FIRST FIVE-YEAR REVIEW REPORT FOR GRASSE RIVER (aka ALCOA AGGREGATION) SUPERFUND SITE ST. LAWRENCE COUNTY, NEW YORK

Prepared by

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LIST OF ABBREVIATIONS & ACRONYMS

ACPS	Activated Carbon Pilot Study
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPS	Capping Pilot Study
CY	Cubic Yard
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
GAC	Granular Activated Carbon
ICs	Institutional Controls
LOAEL	Lowest Observed Adverse Effect Level
mg/kg	milligram per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	No Observed Adverse Effect Level
NPL	National Priorities List
NYSDEC	New York State of Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
PCBs	Polychlorinated Biphenyls
PRP	Potentially Responsible Party
RAOs	Remedial Action Objectives
RG	Remediation Goal
RME	Reasonable Maximum Exposure
ROD	Record of Decision
ROPS	Remedial Options Pilot Study
RPM	Remedial Project Manager
SAV	Submerged Aquatic Vegetation
SLSDC	St. Lawrence Seaway Development Corporation
SPDES	State Pollution Discharge Elimination System
SRMT	Saint Regis Mohawk Tribe
TBC	To be considered
TSS	Total Suspended Solids

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the first FYR for the Grasse River (aka Alcoa Aggregation) Superfund Site (Site). The triggering action for this statutory review is May 1, 2017, the on-site construction start date of the Grasse River remedial action. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Grasse River Superfund Site FYR was led by Young S. Chang, EPA Remedial Project Manager (RPM). Participants included Abigail Debofsky - EPA Ecological Risk Assessor, Marian Olsen - EPA Human Health Risk Assessor, John Mason - EPA Hydrologist, Rich Henry - EPA ERT Biologist, and Larisa Romanowski - EPA Community Involvement Coordinator. Arconic, the potentially responsible party (PRP), the Town and Village of Massena, the Saint Regis Mohawk Tribe (SRMT) Tribal Council, SRMT Environment Division and New York State Department of Environmental Conservation (NYSDEC), and the New York State Department of Health (NYSDOH) were notified of the initiation of the FYR. The review began on 7/15/2021.

Site Background

The Site is located near the northern boundary of New York State in the Town and Village of Massena. It is not on the National Priorities List (NPL) but is being investigated and remediated as an enforcement-lead remedial action that follows the same investigation and remedy selection requirements as sites on the NPL. EPA issued an Administrative Order (Index II CERCLA- 90229) (Order) to Alcoa Inc. (Alcoa), Arconic's predecessor in interest, in September 1989, calling for the investigation of the Alcoa Study Area to determine the nature and extent of hazardous substances contamination. The Alcoa Study Area included approximately 7.2 miles of the lower Grasse River from the intersection of the Massena Power Canal (Power Canal) and the Grasse River, to the confluence of the Grasse and St. Lawrence Rivers. This 7.2 mile stretch of the Grasse River is referred to as the Site. The Alcoa Study Area also included the approximately 1.3 miles of the lower Grasse River upstream of the confluence of the Grasse River and the Power Canal, Robinson Creek (which discharges to the St. Lawrence River) and the Unnamed Tributary (See Figure 1, Site Location Map).

The former Alcoa Massena West Plant (facilities now operated by two spin-off companies named

Arconic Corporation and Alcoa Corporation, respectively[1]) is located on the north shore of the lower Grasse River, east of the Power Canal, and is bounded to the north by the St. Lawrence River. Two other large manufacturing facilities, the Reynolds Metals facility (formerly known as the Alcoa Massena East Plant) and the former General Motors Central Foundry Division plant (demolished as of 2012) are located within two miles east of the confluence of the Grasse and St. Lawrence Rivers.[2]

The combined 2,700-acre Alcoa Corporation and Arconic Corporation operations consist of aluminum production and fabrication operations that have been in operation since 1903. Alcoa Inc.'s past waste generation and disposal practices resulted in polychlorinated biphenyls (PCBs) accumulating in sediment that became deposited primarily on top of bedrock and/or hard glacial till in the river. PCB discharges to the lower Grasse River decreased significantly after PCB use was stopped in the mid-1970's. Storm water and treated wastewater from these operations are discharged from permitted outfalls that flow into the lower Grasse River, the Power Canal, the Unnamed Tributary, and Robinson Creek.

As a result of these past disposal practices, NYSDEC determined that environmental conditions arising from hazardous waste disposal at the facility gave rise to significant threats to human health and the environment. Under a 1985 NYSDEC Order, Alcoa conducted a land-based cleanup program from 1991 to 2001, which included the elimination or mitigation of sources of contamination to the Grasse River.

Please see Appendix C for more details concerning the cleanup of the uplands, improvements to SPDES discharges and additional background information concerning various demonstration and pilot studies performed at the facility and in the lower Grasse River.

The ancestral lands of the federally recognized SRMT, Mohawks, and Mohawks of Akwesasne, include land on both banks of the lower Grasse River and a tract of land along the confluence of the St. Lawrence River, as recognized by the 1796 Treaty with the Seven Nations of Canada, 7 Stat. 55, known as "Indian Meadows." The lower Grasse River, as well as associated land identified by the SRMT as the Indian Meadows, are of cultural importance to the Mohawks, Mohawks of Akwesasne, and the SRMT. Fishing, hunting, harvesting and spiritual ceremonies are among the activities that have been historically and are now conducted by the Mohawks of Akwesasne in the lower Grasse River.

Primary land uses in the vicinity of the lower Grasse River, including the Indian Meadows and the Town of Massena, include residential, agricultural, industrial, recreational and tribal activities. It is expected that future uses of these areas will be similar to the current uses.

The Grasse River is a New York State Class B fresh surface water body, which means the best usages for the river are "primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival" (6 NYCRR § 701.7). The lower Grasse River is used for various recreational activities such as fishing, boating, and water sports. However, a fish

[1] On November 1, 2016, Alcoa Inc. separated into two companies by spinning off a subsidiary company called Alcoa Corporation and then changing its name from Alcoa Inc. to Arconic Inc. On April 1, 2020, Arconic Inc. separated into two companies, with Arconic Inc. changing its name to Howmet Aerospace Inc. and also spinning off a subsidiary that was then renamed Arconic Corporation. Howmet Aerospace Inc. is the owner and Arconic Corporation is the operator for the Grasse River site. Arconic Corporation has assumed responsibility to implement the project and conduct all work at the site.

