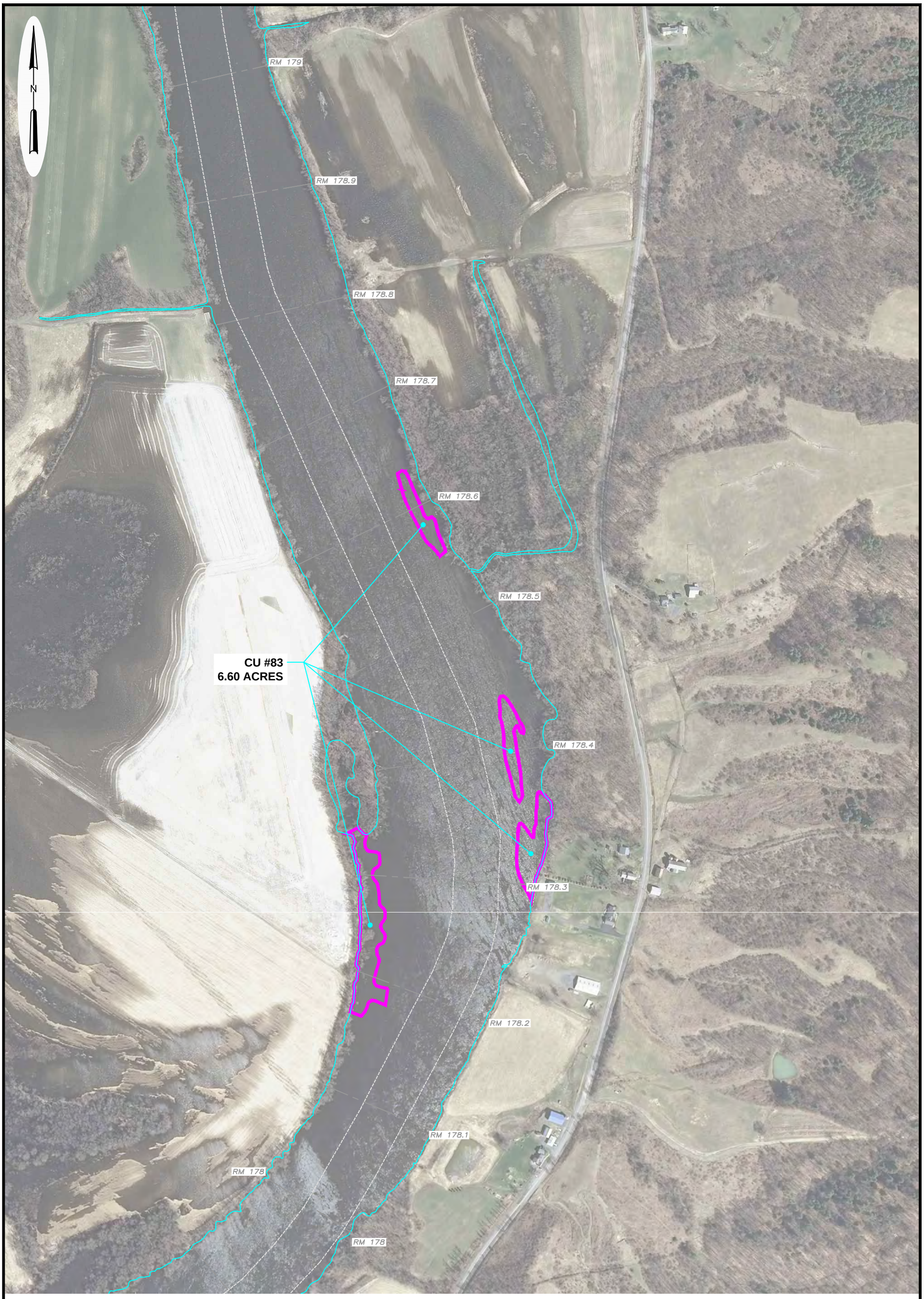

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- CU # — CU BORDER
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- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 83
HUDSON RIVER PCBs SUPERFUND SITE

DRAWING NO.: FIGURE 2-14	SCALE: AS SHOWN
	JOB NO.: 449173.07200

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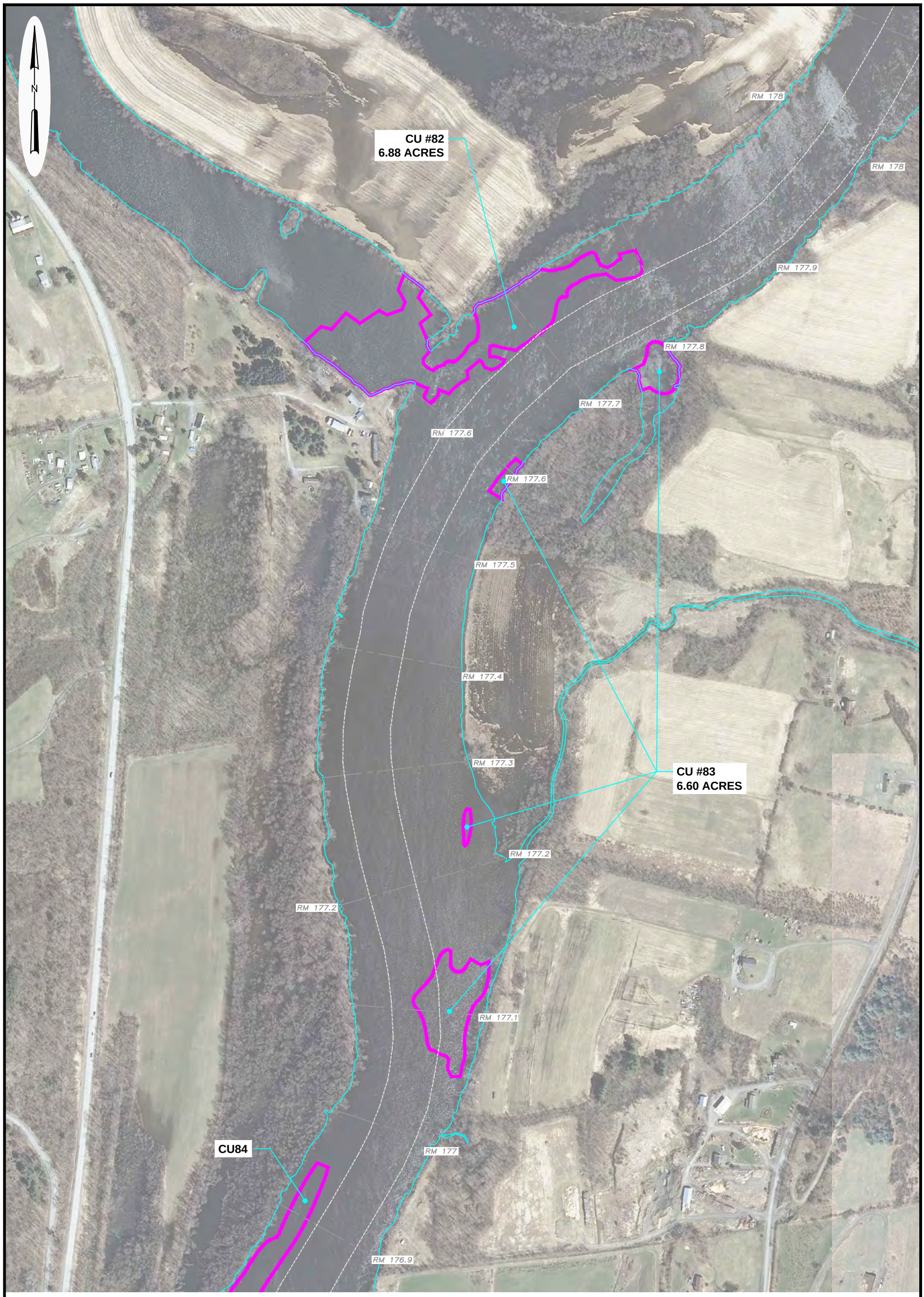

LEGEND

- CU # — CU BORDER
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- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 82 & 83
HUDSON RIVER PCBs SUPERFUND SITE

DRAWING NO.	SCALE
FIGURE 2-15	AS SHOWN
	JOB NO. 449173.07200

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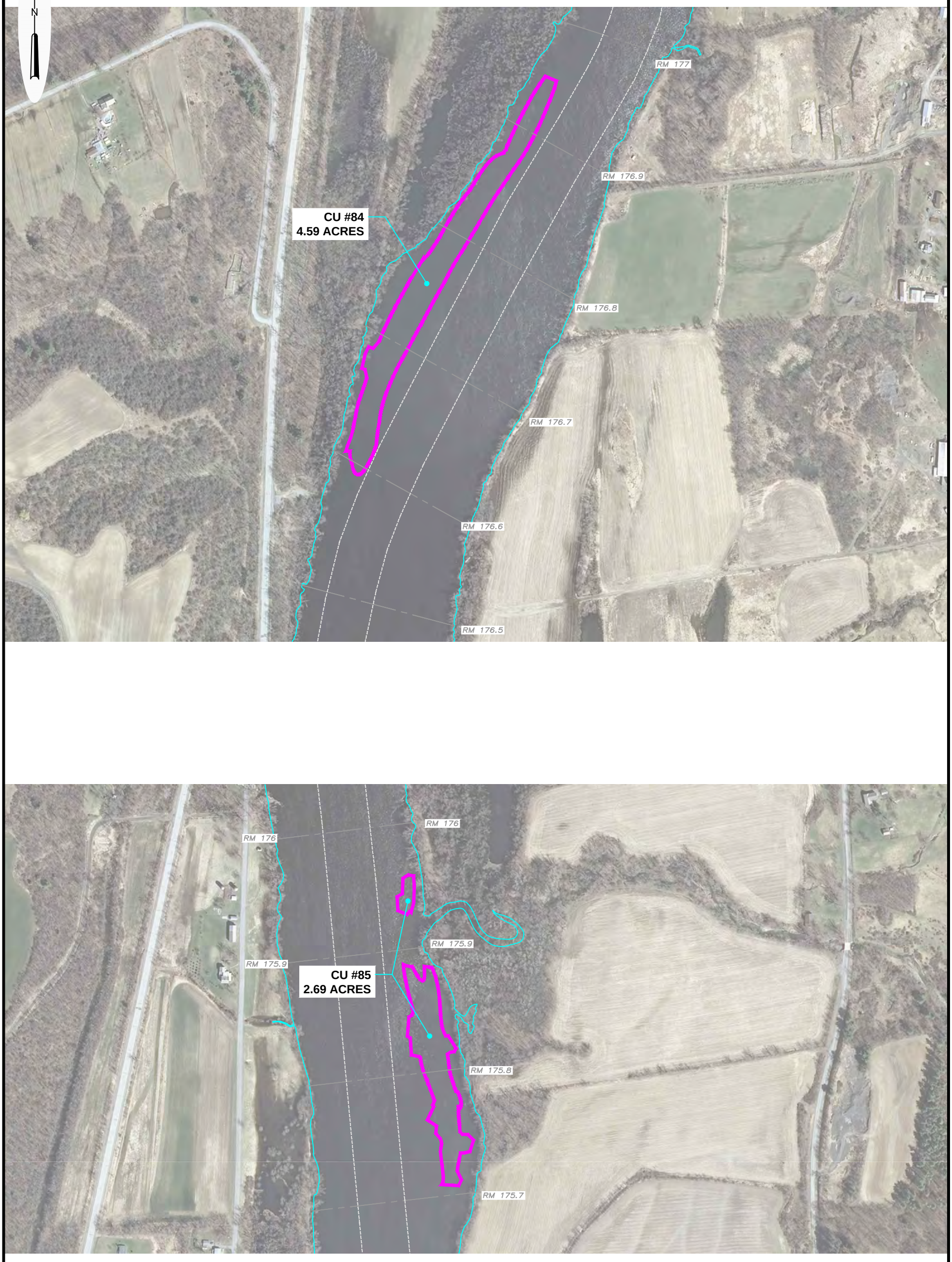

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- NAV CHANNEL
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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 84-85
HUDSON RIVER PCBs SUPERFUND SITE

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MWB	MG	FIGURE 2-16	AS SHOWN
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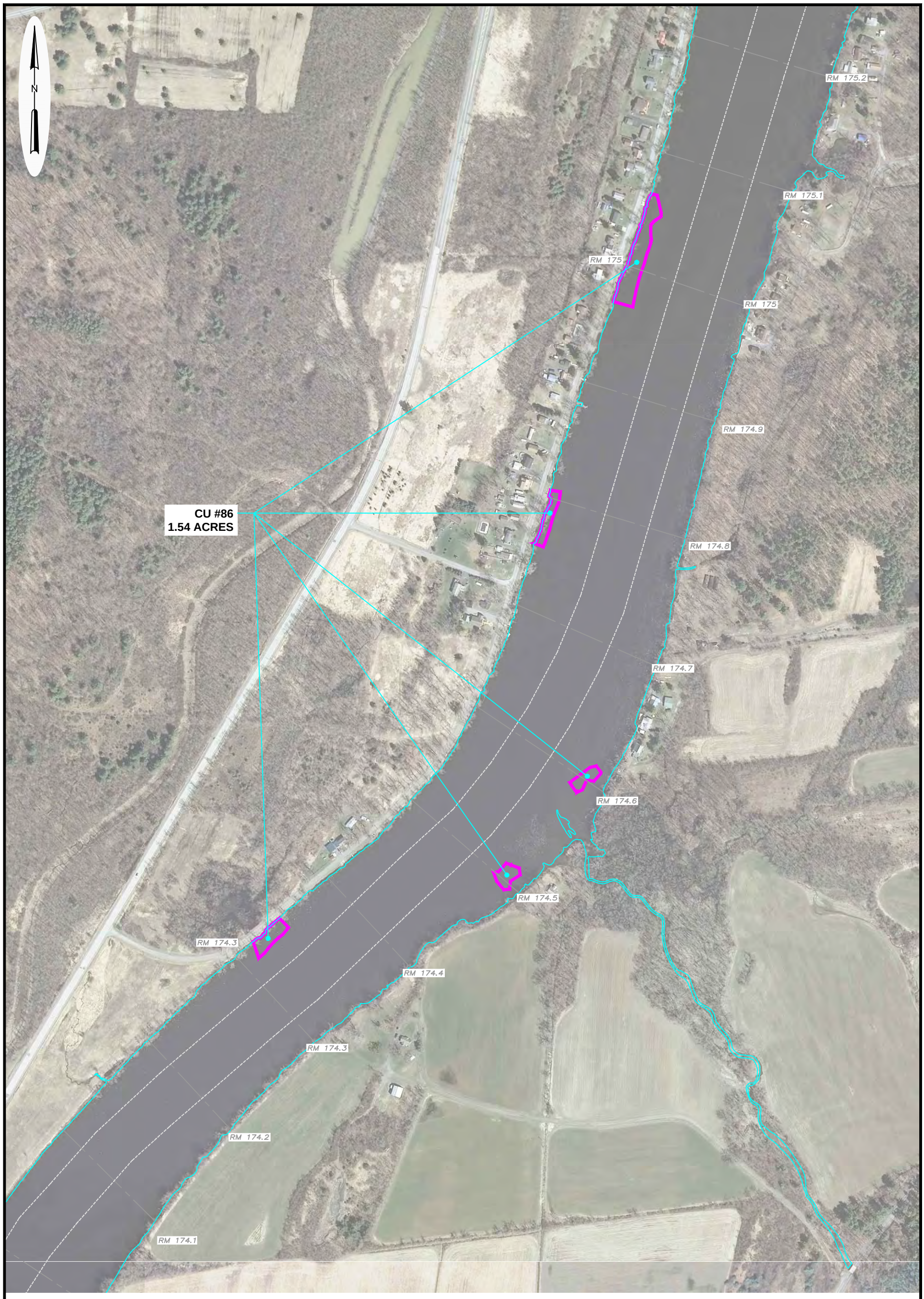

