# APPENDIX E
# MATERIAL SOURCING SUMMARY

585778

# GRASSE RIVER TECHNICAL MEMORANDUM

# BORROW SOURCE IDENTIFICATION AND TESTING 2016 UPDATE

## 1 INTRODUCTION

This memorandum presents an update on the activities that have occurred since the submission of the Pre-Design Investigation Data Summary Report, dated March 2015, to the U.S. Environmental Protection Agency. The focus of the recent borrow source investigation activities has been to refine the material quantities and specifications to meet the current design assumptions. The updated information is currently being used to verify the availability of sources, material types, and production rates. This information will be required for the development of the lower Grasse River Final Design.

## 2 BACKGROUND

In 2014, a borrow material source evaluation was conducted to assess the availability of materials and the characteristics of the local materials. The evaluation was conducted based on the quantities and materials as they were identified in the conceptual design. Existing and potential borrow sources were evaluated as part of this work. Each prospective borrow source vendor provided information on the materials that were available, including laboratory data in support of identifying material characteristics, when available. Samples from the borrow sources were collected for analytical and geotechnical data, as needed. The samples were collected to evaluate the background levels of organics that existed in the borrow materials. The evaluation resulted in finding seven prospective material suppliers with nineteen total borrow source locations. The data collected during this evaluation have been complied, were presented in the *Pre-Design Investigation Data Summary Report,* and are included in Attachment A.

## 3 CURRENT BORROW SOURCE WORK

Since the collection of the initial borrow source information, the conceptual design of the remediation capping for the Grasse River has been developed further. From the updated design, more clearly defined anticipated material take-off (MTO) quantities were obtained.

The updated MTO was used to verify if the capping materials are still locally available for the project. Each prospective material supplier was asked to estimate quantities of materials that could be supplied based on the more defined capping material requirements and anticipated construction schedule. In addition to the previously identified prospective material suppliers, two new suppliers have been contacted. A summary table of the MTO quantities and the prospective materials availability is included in Attachment B.

An investigation of prospective material suppliers' borrow sources will be performed for respondents who indicated their ability to meet project needs. The investigation will require additional material sampling. The intent of the sampling will be to collect data on materials from new borrow sources and confirm previously collected data. Confirmation sampling at previously sampled sources will occur if the materials have changed in character or previous sample results need to be verified. This sampling event will include geotechnical and analytical analysis. The data collected will be compiled and incorporated into the Final Design.

# ATTACHMENT A
# SUMMARY OF BORROW SOURCE SUPPLIERS

*Tables from Pre-Design Investigation Data Summary Report (March 2015)

**Table 5-2**

**Summary of Borrow Source Suppliers**
**Pre-Design Investigation Report**
**Grasse River Study Area, Massena, New York**

| Borrow Source Location ID | Borrow Source ID | Material Supplier ID | Material |
|---|---|---|---|
| 1 | GRASSE RVR BS-1 | A | Gravel and Riprap (crushed stone) |
| 2 | GRASSE RVR BS-2 | B | Gravel and Riprap (crushed stone) |
| 3 | GRASSE RVR BS-3 | B | Sand |
| 4 | GRASSE RVR BS-4 | C | Gravel and Riprap (bank run gravel) |
| 5 | GRASSE RVR BS-5 | C | Sand |
| 6 | GRASSE RVR BS-6 | D | Gravel and Riprap (bank run gravel) |
| 7 | GRASSE RVR BS-7 | E | Gravel and Riprap (bank run gravel) |
| 8 | GRASSE RVR BS-8 | F | Gravel and Riprap (crushed stone) |
| 9 | GRASSE RVR BS-9 | F | Sand |
| 10 | GRASSE RVR BS-10 | G | Sand |
| 11 | GRASSE RVR BS-11 | G | Sand |
| 12 | GRASSE RVR BS-12 | C | Low Permeability Soil |
| 13 | GRASSE RVR BS-13 | E | Sand |
| 14 | GRASSE RVR BS-14 | C | Gravel and Riprap (bank run gravel) |
| 15 | GRASSE RVR BS-15 | G | Low Permeability Soil |
| 17 | GRASSE RVR BS-17 | C | Topsoil |
| 18 | GRASSE RVR BS-18 | G | Topsoil |
| 19 | GRASSE RVR BS-19 | F | Topsoil |

## Table 5-3A
## Summary of Borrow Source Analaytical Data
## Pre-Design Investigation Report
## Grasse River Study Area, Massena, New York

| Chemical unrestricted | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | B | C | C | D | E | F | F | G | G |
| | GRASSE RVR BS-1 | GRASSE RVR BS-2 | GRASSE RVR BS-3 | GRASSE RVR BS-4 | GRASSE RVR BS-5 | GRASSE RVR BS-6 | GRASSE RVR BS-7 | GRASSE RVR BS-8 | GRASSE RVR BS-9 | GRASSE RVR BS-10 | GRASSE RVR BS-11 |
| | Gravel - crusher run | Gravel - crusher run | Sand - bank run | Gravel - bank run, below water | Sand - bank run | Gravel - bank run | Gravel - bank run, below water | Gravel - crusher run | Sand - bank run | Sand - bank run | Sand - bank run |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | |
| Aluminum | 1410 | 1200 | 1,600 | 1990 | 1260 | 3230 | 1880 | 1450 | 1310 | 1550 | 1300 |
| Antimony | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Arsenic | ND | 5.6 | 0.591 | ND | 0.591 | 0.924 | 1.1 | ND | ND | ND | ND |
| Barium | 17.4 | 41.1 | 7.18 | 13.8 | 11.6 | 23.4 | 34.3 | 5.88 | 8.59 | 6.32 | 13 |
| Beryllium | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Cadmium | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Calcium | 324000 | 169000 | 637 | 145000 | 618 | 1890 | 1720 | 159000 | 985 | 233 | 613 |
| Chromium, Total | 5.06 | 6.16 | 2.4 | 5.28 | 1.82 | 5.03 | 3.49 | 7.76 | 1.79 | 2.28 | 1.82 |
| Cobalt | ND | ND | 1.29 | ND | 0.78 | 4.16 | 2.34 | ND | 1.04 | 0.704 | 0.789 |
| Copper | 7.24 | 8.83 | 1.88 | 8.62 | 0.664 | 7.27 | 4.17 | ND | 1.62 | ND | 0.78 |
| Iron | 4520 | 6740 | 4,530 | 6260 | 3080 | 9990 | 8460 | 8760 | 3150 | 3910 | 3030 |
| Lead | 6.18 | 15.5 | 1.14 | 7.71 | ND | 1.4 | 1.33 | 7.36 | 0.754 | 0.547 | ND |
| Magnesium | 16300 | 101000 | 826 | 59300 | 609 | 2150 | 1450 | 79200 | 640 | 331 | 513 |
| Manganese | 469 | 506 | 110 | 346 | 37.8 | 143 | 313 | 492 | 60.8 | 18 | 39 |
| Mercury | ND | 0.0479 | ND | 0.0657 | ND | 0.0544 | ND | ND | ND | ND | 0.0627 |
| Nickel | 6.21 | 6.3 | 2.07 | ND | 1.46 | 5.71 | 3.23 | 5.92 | 1.89 | 1.48 | 1.52 |
| Potassium | 685 | ND | 174 | ND | 174 | 339 | 178 | ND | 179 | 111 | 176 |
| Selenium | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Sodium | ND | ND | ND | ND | ND | 62.5 | ND | ND | ND | ND | ND |
| Silver | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Thallium | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Vanadium | ND | 7.21 | 3.83 | 6.1 | 3.56 | 10.7 | 8 | 7.07 | 3.17 | 4.79 | 3.52 |
| Zinc | 15 | 30.3 | 7.85 | 14 | 4.51 | 19.5 | 9.84 | 5.03 | 4.68 | 4.16 | 4.58 |
| **Volatile Organic Compounds (mg/kg)** | | | | | | | | | | | |
| Acetone | 0.04 | ND | 0.15 | ND | 0.18 | 0.07 | ND | ND | 0.18 | 0.08 | 0.19 |
| **Wet Chemistry** | | | | | | | | | | | |
| Total Organic Carbon | 630 | ND | ND | 1100 | ND | ND | ND | ND | ND | ND | ND |
| Cyanide | 11.2 | 4.77 | ND | ND | ND | ND | ND | 3.23 | ND | ND | ND |

## Table 5-3B
## Summary of Background Analytical Data

| Chemical unrestricted | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GRback1-SD-141106-0-6 | GRback2-SD-141106-0-6 | GRback3-SD-141106-0-6 | GRback4-SD-141106-0-6 | GRback5-SD-141106-0-6 | GRback6-SD-141106-0-6 | GRback7-SD-141106-0-6 | GRback8-SD-141106-0-6 | GRback9-SD-141106-0-6 | GRback10-SD-141106-0-6 | RQback1-SD-141106-0-6 | RQback2-SD-141106-0-6 | RQback3-SD-141106-0-6 | RQback4-SD-141106-0-6 | RQback5-SD-141106-0-6 |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | | | | | |
| Aluminum | 1920 | 1940 | 1800 | 16100 | 2210 | 1700 | 1750 | 1820 | 2180 | 2370 | 2710 | 1830 | 1840 | 11100 | 2840 |
| Antimony | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Arsenic | 0.840 | 0.653 | 0.757 | 1.97 | ND | ND | 0.694 | 1.02 | 0.643 | 1.88 | 0.934 | 0.723 | ND | 1.48 | 0.723 |
| Barium | 13.2 | 9.88 | 13.9 | 207 | 19.7 | 10.5 | 9.49 | 12.3 | 13.6 | 18.5 | 20.0 | 10.4 | 12.2 | 138 | 22.7 |
| Beryllium | ND | ND | ND | 0.568 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Cadmium | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Calcium | 560 | 701 | 746 | 14500 | 732 | 722 | 801 | 1140 | 1110 | 90100 | 792 | 928 | 848 | 3800 | 827 |
| Chromium, Total | 4.58 | 3.13 | 2.85 | 32.5 | 3.40 | 2.75 | 2.73 | 4.37 | 4.09 | 5.49 | 3.18 | 2.12 | 2.85 | 21.9 | 3.73 |
| Cobalt | 1.51 | 1.50 | 1.47 | 9.93 | 1.68 | 1.32 | 1.40 | 1.63 | 1.80 | 2.59 | 1.81 | 1.25 | 1.24 | 7.09 | 2.02 |
| Copper | ND | 0.749 | ND | 20.4 | 0.719 | ND | ND | 0.838 | 0.796 | 3.48 | 1.37 | 1.03 | 1.57 | 14.6 | 2.01 |
| Iron | 6020 | 6450 | 5810 | 24200 | 6310 | 4540 | 5050 | 7880 | 6330 | 6410 | 7610 | 4770 | 4380 | 18200 | 5640 |
| Lead | 1.92 | 1.99 | 2.01 | 6.11 | 2.52 | 1.70 | 1.66 | 2.04 | 1.84 | 6.00 | 4.19 | 2.85 | 3.43 | 5.65 | 2.18 |
| Magnesium | 783 | 594 | 579 | 11100 | 701 | 641 | 611 | 564 | 633 | 52500 | 993 | 534 | 594 | 6770 | 984 |
| Manganese | 64.6 | 69.2 | 59.7 | 503 | 95.0 | 60.1 | 78.3 | 71.3 | 77.1 | 314 | 191 | 96.8 | 49.2 | 308 | 78.6 |
| Mercury | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Nickel | 2.57 | 2.19 | 2.02 | 22.7 | 2.26 | 2.02 | 2.28 | 2.33 | 2.33 | 6.10 | 2.76 | 1.84 | 1.93 | 15.6 | 2.63 |
| Potassium | 197 | 191 | 152 | 5780 | 221 | 168 | 139 | 142 | 243 | 608 | 304 | 197 | 268 | 3880 | 439 |
| Selenium | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Sodium | ND | ND | ND | 612 | ND | ND | ND | ND | ND | 158 | ND | ND | ND | 472 | ND |
| Silver | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Thallium | ND | ND | ND | 1.62 | ND | ND | ND | ND | ND | ND | ]ND | ND | ND | ND | ND |
| Vanadium | 3.72 | 4.20 | 3.48 | 42.0 | 3.32 | 2.90 | 3.21 | 9.28 | 3.95 | 7.44 | 5.02 | 3.54 | 5.76 | 28.9 | 6.76 |
| Zinc | 31.6 | 33.0 | 31.1 | 69.5 | 39.7 | 29.4 | 28.6 | 29.1 | 36.9 | 23.2 | 50.2 | 36.7 | 30.4 | 62.1 | 34.7 |
| **Volatile Organic Compounds (mg/kg)** | | | | | | | | | | | | | | | |
| Acetone | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Wet Chemistry** | | | | | | | | | | | | | | | |
| Total Organic Carbon | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cyanide | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Notes:**
1) Lab Qualifiers are defined as the following: J – estimated value, R – rejected value, ND – non-detect value, D –dilution, N – presumptive evidence of the compound, B-Compound was found in the Blank and the Sample
2) -- - No Test Conducted

## Table 5-4A
## Comparison of Borrow Source Analytical Data to Unrestricted Use SCOs
## Pre-Design Investigation Report
## Grasse River Study Area, Massena, New York

| Chemical unrestricted | Unrestricted Use Soil Cleanup Objectives (mg/kg) | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | B | C | C | D | E | F | F | G | G |
| | | GRASSE RVR BS-1 | GRASSE RVR BS-2 | GRASSE RVR BS-3 | GRASSE RVR BS-4 | GRASSE RVR BS-5 | GRASSE RVR BS-6 | GRASSE RVR BS-7 | GRASSE RVR BS-8 | GRASSE RVR BS-9 | GRASSE RVR BS-10 | GRASSE RVR BS-11 |
| | | Gravel - crusher run | Gravel - crusher run | Sand - bank run | Gravel - bank run, below water table | Sand - bank run | Gravel - bank run | Gravel - bank run, below water table | Gravel - crusher run | Sand - bank run | Sand - bank run | Sand - bank run |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | | |
| Arsenic | 13 | ND | 5.6 | 0.591 | ND | 0.591 | 0.924 | 1.1 | ND | ND | ND | ND |
| Barium | 350 | 17.4 | 41.1 | 7.18 | 13.8 | 11.6 | 23.4 | 34.3 | 5.88 | 8.59 | 6.32 | 13 |
| Beryllium | 7.2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Cadmium | 2.5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Copper | 50 | 7.24 | 8.83 | 1.88 | 8.62 | 0.664 | 7.27 | 4.17 | ND | 1.62 | ND | 0.78 |
| Lead | 63 | 6.18 | 15.5 | 1.14 | 7.71 | ND | 1.4 | 1.33 | 7.36 | 0.754 | 0.547 | ND |
| Manganese | 1,600 | 469 | 506 | 110 | 346 | 37.8 | 143 | 313 | 492 | 60.8 | 18 | 39 |
| Mercury | 0.18 | ND | 0.0479 | ND | 0.0657 | ND | 0.0544 | ND | ND | ND | ND | 0.0627 |
| Nickel | 30 | 6.21 | 6.3 | 2.07 | ND | 1.46 | 5.71 | 3.23 | 5.92 | 1.89 | 1.48 | 1.52 |
| Selenium | 3.9 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Silver | 2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Zinc | 109 | 15 | 30.3 | 7.85 | 14 | 4.51 | 19.5 | 9.84 | 5.03 | 4.68 | 4.16 | 4.58 |
| Volatile Organic Compounds (mg/kg) | | | | | | | | | | | | |
| Acetone | 0.05 | 0.04 | ND | 0.15 | ND | 0.18 | 0.07 | ND | ND | 0.18 | 0.08 | 0.19 |
| Wet Chemistry | | | | | | | | | | | | |
| Cyanide | 27 | 11.2 | 4.77 | ND | ND | ND | ND | ND | 3.23 | ND | ND | ND |

## Table 5-4B
## Comparison of Background Analytical Data to Unrestricted Use SCOs

| Chemical unrestricted | Unrestricted Use Soil Cleanup Objectives (mg/kg) | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GRback1-SD-141106-0-6 | GRback2-SD-141106-0-6 | GRback3-SD-141106-0-6 | GRback4-SD-141106-0-6 | GRback5-SD-141106-0-6 | GRback6-SD-141106-0-6 | GRback7-SD-141106-0-6 | GRback8-SD-141106-0-6 | GRback9-SD-141106-0-6 | GRback10-SD-141106-0-6 | RQback1-SD-141106-0-6 | RQback2-SD-141106-0-6 | RQback3-SD-141106-0-6 | RQback4-SD-141106-0-6 | RQback5-SD-141106-0-6 |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | | | | | | |
| Arsenic | 13 | 0.840 | 0.653 | 0.757 | 1.97 | ND | ND | 0.694 | 1.02 | 0.643 | 1.88 | 0.934 | 0.723 | ND | 1.48 | 0.723 |
| Barium | 350 | 13.2 | 9.88 | 13.9 | 207 | 19.7 | 10.5 | 9.49 | 12.3 | 13.6 | 18.5 | 20.0 | 10.4 | 12.2 | 138 | 22.7 |
| Beryllium | 7.2 | ND | ND | ND | 0.568 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Cadmium | 2.5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Copper | 50 | ND | 0.749 | ND | 20.4 | 0.719 | ND | ND | 0.838 | 0.796 | 3.48 | 1.37 | 1.03 | 1.57 | 14.6 | 2.01 |
| Lead | 63 | 1.92 | 1.99 | 2.01 | 6.11 | 2.52 | 1.70 | 1.66 | 2.04 | 1.84 | 6.00 | 4.19 | 2.85 | 3.43 | 5.65 | 2.18 |
| Manganese | 1,600 | 64.6 | 69.2 | 59.7 | 503 | 95.0 | 60.1 | 78.3 | 71.3 | 77.1 | 314 | 191 | 96.8 | 49.2 | 308 | 78.6 |
| Mercury | 0.18 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Nickel | 30 | 2.57 | 2.19 | 2.02 | 22.7 | 2.26 | 2.02 | 2.28 | 2.33 | 2.33 | 6.10 | 2.76 | 1.84 | 1.93 | 15.6 | 2.63 |
| Selenium | 3.9 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Silver | 2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Zinc | 109 | 31.6 | 33.0 | 31.1 | 69.5 | 39.7 | 29.4 | 28.6 | 29.1 | 36.9 | 23.2 | 50.2 | 36.7 | 30.4 | 62.1 | 34.7 |
| Volatile Organic Compounds (mg/kg) | | | | | | | | | | | | | | | | |
| Acetone | 0.05 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Wet Chemistry | | | | | | | | | | | | | | | | |
| Cyanide | 27 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Notes:**

1) Lab Qualifiers are defined as the following: J – estimated value, R – rejected value, ND – non-detect value, D –dilution, N – presumptive evidence of the compound, B- Compound was

2) Yellow highlighted values exceed minimum soil clean up objective.

3) Unrestricted Use Soil Cleanup Objectives from NYSDEC Subpart 375-6 Table 375-6.8(b) (http://www.dec.ny.gov/regs/15507.html).

4) -- No Test Conducted

## Table 5-5A
## Comparison of Borrow Source Analytical Data to Ecological Resources Protection SCOs
## Pre-Design Investiagtion Report
## Grasse River Study Area, Massena, New York

| Chemical unrestricted | Ecological Resources Protection Soil Cleanup Objectives (mg/kg) | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | B | C | C | D | E | F | F | G | G |
| | | GRASSE RVR BS-1 | GRASSE RVR BS-2 | GRASSE RVR BS-3 | GRASSE RVR BS-4 | GRASSE RVR BS-5 | GRASSE RVR BS-6 | GRASSE RVR BS-7 | GRASSE RVR BS-8 | GRASSE RVR BS-9 | GRASSE RVR BS-10 | GRASSE RVR BS-11 |
| | | Gravel - crusher run | Gravel - crusher run | Sand - bank run | Gravel - bank run, below water table | Sand - bank run | Gravel - bank run | Gravel - bank run, below water table | Gravel - crusher run | Sand - bank run | Sand - bank run | Sand - bank run |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | | |
| Arsenic | 13 | ND | 5.6 | 0.591 | ND | 0.591 | 0.924 | 1.1 | ND | ND | ND | ND |
| Barium | 433 | 17.4 | 41.1 | 7.18 | 13.8 | 11.6 | 23.4 | 34.3 | 5.88 | 8.59 | 6.32 | 13 |
| Copper | 50 | 7.24 | 8.83 | 1.88 | 8.62 | 0.664 | 7.27 | 4.17 | ND | 1.62 | ND | 0.78 |
| Lead | 63 | 6.18 | 15.5 | 1.14 | 7.71 | ND | 1.4 | 1.33 | 7.36 | 0.754 | 0.547 | ND |
| Manganese | 1,600 | 469 | 506 | 110 | 346 | 37.8 | 143 | 313 | 492 | 60.8 | 18 | 39 |
| Mercury | 0.18 | ND | 0.0479 | ND | 0.0657 | ND | 0.0544 | ND | ND | ND | ND | 0.0627 |
| Nickel | 30 | 6.21 | 6.3 | 2.07 | ND | 1.46 | 5.71 | 3.23 | 5.92 | 1.89 | 1.48 | 1.52 |
| Selenium | 3.9 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Silver | 2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Zinc | 109 | 15 | 30.3 | 7.85 | 14 | 4.51 | 19.5 | 9.84 | 5.03 | 4.68 | 4.16 | 4.58 |
| **Volatile Organic Compounds (mg/kg)** | | | | | | | | | | | | |
| Acetone | 2.20 | 0.04 | ND | 0.15 | ND | 0.18 | 0.07 | ND | ND | 0.18 | 0.08 | 0.19 |

## Table 5-5B
## Comparison of Background Analytical Data to Ecological Resources Protection SCOs

| Chemical unrestricted | Ecological Resources Protection Soil Cleanup Objectives (mg/kg) | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GRback1-SD-141106-0-6 | GRback2-SD-141106-0-6 | GRback3-SD-141106-0-6 | GRback4-SD-141106-0-6 | GRback5-SD-141106-0-6 | GRback6-SD-141106-0-6 | GRback7-SD-141106-0-6 | GRback8-SD-141106-0-6 | GRback9-SD-141106-0-6 | GRback10-SD-141106-0-6 | RQback1-SD-141106-0-6 | RQback2-SD-141106-0-6 | RQback3-SD-141106-0-6 | RQback4-SD-141106-0-6 | RQback5-SD-141106-0-6 |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | | | | | | |
| Arsenic | 13 | 0.840 | 0.653 | 0.757 | 1.97 | ND | ND | 0.694 | 1.02 | 0.643 | 1.88 | 0.934 | 0.723 | ND | 1.48 | 0.723 |
| Barium | 433 | 13.2 | 9.88 | 13.9 | 207 | 19.7 | 10.5 | 9.49 | 12.3 | 13.6 | 18.5 | 20.0 | 10.4 | 12.2 | 138 | 22.7 |
| Copper | 50 | ND | 0.749 | ND | 20.4 | 0.719 | ND | ND | 0.838 | 0.796 | 3.48 | 1.37 | 1.03 | 1.57 | 14.6 | 2.01 |
| Lead | 63 | 1.92 | 1.99 | 2.01 | 6.11 | 2.52 | 1.70 | 1.66 | 2.04 | 1.84 | 6.00 | 4.19 | 2.85 | 3.43 | 5.65 | 2.18 |
| Manganese | 1,600 | 64.6 | 69.2 | 59.7 | 503 | 95.0 | 60.1 | 78.3 | 71.3 | 77.1 | 314 | 191 | 96.8 | 49.2 | 308 | 78.6 |
| Mercury | 0.18 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Nickel | 30 | 2.57 | 2.19 | 2.02 | 22.7 | 2.26 | 2.02 | 2.28 | 2.33 | 2.33 | 6.10 | 2.76 | 1.84 | 1.93 | 15.6 | 2.63 |
| Selenium | 3.9 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Silver | 2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Zinc | 109 | 31.6 | 33.0 | 31.1 | 69.5 | 39.7 | 29.4 | 28.6 | 29.1 | 36.9 | 23.2 | 50.2 | 36.7 | 30.4 | 62.1 | 34.7 |
| **Volatile Organic Compounds (mg/kg)** | | | | | | | | | | | | | | | | |
| Acetone | 2.20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Notes:**

1) Lab Qualifiers are defined as the following: J – estimated value, R – rejected value, ND – non-detect value, D –dilution, N – presumptive evidence of the compound, B- Compound was found

2) Yellow highlighted values exceed minimum soil clean up objective.

3) Soil Cleanup Objectives based on values provide in the January 28, 2013 memorandum from NYSDEC.

4) -- No Test Conducted

## Table 5-6A
## Comparison of Borrow Source Analytical Data to Sediment Guidance LEL SCOs
## Pre-Design Investigation Report
## Grasse River Study Area, Massena, New York

| Chemical unrestricted | Sediment Guidance LEL Soil Cleanup Objectives (mg/kg) | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | B | C | C | D | E | F | F | G | G |
| | | GRASSE RVR BS-1 | GRASSE RVR BS-2 | GRASSE RVR BS-3 | GRASSE RVR BS-4 | GRASSE RVR BS-5 | GRASSE RVR BS-6 | GRASSE RVR BS-7 | GRASSE RVR BS-8 | GRASSE RVR BS-9 | GRASSE RVR BS-10 | GRASSE RVR BS-11 |
| | | Gravel - crusher run | Gravel - crusher run | Sand - bank run | Gravel - bank run, below water table | Sand - bank run | Gravel - bank run | Gravel - bank run, below water table | Gravel - crusher run | Sand - bank run | Sand - bank run | Sand - bank run |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | | |
| Antimony | 2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Arsenic | 6 | ND | 5.6 | 0.591 | ND | 0.591 | 0.924 | 1.1 | ND | ND | ND | ND |
| Copper | 16 | 7.24 | 8.83 | 1.88 | 8.62 | 0.664 | 7.27 | 4.17 | ND | 1.62 | ND | 0.78 |
| Iron | 20000 | 4520 | 6740 | 4,530 | 6260 | 3080 | 9990 | 8460 | 8760 | 3150 | 3910 | 3030 |
| Lead | 31 | 6.18 | 15.5 | 1.14 | 7.71 | ND | 1.4 | 1.33 | 7.36 | 0.754 | 0.547 | ND |
| Manganese | 460 | 469 | 506 | 110 | 346 | 37.8 | 143 | 313 | 492 | 60.8 | 18 | 39 |
| Nickel | 16 | 6.21 | 6.3 | 2.07 | ND | 1.46 | 5.71 | 3.23 | 5.92 | 1.89 | 1.48 | 1.52 |
| Silver | 1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Zinc | 120 | 15 | 30.3 | 7.85 | 14 | 4.51 | 19.5 | 9.84 | 5.03 | 4.68 | 4.16 | 4.58 |

## Table 5-6B
## Comparison of Background Analytical Data to Sediment Guidance LEL SCOs

| Chemical unrestricted | Sediment Guidance LEL Soil Cleanup Objectives (mg/kg) | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GRback1-SD-141106-0-6 | GRback2-SD-141106-0-6 | GRback3-SD-141106-0-6 | GRback4-SD-141106-0-6 | GRback5-SD-141106-0-6 | GRback6-SD-141106-0-6 | GRback7-SD-141106-0-6 | GRback8-SD-141106-0-6 | GRback9-SD-141106-0-6 | GRback10-SD-141106-0-6 | RQback1-SD-141106-0-6 | RQback2-SD-141106-0-6 | RQback3-SD-141106-0-6 | RQback4-SD-141106-0-6 | RQback5-SD-141106-0-6 |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | | | | | | |
| Antimony | 2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Arsenic | 6 | 0.84 | 0.653 | 0.757 | 1.97 | ND | ND | 0.694 | 1.02 | 0.643 | 1.88 | 0.934 | 0.723 | ND | 1.48 | 0.723 |
| Copper | 16 | ND | 0.749 | ND | 20.4 | 0.719 | ND | ND | 0.838 | 0.796 | 3.48 | 1.37 | 1.03 | 1.57 | 14.6 | 2.01 |
| Iron | 20000 | 6020 | 6450 | 5810 | 24200 | 6310 | 4540 | 5050 | 7880 | 6330 | 6410 | 7610 | 4770 | 4380 | 18200 | 5640 |
| Lead | 31 | 1.92 | 1.99 | 2.01 | 6.11 | 2.52 | 1.70 | 1.66 | 2.04 | 1.84 | 6.00 | 4.19 | 2.85 | 3.43 | 5.65 | 2.18 |
| Manganese | 460 | 64.6 | 69.2 | 59.7 | 503 | 95.0 | 60.1 | 78.3 | 71.3 | 77.1 | 314 | 191 | 96.8 | 49.2 | 308 | 78.6 |
| Nickel | 16 | 2.57 | 2.19 | 2.02 | 22.7 | 2.26 | 2.02 | 2.28 | 2.33 | 2.33 | 6.10 | 2.76 | 1.84 | 1.93 | 15.6 | 2.63 |
| Silver | 1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Zinc | 120 | 31.6 | 33.0 | 31.1 | 69.5 | 39.7 | 29.4 | 28.6 | 29.1 | 36.9 | 23.2 | 50.2 | 36.7 | 30.4 | 62.1 | 34.7 |

**Notes:**

1) Lab Qualifiers are defined as the following: J – estimated value, R – rejected value, ND – non-detect value, D –dilution, N – presumptive evidence of the compound, B- Compound was found

2) Yellow highlighted values exceed minimum soil clean up objective.

3) Soil Cleanup Objectives based on values provide in the January 28, 2013 memorandum from NYSDEC.

## Table 5-7A
## Comparison of Borrow Source Analytical Data to St. Lawrence County SCOs
## Pre-Design Investigation Report
## Grasse River Study Area, Massena, New York

| Chemical unrestricted | St. Lawrence County Soil Cleanup Objectives (mg/kg) | | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | B | C | C | D | E | F | F | G | G |
| | | | GRASSE RVR BS-1 | GRASSE RVR BS-2 | GRASSE RVR BS-3 | GRASSE RVR BS-4 | GRASSE RVR BS-5 | GRASSE RVR BS-6 | GRASSE RVR BS-7 | GRASSE RVR BS-8 | GRASSE RVR BS-9 | GRASSE RVR BS-10 | GRASSE RVR BS-11 |
| | Max | Min | Gravel - crusher run | Gravel - crusher run | Sand - bank run | Gravel - bank run, below water table | Sand - bank run | Gravel - bank run | Gravel - bank run, below water table | Gravel - crusher run | Sand - bank run | Sand - bank run | Sand - bank run |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | | | |
| Antimony | 1.34 | 0.597 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Arsenic | 12.3 | 0.251 | ND | 5.6 | 0.591 | ND | 0.591 | 0.924 | 1.1 | ND | ND | ND | ND |
| Barium | 162 | 5.65 | 17.4 | 41.1 | 7.18 | 13.8 | 11.6 | 23.4 | 34.3 | 5.88 | 8.59 | 6.32 | 13 |
| Copper | 35.6 | 2.18 | 7.24 | 8.83 | 1.88 | 8.62 | 0.664 | 7.27 | 4.17 | ND | 1.62 | ND | 0.78 |
| Iron | 27200 | 5060 | 4520 | 6740 | 4,530 | 6260 | 3080 | 9990 | 8460 | 8760 | 3150 | 3910 | 3030 |
| Lead | 43.8 | 2.65 | 6.18 | 15.5 | 1.14 | 7.71 | ND | 1.4 | 1.33 | 7.36 | 0.754 | 0.547 | ND |
| Manganese | 907 | 66.3 | 469 | 506 | 110 | 346 | 37.8 | 143 | 313 | 492 | 60.8 | 18 | 39 |
| Mercury | 0.16 | 0.01 | ND | 0.0479 | ND | 0.0657 | ND | 0.0544 | ND | ND | ND | ND | 0.0627 |
| Nickel | 40.5 | 1.54 | 6.21 | 6.3 | 2.07 | ND | 1.46 | 5.71 | 3.23 | 5.92 | 1.89 | 1.48 | 1.52 |
| Selenium | 4.18 | 0.373 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Silver | 1.48 | 0.111 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Zinc | 133 | 10.4 | 15 | 30.3 | 7.85 | 14 | 4.51 | 19.5 | 9.84 | 5.03 | 4.68 | 4.16 | 4.58 |

## Table 5-7B
## Comparison of Background Analytical Data to St. Lawrence County SCOs

| Chemical unrestricted | St. Lawrence County Soil Cleanup Objectives (mg/kg) | | Material Supplier ID / Borrow Source ID / Material Type | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max | Min | GRback1-SD-141106-0-6 | GRback2-SD-141106-0-6 | GRback3-SD-141106-0-6 | GRback4-SD-141106-0-6 | GRback5-SD-141106-0-6 | GRback6-SD-141106-0-6 | GRback7-SD-141106-0-6 | GRback8-SD-141106-0-6 | GRback9-SD-141106-0-6 | GRback10-SD-141106-0-6 | RQback1-SD-141106-0-6 | RQback2-SD-141106-0-6 | RQback3-SD-141106-0-6 | RQback4-SD-141106-0-6 | RQback5-SD-141106-0-6 |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | | | | | | | |
| Antimony | 1.34 | 0.597 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Arsenic | 12.3 | 0.251 | 0.840 | 0.653 | 0.757 | 1.97 | ND | ND | 0.694 | 1.02 | 0.643 | 1.88 | 0.934 | 0.723 | ND | 1.48 | 0.723 |
| Barium | 162 | 5.65 | 13.2 | 9.88 | 13.9 | 207 | 19.7 | 10.5 | 9.49 | 12.3 | 13.6 | 18.5 | 20.0 | 10.4 | 12.2 | 138 | 22.7 |
| Copper | 35.6 | 2.18 | ND | 0.749 | ND | 20.4 | 0.719 | ND | ND | 0.838 | 0.796 | 3.48 | 1.37 | 1.03 | 1.57 | 14.6 | 2.01 |
| Iron | 27200 | 5060 | 6020 | 6450 | 5810 | 24200 | 6310 | 4540 | 5050 | 7880 | 6330 | 6410 | 7610 | 4770 | 4380 | 18200 | 5640 |
| Lead | 43.8 | 2.65 | 1.92 | 1.99 | 2.01 | 6.11 | 2.52 | 1.70 | 1.66 | 2.04 | 1.84 | 6.00 | 4.19 | 2.85 | 3.43 | 5.65 | 2.18 |
| Manganese | 907 | 66.3 | 64.6 | 69.2 | 59.7 | 503 | 95.0 | 60.1 | 78.3 | 71.3 | 77.1 | 314 | 191 | 96.8 | 49.2 | 308 | 78.6 |
| Mercury | 0.16 | 0.01 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Nickel | 40.5 | 1.54 | 2.57 | 2.19 | 2.02 | 22.7 | 2.26 | 2.02 | 2.28 | 2.33 | 2.33 | 6.10 | 2.76 | 1.84 | 1.93 | 15.6 | 2.63 |
| Selenium | 4.18 | 0.373 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Silver | 1.48 | 0.111 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Zinc | 133 | 10.4 | 31.6 | 33.0 | 31.1 | 69.5 | 39.7 | 29.4 | 28.6 | 29.1 | 36.9 | 23.2 | 50.2 | 36.7 | 30.4 | 62.1 | 34.7 |

**Notes:**

1) Lab Qualifiers are defined as the following: J – estimated value, R – rejected value, ND – non-detect value, D –dilution, N – presumptive evidence of the compound, B- Compound was found in the

2) Yellow highlighted values fall between minimum and maximum soil clean up objectives. Red highlighted values exceed maximum soil clean up objective.

3) Soil Cleanup Objectives based on values provide in the January 28, 2013 memorandum from NYSDEC.

**Table 5-8**
**Summary of Recent Borrow Source Geotechnical Index Test Results**
**Pre-Design Investigation Report**
**Grasse River Study Area, Massena, New York**

| Material Use | Material Supplier ID | Borrow Source ID | USCS Classification [1] | Grain Size Analysis [2] | | | | | | | Atterberg Limits [3] | | | Moisture Content [4] (%) | Organic Content [5] (%) | Specific Gravity [6] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Gravel (%) | | Sand (%) | | | Fines (%) | | LL (%) | PL (%) | PI (%) | | | |
| | | | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay | | | | | | |
| Base/Chemical Isolation Layer, Granular Soil | B | GRASSE RVR BS-3 | SP | 0.0 | 8.4 | 3.4 | 26.1 | 59.9 | 1.8 | 0.4 | -- | -- | -- | 4.1 | 0.1 | 2.66 |
| | C | GRASSE RVR BS-5 | SP | 0.0 | 0.0 | 0.0 | 2.2 | 95.9 | 1.9 | 0.0 | -- | -- | -- | 3.8 | 4.6 | 2.66 |
| | F | GRASSE RVR BS-9 | SP | 0.0 | 0.0 | 0.0 | 1.7 | 92.5 | 5.8 | 0.0 | -- | -- | -- | 7.2 | 0.1 | 2.67 |
| | G | GRASSE RVR BS-10 | SP | 0.0 | 0.0 | 0.0 | 8.9 | 87.5 | 3.6 | 0.0 | -- | -- | -- | 4.0 | 4.2 | 2.67 |
| | G | GRASSE RVR BS-11 | SP-SM | 0.0 | 0.0 | 0.0 | 1.7 | 93.1 | 5.2 | 0.0 | -- | -- | -- | 4.7 | 1.1 | 2.66 |
| | E | GRASSE RVR BS-13 | SP | 0.0 | 0.1 | 0.5 | 19.8 | 78.5 | 1.1 | 0.0 | -- | -- | -- | 3.4 | 0.8 | 2.67 |
| Low Permeability Soil | C | GRASSE RVR BS-12 | CL | 0.0 | 0.0 | 0.1 | 0.8 | 8.6 | 62.3 | 28.2 | 31 | 16 | 15 | 26.4 | 0.9 | 2.70 |

Notes:

1. Unified Soil Classification System (USCS) classifications were performed in accordance with ASTM D2488.
2. Grain size analysis tests were conducted in accordance with ASTM D422.
3. Atterberg Limit tests were conducted in accordance with ASTM D4318.
4. Moisture Content tests were conducted in accordance with ASTM D2216.
5. Organic Content tests were conducted in accordance with ASTM D2974.
6. Specific Gravity tests were conducted in accordance with ASTM D854.
7. Acronyms and abbreviations:

| | | |
|---|---|---|
| CL = Lean Clay | LL = Liquid Limit | -- = test not performed |
| SP = Poorly Graded Sand | PL = Plastic Limit | % = Percent |
| SP-SM = Poorly Graded Sand with Silt | PI = Plasticity Index | ft = feet |

# Table 5-9
# Comparison of Soil Cleanup Objectives
# Pre-Design Investigation Report
# Grasse River Study Area, Massena, New York

| Chemical unrestricted | Unrestricted Use Soil Cleanup Objectives (mg/kg) | Ecological Resources Protection Soil Cleanup Objectives (mg/kg) | Sediment Guidance LEL Soil Cleanup Objectives (mg/kg) | St. Lawrence County Soil Cleanup Objectives (mg/kg) | | Borrow Source Analytical Results | | | Background Analytical Results | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Max | Min | Min | Max | Average | Min | Max | Average |
| **Inorganic Analytes (mg/kg)** | | | | | | | | | | | |
| Aluminum [(2)] | -- | -- | -- | -- | -- | 1200 | 3230 | 1653 | 1700 | 16100 | 3607 |
| Antimony | -- | -- | 2 | 1.34 | 0.597 | ND | ND | ND | ND | ND | ND |
| Arsenic | 13 | 13 | 6 | 12.3 | 0.251 | ND | 5.6 | 2.3 | ND | 1.97 | 0.9 |
| Barium | 350 | 433 | -- | 162 | 5.65 | 5.88 | 41.1 | 17 | 9.49 | 207 | 35 |
| Beryllium | 7.2 | -- | -- | -- | -- | ND | ND | ND | ND | 0.568 | 0.50 |
| Cadmium | 2.5 | -- | -- | -- | -- | ND | ND | ND | ND | ND | ND |
| Calcium [(2)] | -- | -- | -- | -- | -- | 233 | 324000 | 73063 | 560 | 90100 | 7887 |
| Chromium, Total [(2)] | -- | -- | -- | -- | -- | 1.8 | 7.8 | 3.9 | 2.12 | 32.5 | 6.6 |
| Cobalt [(2)] | -- | -- | -- | -- | -- | ND | 4.2 | 2.8 | 1.24 | 9.93 | 2.5 |
| Copper | 50 | 50 | 16 | 35.6 | 2.18 | ND | 8.8 | 4.2 | ND | 20.4 | 3.3 |
| Iron | -- | -- | 20000 | 27200 | 5060 | 3030 | 9990 | 5675 | 4380 | 24200 | 7973 |
| Lead | 63 | 63 | 31 | 43.8 | 2.65 | ND | 15.5 | 4 | 1.66 | 6.11 | 3 |
| Magnesium [(2)] | -- | -- | -- | -- | -- | 331 | 101000 | 23847 | 534 | 52500 | 5239 |
| Manganese | 1,600 | 1,600 | 460 | 907 | 66.3 | 18 | 506 | 230 | 49.2 | 503 | 141 |
| Mercury | 0.18 | 0.18 | -- | 0.16 | 0.01 | ND | 0.066 | 0.046 | ND | ND | ND |
| Nickel | 30 | 30 | 16 | 40.5 | 1.54 | ND | 6.3 | 3.7 | 1.84 | 22.7 | 4.8 |
| Potassium [(2)] | -- | -- | -- | -- | -- | ND | 685 | 323 | 139 | 5780 | 862 |
| Selenium | 3.9 | 3.9 | -- | 4.18 | 0.373 | ND | ND | ND | ND | ND | ND |
| Sodium [(2)] | -- | -- | -- | -- | -- | ND | 62.5 | 216.7 | ND | 612 | 132 |
| Silver | 2 | 2 | 1 | 1.48 | 0.111 | ND | ND | ND | ND | ND | ND |
| Thallium [(2)] | -- | -- | -- | -- | -- | ND | ND | ND | ND | 1.62 | 1.3 |
| Vanadium [(2)] | -- | -- | -- | -- | -- | ND | 10.7 | 5.7 | 2.9 | 42 | 8.9 |
| Zinc | 109 | 109 | 120 | 133 | 10.4 | 4.16 | 30.3 | 10.9 | 23.2 | 69.5 | 37.7 |
| **Volatile Organic Compounds (mg/kg)** | | | | | | | | | | | |
| Acetone | 0.05 | 2.20 | -- | -- | -- | ND | 0.19 | 0.09 | NT | NT | NT |
| **Wet Chemistry** | | | | | | | | | | | |
| Cyanide | 27 | -- | -- | -- | -- | ND | 11.2 | 3.6 | NT | NT | NT |

**Notes:**
1) Analytes with ND values were assumed to have a value equal to the Practical Quantitation Limit (PQL) for averaging.
2) Analytes tested but analyte not included in SCOs.

**Abbreviations:**
ND = Non Detect
NT = Not Tested
-- = Not Specified

**Table 5-10**
**Recommended Site Specific Soil and Sediment Cleanup Objectives**

**Pre-Design Investigation Data Summary Report**
**Grasse River Study Area, Massena, New York**

| Analyte | Unrestricted Use Soil Cleanup Objectives | Ecological Resources Protection Soil Cleanup Objectives | Sediment Guidance LEL Soil Cleanup Objectives | St. Lawrence County Soil Cleanup Objectives | | Site Specific Soil and Sediment Cleanup Objectives |
|---|---|---|---|---|---|---|
| | | | | Max | Min | |
| Inorganic Analytes | | | | | | |
| Antimony | -- | -- | 2 | 1.34 | 0.597 | 2 |
| Arsenic | 13 | 13 | 6 | 12.3 | 0.251 | 6 |
| Barium | 350 | 433 | -- | 162 | 5.65 | 350 |
| Beryllium | 7.2 | -- | -- | -- | -- | 7.2 |
| Cadmium | 2.5 | -- | -- | -- | -- | 2.5 |
| Copper | 50 | 50 | 16 | 35.6 | 2.18 | 16 |
| Iron | -- | -- | 20000 | 27200 | 5060 | 20000 |
| Lead | 63 | 63 | 31 | 43.8 | 2.65 | 31 |
| Manganese | 1,600 | 1,600 | 460 | 907 | 66.3 | 600 |
| Mercury | 0.18 | 0.18 | -- | 0.16 | 0.01 | 0.18 |
| Nickel | 30 | 30 | 16 | 40.5 | 1.54 | 16 |
| Selenium | 3.9 | 3.9 | -- | 4.18 | 0.373 | 3.9 |
| Silver | 2 | 2 | 1 | 1.48 | 0.111 | 1 |
| Zinc | 109 | 109 | 120 | 133 | 10.4 | 109 |
| Volatile Organic Compounds | | | | | | |
| Acetone | 0.05 | 2.2 | -- | -- | -- | 2.2 |
| Wet Chemistry | | | | | | |
| Cyanide | 27 | -- | -- | -- | -- | 27 |

Note:
1. All levels are provided in milligrams per kilogram (mg/kg).