[2] These two facilities are associated with the Reynolds Metals Co. and General Motors-Central Foundry Division Superfund Sites, respectively, and both include sediment in the St. Lawrence River. EPA is overseeing cleanups under CERCLA at both sites.

consumption advisory issued initially in 1990 and updated annually by New York State Department of Health (NYSDOH) currently indicates that no species of fish from the lower Grasse River (i.e., mouth of Grasse River to the Power Canal) should be eaten because of PCBs in the fish. Grasse River water is also used for domestic purposes (watering lawns and gardens) and agriculture (irrigating crops). The Grasse River is not currently used as a public water supply.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Grasse River (aka Alcoa Aggregation) Superfund Site		
EPA ID: NYD980506232		
Region: 2	**State:** NY	**City/County:** Massena/St. Lawrence County
SITE STATUS		
NPL Status: Non-NPL		
Multiple OUs? No	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]*:**		
Author name (Federal or State Project Manager): Young S. Chang		
Author affiliation: US Environmental Protection Agency		
Review period: 7/15/2021 - 3/31/2022		
Date of site inspection: 9/29/2021		
Type of review: Statutory		
Review number: 1		
Triggering action date: 5/1/2017		
Due date *(five years after triggering action date)*: 5/1/2022		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

For the investigation of the Site, Alcoa had conducted numerous studies, summarized in the Comprehensive Characterization of the Lower Grasse River (CCLGR) Report of April 2001 and Addendum to the CCLGR of April 2009 (collectively referred to as the "Final CCLGR Report"). Additional investigations and modeling were conducted to study the fate and transport of the PCBs at the Site. Based on the results of the studies, the 7.2 miles of the lower Grasse River had been determined

to be the area of primary concern, comprising approximately 2.3 million cubic yards (cy) of sediment over 400 acres, of which, 1.7 million cy of sediment was estimated to be contaminated with PCBs over about 325 acres. River sediment contaminated from discharges from the facility presented both a potential human health risk from ingestion of contaminated fish, as well as ecological risks, including those associated with ingestion of fish by birds and mammals. The response action selected in the Record of Decision (ROD) was determined necessary to protect public health, welfare, or the environment from actual or threatened releases of hazardous substances into the environment.

Response Actions

As detailed in Appendix C, numerous actions were taken to limit continued discharges to the Grasse River from the Alcoa West facility, including land based remediation, minimization of discharges through the permitted outfalls and various demonstration and pilot studies.

Alcoa conducted a Non-Time-Critical Removal Action (NTCRA) to address the PCB-contaminated sediment within a one-acre area around the Outfall 1 under the amended Administrative Order between July and September, 1995. Approximately 3,000 cy of sediment, boulders and debris were removed. Dredged sediment was dewatered and disposed of in Alcoa's TSCA and RCRA-permitted, double-lined, on-site Secure Landfill. However, it was not possible to remove all of the PCB contaminated sediments in this area, due mainly to the presence of cobbles and boulders on the river bottom.

EPA issued the ROD for the Site on April 4, 2013. Remedial action objectives (RAOs) are specific goals to protect human health and the environment. There are no federal or New York State cleanup standards for PCB-contamination in sediment[3]. A sediment PCB concentrations greater than or equal to 1 milligram per kilogram (mg/kg) was utilized to identify (or target) areas requiring remedial action. The following RAOs have been established for the Site:

1. **Reduce the cancer risks and non-cancer health hazards for people eating fish from the Grasse River by reducing the concentration of PCBs in fish.** The risk-based remediation goal (RG) for the protection of human health is 0.05 mg/kg (wet weight) PCBs in fish fillet based on non-cancer hazard indices for the reasonable maximum exposure (RME) adult fish consumption rate of one half-pound meal per week (equivalent to 32 grams per day, this level is protective of cancer risks as well). The risk-based RG for the protection of Mohawk human health is 0.01 mg/kg PCBs in fish fillet based on non-cancer hazard indices for the adult tribal subsistence population with a consumption rate of 142 grams per day. Interim target concentrations are 0.26 mg/kg PCBs in fish fillet, which is protective for cancer risks for the adult avid angler at a fish consumption rate of one half-pound meal per month and 0.36 mg/kg PCBs in fish fillet, which is protective of an average angler, who consumes one half-pound meal every two months.
2. **Reduce the risks to ecological receptors by reducing the concentration of PCBs in fish.** The risk-based RG for the ecological exposure pathway is a range in whole-body fish (brown bullhead and spottail shiner) PCB concentrations of 0.22 to 0.44 mg/kg (wet weight) based on the no observed adverse effect level (NOAEL) and the lowest observed adverse effect level

[3] EPA evaluated the SRMT sediment standard as a "to-be-considered" requirement for the Grasse River cleanup. The SRMT sediment standard was considered when EPA established a remediation goal for PCBs in fish that is protective of Mohawk health, although it is not being adopted as the cleanup standard for the sediment. EPA notes in the 2013 Record of Decision that the SRMT cleanup standard is significantly lower than EPA's action levels for sediment cleanup (i.e., >1 mg/kg PCB surface or SLWA concentration), and analyses performed by Alcoa, at EPA's request and included in the administrative record, concluded that it is not technically practicable to achieve the SRMT's sediment cleanup level of 0.1 mg/kg.

(LOAEL) for consumption of fish by the mink. The ecological RG is considered protective of all the ecological receptors evaluated because it was developed for the mink, the piscivorous mammal calculated to be at greatest risk from PCBs at the Site. In addition, a range from 0.1 to 0.2 mg/kg (wet weight) PCBs in brown bullhead fillet was developed based on the NOAEL and LOAEL for consumption of fish by the mink.

3. **Minimize the current and potential future bioavailability of the PCBs in sediments.** PCBs in sediments may become bioavailable by various mechanisms (e.g., pore water diffusion, bioturbation, biological activity, benthic food chains, ice jam event scour, etc). Minimizing the degree to which such mechanisms may make PCBs bioavailable (e.g., through removal or containment) will reduce PCB levels in biota and the associated risks to human health and the environment.
4. **Protect the ecosystem of the lower Grasse River.** The remedy will protect the ecosystem and replace and/or reconstruct habitat impacted by remedial activities in order to re-establish appropriate conditions for supporting the fish and wildlife of the river. The remedy will be monitored for ecosystem recovery through the measurement and analysis of appropriate physical, chemical, and biological parameters.
5. **Minimize the long-term transport of PCBs from the lower Grasse River to the St. Lawrence River.** PCBs that are transported downstream in the water column are available to biota, contributing to the risks from the Site. Downstream transport also may move PCBs from contaminated areas to clean areas and from the lower Grasse River to the St. Lawrence River.

The major components of the selected remedy (Figure 4 Selected Remedy) include the following:

- Dredging of near shore sediment between river transects[4] T1 and T21 with sediment PCB concentrations greater than or equal to 1 milligram per kilogram (mg/kg) on a segment length weighted average[5] (SLWA) or maximum surface[6] concentration basis, followed by backfill to grade;
- Dredging of near shore sediment between T21 and T72 with maximum surface sediment PCB concentrations greater than or equal to 1 mg/kg, followed by backfill to grade;
- Placement of an armored cap over the main channel sediments between T1 and T21 where either the SLWA or the maximum surface sediment PCB concentration is greater than or equal to 1 mg/kg. During design, the composition and thickness of the capping material will be optimized to promote reliability and efficacy of the cap;
- Placement of a main channel cap over sediments between T21 and T72 with maximum surface sediment PCB concentrations greater than or equal to 1 mg/kg. During design, the composition and thickness of the capping material will be optimized to promote reliability and efficacy of the cap;
- Within the near shore area targeted for dredging, the goal is to remove all of the PCB-contaminated sediments within these areas, leaving a residual of less than 1 mg/kg;

[4] For purposes of the investigation, the Site was divided by transects (T) where each transect represented onetenth of a mile. In most of the Site reports the river is divided into 72 transects (T1 through T72).

[5] Segment length-weighted average (SLWA) concentrations are calculated over the interval from the surface of the sediments to the depth of PCB contamination of each core or, when a depth of contamination is not observed, then to the depth of recovered sediments. SLWA metric was used for targeting dredging and/or armored capping actions at locations where sediments are vulnerable to ice jam induced scour because it provides a representative measure of the amount of PCBs present in sediment deposits that could potentially be released to the river by erosion during an ice jam.