LEGEND

- CU # — CU BORDER
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- NAV CHANNEL
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BAR SCALE

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 86
HUDSON RIVER PCBs SUPERFUND SITE

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MWB	MG	FIGURE 2-17	AS SHOWN
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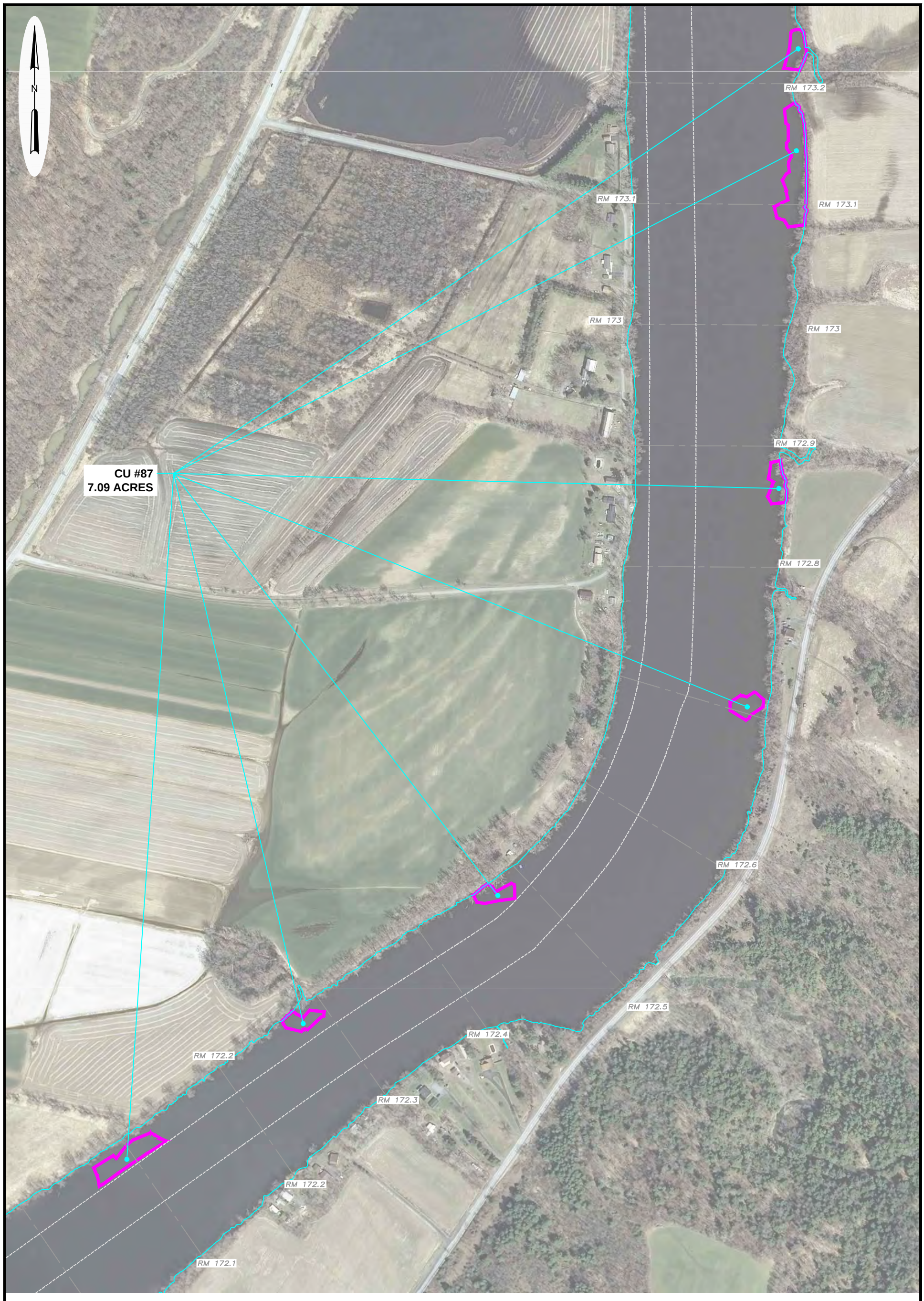

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- SHORELINE
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

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BAR SCALE

PARSONS COMMERCIALTECHNOLOGY GROUP GE COMPANY - PARSONS PROJECT OFFICE BUILDING 40-2, 381 BROADWAY FORT EDWARD, NEW YORK 12828 (518) 746-5311	DRAWING TITLE **REMEDIAL ACTION COMPLETION REPORT** **PHASE 2 DREDGE AREAS** **CERTIFICATION UNIT 87** **HUDSON RIVER PCBs SUPERFUND SITE**
DRAWN BY: MWB; CHECKED BY: MG DATE: 10/28/2015; APPROVED BY: MG	DRAWING NO.: FIGURE 2-18 SCALE: AS SHOWN JOB NO.: 449173.07200

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N

RM 171.7

RM 171.8

RM 171.7

RM 171.6

RM 171.5

RM 171.4

RM 171.3

RM 171.3

RM 171.2

RM 171.1

RM 171

RM 170.9

CU #87
7.09 ACRES

LEGEND

CU # — CU BORDER

SHORELINE

NAV CHANNEL

RM 192.1 — RIVER MILE MARKER

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BAR SCALE

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PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 87
HUDSON RIVER PCBs SUPERFUND SITE

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MWB	MG	FIGURE 2-19	AS SHOWN
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RM 171.3

RM 171.2

RM 171.1

RM 171

RM 170.9

RM 170.8

CU #88
6.13 ACRES

RM 170.7

RM 170.6

RM 170.5

RM 170.4

RM 170.4

RM 170.3

LEGEND

CU # — CU BORDER

SHORELINE

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BAR SCALE

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REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 88
HUDSON RIVER PCBs SUPERFUND SITE

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MWB	MG	FIGURE 2-20	AS SHOWN
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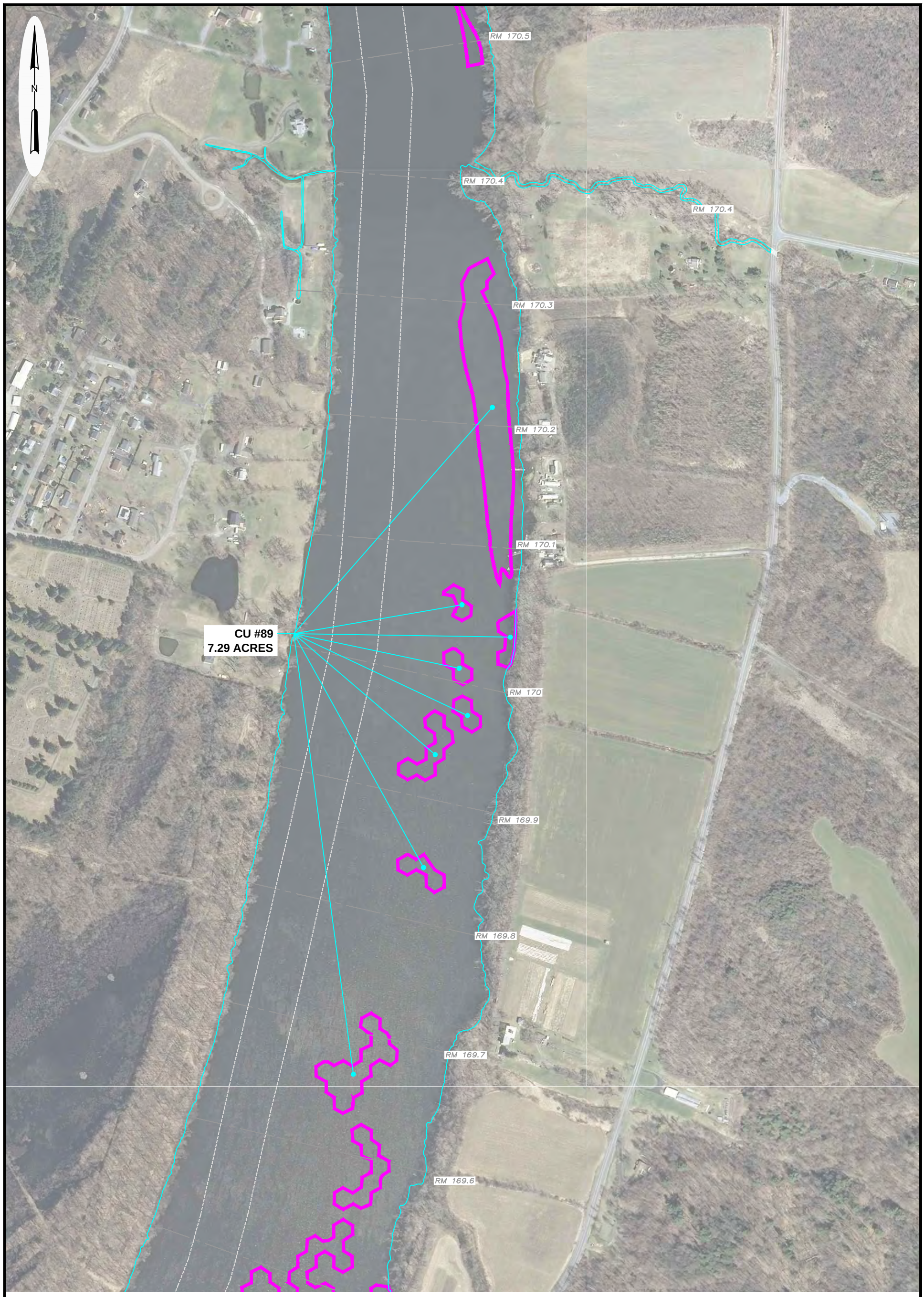

LEGEND

- CU # — CU BORDER
- SHORELINE
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

PARSONS
COMMERCIALTECHNOLOGY GROUP
GE COMPANY - PARSONS PROJECT OFFICE
BUILDING 40-2, 381 BROADWAY
FORT EDWARD, NEW YORK 12828 (518) 746-5311

DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 89
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-21	AS SHOWN
DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

FILE NAME: C:\USERS\P003604A\DOCUMENTS\PARSONS 2015\PROJECTS\RACR\2_P2_CUS.DWG
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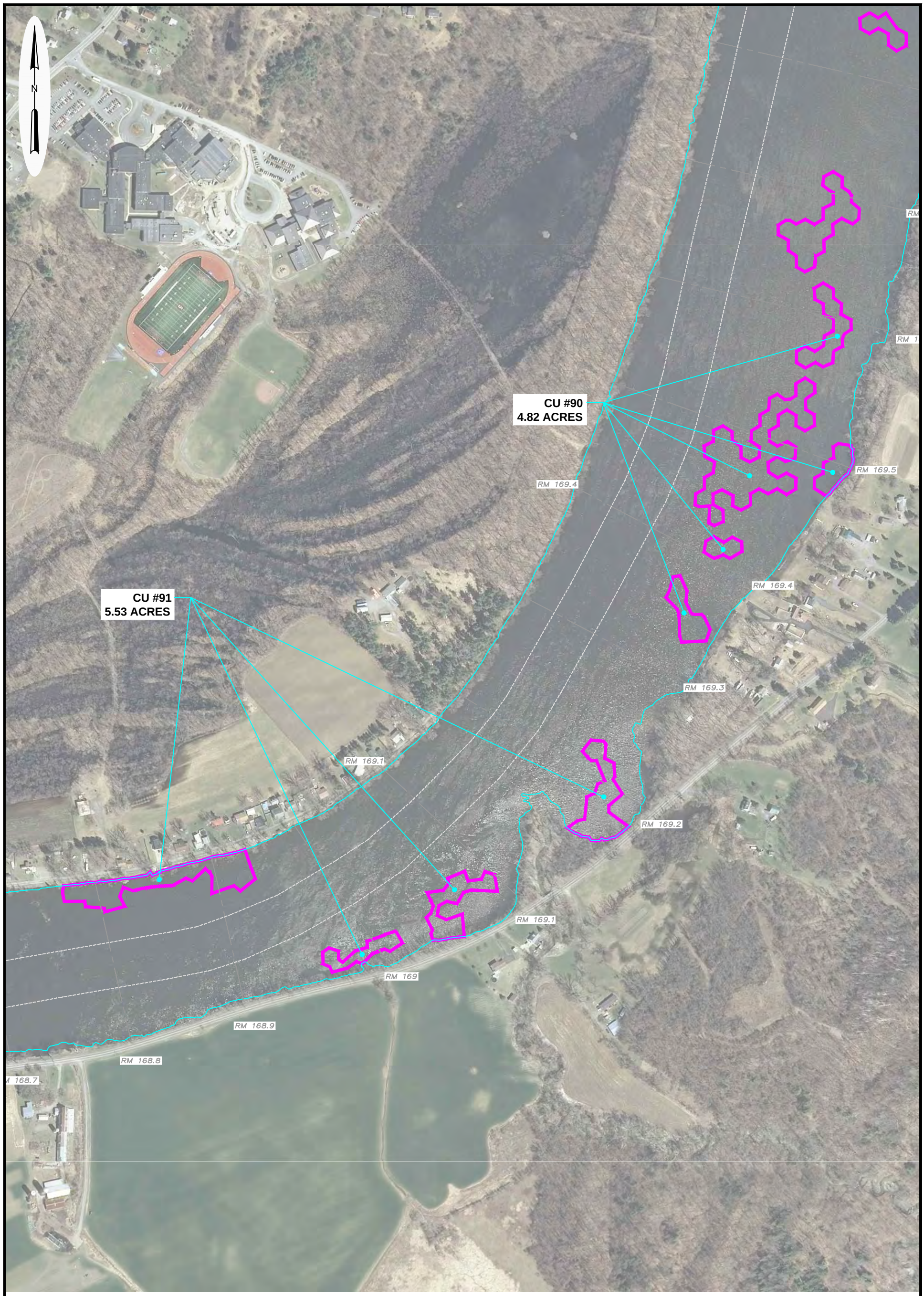

LEGEND

- CU # — CU BORDER
- SHORELINE
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

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FORT EDWARD, NEW YORK 12828 (518) 746-5311

DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 90 & 91
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-22	AS SHOWN
DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

FILE NAME: C:\USERS\P003604A\DOCUMENTS\PARSONS 2015\PROJECTS\RACR\2_P2_CUS.DWG
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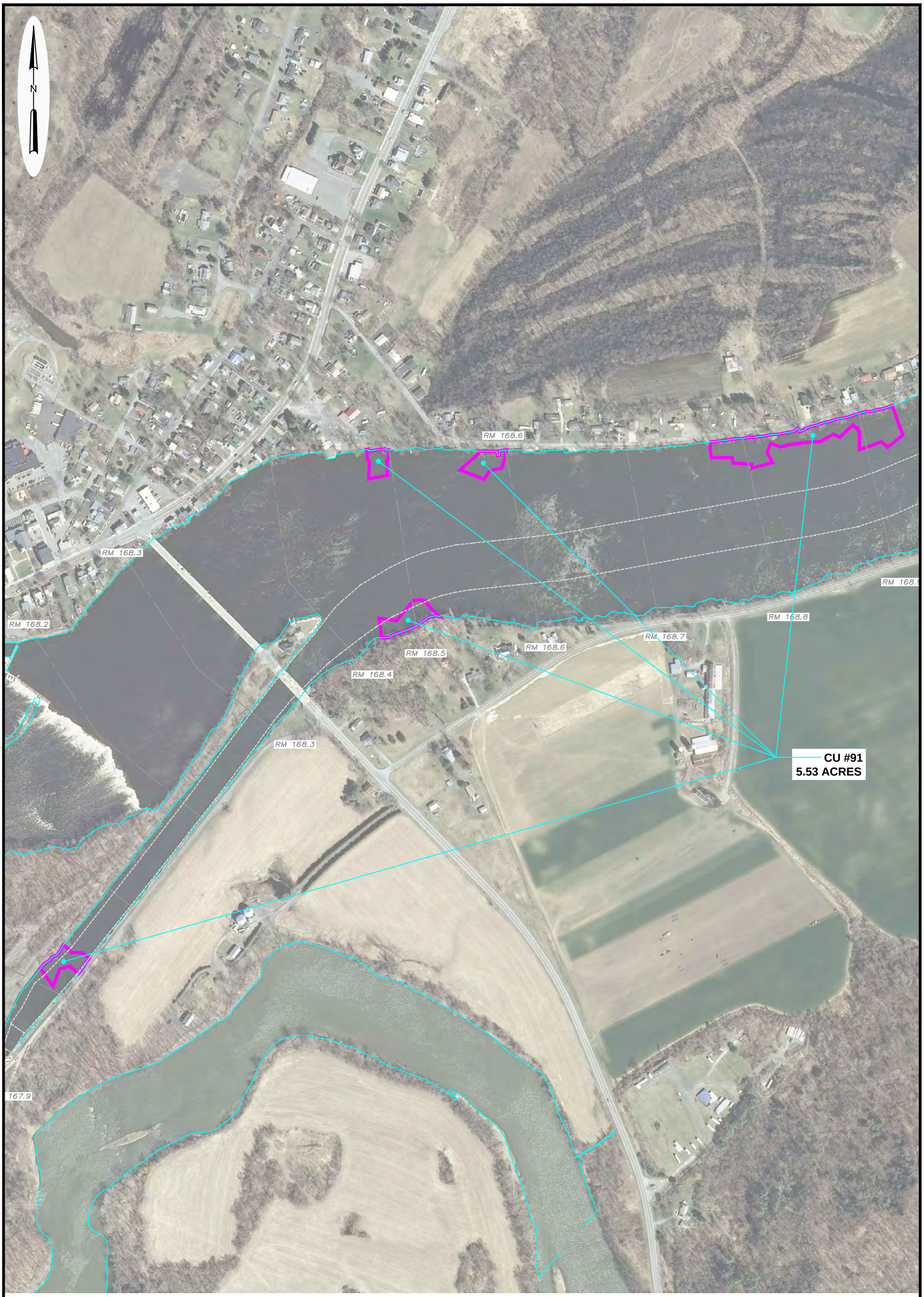

LEGEND

- CU # — CU BORDER
- SHORELINE
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

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DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 91
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-23	AS SHOWN
DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

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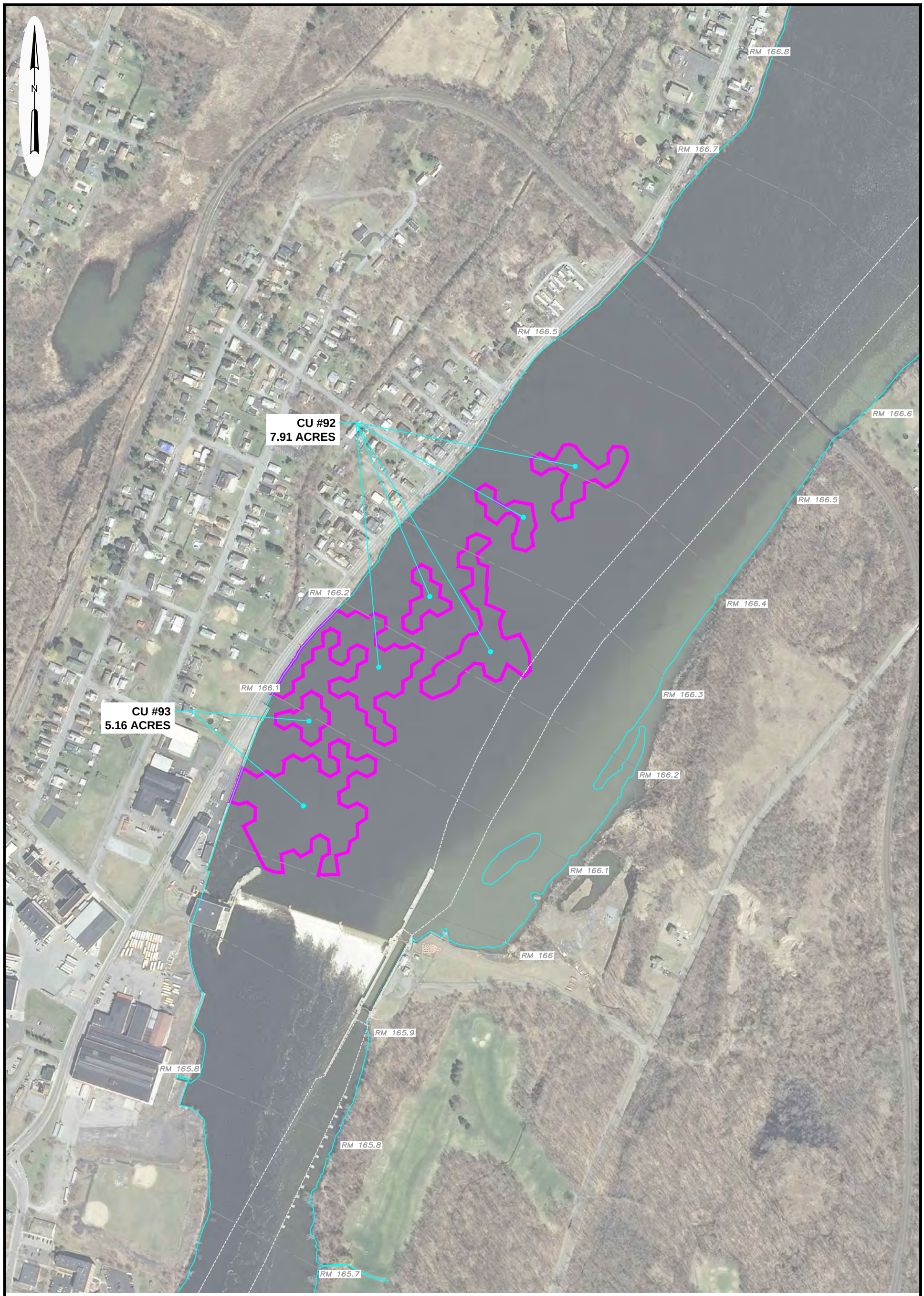
PLOT DATE: 11/10/2015 6:11 PM PLOTTED BY: BELLACK, MICHAEL



LEGEND

- CU # — CU BORDER
- SHORELINE (ELEVATION 70.0')
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

PARSONS
COMMERCIALTECHNOLOGY GROUP
GE COMPANY - PARSONS PROJECT OFFICE
BUILDING 40-2, 381 BROADWAY
FORT EDWARD, NEW YORK 12828 (518) 746-5311

DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 92 & 93
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-24	AS SHOWN
DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

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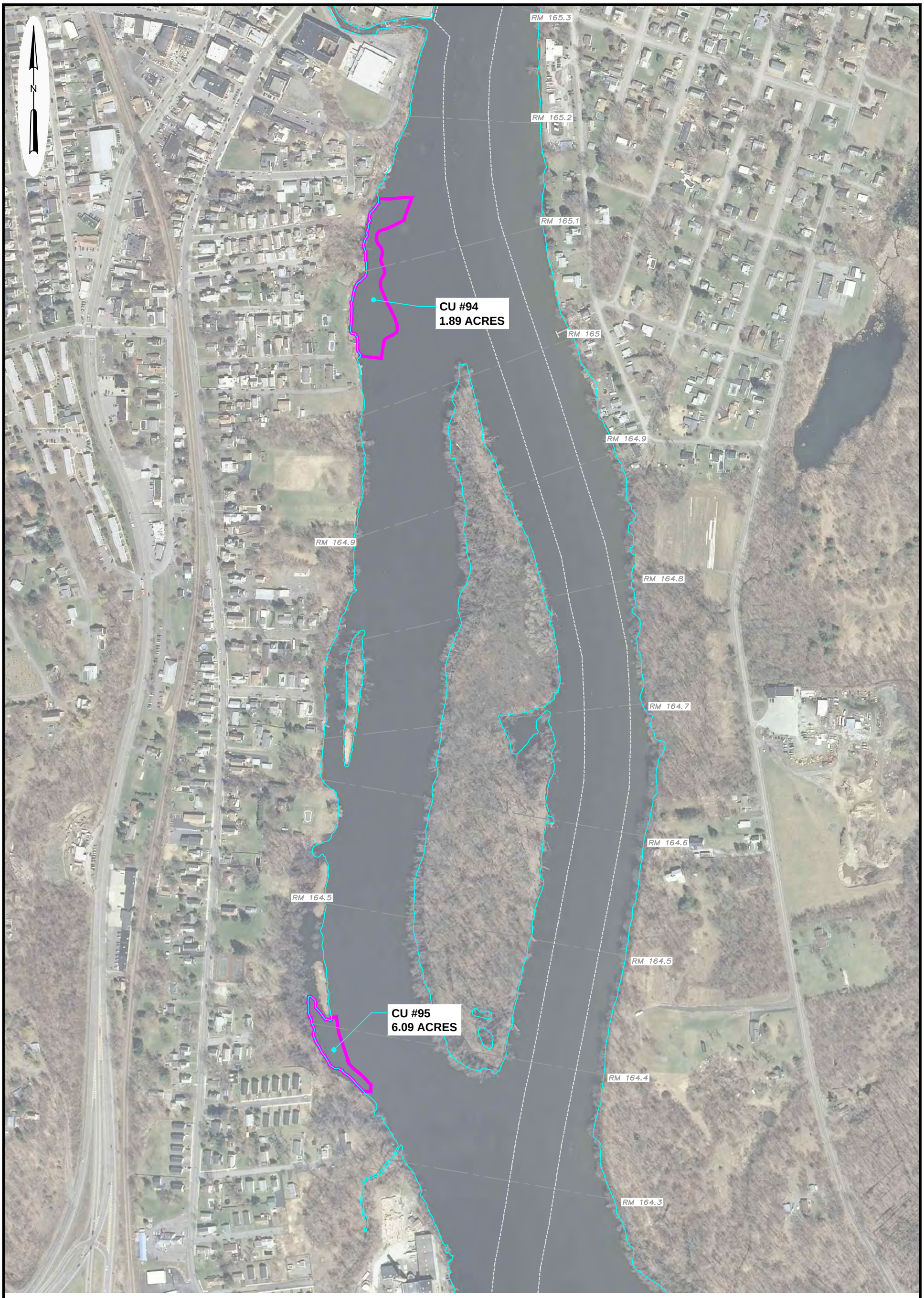


LEGEND

- CU # — CU BORDER
- SHORELINE (ELEVATION 47.8')
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

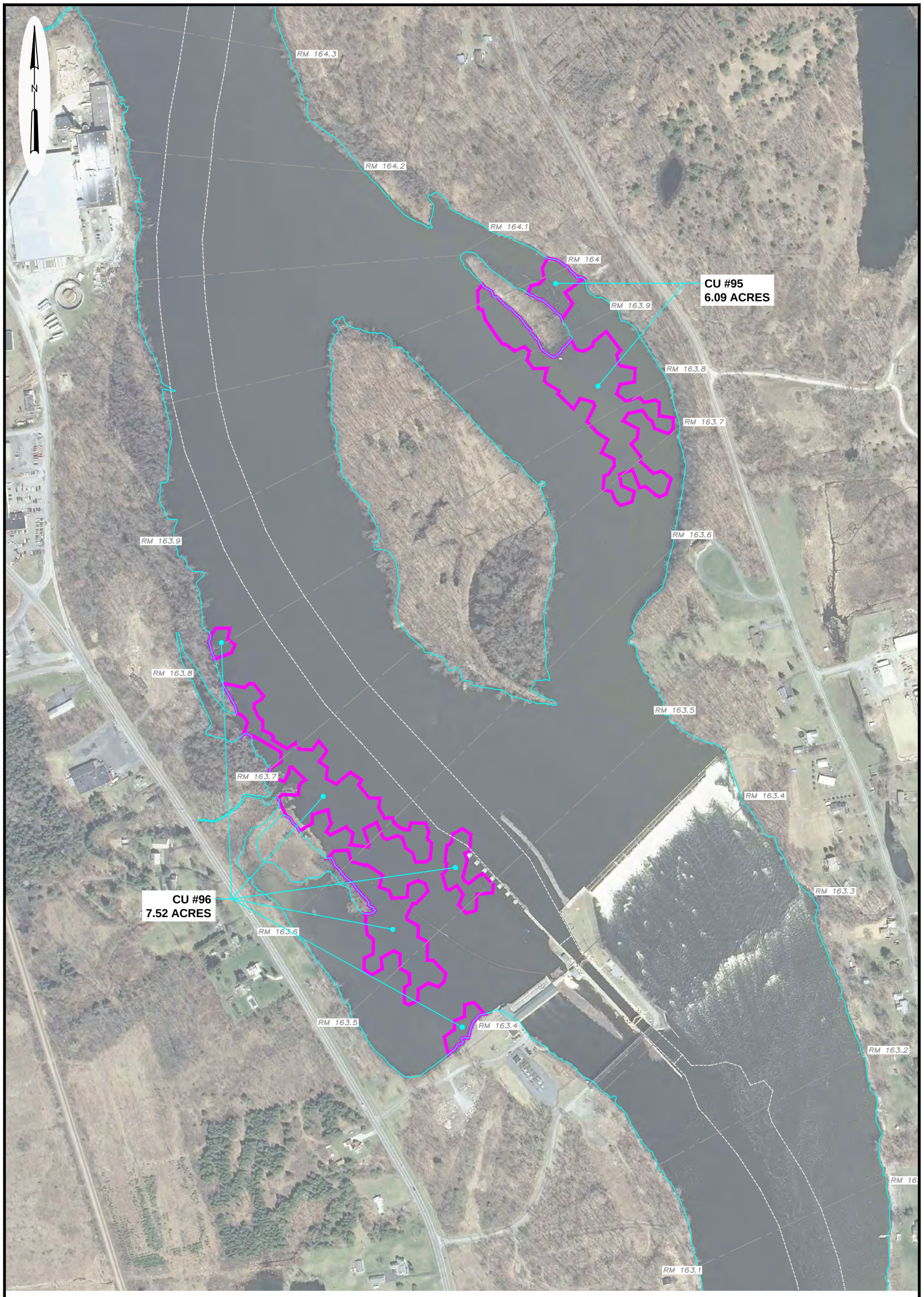
BAR SCALE

PARSONS
COMMERCIALTECHNOLOGY GROUP
GE COMPANY - PARSONS PROJECT OFFICE
BUILDING 40-2, 381 BROADWAY
FORT EDWARD, NEW YORK 12828 (518) 746-5311

DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 94 & 95
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-25	AS SHOWN
DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

FILE NAME: C:\USERS\P003604A\DOCUMENTS\PARSONS 2015\PROJECTS\RACR\2_P2_CUS.DWG
PLOT DATE: 11/10/2015 6:11 PM PLOTTED BY: BELLACK, MICHAEL



LEGEND

- CU # — CU BORDER
- SHORELINE (ELEVATION 47.8')
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

PARSONS
COMMERCIALTECHNOLOGY GROUP
GE COMPANY - PARSONS PROJECT OFFICE
BUILDING 40-2, 381 BROADWAY
FORT EDWARD, NEW YORK 12828 (518) 746-5311

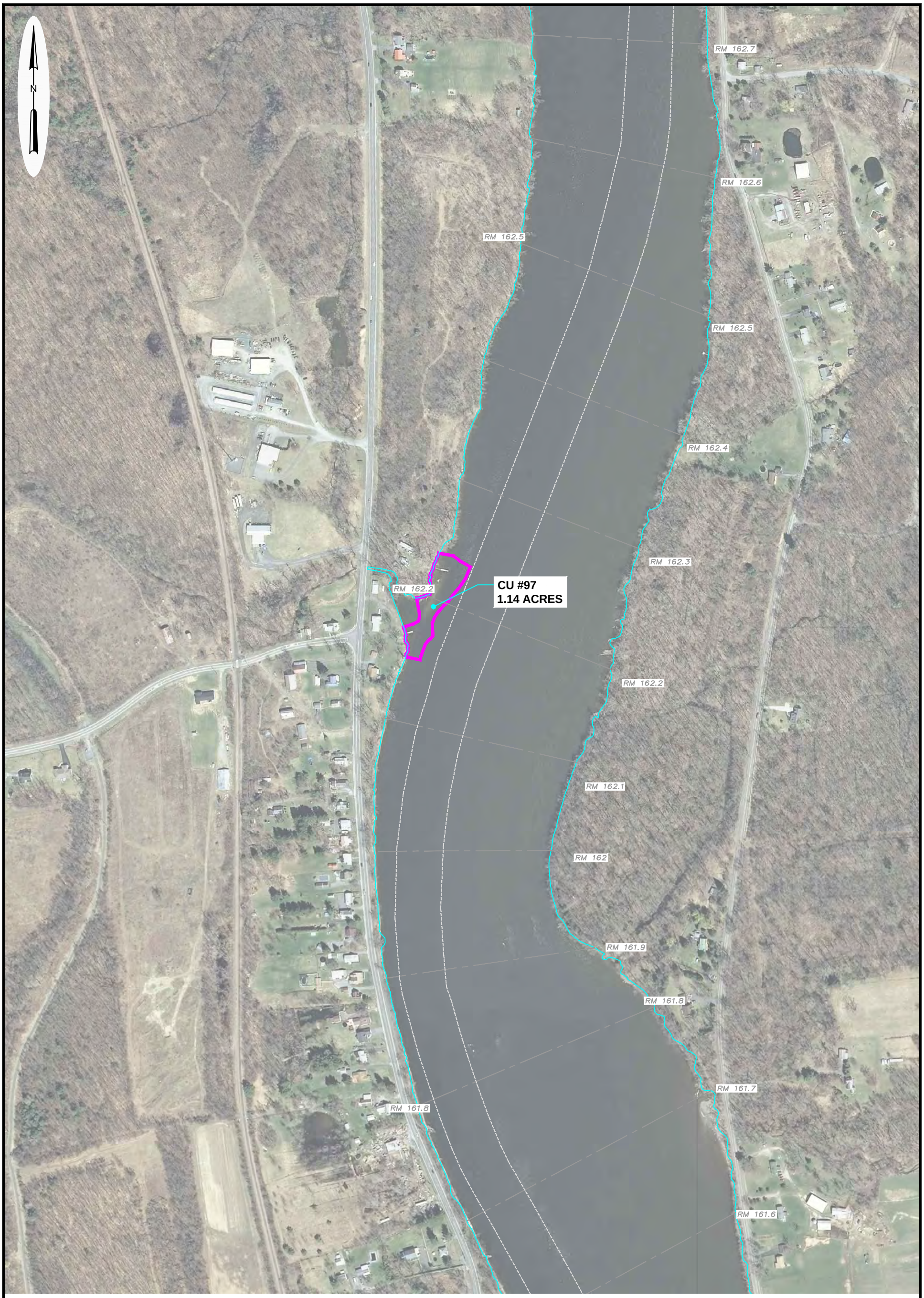
DRAWN BY	CHECKED BY
MWB	MG
DATE	APPROVED BY
10/28/2015	MG

DRAWING TITLE

REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNITS 95 & 96
HUDSON RIVER PCBs SUPERFUND SITE

DRAWING NO.	SCALE
FIGURE 2-26	AS SHOWN
	JOB NO. 449173.07200

FILE NAME: C:\USERS\P003604A\DOCUMENTS\PARSONS 2015\PROJECTS\RACR\2_P2_CUS.DWG
PLOT DATE: 11/10/2015 6:12 PM PLOTTED BY: BELLACK, MICHAEL



LEGEND

- CU # — CU BORDER
- SHORELINE (ELEVATION 29.6')
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

PARSONS
COMMERCIALTECHNOLOGY GROUP
GE COMPANY - PARSONS PROJECT OFFICE
BUILDING 40-2, 381 BROADWAY
FORT EDWARD, NEW YORK 12828 (518) 746-5311

DRAWN BY	CHECKED BY
MWB	MG
DATE	APPROVED BY
10/28/2015	MG

DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 97
HUDSON RIVER PCBs SUPERFUND SITE

DRAWING NO.	SCALE
FIGURE 2-27	AS SHOWN
	JOB NO. 449173.07200

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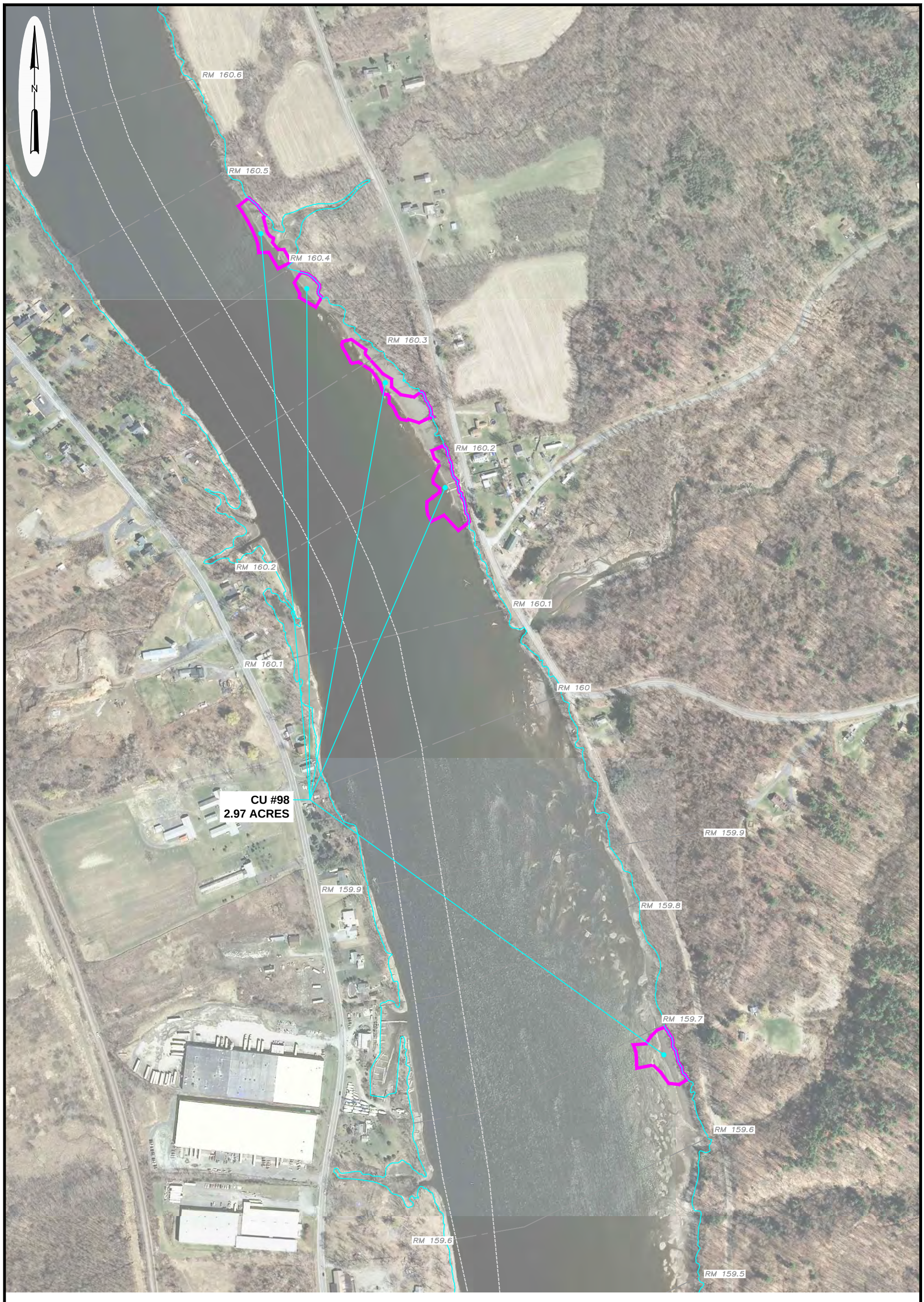


LEGEND

- CU # — CU BORDER
- SHORELINE (ELEVATION 29.6')
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

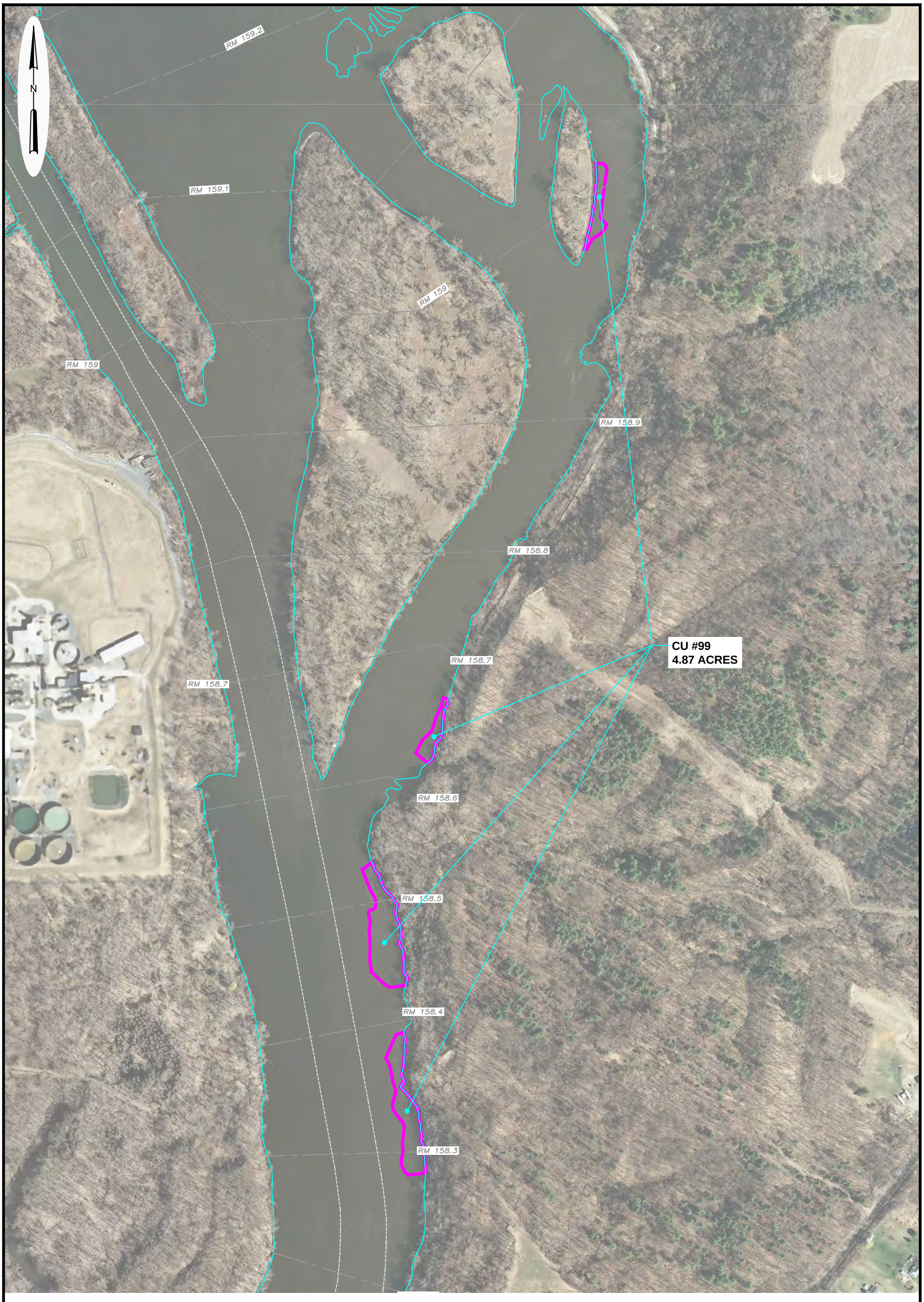
BAR SCALE

PARSONS
COMMERCIALTECHNOLOGY GROUP
GE COMPANY - PARSONS PROJECT OFFICE
BUILDING 40-2, 381 BROADWAY
FORT EDWARD, NEW YORK 12828 (518) 746-5311

DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 98
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-28	AS SHOWN
DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

FILE NAME: C:\USERS\P003604A\DOCUMENTS\PARSONS 2015\PROJECTS\RACR\2_P2_CUS.DWG
PLOT DATE: 11/10/2015 6:14 PM PLOTTED BY: BELLACK, MICHAEL



LEGEND

- CU # — CU BORDER
- CU # — DREDGING COMPLETED IN SEGMENT OF CU
- SHORELINE (ELEVATION 16.0')
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

PARSONS
COMMERCIALTECHNOLOGY GROUP
GE COMPANY - PARSONS PROJECT OFFICE
BUILDING 40-2, 381 BROADWAY
FORT EDWARD, NEW YORK 12828 (518) 746-5311

DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 99
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-29	AS SHOWN
DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

FILE NAME: C:\USERS\P003604A\DOCUMENTS\PARSONS 2015\PROJECTS\RACR\2_P2_CUS.DWG
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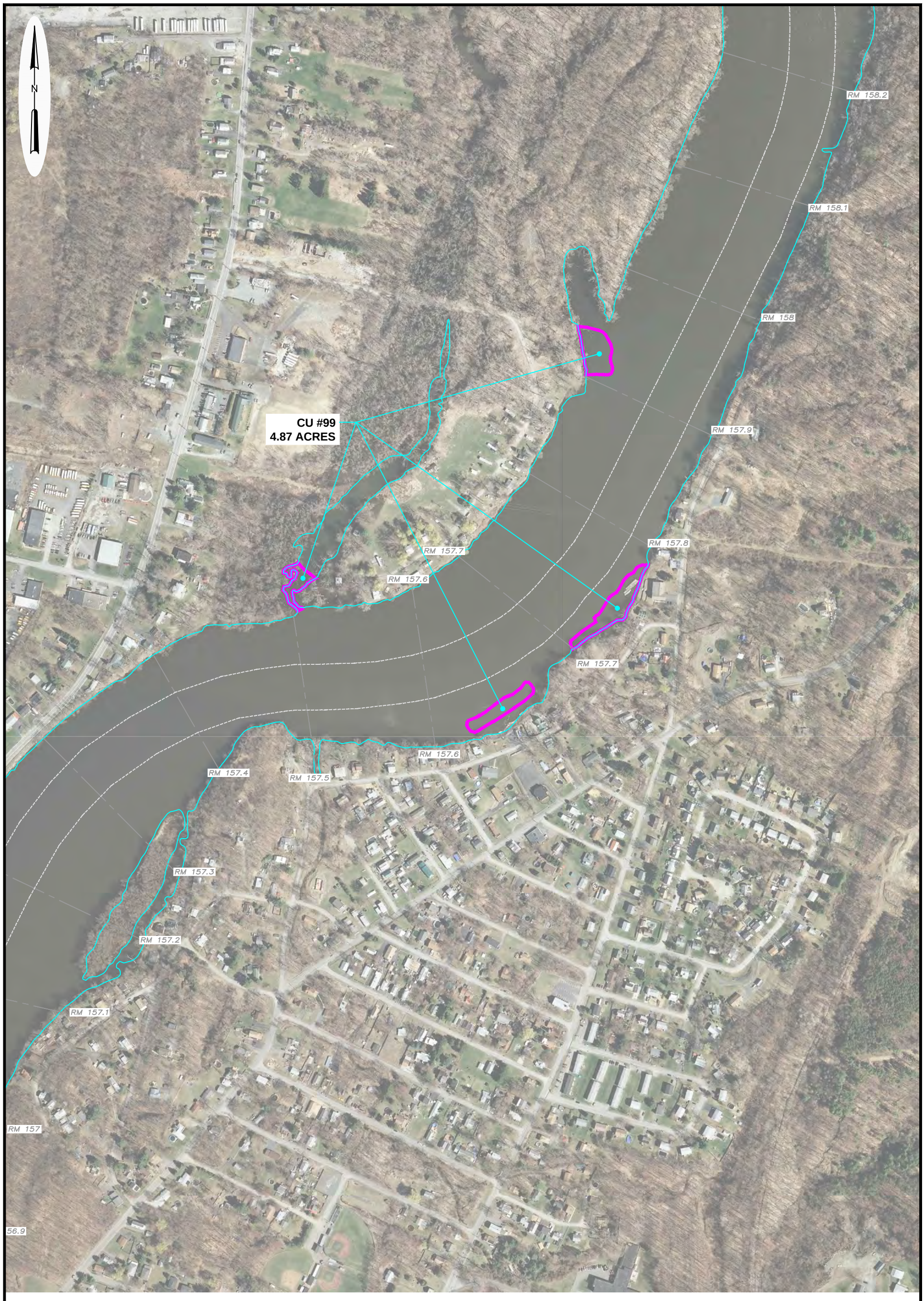


LEGEND

- CU # — CU BORDER
- SHORELINE (ELEVATION 16.0')
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

PARSONS
COMMERCIALTECHNOLOGY GROUP
GE COMPANY - PARSONS PROJECT OFFICE
BUILDING 40-2, 381 BROADWAY
FORT EDWARD, NEW YORK 12828 (518) 746-5311

DRAWING TITLE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 99
HUDSON RIVER PCBs SUPERFUND SITE

DRAWN BY	CHECKED BY	DRAWING NO.	SCALE
MWB	MG	FIGURE 2-30	AS SHOWN
DATE	APPROVED BY		JOB NO.
10/28/2015	MG		449173.07200

FILE NAME: C:\USERS\P003604A\DOCUMENTS\PARSONS 2015\PROJECTS\RACR\2_P2_CUS.DWG
PLOT DATE: 11/10/2015 6:16 PM PLOTTED BY: BELLACK, MICHAEL

LEGEND

- CU # — CU BORDER
- SHORELINE (ELEVATION 15.2')
- NAV CHANNEL
- RM 192.1 — RIVER MILE MARKER

400 200 0 400

BAR SCALE

PARSONS
COMMERCIALTECHNOLOGY GROUP
GE COMPANY - PARSONS PROJECT OFFICE
BUILDING 40-2, 381 BROADWAY
FORT EDWARD, NEW YORK 12828 (518) 746-5311

DRAWN BY	CHECKED BY
MWB	MG
DATE	APPROVED BY
10/28/2015	MG

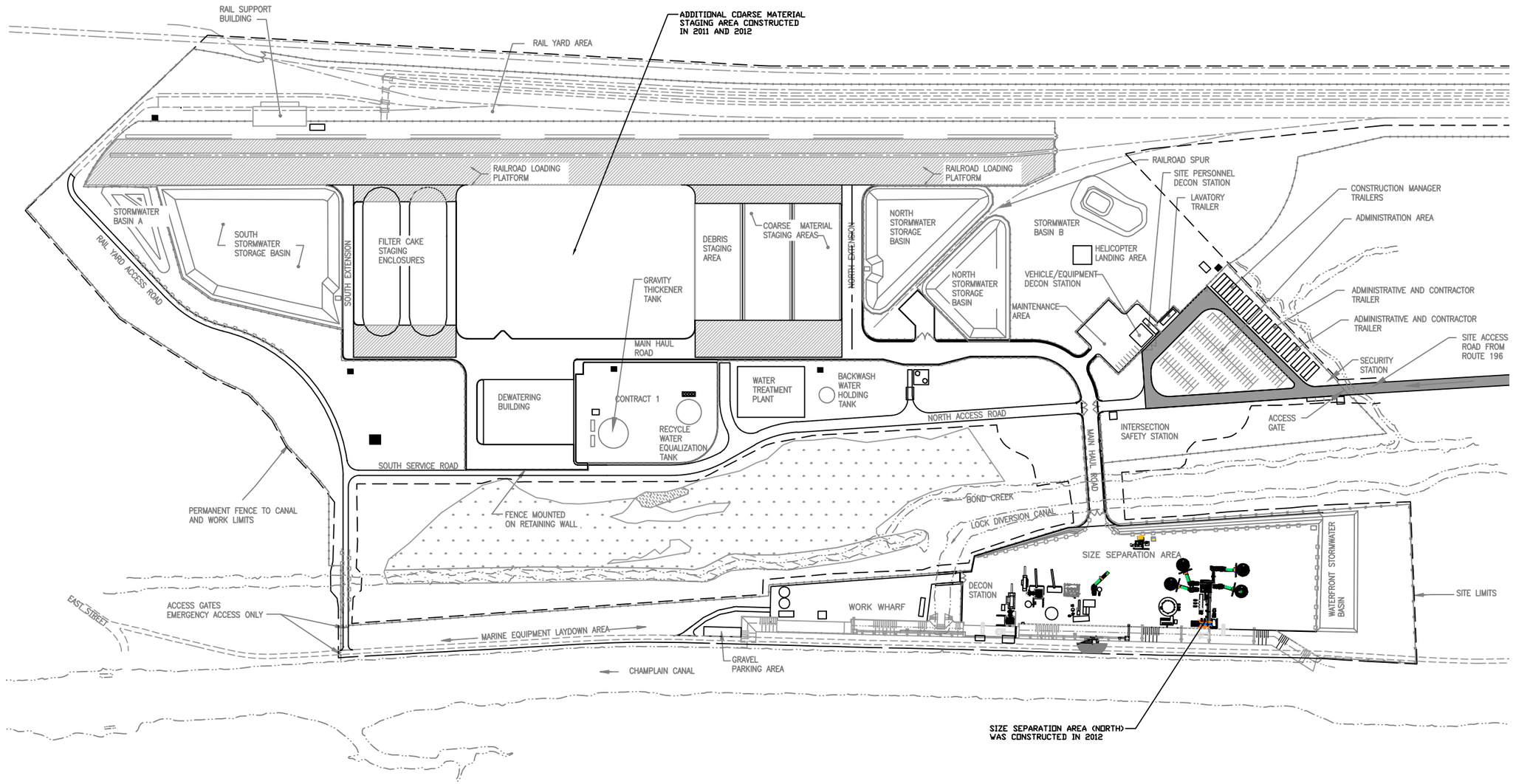
DRAWING TITLE

REMEDIAL ACTION COMPLETION REPORT
PHASE 2 DREDGE AREAS
CERTIFICATION UNIT 100
HUDSON RIVER PCBs SUPERFUND SITE

DRAWING NO.	SCALE
FIGURE 2-31	AS SHOWN
	JOB NO. 449173.07200

FILE NAME: C:\USERS\P003604A\DOCUMENTS\PARSONS 2015\PROJECTS\RACR\2_P2_CUS.DWG
PLOT DATE: 11/10/2015 6:18 PM PLOTTED BY: BELLACK, MICHAEL

SOURCE:
BASE MAP DRAWING SUPPLIED BY ARCADIS.



LEGEND:

- SITE PERIMETER FENCE
- FORESTED AREA
- EMERGENT WETLANDS
- SITE ACCESS ROAD FROM ROUTE 196

300 150 0 300 600

SCALE: 1"=300'

FILE NAME: C:\USERS\P003604A\DOCUMENTS\PARSONS 2015\PROJECTS\RACR\3-1_PF1.DWG
PLOT DATE: 11/10/2015 6:34 PM PLOTTED BY: BELLACK, MICHAEL

FIGURE 3-1

GENERAL ELECTRIC COMPANY
HUDSON RIVER PCBs SUPERFUND SITE
REMEDIAL ACTION COMPLETION REPORT
PHASE 2

SEDIMENT PROCESSING FACILITY

PARSONS
GE COMPANY – PARSONS PROJECT OFFICE, BUILDING 40-2,
381 BROADWAY FT. EDWARD, NY 12828

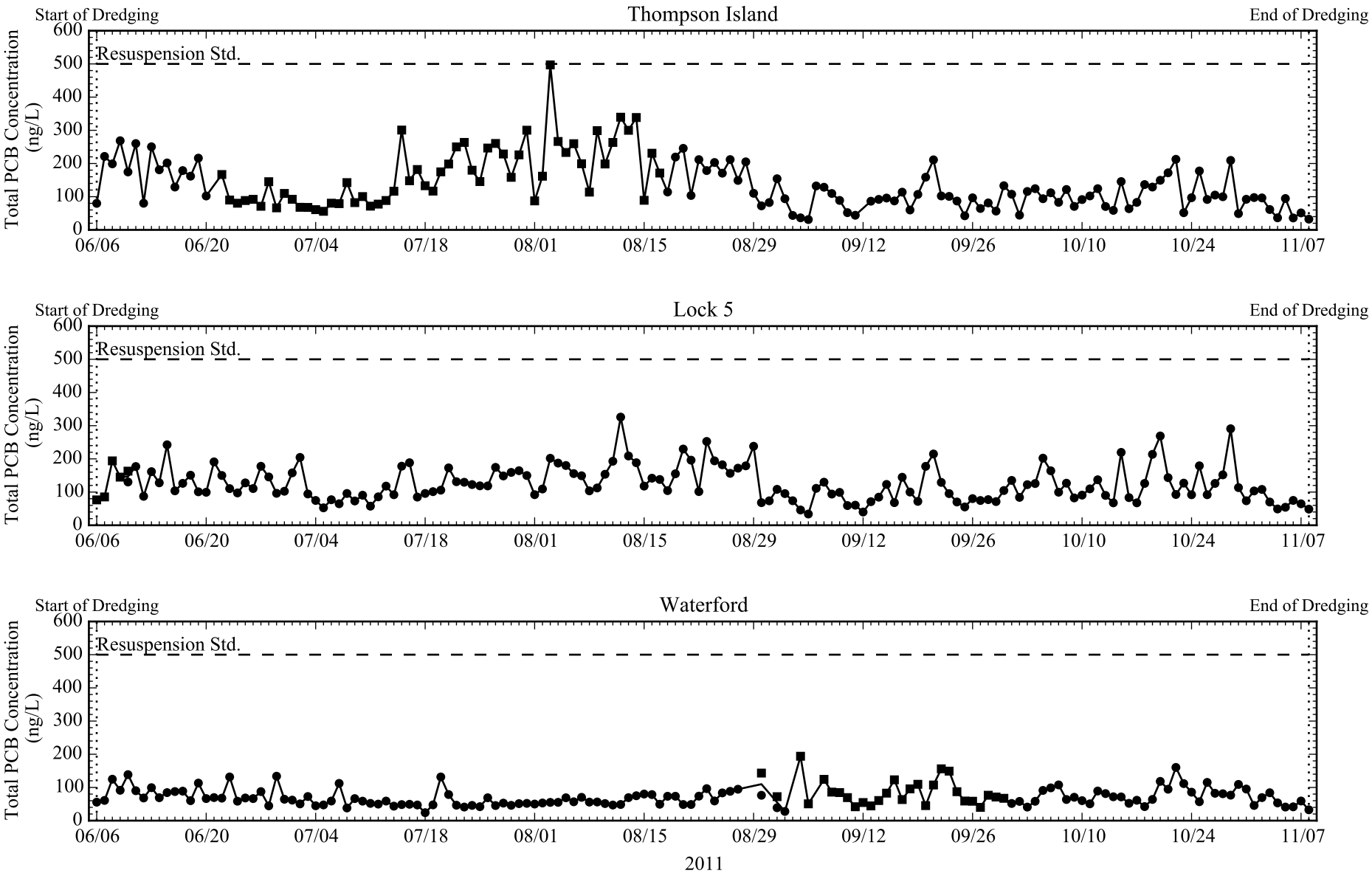


Figure 5-1a

Year 2011: Phase 2, Year 1 Total PCB Concentrations at Far-field Stations Monitored Daily

Notes: Non-detects set to 1/2 MDL. Duplicate data averaged. Lines depict average values where appropriate. Data shown are analyzed with NE294_00 method. Source data file is ff_analyticals_20111110_1400.