# ATTACHMENT B
# AVAILABILITY BY SUPPLIER

## Attachment B
## Availability by Supplier

| Material | Volume Required (cy) | Gradation Requirements | Material Supplier A | Material Supplier B | Material Supplier C | Material Supplier D | Material Supplier E | Material Supplier F | Material Supplier G | Material Supplier I | Material Supplier J |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sand** | **888,000** | USCS designation SP, SM or SP-SM | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Gravel** | **78,000** | USCS designation GW or GP | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| **Type B Material** | **15,000** | USCS designation SW/SP | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| **Type C Material** | **18,000** | $D_{100}$ = 4" NYSDOT 703-0202 (#4 Stone) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| **Armor Stone** | **158,000** | $D_{50}$ = 6" NYSDOT 733.2102 (stone filling, light) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |

**Notes:**
cy = cubic yards
d = diameter
GP = poorly graded gravel
GW = fine to coarse gravel
NYSDOT = New York State Department of Transportation
SM = silty sand
SP = poorly graded sand
USCS = Unified Soil Classification System

# APPENDIX F
# DREDGE PLAN DESIGN DOCUMENTATION

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T1-2N | T1-2N-1 | N | Extends halfway to upstream core (updated based on 2016 data) and has been extended downstream to the boundary of T1-2N-2. Bounded by the near shore boundary toward the main channel and the shoreline. | DoC | 12 | Set to the maximum DoC of the 4 complete cores in the area, which is consistent with the maximum depth of probing, penetration and recovery of the 5 grabs and 1 incomplete core in the area. | Hard bottom likely within area. | No | Yes | Yes | No |
| | T1-2N-2 | N | Bounded by the near shore boundary toward the main channel. The shoreward boundary is limited by the near shore boundary (upstream) and the 153.5' bathymetric contour (downstream), with the transition point being halfway to the downstream below criteria core. Downstream boundary has been extended to the probing transect showing 0.1' of sediment. | DoC | 1 | Grab over gravel. Set to maximum depth of probing, penetration and recovery of the 2 grabs in the area. | | No | Yes | No | No |
| | T1-2N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. Clearly defined peak over clean gravel. | | No | Yes | No | No |
| | T1-2N-4 | N | Extends halfway to upstream and downstream (updated based on 2016 data) cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 2.4 | Set to maximum depth of probing, penetration and recovery of the 1 grab in the area. | Hard bottom likely within area. | No | No | Yes | No |
| | T1-2N-5 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 2 | Set to maximum depth of probing, penetration and recovery of the 1 grab in the area. | | No | No | No | No |
| T3-6N | T3-6N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and the 153.5' bathymetric contour toward the main channel | DoC | 3 | Set to maximum depth of probing, penetration and recovery of the 1 grab in the area. | Hard bottom likely within area. | No | No | No | No |
| | T3-6N-2 | N | Extends halfway to upstream core and has been extended to the downstream below criteria core. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 24 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T3-6N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T3-6N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the 154' toward land. Bounded by the near shore boundary toward the main channel | DoC | 11 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | No | No | No | No |
| | T3-6N-5 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 21 | Area includes 2 cores: 1 complete DoC of 12" and one incomplete DoC of 15". Set to the depth of last measured section plus 6" of the 1 incomplete core. | | Yes | Yes | No | No |
| | T3-6N-6 | N | Extends halfway to upstream and downstream cores. Bounded by the 153' contour toward the main channel and near shore boundary toward the shoreline | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T3-6N-7 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153' contour toward the shoreline | DoC | 24 | Depth of last measured section plus 6" of the 2 incomplete cores in the area. | | No | No | No | No |
| | T3-6N-8 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T3-6N-9 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline. | DoC | 27 | Depth of last measured section plus 6" of the 1 incomplete core in the area. 1" deeper than DoC of 1 complete core in area. No indication of hard bottom. | | No | No | No | No |
| | T3-6N-10 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 22 | Set to the deepest DoC of the 2 complete core in the area. Well defined peak over clay. DoCs within 1" of each other | | No | No | No | No |
| | T3-6N-11 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 154' contour toward the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. Well defined peak over clay. | | Yes | No | No | No |
| | T3-6N-12 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward the main channel and the 153.5' contour towards the shoreline | DoC | 18 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Hard bottom likely within area. | New | No | No | No |
| | T3-6N-13 | N | Extends halfway to upstream (updated based on 2016 data) and downstream cores. Bounded by the near shore boundary toward the shoreline and main channel. | DoC | 12 | Set to the DoC of the 1 complete core in the area and the maximum depth of probing, penetration and recovery of the 1 incomplete core in the area. | | New | Yes | Yes | No |
| | T3-6N-14 | N | Upstream boundary based on T3-6N-5 and probing data. Bounded by the near shore boundary toward the shoreline and the 154.5' bathymetric contour toward the main channel and at the downstream end. | DoC | 5 | Set to the DoC of 1 complete core in the area. Area also contains 1 grab location. | | | New | No | No |
| | T3-6N-15 | N | Extends halfway to upstream and downstream cores (updated based on 2016 data). Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 36 | Set to maximum depth of probing, penetration and recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | | New | Yes | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T3-6N (cont'd) | T3-6N-16 | N | Extends from the upstream boundary of T3-6N-3 downstream to a break in the bathymetry, approximately 15' downstream of the sediment core. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T3-6N-17 | N | Extends between natural breaks in the bathymetric contours upstream and downstream of the core and grab sample in the area. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 6 | Set to the DoC of the only complete core in the area and 1" deeper than the maximum depth of probing, penetration and recovery of the only grab sample in the area. | Additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | | | | New |
| T6-7N | T6-7N-1 | N | Upstream and downstream boundaries have been extended to the adjacent below criteria cores. Bounded by the near shore boundary toward the main channel and the shoreline. | DoC | 10 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T6-7N-2 | N | Upstream boundary has been extended to the adjacent below criteria core. Bounded by the near shore boundary (upstream) and the 153' (middle) and 152.5' (downstream) bathymetric contours toward the main channel. Bounded by the 154' (upstream) and 153.5' (downstream) bathymetric contours toward the shoreline. | EoC | ***150.8*** | Set to the deepest EoC of 6 above criteria cores in the area. EoC overcuts the incomplete core by 6". | | Yes | Yes | No | No |
| | T6-7N-3 | N | Bounded by the 154' bathymetric contour toward main channel and halfway to the adjacent above criteria core toward the shoreline. Upstream and downstream borders follow footprint of higher-elevation feature. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T6-7N-4 | N | Upstream and downstream boundary halfway between nearest cores. Bounded by near shore border and 152' contour around adjacent above criteria core toward the main channel. Bounded by 153' bathymetric contour between other dredge areas toward the shoreline. | EoC | ***149.8*** | Elevation of last measured section plus 6" of the 1 incomplete core in the area. 1 complete core in area has similar but slightly shallower EoC | | Yes | Yes | No | No |
| | T6-7N-5 | N | Bounded by the 151.5' bathymetric contour toward the upstream, downstream, and shoreline. Bounded by near shore border toward the main channel. | DoC | 83 | Set to maximum depth of probing, penetration and recovery of 1 incomplete core in area. Area also contains 1" complete core which does not influence the target dredge depth. | | Yes | Yes | No | No |
| | T6-7N-6 | N | Extends halfway to upstream core and has been extended to downstream below criteria core. Bounded by 152.5' bathymetric contour toward the main channel and 153' contour toward the shoreline. | DoC | 31 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T6-7N-7 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline | DoC | 2 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T6-7N-8 | N | Upstream and downstream boundaries have been extended to adjacent below criteria cores. Bounded by the near shore boundary toward the main channel and the 153.2' contour towards the shoreline. | DoC | 32 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T6-7N-9 | N | Extends halfway to downstream core and to the shift in bathymetry upstream (at the 152.5' contour). Bounded by the near shore boundary toward main channel and 153.5' bathymetric contour toward the shoreline. | EoC | ***151.9*** | Deepest EoC of 2 complete cores in the area. | | No | No | No | No |
| | T6-7N-10 | N | Has been extended to upstream below criteria core and halfway to downstream below criteria core. Bounded by the near shore boundary toward the shoreline and 154' contour toward the main channel. | DoC | 12 | Set to the DoC of 2 complete cores in the area. | | New | Yes | No | No |
| | T6-7N-11 | N | Bounded by the 152' bathymetric contour toward the upstream, downstream, and shoreline. Bounded by the near shore boundary toward the main channel | DoC | 36 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| | T6-7N-12 | N | Bounded by the 151.5' bathymetric contour and the near shore boundary toward the main channel, and the 152' contour toward the shoreline. | DoC | 60 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| | T6-7N-13 | N | Extends halfway to upstream core. Bounded by 152.5' bathymetric contour toward the shoreline and downstream. Bounded by the 152' contour toward the main channel. | DoC | 42 | Set to the maximum DoC of 2 complete cores in the area. | | | New | No | No |
| | T6-7N-14 | N | Extends from a natural break in the upstream bathymetric contours to halfway to the next downstream below criteria core. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 24 | Set to the DoC of the 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T8-11N | T8-11N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 5 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T8-11N-2 | N | Extends halfway to upstream and downstream cores. Originally bounded by the near shore boundary toward the main channel and the shoreline. Extended into the main channel side slope area to 148.9' bathymetric contour. Upstream boundary of this extension coincides with the upstream boundary of T8-11N-1. | DoC | 12 | Set to the DoC of 2 complete cores in the area. | Extended into main channel for additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | Yes | No | No | Yes |
| | T8-11N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T8-11N-4 | N | Extends halfway to upstream core and extends to the downstream below criteria core. Bounded by 153.5' bathymetric contour toward main channel and near shore boundary toward the shoreline. | DoC | 12 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T8-11N-5 | N | Extends halfway to upstream and has been extended to the downstream below criteria core. Bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T8-11N-6 | N | Extends halfway to upstream and downstream cores. Originally bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. Extended into the main channel side slope area to 148.9' bathymetric contour. The upstream end of this extension coincides with the original upstream boundary. The downstream end of this extension goes halfway to the next below criteria core on the main channel side slope. | DoC | 6 | Set to the DoC of 2 complete cores in the area. | Extended into main channel for additional sediment removal area to address potential post-cap shallow conditions. | Yes | No | No | Yes |
| | T8-11N-7 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 154' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T8-11N-8 | N | Extends halfway to upstream and downstream cores. Bounded by 154' bathymetric contour toward main channel and near shore boundary toward the shoreline | DoC | 1.2 | Set to maximum depth of probing, penetration and recovery of the 1 grab in the area. | Hard bottom likely within area. | No | No | No | No |
| | T8-11N-9 | N | Extends halfway to upstream and downstream cores. Bounded near shore boundary toward main channel and by 154' bathymetric contour toward the shoreline for upstream half and near shore boundary for downstream half. | DoC | 18 | Set to the DoC of 2 complete cores in the area. An additional 14", low concentration, incomplete core was included in the area assuming 6" contractor over cut will capture bottom of 14" contamination. | | Yes | No | No | No |
| | T8-11N-10 | N | Extends halfway to downstream core and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T8-11N-11 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 2 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T8-11N-12 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T8-11N-13 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 154' bathymetric contour toward the shoreline. | DoC | 1 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T8-11N-14 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 154' bathymetric contour toward the shoreline. | DoC | 15 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T8-11N-15 | N | Extends halfway to upstream probing transect and has been extended to the downstream abandoned location. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 12 | Set to maximum depth of probing, penetration and recovery of the 2 grabs in the area. | Hard bottom likely within area. | No | Yes | No | No |
| | T8-11N-16 | N | Extends halfway to upstream core and has been extended to the downstream below criteria core. Bounded by the near shore boundary toward the main channel and the 154.25' bathymetric contour toward the shoreline. | DoC | 32 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T8-11N (cont.) | T8-11N-17 | N | Extends halfway to downstream core and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the shoreline and the 153.5' (upstream half) and 154' (downstream half) bathymetric contours toward main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T8-11N-18 | N | Extends halfway to upstream core and has been extended to the downstream below criteria core. Bounded by the near shore boundary toward the shoreline and the 154.25' bathymetric contour toward the main channel. | DoC | 3 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T8-11N-19 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and towards the main channel. | DoC | 1 | Set to maximum depth of probing, penetration and recovery of the 1 grab in the area. | Hard bottom likely within area. | New | No | No | No |
| | T8-11N-20 | N | Formerly T8-T11N-3. Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 152' bathymetric contour toward the shoreline. | DoC | 20 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T8-11N-21 | N | Extends halfway to upstream and downstream cores. Bounded by the 153.5' bathymetric contour toward main channel and near shore boundary toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| | T8-11N-22 | N | Upstream boundary extends approximately halfway to the next upstream core. Downstream boundary coincides with the upstream boundary of T8-11N-1 in the near shore. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-11N-23 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | EoC | ***148.9*** | Core in this area has an extremely deep DoC (78"). Area to be capped after dredging. Set to an EoC that ensures adequate boat draft after capping. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-11N-24 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 3 | Set to maximum depth of probing, penetration and recovery of the 1 grab in the area. | Additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | | | | New |
| | T8-11N-25 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 21 | Set to the DoC of the 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-11N-26 | N | Upstream boundary is halfway to the next side slope core. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 36 | Set to maximum depth of probing, penetration and recovery of the 1 core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-11N-27 | N | Upstream boundary extends to the next incomplete core. Downstream boundary is halfway to the next side slope core. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 30 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | | | | New |
| | T8-11N-28 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 24 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-11N-29 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 45 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-11N-30 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-11N-31 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 18 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-11N-32 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 14 | Set to the DoC of the 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | | | | New |
| | T8-11N-33 | N | Upstream boundary extends halfway to the next side slope core. Downstream boundary is halfway between a probing point in the area and the next side slope core. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | | | | New |

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**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T8-11N (cont.) | T8-11N-35 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 5 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-11N-36 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 22 | Set to maximum depth of probing, penetration and recovery of 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| T12-13N | T12-13N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T12-13N-2 | N | Extends halfway to downstream core and has been extended to upstream below criteria core. Bounded by 153.5' bathymetric contour toward main channel and the 154' contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area | | Yes | Yes | No | No |
| | T12-13N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 30 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T12-13N-4 | N | Extends halfway to upstream and downstream cores. Bounded by 153.5' bathymetric contour toward main channel and near shore boundary toward the shoreline. | DoC | 5 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T12-13N-5 | N | Extends halfway to upstream and downstream core. Bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 2 complete cores in the area. An additional 14", low concentration, incomplete core was included in the area assuming 6" contractor over cut will capture bottom of 14" contamination. | | Yes | No | No | No |
| | T12-13N-6 | N | Extends halfway to upstream and downstream core. Bounded by 153' bathymetric contour toward main channel and the 154.5' contour toward the shoreline. | DoC | 22 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | No | No | No |
| | T12-13N-7 | N | Extends halfway to upstream core and downstream abandoned location. Bounded by near shore boundary toward main channel and 153' bathymetric contour toward the shoreline. | DoC | 10 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T12-13N-8 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour toward the shoreline. | DoC | 12 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T12-13N-9 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 15 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T12-13N-10 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. Set depth also over dredges 1 incomplete core by 6". | | Yes | Yes | No | No |
| | T12-13N-11 | N | Extends halfway to upstream and downstream cores. Bounded by 154' bathymetric contour (upstream half) and 153.5' contour (downstream half) toward main channel and near shore boundary toward the shoreline. | DoC | 16 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | New | No | No | No |
| | T12-13N-12 | N | Extends halfway to upstream core and has been extended to the downstream probing transect. Bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T12-13N-13 | N | Extends half way to downstream core and has been extended to the upstream probing transect. Bounded by the near shore boundary toward the main channel and the shoreline. | DoC | 7 | Set to maximum depth of probing, penetration and recovery of 1 grab in the area. | | New | Yes | No | No |
| | T12-13N-14 | N | Bounded by the near shore boundary toward the shoreline and the 154.5' bathymetric contour toward the main channel. | DoC | 15 | Set to the maximum depth of probing, penetration and recovery of the 2 incomplete cores in the area. | | New | Yes | No | No |
| | T12-13N-15 | N | Bounded by the 154' bathymetric contour toward the main channel and the near shore boundary (upstream) and the 154.5' contour (downstream) toward the shoreline. Upstream boundary has been extended to adjacent abandoned location. | EoC | ***152.9*** | Set to the deeper EoC of 3 cores (1 complete, 2 incomplete) in the area. | | New | Yes | No | No |
| | T12-13N-16 | N | Extends halfway to upstream core and has been extended to the downstream abandoned location. Bounded by the 154' (upstream half) and 154.5' (downstream half) bathymetric contours toward the shoreline and the near shore boundary toward the main channel. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T12-13N-17 | N | Extends to the upstream below criteria core and the downstream probing transect. Bounded by the near shore toward the shoreline and the 153.5' bathymetric contour toward the main channel. | DoC | 18 | Set to depth of last measured section plus 6" of the 1 incomplete core in the area. | | | New | No | No |

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**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T12-13N (cont.) | T12-13N-18 | N | Downstream boundary encompasses the next below criteria core. Bounded by the near shore toward the shoreline and the 153.5' bathymetric contour toward the main channel. | DoC | 12 | Set according peak concentrations of cores just outside the areal boundaries. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T12-13N-19 | N | Dredging added to eliminate capping at the top of the slope. Upstream boundary extends halfway to the next side slope core. Downstream boundary is based on previous extent of cap. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main | DoC | 12 | Set to the DoC of 1 complete core in the area. And the maximum depth of probing, penetration and recovery of the 1 incomplete core in the area | Additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | | | | New |
| T14-16N | T14-16N-1 | N | Extends halfway to downstream core and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the upstream shoreline, and the 154' bathymetric contour toward the downstream shoreline. | DoC | 18 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. Confirmed by DoC of 1 complete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T14-16N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel (upstream) and the 153.5' bathymetric contour (downstream). Bounded by the 154' contour (upstream) and the near shore (downstream) toward the shoreline. | DoC | 3 | Set to the DoC of 1 complete core in the area. Consistent w/maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T14-16N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T14-16N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153' contour towards the shoreline | DoC | 30 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T14-16N-5 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T14-16N-6 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T14-16N-7 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 10 | Set to the DoC of 2 incomplete cores in the area. | Additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | | | | New |
| T17-18N | T17-18N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' contour towards the shoreline | DoC | 3 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T17-18N-2 | N | Extends halfway to downstream core and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the shoreline. | DoC | 4 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T17-18N-3 | N | Extends halfway to upstream and downstream abandoned location. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 15 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | No | No | No |
| | T17-18N-4 | N | Extends halfway to upstream and downstream abandoned location. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T17-18N-5 | N | Extends halfway to upstream and downstream abandoned location. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 24 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | New | No | No | No |
| | T17-18N-7 | N | Upstream boundary coincides with the upstream boundary of T17-18N-2. The downstream boundary coincides with a break in the bathymetry. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 32 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. Due to steep slopes, the upstream half of this area could not be graded to meet the DoC and will be capped after dredging. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| T19-20N | T19-20N-1 | N | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and the shoreline (upstream half) or the 154' contour toward the shoreline (downstream half). | DoC | 6 | Set to the DoC of 2 complete cores in the area. | | Yes | Yes | No | No |
| | T19-20N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel, upstream half bounded by near shore border towards main channel, downstream half bounded by 153' contour towards main channel. | DoC | 1 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T19-20N-3 | N | Extends halfway to upstream core and has been extended to the downstream and channel-side below criteria cores. Bounded by the near shore boundary toward the shoreline and main channel. | DoC | 6 | Set to the DoC of 2 complete cores in the area. | | Yes | Yes | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T19-20N (cont.) | T19-20N-4 | N | Extends halfway between upstream core and has been extended to downstream below criteria core. Bounded by near shore boundary towards shoreline and 154' contour towards main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T19-20N-5 | N | Extends halfway to downstream core and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| T20-22N | T20-22N-1 | N | Extends halfway to the downstream core and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline. | DoC | 12 | Set to the DoC of 2 complete cores in the area. | | Yes | Yes | No | No |
| | T20-22N-2 | N | Original boundary extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline. Extended into the main channel side slope area to 149.75' bathymetric contour. Upstream and downstream boundaries of this extension are halfway to the next below criteria side slope cores. | DoC | 6 | Set to the DoC of 2 complete cores in the area. | Extended into main channel for additional sediment removal area to address potential post-cap shallow conditions. | Yes | No | No | Yes |
| | T20-22N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T20-22N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour (upstream half) and the 153.5' contour (downstream half) towards the shoreline. | DoC | 18 | Set to deeper DoC of 2 complete cores in the area. | | Yes | No | No | No |
| | T20-22N-5 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline | DoC | 12 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T20-22N-6 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T20-22N-7 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline | DoC | 15 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | No | No | No |
| | T20-22N-8 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 2 complete cores in the area. | | Yes | No | No | No |
| | T20-22N-9 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' contour towards the shoreline | DoC | 12 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T20-22N-10 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' contour towards the shoreline | DoC | 4 | Set to the DoC of grab in the area. | | New | No | No | No |
| T23-24N | T23-24N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T23-24N-2 | N | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and the 153.5' contour towards the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T23-24N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline in upstream half and at 154' contour towards shoreline in downstream half. | DoC | 6 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T23-24N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and upstream shoreline, and the 154' bathymetric contour toward the downstream shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T23-24N-5 | N | Extends halfway to upstream core. Bounded by the near shore boundary toward the main channel and downstream. Bounded by the 154' bathymetric contour toward the shoreline. | DoC | 36 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T23-24N-6 | N | Extends halfway to upstream and downstream cores. Bounded by the shoreline and the 153.5' bathymetric contour toward the main channel | DoC | 3 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T23-24N-7 | N | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the shoreline and the 154' contour towards the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| | T23-24N-8 | N | Extends to the downstream below criteria core. Bounded by the 154' bathymetric contour toward the shoreline and the near shore boundary upstream and toward the main channel. | DoC | 18 | Set to the DoC of 1 complete core adjacent to the area (no sample locations exist within the area). | | | New | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T23-24N (cont.) | T23-24N-9 | N | Bounded by the near shore boundary toward the shoreline and the 150.75' contour toward the main channel. Upstream and downstream boundaries are pinched by these two boundaries. | DoC | 6 | Set to the Doc of the 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T23-24N-10 | N | Upstream boundary coincides with a break in the bathymetry. Downstream boundary coincides with the downstream boundary of T23-24N-3. Bounded by the near shore boundary toward the shoreline and the 150.75' contour toward the main channel. | DoC | 36 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| T25-27N | T25-27N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 46 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | No | No | No |
| | T25-27N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' contour towards the shoreline | DoC | 24 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T25-27N-3 | N | Extends halfway to the downstream probing transect and a change in the bathymetry approximately 11' from the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the 153.5' contour towards the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T25-27N-4 | N | Extends halfway to downstream core and upstream is bounded by core nsT26.8N. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | New | No | No | No |
| | T25-27N-5 | N | Extends halfway to upstream core and has been extended to the downstream below criteria core. Bounded by the near shore boundary toward the shoreline and the 153.5' contour toward the main channel. | DoC | 16 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | New | Yes | No | No |
| | T25-27N-6 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and the 153.5' contour toward the main channel | DoC | 6 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | New | No | No | No |
| T28-33N | T28-33N-1 | N | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline. | DoC | 9 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T28-33N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and a majority of the downstream shoreline, and the 154.5' contour toward the upstream and downstream-most shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area, and the maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T28-33N-3 | N | Has been extended along the shoreline to the upstream below criteria core. Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and shoreline in upstream half, bounded by 154' bathymetric contour toward the shoreline in downstream half. | DoC | 24 | Set to maximum depth of probing, core penetration and core recovery of 3 incomplete cores in area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T28-33N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and 154' bathymetric contour toward main channel | DoC | 6 | Set to DoC of 1 complete core in area. 1 incomplete core in area is above 155.5' contour | Hard bottom likely within area. | Yes | Yes | No | No |
| | T28-33N-5 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward main channel and 154' bathymetric contour toward the shoreline | DoC | 18 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | No | No | No | No |
| | T28-33N-6 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline. | DoC | 14 | Depth of last measured section plus 6" of the 1 incomplete core in the area. Overcuts 10" complete DoC to account for high PCB levels at bottom of incomplete core | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-7 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour towards the shoreline. | DoC | 32 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area | Hard bottom likely within area. | Yes | No | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

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|---|---|---|---|---|---|---|---|---|---|---|---|
| T28-33N (cont.) | T28-33N-8 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' toward the shoreline | DoC | 13 | Set to deepest of depth of maximum depth of probing, core penetration and core recovery of the 2 incomplete cores in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-9 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and 154' bathymetric contour toward main channel | DoC | 12 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-10 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward main channel and 152' bathymetric contour toward the shoreline | DoC | 24 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area | Hard bottom likely within area. | No | No | No | No |
| | T28-33N-11 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153' contour in upstream half and 153.5' toward the shoreline in downstream half toward the shoreline | DoC | 18 | Area contains 5 cores with a complete DoC or core maximum depth of probing, core penetration and core recovery of 18". Set DoC to 18". | Hard bottom likely within area. | Yes | Yes | No | No |
| | T28-33N-12 | N | Extends halfway to upstream core and has been extended to the downstream below criteria core. Bounded by the near shore boundary toward the shoreline and 153' bathymetric contour toward main channel. | DoC | 22 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T28-33N-13 | N | Extends halfway to upstream and downstream cores. Upstream end is bounded by the near shore border toward the main channel and the 154.5' contour toward the shoreline. Downstream end is bounded by the 154' bathymetric contour toward main channel and the 155' contour toward the shoreline. | DoC | 12 | Set to the DoC of 2 complete cores in the area. An additional 14", low concentration, incomplete core was included in the area assuming 6" contractor over cut will capture bottom of 14" contamination. | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-14 | N | Extends halfway to upstream and downstream cores. Bounded by 153.5' bathymetric contour toward main channel and 154' bathymetric contour toward the shoreline. | DoC | 16 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Hard bottom likely within area. | No | No | No | No |
| | T28-33N-15 | N | Extends halfway to upstream and downstream cores. Bounded by 152.5' bathymetric contour toward main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | No | No | No | No |
| | T28-33N-16 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward main channel and 152.5' bathymetric contour toward the shoreline. | EoC | ***151.0*** | Deepest EoC plus 6" of 2 incomplete cores in the area. | Hard bottom likely within area. | No | No | No | No |
| | T28-33N-17 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward main channel and 154' bathymetric contour toward the shoreline | DoC | 11 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area | Hard bottom likely within area. | No | No | No | No |
| | T28-33N-18 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward main channel and 154' bathymetric contour toward the shoreline in upstream half and 153' contour in downstream half. | DoC | 6 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-19 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward the shoreline and 154' bathymetric contour toward main channel | DoC | 6 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-20 | N | Extends halfway to upstream and downstream cores. Bounded by 153' bathymetric contour toward main channel and 154' bathymetric contour toward the shoreline. | EoC | ***152.3*** | Set to EoC of 1 complete and 1 incomplete core in the area (152.3'). One additional incomplete core present with EoC of 152.4'. | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-22 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward main channel and 154' bathymetric contour toward the shoreline in downstream end and near shore boundary in upstream end. | DoC | 12 | Set to DoC of 2 complete cores in the area. Consistent with maximum depth of probing, core penetration and core recovery of the 2 incomplete cores in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-23 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward the shoreline and 153.5' bathymetric contour toward main channel in the downstream end and the 154' contour in the upstream end. | DoC | 18 | Set to maximum depth of probing, core penetration and core recovery of 1 incomplete core and DoC of 1 complete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-25 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward main channel and 152.5' bathymetric contour toward the shoreline. | DoC | 6 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | No | No | No | No |
| | T28-33N-26 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward the shoreline and 153.5' bathymetric contour toward main channel. | DoC | 6 | Set to the DoC of the 1 complete core and the maximum depth of probing, core penetration and core recovery of the 2 incomplete cores in the area. | Hard bottom likely within area. | Yes | No | No | No |

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**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T28-33N (cont.) | T28-33N-27 | N | Extends halfway to upstream and downstream cores. Bounded by 152.5' contour toward main channel and 153.5' bathymetric contour toward the shoreline | DoC | 10 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-28 | N | Extends halfway to upstream and downstream cores. Bounded by 152.5' contour toward main channel and 153.5' bathymetric contour toward the shoreline | DoC | 12 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-29 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward the shoreline and 153.5' bathymetric contour toward main channel. | DoC | 4 | Set to maximum depth of probing, penetration and recovery of the 1 grab in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-30 | N | Extends halfway to upstream and downstream core. Trimmed to 153.5' and 152.5' in upstream end and near shore border toward main channel and shoreline in downstream end. | DoC | 2 | Set to maximum depth of probing, penetration and recovery of the 4 grabs in the area. Multiple grabs over rock. | Hard bottom likely within area. | Yes | No | No | No |
| | T28-33N-31 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T28-33N-32 | N | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the shoreline and the 154' contour towards the main channel. | DoC | 18 | Set to maximum depth of probing, penetration and recovery of the 1 incomplete core in the area. | | New | Yes | No | No |
| | T28-33N-33 | N | Extends halfway to downstream core and has been extended to upstream probing transect. Bounded by near shore boundary toward the shoreline and main channel | DoC | 12 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T28-33N-34 | N | Extends halfway to upstream core and has been extended to downstream probing transect. Bounded by near shore boundary toward the shoreline and the 154' bathymetric contour toward the main channel. | DoC | 10 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| T36-37N | T36-37N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T36-37N-2 | N | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 150.75' contour toward the main channel. | DoC | 3 | Set to maximum depth of probing, penetration and recovery of the 1 grab in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| T37-40N | T37-40N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour toward the shoreline | DoC | 12 | Set to the DoC of 2 complete cores in the area. | | Yes | No | No | No |
| | T37-40N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the 152.5' bathymetric contour toward the main channel and the 153.5' bathymetric contour toward the shoreline. | EoC | ***151.6*** | Set to deepest EoC of 2 complete cores in the area. | | No | No | No | No |
| | T37-40N-3 | N | Extends halfway to upstream and downstream cores. Bounded by 152.5' bathymetric contour toward the shoreline and near shore boundary toward main channel. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T37-40N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the 152.5' bathymetric contour toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T37-40N-5 | N | Extends halfway to upstream and downstream cores. At upstream and downstream ends, bounded by 152.5' bathymetric contour, and in the middle by the 154' contour, toward the shoreline. Bounded by the near shore boundary toward the main channel. | DoC | 18 | Set to the DoC of 4 complete cores in the area. Area also includes 1 below criteria core. | | No | Yes | No | No |
| | T37-40N-6 | N | Extends halfway to upstream and downstream cores. Bounded by 152' bathymetric contour toward main channel and the near shore boundary toward the shoreline | DoC | 24 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T37-40N-7 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel (upstream half) and the 151' contour (downstream half) and the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T37-40N-8 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and the 151' contour toward the main channel | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T37-40N-9 | N | Has been extended to upstream and downstream below criteria cores. Bounded by the near shore boundary and toward the main channel and the shoreline. Downstream end bounded by the 153.5' contour toward the main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. Consistent w/maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | | No | Yes | No | No |
| | T37-40N-10 | N | Extends halfway to upstream and downstream cores. Bounded by near shore boundary toward main channel and the 153.5' bathymetric contour toward the shoreline. | EoC | ***151.3*** | Set to deepest EoC plus 6" of 2 incomplete cores, consistent with EoC of 1 complete core, in the area. | | Yes | No | No | No |
| | T37-40N-11 | N | Bounded by the near shore boundary toward the main channel and the 151' contour toward the shoreline. | DoC | 4 | Set to the DoC of 1 grab in the area. | Hard bottom likely within area. | New | No | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T41-42N | T41-42N-1 | N | Extends halfway to downstream core and has been extended to upstream below criteria core. Bounded by the 154.2' contour toward the shoreline and 152.5' contour toward main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T41-42N-2 | N | Extends halfway to downstream core and has been extended to upstream below criteria core. Bounded by the near shore boundary towards main channel. Upstream half bounded by 152.5' contour toward the shoreline, downstream half bounded by 152.7' contour toward the shoreline. | EoC | ***149.5*** | Set to the deepest EoC of the 2 complete cores in the area. | | Yes | Yes | No | No |
| | T41-42N-3 | N | Extends halfway to upstream and downstream cores. Upstream is bounded by the 153.5' bathymetric contour toward the shoreline and 152.7' contour toward the main channel. Downstream is bounded by the 154' bathymetric contour toward the shoreline and 153.5' contour toward the main channel. | EoC | ***151.4*** | Set to the EoC of 1 complete and 1 incomplete core in the area. | | Yes | No | No | No |
| | T41-42N-4 | N | Extends halfway to upstream and downstream cores. Upstream is bounded by 153.5' contour toward the shoreline, downstream half bounded by 154' contour toward the shoreline. Bounded by the 152' bathymetric contour toward the main channel. | EoC | ***152.3*** | Set to the deepest EoC of the 7 cores in the area, which corresponds to the last measured section plus 6" of the westernmost incomplete core. | Several bathymetric mounds within the area. | Yes | Yes | No | No |
| | T41-42N-5 | N | Extends halfway to downstream and upstream cores. Bounded by near shore border toward the shoreline and 154' contour toward main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T41-42N-6 | N | Extends halfway to downstream, upstream, and channel-side cores. Bounded by the 154.5' contour toward the shoreline. | EoC | ***152.3*** | Area contains 1 complete and 1 incomplete core. Set to EoC of incomplete core plus 1', and is consistent with the EoC of T41-42N-4. | | Yes | Yes | No | No |
| | T41-42N-7 | N | Bounded by 153' contour toward the shoreline, the 152' contour upstream, and the near shore boundary toward the main channel. | EoC | ***149.1*** | Set to the deepest EoC of the 3 complete cores in the area | | Yes | Yes | No | No |
| | T41-42N-8 | N | Extends halfway to downstream and upstream cores. Bounded by 154' contour toward the shoreline and 153' contour toward main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T41-42N-9 | N | Extends halfway to upstream and downstream cores. Bounded by 153.7' contour toward main channel. Bounded by near shore boundary toward the shoreline in upstream end and 153.7' contour toward the shoreline in downstream end. | DoC | 12 | Set to the DoC of 3 complete cores in the area. | | Yes | No | No | No |
| | T41-42N-10 | N | Extends halfway to downstream core and has been extended to the upstream below criteria core. Bounded by the 152.8' bathymetric contour on the shoreline side and the 153.3' contour toward the main channel side. | EoC | ***151.5*** | Set to 0.2' below the EoC of 1 complete core in the area to target buried peak of the upstream below criteria core. | | Yes | Yes | No | No |
| | T41-42N-11 | N | Extends halfway to downstream cores and has been extended to the upstream below criteria core. Bounded by the 153.5' contour toward the shoreline and 152.5' contour toward main channel. | EoC | ***152.2*** | Set to lowest EoC of 5 complete cores in area | | New | Yes | No | No |
| | T41-42N-12 | N | Extends halfway between upstream and downstream cores. Bounded by the 152.5' contour toward the shoreline and near shore boundary toward main channel | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T41-42N-13 | N | Extends halfway between upstream and downstream cores. Bounded by the 153.5' contour toward the shoreline and 153.25' contour toward main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T41-42N-14 | N | Extends halfway to upstream, downstream, and shoreward cores. Bounded by the near shore boundary toward the main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T41-42N-15 | N | Bounded by the 152' bathymetric contour toward the shoreline and downstream, and the near shore boundary toward the main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| T43-46N | T43-46N-1 | N | Extends halfway to downstream cores. Has been extended towards the upstream below criteria core but is bounded by the near shore boundary upstream and toward the main channel. Bounded by the 154' contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T43-46N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour toward the shoreline. | DoC | 6 | Set to the DoC of 2 complete cores in the area. | | No | No | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T47-50N | T47-50N-1 | N | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and the shoreline. | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T47-50N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T47-50N-3 | N | Extends halfway to upstream core. Bounded by the near shore boundary toward the main channel. Downstream boundary has been extended but is limited by the 152' bathymetric contour, which also sets the boundary toward the shoreline. Mound in the middle was cut out and made into T47-50N-4. | DoC | 36 | Set to DoC of 1 complete core in area and maximum depth of probing, core penetration and core recovery of 1 incomplete core in area | | Yes | Yes | No | No |
| | T47-50N-4 | N | Extends halfway to upstream and downstream cores. Bounded by 152.5' feature | DoC | 5 | Set to maximum depth of probing and DoC of 1 grab in area | | Yes | No | No | No |
| | T47-50N-5 | N | Extends halfway to downstream core. Upstream boundary has been extended but is limited by the 152' bathymetric contour, which also sets the boundary toward the shoreline. Bounded by the near shore boundary toward the main channel. | DoC | 6 | Set to the DoC of 2 complete cores in the area. | | No | Yes | No | No |
| | T47-50N-6 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 152' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area, and the maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | No | Yes | No | No |
| | T47-50N-7 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T47-50N-8 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153' bathymetric contour toward the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| T51-54N | T51-54N-1 | N | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and 154' bathymetric contour toward the shoreline. | DoC | 30 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | No | Yes | No | No |
| | T51-54N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T51-54N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel, except around T51-54N-4. Bounded by 154' bathymetric contour in upstream end, transitions to 152' bathymetric contour in downstream end toward the shoreline. | DoC | 18 | Set to the DoC of 3 complete cores in the area. | | No | No | No | No |
| | T51-54N-4 | N | Small area surrounded by close cores with DoC 18". Bounded by 18" area on upstream, toward shore, and downstream sides (approximately the 151' bathymetric contour toward the shoreline) and near shore boundary toward main channel | DoC | 20 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | No | No | No | No |
| | T51-54N-5 | N | Extends halfway to upstream and downstream cores. Bounded by 154' contour toward the shoreline and 152' bathymetric contour toward the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| T55-57N | T55-57N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' contour (upstream half) and the 154' contour (downstream half) toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. Consistent with the maximum depth of probing, penetration and recovery of the 1 incomplete core in the area. | | Yes | No | No | No |
| | T55-57N-3 | N | Extends halfway to upstream core and has been extended downstream to abut T55-57N-4 at halfway point of shoreline cores. Bounded by the near shore boundary toward the main channel and the 154' contour toward the shoreline. | DoC | 12 | Depth of last measured section/ maximum depth of probing, core penetration and core recovery for 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T55-57N-4 | N | Has been extended upstream to abut T55-57N-4 at halfway point of shoreline cores and to the downstream below criteria core. Bounded by the near shore boundary toward the main channel and the 154' contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T55-57N-5 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T58-60N | T58-60N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' contour toward the shoreline | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T58-60N-2 | N | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the shoreline and 152.5' bathymetric contour toward main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T58-60N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 152.5' bathymetric contour toward the shoreline. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T58-60N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 154.5' contour toward the shoreline | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T58-60N-5 | N | Extends halfway to upstream and downstream cores. Bounded by 154.5' bathymetric contour toward the shoreline and 153' bathymetric contour toward main channel. | DoC | 30 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T58-60N-6 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153' bathymetric contour toward the shoreline. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T58-60N-7 | N | Extends halfway to upstream and downstream cores. Bounded by the 153' contour toward the main channel and 154' bathymetric contour toward the shoreline in upstream half. Bounded by the near shore boundary toward the main channel and 155' bathymetric contour toward the shoreline in downstream half. | DoC | 12 | Set to the DoC of 5 complete cores in the area | | No | No | No | No |
| | T58-60N-8 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| T61-64N | T61-64N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 2 complete cores in the area. | | No | No | No | No |
| | T61-64N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 152.5' contour toward the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T61-64N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and 152.5' bathymetric contour toward the main channel. | DoC | 12 | Set to deepest of the maximum depth of probing, core penetration and core recovery of the 3 incomplete cores in the area. | | Yes | Yes | No | No |
| | T61-64N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 152.5' bathymetric contour toward the shoreline. | DoC | 37 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| T65-67N | T65-67N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 153' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T65-67N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and 154' bathymetric contour toward the main channel . | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T65-67N-3 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and 154' bathymetric contour toward the main channel . | DoC | 6 | Set to the DoC of 1 complete core in the area. A grab is also located within the area, with levels below the dredge criteria. | | No | No | No | No |
| | T65-67N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel. Bounded by 154' contour toward the shoreline in upstream end, transitioning to 153.5' contour in the middle, and 150' contour in downstream end. | DoC | 12 | Set to the DoC of 4 complete cores in the area. | | Yes | No | No | No |
| | T65-67N-5 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward main channel, and 153.5' contour toward the shoreline in upstream end and 152.5' contour in downstream end. Cut out applied around Am Vets boat launch. | DoC | 6 | Set to the DoC of 7 complete cores in the area. | | No | Yes | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T68-69N | T68-69N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 152.5' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T68-69N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 154' bathymetric contour toward the shoreline. | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| T70-72N | T70-72N-1 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and 154' bathymetric contour around 18" dredge area. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T70-72N-2 | N | Extends halfway to upstream and downstream cores. Bounded by the 154' contour toward the shoreline, bounded by 152.5' contour downstream toward the main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T70-72N-3 | N | Extends halfway to upstream and downstream cores. Bounded by 152.5' bathymetric contour toward main channel and 153.5' bathymetric contour toward the shoreline. | DoC | 3 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T70-72N-4 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 151.5' bathymetric contour toward the shoreline. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T70-72N-5 | N | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and 151.5' bathymetric contour toward the shoreline. | DoC | 36 | 66" Core profile has 2 contamination peaks. Set to depth which captures the first peak and DoC of 2nd complete core in area (36"). This dredge depth will leave 2' of clean material to cover second peak of 5 ppm at about 60". | | No | No | No | No |
| | T70-72N-6 | N | Extends halfway to upstream core. Bounded by the near shore boundary toward the main channel and 151.5' bathymetric contour toward the shoreline and at the downstream end. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T70-72N-7 | N | Extends to near shore boundary toward main channel and area T70-72N-2 towards shoreline. Extends to 151.5' bathy feature at downstream end. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T70-72N-8 | N | Extends halfway to downstream cores. Bounded by 151.5' and 152.5' contours in upstream end, and 151.5' and 153.5' contours in downstream end. | DoC | 12 | Set to DoC of 2 complete cores in area. | | New | Yes | No | No |
| | T70-72N-9 | N | Extends halfway to downstream core. Bounded by the near shore boundary toward the main channel and 151.5' bathymetric contour toward the shoreline and at the upstream end. | DoC | 30 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| T1-2S | T1-2S-1 | S | Bounded by 154.5' bathymetric contour at the north, below criteria grab samples at the East and South, and the shoreline at the West. | DoC | 12 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. Single-core dredge area, not adjacent to any other above criteria cores. | Yes | No | No | No |