[6] The surface sediment is defined as the top 6 inches in the main channel and the top 12 inches in the near shore sediment.

- Backfill, capping, and habitat material will be clean material. Acceptance criteria for clean backfill quality are that no organic contaminants shall be detected using the analytical methods identified in Section 12 (Selected Remedy) of the ROD, and concentration of inorganics shall be below Site-specific local background levels or will meet the lowest effects level [LEL] of NYSDEC's sediment criteria for inorganics.[7]
- Treatment of process water from the sediment dewatering facilities to meet NYSDEC discharge limits;
- A Phase 1A Cultural Resources Survey will be conducted during the pre-remedial design prior to any disturbance and/or in-river work;
- Additional sampling and analysis of the relatively small area of floodplains present along the river will be performed concurrent with the design phase of the project to determine if additional actions are warranted in any of the floodplain areas;
- Monitoring (during remedial construction and long-term) data will be collected and/or reviewed to demonstrate the effectiveness of the remedy in meeting the RAOs (see Section 9.2 Common Elements for more monitoring details). Monitoring will include the Massena Power Canal;
- Air monitoring to ensure that remedy implementation is protective;
- Institutional controls in the form of informational devices to limit exposure to PCBs. EPA is relying on existing New York State Department of Health (NYSDOH) fish consumption advisories. NYSDOH periodically reviews fish PCB data to ensure the advisories are up to date and considers whether the fish consumption advisories need modification. Other informational devices would include outreach programs to inform the public to limit activities that could compromise the integrity of the cap (such as dredging) and to promote knowledge of and voluntary compliance with the fish consumption advisories;
- Development of a habitat reconstruction plan. The objective of the habitat reconstruction plan will be to identify impacts to habitat and species from the remedy, identify habitat re-establishment goals, provide design specifications for habitat recovery, and provide the scope for monitoring of habitat recovery. The plan will be developed and implemented during design and remedy implementation, will consider habitat and species management goals such as those stated in the NYS Comprehensive Wildlife Conservation Strategy, and will include the following components:
    - Habitat assessment study for affected species will be conducted to assess the river for habitats that are present and use of the habitats by aquatic and semi-aquatic species;
    - Identification of habitat recovery material over capped areas and/or return to grade;
    - Design for restoration of vegetation; and,
    - Monitoring habitat and biota recovery.

The ROD remedy estimated 59 acres of armored cap, approximately 225 acres of main channel cap, removal of approximately 109,000 in-situ cy of sediment in the near shore, and backfill of approximately 41 acres to grade.

[7] NYSDEC's sediment criteria for inorganics can be found in Table 2 of the NYSDEC Technical Guidance for Screening Contaminated Sediments.

Explanation of Significant Differences (ESD):

In 2018, Arconic was notified by the St. Lawrence Seaway Development Corporation (SLSDC) that it had ordered a new tugboat to service the Seaway lock system. The SLSDC moors its tugboat at Snug Harbor, a small embayment on the north shore of the Grasse River a short distance upstream of its confluence with the St. Lawrence River, which is impacted by PCBs from the PRP's past operations. The new tugboat is larger, has greater engine power, and requires deeper navigation draft than the previous tugboat. As a result, Snug Harbor and the channel leading to the harbor from the St. Lawrence River needed to be deepened. The April 2020 ESD documents the remedy change from sand cap of the impacted areas to dredging of approximately 5,800 cy additional sediment for navigational purposes, dredging of 85,000 cy additional sediment due to PCB contamination, backfill with a 6-inch layer of sand (up to 18.6 acres, depending on post-dredge sampling), and placement of a gravel armor cap of 6-inch sand/granular activated carbon (GAC) layer overlain by a 12-inch gravel armor in a 3.6-acre area to address greater prop wash jet forces anticipated on the main channel upstream of the Snug Harbor during tug maneuvering.

Status of Implementation

- In May of 2017, Arconic's contractor mobilized and began construction of the Route 131 Staging Area; construction was completed in 2018.
- Arconic remediated three floodplain areas (T3.2N, T4N, and T6.3N) in 2018 by excavating 661 cy of floodplain soil.
- From 2019 to 2021(Figure 5 Remedy Implemented):
    - Arconic's contractor dredged approximately 220,000 cy sediment from total of 48 acres of the areas in the near-shore, floodplains, and Snug Harbor area. All dredged sediment was appropriately disposed in the on-site Secure Landfill.
    - Approximately 125,000 cy of clean material was backfilled in parts of the 48-acre dredged areas, mostly in the near-shore to grade and some in the Snug Harbor if post-dredging verification sampling indicated that the residuals in a dredged certification unit exceeded 1 mg/kg PCB.
    - 59 acres of main channel area between T1 and T21 was capped with an armored cap or modified armored cap consisting of approximately 288,000 cy of capping material of sand, GAC, gravel, and armored stone. Capping was implemented to achieve the cap design specifications, as follows:
        - armored cap (T1-T19): 6-inch chemical isolation layer (sand/GAC), 6-inch gravel filter layer, and 13-inch armored stone layer. In select areas, a 1 to 2 inch layer of sand was placed volumetrically as habitat layer on top of the armored cap.
        - modified armored cap (T19-T21): 6-inch chemical isolation layer (sand/GAC), 12-inch modified armor layer (contains stones no larger than 3 inches). The modified armored layer contains smaller stones than the cap between T1-T19 because of the soft clay soils underlying PCB containing sediments within this section of the lower Grasse River.
    - A sand cap was placed in 200 acres of main channel area between T21-T69 with approximately 524,000 cy of capping material consisting of sand and GAC. Some of this capping material was also used to implement modified armored cap called for in the ESD for the 3.6-acre area upstream of Snug Harbor. Capping implemented to achieve the sand cap design specifications was as follows: 6-inch chemical isolation layer (sand/GAC) and 6-inch habitat layer (sand).

- Total of 195,800 plants (submerged aquatic vegetation (SAV) and emergent vegetation) have been placed in the river, 629 trees and shrubs planted, 4.4 acres seeded on land, 22 rock clusters placed in the river, 400 fish cribs placed in the river, and 17 rootwads placed in the river.
- In-river remedial construction was completed in October 2021. Restoration of the Haverstock Staging Area was completed in November 2021. Habitat reconstruction under the Grasse River remedy is expected to continue through 2022. Restoration of the Route 131 Staging Area is anticipated five years after the in-river construction completion.

Institutional Controls

Institutional controls will be in the form of informational devices to limit exposure to PCBs. EPA is relying on existing NYSDOH fish consumption advisories (https://www.health.ny.gov/environmental/outdoors/fish/health_advisories/regional/st_lawrence.htm). NYSDOH periodically reviews fish PCB data to ensure the advisories are up to date and considers whether the fish consumption advisories need modification. Other informational devices would include outreach programs to inform the public to limit activities that could compromise the integrity of the cap (such as dredging) and to promote knowledge of and voluntary compliance with the fish consumption advisories.