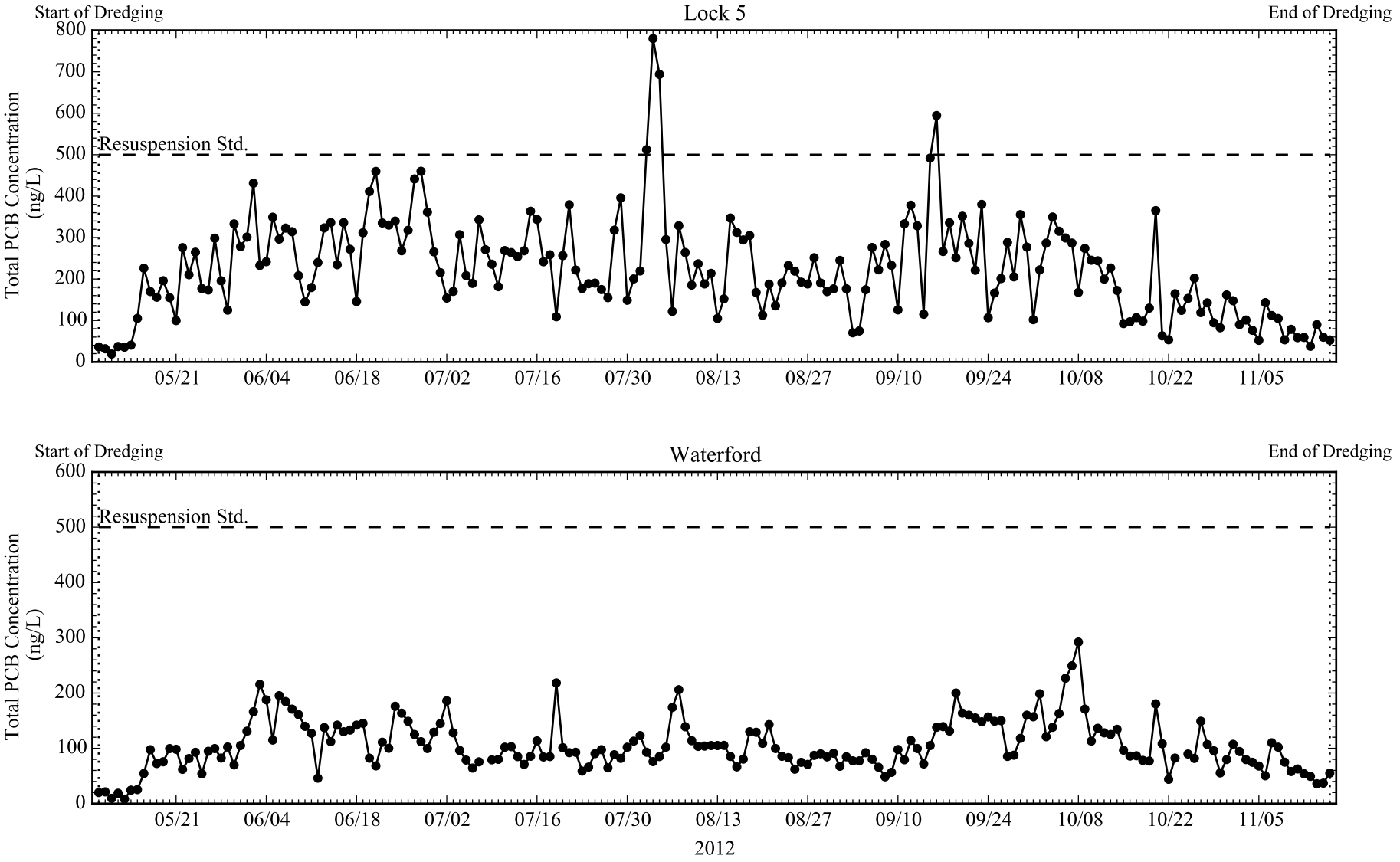
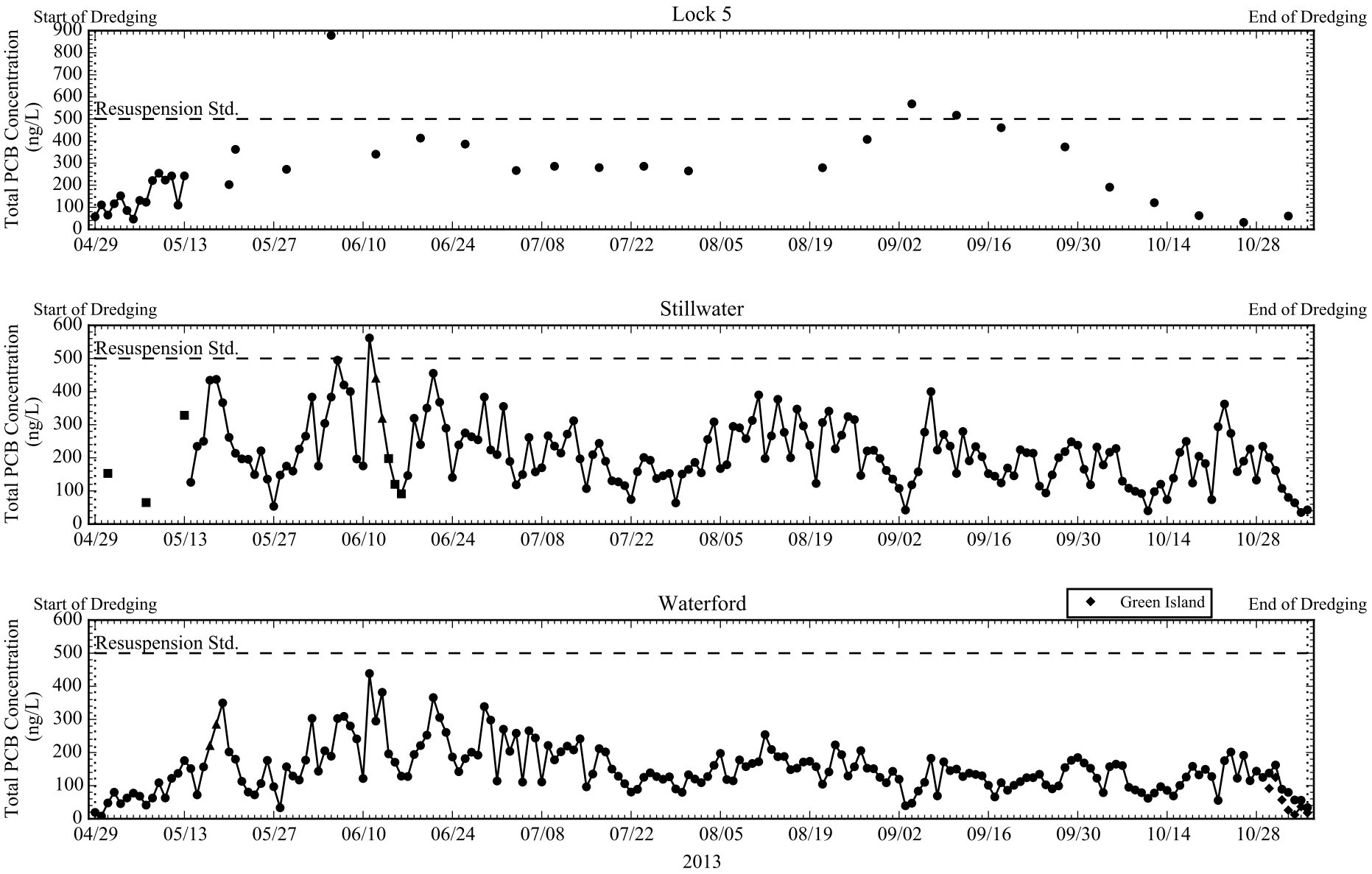


Figure 5-1b

Year 2012: Phase 2, Year 2 Total PCB Concentrations at Far-field Stations Monitored Daily

Notes: Non-detects set to 1/2 MDL. Duplicate data averaged. Lines depict average values where appropriate. Data shown are analyzed with NE273_02 method. Source data file is ff_analyticals_20121121-1400.



ANCHOR QEA

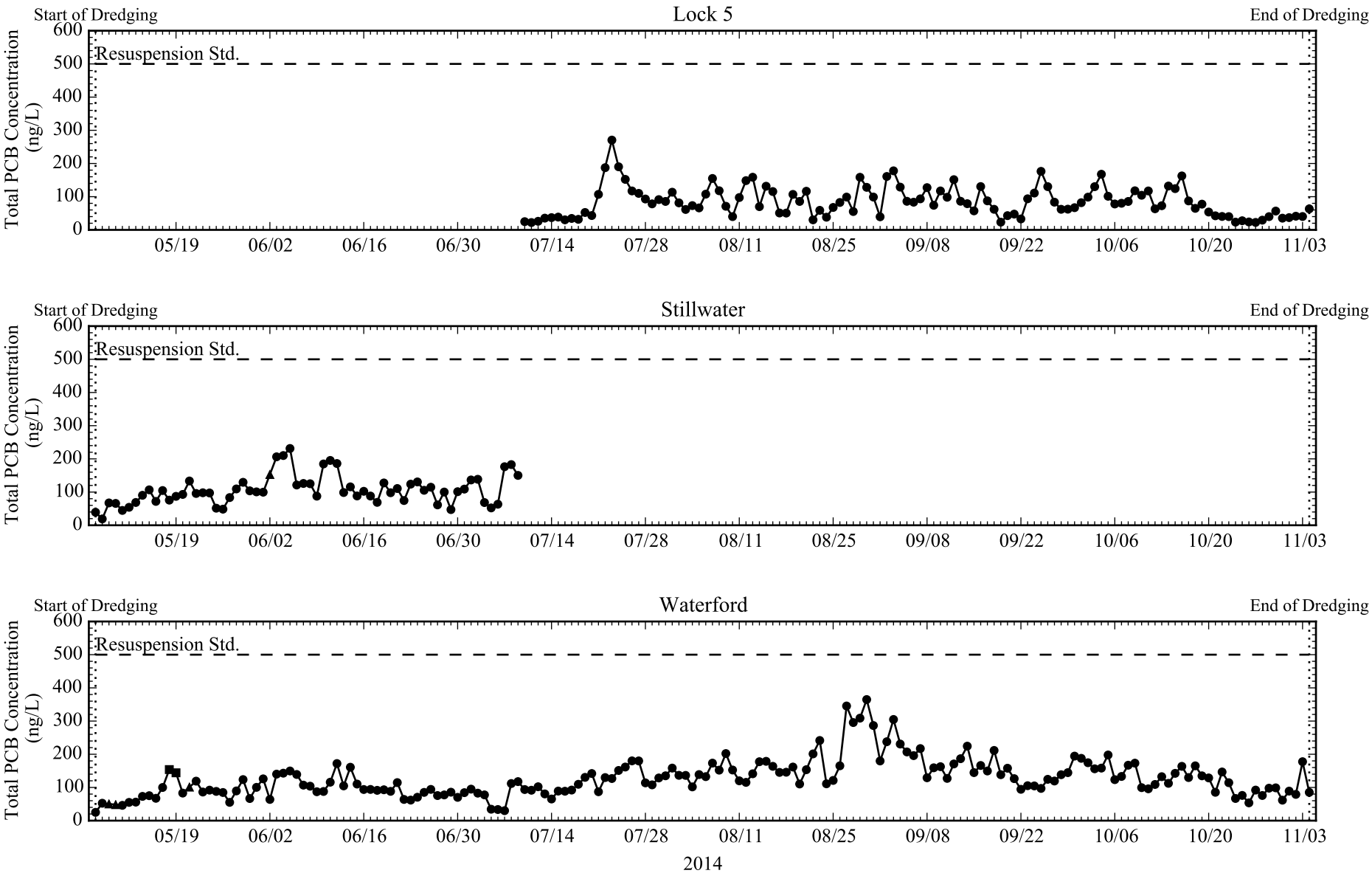
- 24-hr Composite
- Temporal Grab
- Interpolated Data

Figure 5-1c

Year 2013: Phase 2, Year 3 Total PCB Concentrations at Far-field Stations Monitored Daily and Weekly

Notes: Non-detects set to 1/2 MDL. Duplicate data averaged. Lines depict average values where appropriate. Connected symbols show data used for compliance; individual symbols show data used for informational purposes. Data shown are analyzed with NE273_02 method. Source data file is all_water_analyticals_20131113-1500.

MON-ZWAN - C:\D_Drive\Jobs\Hudson\Dredging_Analysis\Document\Phase2_Completion_Report\Python\tpcb_temporal.py 11/23/2015 16:54:31



ANCHOR QEA

- 24-hr Composite
- Temporal Grab
- Interpolated Data

Figure 5-1d

Year 2014: Phase 2, Year 4 Total PCB Concentrations at Far-field Stations Monitored Daily

Notes: Non-detects set to 1/2 MDL. Duplicate data averaged. Lines depict average values where appropriate. Connected symbols show data used for compliance; individual symbols show data used for informational purposes. Data shown are analyzed with NE273_03 method. Source data file is All_Water_Analyticals_20141112-0900.