**Table F1**
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**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T3-4S | T3-4S-1 | S | Extends halfway to downstream core and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the 154.25' bathymetric contour toward the shoreline | DoC | 16 | Depth of last measured section plus 6" of the 1 incomplete core in the area. Below criteria grab sample was ignored due to its proximity to the incomplete core | Hard bottom likely within area. | Yes | Yes | No | No |
| | T3-4S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour (upstream) and 153.7' contour (downstream) toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T3-4S-3 | S | Extends halfway to downstream core and has been extended to the upstream below criteria core. Bounded by the shoreline and the 153.7' bathymetric contour toward the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T3-4S-4 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T3-4S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline. Downstream end was pulled off the shoreline to the 154.2' bathymetric contour. | DoC | 4 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T3-4S-6 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 9 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| T5-7S | T5-7S-1 | S | Boundary extends halfway to upstream and downstream near shore cores. Originally bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. A small area in the downstream half is bounded by the 153.0' contour (along area T5-7S-2). Extended into the main channel side slope area to 148.9' bathymetric contour to eliminate cap at the top of the slope. | DoC | 6 | Set to the DoC of 2 complete cores in the area. Consistent with the maximum depth of probing, penetration and recovery of the 1 incomplete core in the area. | Extended into main channel for additional sediment removal area to address potential post-cap shallow conditions. | Yes | No | No | Yes |
| | T5-7S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.0' bathymetric contour toward the shoreline. | DoC | 16 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T5-7S-3 | S | Extends halfway to downstream core and has been extended to the upstream 0" probing location. Bounded by the 153.5' bathymetric contour toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 16 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T5-7S-4 | S | Extends halfway to upstream and downstream cores, and to the upstream probing transect. Bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 15 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T5-7S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline. Upstream half has an area carved out for T5-7S-13 between the 153.5' and 154.5' contours. | DoC | 12 | Set to maximum depth of probing, core penetration and core recovery of the 3 incomplete cores in the area. | | Yes | No | No | No |
| | T5-7S-6 | S | Extends halfway to upstream core and has been extended downstream halfway to next above criteria core. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 18 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T5-7S-7 | S | Extends halfway to downstream core and has been extended upstream halfway to next above criteria core. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 15 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T5-7S-8 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 12 | Set to maximum depth of probing, penetration and recovery of the 1 incomplete core in the area. There is also 1 grab in the area. | | Yes | No | No | No |
| | T5-7S-9 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 19 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T5-7S-10 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 24 | Depth of last measured section plus 6" of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T5-7S-11 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 6 | Set to maximum depth of probing, penetration and recovery of the 2 grabs in the area. | Hard bottom likely within area. | Yes | No | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T5-7S (cont.) | T5-7S-12 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T5-7S-13 | S | Extends halfway to surrounding cores. Bounded by the 153.5' bathymetric contour toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 24 | Set to the DoC of 1 complete core in the area and maximum depth of probing, penetration and recovery of 1 incomplete core in the area. | | New | No | No | No |
| | T5-7S-14 | S | Extends halfway to upstream and downstream cores. Bounded by the shoreline and the 153.5' bathymetric contour. | DoC | 3 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T5-7S-15 | S | Has been extended to the upstream below criteria core and the downstream 0" probing location. Bounded by the shoreline and the 154' bathymetric contour. | DoC | 4 | Depth of last measured section/ maximum depth of probing, core penetration and core recovery of 1 incomplete core in the area. | | New | Yes | No | No |
| | T5-7S-16 | S | Bounded by near shore boundary toward main channel and the 153.5' bathymetric contour toward the shoreline. Downstream boundary extends halfway to 0" probing location. | DoC | 18 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | New | No | No | No |
| | T5-7S-17 | S | Bounded by near shore boundary toward main channel and halfway to abandoned location towards the shoreline. Extends halfway to upstream and downstream cores. | DoC | 3 | Depth of last measured section/ maximum depth of probing, core penetration and core recovery of 1 incomplete core in the area. | Hard bottom likely within area. | New | No | No | No |
| | T5-7S-18 | S | Dredging added to eliminate capping at the top of the slope. Based on pre-existing cap boundary. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 25 | Set to the DoC of 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T5-7S-19 | S | Bathymetry and nearshore boundary pinch off the upstream boundary. Downstream boundary extends halfway to abandoned location. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T5-7S-20 | S | Dredging added to eliminate capping at the top of the slope. Based on pre-existing cap boundary. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 6 | Set to maximum depth of probing, core penetration and core recovery of the 1 grab in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| T8-10S | T8-10S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 152.7' bathymetric contour toward the shoreline. | DoC | 30 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T8-10S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the 154' bathymetric contour toward the main channel and the near shore boundary toward the shoreline. | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T8-10S-3 | S | Extends halfway to upstream core and halfway between the complete core and the next complete core downstream. Bounded by the 154' bathymetric contour toward the shoreline and the 153.5' bathymetric contour toward the main channel | DoC | 9 | Set to the DoC of the 1 complete core in the area. Profile of incomplete core is consistent with the complete core's profile, but only recovered 7". | | Yes | No | No | No |
| | T8-10S-4 | S | Extends halfway to upstream and downstream cores. Bounded by the 153.5' bathymetric contour toward the shoreline and either the near shore boundary or the 152.25/152.5' bathymetric contour toward the main channel. | DoC | 12 | Set to the DoC of the 2 complete cores in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T8-10S-5 | S | Bounded by the 152.25' bathymetric contour toward the shoreline and the near shore boundary toward the main channel. | DoC | 24 | Set to maximum depth of probing, penetration and recovery of the 2 incomplete cores in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T8-10S-6 | S | Extends halfway to upstream and downstream cores. Bounded by the shoreline and the 154' bathymetric contour toward the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T8-10S-7 | S | Extends halfway to upstream and downstream cores. Bounded by the 154' bathymetric contour on the shoreline side and the 153.25' bathymetric contour toward the main channel. | DoC | 8 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T8-10S-8 | S | Bounded by the 152.5' bathymetric contour toward the shoreline and the near shore boundary toward the main channel. | DoC | 30 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T8-10S-9 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 4 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T8-10S-10 | S | Extends halfway to upstream and downstream cores. Bounded by the 150' contour toward the main channel and 154.5' (upstream half) and 153.7' (downstream half) bathymetric contours toward the shoreline. Shoreward boundary deviates from contour to exclude a below criteria core. | DoC | 24 | Set to the DoC of the 1 complete core in the area. Proposed dredge cut is 12" and 19" below the last measured sections of the 2 incomplete cores. Disregard ROPS core 1190 as only the top 12" were submitted for analysis. | | Yes | No | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T8-10S (cont.) | T8-10S-11 | S | Extends halfway to downstream cores. Bounded by the 152.5' contour upstream, the near shore boundary toward the main channel, and 153' bathymetric contour toward the shoreline. | DoC | 18 | Depth of last measured section plus 6" of the 4 incomplete cores in the area. Confirmed by the DoC of the 1 complete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T8-10S-12 | S | Extends halfway to upstream and downstream cores. Bounded by the 154' bathymetric contour toward the shoreline. Bounded by the 153.5' bathymetric contour (upstream), and 153' contour (downstream) toward the main channel. | DoC | 7 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T8-10S-13 | S | Extends halfway to upstream core. Downstream end bounded by continuation of boundary between T8-10S-14 and T8-10S-15. On shoreline side, bounded by the 153.5' bathymetric contour transitioning to the 153' then to the 152.5' contour. On the main channel side, bounded by the near shore boundary (upstream) and the 151.75' contour (downstream). | DoC | 13 | Depth of last measured section plus 6" of the 2 incomplete cores in the area. Confirmed by DoC of 2 complete cores (12"). A grab was also collected within this area, with PCB levels below the dredge criteria. | | Yes | No | No | No |
| | T8-10S-14 | S | Extends halfway to upstream and downstream cores. Bounded by the 154' bathymetric contour, which transitions to the 153.5' contour, toward the shoreline. Bounded by the 153' contour toward the main channel. | DoC | 5 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T8-10S-15 | S | Extends halfway to upstream and downstream cores. Bounded by the 153.5' bathymetric contour toward the shoreline. Bounded by the 152' contour toward the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T8-10S-16 | S | Extends halfway to upstream and downstream cores. Bounded by the 154' bathymetric contour toward the shoreline. Bounded by the near shore boundary or the 151.75' contour toward the main channel. | DoC | 30 | Set to the maximum DoC of the 2 complete cores in the area. Area also contains 3 incomplete cores which do not influence the target dredge depth, as it is 14" below the deepest last measured section of the incomplete cores. | | No | No | No | No |
| | T8-10S-17 | S | Extends halfway to upstream and downstream cores. Bounded by the 153' bathymetric contour toward the shoreline. Bounded by the near shore boundary toward the main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T8-10S-18 | S | Extends halfway to upstream core and has been extended downstream. Bounded by the 153' bathymetric contour toward the shoreline and at the downstream end. Bounded by the near shore boundary toward the main channel. | DoC | 16 | Depth of last measured section plus 6" of the incomplete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T8-10S-19 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and the 152.7' bathymetric contour toward the main channel. | DoC | 10 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T8-10S-20 | S | Extends halfway to upstream and downstream cores. Bounded by the 153.5' bathymetric contour toward the shoreline and 152.5' contour toward the main channel. | DoC | 7 | Set to the DoC of 1 complete core in the area plus 1" due to proximity of 7" DoC core. | | New | No | No | No |
| | T8-10S-21 | S | Extends halfway to upstream cores. Bounded by the 150' bathymetric contour toward the shoreline and the near shore boundary toward the main channel. | DoC | 60 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T8-10S-22 | S | Extends halfway to upstream cores. Bounded by the 153.5' bathymetric contour toward the shoreline and the 153' contour toward the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T8-10S-23 | S | Extends halfway to upstream cores. Bounded by the 153.5' bathymetric contour toward the shoreline and the near shore boundary toward the main channel. | DoC | 8 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T8-10S-24 | S | Extends halfway to upstream and downstream cores. Bounded by the 153.25' bathymetric contour toward the shoreline and 152.5' contour toward the main channel. | DoC | 12 | Set to maximum DoC of 1 complete core in the area. A second incomplete core is also present but was only sampled to 7" as part of the post-ROPS sampling. | | New | No | No | No |
| | T8-10S-25 | S | Bounded by the 148.9' contour toward the main channel and the near shore boundary toward the shoreline. | DoC | 16 | Depth of last measured section plus 6" of the 1 incomplete core adjacent to the area, which is also the maximum depth of probing, penetration and recovery of that core. | Additional sediment removal area to address potential post-cap shallow conditions. | | | New | No |
| | T8-10S-26 | S | Dredging added to eliminate capping at the top of the slope. Based on pre-existing cap boundary. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-10S-27 | S | Upstream boundary is pre-existing dredge area T8-10S-25. Downstream boundary pinched by the near shore boundary and the bathymetry. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | EoC | ***148.0*** | Set to the EoC of 1 complete core in the area, which coincides with adjacent EOC area (T8-10S-25). | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T8-10S-28 | S | Upstream boundary extends halfway to next side slope core. Bounded by the near shore boundary toward the shoreline and the 149.9' contour toward the main channel. | DoC | 34 | Set to the DoC of 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T10-11S | T10-11S-1 | S | Extends to upstream below criteria core and halfway to downstream core. Bounded by the near shore boundary toward the main channel, and the shoreline (upstream half) and the 153.5' contour (downstream half) towards the shoreline. | DoC | 12 | Set to maximum depth of probing, penetration and recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T10-11S-2 | S | Has been extended to the upstream and downstream below criteria cores; however, the upstream extent is limited by the 154' contour. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 39 | Set to maximum depth of probing, core penetration and core recovery of 2 incomplete cores in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T10-11S-3 | S | Extends halfway to downstream core and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the shoreline and the 153.5' bathymetric contour toward the main channel. | DoC | 2 | Set to maximum depth of probing, penetration and recovery of the 1 incomplete grab in the area. | Hard bottom likely within area. | New | Yes | No | No |
| | T10-11S-4 | S | Extends halfway to upstream side slope core and downstream near shore core near the near shore boundary. Bounded by the near shore boundary toward the shoreline and the 149.9' bathymetric contour toward the main channel. | DoC | 30 | Set to maximum depth of probing, core penetration and core recovery of 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| T12-14S | T12-14S-1 | S | Has been extended to the upstream and downstream abandoned locations. Bounded by the 154.5' bathymetric contour toward the shoreline and the 153.75' contour toward the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T12-14S-2 | S | Extends halfway to downstream core. Bounded by the 153' bathymetric contour toward the main channel and the 153.75' bathymetric contour toward the shoreline | DoC | 12 | Set to the DoC of 2 complete cores in the area. | | No | Yes | No | No |
| | T12-14S-3 | S | Extends halfway to upstream core. Downstream end tapers with bathymetry feature. Bounded by the near shore boundary or 152' bathymetric contour toward the main channel and the 153' bathymetric contour on the shoreline side | DoC | 19 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T12-14S-4 | S | Extends halfway to upstream core and downstream grab. Originally bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. Downstream end was extended into the main channel side slope area to 148.9' bathymetric contour. Downstream boundary of this extension coincides with original downstream boundary. | DoC | 9 | Depth of last measured section plus 6" of the incomplete core in the area. | Extended into main channel for additional sediment removal area to address potential post-cap shallow conditions. | Yes | No | No | Yes |
| | T12-14S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' (upstream half) and 153.5' (downstream half) bathymetric contours toward the shoreline. | DoC | 4 | Probing depth of 1 grab in the area. | | Yes | No | No | No |
| | T12-14S-6 | S | Extends halfway to upstream grab and downstream core. Originally bounded by the near shore boundary toward the main channel and the 153.5' (upstream) and 154' (downstream) bathymetric contours toward the shoreline. Upstream end was extended into the main channel side slope area to 148.9' bathymetric contour. Upstream boundary of this extension coincides with original upstream boundary. Downstream end of this extension coincides with a break in the bathymetry. | DoC | 6 | Set to the DoC of 1 complete core and is consistent with the probing depth of the 1 incomplete core and 3 grabs in the area. | Extended into main channel for additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | Yes | No | No | Yes |
| | T12-14S-7 | S | Extends halfway to downstream grab and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline | DoC | 12 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T12-14S-8 | S | Extends halfway to upstream core and downstream grab. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 5 | Set to maximum depth of probing, penetration and recovery of the 3 grabs in the area. | Hard bottom likely within area. | No | No | No | No |
| | T12-14S-9 | S | Has been extended to the upstream and downstream below criteria grabs. Bounded by the near shore boundary toward the main channel and the 153.75' bathymetric contour toward the shoreline. | DoC | 15 | Set to maximum depth of probing, core penetration and core recovery of 1 incomplete core in the area. | Hard bottom likely within area. | No | Yes | No | No |
| | T12-14S-10 | S | Bounded by near shore boundary toward the main channel and 152' bathymetric contour toward the shoreline. | DoC | 2 | Set to maximum depth of probing, penetration and recovery of the 1 grab in the area. | | New | No | No | No |
| | T12-14S-11 | S | Extends upstream to a break in the bathymetry and downstream halfway to next below criteria side slope core. Bounded by the near shore boundary toward the shoreline and the 149.9' bathymetric contour toward the main channel | DoC | 12 | Set to maximum depth of probing, penetration and recovery of the 2 incomplete cores in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T12-14S-12 | S | Extends upstream halfway to nearby abandoned location in the near shore. Extends downstream to shift in the bathymetry. Bounded by the near shore boundary toward the shoreline and the 149.9' bathymetric contour toward the main channel | DoC | 6 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T12-14S-13 | S | Extends upstream to shift in the bathymetry. Extends downstream halfway to next below criteria side slope core. Bounded by the near shore boundary toward the shoreline and the 149.9' bathymetric contour toward the main channel | DoC | 12 | DoC is based on the anticipated depth of soft sediment based on core and probing data. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T12-14S (cont.) | T12-14S-14 | S | Upstream and downstream boundaries coincide with T12-14S-5. Bounded by the near shore boundary toward the shoreline and the 149.9' bathymetric contour toward the main channel. | DoC | 10 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| | T12-14S-15 | S | Extends upstream to next below criteria side slope core. Extends downstream to shift in the bathymetry. Bounded by the near shore boundary toward the shoreline and the 149.9' bathymetric contour toward the main channel. | DoC | 18 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | | | | New |
| | T12-14S-16 | S | Extends upstream to shift in the bathymetry. Extends downstream halfway to next below criteria side slope core. Bounded by the near shore boundary toward the shoreline and the 149.9' bathymetric contour toward the main channel. | DoC | 22 | Set to maximum depth of probing, core penetration and core recovery of 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. Hard bottom likely within area. | | | | New |
| T15-17S | T15-17S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T15-17S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the 148.9' contour and the near shore boundary toward the main channel, and the 154' bathymetric contour toward the shoreline. | DoC | 12 | Set to maximum depth of probing, penetration and recovery of the 2 incomplete cores in the area. | Expanded sediment removal area to address potential post-cap shallow conditions. | Yes | Yes | Yes | No |
| | T15-17S-3 | S | Extends halfway to upstream core and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 16 | Set to maximum depth of probing, penetration and recovery of the 2 incomplete cores in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T15-17S-4 | S | Extends downstream halfway to below criteria grab and has been extended halfway to upstream above criteria core (to include upstream below criteria grab). Bounded by 154.5' contour toward the shoreline and the 153' bathymetric contour toward the main channel. | DoC | 2 | Set to the probing depth of 1 grab in the area. | | Yes | Yes | No | No |
| | T15-17S-5 | S | Has been extended halfway to the above criteria upstream core and downstream grab. The boundary toward the main channel and shoreline have been extended to the adjacent below criteria grab and core, and is generally bounded by the 154.5' and 152' bathymetric contours. | DoC | 54 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T15-17S-6 | S | Extends halfway to upstream core and has been extended to the downstream grab. Bounded by the near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 12 | Set to maximum depth of probing, penetration and recovery of the 1 incomplete core in the area, which is consistent with the probing data in the area. | | No | Yes | No | No |
| | T15-17S-7 | S | Extends halfway to upstream core and has been extended halfway to downstream above criteria core. Bounded by the near shore boundary or the 152.5' bathymetric contour toward the main channel and the 154' contour toward the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T15-17S-8 | S | Extends halfway to upstream grab. Bounded by the near shore boundary toward the shoreline and the 154.5' bathymetric contour toward the main channel and at the downstream end. | DoC | 22 | Set to maximum depth of probing, core penetration and core recovery of the 2 incomplete cores in the area. | | New | Yes | No | No |
| | T15-17S-9 | S | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T15-17S-10 | S | Extends halfway to upstream and downstream cores. Bounded by the 148.9' contour and the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 22 | Set to the depth of last measured section plus 6" of the 1 incomplete core in the area. | Expanded sediment removal area to address potential post-cap shallow conditions. | | New | Yes | No |
| | T15-17S-11 | S | Bounded by the 148.9' contour toward the main channel and the near shore boundary toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | New | No |
| | T15-17S-12 | S | Bounded by the 148.9' contour toward the main channel and the near shore boundary toward the shoreline. | DoC | 42 | Set to the DoC of 1 complete core in the area. It is anticipated that the full DoC will not be achievable; as such the design will target removal of sediment to result in a post-cap water depth of 3 feet at the top of the side slope. | Additional sediment removal area to address potential post-cap shallow conditions. | | | New | No |
| | T15-17S-13 | S | Bounded by the 148.9' contour toward the main channel. | DoC | 24 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | New | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T18-20S | T18-20S-1 | S | Extends halfway to the downstream core and has been extended to the upstream below criteria grab. Bounded by the near shore boundary toward the main channel and the shoreline (upstream), and the 153.5' contour toward the shoreline (downstream). | DoC | 12 | Set to the depth of last measured section plus 6" of the incomplete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T18-20S-2 | S | Extends upstream to narrow point in the near shore area and downstream halfway to the nearest core. Bounded by the near shore boundary toward the main channel and the 153.5' contour toward the shoreline. | DoC | 16 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T18-20S-3 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' contour toward the shoreline | DoC | 31 | Set to the depth of last measured section plus 6" of the incomplete core in the area. | | Yes | No | No | No |
| | T18-20S-4 | S | Extends halfway to upstream core and downstream grab. Bounded by the shoreline, and the 153.5' bathymetric contour toward the main channel (upstream) or the near shore boundary toward the main channel (downstream). | DoC | 3 | Set to the DoC of 3 complete cores in the area. | | Yes | Yes | No | No |
| | T18-20S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the 148.9' contour and the near shore boundary toward the main channel and the shoreline. | DoC | 5 | Set to the probing depth of 2 grabs in the area. | Hard bottom likely within area. Expanded sediment removal area to address potential post-cap shallow conditions. | Yes | No | Yes | No |
| | T18-20S-6 | S | Extends halfway to upstream grab and downstream core. Bounded by the 148.9' contour and the near shore boundary toward the main channel and the 154' contour toward the shoreline. | DoC | 18 | Set to the DoC of 2 complete cores in the area. | Expanded sediment removal area to address potential post-cap shallow conditions. | Yes | No | Yes | No |
| | T18-20S-7 | S | Extends halfway to downstream core and has been extended to the upstream 0" probing location. Bounded by the 154.75' bathymetric contour toward the shoreline and the 153.5' contour toward the main channel. | DoC | 22 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T18-20S-8 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and the 154.75' bathymetric contour toward the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| | T18-20S-9 | S | Bounded by the 148.9' contour toward the main channel and the near shore boundary toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | New | No |
| | T18-20S-10 | S | Bounded by the 148.9' contour toward the main channel and the near shore boundary toward the shoreline. | DoC | 6 | Set to maximum depth of probing, penetration and recovery of the 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | New | No |
| | T18-20S-11 | S | Bounded by the 148.9' contour toward the main channel and the near shore boundary toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | New | No |
| | T18-20S-12 | S | Bounded by the 148.9' contour toward the main channel and the near shore boundary toward the shoreline. | DoC | 8 | Set to the probing depth of 1 incomplete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | New | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T20-22S | T20-22S-1 | S | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T20-22S-2 | S | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T20-22S-3 | S | Extends halfway to upstream and downstream cores. Bounded by the 153.25' bathymetric contour toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 2 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T20-22S-4 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.75' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T20-22S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 2 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T20-22S-6 | S | Extends halfway to upstream core and has been extended to the downstream below criteria core. Bounded by the near shore boundary toward the main channel and the 154.75' bathymetric contour toward the shoreline. | DoC | 36 | Set to the DoC of the incomplete core at the downstream boundary to account for a buried peak. Target depth is 6" deeper than the DoC of the 1 complete core in the area. | | New | Yes | No | No |
| | T20-22S-7 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T20-22S-8 | S | Dredging added to eliminate capping at the top of the slope. Based on pre-existing cap boundary. Extends upstream to a break in the bathymetry and the downstream end coincides with the boundary of T20-22S-7. Bounded by the near shore boundary toward the shoreline and the toe of the steep slope toward the main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| T23-24S | T23-24S-1 | S | Extends halfway to downstream core and has been extended to upstream below criteria core. Bounded by the near shore boundary toward the main channel and the 154.5' contour toward the shoreline. | DoC | 6 | Set to the DoC of 2 complete cores in the area. | | Yes | Yes | No | No |
| | T23-24S-2 | S | Extends halfway to downstream core and has been extended to upstream below criteria core. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 32 | Set to the depth of the last measured section plus 6" of the incomplete core in the area. | | Yes | Yes | No | No |
| | T23-24S-3 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 15 | Set to the depth of the last measured section plus 6" of the incomplete core in the area. | | Yes | No | No | No |
| | T23-24S-4 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.5' (downstream half) and 154' (upstream half) contours toward the shoreline. | DoC | 10 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T23-24S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and the 154' bathymetric contour toward the main channel. | DoC | 24 | Set to the depth of the last measured section plus 6" of the incomplete core in the area. | | New | Yes | No | No |
| | T23-24S-6 | S | Has been extended to the downstream below criteria core. Bounded by the 153.8' contour toward the shoreline and the near shore boundary toward the main channel. | DoC | 16 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | | New | Yes | No | No |
| | T23-24S-7 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and the 154' bathymetric contour toward the main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| | T23-24S-8 | S | Extends halfway to upstream core and to the downstream below criteria core. Bounded by the near shore boundary toward the shoreline and the 154' bathymetric contour toward the main channel. | DoC | 4 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | | | New | No | No |
| T24-27S | T24-27S-1 | S | Extends halfway to upstream core and has been extended to the downstream grab. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 12 | Set to maximum depth of probing, core penetration and core recovery of the 2 incomplete cores in the area | Hard bottom likely within area. | Yes | Yes | No | No |
| | T24-27S-2 | S | Extends halfway to upstream grab and downstream core. Bounded by the near shore boundary toward the main channel and the 153.5' contour toward the shoreline. | DoC | 18 | Set to the depth of last measured section plus 6" of the incomplete core in the area. | | Yes | No | No | No |
| | T24-27S-3 | S | Extends halfway to downstream core and upstream to the probing transect showing 0' sediment depth and rock. Bounded by the near shore boundary toward the main channel and the 153.5' contour toward the shoreline. | DoC | 18 | Set to DoC of 1 incomplete core in this area. Surrounding probe data suggests isolated pockets of sediment over hard bottom. | Hard bottom likely within area. | Yes | No | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T28-32S | T28-32S-1 | S | Extends halfway to downstream grab and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area | | No | Yes | No | No |
| | T28-32S-2 | S | Extends halfway to upstream and downstream cores. Bounded by 150' bathymetric contour toward the main channel and the 154' contour toward the shoreline | DoC | 24 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T28-32S-3 | S | Extends halfway to core at downstream end. Boundary toward the shoreline transitions from the 154.5' contour (upstream end) to the 153.5', 153', and 152.5' contours. Bounded by 150' bathymetric contour toward main channel. | DoC | 12 | 4 of 5 cores in this area are complete with a DoC of 12". One incomplete core has a last measured section at 7" and its profile is consistent with the other cores in the area. There are also 3 grabs within this area. | | Yes | Yes | No | No |
| | T28-32S-4 | S | Extends halfway to upstream, shoreward, and downstream cores. Bounded by the near shore boundary toward the main channel. | DoC | 79 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T28-32S-5 | S | Extends halfway to upstream and downstream cores. Bounded by 150' bathymetric contour toward the shoreline and the near shore boundary toward the main channel. | DoC | 48 | Set to the depth of the last measured section plus 6", one of the 1 incomplete core in the area. Confirmed by co-located core w/complete DoC of 44", and the maximum depth of probing, penetration and core recover of the other incomplete core in the area. There is also 1 grab within this area. | | Yes | Yes | No | No |
| | T28-32S-6 | S | Bounded by the near shore boundary (upstream half) and below criteria core and 154.25' bathymetric contour (downstream half) toward the shoreline Bounded by the 153.5' (upstream) and 153' (downstream) bathymetric contours toward the main channel. | DoC | 6 | Set to 6" based on 2 grabs in the area and depth of probing transects. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T28-32S-7 | S | Extends halfway between upstream probing transects and has been extended to the downstream below criteria core. Bounded by the 150' bathymetric contour toward the shoreline and the 148.5' contour toward the main channel | DoC | 18 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T28-32S-8 | S | Extends halfway to upstream core and has been extended to downstream below criteria core. Bounded by 148.5' bathymetric contour toward the shoreline and the near shore boundary toward the main channel. | DoC | 27 | Set to maximum depth of probing, core penetration and core recovery of the 1 incomplete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T28-32S-9 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T28-32S-10 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 27 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. | | Yes | Yes | No | No |
| | T28-32S-11 | S | Extends halfway to upstream and downstream cores. Bounded by the shoreline and the 153.5' bathymetric contour toward main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T28-32S-12 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary and the 152' bathymetric contour toward the main channel, and the 153.5' contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T28-32S-14 | S | Extends halfway to upstream and downstream cores. Bounded by the shoreline, and the near shore boundary (upstream half) and the 154.25' bathymetric contour toward main channel. | DoC | 30 | Set to the DoC of 2 complete cores in the area. | | Yes | No | No | No |
| | T28-32S-16 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.25' bathymetric contour toward the shoreline. | DoC | 42 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T28-32S-18 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary or the 153' contour (along T28-32S-19, T28-32S-22, and T28-32S-23) toward the main channel. Bounded by the near shore boundary or the 154.25' (along T28-32S-32), 153.25' (along T28-32S-20), and 154' (along T28-32S-33) bathymetric contours toward the shoreline. | DoC | 36 | Set to the DoC of 7 complete cores in the area. | | Yes | Yes | No | No |
| | T28-32S-19 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T28-32S (cont.) | T28-32S-20 | S | Extends halfway to upstream and downstream cores. Defined by shoreline and the 153.25' bathymetric contour toward the main channel. | DoC | 50 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. There is also 1 grab within this area. | | Yes | No | No | No |
| | T28-32S-22 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 44 | Set to the DoC of 1 complete core in the area. There are also 2 grabs within this area. | | No | No | No | No |
| | T28-32S-23 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 42 | Set to the DoC of 1 complete core in the area. There is also 1 grab within this area. | | No | No | No | No |
| | T28-32S-24 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 54 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T28-32S-25 | S | Extends halfway to upstream core and has been extended to the downstream below criteria core. Defined by the 154' bathymetric contour toward the shoreline and the 153' bathymetric contour toward the main channel. | DoC | 42 | Set to the DoC of 2 complete cores in the area. | | Yes | Yes | No | No |
| | T28-32S-26 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 60 | Set to the DoC of 2 complete cores in the area. | | No | No | No | No |
| | T28-32S-27 | S | Extends halfway to upstream core and has been extended to the downstream below criteria core. Defined by near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 54 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T28-32S-28 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the shoreline and the 154' bathymetric contour toward the main channel. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T28-32S-29 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the shoreline and the 154.5' bathymetric contour toward the main channel. | DoC | 9 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T28-32S-30 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel and the 150' bathymetric contour toward the shoreline. | DoC | 37 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. | | New | Yes | No | No |
| | T28-32S-32 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the shoreline and the 154.2' bathymetric contour toward the main channel. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T28-32S-33 | S | Extends halfway to upstream core and has been extended to the downstream below criteria core. Defined by near shore boundary at the shoreline and the 154' bathymetric contour toward the main channel. | DoC | 24 | Set to the maximum DoC of 3 complete cores and 2 incomplete core in the area. | | New | Yes | No | No |
| | T28-32S-34 | S | Extends halfway to upstream, channel-side, and downstream cores. Bounded by the 150' bathymetric contour toward the shoreline. | DoC | 36 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T28-32S-35 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel and the 150' bathymetric contour toward the shoreline. | DoC | 42 | Set to the DoC of 1 complete core in the area. | | New | Yes | No | No |
| | T28-32S-36 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel and the 149.25' bathymetric contour toward the shoreline. | DoC | 72 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| | T28-32S-37 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel, and the 150' (upstream) and 148.5' (downstream) bathymetric contours toward the shoreline. | DoC | 24 | Set to maximum depth of probing, core penetration and core recovery of the 2 incomplete cores in the area. | | | New | No | No |
| | T28-32S-38 | S | Extends halfway to upstream and downstream cores. Defined by near shore boundary toward the main channel, and the 154.5' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | | New | No | No |

**Table F1**
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**Final Design Report**
**Grasse River Study Area, Massena, New York**

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|---|---|---|---|---|---|---|---|---|---|---|---|
| T28-32S (cont.) | T28-32S-39 | S | EPA requested the extension of the upstream boundary of T28-32S-30; however, dredging to the adjacent below criteria core would expose a buried peak. As such, this new area was created. Bounded by the near shore boundary at the upstream end and toward the main channel boundary, and halfway to downstream core. Bounded by the 150' bathymetric contour toward the shoreline. | DoC | 52 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. | | | New | No | No |
| | T28-32S-40 | S | Bounded by the 152' bathymetric contour toward the downstream, upstream, and shoreline. Originally bounded by the near shore boundary toward the main channel. Extended into the main channel side slope area to 150.75' bathymetric contour. Upstream and downstream boundaries coincide with original boundaries. | DoC | 28 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. | Extended into main channel for additional sediment removal area to address potential post-cap shallow conditions. | | New | No | Yes |
| T33-34S | T33-34S-1 | S | Has been extended to the upstream grab and downstream core. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area | | Yes | Yes | No | No |
| | T33-34S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 54 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. There is also 1 grab in the area. | | Yes | No | No | No |
| | T33-34S-3 | S | Extends halfway to upstream grab and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 2 complete cores in the area. | | Yes | No | No | No |
| | T33-34S-4 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T33-34S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 10 | Set to the maximum depth of probing, core penetration and core recovery of 1 incomplete core in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T33-34S-6 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the shoreline and the 153' bathymetric contour toward the main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| T34-36S | T34-36S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the shoreline and, at the main channel side, either the near shore boundary or the 152.5' bathymetric contour. | DoC | 6 | Set to the maximum depth of probing, penetration and recovery of 1 incomplete core in the area | Hard bottom likely within area. | Yes | No | No | No |
| | T34-36S-2 | S | Area is bounded by the near shore boundary toward the main channel and the 152.5' bathymetric contour toward the shoreline. | DoC | 22 | Set to the depth of last measured section plus 6" of the 1 incomplete core in the area. | Hard bottom likely within area. | No | No | No | No |
| | T34-36S-3 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T34-36S-4 | S | Extends halfway to upstream and downstream cores. Bounded by the shoreline (upstream half) or the 154' contour (downstream half) towards the shoreline. Bounded by the near shore boundary or the 153' bathymetric contour toward the main channel. | DoC | 10 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T34-36S-5 | S | Area is bounded by either the near shore boundary or the 152.25' bathymetric contour toward the main channel, and the 153' bathymetric contour toward the shoreline. | DoC | 24 | Set to the maximum depth of probing, core penetration and core recovery of 1 incomplete core in the area. | Hard bottom likely within area. | No | No | No | No |
| | T34-36S-6 | S | Area is bounded by the near shore boundary at the main channel side and the 152.25' bathymetric contour at the shoreline side. | EoC | ***151.2*** | Set to the maximum depth of probing, core penetration and core recovery of 1 incomplete core in the area converted to elevation. There is also 1 grab in the area. | Hard bottom likely within area. | No | No | No | No |
| | T34-36S-7 | S | Extends halfway to upstream and downstream cores. Bounded by the 153' bathymetric contour toward the main channel, and the 154' (upstream half) or 154.5' (downstream half) bathymetric contours toward the shoreline. | DoC | 16 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T34-36S-8 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 2 complete cores in the area. | Hard bottom likely within area. | Yes | No | No | No |
| | T34-36S-9 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T34-36S-10 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the maximum depth of probing, core penetration and core recovery of 1 grab in the area. | | New | No | No | No |

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**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T34-36S (cont.) | T34-36S-11 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the DoC of 1 complete core in the area. | | New | No | No | No |
| | T34-36S-12 | S | Extends halfway to upstream and downstream side slope cores. Bounded by the near shore boundary toward the shoreline and the 150.75' bathymetric contour toward the main channel. | Doc | 12 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |
| T37-38S | T37-38S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the 153' bathymetric contour toward the main channel and the 154.25' bathymetric contour toward the shoreline. | EoC | ***152.8*** | Set to the EoC of 2 complete cores in the area. | | No | No | No | No |
| | T37-38S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.5' (upstream) or 154' (downstream) bathymetric contours toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T37-38S-3 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' (upstream) or 154.5' (downstream) bathymetric contours toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T37-38S-4 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 4 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T37-38S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.5' (upstream) or 155' (downstream) bathymetric contours toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T37-38S-6 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 6 | Set to the deepest DoC of all complete cores in the area. Consistent with DoC of 1 incomplete core in the area | | No | No | No | No |
| T39-42S | T39-42S-1 | S | Extends halfway to upstream and downstream cores. Originally bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. Downstream portion extended into the main channel side slope area to 150.75' bathymetric contour. Downstream boundary of extension is where the bathymetry and near shore boundary are pinched. | DoC | 6 | Set to the DoC of 1 complete core in the area. | Extended into main channel for additional sediment removal area to address potential post-cap shallow conditions. | Yes | No | No | Yes |
| | T39-42S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the 154.25' bathymetric contour toward the shoreline and the near shore boundary toward the main channel. | DoC | 8 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T39-42S-3 | S | Extends halfway to upstream core and has been extended to the downstream below criteria core. Bounded by the 154.25' bathymetric contour toward the shoreline, and the 152.5' (along T39-42S-4) and the 153' (along T39-42S-5) bathymetric contours toward the main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T39-42S-4 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 152.5' bathymetric contour toward the shoreline. | DoC | 10 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. | | No | No | No | No |
| | T39-42S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T39-42S-6 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T39-42S-7 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 36 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T39-42S-8 | S | Extends halfway to upstream core and has been extended to the downstream below criteria core. Bounded by the near shore boundary toward the main channel and the 154.5' bathymetric contour toward the shoreline. | DoC | 30 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T39-42S-9 | S | Bounded on all sides by the near shore boundary toward the shoreline and the 150.75' bathymetric contour toward the main channel. | DoC | 11 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T43-46S | T43-46S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 5 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T43-46S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.25' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T43-46S-3 | S | Extends halfway to upstream and downstream cores. Bounded by the 153.5' bathymetric contour toward the main channel and the 154.25' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | Hard bottom likely within area. | No | No | No | No |
| | T43-46S-4 | S | Has been extended to the upstream and shoreward below criteria cores. Bounded by the 152.5' bathymetric contour toward the shoreline. Toward the main channel, the area is bounded by the 151.5' bathymetric contour and a boundary drawn halfway to core T44-SSS. | DoC | 35 | Set to the maximum depth of probing, core penetration and core recovery of 1 incomplete core in the area. | | No | Yes | No | No |
| | T43-46S-5 | S | Has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the 151.5' bathymetric contour toward the shoreline. | EoC | ***150.6*** | Set to the maximum depth of probing, core penetration and core recovery of 2 incomplete cores in the area converted to elevation. | Hard bottom likely within area. | Yes | Yes | No | No |
| | T43-46S-6 | S | Extends halfway to upstream and downstream cores. Bounded by the 152.25' bathymetric contour toward the shoreline and 151.25' contour toward the main channel. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T43-46S-7 | S | Has been extended to the upstream below criteria core and downstream is bounded by bump-out in the shoreline. Bounded by the 154.5' contour toward the shoreline and the 152.5' (upstream) and 152.25' (downstream) bathymetric contours toward the main channel. | DoC | 6 | Set to the DoC of 3 complete cores in the area. | | Yes | Yes | No | No |
| | T43-46S-8 | S | Extends halfway to downstream core and upstream is bounded by the 151' contour to include a hole around core nsT44.1bS. Bounded by near shore boundary toward main channel. Boundary toward the shoreline is the 151.25' bathymetric contour (upstream end) or the 150.5' bathymetric contour (middle) or the 150' bathymetric contour (downstream end). | EoC | ***147.0*** | Set to the deepest EoC of 10 complete cores in the area. Overcuts the EoC of the 3 incomplete cores in the area by 0.6 to 1.5 feet. | | Yes | No | No | No |
| | T43-46S-9 | S | Extends downstream halfway to upstream and downstream cores. Bounded toward the main channel by the 150.75' bathymetric contour and the 152.25' contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | Yes | No | No |
| | T43-46S-10 | S | Bounded toward the shoreline at the 153.25' bathymetric contour. Bounded toward the main channel by the 151' bathymetric contour. Upstream is bounded by the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. There is also 1 grab within the area. | | Yes | No | No | No |
| | T43-46S-12 | S | Area has a steadily decreasing slope. Is delineated around a change in the bathymetric features compared to the area directly upstream. Bounded by the 151.75' bathymetric contour toward the shoreline. Toward the main channel, bounded by the 150' contour (upstream) toward the main channel, then divides area where the bathymetric features change and continues along the near shore boundary. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T43-46S-13 | S | Extends halfway to upstream and downstream cores. Bounded by the 153' bathymetric contour toward the shoreline. Toward the main channel, the area is bounded by the 151.75' bathymetric contour (upstream) and the near shore boundary (downstream). | DoC | 6 | Set to the DoC of 2 complete cores in the area. | | No | No | No | No |
| | T43-46S-14 | S | Bounded by 151.5' contour upstream, the 151' contour downstream, the near shore boundary toward the main channel, and the 152.5' contour toward the shoreline | EoC | ***150.3*** | Set to the EoC of 1 complete core in the area and 6" deeper than the EoC of the one incomplete core in the area | | New | Yes | No | No |
| | T43-46S-15 | S | Extends halfway to upstream core and downstream is bounded by bump-out in the shoreline. Bounded by the 152.25' contour toward the shoreline and the 150.5' bathymetric contour toward the main channel. | DoC | 24 | Set to the DoC of 1 complete core in the area. | | | New | No | No |
| | T43-46S-16 | S | Extends halfway to downstream core. Bounded by the 151' contour toward the shoreline and the 150.5' bathymetric contour toward the main channel and at the upstream extent. | DoC | 18 | Set to the DoC of 2 complete cores in the area. | | | New | No | No |
| | T43-46S-17 | S | Bounded on three sides by the near shore boundary toward the shoreline and the 150.75' bathymetric contour toward the main channel. Downstream boundary coincides with the upstream boundary of T43-46S-2. | DoC | 12 | Set to the DoC of 1 complete core in the area. | Additional sediment removal area to address potential post-cap shallow conditions. | | | | New |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T47-52S | T47-52S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the 153' bathymetric contour toward the main channel and the shoreline | DoC | 6 | Set to the deepest DoC of 2 complete cores in the area. | | Yes | No | No | No |
| | T47-52S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 18 | Set to the depth of the last measured section plus 6" of the 1 incomplete core in the area. | | No | No | No | No |
| | T47-52S-3 | S | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 16 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T47-52S-4 | S | Extends halfway to downstream cores. Bounded by the 153.25' bathymetric contour toward the main channel and the 154' bathymetric contour toward the shoreline. The upstream end curves around what appears to be the boundary of the flat sediment deposit where the cores reside. | EoC | ***152.2*** | Set to the deepest elevation of the 2 incomplete cores in the area plus 6". There are also 3 grabs in the area. | | No | No | No | No |
| | T47-52S-5 | S | Extends halfway to next upstream and downstream cores. Bounded by the near shore boundary toward the main channel. Boundary toward the shoreline begins upstream at the 153.25' bathymetric contour then transitions to the 151' bathymetric contour. Halfway between core nsT49.5cS and core T49.8S, the boundary jumps to the shoreline. | DoC | 6 | Set to the DoC of 4 complete cores in the area. | | No | No | No | No |
| | T47-52S-6 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| T53-56S | T53-56S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 3 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T53-56S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.25' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T53-56S-3 | S | Extends halfway to upstream core and has been extended to the downstream below criteria core. Bounded by the near shore boundary toward the main channel and the 153.75' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| T57-62S | T57-62S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T57-62S-2 | S | Has been extended to the upstream and downstream below criteria cores. Bounded by the near shore boundary toward the main channel and the 153.5' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| T63-64S | T63-64S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 154.25' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |

**Table F1**
**Near Shore Dredge Design - Chemistry-based Surface Documentation**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Design Area | Subarea Name | Shore | Brief Description of Aerial Delineation | Type of Target Dredge Value (DoC or EoC) | Selected Target Dredge Value (DoC = in, EoC = ft)[2] | Brief Description of Vertical Delineation | Additional Notes | Change since PDR? | Change since IDR? | Change since Jan 2017?[3] | Change since FDR Sept 2018? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T65-69S | T65-69S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.25' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | Yes | No | No | No |
| | T65-69S-2 | S | Extends halfway to upstream and downstream cores. Bounded by the 151.5' bathymetric contour toward the main channel and the 153.25' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. There is also 1 grab in the area. | | No | No | No | No |
| | T65-69S-3 | S | Extends halfway to upstream and downstream cores. Bounded by the 151.5' bathymetric contour toward the main channel. The boundary toward the shoreline begins at the 153.25' contour (upstream end), transitions to the shoreline boundary and then transitions to the 154.25 bathymetric contour at the downstream end. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T65-69S-4 | S | Extends halfway to upstream and downstream cores. Bounded by the 151.5' bathymetric contour toward the main channel and the 154.25' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T65-69S-5 | S | Extends halfway to upstream and downstream cores. Bounded by the 151.5' bathymetric contour toward the main channel and the 154.25' bathymetric contour toward the shoreline. | DoC | 18 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T65-69S-6 | S | Extends halfway to downstream and has been extended to the upstream below criteria core. Bounded by the near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 10 | Set to the DoC of 1 complete core in the area. | | No | Yes | No | No |
| | T65-69S-7 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T65-69S-8 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the shoreline | DoC | 10 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T65-69S-9 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 152.5' bathymetric contour toward the shoreline. | DoC | 6 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| | T65-69S-10 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |
| T69-72S | T69-72S-1 | S | Extends halfway to upstream and downstream cores. Bounded by the near shore boundary toward the main channel and the 153.25' bathymetric contour toward the shoreline. | DoC | 12 | Set to the DoC of 1 complete core in the area. | | No | No | No | No |

Notes:
1. DoC = depth of contamination; EoC = elevation of contamination; ft = feet; in = inches; N = North; PCB = polychlorinated biphenyls; S = South, PDR = Preliminary Design Report (Alcoa, June 2015), IDR = Intermediate Design Report (Alcoa, September 2016), FDR = Final Design Report (Arconic, September 2018)
2. Target dredge elevations are listed in bold italics. Design areas shown on Figures F1-1 through F1-78.
3. An update to the chemistry-based design was submitted January 20, 2017 as a follow-up to the draft Intermediate Design Report (September 2016).