The 2013 Saint Regis Mohawk Tribe "Akwesasne Family Guide to Eating Locally Caught Fish" is available at https://www.epa.gov/sites/default/files/2016-09/documents/srmt_fishadvisory_webfinal.pdf

Monitoring and Maintenance

The Operation, Monitoring and Maintenance Plan (OMMP) is currently in development. The OMMP will include: long-term monitoring of fish tissue PCB levels to document changes in concentration over time, to assess whether the RAOs and RGs are being achieved, and support decisions regarding the consumption advisories that are currently in place. The OMMP will include: long-term monitoring of water column PCB levels to document changes in concentration over time and assess whether the RAOs and RGs set forth in the ROD are being achieved; collection of information to evaluate the physical integrity of the caps and assess whether the caps have experienced erosion or other disturbances and make repairs as necessary; collection of PCB concentration data from water overlying the caps to evaluate their effectiveness at mitigating PCB transport; annual fish monitoring for the first five years; monthly monitoring of the water column (May to October). In addition, event based bathymetric surveys will be performed in the capping areas potentially affected by ice jams (T1 to T19 stretches) following major ice jam events. Surveying will be triggered by a water level of 160 feet (USLS 1935) or greater at Outfall 001 during ice breakup, which is approximately 5 feet above the mean water surface elevation and consistent with the results of the tree scar survey conducted after the 2003 ice jam. Post-construction monitoring will commence in 2022.

After the completion of habitat reconstruction, a monitoring plan to address reconstructed habitat and recovery of vegetation will be submitted. Monitoring and maintenance, if necessary, of underwater features such as anchored large woody debris and crib structures will also be included in the habitat monitoring plan. Lastly, the habitat monitoring plan will include monitoring for benthic invertebrates, sturgeon, and mussels; the frequency of this monitoring will be on an annual basis for the first five years and is anticipated to commence in 2023 except for mussels. Mussel monitoring will start five years after habitat construction completion.

Climate Change Assessment

EPA has considered extreme weather events during the extensive Site-specific investigations. The investigations included examination of the fate and transport of the PCBs in the Grasse River under ice conditions and under non-ice conditions.

Based upon investigations performed subsequent to the March 2003 ice jam event, the ROD noted that the main channel in the T1 to T21 transects of the river are prone to potential scouring of sediment from severe ice jam events. Ice jam-related scour is primarily of concern from T1 to T19. For purposes of developing remedial alternatives, however, T21 was used to define the downstream extent of the Grasse River that is potentially subject to ice jam-related scour because a contiguous sediment deposit runs from T19 to T21, and any remedy would be expected to address the contiguous deposit as a whole. In order to address the potential for ice jam-related scour in this stretch of the river, the cap installed in the T1-T19 stretch is an armored cap with minimum 25-inch thickness and designed to withstand severe ice jam events; the cap in the T19-T21 stretch is modified armored cap with minimum of 18-inch thickness.

Under non-ice conditions, erosion potential was modeled for 100-year and 500-year flood events. Field observations support the multiple modeling efforts performed for the Site. Monitoring the Site prior to and after the high-flow event of 1998, which approximated a 100-year flood event, indicated that there were no discernable long-term impacts on the PCB levels in sediment, water, or fish tissue resulting from the high flow event. The Site hydrodynamic model predicted velocities of about 2.5 to 4.5 feet per second (ft/s) and 2.0 to 2.5 ft/s in the main channel and near shore areas, respectively, during a 100-year flood event, which supports the conclusion that the river velocities remain too low to cause significant erosion even when high river flows or storm events occur. Using the maximum erosion during a 100-year flood (i.e., conservatively estimated at about 0.9 cm), the maximum estimated erosion during a 500-year flood event was calculated to be between 1 and 1.5 cm. Therefore, even under extreme flow conditions, little sediment resuspension is anticipated. Further, increases in sediment bed elevation following capping are not anticipated to increase the bed shear stress, so these conclusions are also relevant to the post-capping conditions.

With the cap constructed over the main channel having a minimum thickness of 12 inches for the sand cap, 25 inches for the armored cap and 18 inches for the modified armored cap, potential erosion in the 100-year flood or in 500-year flood event is not anticipated to expose the contamination in the sediment under the cap.

EPA however, will continue to monitor the Site, to ensure that the remedies are not affected by storms or flooding. As mentioned above, the OMMP will include event-based monitoring of the caps, such as after a severe ice jam event.

III. PROGRESS SINCE THE LAST REVIEW

This is the first FYR for this site.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification & Involvement

On Friday, August 6, 2021, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, Puerto Rico and the U.S. Virgin Islands, including the Grasse River (aka Alcoa Aggregation) Superfund site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, efforts will be made to reach out to local public officials to inform them of the results. The EPA Community Involvement Coordinator for the site, Larisa Romanowski, arranged for a notice to be posted on the town of Massena website, as well as the EPA site website, https://www.epa.gov/superfund/alcoa-aggregate. The notice was also provided to the village of Massena, SRMT Tribal Council and SRMT Environment Division. This notice indicated that a FYR would be conducted at the Grasse River Superfund site to ensure that the site is protective of human health and the environment.

Once the FYR is completed, the results will be made available at the following repositories: EPA Region 2 Superfund Records Center, 290 Broadway, 18th Floor, New York, New York; St. Regis Mohawk Tribe Environment Division, 449 Frogtown Road, Akwesasne, NY; Akwesasne Library, 321 State Route 37, Akwesasne, NY; and Massena Public Library, 41 Glen Street, Massena, NY. In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/alcoa-aggregate.

Data Review

At this time, the remedy at the Site is not completed. Verification sampling, including post-dredging sediment sampling and post-capping thickness verification, during remedy implementation was used to demonstrate that the remedy achieved the cleanup levels identified in the ROD. However, the post-construction report was not submitted to EPA in time for consideration for this FYR. A summary of verification sampling will be provided in the subsequent FYR. Data to assess the RAOs, long-term monitoring data such as PCB concentrations in fish tissue, the water column, and habitat, as well as the measurement of physical cap parameters to gauge cap integrity and PCB concentration of water overlying the caps to evaluate their effectiveness in mitigating PCB transport will be included in the next FYR.

Site Inspection

The inspection of the Site was conducted on September 29, 2021. In attendance were Young S. Chang, EPA RPM, David Tromp, NYSDEC Project Manager, Jay Wilkins, SRMT Project Manager, Jessica Jock, SRMT Program Manager, Larry McShea, Arconic Project Manager and Abigail Debofsky, EPA Ecological Risk Assessor. The purpose of the inspection was to assess the protectiveness of the remedy. The implementation of the remedy was in progress during the site inspection and no issues were noted.

In-river and floodplain dredging: Complete at the time of site inspection and backfill placement also completed.

Sediment processing: All dredged sediment had been processed and transported to and disposed of in the Secure Landfill Cell 3.

Capping: Armored capping and modified armored capping were complete. Main channel sand capping was in progress and was anticipated to be completed in a few days at the time of the site inspection.