MON-ZWAN - C:\D_Drive\Jobs\Hudson\Dredging_Analysis\Document\Phase2_Completion_Report\Python\tpcb_temporal.py 11/23/2015 16:54:34

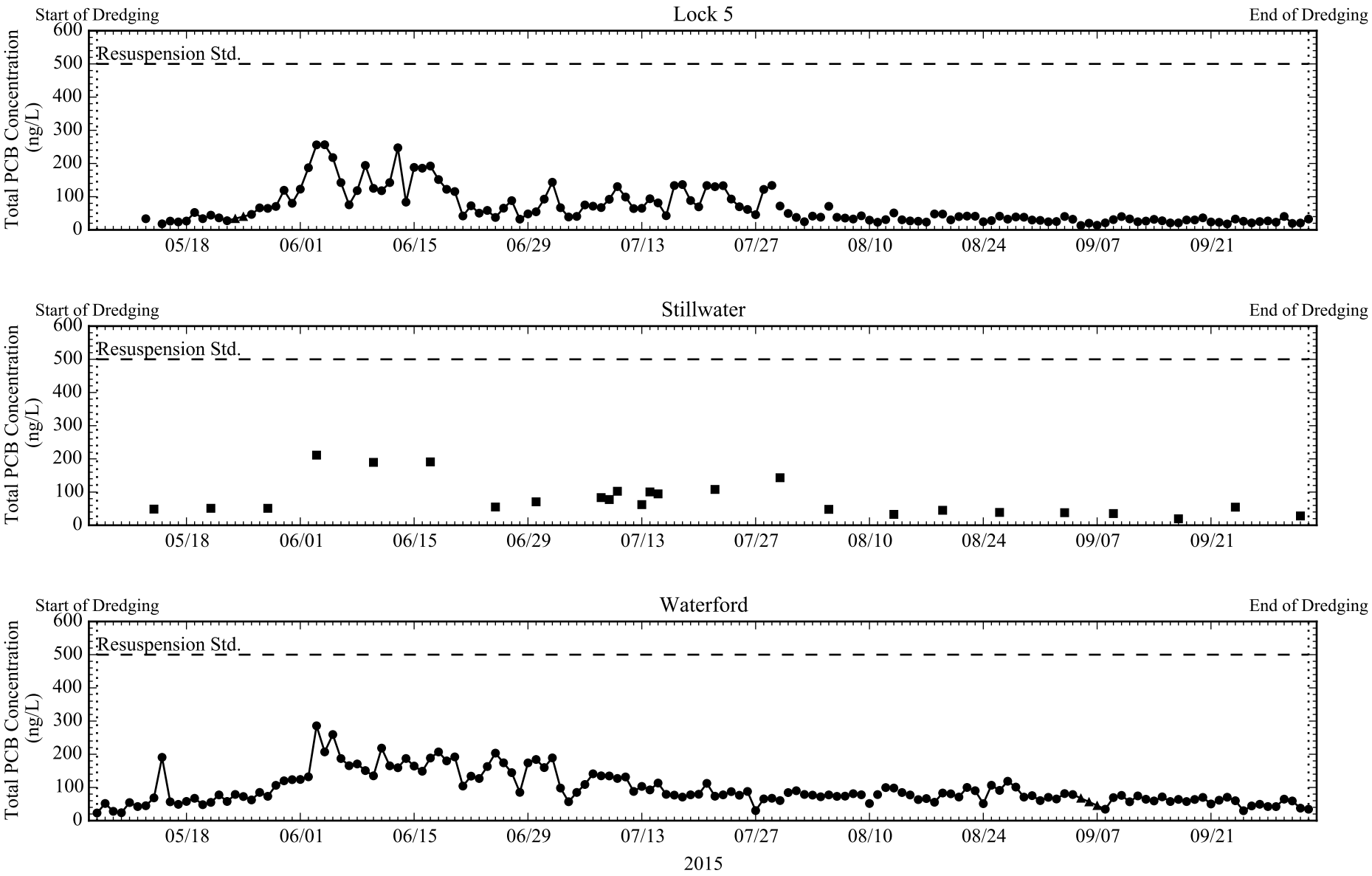


Figure 5-1e

Year 2015: Phase 2, Year 5 Total PCB Concentrations at Far-field Stations Monitored Daily and Weekly

Notes: Non-detects set to 1/2 MDL. Duplicate data averaged. Lines depict average values where appropriate. Connected symbols show data used for compliance; individual symbols show data used for informational purposes. Data shown are analyzed with NE273_03 and NE273_04 method. Source data file is All_Water_Analyticals_20151005-1600.

MON-ZWAN - C:\D_Drive\Jobs\Hudson\Dredging_Analysis\Document\Phase2_Completion_Report\Python\tpcb_temporal.py 11/23/2015 16:54:37

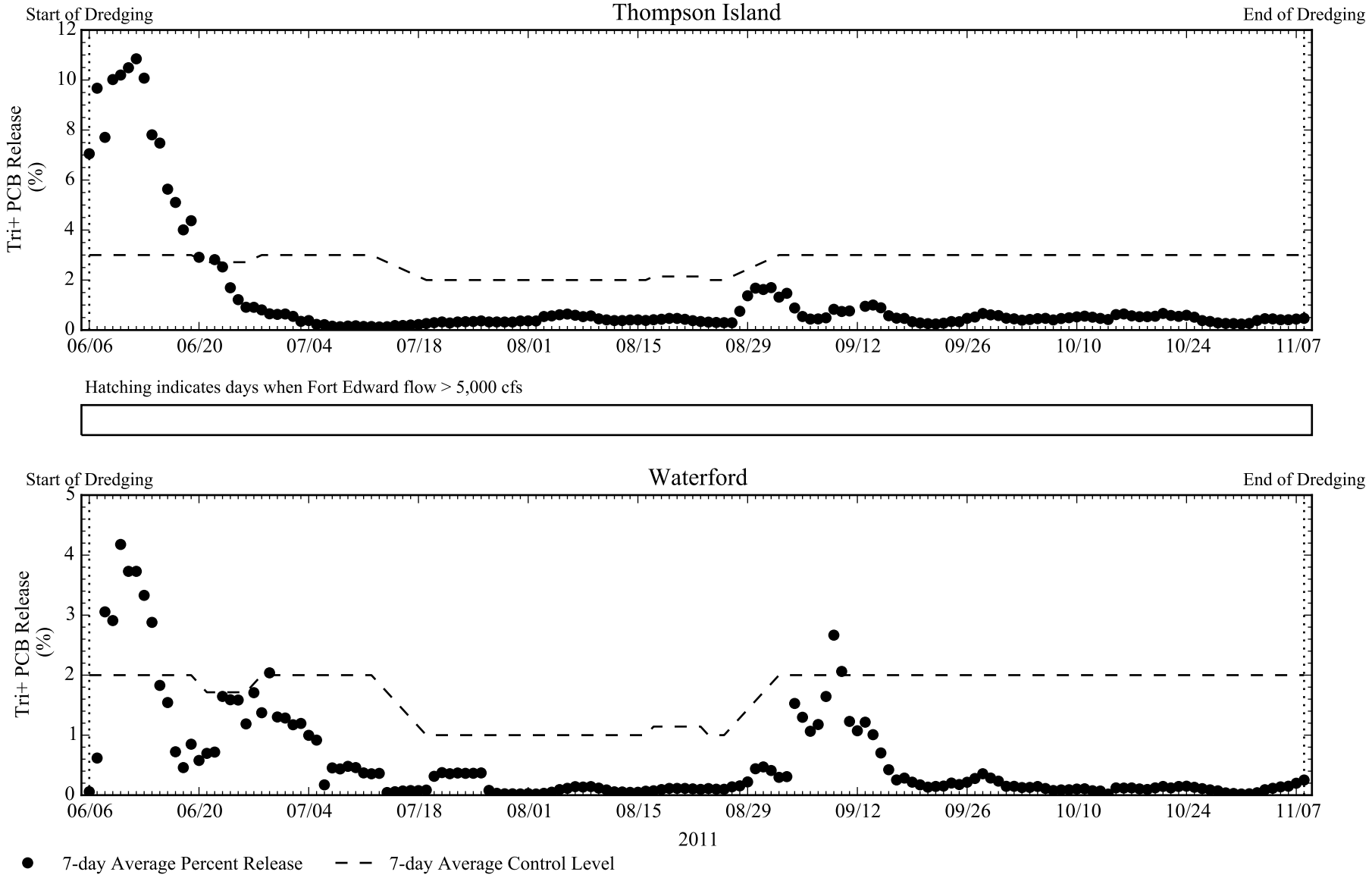


Figure 5-2a

Year 2011: Phase 2, Year 1 Percent Release 7-day Running Average

Notes: Values are (7-day averaged PCB net load) / (7-day averaged PCB mass removed) for Tri+ PCBs. Data prior to dredge start date excluded. Non-detects set to 1/2 MDL. Duplicate data averaged. Averages may contain fewer than 7 values when data are not available. 7-day average percent release was not calculated on days when sample was not collected.

ANCHOR QEA

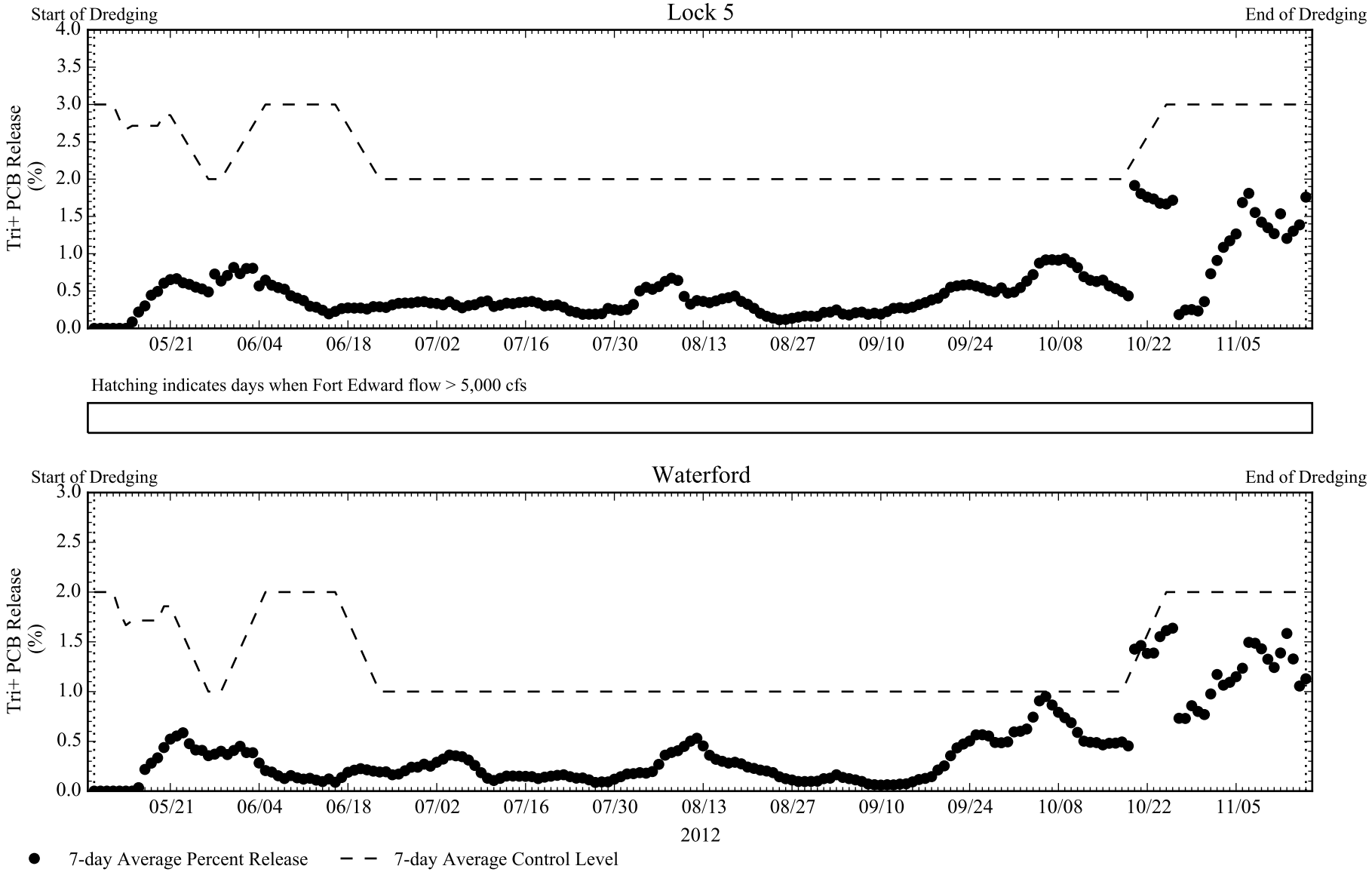


Figure 5-2b

Year 2012: Phase 2, Year 2 Percent Release 7-day Running Average

Notes: Values are (7-day averaged PCB net load) / (7-day averaged PCB mass removed) for Tri+ PCBs. Data prior to dredge start date excluded. Non-detects set to 1/2 MDL. Duplicate data averaged. Averages may contain fewer than 7 values when data are not available. 7-day average percent release was not calculated on days when sample was not collected.

ANCHOR QEA

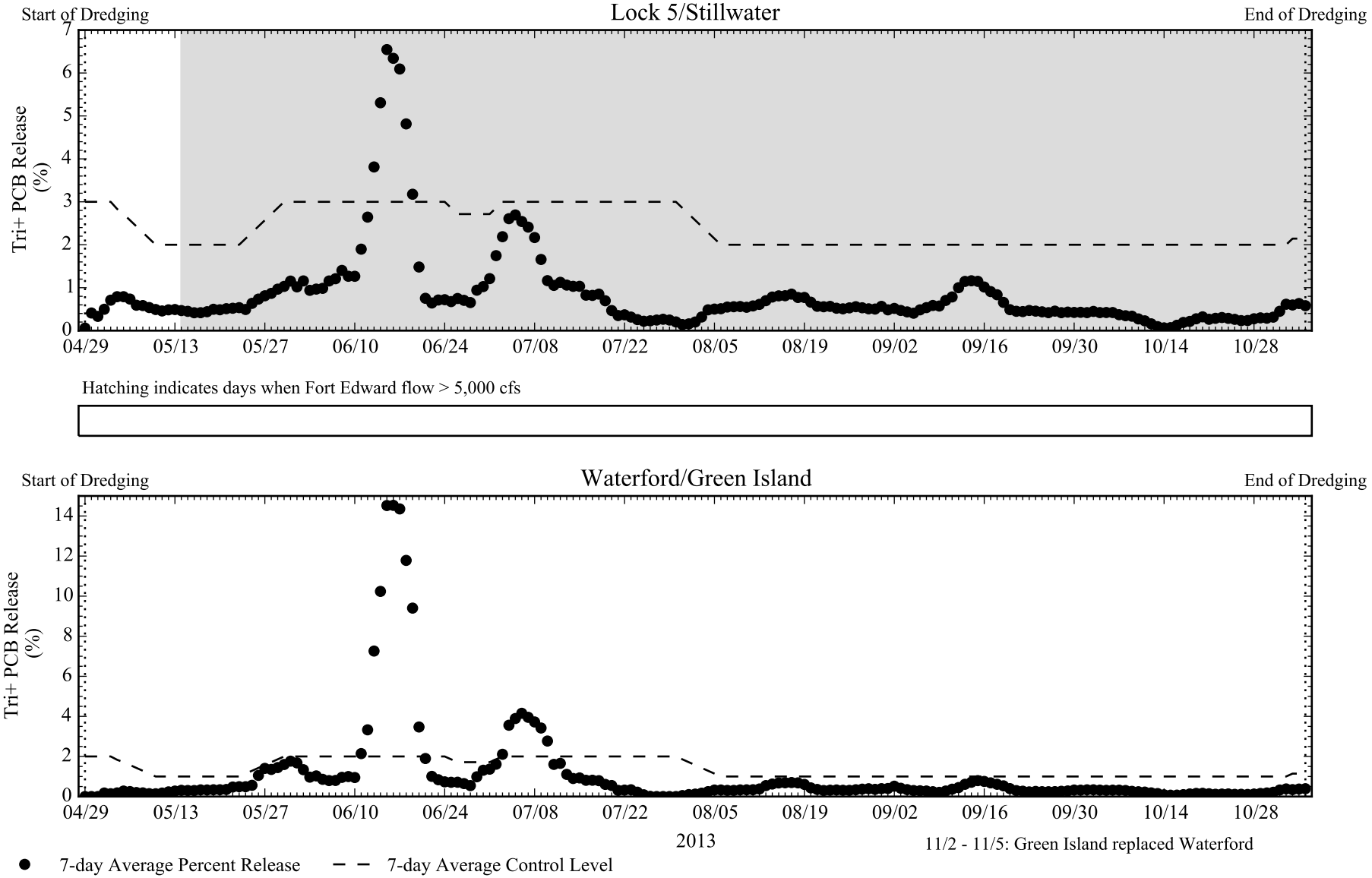


Figure 5-2c

Year 2013: Phase 2, Year 3 Percent Release 7-day Running Average

ANCHOR QEA

Notes: Values are (7-day averaged PCB net load) / (7-day averaged PCB mass removed) for Tri+ PCBs. Data prior to dredge start date excluded. Non-detects set to 1/2 MDL. Duplicate data averaged. Averages may contain fewer than 7 values when data are not available. The first far-field station is at Lock 5, or Stillwater (shaded area), as applicable. The following factors contributed to atypically high calculated net Tri+ PCB releases for week of 6/10: near-field and far-field water column PCB concentrations spiked, dredging was halted from 6/12 through 6/16 because of high flows,and mass removed was low (half that during a typical week).