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| North | T0.9N | T1-2N-1 | Depth based cut to 12 in. | Full Removal / Upland removal | 12-in. cut | 95 | 2.5:1 Slope into Upland | 4:1 slope on south end | --- | Arconic | --- | --- | 95 | 4 to 23 |
| North | T1.05N | T1-2N-2 | Depth based cut to 1 in. | Full removal | 1-in. cut | 46 | --- | --- | --- | Arconic | --- | --- | --- | --- |
| North | T1.14N | T1-2N-3 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut to 2.5:1 slope | 31 | --- | Dredge and immediate backfill; Adjacent to Outfall 001 | --- | Arconic | 28 | 54 | --- | --- |
| North | T1.22N | T1-2N-4 | Depth based cut to 2.4 in. | Full removal | 2.4-in. cut | 60 | 2.5" CUT AT THE SHORELINE AND 2.5:1 INTO AND OUT OF THE CHEM-SURFACE | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| North | T2.31N | T1-2N-5 | Depth based cut to 2 in. | Full removal | 2-in. cut | 96 | --- | --- | --- | Arconic | --- | --- | --- | --- |
| North | T3.78N, T3.96N | T3-6N-1, T3-6N-2, T3-6N-12 | Depth based cuts to 3 in., 18 in., and 24 in. | Volume left behind | 3-in. vertical cut to 2.5:1 slope; 6-in. vertical cut to 2.5:1 slope | 90 | --- | 4:1 slope on south end | Hard bottom | Arconic | 268 | 1126 | --- | --- |
| North | T4.00N | T3-6N-3 | Depth based cuts to 3 in. and 11 in. | Full removal | 3-in. cut; 6-in. vertical cut to 2.5:1 slope | 75 | --- | 4:1 slope on south end | --- | Arconic | --- | --- | --- | --- |
| North | T4.10N | T3-6N-4 | Depth based cut to 11 in. | Volume left behind | 6-in. vertical cut to 2.5:1 slope | 99 | Steep/undercut shoreline classification. | --- | --- | Arconic | 7 | 12 | --- | --- |
| North | T4.42N | T3-6N-14, T3-6N-5 | Depth based cuts to 5 in. and 21 in. | Volume left behind | 6-in. vertical cut to 2.5:1 slope | 114 | --- | Adjacent to Outfall 001 | Clay | Arconic | 23 | 202 | --- | --- |
| North | T4.61N | T3-6N-15 | Depth based cut to 36 in. | Volume left behind | 36-in. vertical cut at sheet pile wall | 35 | --- | Adjacent to Outfall 001 | --- | --- | 20 | 27 | --- | --- |
| North | T4.84N | T3-6N-13 | Depth based cuts to 6 in. and 12 in. | Volume left behind | 6-in. vertical cut to 2.5:1 slope | 170 | Soft silty clay and loose sand with low shear strengths, and steep upland slopes (1.5H:1.V). | Dredge and immediate backfill | --- | Arconic | 13 | 27 | --- | --- |
| North | T4.99N | T3-6N-6, T3-6N-7 | Depth based cuts to 3 in., and 24 in. | Volume left behind | 6-in. vertical cut to 2.5:1 slope | 50 | Steep shoreline with indications of undercutting, occurrence of very soft clay and very loose clay as indicated by borehole GI-2. | --- | --- | Arconic | 5 | 18 | --- | --- |
| North | T5.10N | T3-6N-8, T3-6N-9 | Depth based cuts to 18 in. and 27 in. | Volume left behind | 6-in. vertical cut to 3:1 slope (18-in. prism) or 2.5:1 slope (27-in. prism) | 90 | Undercut shoreline classifications. | 4:1 slope on north end | --- | Arconic | 7 | 19 | --- | --- |
| North | T5.46N | T3-6N-10 | Depth based cut to 22 in. | Volume left behind | 6-in. vertical cut to 2.5:1 slope | 77 | Steep shoreline slopes | Dredge and immediate backfill | Clay | Arconic | 7 | 19 | --- | --- |
| North | T5.88N | T3-6N-11 | Depth based cut to 6 in. | Full removal | 6-in. cut | 61 | --- | 4:1 slopes on south and north ends | Clay | Arconic | --- | --- | --- | --- |
| North | T6.22N | T6-7N-1 | Depth based cut to 10 in. | Full Removal / Upland removal | 2.5:1 slope into upland, 6-in. cut at top | 51 | Loose sand and soft clay, with steep upland slope. Due to the occurrence of loose sands, some sloughing of soils is expected during dredging. | Dredge and immediate backfill; potential access issues | --- | Arconic | --- | --- | 51 | 17 |
| North | T6.27N, T6.36N, T6.41N | T6-7N-2, T6-7N-3, T6-7N-10 | Depth based cuts to 12 in. and 24 in., Elevation based cut to 150.8 ft. | Full Removal / Upland removal | 4:1 slope into upland, 6-in. cut at top; 3:1 slope into upland | 190 | Due to steep bank slope classification, occurrence of very loose sand and soft clay. | Potential access issues | --- | Arconic | --- | --- | 61 | 4 |
| North | T6.41N, T6.53N | T6-7N-2, T6-7N-4, T6-7N-11 | Depth based cut to 36 in., Elevation based cuts to 150.8 ft. and 149.8 ft. | Full removal | 4:1 slope | 87 | --- | Potential access issues | Clay | Arconic | --- | --- | --- | --- |
| North | T6.53N, T6.62N | T6-7N-5, T6-7N-12, T6-7N-13, T6-7N-6 | Depth-based cuts to 31 in., 42 in., 60 in., and 83 in. | Volume left behind | 3:1 slope into upland with 6-in. cut at top; 6-in. vertical cut to 3:1 slope | 108 | Steep upland slope, presence of soft clays, and evidence of undercutting. | Potential access issues | --- | Arconic | 11 | 322 | --- | --- |
| North | T6.69N | T6-7N-7 | Depth based cut to 2 in. | Full removal | 2-in. cut | 20 | --- | --- | --- | Arconic | --- | --- | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| North | T6.84N | T6-7N-8 | Depth based cut to 32 in. | Volume left behind | 6-in. vertical cut to 2.5:1 slope, with another 6-in. vertical cut at the prism boundary | 83 | --- | 4:1 slopes on south and north ends | --- | Arconic | 12 | 49 | --- | --- |
| North | T6.93N | T6-7N-9 | Elevation based cut to 152 ft. | Full removal | 6-in. vertical cut to 2.5:1 slope | 70 | --- | 4:1 slopes on south and north ends | --- | Arconic | --- | --- | --- | --- |
| North | T7.26N | T8-11N-1, T8-11N-2, T8-11N-3 | Depth based cuts at 5, 12 and 6 in. | Volume left behind | 5 in. vertical cut at shoreline (5-in. prism), 6-in. vertical cut to 2.5:1 slope (12-in. prism), and 6-in. vertical cut at shoreline (6-in. prism) | 204 | Undercut shoreline, small amount of material left behind at shoreline. | 4:1 slope on south end | Clay | Arconic | 12 | 25 | --- | --- |
| North | T7.47N | T8-11N-20 | Depth based cut to 20 in. | Full removal | 6-in. vertical cut to 4:1 slope | 67 | --- | 4:1 slope into river along southern portion of prism | --- | Arconic | --- | --- | --- | --- |
| North | T7.62N, T7.75N | T8-11N-4, T8-11N-5, T8-11N-21 | Depth based cuts to 6-in., 12-in., and 24-in. | Volume left behind | 6 in. vertical cut at shoreline (6-in. prism), 2.5:1 slope into river from shoreline (12-in. prism), and 2.5:1 slope from prism out (24-in. prism) | 195 | Loose sands at shoreline | 4:1 slope on north end | Clay | Arconic | 58 | 126 | --- | --- |
| North | T8.09N, T8.35N | T8-11N-6, T8-11N-7, T8-11N-17 | Depth based cuts to 6 in. and 12 in. | Full removal | 6-in. cut at shoreline | 195 | --- | 4:1 slope on south end | Clay / Hard Bottom | Arconic | --- | --- | --- | --- |
| North | T8.60N, T8.80N, T8.92N | T8-11N-8, T8-11N-9 | Depth based cuts to 1.2 in. and 18 in. | Volume left behind | 1.2-in. vertical cut at shoreline (1.2-in. prism), 6-in. vertical cut at shoreline with 3:1 slope into prism (18-in. prism) | 320 | Undercut shoreline, small amount of material left behind at shoreline. | 4:1 slope on north end | Hard bottom | Arconic | 3 | 53 | --- | --- |
| North | T9.48N | T8-11N-10 | Depth based cut to 6 in. | Full removal | 6-in. cut | 170 | --- | 4:1 slope on south end | Clay | NYS Reforestation | - | - | --- | --- |
| North | T9.67N | T8-11N-11 | Depth based cut to 2 in. | Full removal | 2-in. cut | 101 | --- | --- | Clay | NYS Reforestation | - | - | --- | --- |
| North | T9.85N-R | T8-11N-12 | Depth based cut to 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 3:1 slope into prism | 67 | Steep shoreline classification. | --- | --- | NYS Reforestation | 34 | 48 | --- | --- |
| North | T9.93N | T8-11N-16, T8-11N-18 | Depth based cuts to 3 in. and 32 in. | Volume left behind | 6-in. vertical cut at shoreline, 3:1 slope into 32-in. prism | 112 | Loose sands underlain by medium stiff clay; tilted upland trees suggest localized slope instability. | 4:1 slope on north end | Clay | NYS Reforestation | 88 | 3070 | --- | --- |
| North | T10.32N | T8-11N-13 | Depth based cut to 1 in. | Full removal | 1-in. cut | 90 | --- | --- | Clay | NYS Reforestation | --- | --- | --- | --- |
| North | T10.43N, T10.68N | T8-11N-14 | Depth based cut to 15 in. | Volume left behind | 3:1 slope to a 6-in. vertical cut at prism | 172 | Steep shoreline classification; loose sands underlain by medium stiff clay; tilted upland trees suggest localized slope instability. | --- | Clay | NYS Reforestation | 4 | 21 | --- | --- |
| North | T10.83N-R | T8-11N-15 | Depth based cut to 12 in. | Volume left behind | 1.5-ft. horizontal offset at shoreline with 6-in. vertical cut and 2.9:1 slope into prism | 116 | Steep shoreline classification. | 4:1 slope on north end | Clay | NYS Reforestation | 8 | 32 | --- | --- |
| North | T11.37N | T8-11N-19 | Depth based cut to 1 in. | Full removal | 1-in. cut | 171 | --- | --- | Hard bottom | NYS Reforestation | --- | --- | --- | --- |
| North | T11.94N, T12.03N | T12-13N-1 | Depth based cut to 3 in. | Full removal | 3-in. cut | 56 | --- | 4:1 slope on south end | Clay | Arconic | --- | --- | --- | --- |
| North | T12.03N, T12.23N | T12-13N-2, T12-13N-3 | Depth based cuts to 12 in. and 30 in. | Full removal | 6-in. vertical cut at 30-in. prism, 4:1 slope towards shoreline | 175 | --- | --- | Clay | Arconic | --- | --- | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| North | T12.38N | T12-13N-11 | Depth based cut to 16 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 70 | Stable slope classification. | --- | Clay | Arconic | 4 | 136 | --- | --- |
| North | T12.38N, T12.46N | T12-13N-4, T12-13N-5 | Depth based cuts to 5 in. and 12 in. | Full removal | 5-in. vertical cut at shoreline (5-in. prism), 4:1 slope from prism towards shore to 6-in. vertical cut (12-in. prism) | 108 | Stable shoreline classification | --- | Clay | Arconic | --- | --- | --- | --- |
| North | T12.58N-R, T12.73N | T12-13N-12, T12-13N-17 | Depth based cuts to 28 in. and 24 in. | Volume left behind / Upland removal | 6-in. vertical cut at shoreline, 4:1 slope into prism (18-in. prism), 3:1 slope from prism to 6-in. vertical cut in upland (24-in. prism) | 146 | Loose sand overlying medium stiff clay. Geologic investigations indicate evidence of a previous landslide. | --- | Clay | Arconic | 13 | 62 | 90 | 6 to 12 |
| North | T12.83N | T12-13N-13 | Depth based cut to 7 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 27 | --- | --- | --- | NYS Reforestation | No recoverable sediment | | --- | --- |
| North | T12.9N | T12-13N-6, T12-13N-7, T12-13N-14 | Depth based cuts to 10 in., 12 in., and 22 in. | Volume left behind | 6-in. cut at shoreline, 4:1 slope into prism | 80 | Presence of loose sand underlain by medium stiff clay. Evidence of a previous landslide. | --- | Clay | NYS Reforestation | 30 | 268 | --- | --- |
| North | T13.01N, T13.07N | T12-13N-8, T12-13N-9 | Depth based cuts to 12 in. and 15 in. | Volume left behind | 3:1 slope | 78 | --- | --- | Hard bottom | NYS Reforestation | 12 | 125 | --- | --- |
| North | T13.21N, T13.26N, T13.41N | T12-13N-10, T12-13N-15, T12-13N-16 | Depth based cuts to 18 in. and 24 in., Elevation based cut to 152.9 ft. | Volume left behind | 6-in. vertical cut at shoreline, 2:1 slope into prism (152.9 ft. prism), 6-in. vertical cut at shoreline, 2.5:1 slope into prism (18-in. prism), 6-in. vertical cut at shoreline, 2:1 slope into prism (24-in. prism) | 226 | High PCB concentrations | Dredge and immediate backfill; 4:1 slope on north end | Clay | NYS Reforestation | 37 | 197 | --- | --- |
| North | --- | T12-13N-19 | Depth based cut to 12 in. | Full removal | 6-in. vertical cut outside dredge area and 2.5:1 (upstream) and 3:1 (downstream) slope down to prism | 128 | --- | --- | Clay / Hard Bottom | NYS Reforestation | --- | --- | --- | --- |
| North | T13.84N, T13.91N | T14-16N-1 | Depth based cut to 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 72 | Undercut shoreline | 4:1 slope on south end | Clay | NYS Reforestation | 10 | 34 | --- | --- |
| North | T14.13N-R, T14.19N | T14-16N-2 | Depth based cut to 3 in. | Full removal | 3-in. cut | 115 | --- | --- | --- | NYS Reforestation | --- | --- | --- | --- |
| North | T14.19N, T14.35N-R | T14-16N-5 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 85 | --- | --- | Clay | Arconic/NYS Reforestation | 55 | 180 | --- | --- |
| North | T14.55N | T14-16N-6 | Depth based cut to 6 in. | Full removal | 6-in. cut | 100 | --- | 4:1 slope on north end | Hard bottom | Arconic | --- | --- | --- | --- |
| North | T15.15N | T14-16N-3 | Depth based cut to 6 in. | Full removal | 6-in. cut | 100 | --- | 4:1 slopes on south and north ends | Clay | Arconic | --- | --- | --- | --- |
| North | T15.91N | T14-16N-4 | Depth based cut to 30 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 103 | Loose sand over clay with low remolded strength; tilted upland trees suggest localized slope instability. | 4:1 slopes on south and north ends | Clay | Arconic | 5 | 9 | --- | --- |
| North | T17.41N | T17-18N-1 | Depth based cut to 3 in. | Full removal | 3-in. cut | 90 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | T17.98N | T17-18N-2 | Depth based cut to 4 in. | Full removal | 4-in. cut | 92 | --- | 4:1 slope on south end | --- | Arconic | --- | --- | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| North | T18.15N | T17-18N-3, T17-18N-5 | Depth based cuts to 15 in. and 24 in. | Volume left behind | 6-in. vertical cut at shoreline, 3:1 slope into prism | 100 | Loose sands and silt and steep upland slope. | --- | Clay | Arconic | 7 | 24 | --- | --- |
| North | T18.41N | T17-18N-4 | Depth based cut to 3 in. | Full removal | 3-in. cut | 110 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | T18.88N, T19.02N | T19-20N-1, T19-20N-4 | Depth based cuts to 6 in. and 12 in. | Volume left behind | 6-in. cut (6-in. prism), 6 in. vertical cut at shoreline, 4:1 slope into prism (12-in. prism) | 190 | Steep shoreline classification | --- | Clay | Arconic | 4 | 15 | --- | --- |
| North | T19.50N | T19-20N-5, T19-20N-2, T19-20N-3 | Depth based cuts to 1 in. and 6 in. | Full removal | 1-in. cut or 6-in. cut | 430 | --- | --- | Clay | Arconic | --- | --- | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| North | T20.08N, T21.19N | T20-22N-1 | Depth based cut to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut (southern portion), 3:1 slope from prism to 6-in. vertical cut (northern portion) | 305 | --- | 4:1 slope on south end | Clay | Arconic | --- | --- | --- | --- |
| North | T20.33N | T20-22N-2 | Depth based cut to 6 in. | Full removal | 6-in. cut | 117 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | | T20-22N-3 | Depth based cut to 12 in. | Full removal | 12-in. vertical cut at sheetpile wall | 75 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | | T20-22N-4 | Depth based cut to 18 in. | Full removal | 18-in. vertical cut at sheetpile wall | 160 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | | T20-22N-9 | Depth based cut to 12 in. | Full removal | 12-in. vertical cut at sheetpile wall | 45 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | | T20-22N-10 | Depth based cut to 4 in. | Full removal | 4-in. vertical cut at sheetpile wall | 28 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | | T20-22N-5 | Depth based cut to 12 in. | Full removal | 12-in. vertical cut at sheetpile wall | 68 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | | T20-22N-6 | Depth based cut to 6 in. | Full removal | 6-in. vertical cut at sheetpile wall | 85 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | | T20-22N-7 | Depth based cut to 15 in. | Full removal | 15-in. vertical cut at sheetpile wall | 137 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| North | T22.31N | T20-22N-8 | Depth based cut to 6 in. | Full removal | 6-in. cut | 336 | --- | --- | Clay | NY State Power Authority | --- | --- | --- | --- |
| North | T22.56N | T23-24N-1 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 100 | --- | --- | Clay | NY State Power Authority | 7 | 9 | --- | --- |
| North | T22.68N | T23-24N-4 | Depth based cut to 6 in. | Full removal | 6-in. cut | 65 | --- | --- | Clay | NY State Power Authority | --- | --- | --- | --- |
| North | T22.84N, T23.03N | T23-24N-5, T23-24N-7, T23-24N-8 | Depth based cuts to 6 in., 18 in., and 36 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 195 | Dense sand and gravel | --- | Clay | Private | 16 | 115 | --- | --- |
| North | T23.18N, T23.39N, T23.59N | T23-24N-2, T23-24N-6 | Depth based cuts to 3 in. and 12 in. | Volume left behind | 3-in. cut (3-in. prism), 2.5:1 slope from prism to 6-in. vertical cut | 210 | --- | 4:1 slope on north end | Clay | Private | 2 | 10 | --- | --- |
| North | T23.87N | T23-24N-3 | Depth based cut to 6 in. | Full removal | 6-in. cut | 131 | --- | --- | Hard bottom | Private | --- | --- | --- | --- |
| North | T26.7N | T25-27N-4 | Depth based cut to 6 in. | Full removal | 6-in. cut | 40 | --- | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| North | T26.8N | T25-27N-1 | Depth based cut to 46 in. | Upland removal | 2.5:1 slope into upland, 6-in. cut at top | 43 | Nearby boring indicates shallow glacial till at 2 ft. Existing upland slopes stable at approximately 2H:1V | --- | Hard bottom | Arconic | --- | --- | 43 | 15 to 24 |
| North | T26.9N | T25-27N-2, T25-27N-5 | Depth based cuts to 16 in. and 24 in. | Upland removal | 2.5:1 slope into upland, 6-in. cut at top | 108 | Nearby boring indicates shallow glacial till at 2 feet. Existing upland slopes stable at approximately 2H:1V | 4:1 slope on north end | Hard bottom | Arconic | --- | --- | 108 | 15 to 17 |
| North | T27.24N, T27.35N | T25-27N-3, T25-27N-6 | Depth based cuts to 6 in. and 12 in. | Volume left behind | 6 in. cut (6-in. prism), 4:1 slope from prism to 6 in. vertical cut (12-in. prism) | 132 | --- | 4:1 slopes on south and north ends | Clay | Arconic | 20 | 37 | --- | --- |
| North | T28.03N | T28-33N-1, T28-33N-32 | Depth based cuts to 9 in. and 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 100 | --- | 4:1 slope on south end | --- | NYS Reforestation | 19 | 84 | --- | --- |
| North | T28.20N, T28.38N | T28-33N-2 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism (northern portion), 4:1 slope from prism to 6-in. vertical cut at top (southern portion) | 186 | --- | --- | Hard bottom | NYS Reforestation | 7 | 14 | --- | --- |
| North | T28.57N, T28.73N | T28-33N-3 | Depth based cut to 24 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 90 | Weathered till at shallow depth (2 ft) and shallow upland slopes. | Potential access issues | Hard bottom | NYS Reforestation | 7 | 14 | --- | --- |
| North | T28.73N, T28.86N | T28-33N-4 | Depth based cut to 6 in. | Full removal | 6-in. cut | 156 | --- | Potential access issues | Hard bottom | NYS Reforestation | --- | --- | --- | --- |
| North | T29.04N, T29.12N | T28-33N-34 | Depth based cut to 10 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 115 | --- | Potential access issues | Hard bottom | NYS Reforestation | 36 | 307 | --- | --- |
| North | T28.86N, T29.04N, T29.12N, T29.22N | T28-33N-5, T28-33N-6, T28-33N-7, T28-33N-8, T28-33N-10 | Depth based cuts to 13 in., 14 in, 18 in., 24 in., and 32 in. | Full removal | NA | NA | --- | Potential access issues | --- | NYS Reforestation | --- | --- | --- | --- |
| North | T29.22N | T28-33N-9 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 40 | --- | Potential access issues | Hard bottom | Private | 10 | 125 | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| North | T29.47N, T29.61N | T28-33N-11, T28-33N-12 | Depth based cuts to 18 in. and 22 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism (southern portion), 2.5:1 slope from prism to 6-in. vertical cut at top (northern portion) | 250 | --- | Potential access issues | Hard bottom | Private | 15 | 63 | --- | --- |
| North | T29.90N, T30.01N | T28-33N-13, T28-33N-14, T28-33N-15, T28-33N-16 | Depth based cuts to 6 in., 12 in., and 16 in., Elevation based cut to 151 ft. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 165 | --- | Potential access issues | --- | Arconic | 5 | 14 | --- | --- |
| North | T30.20N | T28-33N-17 | Depth based cut to 11 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 95 | --- | Potential access issues | Hard bottom | Arconic | --- | --- | --- | --- |
| North | T30.42N | T28-33N-18 | Depth based cut to 6 in. | Full removal | 6-in. cut | 101 | --- | Potential access issues | Hard bottom | Private | --- | --- | --- | --- |
| North | T30.58N | T28-33N-19, T28-33N-20 | Depth based cut to 6 in., Elevation based cut to 152.3 ft. | Full removal | 6-in. cut | 140 | --- | Potential access issues | Hard bottom | Private | --- | --- | --- | --- |
| North | T30.75N, T30.97N | T28-33N-22, T28-33N-25 | Depth based cuts to 6 in. and 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 61 | --- | Potential access issues | Hard bottom | Arconic/ Private | 14 | 18 | --- | --- |
| North | T30.97N | T28-33N-23 | Depth based cut to 18 in. | Upland removal | 2.5:1 slope into upland, 6-in. cut at top | 170 | --- | Potential access issues | Hard bottom | Arconic/ Private | --- | --- | 170 | 5 to 8 |
| North | T31.32N, T31.58N | T28-33N-26, T28-33N-27, T28-33N-28, T28-33N-29, T28-33N-30 | Depth based cuts to 2 in., 4 in., 6 in., 10 in., and 12 in. | Full removal | 6-in. cut (6-in. prism), 4-in. cut (4-in. prism), and 2-in. cut (2-in prism) | 575 | --- | Potential access issues | Hard bottom | Arconic/ Private | --- | --- | --- | --- |
| North | T32.64N, T32.92N | T28-33N-31, T28-33N-33 | Depth based cuts to 12 in. and 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism (western portion), 6-in. vertical cut at shoreline, 3:1 slope into prism (eastern portion) | 208 | Steep upland slopes | Potential access issues; 4:1 slope at west and east ends | Hard bottom | Arconic | 8 | 21 | --- | --- |
| North | T36.31N | T36-37N-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 183 | --- | --- | --- | NYS Reforestation | --- | --- | --- | --- |
| North | T37.66N | T37-40N-1 | Depth based cut to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 170 | --- | Potential access issues; 4:1 slope on south end | --- | Private | --- | --- | --- | --- |
| North | T38.05N | T37-40N-2, T37-40N-3 | Elevation based cut to 151.6 ft., Depth based cut to 24 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 178 | --- | Potential access issues | Clay | Private | --- | --- | --- | --- |
| North | T38.31N | T37-40N-4 | Depth based cut to 6-in. | Full removal | 6-in. cut | 118 | --- | Potential access issues | --- | --- | --- | --- | --- | --- |
| North | T38.31N, T38.54N, T38.77N | T37-40N-5 | Depth based cut to 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 300 | --- | Potential access issues | Hard bottom | Private | --- | --- | --- | --- |
| North | T38.91N | T37-40N-6 | Depth based cut to 24 in. | Volume left behind | 4:1 slope from prism to 6-in. vertical cut (southern portion), 6-in. vertical cut at shoreline with 4:1 slope into prism (northern portion) | 65 | --- | Potential access issues | Hard bottom | Private | 10 | 21 | --- | --- |
| North | T38.05N, T38.09N | T37-40N-7, T37-40N-8, T37-40N-11 | Depth based cuts to 4 in., 6 in., and 12 in. | Full removal | 6-in. cut (6-in. prism), 4:1 slope from prism to 6-in. vertical cut at top (12-in. prism) | 145 | --- | Potential access issues | --- | Private | --- | --- | --- | --- |
| North | T39.63N, T39.85N | T37-40N-9 | Depth based cut to 18 in. | Volume left behind | 6-in. cut at shoreline, 3:1 slope into prism | 214 | --- | Dredge and immediate backfill; 4:1 slope on south end | Hard bottom | Private/ Commercial | 4 | 13 | --- | --- |
| North | T39.85N, T39.98N, T40.06N | T37-40N-10 | Elevation based cut to 151.3 ft | Volume left behind | 6-in. vertical cut at shoreline with 3:1 slope into prism (southern/western portion), 3:1 slope from prism to 6-in. vertical cut (northern/eastern portion), | 250 | --- | 4:1 slope on east end | --- | Private | 1.4 | 1.4 | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| North | T40.76N, T40.91N | T41-42N-1, T41-42N-2 | Depth based cut to 18 in., Elevation based cut to 149.5 ft. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 215 | --- | Potential access issues; 4:1 slope on west end | --- | Private | --- | --- | --- | --- |
| North | T40.76N, T40.91N, T41.00N, T41.13N | T41-42N-3, T41-42N-4, T41-42N-15 | Depth based cut to 12 in., Elevation based cuts to 151.4 ft. and 152.3 ft. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 195 | --- | Potential access issues | --- | Private | --- | --- | --- | --- |
| North | T41.13N | T41-42N-5 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 68 | --- | Potential access issues | --- | Private | 2 | 3 | --- | --- |
| North | T41.25N | T41-42N-6 | Elevation based cut to 152.3 ft. | Volume left behind | 3:1 slope from prism to 6-in. vertical cut | 37 | --- | Potential access issues | --- | Private | 8 | 16 | --- | --- |
| North | T41.37N | T41-42N-7, T41-42N-8 | Depth based cut to 6 in., Elevation based cut to 149.1 ft. | Full removal | 6-in. cut | 98 | --- | Potential access issues | Clay | Private | --- | --- | --- | --- |
| North | T41.53N, T41.70N | T41-42N-9 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism (southern/ western portion), 4:1 slope from prism to 6-in. vertical cut (northern /eastern portion) | 245 | --- | Potential access issues | Clay | Private | 2 | 3 | --- | --- |
| North | T41.96N, T42.21N | T41-42N-10, T41-42N-11, T41-42N-12, T41-42N-13 | Depth based cuts to 6 in. and 18 in., Elevation based cuts to 151.5 ft. and 152.2 ft. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 360 | --- | Potential access issues; 4:1 slopes on west and east ends | Clay | NYS Reforestation | --- | --- | --- | --- |
| North | T42.81N | T41-42N-14 | Depth based cut to 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 80 | --- | Potential access issues; 4:1 slopes on west and east ends | --- | NYS Reforestation | --- | --- | --- | --- |
| North | T43.04N, T43.15N | T43-46N-1 | Depth based cut to 18 in. | Volume left behind | 4:1 slope from prism to 6-in. vertical cut, Small portion of 6-in. vertical cut at shoreline, 4:1 slope into prism | 160 | --- | 4:1 slope on west end | Clay | NYS Reforestation | 10 | 27 | --- | --- |
| North | T43.80N | T43-46N-2 | Depth based cut to 6 in. | Full removal | 6-in. cut | 239 | --- | 4:1 slope on east end | Clay | Arconic | --- | --- | --- | --- |
| North | T46.94N | T47-50N-1 | Depth based cut to 3 in. | Full removal | 3-in. cut | 60 | --- | --- | --- | NYS Reforestation | --- | --- | --- | --- |
| North | T47.45N | T47-50N-2 | Depth based cut to 6 in. | Full removal | 6-in. cut | 134 | --- | Potential access issues | Clay | NYS Reforestation | --- | --- | --- | --- |
| North | T48.36N, T48.41N | T47-50N-3, T47-50N-4 | Depth based cuts to 5 in. and 36 in. | Volume left behind | 4:1 slope from prism to 6-in. vertical cut | 185 | --- | Potential access issues; 4:1 slopes on west and east ends | --- | NYS Reforestation | 19 | 36 | --- | --- |
| North | T49.01N, T49.63N | T47-50N-5, T47-50N-6 | Depth based cuts to 6 in. and 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 500 | --- | Potential access issues; 4:1 slope on east end | --- | NYS Reforestation | --- | --- | --- | --- |
| North | T49.97N, T50.10N | T47-50N-7, T47-50N-8 | Depth based cuts to 6 in. and 12 in. | Full removal | 6-in. cut (6-in. prism), 4:1 slope from prism to 6-in. vertical cut (12-in. prism) | 150 | --- | Potential access issues; 4:1 slope on west end | --- | NYS Reforestation | --- | --- | --- | --- |
| North | T50.94N | T51-54N-1 | Depth based cut to 30 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 52 | Unclassified shoreline | 4:1 slopes on west and east ends | --- | Arconic | 3 | 20 | --- | --- |
| North | T51.96N | T51-54N-2 | Depth based cut to 6 in. | Full removal | 6-in. cut | 114 | --- | 4:1 slopes on west and east ends | --- | Arconic | --- | --- | --- | --- |
| North | T52.61N, T53.19N, T53.44N | T51-54N-3, T51-54N-4, T51-54N-5 | Depth based cuts to 6 in., 18 in., and 20 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut (18 in. and 20 in. prisms), 6-in. cut (6-in. prism) | 360 | --- | 4:1 slopes on west and east ends | Hard bottom | Arconic | --- | --- | --- | --- |
| North | T56.04N | T55-57N-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 330 | --- | 4:1 slope on south end | --- | Private | --- | --- | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| North | T56.44N | T55-57N-3 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism (or existing bathymetry) | 124 | Soft clays and evidence of previous landslides in the vicinity | --- | --- | Private | 3 | 4 | --- | --- |
| North | T56.83N | T55-57N-4 | Depth based cut to 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 190 | --- | 4:1 slope on north end; Dredge and immediate backfill area | --- | Private | 3 | 13 | --- | --- |
| North | T57.39N | T55-57N-5 | Depth based cut to 6 in. | Full removal | 6-in. cut | 171 | --- | 4:1 slopes on south and north ends | --- | Private | --- | --- | --- | --- |
| North | T58.02N | T58-60N-1 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at prism, 3:1 slope toward upland or 6-in. vertical cut at shoreline, 3:1 slope into prism (varies by location) | 135 | --- | 4:1 slopes on south and north ends | --- | Private | 2 | 3 | --- | --- |
| North | T58.61N, T58.89N, T58.96N | T58-60N-2, T58-60N-3 | Depth based cuts to 6 in. and 24 in. | Volume left behind | 6-in. cut (6-in. prism), 6-in. vertical cut at shoreline, 3:1 slope into prism (adjacent to 24. in prism) | 220 | --- | 4:1 slopes on south and north ends | Clay | Private | 8 | 21 | --- | --- |
| North | T59.21N | T58-60N-4 | Depth based cut to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 152 | --- | Potential access issues; 4:1 slope on south end | --- | Private | --- | --- | --- | --- |
| North | T59.39N, T59.45N | T58-60N-5, T58-60N-6 | Depth based cuts to 24 in. and 30 in. | Volume left behind | 4:1 slope from prism to 6-in. vertical cut, Small portion of 6-in. vertical cut at shoreline, 4:1 slope into prism | 145 | --- | Potential access issues | --- | Private | 5 | 12 | --- | --- |
| North | T59.81N, T60.06N, T60.18N | T58-60N-7, T58-60N-8 | Depth based cuts to 12 in. and 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut, Small portion of 6-in. vertical cut at shoreline, 4:1 slope into prism | 395 | Unclassified shoreline | Potential access issues, 4:1 slope on north end | --- | Private | --- | --- | --- | --- |
| North | T62.57N | T61-64N-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 138 | --- | --- | Clay | Private | --- | --- | --- | --- |
| North | T63.14N | T61-64N-2 | Depth based cut to 6 in. | Full removal | 6-in. cut | 121 | --- | 4:1 slopes on west and east ends | Clay | Private | --- | --- | --- | --- |
| North | T63.95N | T61-64N-3, T61-64N-4 | Depth based cuts to 12 in. and 37 in. | Volume left behind | 6-in. vertical cut at shoreline, 2:1 slope into prism | 120 | --- | Dredge and immediate backfill; 4:1 slopes on west and east ends | Clay | NYS Reforestation | 2 | 6 | --- | --- |
| North | T64.83N | T65-67N-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 138 | --- | 4:1 slopes on west and east ends | Clay | NYS Reforestation/ Private | --- | --- | --- | --- |
| North | T65.49N | T65-67N-2 | Depth based cut to 6 in. | Full removal | 6-in. cut | 180 | --- | Potential access issues; 4:1 slopes on west and east ends | Clay | Private | --- | --- | --- | --- |
| North | T66.03N, T66.27N, T66.54N | T65-67N-3, T65-67N-4 | Depth based cuts to 6 in. and 12 in. | Volume left behind | 6-in. cut (6-in. prism), 4:1 slope from prism to 6-in. vertical cut (12-in. prism) | 325 | --- | Potential access issues; 4:1 slope on west end | Clay | NYS Reforestation | 4 | 11 | --- | --- |
| North | T67.32N | T65-67N-5 | Depth based cut to 6 in. | Volume left behind (channel-side of prism) | 6-in. cut | 500 | --- | Potential access issues; 4:1 slope on east end | Clay | NYS Reforestation | 2 | 3 | --- | --- |
| North | T68.33N | T68-69N-1 | Depth based cut to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 97 | --- | 4:1 slopes on west and east ends | --- | NYS Reforestation | --- | --- | --- | --- |
| North | T68.80N | T68-69N-2 | Depth based cut to 3 in. | Full removal | 3-in. cut | 127 | --- | 4:1 slopes on south and north ends | --- | NYS Reforestation | --- | --- | --- | --- |
| North | T69.61N | T70-72N-7 | Depth based cut to 6 in. | Volume left behind | 6-in. cut | 108 | --- | --- | Clay | NYS Reforestation | 3 | 30 | --- | --- |
| North | T69.43N, T69.54N | T70-72N-1 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 215 | Difficult access area | Potential access issues | Clay | Private | 7 | 30 | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| North | T69.54N, T69.61N, T69.69N-R | T70-72N-2 | Depth based cut to 18 in. | Volume left behind | 4:1 slope from prism to 6-in. vertical cut, Small portion of 6-in. vertical cut at shoreline, 4:1 slope into prism | 138 | Difficult access area | Potential access issues | Clay | NYS Reforestation | 16 | 30 | --- | --- |
| North | T69.69N-R, T69.82N, T70.02N, T70.12N | T70-72N-3, T70-72N-8 | Depth based cuts to 3 in. and 12 in. | Full removal | 3 in. cut (3-in. prism), 4:1 slope from prism to 6-in. vertical cut (12-in. prism) | 215 | --- | Potential access issues | Clay | NYS Reforestation | --- | --- | --- | --- |
| North | T69.69N-R, T69.82N, T70.02N, T70.12N | T70-72N-9, T70-72N-4, T70-72N-5, T70-72N-6 | Depth based cuts to 24 in., 30 in. and 36 in. | Full removal | NA | NA | --- | Potential access issues; 4:1 slope on east end | Clay | NYS Reforestation | --- | --- | --- | --- |
| South | T1.83S | T1-2S-1 | Depth based cut to 12 in. | Upland removal (At peninsula) | 4:1 slope from prism to 6-in. vertical cut | 127 | --- | Potential access issues | Clay | Private | --- | --- | 40 | 4 to 5 |
| South | T3.01S, T3.12S | T3-4S-1 | Depth based cut to 16 in. | Upland removal | 3:1 slope from prism to 6-in. vertical cut | 70 | Soft silt encountered in the top 2 ft and medium stiff clay at 2 ft. Recommended maximum slope of 3H:1V | 4:1 slope on west end | Hard bottom | Arconic | --- | --- | 30 | 1 to 5 |
| South | T3.12S | T3-4S-2 | Depth based cut to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 120 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T3.45S | T3-4S-3, T3-4S-4 | Depth based cuts to 6 in., and 18 in. | Upland removal | 6 in. cut (6-in. prism), 3.3:1 slope from prism to 6 in. vertical cut (18-in. prism) | 180 | --- | --- | Clay | Arconic | --- | --- | 44 | 4 to 10 |
| South | T3.60S | T3-4S-5 | Depth based cut to 4 in. | Full removal | 4-in. cut | 100 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T3.84S | T3-4S-6 | Depth based cut to 9 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 106 | --- | 4:1 slope on north end | Clay | Arconic | --- | --- | --- | --- |
| South | T4.50S, T4.60S, T4.63S | T5-7S-1, T5-7S-2 | Depth based cuts to 6 in. and 16 in. | Full removal | 6 in. cut (6-in. prism), 4:1 slope from prism to 6 in. vertical cut (16-in. prism) | 130 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T4.75S | T5-7S-3 | Depth based cut to 16 in. | Volume left behind | 6-in. vertical cut at prism, 4:1 slope towards shoreline | 98 | --- | 4:1 slope on south end | Clay | Arconic | 175.47 | 422.60 | --- | --- |
| South | T4.88S | T5-7S-4 | Depth based cut to 15 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 54 | Steep upland bank | --- | --- | Arconic | 0.02 | 0.02 | --- | --- |
| South | T4.94S | T5-7S-12 | Depth based cut to 6 in. | Full removal | 6-in. cut | 30 | --- | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T5.02S, T5.10S | T5-7S-5, T5-7S-13 | Depth based cuts to 12 in. and 24 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 96 | Steep upland slope and evidence of undercutting | --- | Clay | Arconic | 35 | 1013 | --- | --- |
| South | T5.20S | T5-7S-6, T5-7S-14 | Depth based cuts to 3 in. and 18 in | Full removal | 3 in. cut (3-in. prism), 4:1 slope from prism to 6-in. vertical cut (18-in. prism) | 117 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T5.56S | T5-7S-7 | Depth based cut to 15 in. | Volume left behind | 6-in. vertical cut at prism, 4:1 slope towards shoreline | 156 | --- | --- | Clay | Arconic | 151 | 441 | --- | --- |
| South | T5.85S, T5.90S, T.604S, T6.18S, T6.28S | T5-7S-15 | Depth based cut to 4 in. | Full removal | 4 in. cut | 275 | Shoreline classified as steep slope | --- | Clay | Arconic | --- | --- | --- | --- |
| South | | T5-7S-8, T5-7S-9, T5-7S-10, T5-7S-11 | Depth based cuts to 6 in., 12 in., 19 in., and 24 in. | Full removal | NA | NA | Shoreline classified as steep slope | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T6.28S, T6.36S | T5-7S-16 | Depth based cut to 18 in. | Volume left behind | 6-in. vertical cut at prism, 3:1 slope towards shoreline | 92 | Shoreline classified as stable slope | Dredge and immediate backfill; 4:1 slope on north end | Hard bottom | NYS Reforestation/ Arconic | 3 | 3 | --- | --- |
| South | T7.05S | T5-7S-17 | Depth based cut to 3 in. | Full removal | 3-in. cut | 93 | --- | --- | --- | NYS Reforestation/ Arconic | --- | --- | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| South | T7.62S | T8-10S-1, T8-10S-19 | Depth based cuts to 10 in. and 30 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism (southern portion) and 3:1 slope into prism (northern portion) | 122 | Loose sand | 4:1 slope on south end | Clay | Arconic/NYS Reforestation | 0.8 | 10 | --- | --- |
| South | T7.85S, T8.08S | T8-10S-2 | Depth based cut to 3 in. | Full removal | 3-in. cut | 232 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T8.51S | T8-10S-6 | Depth based cut to 6 in. | Full removal | 6-in. cut | 184 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T7.85S, T8.08S, T8.51S | T8-10S-4, T8-10S-5, T8-10S-20, T8-10S-8, T8-10S-7, T8-10S-24 | Depth based cuts to 7 in., 8 in., 9 in., 12 in., 24 in., and 30 in. | Full removal | NA | NA | --- | --- | Clay, Hard Bottom | Arconic | --- | --- | --- | --- |
| South | T8.58S | T8-10S-9 | Depth based cut to 4 in. | Full removal | 4-in. cut | 37 | --- | --- | --- | Arconic | --- | --- | --- | --- |
| South | T8.65S | T8-10S-10, T8-10S-21 | Dredge cut to 24 in. and 60 in. | Volume left behind | 3:1 slope from prism to 6-in. vertical cut | 70 | Soft clayey sediment | Dredge and immediate backfill | Clay | Arconic | 161 | 1387 | 50 | 12 to 15 |
| South | T8.82S-R, T8.88S | T8-10S-11, T8-10S-22 | Depth based cuts to 6 in. and 18 in. | | 6-in. cut | 82 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T9.08S | T8-10S-23 | Depth based cut to 8 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 16 | --- | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | | T8-10S-12 | Depth based cut to 7 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 45 | --- | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | | T8-10S-14, T8-10S-13 | Depth based cuts to 5 in. and 13 in. | Full removal | Grade to 5 in. Vertical cut | 77 | --- | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T9.22S | T8-10S-15 | Depth based cut to 6 in. | Full removal | 6-in. cut | 46 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T9.42S | T8-10S-16 | Depth based cut to 30 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 104 | --- | --- | Clay | Arconic | 6 | 25 | --- | --- |
| South | T9.69S | T8-10S-17 | Depth based cut to 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | | Evidence of undercutting and blow counts indicate soft clays | --- | Clay | Arconic | 66 | 109 | --- | --- |
| South | T9.89S | T8-10S-18 | Depth based cut to 16 in. | Volume left behind | 4:1 slope from prism to 6-in. vertical cut | 98 | Evidence of undercutting and blow counts indicate soft clays | 4:1 slope on north end | Clay | Arconic | 18 | 40 | --- | --- |
| South | T10.60S | T10-11S-1, T10-11S-3 | Depth based cuts to 2 in. and 12 in. | Volume left behind | 2-in. cut, areas of 2-in. cut and 4:1 slope from shoreline into 12 in. prism | 265 | --- | 4:1 slope on south and north ends | Hard bottom | Arconic | 22 | 38 | --- | --- |
| South | T10.97S, T11.02S | T10-11S-2 | Depth based cut to 39 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 76 | Shallow glacial till approximately 4 ft deep | 4:1 slope on south and north ends | --- | Arconic | 11 | 171 | --- | --- |
| South | T11.85S | T12-14S-3 | Depth based cut to 19 in. | Volume left behind | 6 in. vertical cut at shoreline, 3:1 slope into prism | 36 | --- | --- | Clay | Arconic | 4 | 32 | --- | --- |
| South | T11.78S, T11.99S-R, T12.10S, T12.17S, T12.34S-R | T12-14S-1, T12-14S-2, T12-14S-3, T12-14S-10 | Depth based cuts to 2 in., 6 in., 12 in. and 19 in. | Full Removal | 6-in. cut | 275 | --- | 4:1 slope on south end | Clay | Arconic | --- | --- | --- | --- |
| South | T12.34S-R | T12-14S-4 | Depth based cut to 9 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 42 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T12.34S-R, T12.91S | T12-14S-5, T12-14S-6 | Depth based cuts to 4 in. and 6 in. | Full removal | 4 in. cut, 6 in. cut | 300 | --- | 4:1 slope on north end | --- | Arconic | --- | --- | --- | --- |
| South | T13.24S, T13.43S | T12-14S-7 | Depth based cut to 12 in. | Full removal | 3:1 slope from prism to 6-in. vertical cut (southern portion), 4:1 slope from prism to 6-in. vertical cut (northern portion), | 243 | --- | 4:1 slope on south end | --- | Arconic | --- | --- | --- | --- |
| South | T13.59S | T12-14S-8 | Depth based cuts to 5 in. | Full removal | 5-in. cut | 215 | --- | 4:1 slope on north end | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T14.02S-R | T12-14S-9 | Depth based cut to 15 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 72 | Steep upland slope and clayey material | 4:1 slope on south and north ends | --- | Arconic | 11 | 33 | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| South | T15.16S | T15-17S-9 | Depth based cut to 6 in. | Full removal | 6-in. cut | 125 | --- | 4:1 slope on south and north ends | --- | Arconic | --- | --- | --- | --- |
| South | T15.93S | T15-17S-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 85 | --- | 4:1 slope on south end | Clay | Arconic | --- | --- | --- | --- |
| South | T16.21S | T15-17S-2 | Depth based cut to 12 in. | Volume left behind | 3.5:1 slope from prism to 6-in. vertical cut | 160 | --- | --- | Clay | Arconic | 2 | 4 | --- | --- |
| South | T16.26S, T16.40S, T16.42S | T15-17S-10 | Depth based cut to 22 in. | Volume left behind | 6-in. vertical cut at shoreline, 3.5:1 or 2.5:1 slope into prism | 160 | --- | --- | Clay | Arconic | 14 | 555 | --- | --- |
| South | T16.45S, T16.57S, T16.64S | T15-17S-3 | Depth based cut to 16 in. | Volume left behind | 6-in. vertical cut at shoreline, 3.5:1 slope into prism or 6-in. vertical cut at prism, 3.5:1 slope to upland | 155 | Shallow upland slope and soft clays | --- | Hard bottom | Arconic | 110 | 555 | --- | --- |
| South | T16.76S | T15-17S-7 | Depth based cut to 6 in. | Full removal | 6-in. cut | 85 | --- | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T17.00S | T15-17S-5 | Depth based cut to 54 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 96 | Soft clays | --- | --- | Arconic | 0.7 | 210 | --- | --- |
| South | | T15-17S-8 | Depth based cut to 22 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 90 | Soft clays | --- | --- | Arconic | 20 | 65 | --- | --- |
| South | T17.16S, T17.26S | T15-17S-4, T15-17S-6 | Depth based cuts to 2 in. and 12 in. | Full Removal | 2 in. cut (2-in. prism), 2.5:1 slope from prism to 6-in. vertical cut (12-in. prism) | 30 | Soft clays | --- | --- | Arconic | --- | --- | --- | --- |
| South | T17.64S, T17.73S, T17.82S, T17.90S | T18-20S-1 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 or 3:1 slope into prism | 300 | Soft clays and shallow upland slope. Immediate backfill to avoid/limit disturbance to private upland property | Dredge and immediate backfill | --- | Private | 29 | 51 | --- | --- |
| South | T17.99S | T18-20S-2, T18-20S-8, T18-20S-7 | Depth based cuts to 6 in., 16 in. and 22 in. | Volume left behind | 6 in. cut, 6-in. vertical cut at shoreline, 3:1 slope into prism in small portions | 69 | Wide nearshore area has possible access issues | --- | Clay | Private | 13 | 17 | --- | --- |
| South | T18.06S | T18-20S-3, T18-20S-4 | Depth based cuts to 3 in. and 31 in. | Full removal | 3-in cut (3-in. prism), 6-in. vertical cut at shoreline, 3:1 slope into prism (30-in. prism) | 275 | Soft clays | --- | Clay | Private | --- | --- | --- | --- |
| South | T18.57S | T18-20S-5, T18-20S-11 | Depth based cut to 5 in. and 6 in. | Full removal | 6-in cut (6-in. prism), 3:1 slope into prism (5-in. prism) | 145 | --- | 4:1 slope on north end | Clay | Private | --- | --- | --- | --- |
| South | T18.96S | T18-20S-6 | Depth based cut to 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 3:1 slope into prism or 6-in. vertical cut at prism | 137 | Steep upland slope and loose sands. | 4:1 slope on south and north ends | Hard bottom | Private | 3 | 7 | --- | --- |
| South | T20.38S | T20-22S-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 194 | --- | --- | Clay | Massena Town Center | --- | --- | --- | --- |
| South | T21.16S | T20-22S-2 | Depth based cut to 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 70 | Undercut bank at private property | 4:1 slope on south and north ends | Clay | Massena Town Center | 3 | 23 | --- | --- |
| South | T21.35S | T20-22S-3 | Depth based cuts to 2 in. | Full removal | 2-in. cut | 87 | --- | --- | Clay | Massena Town Center | --- | --- | --- | --- |
| South | T21.54S | T20-22S-4, T20-22S-6 | Depth based cuts to 18 in. and 36 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 162 | Flat upland slope (approximately 5H:1V), but low remolded strengths | Dredge and immediate backfill; 4:1 slope on south and north ends | Clay | Massena Town Center | 8 | 25 | --- | --- |
| South | T22.25S, T22.41S | T20-22S-5, T20-22S-7 | Depth based cuts to 2 in. and 6 in. | Full removal | 2-in. cut (2 in. prism) and 6-in. cut (6 in. prism) | 288 | --- | --- | Clay | NY State Power Authority | --- | --- | --- | --- |
| South | T23.02S | T23-24S-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 240 | --- | --- | Clay | Private/NY State | --- | --- | --- | --- |
| South | T23.62S, T23.74S, T23.81S | T23-24S-7, T23-24S-5, T23-24S-2, T23-24S-3 | Depth based cuts to 12 in., 15 in., 24 in. and 32 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 182 | Steep upland slope and soft clays. | 4:1 slope on south end | Clay | Private | 12 | 100 | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| South | T23.90S, T23.95S | T23-24S-8, T23-24S-4 | Depth based cuts to 4 in. and 10 in. | Volume left behind | 4-in. cut (4 in. prism), 6-in. vertical cut at shoreline, 4:1 slope into prism (10 in. prism) | 88 | Rock revetment along shoreline | Dredge and immediate backfill; 4:1 slope on north end | --- | Private | 9 | 56 | --- | --- |
| South | T23.99S, T24.08S | T23-24S-6 | Depth based cut to 16 in. | Volume left behind | 6-in. vertical cut at shoreline, 3:1 slope into prism or 6-in. vertical cut at prism, 3:1 slope to upland | 87 | Steep slope classification. Existing slope is approximately 1.5H:1V | 4:1 slope on south and north ends | --- | Private | 26 | 89 | --- | --- |
| South | T24.70S | T24-27S-1 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 222 | --- | Dredge and immediate backfill; 4:1 slope on south and north ends | Hard bottom | Private | 9 | 31 | --- | --- |
| South | T25.02S | T24-27S-2 | Depth based cut to 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism or 6-in. vertical cut at prism, 2.5:1 slope to upland | 62 | --- | 4:1 slope on south and north ends | Hard bottom | Private | 5 | 6 | --- | --- |
| South | T25.73S | T24-27S-3 | Depth based cut to 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism or 6-in. vertical cut at prism, 2.5:1 slope to upland | 142 | --- | 4:1 slope on south and north ends | Hard bottom | Private | 0.6 | 4 | --- | --- |
| South | T27.95S | T28-32S-1 | Depth based cut to 12 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 98 | --- | 4:1 slope on south end | --- | Arconic | 3 | 16 | --- | --- |
| South | T28.11S | T28-32S-28, T28-32S-2, T28-32S-39 | Depth based cuts to 6 in., 24 in. and 52 in. | Full removal | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 69 | Steep upland slope and shallow till | Dredge and immediate backfill | Clay | Arconic | --- | --- | --- | --- |
| South | T28.30S, T28.40S, T28.51S | T28-32S-29 | Depth based cut to 9 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 145 | Steep slope classification | --- | Clay | Arconic | 7 | 175 | --- | --- |
| South | T28.61S, T28.75S, T28.83S, T28.92S | T28-32S-6 | Depth based cut to 6 in. | Full removal | 6-in. cut | 240 | Steep slope classification | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T28.51S, T28.61S, T28.75S, T28.83S, T28.92S, T29.37S | T28-32S-3 | Depth based cut to 12 in. | Full removal | 2.5:1 slope from prism to 6-in. vertical cut | 104 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T28.30S, T28.40S | T28-32S-30, T28-32S-36, T28-32S-34, T28-32S-4 | Depth based cuts to 36 in., 37 in., 72 in. and 79 in. | Full removal | NA | NA | --- | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T28.51S, T28.61S, T28.75S | T28-32S-5, T28-32S-35 | Depth based cuts to 42 in. and 48 in. | Full removal | NA | NA | --- | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T28.92S, T29.08S, T29.37S | T28-32S-7, T28-32S-8 | Depth based cuts to 18 in. and 27 in. | Full removal | NA | NA | soft silts | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T29.47S, T29.53S | T28-32S-9 | Depth based cut to 6 in. | Full removal | 6 in cut. | 62 | steep upland bank and soft silts | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T29.87S | T28-32S-38 | Depth based cut to 12 in. | Full removal | 2.5:1 slope from prism to 6-in. vertical cut | 42 | Evidence of glacial till and presence of stiff silt and clay at 2-foot depth | --- | Hard bottom | Arconic | --- | --- | --- | --- |
| South | | T28-32S-10 | Depth based cut to 27 in. | Volume left behind | 6 in. vertical cut at shoreline, 2.5:1 slope into prism | 24 | Evidence of glacial till and presence of stiff silt and clay at 2-foot depth | --- | Hard bottom | Arconic | 6 | 26 | --- | --- |
| South | T30.00S | T28-32S-11, T28-32S-12, T28-32S-40 | Depth based cuts to 12 in., 18 in. and 28 in. | Volume left behind | 6 in. vertical cut at shoreline, 3:1 slope into prism | 60 | Soft silt and steep upland bank | --- | Hard bottom | Arconic | 8 | 23 | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| South | T30.23S, T30.38S, T30.49S | T28-32S-14, T28-32S-16, T28-32S-32 | Depth based cuts to 18 in., 30 in. and 42 in. | Volume left behind | 6 in. vertical cut at shoreline, 2.5:1 or 3:1 or 4:1 slope into prism | 168 | Evidence of glacial till and presence of stiff silt and clay at 2-foot depth | --- | Hard bottom | Arconic | 26 | 425 | --- | --- |
| South | T30.49S, T30.66S, T30.90S-R, T31.30S | T28-32S-18, T28-32S-19, T28-32S-20, T28-32S-33, T28-32S-22, T28-32S-23 | Depth based cuts to 18 in., 24 in., 36 in., 42. in., 44 in. and 50 in. | Upland Removal | 2.5:1 slope from prism to 6-in. vertical cut | 575 | Evidence of soft organic silt and very loose sand | Potential access issues | Hard bottom | Arconic | --- | --- | 575 | 5 to 20 |
| South | T32.07S, T32.23S | T28-32S-24, T28-32S-25, T28-32S-26, T28-32S-27 | Depth based cuts to 42 in., 54 in. and 60 in. | Upland Removal | 2.5:1 slope from prism to 6-in. vertical cut | 355 | --- | Potential access issues; 4:1 slope on east end | Hard bottom | Arconic | --- | --- | 70 | 7 to 20 |
| South | T32.66S | T33-34S-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 220 | --- | 4:1 slopes on east and west ends | --- | Private | --- | --- | --- | --- |
| South | T33.00S | T33-34S-2 | Depth based cut to 54 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism or 6-in. vertical cut at prism, 4:1 slope to upland | 100 | --- | 4:1 slope on west end | --- | Private | 1.0 | 5 | --- | --- |
| South | T33.11S | T33-34S-3 | Depth based cut to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 160 | --- | Potential access issues | --- | Private | --- | --- | --- | --- |
| South | T33.45S | T33-34S-4, T33-34S-6 | Depth based cuts to 12 in. and 18 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 97 | Steep in-river slopes and evidence of glacial till | --- | --- | Private | 4 | 9 | --- | --- |
| South | T33.68S | T33-34S-5 | Depth based cut to 10 in. | Volume left behind | 6-in. vertical cut at shoreline, 2.5:1 slope into prism | 74 | Steep in-river slopes and evidence of glacial till | 4:1 slope on east end | Hard bottom | Private | 2 | 9 | --- | --- |
| South | T34.10S, T34.24S | T34-36S-1, T34-36S-2 | Depth based cuts to 6 in. and 22 in. | Full removal | 6-in. cut | 112 | --- | 4:1 slope on west end | Clay | Private | --- | --- | --- | --- |
| South | T34.46S | T34-36S-10 | Depth based cut to 6 in. | Full removal | 6-in. cut | 45 | --- | --- | --- | Private | --- | --- | --- | --- |
| South | T34.72S | T34-36S-3 | Depth based cut to 3 in. | Full removal | 3-in. cut | 133 | --- | 4:1 slopes on east and west ends | Clay | Private | --- | --- | --- | --- |
| South | T35.27S | T34-36S-11 | Depth based cut to 6 in. | Full removal | 6-in. cut | 135 | --- | 4:1 slope on west end | Clay | Arconic | --- | --- | --- | --- |
| South | T35.41S, T35.48S, T35.54S | T34-36S-4 | Depth based cut to 10 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism (western portion), 4:1 slope from prism to 6 in. vertical cut (eastern portion) | 125 | --- | --- | Clay | Arconic | 1.2 | 2 | --- | --- |
| South | T35.41S, T35.48S, T35.54S, t35.63S, T35.73S, T35.80S | T34-36S-5, T34-36S-6, T34-36S-7 | Depth based cuts to 15 in. and 16 in., Elevation based cut to 151.2 ft. | Full removal | 3:1 slope from prism to 6-in. vertical cut | 102 | --- | Potential access issues | Clay | Arconic | --- | --- | --- | --- |
| South | T35.80S, T35.98S | T34-36S-8 | Depth based cut to 6 in. | Full removal | 6-in. cut | 128 | --- | --- | Clay | Arconic | --- | --- | --- | --- |
| South | T35.98S | T34-36S-9 | Depth based cut to 3 in. | Full removal | 3-in. cut | 70 | --- | 4:1 slope on east end | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T36.56S, T36.62S | T37-38S-1 | Elevation based cut to 152.8 ft | Full removal | 4:1 slope from prism to 6-in. vertical cut | 112 | --- | 4:1 slopes on east and west ends | Clay | Arconic | --- | --- | --- | --- |
| South | T36.94S | T37-38S-2 | Depth based cuts to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 100 | --- | Potential access issues; 4:1 slope on west end | --- | Arconic | --- | --- | --- | --- |
| South | T37.11S | T37-38S-3 | Depth based cut to 6 in. | Full removal | 6-in. cut | 115 | --- | Potential access issues; 4:1 slope on east end | Clay | Arconic | --- | --- | --- | --- |