Habitat reconstruction: Water feature placement and SAV and emergent vegetation plantings was ongoing. No issues were noted at the site inspection.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

As summarized above, implementation of the remedy was mostly completed at the time of inspection. In the fall of 2021, remaining main channel sand capping was completed. Remaining in 2022 are some habitat reconstruction items associated with plantings. Given that the remedy removed the contaminated materials from the Site or isolated the contamination by main channel capping, the exposure pathways associated surface soil, subsurface soil, and sediment have been eliminated. Upon completion of the cleanup, the Site is expected to function as designed and protect human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being addressed.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Question B Summary:
The RAOs are still valid. This is the first FYR since the Baseline Human Health Risk Assessment (BHHRA) was completed. The BHHRA evaluated exposures under current and future conditions at the Site. The BHHRA includes the 1993 Revised Risk Assessment Alcoa Study Area (TRC); the 2002 Update to the 1993 Revised Risk Assessment (Alcoa); and the 2012 Addendum 4 to assess non-PCB chemical contaminants. Potential current and future receptors that may be exposed to the Grasse River include: adults from the local population and the Mohawk Nation who may fish and consume their catch; recreational users of the River including adults, adolescents, and young children who may camp near or swim in the River; and Mohawk adult anglers who may contact sediments when pulling gillnets from the water. Routes of exposure under current/future conditions included: consumption of fish and incidental ingestion and dermal contact with sediments and surface water.

There have been no changes in the risk assessment methodology that would affect the conclusions of the BHHRA and the protectiveness of the remedy. The toxicity values for PCBs used in the assessment are consistent with current PCB toxicity values for cancer and noncancer. The toxicity values used in the BHHRA were obtained from the Integrated Risk Information System (IRIS), EPA's consensus database for toxicity information. Consistent with EPA's Toxicity Hierarchy, IRIS is a Tier 1 toxicity database identified in EPA's OSWER Directive 9285.7-53 (December 5, 2003). The IRIS program is updating the noncancer toxicity values for PCBs. When the toxicity values are updated, EPA will evaluate the impacts of the updated values on the calculated noncancer hazards for the Site.

There are no changes in the land use that will affect the protectiveness of the remedy. The NYSDOH health advisories provide guidance on fish consumption and are updated as new data is collected. The

on-going remedial actions will reduce potential exposures and associated cancer risks and noncancer hazards from those exposures.

Changes in exposures assumptions based on updates to the Standard Default Exposure Assumptions listed in OSWER Directive 9200.1-120 (February 6, 2014) are listed below but they do not change the protectiveness of the remedy.

Adult resident bodyweight increased from 70 kgs to 80 kgs.
Adult resident water ingestion rate increased from 2 liters/day to 2.5 liters/day
Child resident water ingestion rate decreased from 1 liter/day to 0.78 liters/day.
Child resident skin surface areas decreased from 2,800 cm^2 to 2,373 cm^2.
Adult worker skin surface area increased from 5,700 cm^2 to 6,032 cm^2.
Adult worker skin surface area increased from 3,300 cm^2 to 3,527 cm^2.

The changes result in only a marginal changes in cancer risk and noncancer hazard estimates (i.e., slightly lower or higher) and do not affect the protectiveness of the remedy.

The receptors evaluated in the BHHRA, have not changed from those receptors assessed in the original BHHRA. The Site remedial actions have reduced the potential exposures and the associated cancer risks and noncancer hazards. The cancer risks and noncancer hazards will be further reduced as the remedy is completed.

Ecological Risk - The July 2010 Ecological Risk Analysis Update Report (SCR/SERAS 2010) followed Agency guidance. Assessment endpoints selected for this Site include the survival, growth, and reproduction of: 1) aquatic organisms (including fish); 2) piscivorous (fish-eating) bird and mammal populations; and 3) insectivorous (insect-eating) mammal populations. Ecological receptors included aquatic plants, benthic macroinvertebrates, and fish. Additionally, the belted kingfisher (*Ceryle alcyon*) and mink (*Mustela vison*) were selected for piscivorous birds and mammals, respectively, while insectivorous mammals were represented by the little brown bat (*Myotis lucifugus*). The exposure parameters and ecological receptors that were selected are still valid, as they represent the most likely exposures related to the site. The toxicity values that were used to estimate the ecological risk included standard screening criteria and established literature values remain valid.

The ecological risk assessment concluded that unacceptable risk to aquatic organisms resulted from exposure to PCBs in sediment and surface water, both through measured concentrations of these media and food chain modeling. Additionally, it was determined that exposure of fish to PCBs in the river resulted in fish tissue concentrations associated with adverse ecological effects. The cleanup values that were selected for the remedy, which are expected to reduce ecological risk associated with the site once the remedy is fully implemented, remain valid. In addition, the RAOs associated with ecological receptors remain valid, specifically RAOs 2 through 4, as presented above. Upon completion of construction at the site, the remedy will be monitored for long-term for ecosystem recovery through the measurement and analysis of appropriate physical, chemical, and biological parameters, including chemical analysis of brown bullhead (*Ameiurus nebulosus*) and spottail shiner (*Notropis hudsonius*) to ensure that the remedy is functioning as intended and protective for ecological receptors

QUESTION C: Has any **other** information come to light that could call into question the protectiveness of the remedy?

Subsequent to the site inspection conducted as part of the FYR, routine monitoring of the spring ice breakup on the Grasse River revealed the formation of an ice jam in the river downstream of Outfall 001. Monitoring and evaluation of the ice breakup event is underway and a comprehensive report will be developed by Arconic.

VI. ISSUES/RECOMMENDATIONS

This report did not identify any issues related to remedy protectiveness or performance; however, the observed March 2022 ice breakup and water levels measured at Outfall 001 triggered monitoring of the event. A comprehensive report providing the results of the monitoring (i.e., observations, water sample results, post breakup bathymetric survey, tree scar and river bank documentation) will be developed by Arconic and appropriate actions will be taken, if needed, the results of which will be summarized in the next FYR.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: 01	*Protectiveness Determination:* Will be Protective
Protectiveness Statement: The remedy is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.	

VIII. NEXT REVIEW

The next FYR report for the Grasse River (aka Alcoa Aggregation) Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