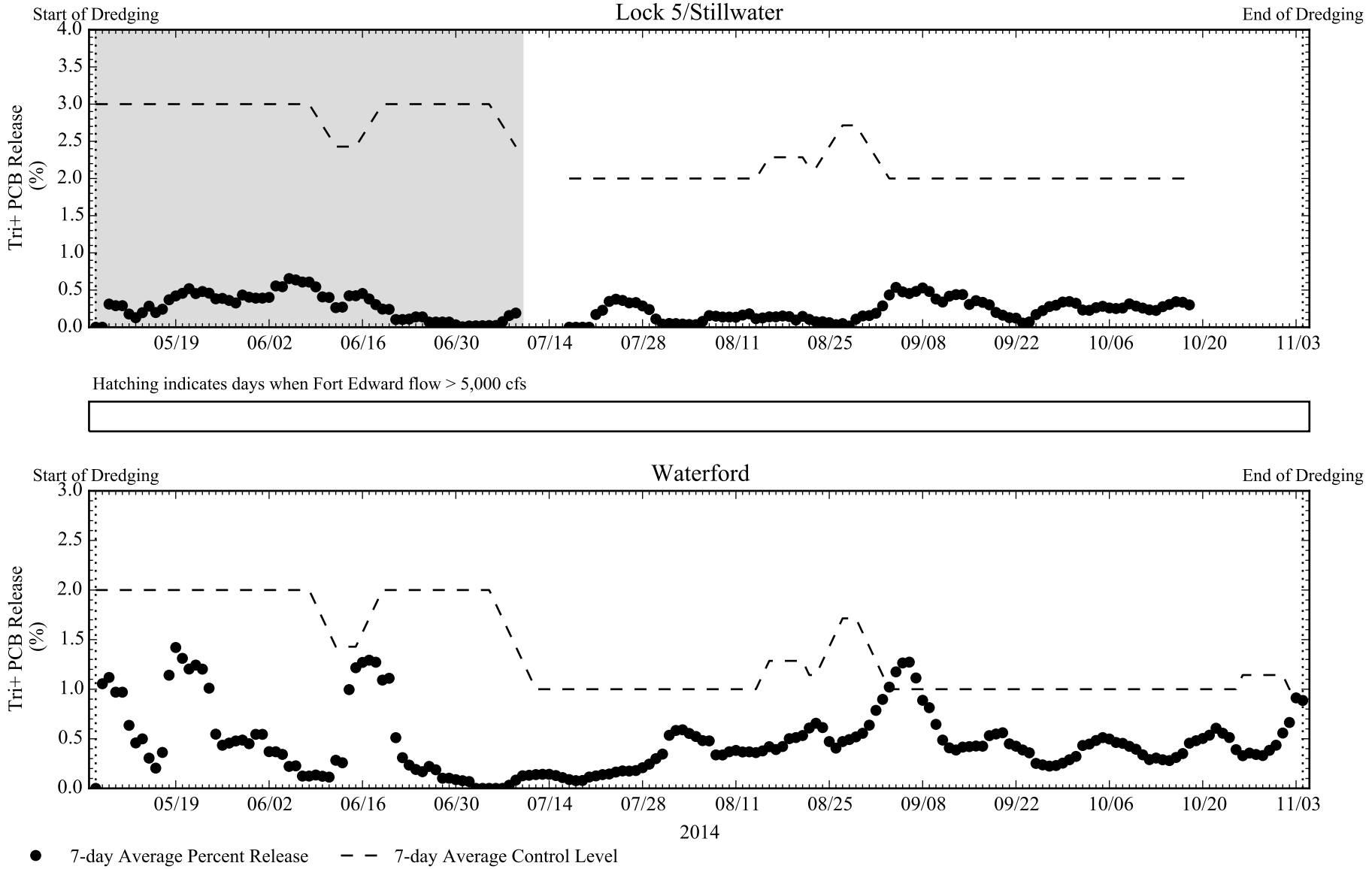


Figure 5-2d

Year 2014: Phase 2, Year 4 Percent Release 7-day Running Average

Notes: Values are (7-day averaged PCB net load) / (7-day averaged PCB mass removed) for Tri+ PCBs. Data prior to dredge start date excluded. Non-detects set to 1/2 MDL. Duplicate data averaged. Averages may contain fewer than 7 values when data are not available. The first far-field station is at Lock 5, or Stillwater (shaded area), as applicable.

ANCHOR QEA

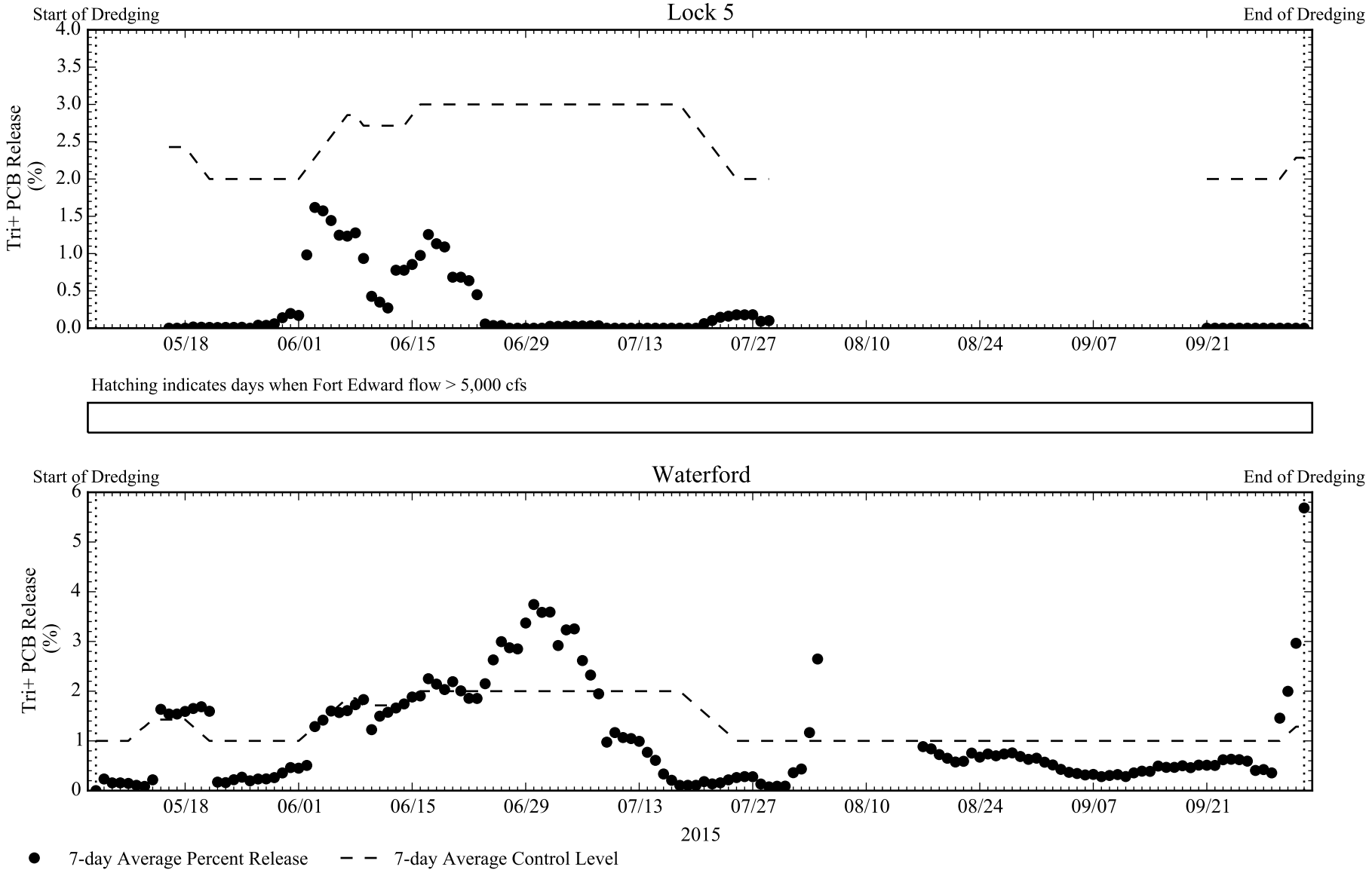


Figure 5-2e

Year 2015: Phase 2, Year 5 Percent Release 7-day Running Average

Notes: Values are (7-day averaged PCB net load) / (7-day averaged PCB mass removed) for Tri+ PCBs. Data prior to dredge start date excluded. Non-detects set to 1/2 MDL. Duplicate data averaged. Averages may contain fewer than 7 values when data are not available.

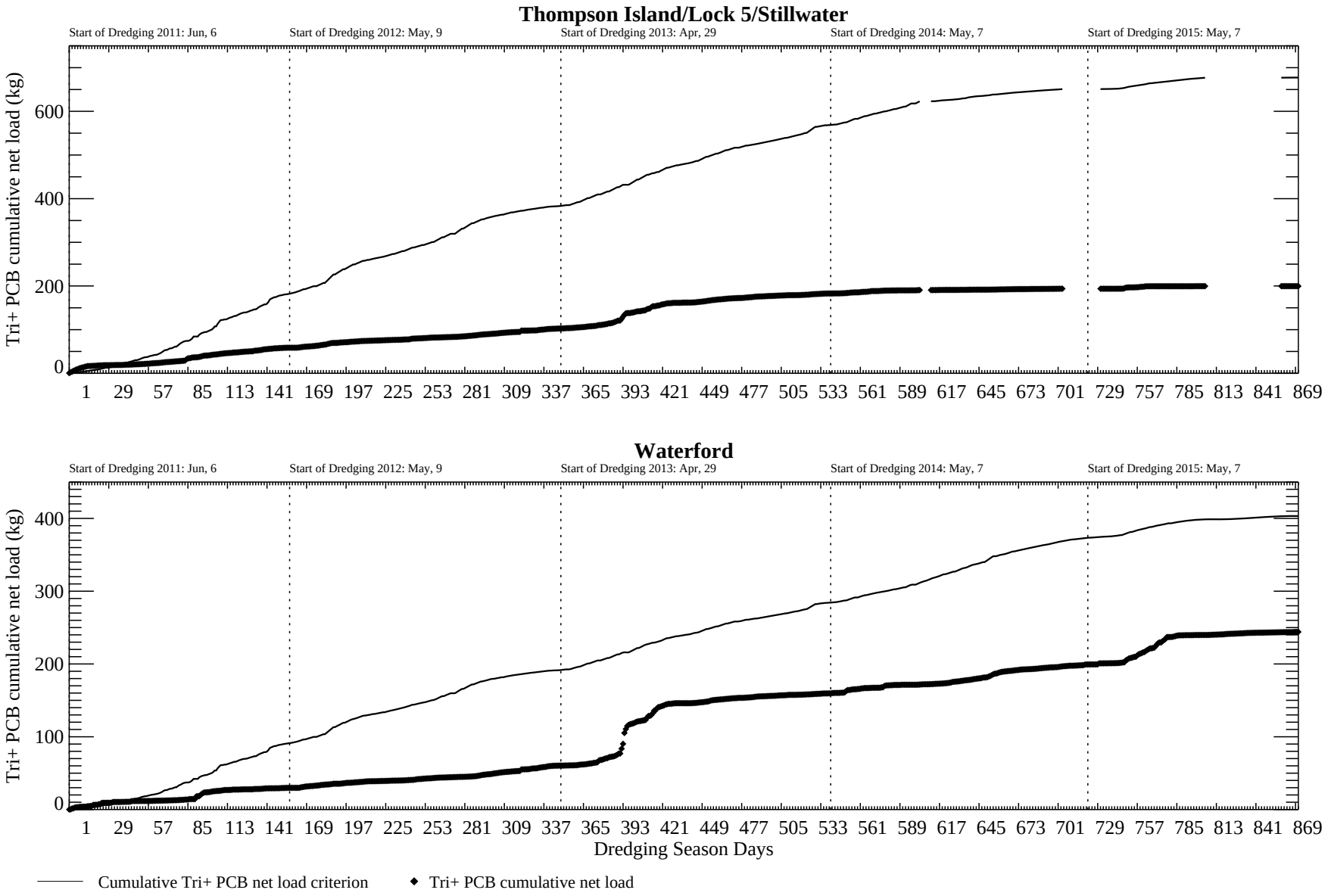


Figure 5-3

Tri+ PCB Cumulative Net Load during 2011 - 2015 Dredging Seasons

Notes: The line represents(in kg) the cumulative net load criterion at each station, calculated based on the applicable annual percent release criteria of 2 percent at the first far-field station and 1 percent at the Waterford station. Non-detects set to 1/2 MDL. Duplicate data averaged. The first far-field station was not in use during July 10-16, 2014 or May 7-15, 2015 when there was no dredging acitivites above the first station. In 2014, landlocked area dredging ended on 10/18, after which the first station was not monitored for compliance purpose. In 2015, Landlocked area dredging ended on 7/29. CU 1 area dredging started on 9/21. Since 9/21, first station was monitored for compliance purpose through end of dredging season.