**Table F2**
**Near Shore Dredge Design - Engineered Dredge Prism Considerations**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| South | T37.70S | T37-38S-4 | Depth based cut to 4 in. | Full removal | 4-in. cut | 104 | --- | Potential access issues; 4:1 slope on west end | Clay | Arconic | --- | --- | --- | --- |
| South | T37.89S | T37-38S-5 | Depth based cut to 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 83 | --- | Potential access issues | Clay | Arconic | --- | --- | --- | --- |
| South | T38.04S | T37-38S-6 | Depth based cut to 6 in. | Full removal | 6-in. cut | 88 | --- | Potential access issues; 4:1 slope on east end | Clay | Arconic | --- | --- | --- | --- |
| South | T38.95S | T39-42S-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 80 | --- | 4:1 slopes on east and west ends | Clay | Arconic/ Private | --- | --- | --- | --- |
| South | T39.95S | T39-42S-2, T39-42S-3, T39-42S-4 | Depth based cuts to 8 in., 10 in. and 12 in. | Full Removal | 4:1 slope from prism to 6-in. vertical cut | 265 | --- | 4:1 slope on west end | Clay | Arconic | --- | --- | --- | --- |
| South | T40.28S | T39-42S-3, T39-42S-5 | Depth based cuts to 6 in. and 12 in. | Volume left behind | 6-in. cut (6-in. prism), 6-in. vertical cut at shoreline, 4:1 slope into prism (12 in. prism) | 115 | --- | 4:1 slope on east end | --- | Arconic | 1.3 | 2 | --- | --- |
| South | T40.93S | T39-42S-6 | Depth based cut to 24 in. | Volume left behind | 4:1 slope from prism to 6-in. vertical cut (western portion), 6-in. vertical cut at shoreline, 4:1 slope into prism (eastern portion) | 125 | --- | 4:1 slope on west end | --- | Arconic | 3 | 17 | --- | --- |
| South | T41.22S | T39-42S-7 | Depth based cut 36 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 155 | Steep upland slope; loose sands and stiff clays over glacial till | --- | --- | Arconic | 6 | 17 | --- | --- |
| South | T41.38S, T41.43S, T41.47S, T41.52S | T39-42S-8 | Depth based cut 30 in. | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism or 6-in. vertical cut at prism, 4:1 slope to upland | 205 | Steep shoreline classification | 4:1 slope on east end | --- | Arconic | 16 | 33 | --- | --- |
| South | T42.57S | T43-46S-1 | Depth based cut to 5 in. | Full removal | 5-in. cut | 126 | --- | Potential access issues; 4:1 slopes on east and west ends | --- | Arconic | --- | --- | --- | --- |
| South | T43.22S | T43-46S-2 | Depth based cut to 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 200 | --- | Potential access issues; 4:1 slope on west end | --- | Arconic | --- | --- | --- | --- |
| South | T43.62S | T43-46S-3 | Depth based cut to 12 in. | Full removal | 4:1 slope | 172 | --- | Potential access issues; 4:1 slope on east end | --- | Arconic | --- | --- | --- | --- |
| South | T43.92S, T44.10S | T43-46S-4, T43-46S-5, T43-46S-14 | Depth based cut to 35 in., Elevation based cuts to 150.3 ft. and 150.6 ft. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 75 | --- | Potential access issues; 4:1 slope on west end | --- | Arconic | --- | --- | --- | --- |
| South | T44.10S, T44.37S, T44.59S, T44.75S | T43-46S-7, T43-46S-6, T43-46S-9, T43-46S-15 | Depth based cuts to 6 in., 12 in., 18 in. and 24 in. | Full removal | 6-in. cut, 24 in. vertical cut at sheetpile wall | 475 | --- | Potential access issues | --- | Arconic | --- | --- | --- | --- |
| South | T44.37S, T44.59S, T44.75S, T44.78S, T44.81S, T45.02S, T45.22S | T43-46S-10, T43-46S-16, T43-46S-8 | Depth based cuts to 12 in., 18 in. and Elevation based cut to 147.0 ft. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 610 | --- | Potential access issues | Hard bottom | Arconic | --- | --- | --- | --- |
| South | T46.00S, T46.20S | T43-46S-12, T43-46S-13 | Depth based cuts to 6 in. and 12 in. | Full removal | 6-in. cut (6 in. prism), 4:1 slope from prism to 6-in. vertical cut (12 in. prism) | 250 | --- | Potential access issues; 4:1 slope on east end | Clay | Arconic/ Private | --- | --- | --- | --- |

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**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| South | T47.75S | T47-52S-1, T47-52S-2 | Depth based cuts to 6 in. and 18 in. | Full removal | 6-in. cut | 340 | --- | Potential access issues; 4:1 slopes on east and west ends (18 in. prism) | Clay | NYS Reforestation | --- | --- | --- | --- |
| South | T48.43S | T47-52S-3 | Depth based cut to 16 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 330 | --- | Potential access issues; 4:1 slopes on east and west ends | Clay | NYS Reforestation | --- | --- | --- | --- |
| South | T48.92S | T47-52S-4 | Elevation cut to 152.2 ft | Volume left behind | 6-in. vertical cut at shoreline, 4:1 slope into prism | 135 | Obstructed shoreline | Potential access issues; 4:1 slope on west end | --- | Arconic/NYS Reforestation | 4 | 13 | --- | --- |
| South | T49.41S | T47-52S-5, T47-52S-6 | Depth based cuts to 3 in. and 6 in. | Full removal | 3-in. cut (3 in. prism), 6-in. cut (6 in. prism) | 595 | --- | Potential access issues | Clay | Arconic | --- | --- | --- | --- |
| South | T55.02S | T53-56S-1 | Depth based cut to 3 in. | Full removal | 3-in. cut. | 93 | --- | Potential access issues | --- | NYS Reforestation | --- | --- | --- | --- |
| South | T55.18S | T53-56S-2, T53-56S-3 | Depth based cuts to 12 in. and 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 425 | --- | Potential access issues; 4:1 slope on north end | --- | NYS Reforestation | --- | --- | --- | --- |
| South | T58.48S | T57-62S-1 | Depth based cut to 6 in. | Full removal | 6-in. cut | 62 | --- | 4:1 slopes on north and south ends | --- | NYS Reforestation | --- | --- | --- | --- |
| South | T59.09S | T57-62S-2 | Depth based cut to 6 in. | Full removal | 6-in. cut | 195 | --- | 4:1 slopes on north and south ends | --- | NYS Reforestation | --- | --- | --- | --- |

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| Shore | Section ID[1] | Design Subareas | Chemistry-Based Neatline Surface Description | Dredging Design Result | Shoreline Grading | | | Additional Design Considerations and Features | Potential Subsurface Confining Layer[3] | Upland Property Owner[4] | Potential Material Left Behind[5] | | Potential Upland Impact[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shoreline Design Cut / Slope[2] | Approximate Extent of Grading Along Shoreline (Linear Feet) | Shoreline Grading Description and Notes Where Upland is Impacted | | | | PCB SLWA (mg/kg) | Maximum PCB (mg/kg) | Shoreline Extent (ft) | Range of Impact into Upland (ft) |
| South | T63.79S | T63-64S-1 | Depth based cut to 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 92 | --- | 4:1 slopes on east and west ends | --- | Private | --- | --- | --- | --- |
| South | T65.64S | T65-69S-1 | Depth based cut to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 149 | --- | 4:1 slope on west end | Clay | Alcoa | --- | --- | --- | --- |
| South | T65.96S | T65-69S-2 | Depth based cut to 6 in. | Full removal | 6-in. cut | 140 | --- | Potential access issues | Clay | Alcoa | --- | --- | --- | --- |
| South | T66.12S | T65-69S-3 | Depth based cut to 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 135 | --- | Potential access issues | Clay | Alcoa | --- | --- | --- | --- |
| South | T66.34S | T65-69S-4 | Depth based cut to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 122 | --- | Potential access issues | Clay | Alcoa | --- | --- | --- | --- |
| South | T66.58S | T65-69S-5 | Depth based cut to 18 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 115 | --- | Potential access issues; 4:1 slope on east end | --- | Alcoa | --- | --- | --- | --- |
| South | T67.02S, T67.13S | T65-69S-6, T65-69S-7 | Depth based cuts to 10 in. and 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 245 | --- | 4:1 slopes on west and east ends | --- | Alcoa | --- | --- | --- | --- |
| South | T67.48S | T65-69S-8 | Depth based cut to 10 in. | Volume left behind | 6-in. vertical cut at shoreline, 3:1 slope into prism | 150 | --- | 4:1 slopes on west and east ends | Clay | Alcoa | 1.3 | 3 | --- | --- |
| South | T67.80S | T65-69S-9 | Depth based cut to 6 in. | Full removal | 6-in. cut | 137 | --- | --- | Clay | Alcoa | --- | --- | --- | --- |
| South | T67.96S | T65-69S-10 | Depth based cut to 12 in. | Full removal | 3:1 slope from prism to 6-in. vertical cut | 97 | --- | 4:1 slope on east end | Clay | Alcoa | --- | --- | --- | --- |
| South | T70.68S | T69-72S-1 | Depth based cut to 12 in. | Full removal | 4:1 slope from prism to 6-in. vertical cut | 225 | --- | 4:1 slopes on north and south ends | Clay | Alcoa | --- | --- | --- | --- |

Notes:
1. Section IDs correspond to cross-sections cut through dredge areas as part of the engineering design. Section and dredge areas IDs are shown on Figures F3-1 through F3-24.
2. Design slopes not required for cuts less than 6 in.
3. Potential subsurface confining layer that may be encountered by dredging within some, or all, of a given area.
4. Property ownership designations are based on county tax maps and additional outreach conducted by Arconic.
5. PCB concentrations of cores adjacent to, or within, the wedge of potentially contaminated sediment to be left behind, where applicable.
6. Potential extent of upland impacts, where applicable.
7. Considerations presented here provide information for the development of the engineered dredge prism. The resulting extents and volumes of the prism are provided in Table F-3.
ft = feet
H:V = horizontal to vertical
in = inches
mg/kg = milligrams per kilogram
NYS = New York State
PCB = polychlorinated biphenyl
SLWA = section length-weighted average
T = transect

**Table F3**
**Near Shore Dredge Design Extents and Volumes**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Dredge Management Unit ID | Dredge Design Subarea Name[1] | Shore[2] | Chemistry-based Design[3] | | Engineered Dredge Prism Design[4] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dredge Polygon Area ($ft^2$) | Neatline Volume (cy) | Dredge Extent [Chem-based polygon+Grading] ($ft^2$) | Volume Left Behind (cy) | Design Prism Volume (cy) | 6-in. Overdredge Volume (cy) | Removal Volume [Prism+ Overdredge] |
| DMU-N01A | T1-2N-1 | N | 1,496 | 55 | 7,145 | 6 | 283 | 135 | 418 |
| | T1-2N-2 | | 835 | 3 | | | | | |
| | T1-2N-3 | | 1,840 | 68 | | | | | |
| | T1-2N-4 | | 576 | 4 | | | | | |
| DMU-S02A | T1-2S-1 | S | 974 | 36 | 1,389 | 0 | 48 | 26 | 74 |
| DMU-N01B | T1-2N-5 | N | 1,156 | 7 | NA | 0 | 7 | 22 | 29 |
| DMU-S02B | T3-4S-1 | S | 964 | 48 | 13,701 | 0 | 441 | 259 | 700 |
| | T3-4S-2 | | 1,320 | 49 | | | | | |
| | T3-4S-3 | | 2,008 | 37 | | | | | |
| | T3-4S-4 | | 2,172 | 121 | | | | | |
| | T3-4S-5 | | 2,467 | 30 | | | | | |
| | T3-4S-6 | | 1,769 | 49 | | | | | |
| DMU-N03A | T3-6N-1 | N | 659 | 6 | 2,675 | 1 | 128 | 51 | 179 |
| | T3-6N-2 | | 722 | 53 | | | | | |
| | T3-6N-12 | | 341 | 19 | | | | | |
| DMU-S04A | T5-7S-1 | S | 2,123 | 39 | 3,037 | 1 | 113 | 58 | 171 |
| | T5-7S-2 | | 112 | 6 | | | | | |
| | T5-7S-18 | | 374 | 29 | | | | | |
| DMU-S04B | T5-7S-3 | S | 803 | 40 | 22,652 | 16 | 830 | 430 | 1,260 |
| | T5-7S-4 | | 669 | 31 | | | | | |
| | T5-7S-5 | | 1,966 | 73 | | | | | |
| | T5-7S-6 | | 2,149 | 119 | | | | | |
| | T5-7S-7 | | 2,090 | 97 | | | | | |
| | T5-7S-8 | | 966 | 36 | | | | | |
| | T5-7S-9 | | 556 | 33 | | | | | |
| | T5-7S-10 | | 569 | 42 | | | | | |
| | T5-7S-11 | | 904 | 17 | | | | | |
| | T5-7S-12 | | 472 | 9 | | | | | |
| | T5-7S-13 | | 562 | 42 | | | | | |
| | T5-7S-14 | | 1,401 | 13 | | | | | |
| | T5-7S-15 | | 2,670 | 33 | | | | | |
| | T5-7S-16 | | 851 | 47 | | | | | |
| | T5-7S-19 | | 903 | 17 | | | | | |
| DMU-N03B | T3-6N-3 | N | 1,760 | 16 | 16,833 | 124 | 582 | 323 | 905 |
| | T3-6N-4 | | 1,533 | 52 | | | | | |
| | T3-6N-5 | | 1,654 | 107 | | | | | |
| | T3-6N-6 | | 475 | 4 | | | | | |
| | T3-6N-7 | | 178 | 13 | | | | | |
| | T3-6N-8 | | 497 | 28 | | | | | |
| | T3-6N-9 | | 956 | 80 | | | | | |
| | T3-6N-10 | | 1,636 | 111 | | | | | |
| | T3-6N-13 | | 2,456 | 91 | | | | | |
| | T3-6N-14 | | 385 | 6 | | | | | |
| | T3-6N-15 | | 381 | 42 | | | | | |
| | T3-6N-16 | | 502 | 19 | | | | | |
| | T3-6N-17 | | 1,876 | 35 | | | | | |
| DMU-N03C | T3-6N-11 | N | 412 | 8 | NA | 0 | 8 | 7 | 15 |
| DMU-N05A | T6-7N-1 | N | 876 | 27 | 19,558 | 13 | 1,670 | 366 | 2,036 |
| | T6-7N-2 | | 4,040 | 356 | | | | | |
| | T6-7N-3 | | 402 | 30 | | | | | |
| | T6-7N-4 | | 1,242 | 124 | | | | | |
| | T6-7N-5 | | 625 | 160 | | | | | |
| | T6-7N-6 | | 418 | 40 | | | | | |
| | T6-7N-7 | | 244 | 2 | | | | | |
| | T6-7N-10 | | 2,712 | 100 | | | | | |
| | T6-7N-11 | | 138 | 15 | | | | | |
| | T6-7N-12 | | 1,139 | 211 | | | | | |
| | T6-7N-13 | | 590 | 76 | | | | | |
| | T6-7N-14 | | 759 | 56 | | | | | |
| DMU-NO5B | T6-7N-8 | | 954 | 94 | 2,609 | 12 | 153 | 50 | 203 |
| DMU-S04C | T5-7S-17 | S | 390 | 4 | 814 | 0 | 13 | 15 | 28 |
| DMU-S04C | | | 390 | 4 | | | | | |

**Table F3**
**Near Shore Dredge Design Extents and Volumes**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Dredge Management Unit ID | Dredge Design Subarea Name[1] | Shore[2] | Chemistry-based Design[3] | | Engineered Dredge Prism Design[4] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dredge Polygon Area ($ft^2$) | Neatline Volume (cy) | Dredge Extent [Chem-based polygon+Grading] ($ft^2$) | Volume Left Behind (cy) | Design Prism Volume (cy) | 6-in. Overdredge Volume (cy) | Removal Volume [Prism+ Overdredge] |
| DMU-N05A | T6-7N-7 | N | 244 | 2 | | | | | |
| DMU-N05B | T6-7N-8 | N | 954 | 94 | | | | | |
| DMU-N05C | T6-7N-9 | N | 424 | 10 | 802 | 0 | 20 | 15 | 35 |
| DMU-N06A | T8-11N-1 | N | 1,204 | 19 | 9,660 | 5 | 352 | 183 | 535 |
| | T8-11N-2 | | 2,468 | 91 | | | | | |
| | T8-11N-3 | | 1,705 | 32 | | | | | |
| | T8-11N-20 | | 1,692 | 104 | | | | | |
| | T8-11N-22 | | 368 | 20 | | | | | |
| DMU-N06B | T8-11N-4 | N | 715 | 26 | 4,468 | 3 | 213 | 85 | 298 |
| | T8-11N-5 | | 1,423 | 105 | | | | | |
| | T8-11N-21 | | 860 | 16 | | | | | |
| DMU-N06C | T8-11N-6 | N | 1,747 | 32 | 20,708 | 175 | 893 | 399 | 1,292 |
| | T8-11N-7 | | 1,851 | 69 | | | | | |
| | T8-11N-8 | | 1,599 | 6 | | | | | |
| | T8-11N-9 | | 5,062 | 281 | | | | | |
| | T8-11N-17 | | 2,139 | 40 | | | | | |
| | T8-11N-23 | | 1,081 | 64 | | | | | |
| | T8-11N-24 | | 910 | 8 | | | | | |
| | T8-11N-25 | | 803 | 52 | | | | | |
| | T8-11N-26 | | 476 | 53 | | | | | |
| DMU-N09A | T8-11N-10 | | 1,427 | 26 | 13,089 | 45 | 802 | 252 | 1,054 |
| | T8-11N-11 | | 960 | 6 | | | | | |
| | T8-11N-12 | | 652 | 36 | | | | | |
| | T8-11N-16 | | 1,311 | 130 | | | | | |
| | T8-11N-18 | | 552 | 5 | | | | | |
| | T8-11N-27 | | 643 | 60 | | | | | |
| | T8-11N-28 | | 675 | 50 | | | | | |
| | T8-11N-29 | | 716 | 44 | | | | | |
| | T8-11N-36 | | 614 | 42 | | | | | |
| DMU-S07A | T8-10S-1 | S | 4,018 | 372 | 25,822 | 8 | 1,235 | 485 | 1,720 |
| | T8-10S-2 | | 2,841 | 26 | | | | | |
| | T8-10S-3 | | 1,918 | 53 | | | | | |
| | T8-10S-4 | | 3,883 | 144 | | | | | |
| | T8-10S-5 | | 1,093 | 81 | | | | | |
| | T8-10S-6 | | 2,166 | 40 | | | | | |
| | T8-10S-7 | | 625 | 15 | | | | | |
| | T8-10S-8 | | 1,190 | 110 | | | | | |
| | T8-10S-19 | | 2,148 | 66 | | | | | |
| | T8-10S-20 | | 1,654 | 36 | | | | | |
| | T8-10S-24 | | 1,535 | 57 | | | | | |
| | T8-10S-25 | | 175 | 9 | | | | | |
| | T8-10S-27 | | 64 | 3 | | | | | |
| DMU-S08A | T8-10S-9 | | 1,222 | 15 | 23,359 | 27 | 1,370 | 444 | 1,814 |
| | T8-10S-10 | | 1,559 | 115 | | | | | |
| | T8-10S-11 | | 932 | 52 | | | | | |
| | T8-10S-12 | | 277 | 6 | | | | | |
| | T8-10S-13 | | 1,738 | 70 | | | | | |
| | T8-10S-14 | | 450 | 7 | | | | | |
| | T8-10S-15 | | 542 | 10 | | | | | |
| | T8-10S-16 | | 1,940 | 180 | | | | | |
| | T8-10S-17 | | 1,609 | 89 | | | | | |
| | T8-10S-18 | | 579 | 29 | | | | | |
| | T8-10S-21 | | 1,076 | 199 | | | | | |
| | T8-10S-22 | | 547 | 10 | | | | | |
| | T8-10S-23 | | 563 | 14 | | | | | |
| | T8-10S-26 | | 444 | 25 | | | | | |
| | T8-10S-28 | | 291 | 31 | | | | | |
| DMU-N09A | T8-11N-10 | N | 1,427 | 26 | | | | | |
| DMU-N09A | T8-11N-11 | | 960 | 6 | | | | | |
| DMU-N09A | T8-11N-12 | | 652 | 36 | | | | | |
| DMU-N09A | T8-11N-16 | | 1,311 | 130 | | | | | |
| DMU-N09A | T8-11N-18 | | 552 | 5 | | | | | |

**Table F3**
**Near Shore Dredge Design Extents and Volumes**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Dredge Management Unit ID | Dredge Design Subarea Name[1] | Shore[2] | Chemistry-based Design[3] | | Engineered Dredge Prism Design[4] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dredge Polygon Area ($ft^2$) | Neatline Volume (cy) | Dredge Extent [Chem-based polygon+Grading] ($ft^2$) | Volume Left Behind (cy) | Design Prism Volume (cy) | 6-in. Overdredge Volume (cy) | Removal Volume [Prism+ Overdredge] |
| DMU-S08B | T10-11S-1 | S | 2,582 | 96 | 5,756 | 1 | 141 | 109 | 250 |
| | T10-11S-3 | | 2,619 | 16 | | | | | |
| DMU-S08C | T10-11S-2 | S | 536 | 64 | 2,799 | 14 | 179 | 54 | 233 |
| | T10-11S-4 | | 475 | 44 | | | | | |
| DMU-N09B | T8-11N-13 | N | 1,104 | 3 | 8,095 | 3 | 264 | 155 | 419 |
| | T8-11N-14 | | 1,770 | 82 | | | | | |
| | T8-11N-15 | | 955 | 35 | | | | | |
| | T8-11N-30 | | 996 | 37 | | | | | |
| | T8-11N-31 | | 163 | 9 | | | | | |
| | T8-11N-32 | | 645 | 28 | | | | | |
| | T8-11N-37 | | 261 | 5 | | | | | |
| DMU-N09C | T8-11N-19 | N | 2,386 | 7 | 3,607 | 0 | 33 | 69 | 102 |
| | T8-11N-33 | | 1,057 | 20 | | | | | |
| DMU-N11A | T8-11N-35 | N | 705 | 11 | 705 | 0 | 11 | 13 | 24 |
| DMU-S10A | T12-14S-1 | S | 2,017 | 37 | 16,535 | 1 | 495 | 315 | 810 |
| | T12-14S-2 | | 1,989 | 74 | | | | | |
| | T12-14S-3 | | 1,734 | 102 | | | | | |
| | T12-14S-4 | | 1,142 | 32 | | | | | |
| | T12-14S-5 | | 551 | 7 | | | | | |
| | T12-14S-6 | | 3,534 | 65 | | | | | |
| | T12-14S-10 | | 731 | 5 | | | | | |
| | T12-14S-11 | | 1,167 | 43 | | | | | |
| | T12-14S-12 | | 425 | 8 | | | | | |
| | T12-14S-13 | | 535 | 20 | | | | | |
| | T12-14S-14 | | 498 | 15 | | | | | |
| DMU-S10B | T12-14S-7 | S | 987 | 37 | 9,614 | 8 | 270 | 185 | 455 |
| | T12-14S-8 | | 4,006 | 62 | | | | | |
| | T12-14S-9 | | 1,041 | 48 | | | | | |
| | T12-14S-15 | | 458 | 25 | | | | | |
| | T12-14S-16 | | 353 | 24 | | | | | |
| DMU-N11B | T12-13N-1 | N | 822 | 8 | 29,375 | 38 | 1,400 | 552 | 1,952 |
| | T12-13N-2 | | 1,166 | 43 | | | | | |
| | T12-13N-3 | | 1,964 | 182 | | | | | |
| | T12-13N-4 | | 1,343 | 21 | | | | | |
| | T12-13N-5 | | 5,189 | 192 | | | | | |
| | T12-13N-6 | | 854 | 58 | | | | | |
| | T12-13N-7 | | 249 | 8 | | | | | |
| | T12-13N-8 | | 404 | 15 | | | | | |
| | T12-13N-9 | | 486 | 23 | | | | | |
| | T12-13N-10 | | 2,370 | 132 | | | | | |
| | T12-13N-11 | | 1,363 | 67 | | | | | |
| | T12-13N-12 | | 1,717 | 127 | | | | | |
| | T12-13N-13 | | 597 | 13 | | | | | |
| | T12-13N-14 | | 496 | 18 | | | | | |
| | T12-13N-15 | | 1,897 | 116 | | | | | |
| | T12-13N-16 | | 922 | 68 | | | | | |
| | T12-13N-17 | | 1,389 | 77 | | | | | |
| | T12-13N-18 | | 855 | 32 | | | | | |
| | T12-13N-19 | | 925 | 34 | | | | | |
| DMU-N12A | T12-13N-19 | N | 925 | 34 | 925 | 0 | 58 | 37 | 95 |
| DMU-S10B | T12-14S-9 | S | 1,041 | 48 | | | | | |
| DMU-N12B | T14-16N-1 | N | 1,290 | 72 | 6,753 | 43 | 156 | 132 | 288 |
| | T14-16N-2 | | 1,485 | 14 | | | | | |
| | T14-16N-5 | | 816 | 30 | | | | | |
| | T14-16N-6 | | 617 | 11 | | | | | |
| | T14-16N-7 | | 1,559 | 48 | | | | | |
| DMU-N12C | T14-16N-3 | N | 2,052 | 38 | NA | 0 | 38 | 38 | 76 |
| DMU-N12D | T14-16N-4 | N | 418 | 39 | 1,874 | 24 | 44 | 36 | 80 |

**Table F3**
**Near Shore Dredge Design Extents and Volumes**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Dredge Management Unit ID | Dredge Design Subarea Name[1] | Shore[2] | Chemistry-based Design[3] | | Engineered Dredge Prism Design[4] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dredge Polygon Area ($ft^2$) | Neatline Volume (cy) | Dredge Extent [Chem-based polygon+Grading] ($ft^2$) | Volume Left Behind (cy) | Design Prism Volume (cy) | 6-in. Overdredge Volume (cy) | Removal Volume [Prism+ Overdredge] |
| DMU-S13A | T15-17S-1 | S | 790 | 15 | 24783 | 150 | 1276 | 466 | 1742 |
| | T15-17S-2 | | 2,303 | 85 | | | | | |
| | T15-17S-3 | | 2,260 | 112 | | | | | |
| | T15-17S-4 | | 781 | 5 | | | | | |
| | T15-17S-5 | | 1,507 | 251 | | | | | |
| | T15-17S-6 | | 875 | 32 | | | | | |
| | T15-17S-7 | | 914 | 17 | | | | | |
| | T15-17S-8 | | 930 | 63 | | | | | |
| | T15-17S-10 | | 1,708 | 116 | | | | | |
| | T15-17S-12 | | 218 | 28 | | | | | |
| | T15-17S-13 | | 454 | 34 | | | | | |
| | T18-20S-1 | | 6,119 | 227 | | | | | |
| DMU-S15A | T18-20S-2 | | 729 | 36 | 21538 | 68 | 636 | 402 | 1038 |
| | T18-20S-3 | | 965 | 92 | | | | | |
| | T18-20S-4 | | 6,088 | 56 | | | | | |
| | T18-20S-5 | | 3,785 | 58 | | | | | |
| | T18-20S-6 | | 1,622 | 90 | | | | | |
| | T18-20S-7 | | 629 | 43 | | | | | |
| | T18-20S-8 | | 210 | 4 | | | | | |
| | T18-20S-9 | | 543 | 30 | | | | | |
| | T18-20S-10 | | 424 | 8 | | | | | |
| | T18-20S-11 | | 408 | 8 | | | | | |
| | T18-20S-12 | | 202 | 5 | | | | | |
| DMU-S10C | T15-17S-9 | S | 1,590 | 29 | 2,259 | 9 | 40 | 44 | 84 |
| | T15-17S-11 | | 497 | 18 | | | | | |
| DMU-N14A | T17-18N-1 | N | 831 | 8 | NA | 0 | 15 | 16 | 31 |
| DMU-N14B | T17-18N-2 | N | 1,188 | 15 | 4,853 | 41 | 207 | 104 | 311 |
| | T17-18N-3 | | 743 | 34 | | | | | |
| | T17-18N-4 | | 1,516 | 14 | | | | | |
| | T17-18N-5 | | 757 | 56 | | | | | |
| | T17-18N-7 | | 650 | 64 | | | | | |
| DMU-S15A | T18-20S-6 | S | 1,622 | 90 | | | | | |
| DMU-N14C | T19-20N-1 | N | 3,548 | 66 | | | | | |
| DMU-N14C | T19-20N-2 | | 2,773 | 9 | | | | | |
| DMU-N14A | T19-20N-3 | | 5,745 | 106 | | | | | |
| DMU-N14C | T19-20N-4 | | 938 | 35 | | | | | |
| DMU-N14C | T19-20N-5 | | 3,497 | 65 | | | | | |
| DMU-S17A | T20-22S-1 | S | 3,919 | 73 | NA | 0 | 73 | 72 | 145 |
| DMU-S17B | T20-22S-2 | S | 913 | 51 | 1,652 | 30 | 62 | 32 | 94 |
| DMU-S17C | T20-22S-3 | S | 1,128 | 7 | 5,075 | 16 | 278 | 96 | 374 |
| | T20-22S-4 | | 914 | 51 | | | | | |
| | T20-22S-6 | | 1,603 | 178 | | | | | |
| DMU-S17D | T20-22S-5 | S | 2,752 | 17 | 10,057 | 8 | 230 | 193 | 423 |
| | T20-22S-7 | | 2,320 | 43 | | | | | |
| | T20-22S-8 | | 3,589 | 133 | | | | | |
| DMU-N14C | T19-20N-1 | N | 3,548 | 66 | 17,480 | 10 | 314 | 325 | 639 |
| | T19-20N-2 | | 2,773 | 9 | | | | | |
| | T19-20N-3 | | 5,745 | 106 | | | | | |
| | T19-20N-4 | | 938 | 35 | | | | | |
| | T19-20N-5 | | 3,497 | 65 | | | | | |
| DMU-N16A | T20-22N-1 | | 6,200 | 230 | 18,516 | 0 | 596 | 353 | 949 |
| | T20-22N-2 | | 1,816 | 34 | | | | | |
| | T20-22N-3 | | 663 | 25 | | | | | |
| | T20-22N-4 | | 1,024 | 57 | | | | | |
| | T20-22N-5 | | 609 | 23 | | | | | |
| | T20-22N-6 | | 1,367 | 25 | | | | | |
| | T20-22N-7 | | 1,542 | 71 | | | | | |