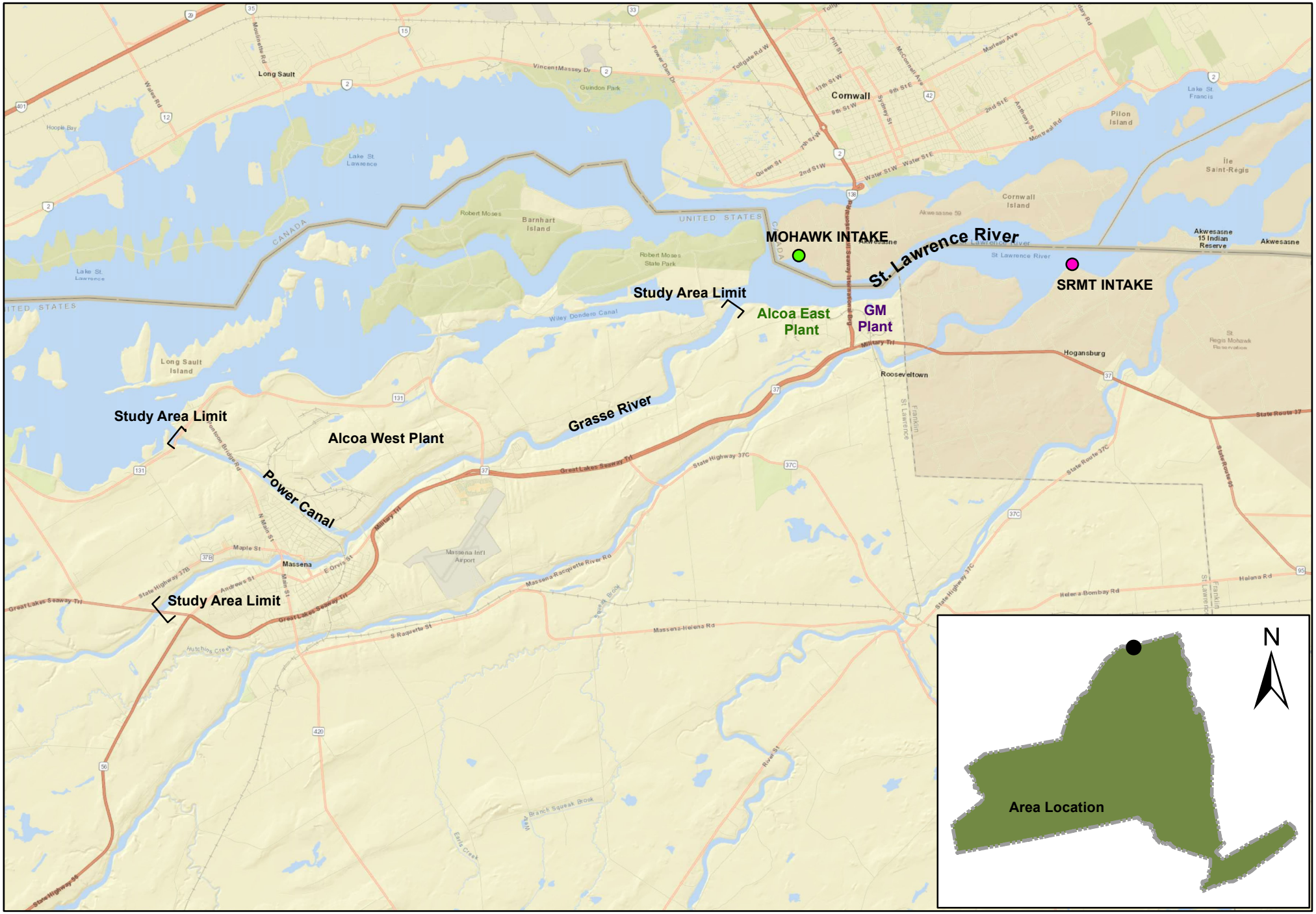
- Record of Decision, Grasse River (aka Alcoa Aggregation) Superfund Site, Massena, St. Lawrence County, New York, **April 2013**

- Explanation of Significant Differences, Grasse River (aka Alcoa Aggregation) Superfund Site, Massena, St. Lawrence County, New York, **April 2020**

- Construction Completion Report T1N/Outfall 001 Removal Action and Associated Floodplains Remedial Action, Grasse River (aka Alcoa Aggregation) Superfund Site, Massena, New York, **October 2020**

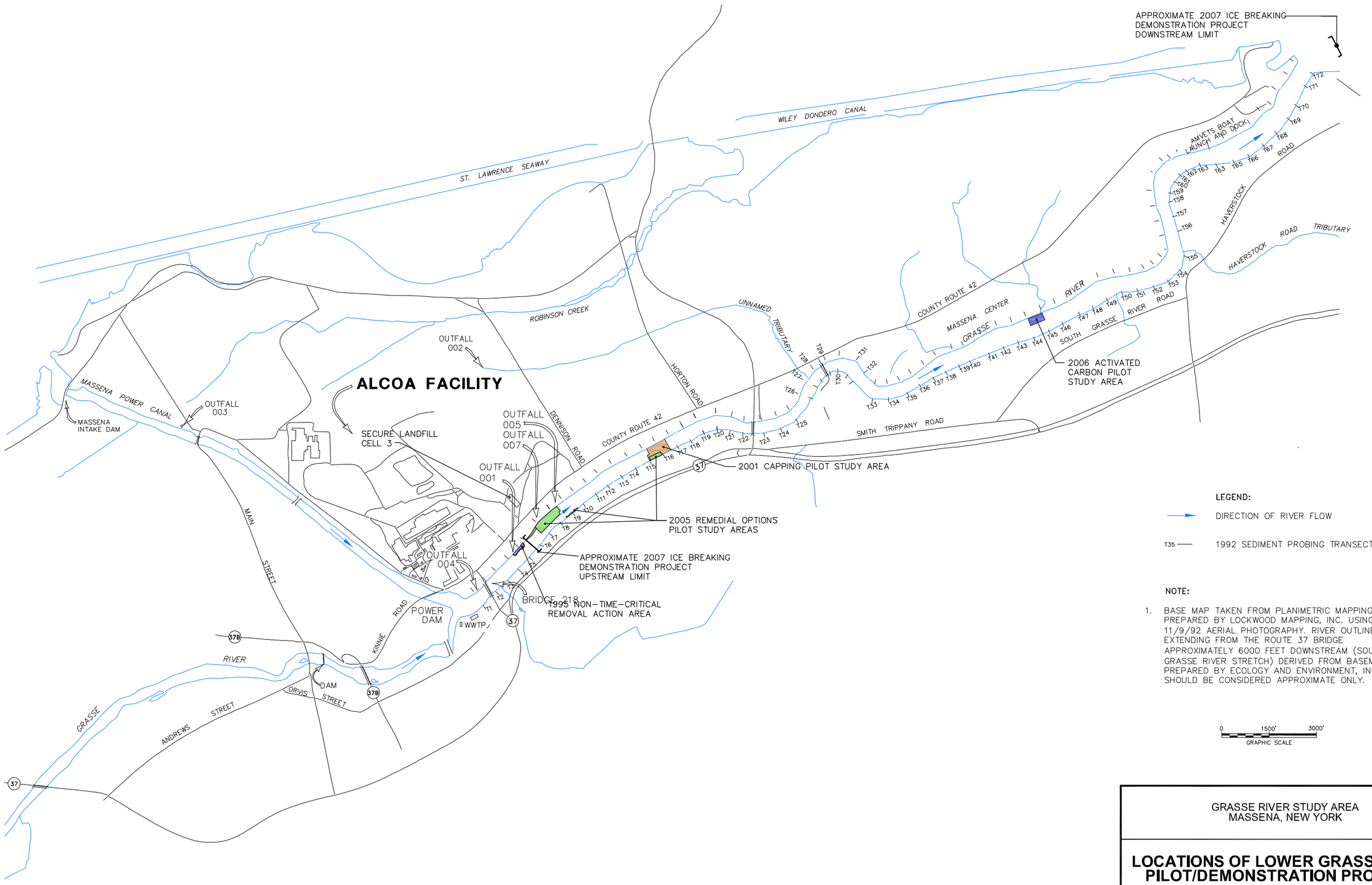
APPENDIX B - FIGURES

FIGURE 1 GRASSE RIVER SITE LOCATION MAP



EPA US EPA Region 2
Map Created 4/13/2022

1 0.5 0 1 2 3 Miles



LEGEND:

- DIRECTION OF RIVER FLOW
- T35 —— 1992 SEDIMENT PROBING TRANSECTS

NOTE:

1. BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. RIVER OUTLINE EXTENDING FROM THE ROUTE 37 BRIDGE APPROXIMATELY 6000 FEET DOWNSTREAM (SOUTHWEST GRASSE RIVER STRETCH) DERIVED FROM BASEMAP PREPARED BY ECOLOGY AND ENVIRONMENT, INC. AND SHOULD BE CONSIDERED APPROXIMATE ONLY.

0 1500' 3000'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

LOCATIONS OF LOWER GRASSE RIVER PILOT/DEMONSTRATION PROJECTS

FIGURE IS FROM THE ANALYSIS OF ALTERNATIVES REPORT, COURTESY OF ALCOA

FIGURE **2**

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: L.POSENAUER K.DAVIS L.FORAKER LD: L.POSENAUER PIC: H.VANDEWALKER PM: H.VANDEWALKER TM: S.HILL LYR: ON=*; OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIVE\010875\0000\0001\DWG\AOARREV\108750304.DWG LAYOUT: 2 SAVED: 9/6/2012 9:53 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: C-L02B-PDF PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/6/2012 9:53 AM BY: SAWYER, NANCY
XREFS:
IMAGES:
10875X01
10875X00

EXEMPT C&D LANDFILL

SECURE LANDFILL CELL 3

DENNISON CROSS-ROAD ACCESS GATE

DENNISON ROAD

COUNTY RTE 42

MASSENA WEST FACILITY

RAILROAD (TYP.)

IMPOUNDMENT 005

MH-5

GATE 4

OUTFALL 005

OUTFALL 007

FLOODPLAIN AREA T6.3N

T13

T12

T11

T10

T9

T8

T7

T6

T5

T4

T3

T2

T1

GRASSE RIVER

PARK AVENUE EAST

MASSENA POWER CANAL

OUTFALL 004 (BUILDING 156)

OUTFALL 001

OUTFALL 001 REMOVAL AREA

ALCOA ROAD

FLOODPLAIN AREA T4N

FLOODPLAIN AREA T3.2N

T1N

T1N REMOVAL AREA

LEGEND:

TRANSPORT ROUTE TO AND FROM SECURE LANDFILL

SOIL REMOVAL LIMITS

NOTES:

1. SOIL REMOVAL AREA BASED ON SURVEY PERFORMED BY THEW BETWEEN OCTOBER 31 AND DECEMBER 14, 2018 AND DOCUMENTED ON DRAWING ENTITLED "MAP SHOWING POST-EXCAVATION CONDITIONS, OUTFALL 001 REMOVAL AREA".
2. SOIL REMOVAL AREA BASED ON SURVEY PERFORMED BY THEW ON JULY 3 AND 26, 2019 AND DOCUMENTED ON DRAWING ENTITLED "MAP SHOWING POST-EXCAVATION CONDITIONS, T1N REMOVAL AREA".

0 250' 500'

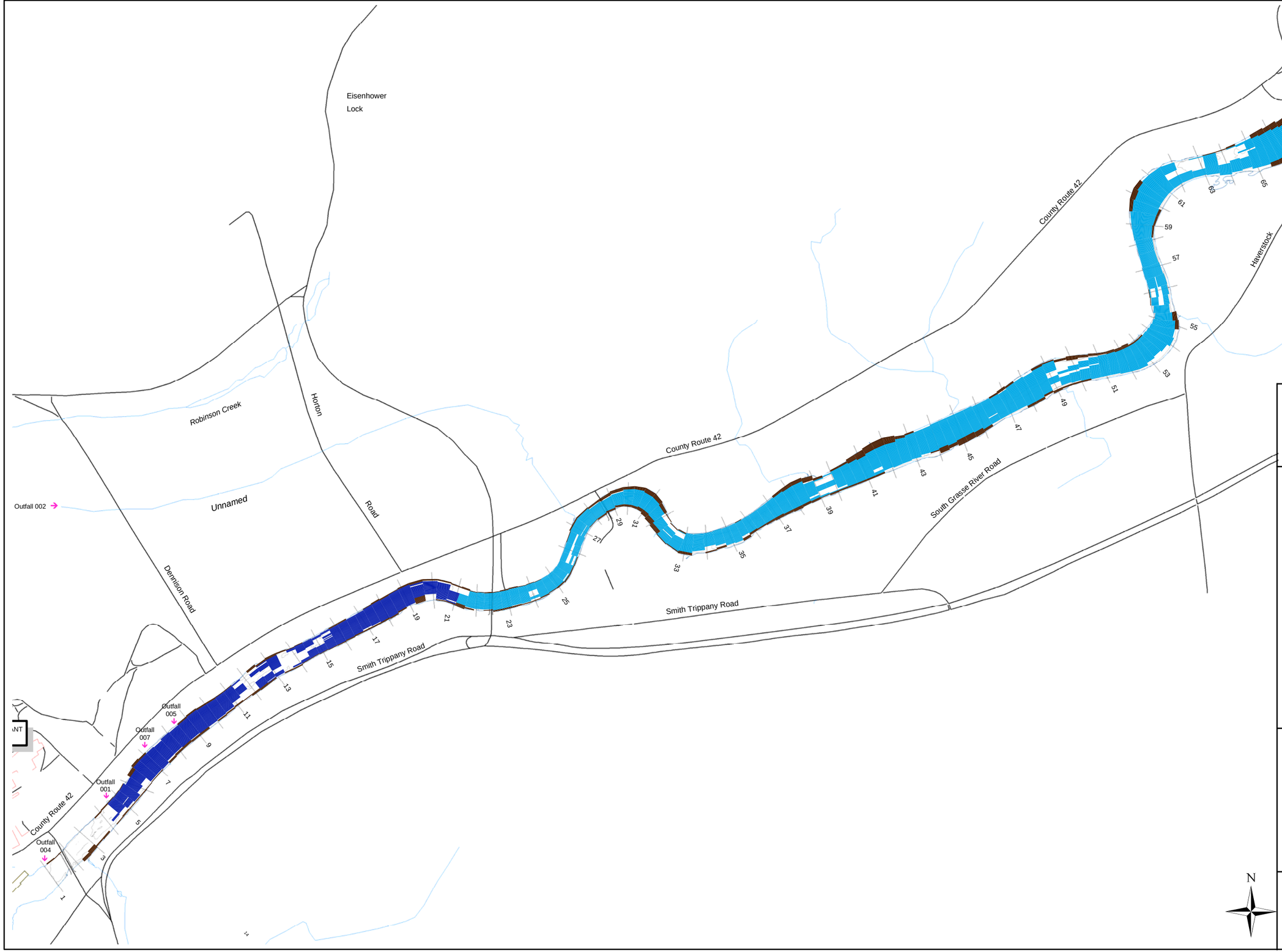
GRAPHIC SCALE

MASSENA, NEW YORK

SOIL REMOVAL ACTION FROM OF001 AND T1N

FIGURE PROVIDED COURTESY OF ARCONIC

FIGURE 3



GRAPHIC SCALE

Feet

0 850 1,700 3,400

LEGEND

- Near Shore Capping
- Capping
- Armored Capping
- Dredging / Capping
- Dredging / Armored Capping
- Dredging / Backfilling to Grade
- Sediment Type
- Grasse River + Tributaries Shoreline
- Roads
- Dams
- Alcoa Buildings
- Bridges
- Sediment Probing Transects

Figure 4
Selected Remedy

N

Figure is from the Analysis of Alternative Report, courtesy of Arconic.