**Table F3**
**Near Shore Dredge Design Extents and Volumes**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Dredge Management Unit ID | Dredge Design Subarea Name[1] | Shore[2] | Chemistry-based Design[3] | | Engineered Dredge Prism Design[4] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dredge Polygon Area ($ft^2$) | Neatline Volume (cy) | Dredge Extent [Chem-based polygon+Grading] ($ft^2$) | Volume Left Behind (cy) | Design Prism Volume (cy) | 6-in. Overdredge Volume (cy) | Removal Volume [Prism+ Overdredge] |
| DMU-N18A | T20-22N-8 | N | 3,475 | 64 | 11,564 | 31 | 362 | 221 | 583 |
| | T20-22N-9 | | 486 | 18 | | | | | |
| | T20-22N-10 | | 202 | 2 | | | | | |
| | T23-24N-1 | | 724 | 27 | | | | | |
| | T23-24N-2 | | 1,381 | 51 | | | | | |
| | T23-24N-4 | | 509 | 9 | | | | | |
| | T23-24N-5 | | 681 | 76 | | | | | |
| | T23-24N-6 | | 1,102 | 10 | | | | | |
| | T23-24N-7 | | 1,270 | 24 | | | | | |
| | T23-24N-8 | | 920 | 51 | | | | | |
| | T23-24N-9 | | 132 | 5 | | | | | |
| DMU-S19A | T23-24S-1 | S | 7,774 | 144 | 7,774 | 0 | 144 | 144 | 288 |
| DMU-S19B | T23-24S-2 | S | 1,225 | 121 | 5,610 | 84 | 223 | 107 | 330 |
| | T23-24S-3 | | 1,246 | 58 | | | | | |
| | T23-24S-4 | | 434 | 13 | | | | | |
| | T23-24S-5 | | 574 | 43 | | | | | |
| | T23-24S-7 | | 637 | 24 | | | | | |
| | T23-24S-8 | | 390 | 5 | | | | | |
| DMU-S19C | T23-24S-6 | S | 670 | 33 | 1,240 | 6 | 41 | 24 | 65 |
| DMU-N18B | T23-24N-3 | N | 1,007 | 19 | 1,173 | 15 | 22 | 21 | 43 |
| | T23-24N-10 | | 166 | 18 | | | | | |
| DMU-S19D | T24-27S-1 | S | 2,301 | 85 | 2741 | 18 | 75 | 53 | 128 |
| DMU-S19E | T24-27S-2 | S | 240 | 13 | 783 | 1 | 29 | 16 | 45 |
| DMU-S19F | T24-27S-3 | S | 551 | 31 | 1,931 | 1 | 76 | 37 | 113 |
| DMU-N20A | T25-27N-1 | N | 489 | 69 | 8,312 | 0 | 587 | 157 | 744 |
| | T25-27N-2 | | 755 | 56 | | | | | |
| | T25-27N-4 | | 677 | 13 | | | | | |
| | T25-27N-5 | | 2,207 | 109 | | | | | |
| DMU-N20B | T25-27N-3 | N | 880 | 33 | 2,139 | 1 | 59 | 41 | 100 |
| | T25-27N-6 | | 734 | 14 | | | | | |
| DMU-S21A | T28-32S-1 | S | 2,187 | 81 | 27,604 | 8 | 2,360 | 516 | 2,876 |
| | T28-32S-2 | | 1,298 | 96 | | | | | |
| | T28-32S-3 | | 6,088 | 225 | | | | | |
| | T28-32S-4 | | 373 | 91 | | | | | |
| | T28-32S-5 | | 2,224 | 330 | | | | | |
| | T28-32S-6 | | 2,885 | 53 | | | | | |
| | T28-32S-7 | | 1,353 | 75 | | | | | |
| | T28-32S-8 | | 959 | 80 | | | | | |
| | T28-32S-28 | | 830 | 15 | | | | | |
| | T28-32S-29 | | 1,059 | 29 | | | | | |
| | T28-32S-30 | | 910 | 104 | | | | | |
| | T28-32S-34 | | 360 | 40 | | | | | |
| | T28-32S-35 | | 837 | 108 | | | | | |
| | T28-32S-36 | | 324 | 72 | | | | | |
| | T28-32S-37 | | 890 | 66 | | | | | |
| | T28-32S-39 | | 1,131 | 181 | | | | | |

**Table F3**
**Near Shore Dredge Design Extents and Volumes**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Dredge Management Unit ID | Dredge Design Subarea Name[1] | Shore[2] | Chemistry-based Design[3] | | Engineered Dredge Prism Design[4] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dredge Polygon Area ($ft^2$) | Neatline Volume (cy) | Dredge Extent [Chem-based polygon+Grading] ($ft^2$) | Volume Left Behind (cy) | Design Prism Volume (cy) | 6-in. Overdredge Volume (cy) | Removal Volume [Prism+ Overdredge] |
| DMU-S23A | T28-32S-9 | S | 1,701 | 32 | 16,387 | 75 | 1,174 | 305 | 1,479 |
| | T28-32S-10 | | 501 | 42 | | | | | |
| | T28-32S-11 | | 630 | 35 | | | | | |
| | T28-32S-12 | | 637 | 24 | | | | | |
| | T28-32S-14 | | 1,792 | 166 | | | | | |
| | T28-32S-16 | | 991 | 128 | | | | | |
| | T28-32S-18 | | 12,236 | 1,360 | | | | | |
| | T28-32S-19 | | 1,801 | 100 | | | | | |
| | T28-32S-32 | | 899 | 50 | | | | | |
| | T28-32S-38 | | 718 | 27 | | | | | |
| | T28-32S-40 | | 74 | 6 | | | | | |
| DMU-S25A | T28-32S-20 | | 833 | 128 | 20,790 | 0 | 2,265 | 385 | 2,650 |
| | T28-32S-22 | | 2,280 | 310 | | | | | |
| | T28-32S-23 | | 3,188 | 413 | | | | | |
| DMU-S26A | T28-32S-24 | | 3,035 | 506 | 15,516 | 0 | 2,094 | 287 | 2,381 |
| | T28-32S-25 | | 2,744 | 356 | | | | | |
| | T28-32S-33 | | 4,226 | 313 | | | | | |
| DMU-S27A | T28-32S-26 | | 6,371 | 1,180 | 17,017 | 0 | 2,240 | 315 | 2,555 |
| | T28-32S-27 | | 3,788 | 631 | | | | | |
| DMU-N20C | T28-33N-1 | N | 2,096 | 58 | 21,112 | 29 | 940 | 393 | 1,333 |
| | T28-33N-2 | | 5,350 | 198 | | | | | |
| | T28-33N-3 | | 5,337 | 395 | | | | | |
| | T28-33N-4 | | 2,783 | 52 | | | | | |
| | T28-33N-5 | | 1,740 | 97 | | | | | |
| | T28-33N-6 | | 1,525 | 66 | | | | | |
| | T28-33N-32 | | 1,113 | 62 | | | | | |
| DMU-N22A | T28-33N-7 | | 1,248 | 123 | 34,613 | 29 | 1,424 | 646 | 2,070 |
| | T28-33N-8 | | 3,065 | 123 | | | | | |
| | T28-33N-9 | | 426 | 16 | | | | | |
| | T28-33N-10 | | 440 | 33 | | | | | |
| | T28-33N-11 | | 5,000 | 278 | | | | | |
| | T28-33N-12 | | 1,385 | 94 | | | | | |
| | T28-33N-13 | | 3,696 | 137 | | | | | |
| | T28-33N-14 | | 810 | 40 | | | | | |
| | T28-33N-15 | | 1,044 | 19 | | | | | |
| | T28-33N-16 | | 969 | 44 | | | | | |
| | T28-33N-17 | | 2,148 | 73 | | | | | |
| | T28-33N-18 | | 3,054 | 57 | | | | | |
| | T28-33N-19 | | 2,713 | 50 | | | | | |
| | T28-33N-20 | | 3,531 | 150 | | | | | |
| | T28-33N-34 | | 1,447 | 45 | | | | | |
| DMU-N24A | T28-33N-22 | | 10,819 | 401 | 41,857 | 2 | 1,183 | 753 | 1,936 |
| | T28-33N-23 | | 6,064 | 337 | | | | | |
| | T28-33N-25 | | 1,777 | 33 | | | | | |
| | T28-33N-26 | | 8,008 | 148 | | | | | |
| | T28-33N-27 | | 2,015 | 62 | | | | | |
| | T28-33N-28 | | 1,890 | 70 | | | | | |
| | T28-33N-29 | | 1,846 | 23 | | | | | |
| | T28-33N-30 | | 7,409 | 46 | | | | | |
| DMU-S28A | T33-34S-1 | S | 2,689 | 50 | 2,949 | 0 | 52 | 57 | 109 |
| DMU-N24B | T28-33N-31 | N | 1,231 | 68 | 3,500 | 18 | 130 | 66 | 196 |
| | T28-33N-33 | | 1,808 | 67 | | | | | |
| DMU-S28B | T33-34S-2 | S | 814 | 136 | 11,506 | 6 | 631 | 217 | 848 |
| | T33-34S-3 | | 3,799 | 141 | | | | | |
| | T33-34S-4 | | 815 | 45 | | | | | |
| | T33-34S-5 | | 932 | 29 | | | | | |
| | T33-34S-6 | | 1,557 | 58 | | | | | |
| DMU-S28C | T34-36S-1 | S | 2,372 | 44 | 3,314 | 0 | 119 | 62 | 181 |
| | T34-36S-2 | | 550 | 37 | | | | | |

**Table F3**
**Near Shore Dredge Design Extents and Volumes**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Dredge Management Unit ID | Dredge Design Subarea Name[1] | Shore[2] | Chemistry-based Design[3] | | Engineered Dredge Prism Design[4] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dredge Polygon Area ($ft^2$) | Neatline Volume (cy) | Dredge Extent [Chem-based polygon+Grading] ($ft^2$) | Volume Left Behind (cy) | Design Prism Volume (cy) | 6-in. Overdredge Volume (cy) | Removal Volume [Prism+ Overdredge] |
| DMU-S28D | T34-36S-10 | S | 1,017 | 19 | NA | 0 | 19 | 19 | 38 |
| DMU-S28E | T34-36S-3 | S | 4,548 | 42 | 4,718 | 0 | 43 | 90 | 133 |
| DMU-S29A | T34-36S-4 | S | 2,342 | 72 | 17,690 | 1 | 582 | 335 | 917 |
| | T34-36S-5 | | 1,927 | 143 | | | | | |
| | T34-36S-6 | | 1,221 | 43 | | | | | |
| | T34-36S-7 | | 1,729 | 85 | | | | | |
| | T34-36S-8 | | 2,688 | 50 | | | | | |
| | T34-36S-9 | | 2,096 | 19 | | | | | |
| | T34-36S-11 | | 3,595 | 67 | | | | | |
| | T34-36S-12 | | 352 | 13 | | | | | |
| DMU-N30A | T36-37N-2 | N | 265 | 2 | 265 | 0 | 2 | 5 | 7 |
| DMU-N30B | T36-37N-1 | N | 2,910 | 54 | NA | 0 | 54 | 53 | 107 |
| DMU-S29B | T37-38S-1 | S | 1,615 | 48 | 2,636 | 0 | 73 | 60 | 133 |
| DMU-S29C | T37-38S-2 | S | 1,814 | 67 | 6,427 | 0 | 155 | 122 | 277 |
| | T37-38S-3 | | 3,734 | 69 | | | | | |
| DMU-S29D | T37-38S-4 | S | 3,311 | 41 | 11,553 | 0 | 285 | 218 | 503 |
| | T37-38S-5 | | 1,957 | 109 | | | | | |
| | T37-38S-6 | | 5,372 | 99 | | | | | |
| DMU-S32A | T39-42S-1 | S | 1,913 | 35 | 2,070 | 0 | 37 | 40 | 77 |
| DMU-N30C | T37-40N-1 | N | 5,214 | 193 | 23,293 | 0 | 1,148 | 435 | 1,583 |
| | T37-40N-2 | | 1,747 | 94 | | | | | |
| | T37-40N-3 | | 5,081 | 376 | | | | | |
| | T37-40N-4 | | 2,851 | 53 | | | | | |
| DMU-N31A | T37-40N-5 | | 18,913 | 1,051 | 25,190 | 0 | 1,171 | 469 | 1,640 |
| | T37-40N-6 | | 1,693 | 125 | | | | | |
| | T37-40N-7 | | 2,075 | 77 | | | | | |
| | T37-40N-8 | | 1,347 | 25 | | | | | |
| | T37-40N-11 | | 2,946 | 36 | | | | | |
| DMU-S32B | T39-42S-9 | S | 153 | 5 | 312 | 0 | 9 | 6 | 15 |
| DMU-S32C | T39-42S-2 | S | 1,651 | 41 | 8,899 | 3 | 237 | 169 | 406 |
| | T39-42S-4 | | 1,347 | 42 | | | | | |
| | T39-42S-3 | | 2,409 | 89 | | | | | |
| | T39-42S-5 | | 1,903 | 35 | | | | | |
| DMU-N33A | T37-40N-9 | N | 3,720 | 207 | 9,527 | 57 | 408 | 184 | 592 |
| | T37-40N-10 | | 4,086 | 141 | | | | | |
| DMU-N34A | T41-42N-1 | N | 4,337 | 241 | 27,991 | 1 | 1,841 | 522 | 2,363 |
| | T41-42N-2 | | 7,682 | 694 | | | | | |
| | T41-42N-3 | | 5,832 | 415 | | | | | |
| | T41-42N-15 | | 2,057 | 76 | | | | | |
| DMU-N36A | T41-42N-4 | | 12,596 | 479 | 41,174 | 8 | 2,093 | 772 | 2,865 |
| | T41-42N-5 | | 1,504 | 56 | | | | | |
| | T41-42N-6 | | 2,686 | 204 | | | | | |
| | T41-42N-7 | | 5,161 | 476 | | | | | |
| | T41-42N-8 | | 5,504 | 102 | | | | | |
| | T41-42N-9 | | 13,423 | 497 | | | | | |
| DMU-S35A | T39-42S-6 | S | 2,287 | 169 | 19,970 | 56 | 1,432 | 379 | 1,811 |
| | T39-42S-7 | | 3,746 | 416 | | | | | |
| | T39-42S-8 | | 5,865 | 543 | | | | | |
| DMU-N37A | T41-42N-10 | N | 2,590 | 158 | 31,251 | 0 | 1,088 | 589 | 1,677 |
| | T41-42N-11 | | 20,600 | 661 | | | | | |
| | T41-42N-12 | | 3,371 | 62 | | | | | |
| | T41-42N-13 | | 1,868 | 104 | | | | | |
| DMU-N39A | T41-42N-14 | N | 3,094 | 172 | 4,427 | 0 | 218 | 84 | 302 |
| DMU-S38A | T43-46S-1 | S | 4,889 | 75 | 5,235 | 0 | 78 | 100 | 178 |
| DMU-N39B | T43-46N-1 | N | 3,198 | 178 | 10,664 | 0 | 341 | 201 | 542 |
| | T43-46N-2 | | 5,541 | 103 | | | | | |

**Table F3**
**Near Shore Dredge Design Extents and Volumes**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

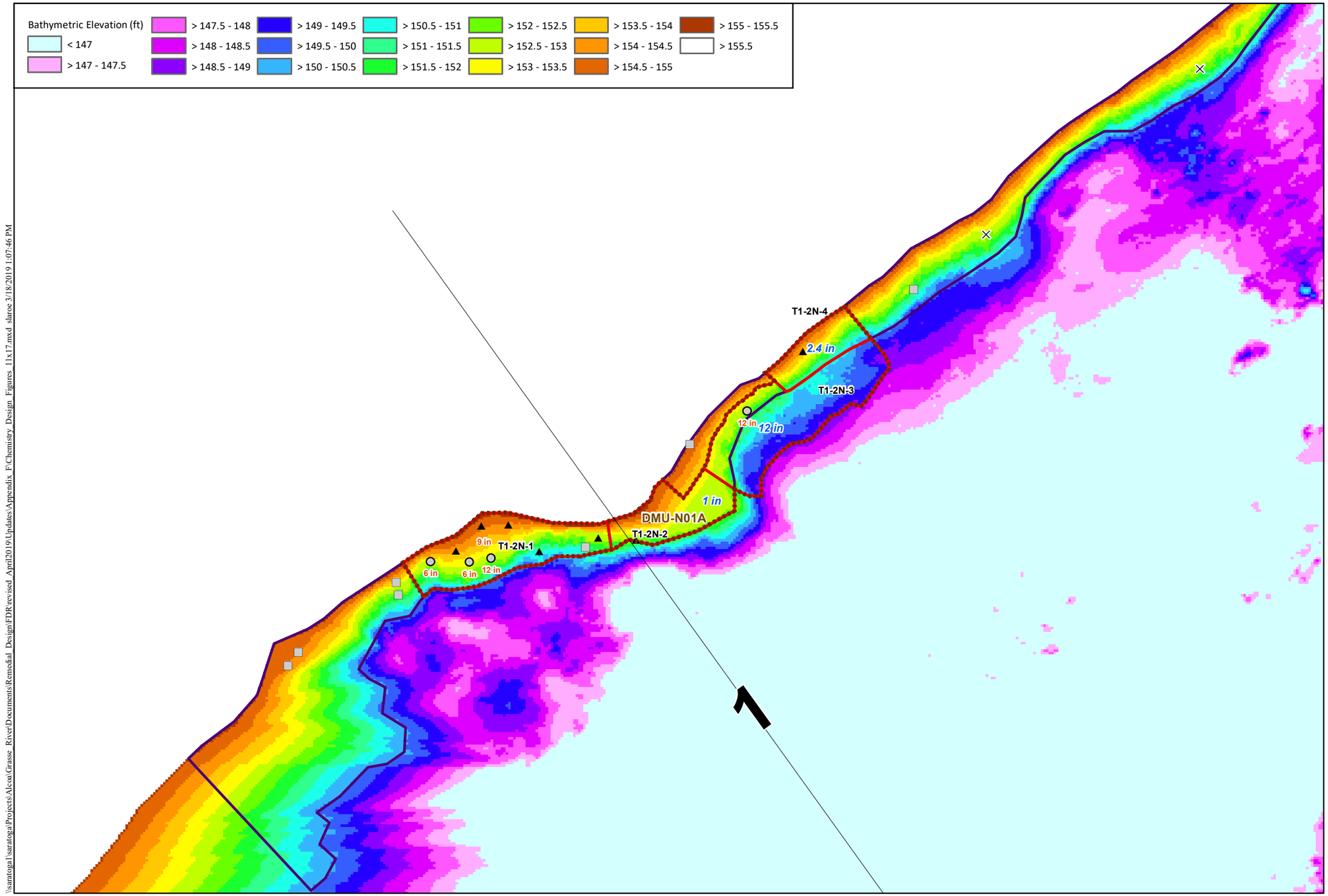
| Dredge Management Unit ID | Dredge Design Subarea Name[1] | Shore[2] | Chemistry-based Design[3] | | Engineered Dredge Prism Design[4] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dredge Polygon Area ($ft^2$) | Neatline Volume (cy) | Dredge Extent [Chem-based polygon+Grading] ($ft^2$) | Volume Left Behind (cy) | Design Prism Volume (cy) | 6-in. Overdredge Volume (cy) | Removal Volume [Prism+ Overdredge] |
| DMU-S38B | T43-46S-2 | S | 5,130 | 285 | 13,255 | 0 | 555 | 256 | 811 |
| | T43-46S-3 | | 3,610 | 134 | | | | | |
| | T43-46S-17 | | 384 | 14 | | | | | |
| DMU-S40A | T43-46S-4 | S | 1,257 | 136 | 38,750 | 0 | 2,398 | 722 | 3,120 |
| | T43-46S-5 | | 742 | 16 | | | | | |
| | T43-46S-6 | | 3,236 | 120 | | | | | |
| | T43-46S-7 | | 21,488 | 398 | | | | | |
| | T43-46S-14 | | 1,514 | 85 | | | | | |
| | T43-46S-9 | | 1,518 | 84 | | | | | |
| DMU-S41A | T43-46S-8 | | 46,636 | 4,349 | 32,783 | 0 | 2,454 | 612 | 3,066 |
| | T43-46S-10 | | 4,682 | 173 | | | | | |
| DMU-S42A | T43-46S-12 | | 5,594 | 207 | 33,770 | 0 | 2,289 | 631 | 2,920 |
| | T43-46S-13 | | 3,434 | 64 | | | | | |
| | T43-46S-15 | | 490 | 36 | | | | | |
| | T43-46S-16 | | 7,585 | 421 | | | | | |
| DMU-N43A | T47-50N-1 | N | 3,335 | 31 | NA | 0 | 31 | 62 | 93 |
| DMU-S44A | T47-52S-1 | S | 6,575 | 122 | 12,691 | 0 | 477 | 238 | 715 |
| | T47-52S-2 | | 5,004 | 278 | | | | | |
| DMU-N43B | T47-50N-2 | N | 2,252 | 42 | NA | 0 | 42 | 41 | 83 |
| DMU-S44B | T47-52S-3 | S | 7,800 | 385 | 11,004 | 0 | 474 | 213 | 687 |
| DMU-N43C | T47-50N-3 | N | 3,124 | 347 | 7,917 | 9 | 642 | 145 | 787 |
| | T47-50N-4 | | 391 | 6 | | | | | |
| DMU-N43D | T47-50N-5 | N | 1,928 | 36 | 12,803 | 0 | 517 | 249 | 766 |
| | T47-50N-6 | | 5,339 | 297 | | | | | |
| DMU-N43E | T47-50N-7 | N | 2,995 | 111 | 7542 | 0 | 202 | 142 | 344 |
| | T47-50N-8 | | 3,734 | 69 | | | | | |
| DMU-S44C | T47-52S-4 | S | 2,508 | 131 | 20,051 | 13 | 425 | 374 | 799 |
| | T47-52S-5 | | 14,323 | 265 | | | | | |
| | T47-52S-6 | | 2,539 | 24 | | | | | |
| DMU-N45A | T51-54N-1 | N | 981 | 91 | 2,423 | 1 | 154 | 48 | 202 |
| DMU-N45B | T51-54N-2 | N | 2,840 | 53 | 3,122 | 0 | 56 | 59 | 116 |
| DMU-N45C | T51-54N-3 | N | 7,405 | 411 | 13,394 | 0 | 627 | 256 | 883 |
| | T51-54N-4 | | 454 | 28 | | | | | |
| | T51-54N-5 | | 1,821 | 34 | | | | | |
| DMU-S46A | T53-56S-1 | S | 4,955 | 46 | 26,785 | 0 | 1,067 | 504 | 1,571 |
| | T53-56S-2 | | 5,186 | 192 | | | | | |
| | T53-56S-3 | | 12,189 | 677 | | | | | |
| DMU-N47A | T55-57N-1 | N | 3,231 | 60 | 8,524 | 20 | 243 | 163 | 406 |
| | T55-57N-3 | | 1,168 | 43 | | | | | |
| | T55-57N-4 | | 1,682 | 93 | | | | | |
| DMU-N47B | T55-57N-5 | N | 1,113 | 21 | 1,326 | 0 | 23 | 26 | 49 |
| DMU-N47C | T58-60N-1 | N | 1,491 | 55 | 2,490 | 1 | 78 | 48 | 126 |
| DMU-N47D | T58-60N-2 | N | 2,778 | 51 | 3,735 | 8 | 109 | 74 | 183 |
| | T58-60N-3 | | 581 | 43 | | | | | |
| DMU-S48A | T57-62S-1 | S | 995 | 18 | 1,269 | 0 | 20 | 22 | 42 |
| DMU-S48B | T57-62S-2 | S | 2,474 | 46 | 2,793 | 0 | 49 | 54 | 103 |
| DMU-N49A | T58-60N-4 | N | 3,004 | 111 | 36,081 | 0 | 1,744 | 675 | 2,419 |
| | T58-60N-5 | | 3,055 | 283 | | | | | |
| | T58-60N-6 | | 2,817 | 209 | | | | | |
| | T58-60N-7 | | 15,586 | 577 | | | | | |
| | T58-60N-8 | | 6,245 | 347 | | | | | |
| DMU-N50A | T61-64N-1 | N | 3,791 | 70 | 3,791 | 0 | 70 | 70 | 140 |
| DMU-N50B | T61-64N-2 | N | 710 | 13 | 870 | 0 | 15 | 17 | 32 |
| DMU-S51A | T63-64S-1 | S | 2,728 | 152 | 4,166 | 0 | 195 | 80 | 275 |

**Table F3**
**Near Shore Dredge Design Extents and Volumes**

**Final Design Report**
**Grasse River Study Area, Massena, New York**

| Dredge Management Unit ID | Dredge Design Subarea Name[1] | Shore[2] | Chemistry-based Design[3] | | Engineered Dredge Prism Design[4] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dredge Polygon Area ($ft^2$) | Neatline Volume (cy) | Dredge Extent [Chem-based polygon+Grading] ($ft^2$) | Volume Left Behind (cy) | Design Prism Volume (cy) | 6-in. Overdredge Volume (cy) | Removal Volume [Prism+ Overdredge] |
| DMU-N50C | T61-64N-3 | N | 1,351 | 50 | 2,245 | 2 | 129 | 43 | 172 |
| | T61-64N-4 | | 274 | 31 | | | | | |
| DMU-N50D | T65-67N-1 | N | 2,481 | 46 | 2,713 | 0 | 49 | 51 | 100 |
| DMU-N50E | T65-67N-2 | N | 6,077 | 113 | 6,568 | 0 | 117 | 126 | 243 |
| DMU-S52A | T65-69S-1 | S | 3,612 | 134 | 26,831 | 0 | 989 | 502 | 1,491 |
| | T65-69S-2 | | 6,565 | 122 | | | | | |
| | T65-69S-3 | | 3,946 | 219 | | | | | |
| | T65-69S-4 | | 5,018 | 186 | | | | | |
| | T65-69S-5 | | 3,321 | 185 | | | | | |
| DMU-N53A | T65-67N-3 | N | 4,930 | 91 | 29,622 | 8 | 953 | 553 | 1,506 |
| | T65-67N-4 | | 24,417 | 904 | | | | | |
| DMU-N54A | T65-67N-5 | | 43,888 | 813 | 47,420 | 3 | 1,021 | 884 | 1,905 |
| DMU-S52B | T65-69S-6 | S | 2,516 | 78 | 5,601 | 0 | 204 | 107 | 311 |
| | T65-69S-7 | | 1,589 | 59 | | | | | |
| DMU-S52C | T65-69S-8 | S | 3,197 | 99 | 7,432 | 3 | 211 | 143 | 354 |
| | T65-69S-9 | | 1,760 | 33 | | | | | |
| | T65-69S-10 | | 1,279 | 47 | | | | | |
| DMU-N55A | T68-69N-1 | N | 1,804 | 67 | 2,490 | 0 | 84 | 48 | 132 |
| DMU-N55B | T68-69N-2 | N | 2,683 | 25 | 2,863 | 0 | 26 | 55 | 81 |
| DMU-N55C | T70-72N-1 | N | 2,634 | 98 | 18,174 | 16 | 1,021 | 340 | 1,361 |
| | T70-72N-2 | | 2,630 | 146 | | | | | |
| | T70-72N-3 | | 1,192 | 11 | | | | | |
| | T70-72N-4 | | 1,174 | 87 | | | | | |
| | T70-72N-5 | | 1,129 | 125 | | | | | |
| | T70-72N-6 | | 1,223 | 91 | | | | | |
| | T70-72N-7 | | 1,138 | 21 | | | | | |
| | T70-72N-8 | | 2,551 | 94 | | | | | |
| | T70-72N-9 | | 1,323 | 123 | | | | | |
| DMU-S56A | T69-72S-1 | S | 5,287 | 196 | 6,792 | 0 | 237 | 138 | 365 |
| **Total** | | | **1,158,260** | **51,682** | **1,353,378** | **1,433** | **63,518** | **25,849** | **89,358** |

Notes:
1. Design area and subarea names correspond to the chemistry-based design presented in Table F1.
2. Shoreline: N = North; S = South
3. Chemistry-based design does not account for grading applied for engineering considerations (e.g., slope stability).
4. Extent and volumes resulting from the 3D grading applied to each dredge area; resulting from engineering considerations outlined in Table F-2. Assumes 6 inches for potential over-dredging.
cy = cubic yard
$ft^2$ = square feet
in = inches




## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-1**
Final Design of Chemistry-based Neatline Surface - Area T1-2N
Final Design Report
Grasse River Project/Arconic

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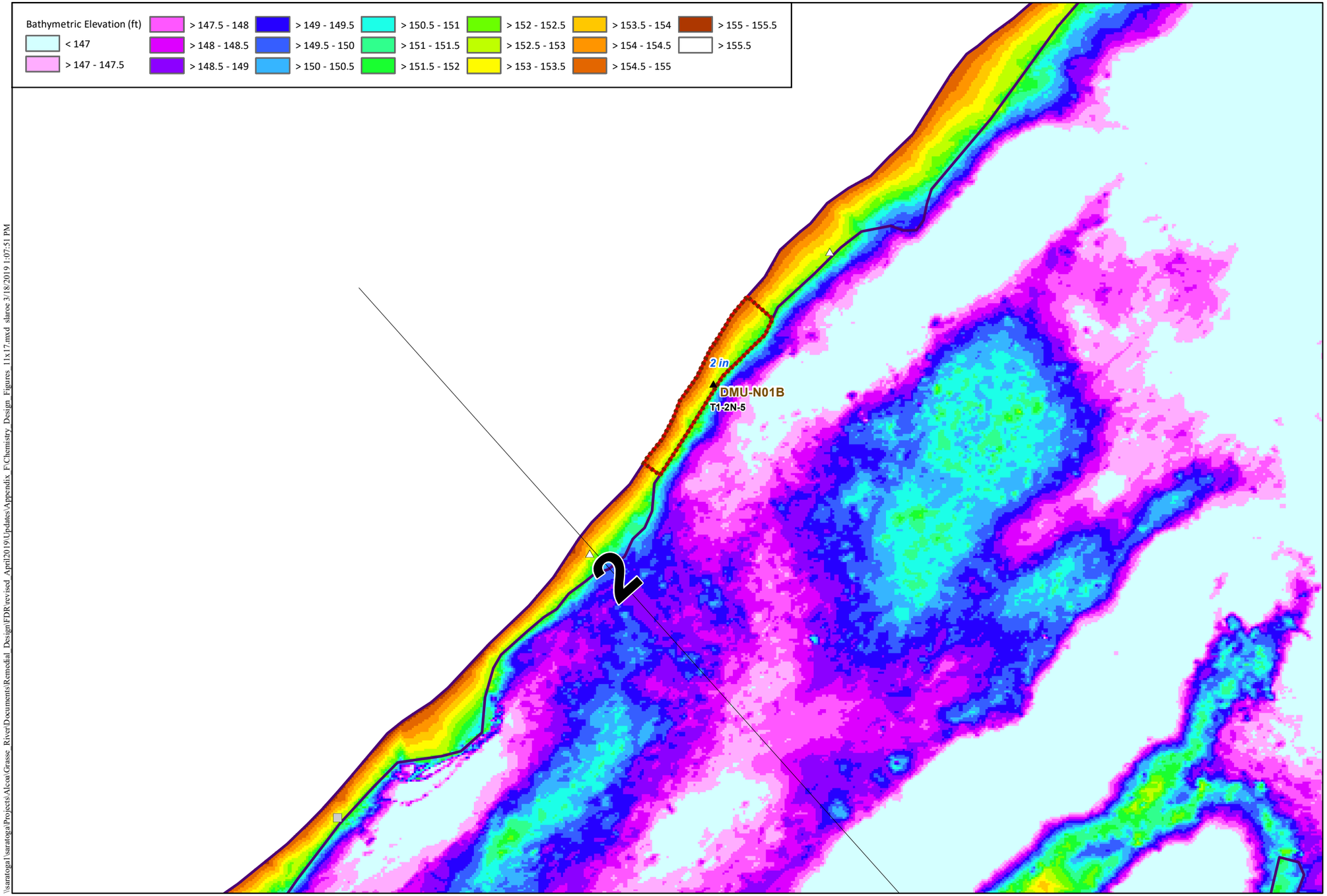
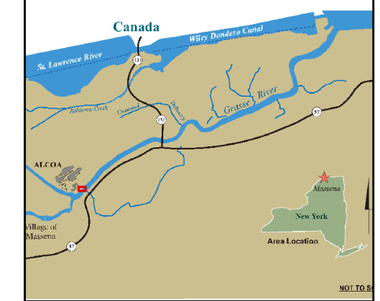



## Locator Map




**NOTES:**

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-2**
Final Design of Chemistry-based Neatline Surface - Area T1-2N
Final Design Report
Grasse River Project/Arconic

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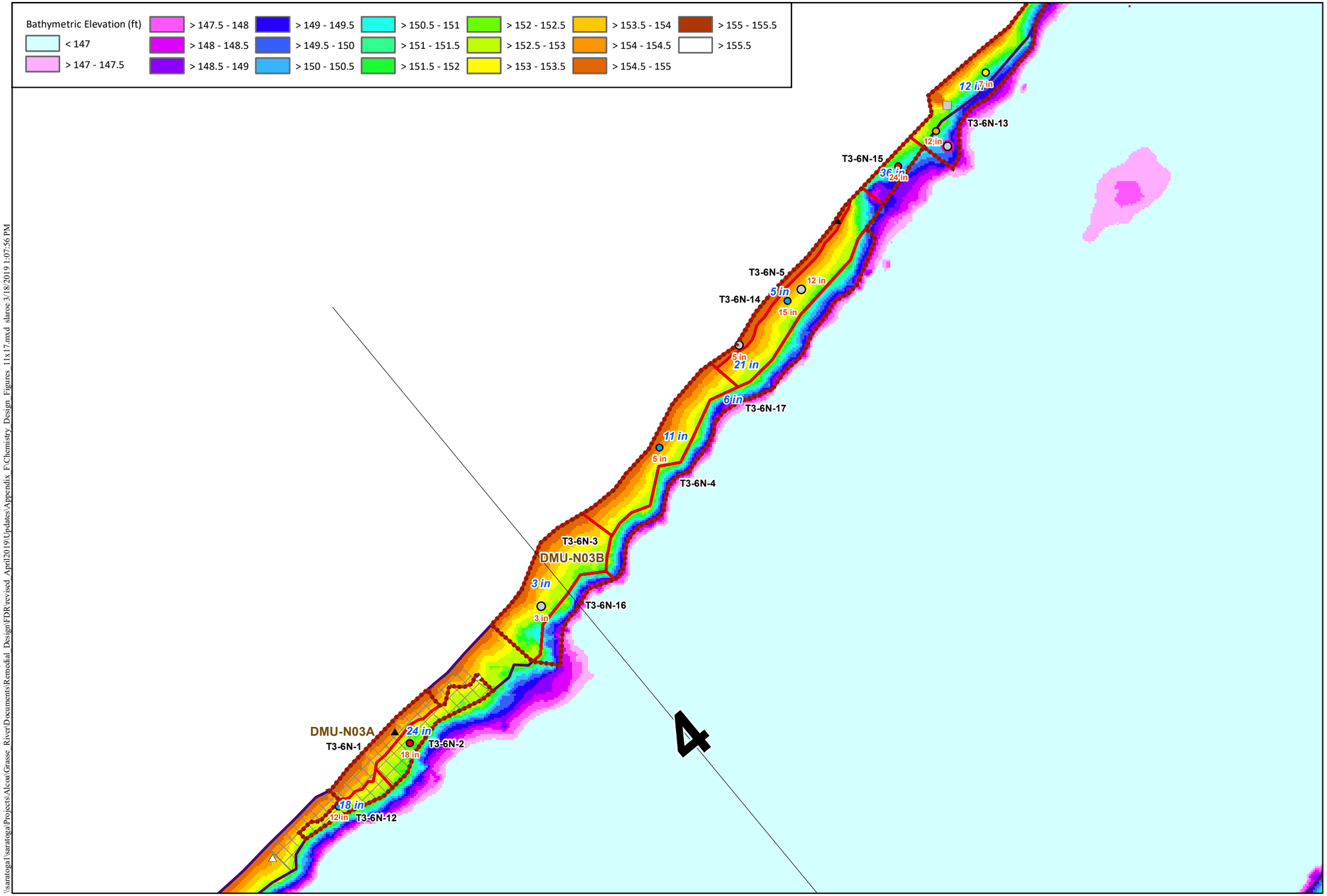
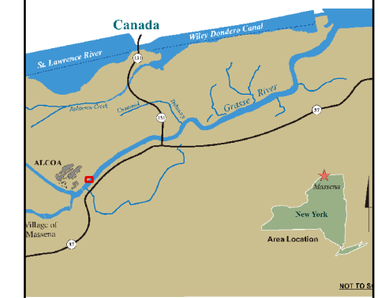



## Locator Map




**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-3**
Final Design of Chemistry-based Neatline Surface - Area T3-6N
Final Design Report
Grasse River Project/Arconic

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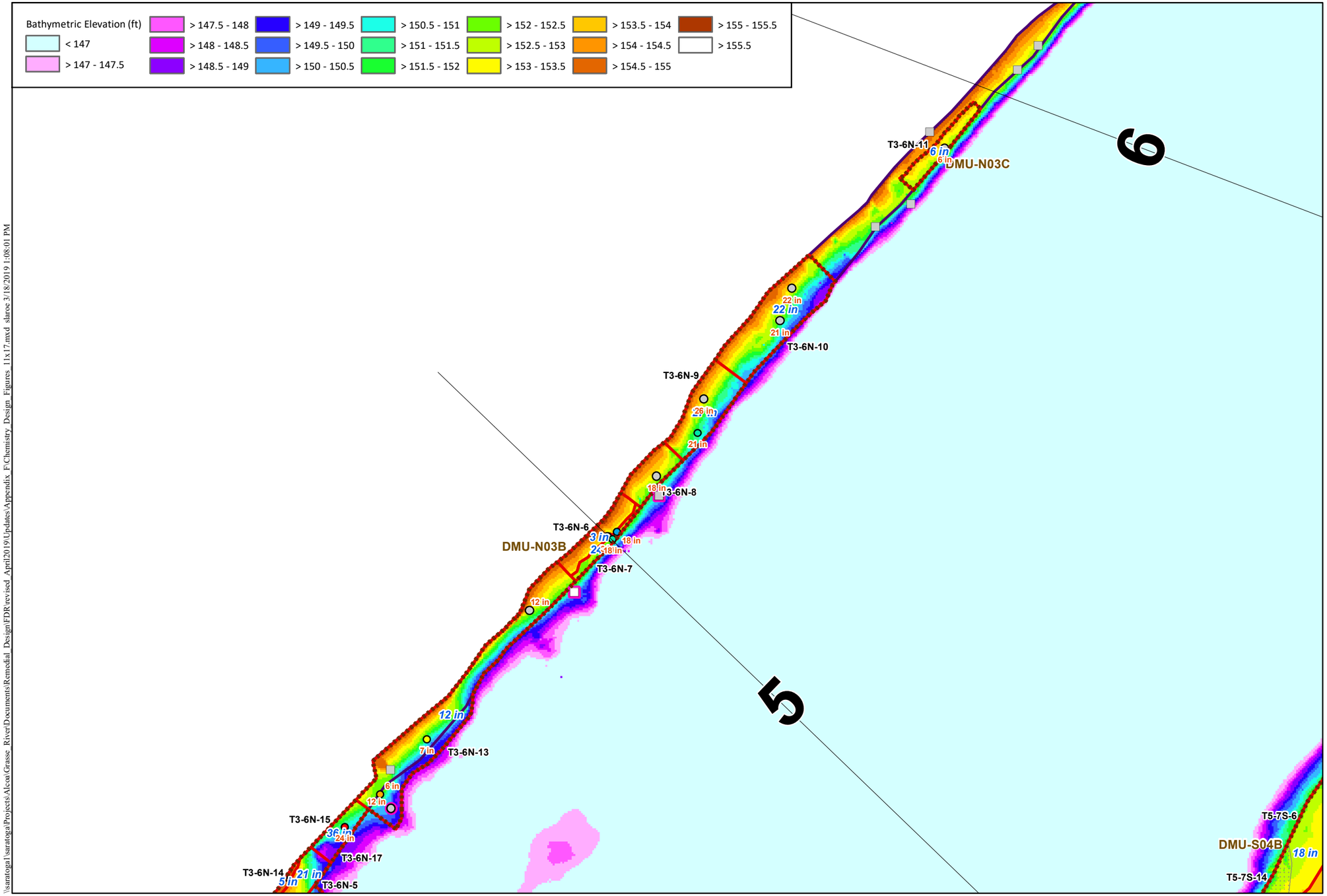


## Locator Map

**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-4**
Final Design of Chemistry-based Neatline Surface - Area T3-6N
Final Design Report
Grasse River Project/Arconic

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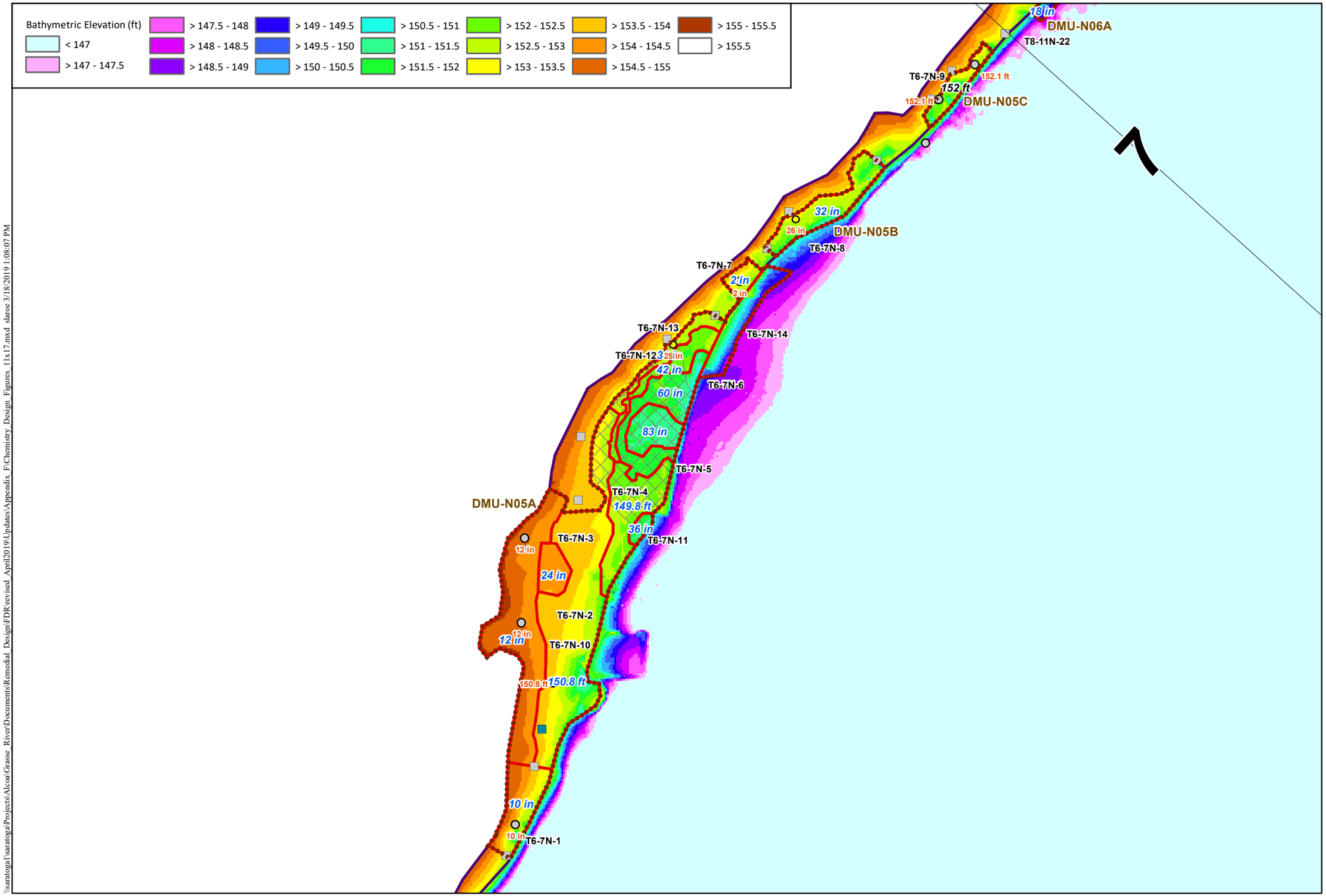
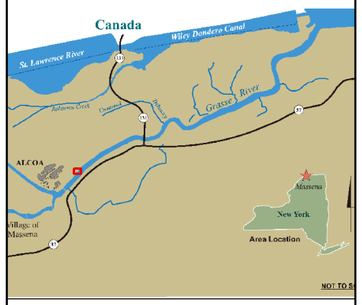