Feb. 2013

CO - C:\D_Drive\alcgra\GIS\Alternatives_maps_20130221.mxd

St. Lawrence Seaway

Snug Harbor

Haverstock Road
Staging Area

Route 131
Staging Area

Arconic/Alcoa
West Plant

Secure
Landfill

1 3 5 7 9 11 13 15 17 19 21 23 25 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 61 71

GRAPHIC SCALE

Feet

0 500 1,000 2,000 3,000 4,000

Legend

- 2019 Dredging/Backfill to Grade
- 2020/2021 Dredging

Cap Type

- Armored Cap (2020)
- Modified Armored Cap (2020/2021)
- Sand Cap (2021)
- Grasse River Transects
- Grasse River
- Roads

Figure 5
Remedy Implemented

Figure provided courtesy of Arconic

APPENDIX C - ADDITIONAL BACKGROUND

The 2,700-acre Alcoa West Plant is an aluminum production and fabrication plant that has been in operation since 1903. Alcoa's past waste generation and disposal practices resulted in polychlorinated biphenyls (PCBs) accumulating in sediment that became deposited primarily on top of bedrock and/or hard glacial till in the river. PCB discharges to the lower Grasse River decreased significantly after Alcoa stopped using PCBs in the mid-1970's, and as a result the sediment deposited in the lower Grasse River since that time has contained lower PCB concentrations than the sediments that were deposited before Alcoa stopped using PCBs. Storm water and treated wastewater from the Alcoa facility are discharged from permitted outfalls that flow into the lower Grasse River, the Power Canal, the Unnamed Tributary, and Robinson Creek. Historically, PCBs also were released into the river through these outfalls.

As a result of these past disposal practices, NYSDEC determined that environmental conditions arising from hazardous waste disposal at the facility gave rise to significant threats to human health and the environment. Under a 1985 NYSDEC Order, Alcoa conducted a land-based cleanup program from 1991 to 2001, which included the elimination or mitigation of sources of contamination to the Grasse River. Concurrently with the land-based cleanup program, Alcoa made several site improvements in relation to its State Pollution Discharge Elimination System (SPDES) permit.

Upland based efforts included: remediation of 18 separate disposal areas, including 37 acres of landfills and 100 acres of lagoons; construction of Alcoa's on-site Secure Landfill to dispose of excavated material; remediation of the Unnamed Tributary; and cleaning of underground utilities that are part of the stormwater/wastewater collection system. Through these efforts, Alcoa has significantly reduced its discharges and controlled the upland sources of PCBs to the Site.

Although plant facility discharges were important contributors to lower Grasse River PCBs in the past, upland remediation efforts completed in 2001 have significantly reduced PCB discharges to the river. However, small but measurable discharge continued to occur until 2003 when Alcoa conducted additional work under a NYSDEC order to further reduce the PCB discharges from Outfall 001. Additional work consisted of installation of oil skimming, pH adjustment, dual media filtration and carbon absorption units at the Central Impoundment in 2003 and 2004. In addition to this installation, several PCB wastewater sources were identified via track down studies and either remediated or rerouted to treatment.

Alcoa's early investigation of the Site under the terms of the 1989 EPA Administrative Order identified significantly elevated PCB concentrations in an area of Grasse River sediment located adjacent to wastewater Outfall 001. As a result, EPA amended the Administrative Order in May 1995 to require Alcoa to conduct a Non-Time-Critical Removal Action (NTCRA) to address the PCB-contaminated sediment within a one-acre area around the Outfall 1 (see Figure 2 Locations of Lower Grasse River Pilot/Demonstration Projects).

Because in-place capping of contaminated sediments was one remedial technology under consideration, Alcoa conducted a capping pilot study (CPS) with EPA oversight between July and October 2001. The study involved the placement of clean cap material over a seven-acre area in a 750-foot stretch of the river about one mile downstream of Outfall 001 (see Figure 2). The CPS demonstrated that a cap could be constructed successfully in the lower Grasse River without significant mixing of the cap material

with the underlying sediment or causing PCB releases to the water column. However, the targeted cap thickness could not always be achieved on the steep side slopes in the area of the pilot study. Monitoring after the first year showed that the cap thickness remained stable in the main channel.

During post-placement monitoring of the CPS, it was discovered that an "ice jam" event in 2003 scoured sediment in the river to a depth of up to four feet, including erosion of parts of the cap material and underlying contaminated sediment. The ice jam was an accumulation of ice in the river channel that caused higher flow rates under the ice jam toe, which resulted in some localized scour of the river bottom. Prior to the 2003 ice jam event, the occurrence of scour from ice jams was not known to the project team and therefore the CPS had not been designed to withstand such great forces. As a result, further investigation was initiated in 2003, which revealed that severe ice jam events can cause scouring of the river bottom sediments in the upper 1.8 miles of the lower river (upstream of transect T19). Through several lines of evidence, the project team discovered that ice jam events severe enough to cause measurable scour have occurred in the upper 1.8 miles of the lower Grasse River at least four times over the past 40 to 50 years.

Based on an updated conceptual site model, Alcoa performed a Remedial Options Pilot Study (ROPS) with EPA oversight in 2005. The ROPS (see Figure 2) included a one-acre armored cap, 24,400 cy (approximate) of main channel dredging, 1,600 cy of near shore dredging/backfilling to grade, and one-half an acre of thin-layer (3 to 6 inches) capping in the southern near shore area. Extensive monitoring was conducted during and following implementation. The study revealed that dredging in the main channel of the Site was difficult due to the presence of cobbles and boulders and irregular river bottom conditions. Regardless of type of equipment used for dredging in the main channel during the ROPS, residual sediments contained high PCB concentrations and required capping after dredging. The study also revealed that the typical main channel sediment profile contains the highest PCB concentrations at the lowest depth of the sediment column. This most highly contaminated sediment is present over bottom materials such as bedrock, glacial till, and/or marine clay which prevent over-dredging, thereby resulting in PCB residuals with high PCB concentrations that require capping even after an extensive dredging effort. A 25-inch armored cap consisting of sand/topsoil, gravel, and armor stone was successfully placed (and is still intact) over a one-acre area in the main channel.

In the fall of 2006, an activated carbon pilot study (ACPS, see Figure 2) was conducted in a 0.5-acre area (between transect T44 and T45) to evaluate the ability to deliver activated carbon to in-river sediments and the effectiveness of activated carbon in reducing the bioavailability of PCBs to biota. The ACPS demonstrated that activated carbon can be successfully applied into the river sediments. No measurable changes in the water column PCBs were observed adjacent to or downstream of the pilot area, with only minor increases in total suspended solids (TSS) measured. Post-construction monitoring revealed that the placed carbon is stable in the fine sediments.

Upland soil in Transect 1 North (T1N) and Outfall 001 (OF001) area with elevated PCBs contamination at surface and subsurface was discovered in year 2016. And full extent of contamination was discovered through several sampling events in 2017 and 2018. Removal action under Paragraph 123 of September 28, 1989 EPA Administrative Order was implemented in 2018 to excavate PCB contaminated soil from the OF001 and T1N areas (Figure 3 Soil Removal Action from OF001 and T1N) with cleanup objective set at:

- PCBs in Surface Soils (0 to 12 inches): 1 mg/kg
- PCBs in Subsurface Soils (greater than 12 inches): 3.2 mg/kg.

T1N and Outfall 001 area upland soil removal action commenced in September of 2018 and was completed in July 2019. Arconic excavated approximately 10,000 cy of upland PCB contaminated soil and backfilled with clean material and regraded and restored both areas. Upland soil removal achieved PCB cleanup at depth to less than 1 mg/kg.