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-5**
Final Design of Chemistry-based Neatline Surface - Area T6-7N
Final Design Report
Grasse River Project/Arconic

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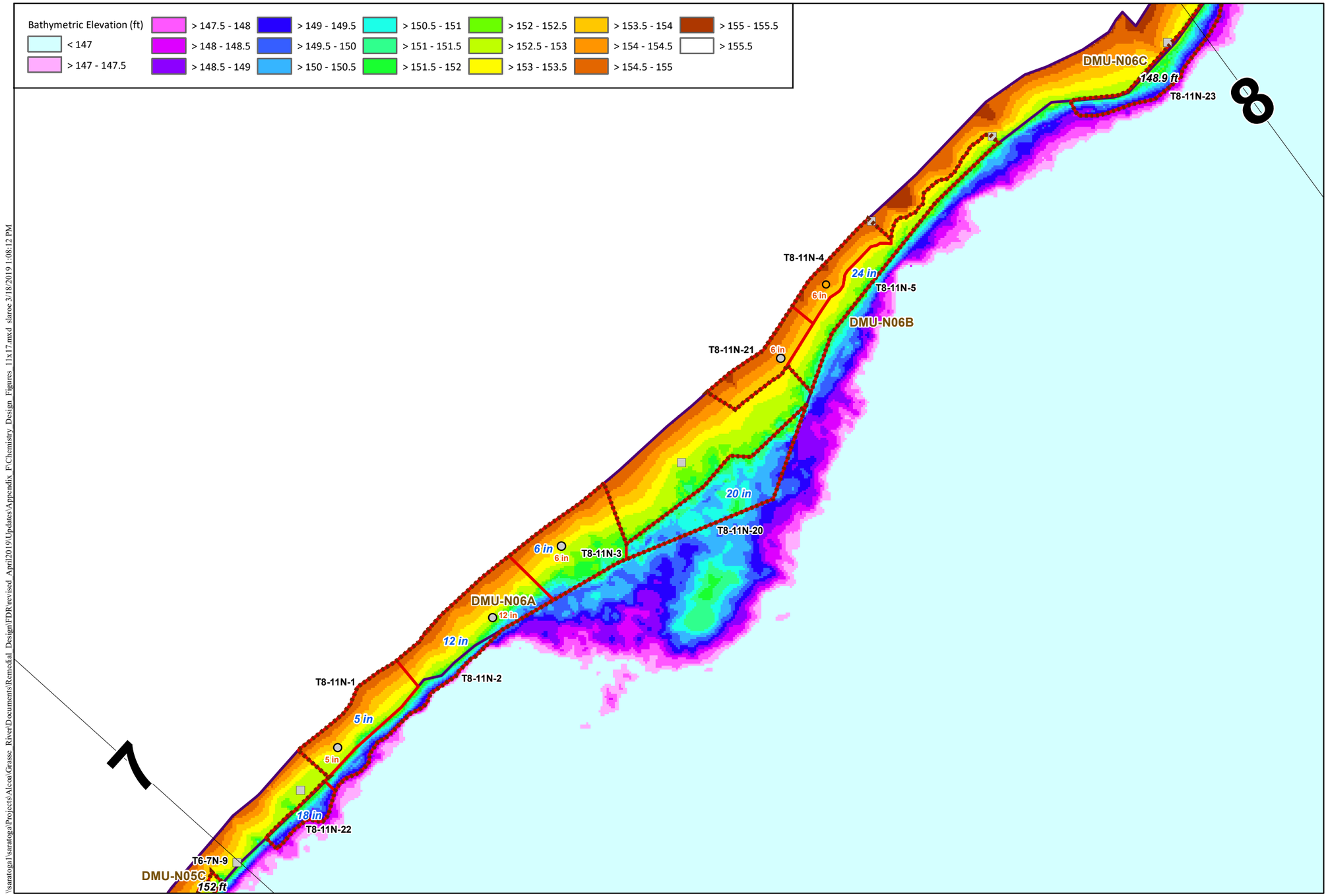


## Locator Map

**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-6**
Final Design of Chemistry-based Neatline Surface - Area T8-11N
Final Design Report
Grasse River Project/Arconic

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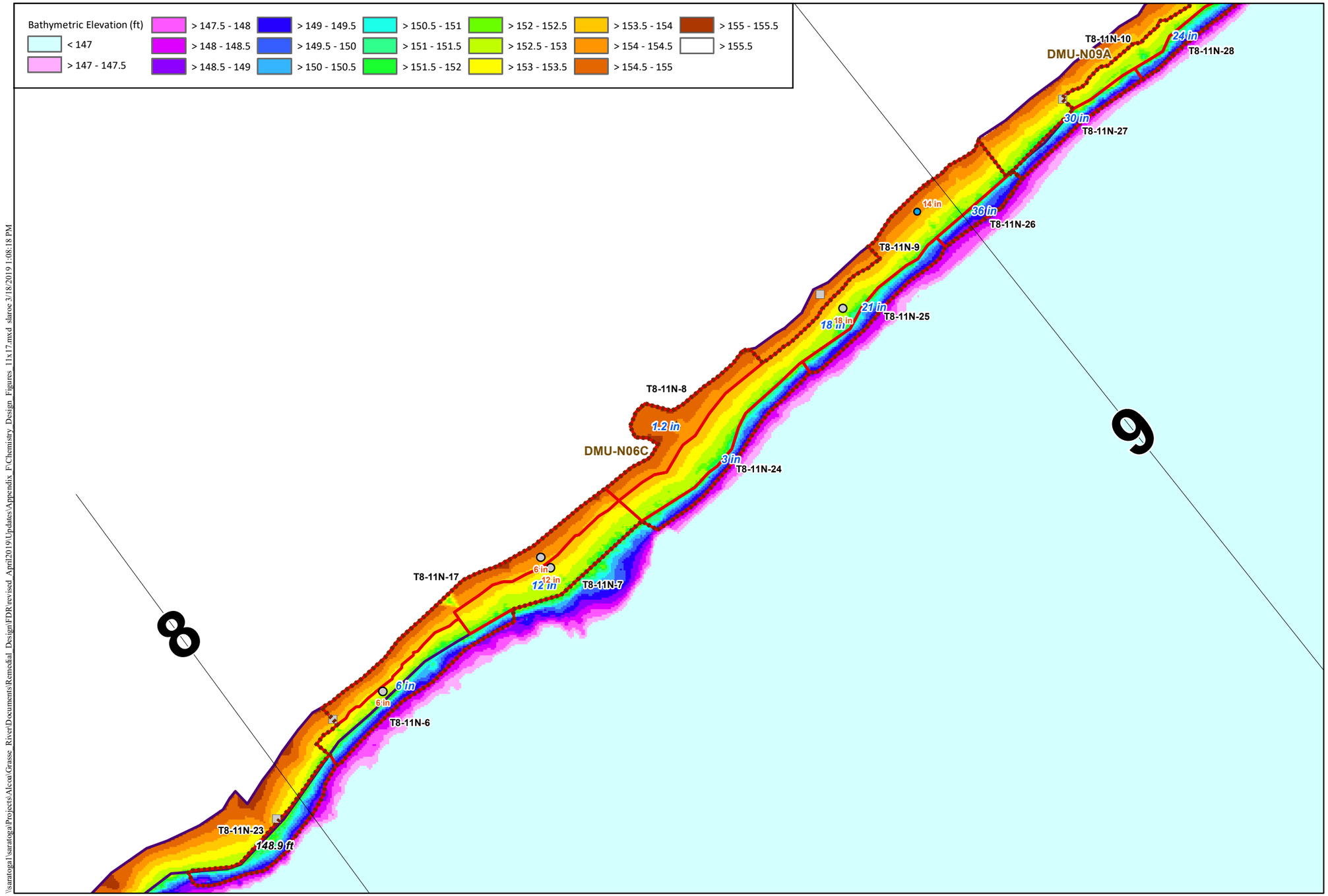


## Locator Map

**NOTES:**

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-7**
Final Design of Chemistry-based Neatline Surface - Area T8-11N
Final Design Report
Grasse River Project/Arconic

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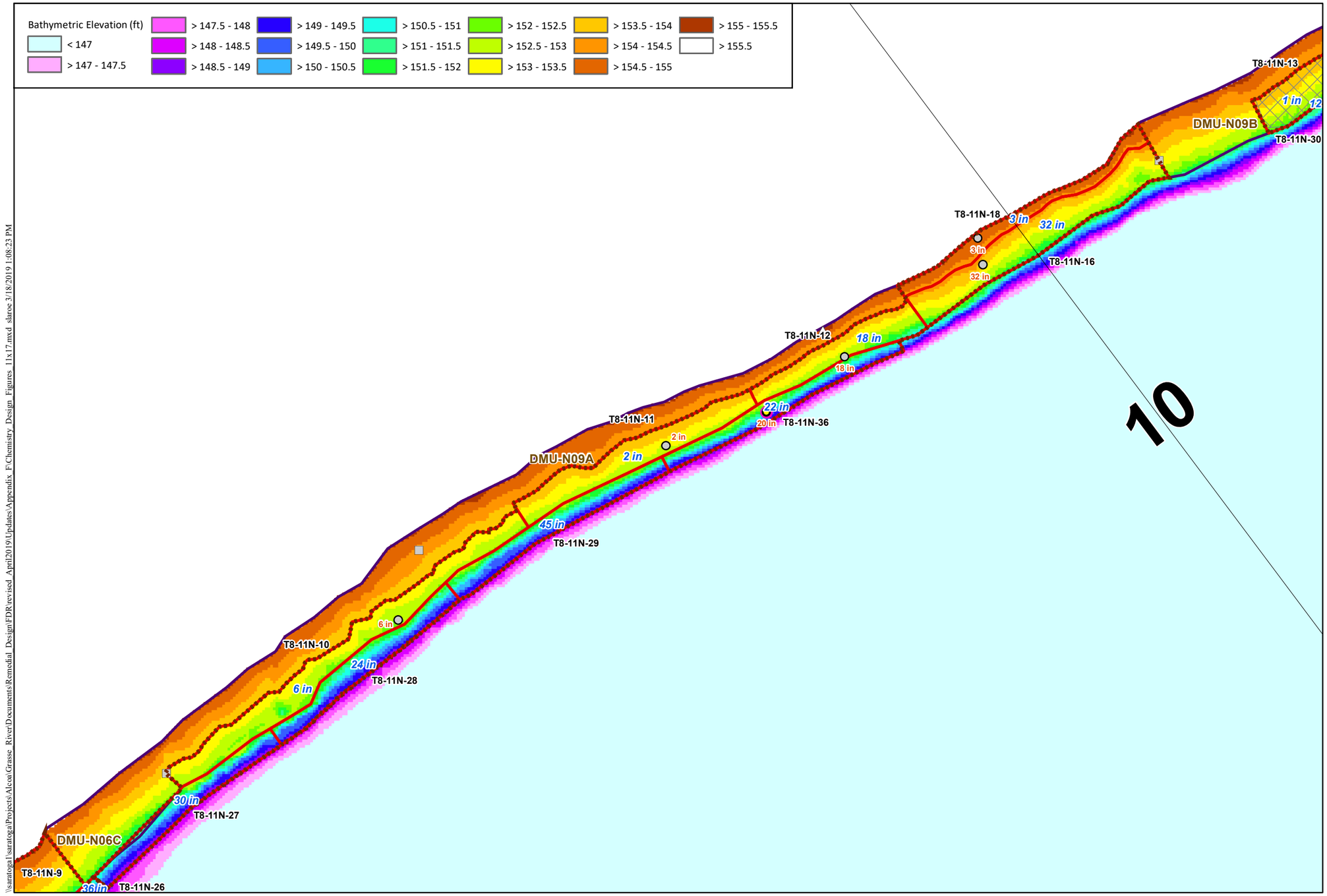


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 10 20 40 Feet

**Figure F1-8**
Final Design of Chemistry-based Neatline Surface - Area T8-11N
Final Design Report
Grasse River Project/Arconic

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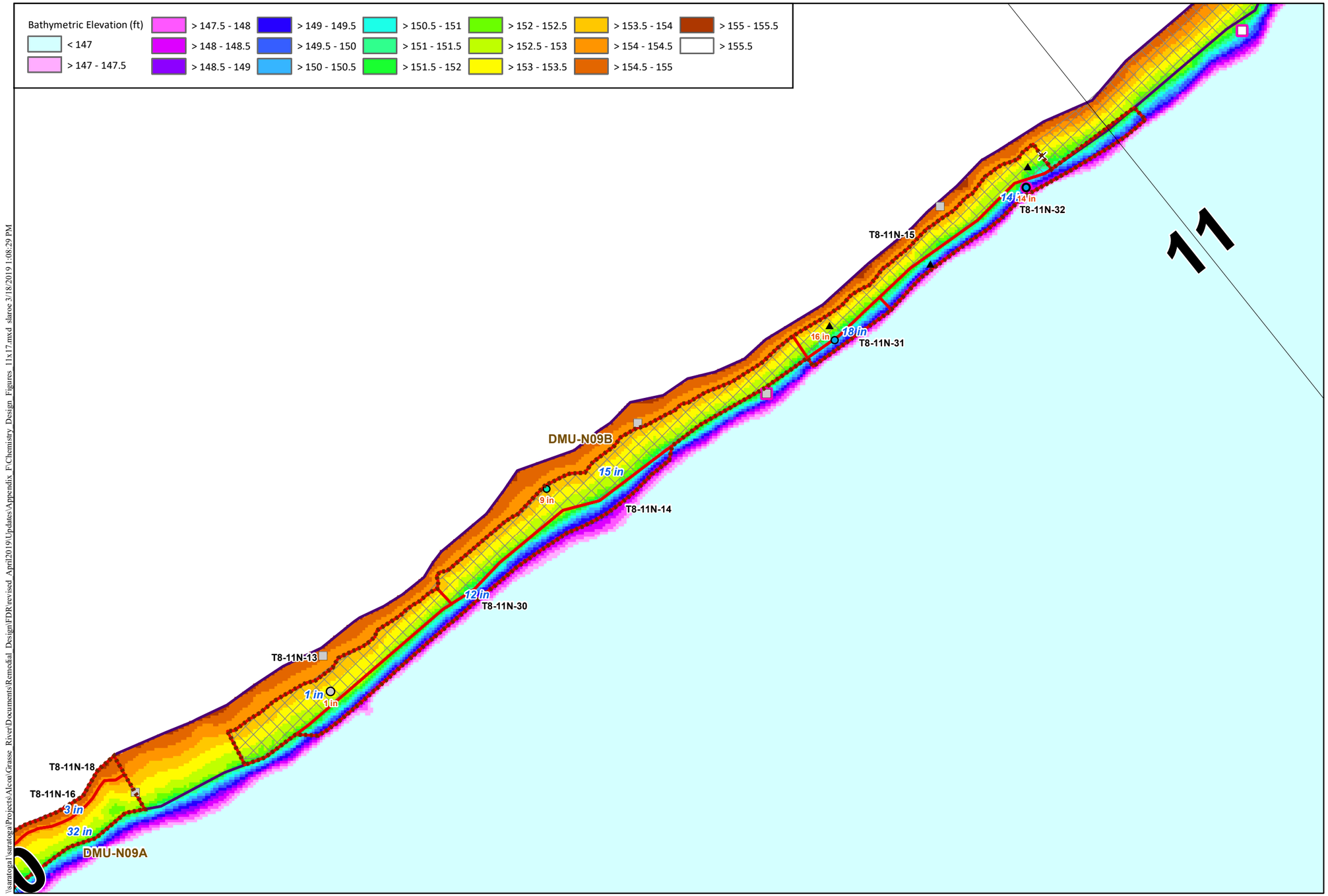
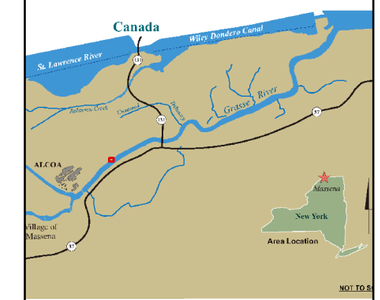



## Locator Map




**NOTES:**

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 10 20 40 Feet

**Figure F1-9**
Final Design of Chemistry-based Neatline Surface - Area T8-11N
Final Design Report
Grasse River Project/Arconic

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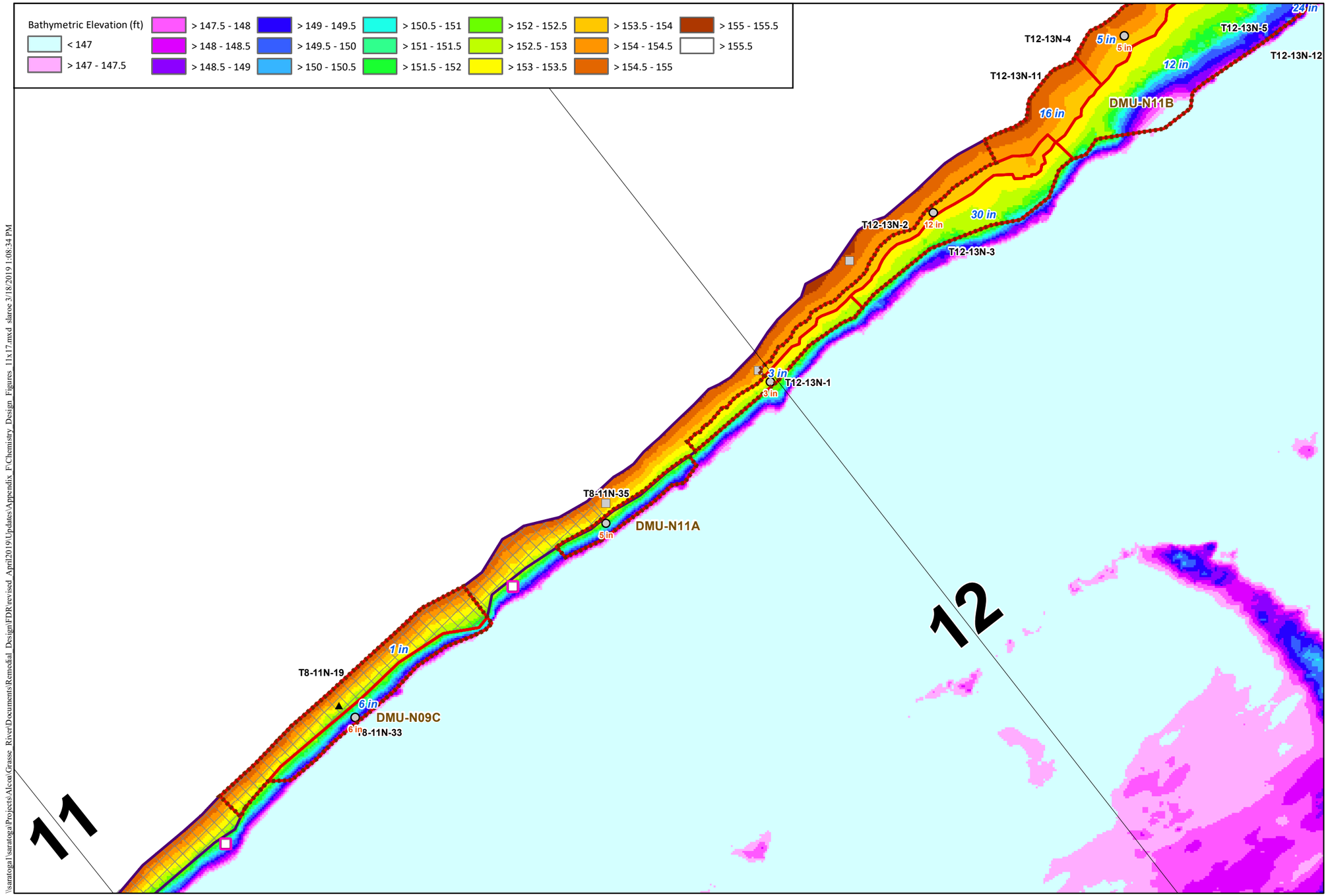


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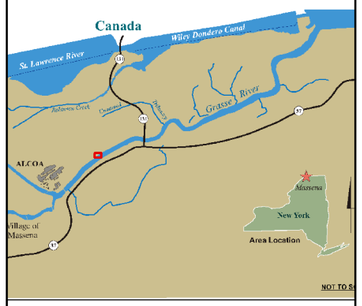


**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-10**
Final Design of Chemistry-based Neatline Surface - Area T12-13N
Final Design Report
Grasse River Project/Arconic

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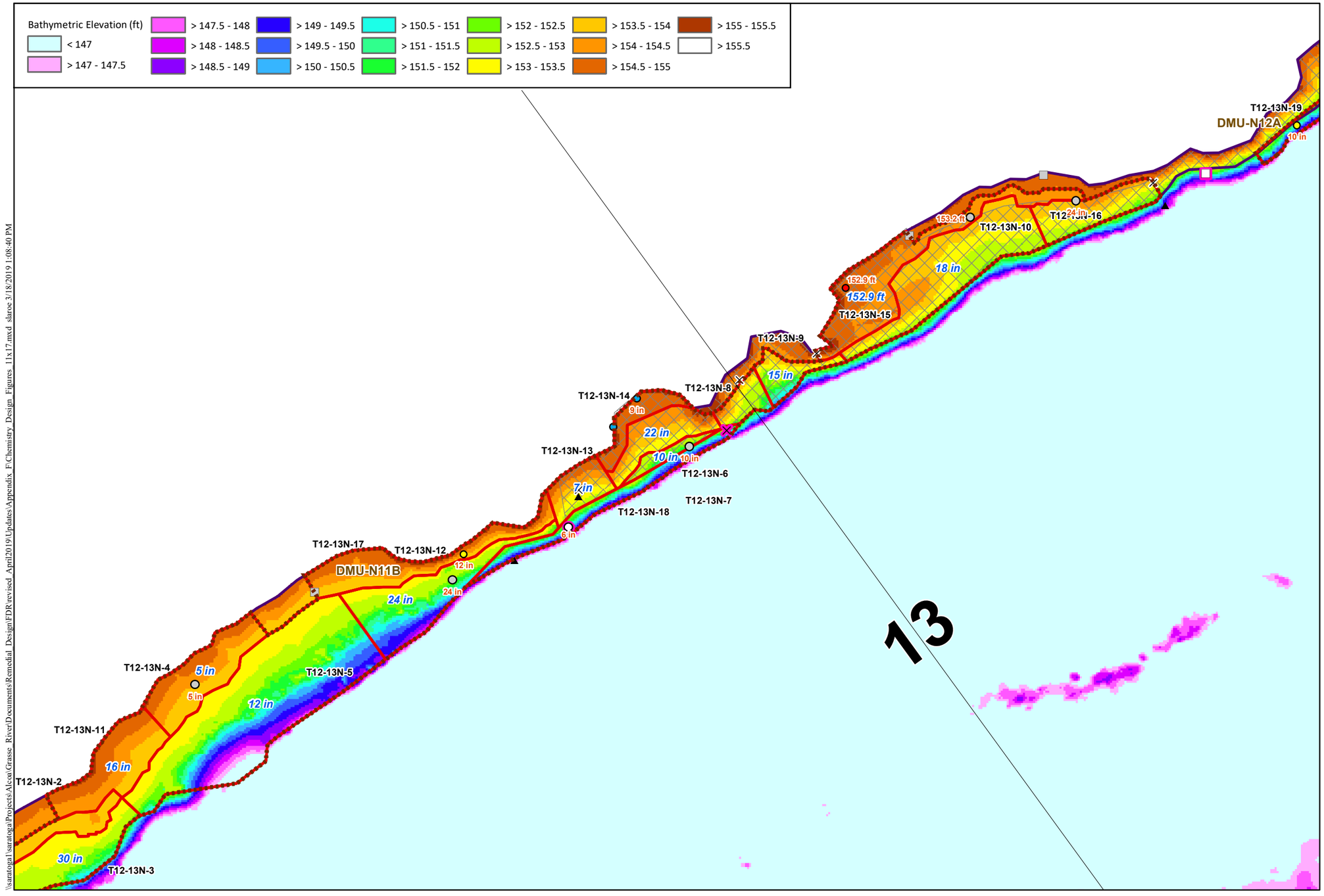


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-11**
Final Design of Chemistry-based Neatline Surface - Area T12-13N
Final Design Report
Grasse River Project/Arconic

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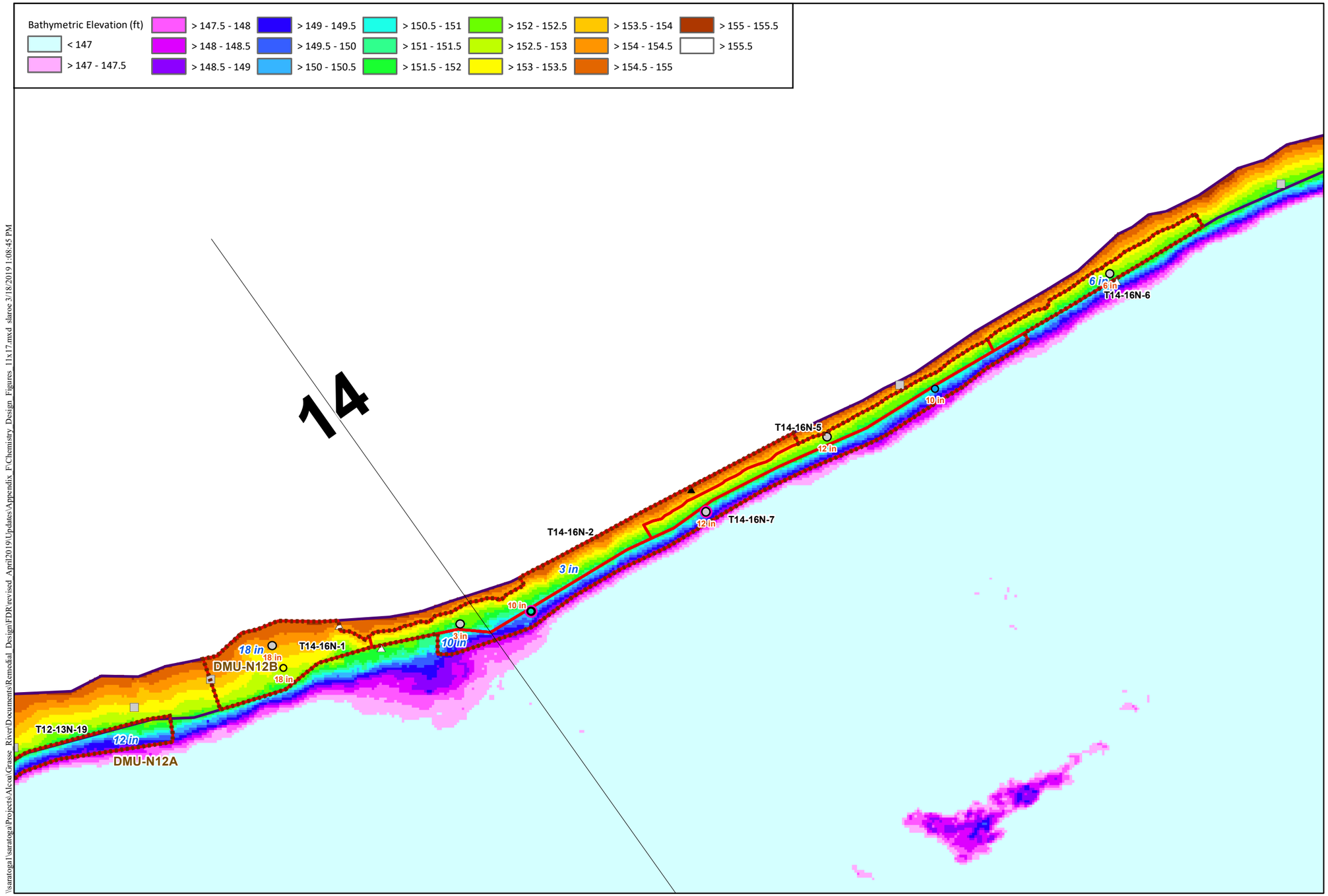
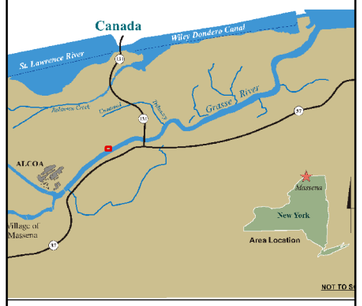



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 10 20 40 Feet

**Figure F1-12**
Final Design of Chemistry-based Neatline Surface - Area T14-16N
Final Design Report
Grasse River Project/Arconic

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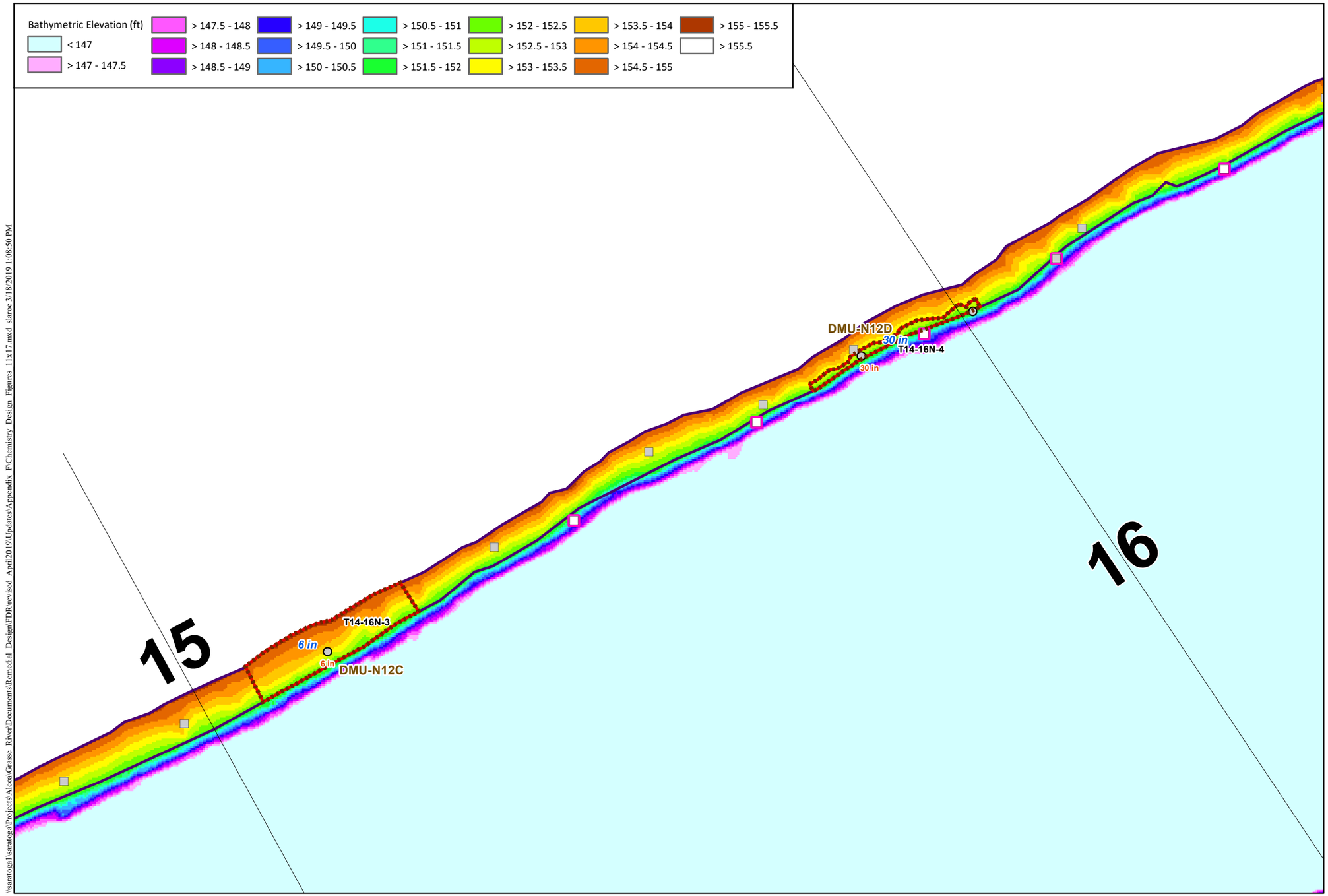
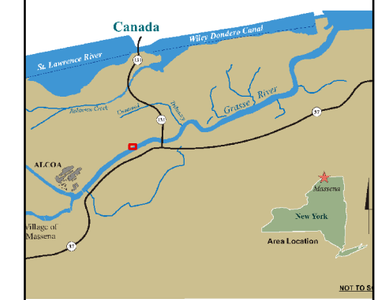



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-13**
Final Design of Chemistry-based Neatline Surface - Area T14-16N
Final Design Report
Grasse River Project/Arconic

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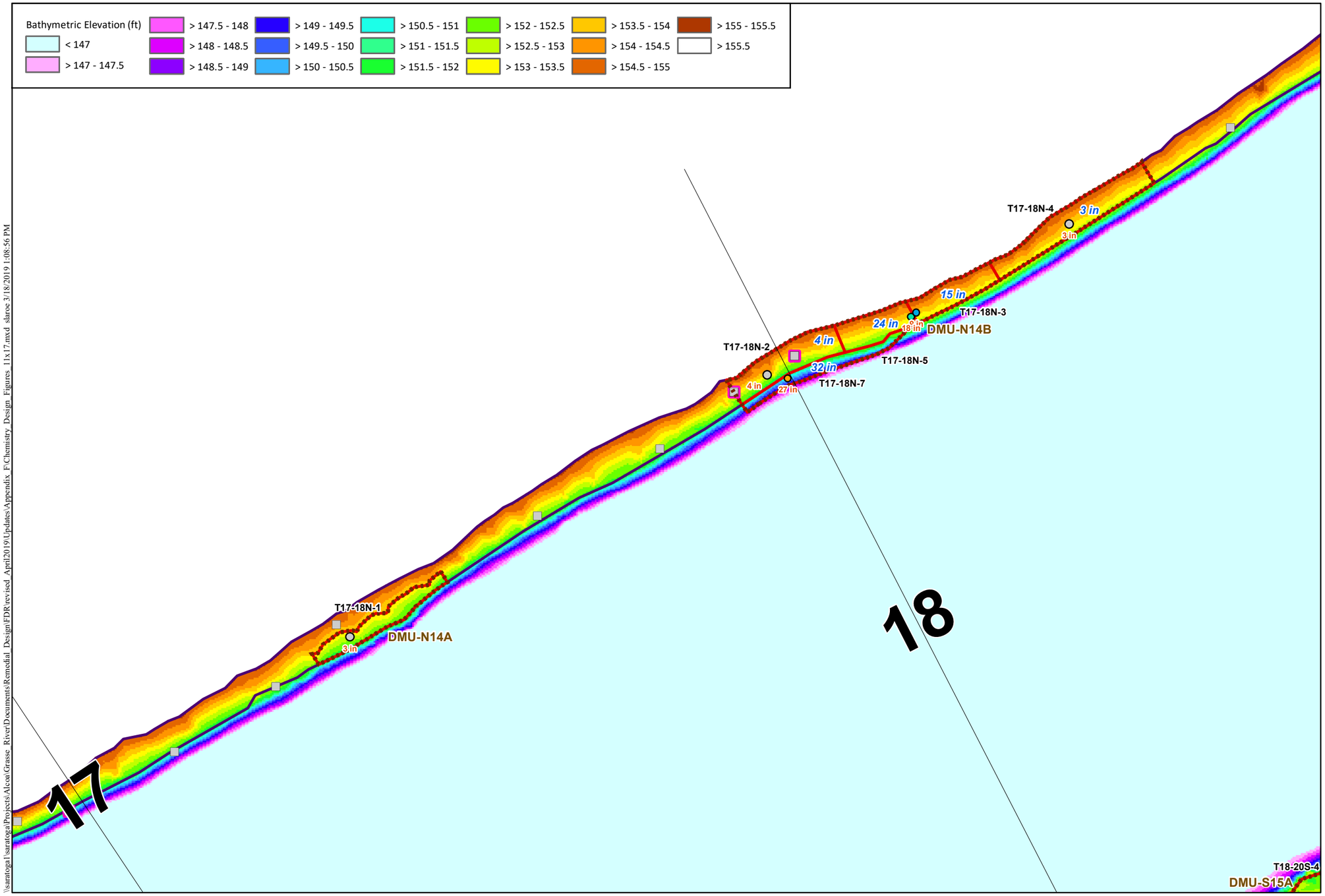


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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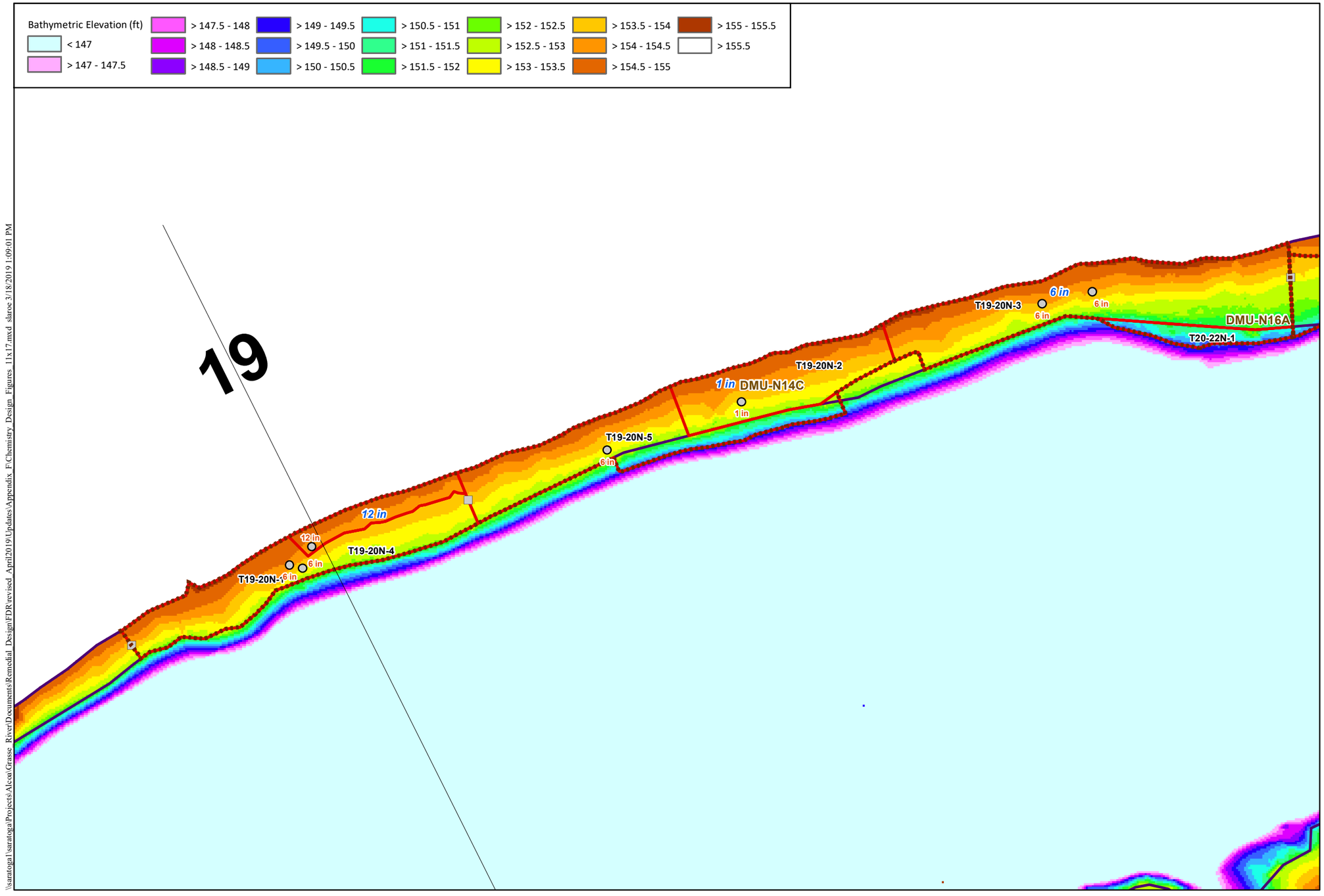
ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-14**
Final Design of Chemistry-based Neatline Surface - Area T17-18N
Final Design Report
Grasse River Project/Arconic




## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-15**
Final Design of Chemistry-based Neatline Surface - Area T19-20N
Final Design Report
Grasse River Project/Arconic

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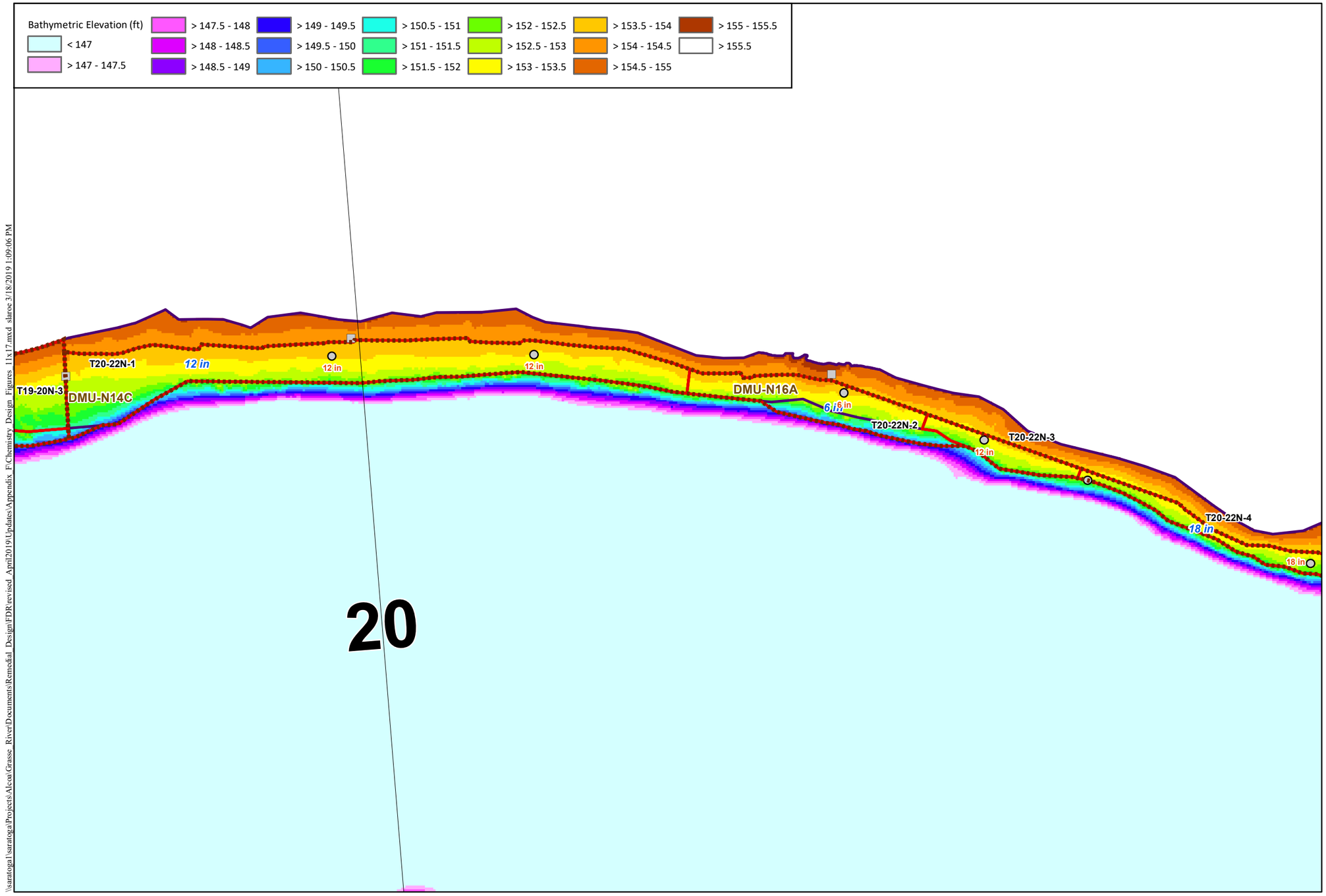


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 12.5 25 50 Feet

**Figure F1-16**
Final Design of Chemistry-based Neatline Surface - Area T20-22N
Final Design Report
Grasse River Project/Arconic

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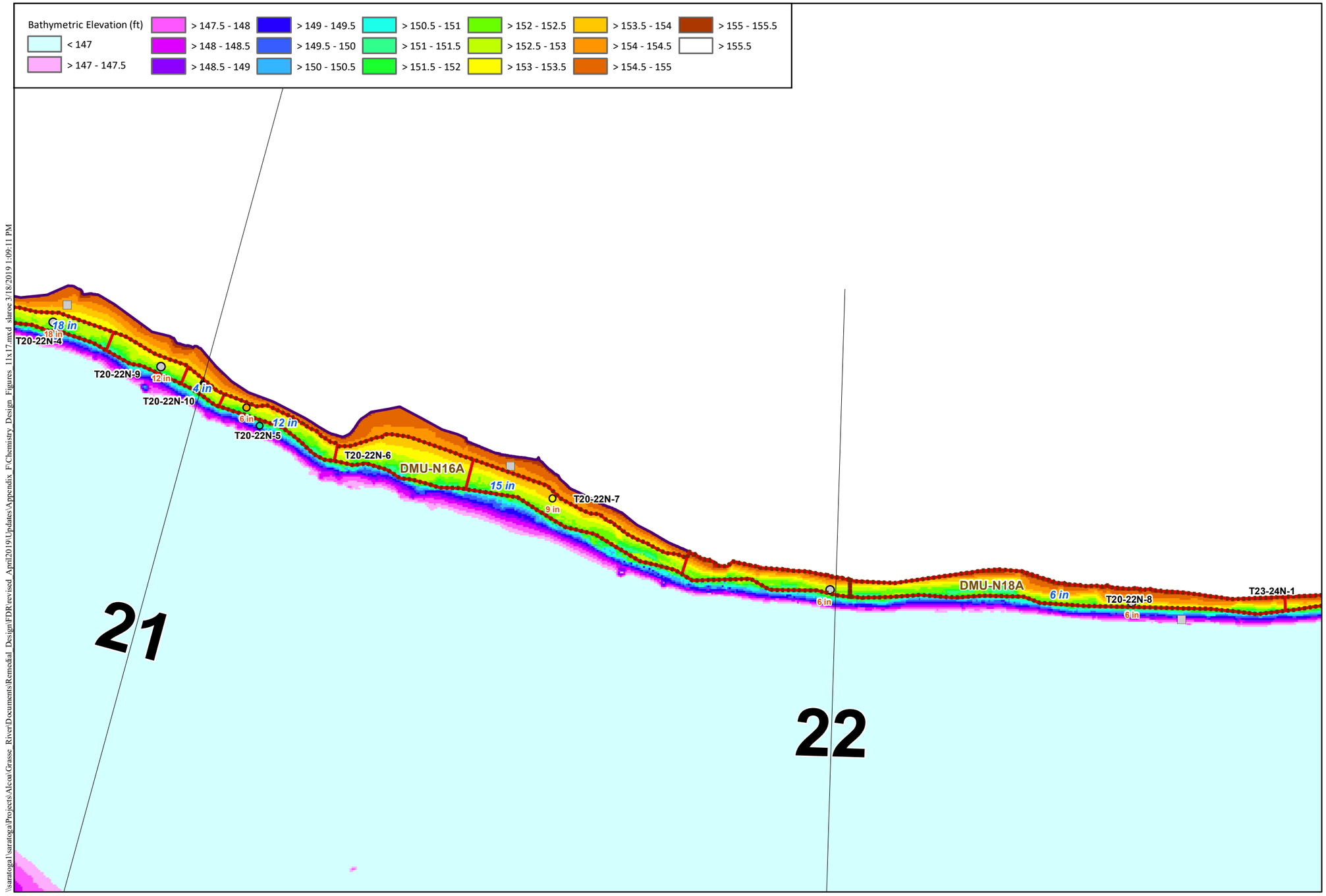
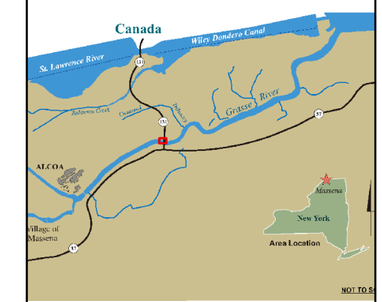



## Locator Map




**NOTES:**
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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 15 30 60 Feet

**Figure F1-17**
Final Design of Chemistry-based Neatline Surface - Area T20-22N
Final Design Report
Grasse River Project/Arconic

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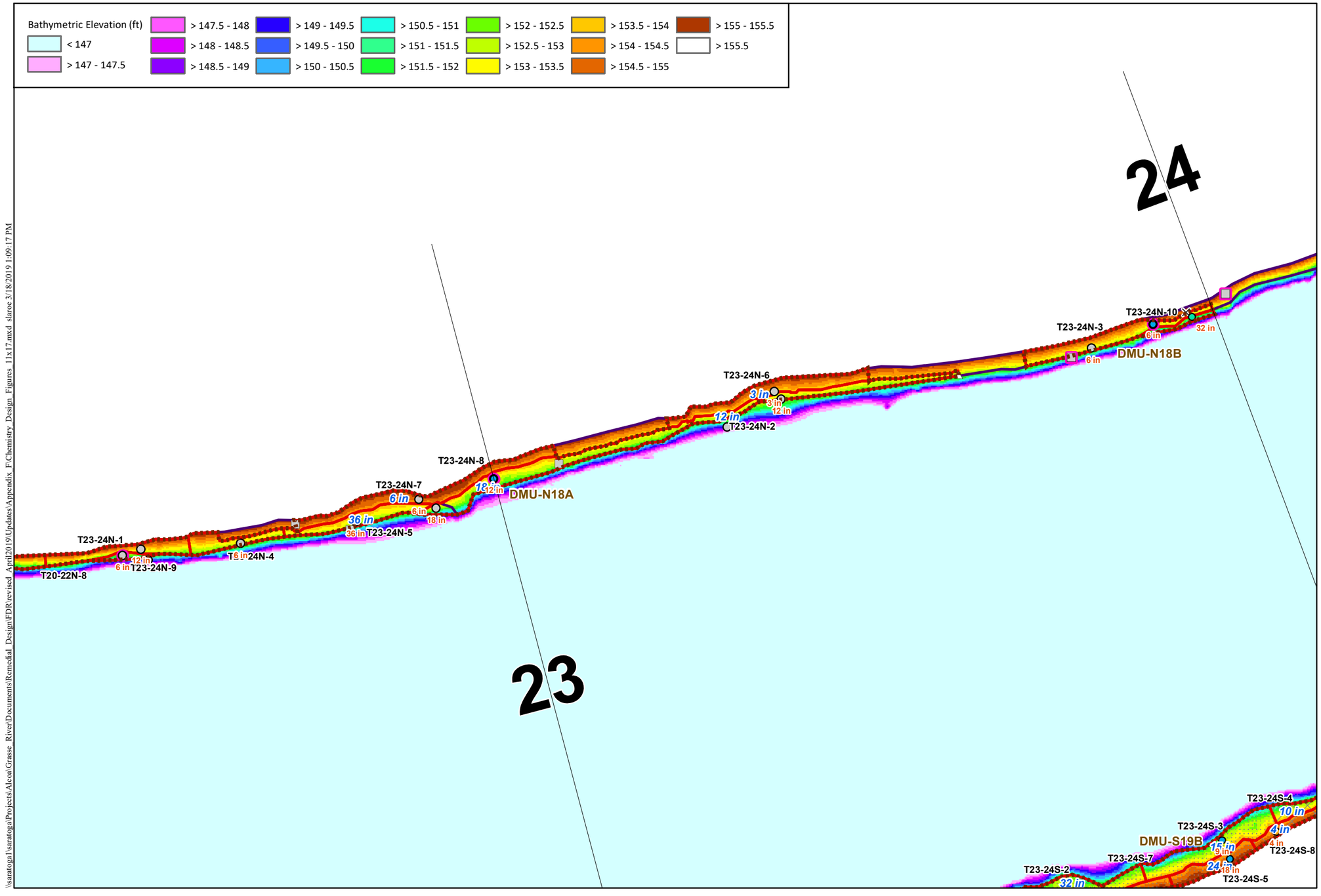


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-18**
Final Design of Chemistry-based Neatline Surface - Area T23-24N
Final Design Report
Grasse River Project/Arconic

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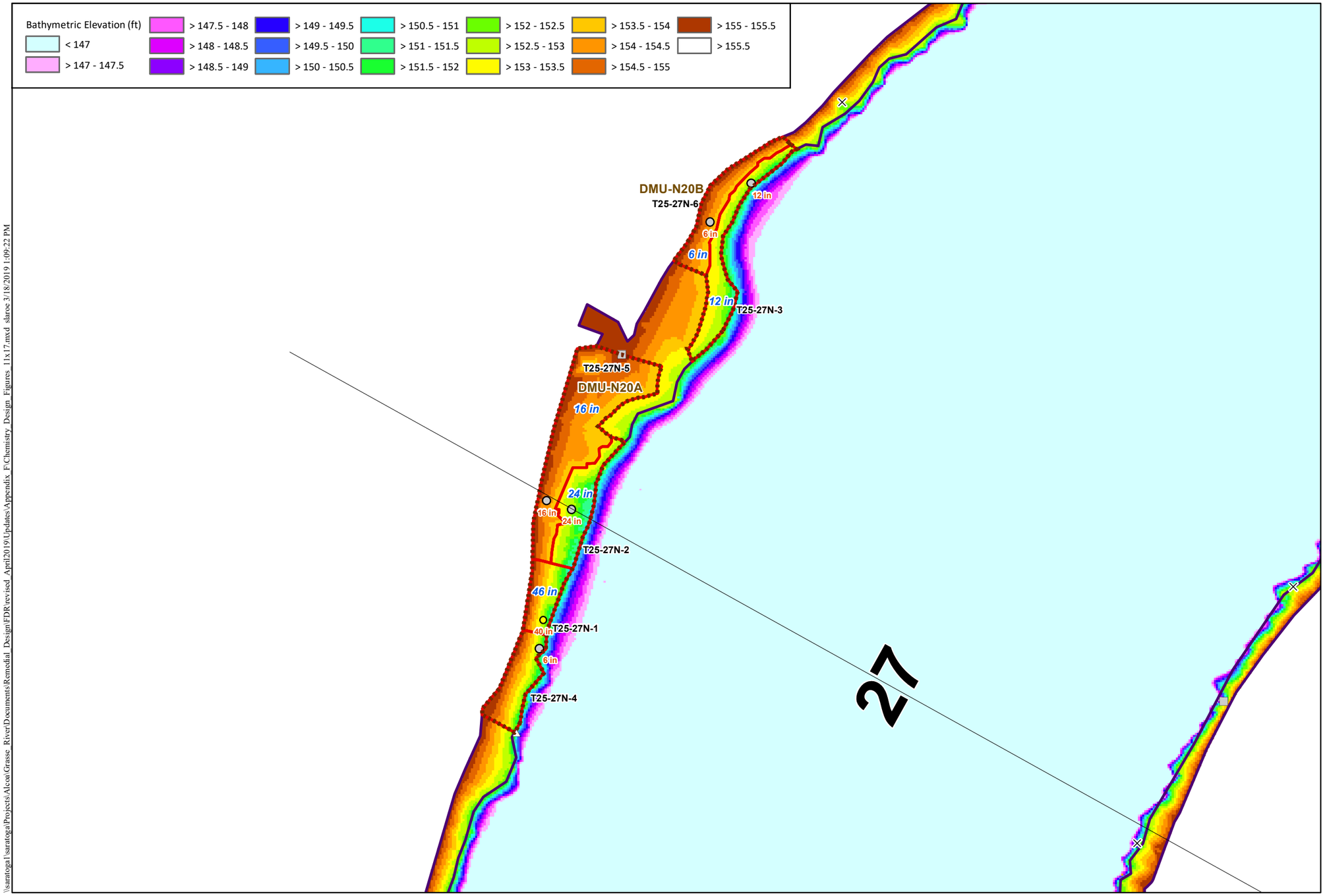
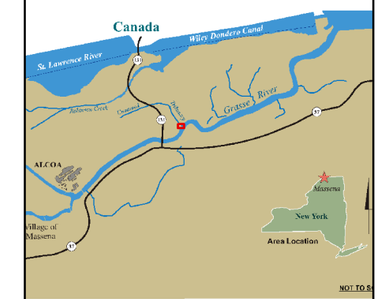



## Locator Map

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-19**
Final Design of Chemistry-based Neatline Surface - Area T26-27N
Final Design Report
Grasse River Project/Arconic

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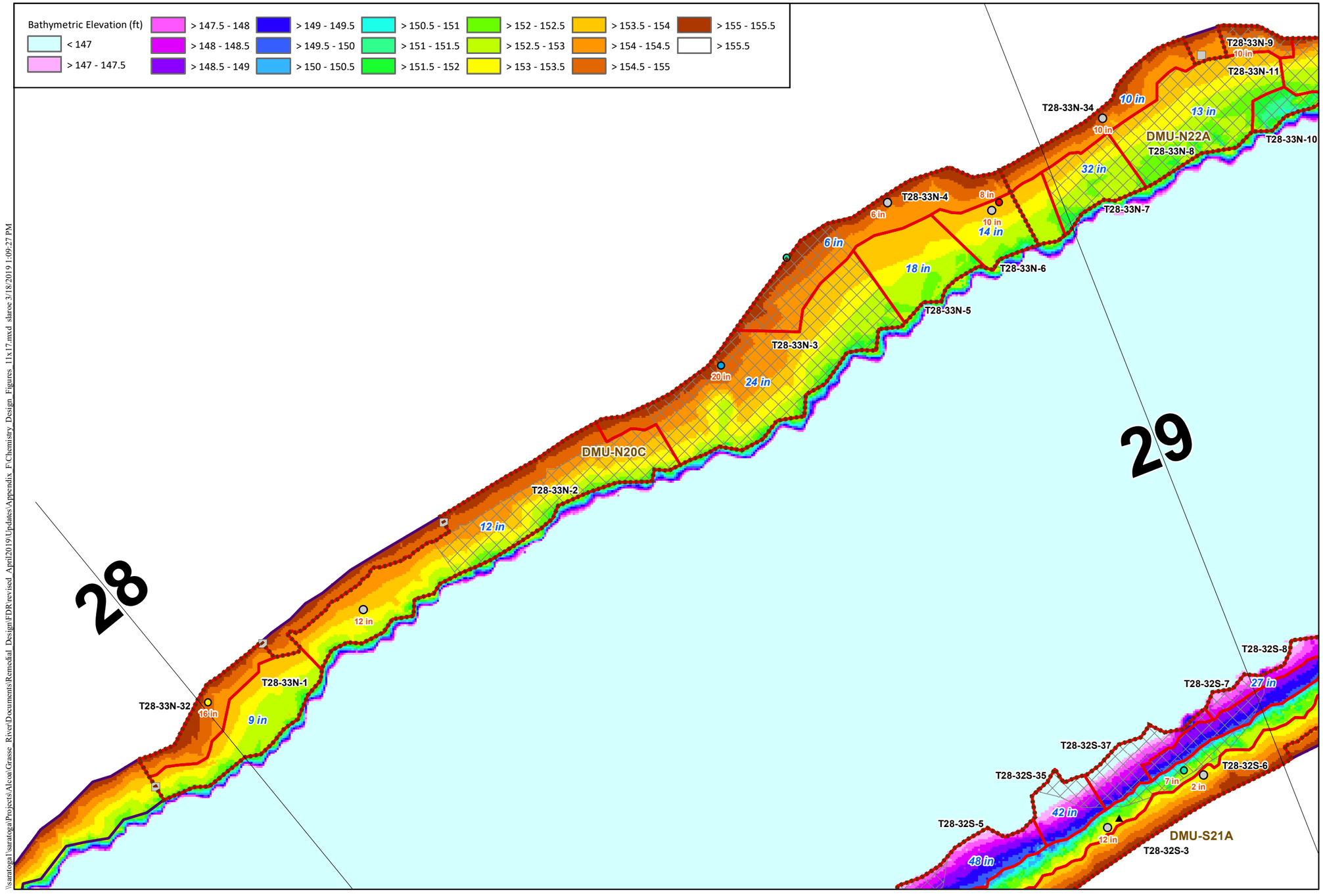


## Locator Map

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-20**
Final Design of Chemistry-based Neatline Surface - Area T28-33N
Final Design Report
Grasse River Project/Arconic

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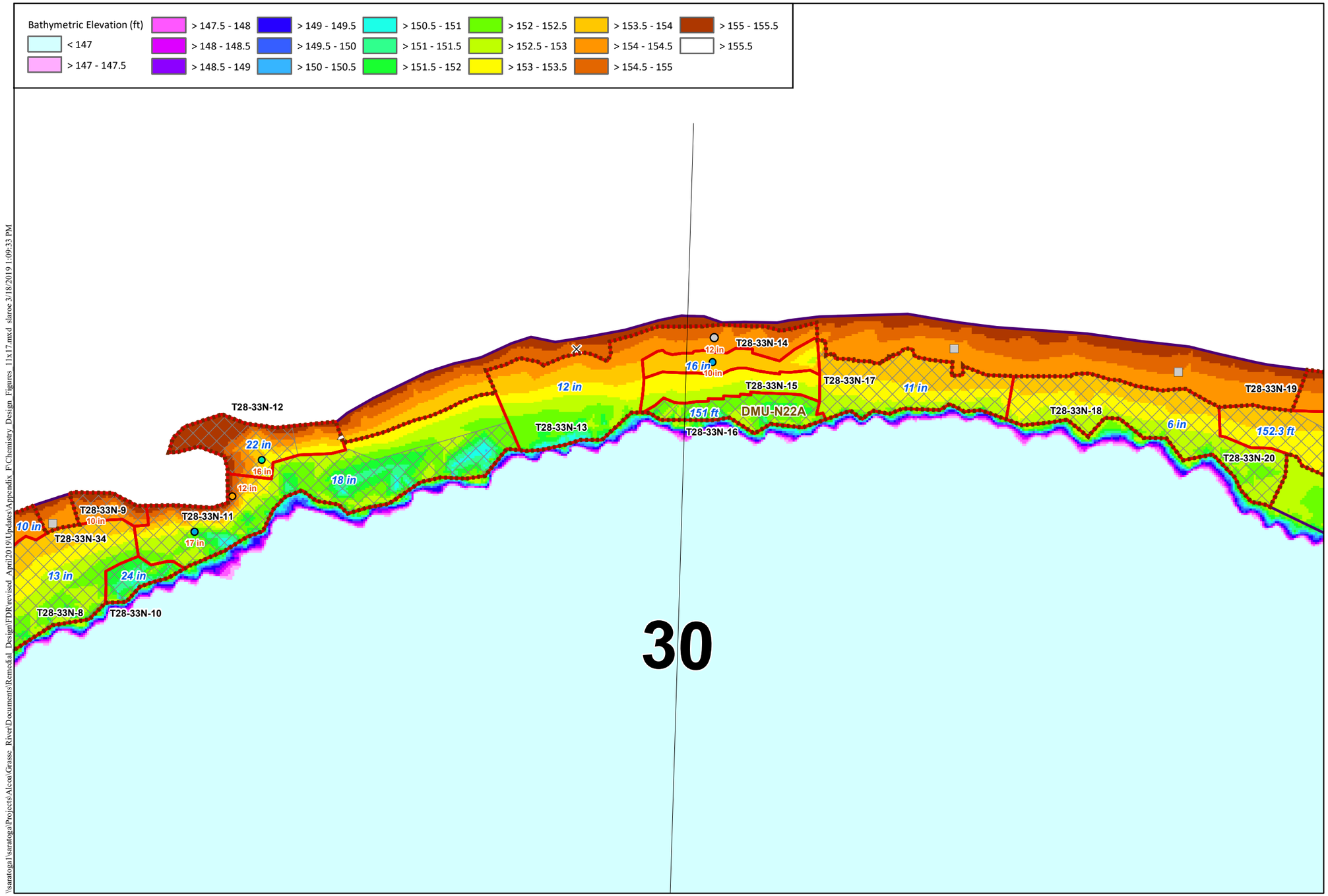


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 12.5 25 50 Feet

**Figure F1-21**
Final Design of Chemistry-based Neatline Surface - Area T28-33N
Final Design Report
Grasse River Project/Arconic

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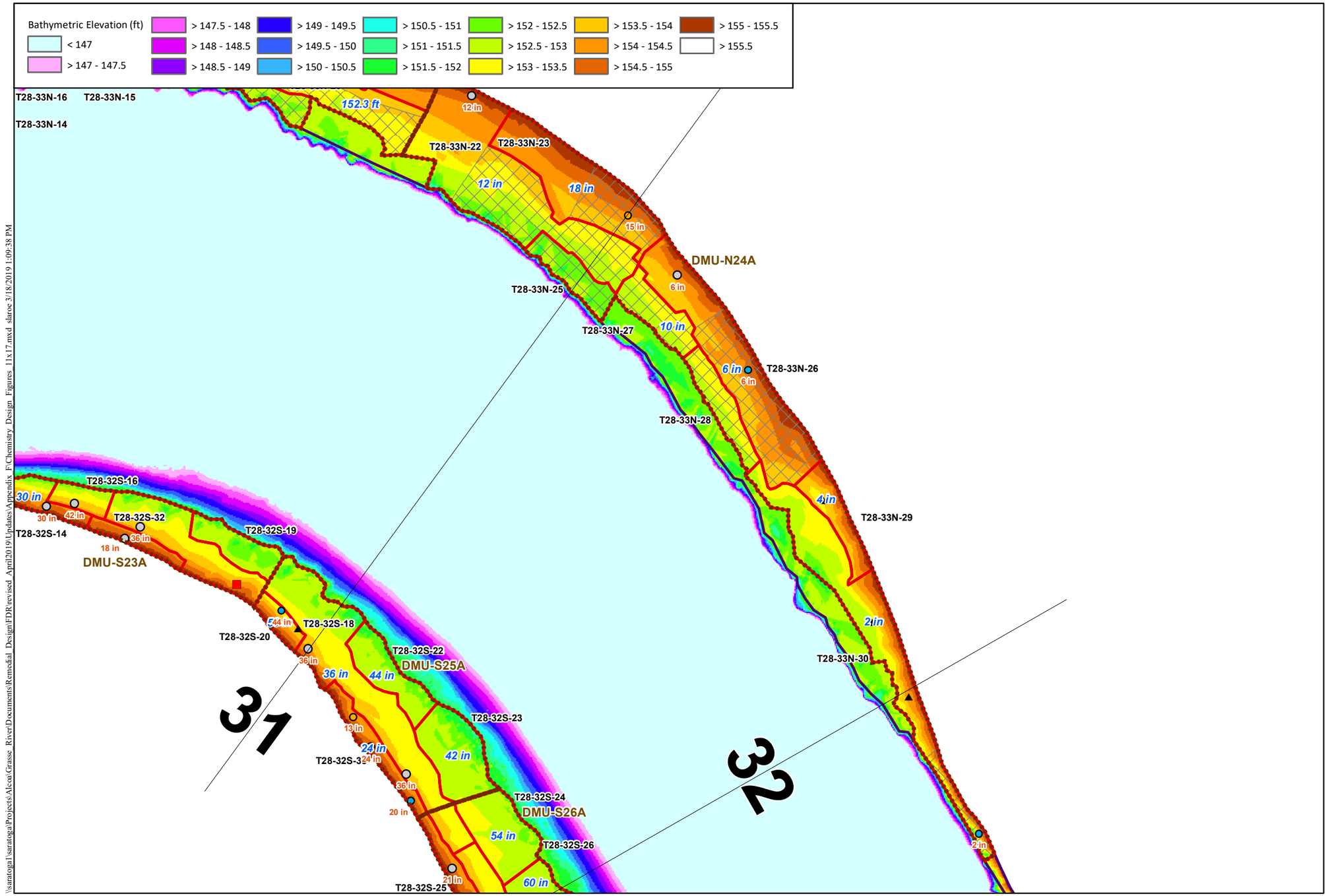


## Locator Map

**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 20 40 80

**Figure F1-22**
Final Design of Chemistry-based Neatline Surface - Area T28-33N
Final Design Report
Grasse River Project/Arconic

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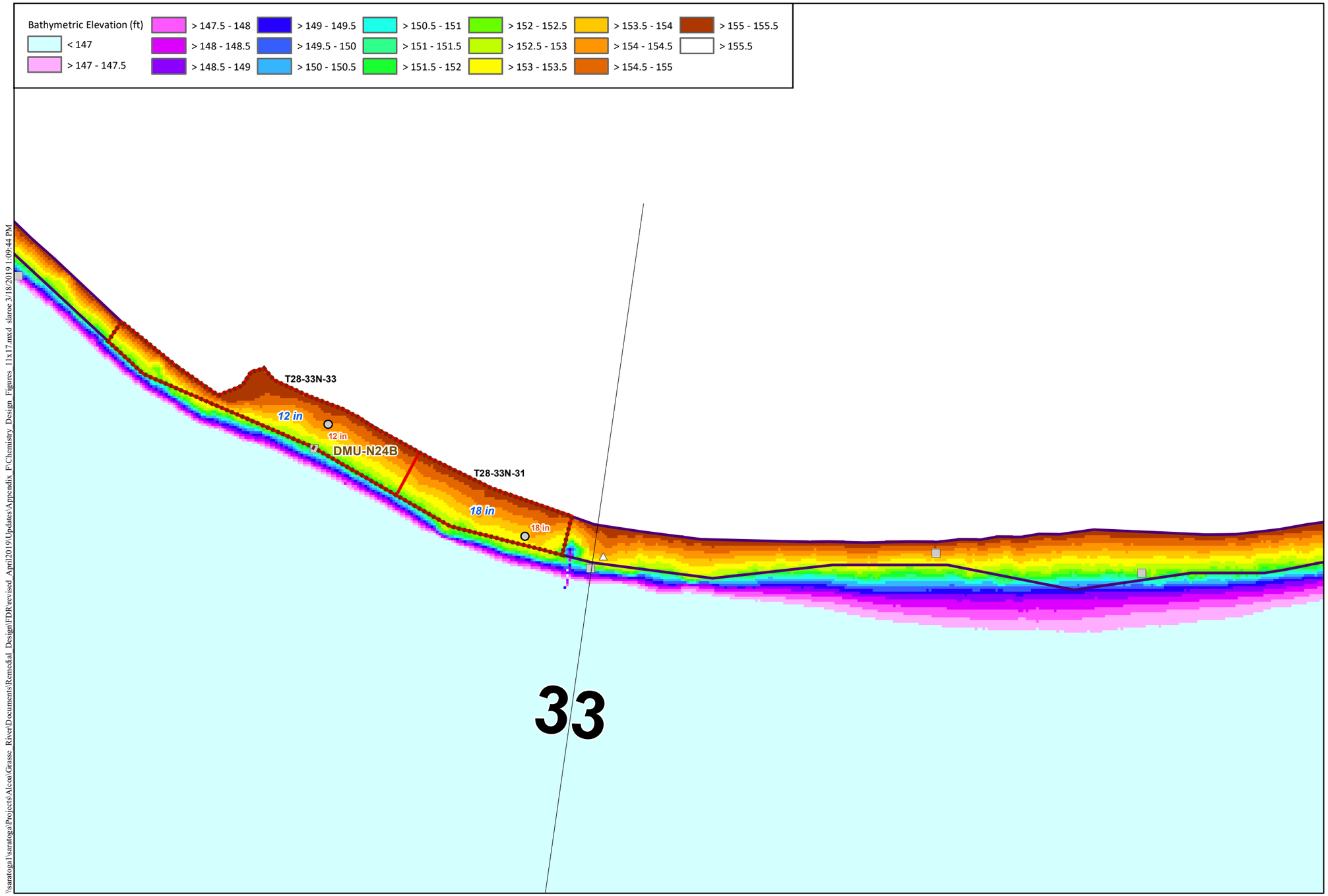
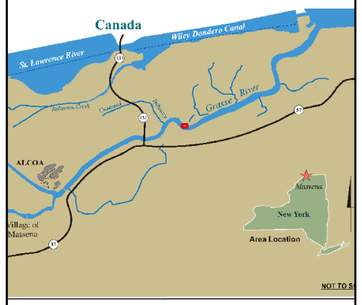



## Locator Map




**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 10 20 40 Feet

**Figure F1-23**
Final Design of Chemistry-based Neatline Surface - Area T28-33N
Final Design Report
Grasse River Project/Arconic

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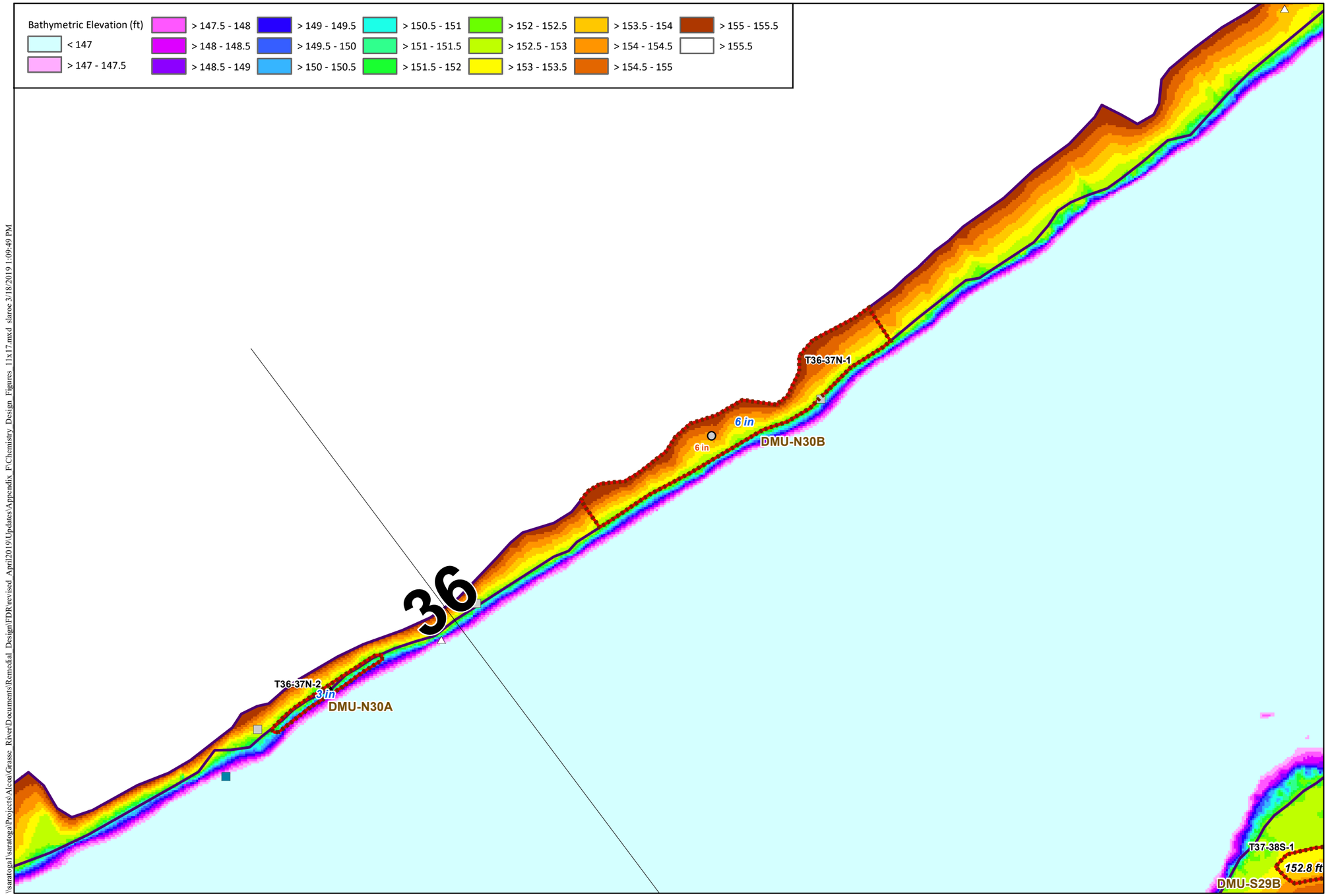
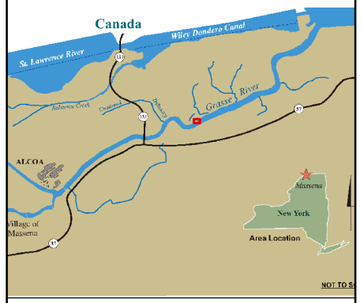



## Locator Map




**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-24**
Final Design of Chemistry-based Neatline Surface - Area T36-37N
Final Design Report
Grasse River Project/Arconic

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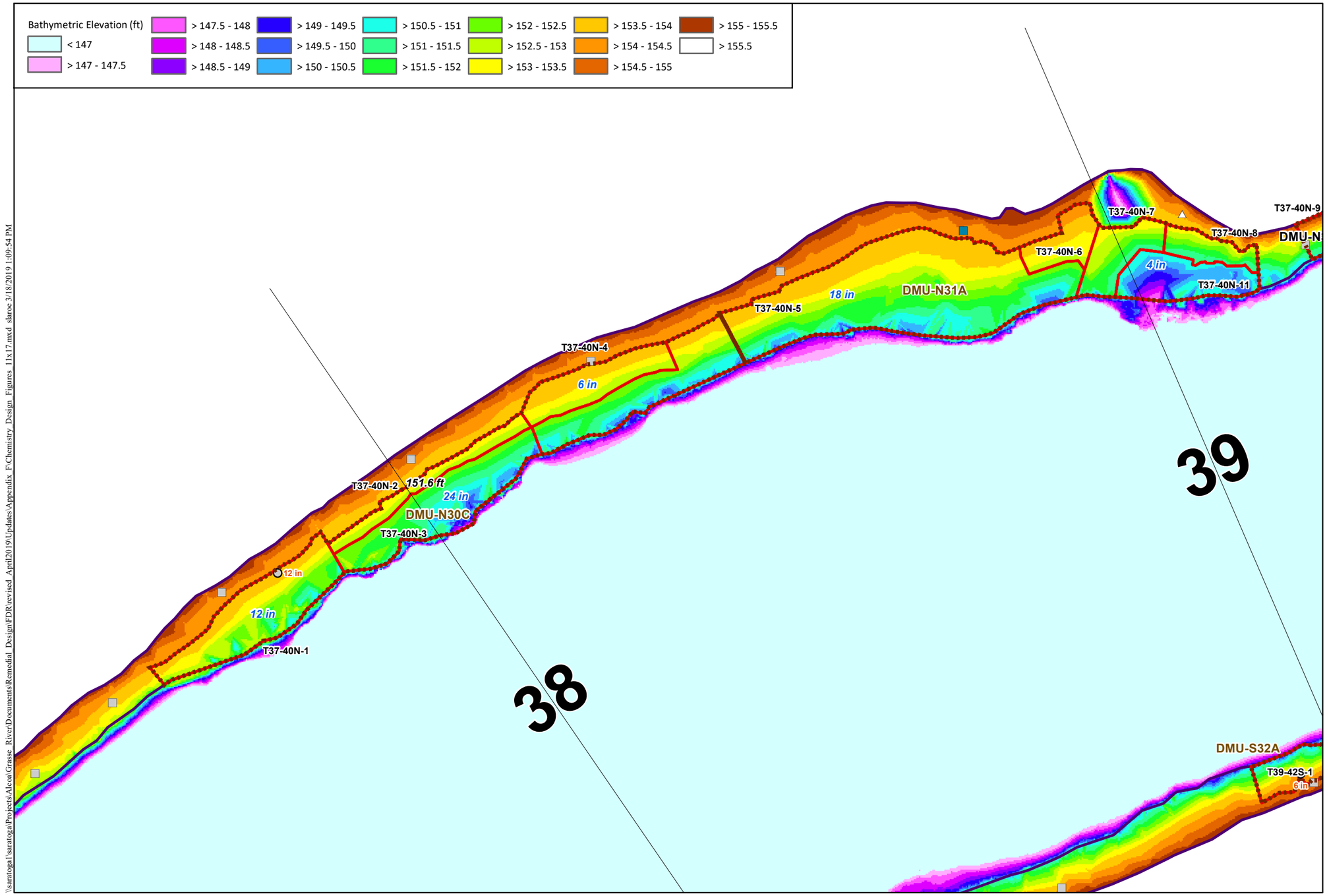


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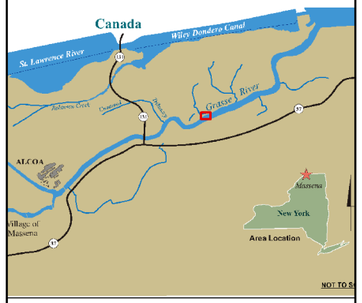


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 20 40 80 Feet

**Figure F1-25**
Final Design of Chemistry-based Neatline Surface - Area T37-40N
Final Design Report
Grasse River Project/Arconic

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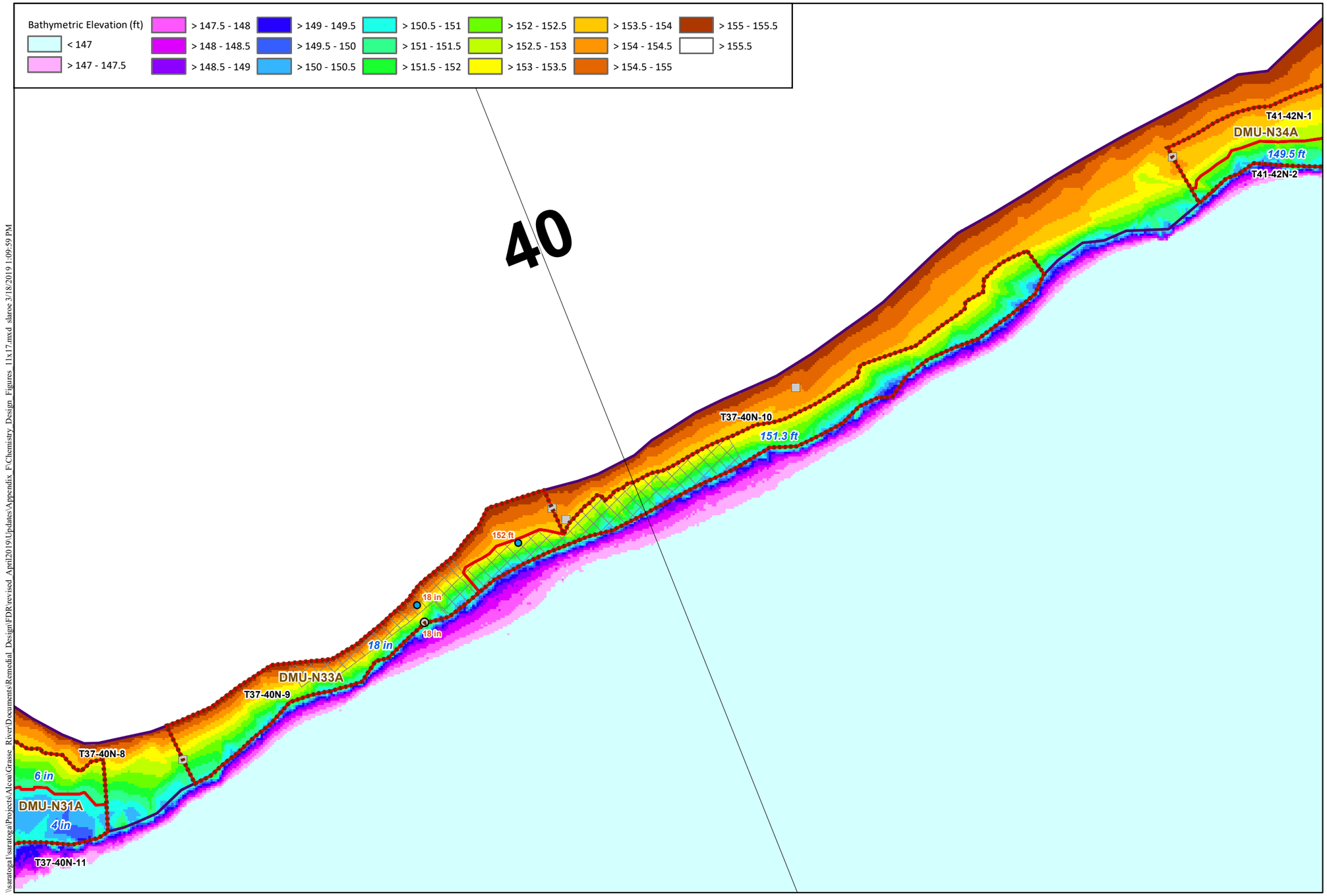


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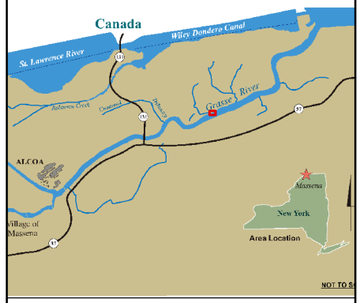


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 12.5 25 50 Feet

**Figure F1-26**
Final Design of Chemistry-based Neatline Surface - Area T37-40N
Final Design Report
Grasse River Project/Arconic

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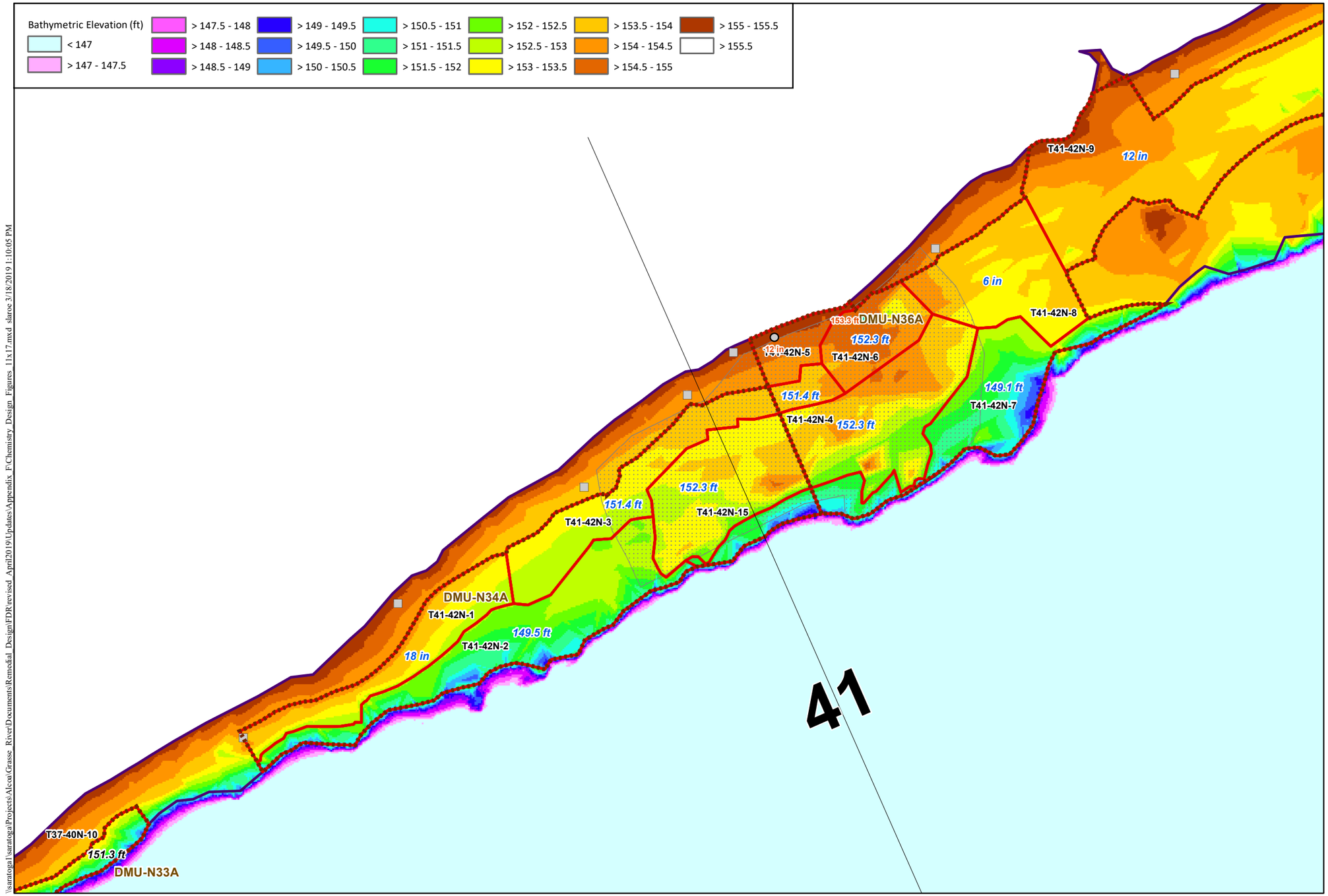
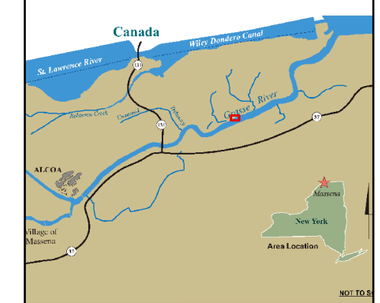



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-27**
Final Design of Chemistry-based Neatline Surface - Area T41-42N
Final Design Report
Grasse River Project/Arconic

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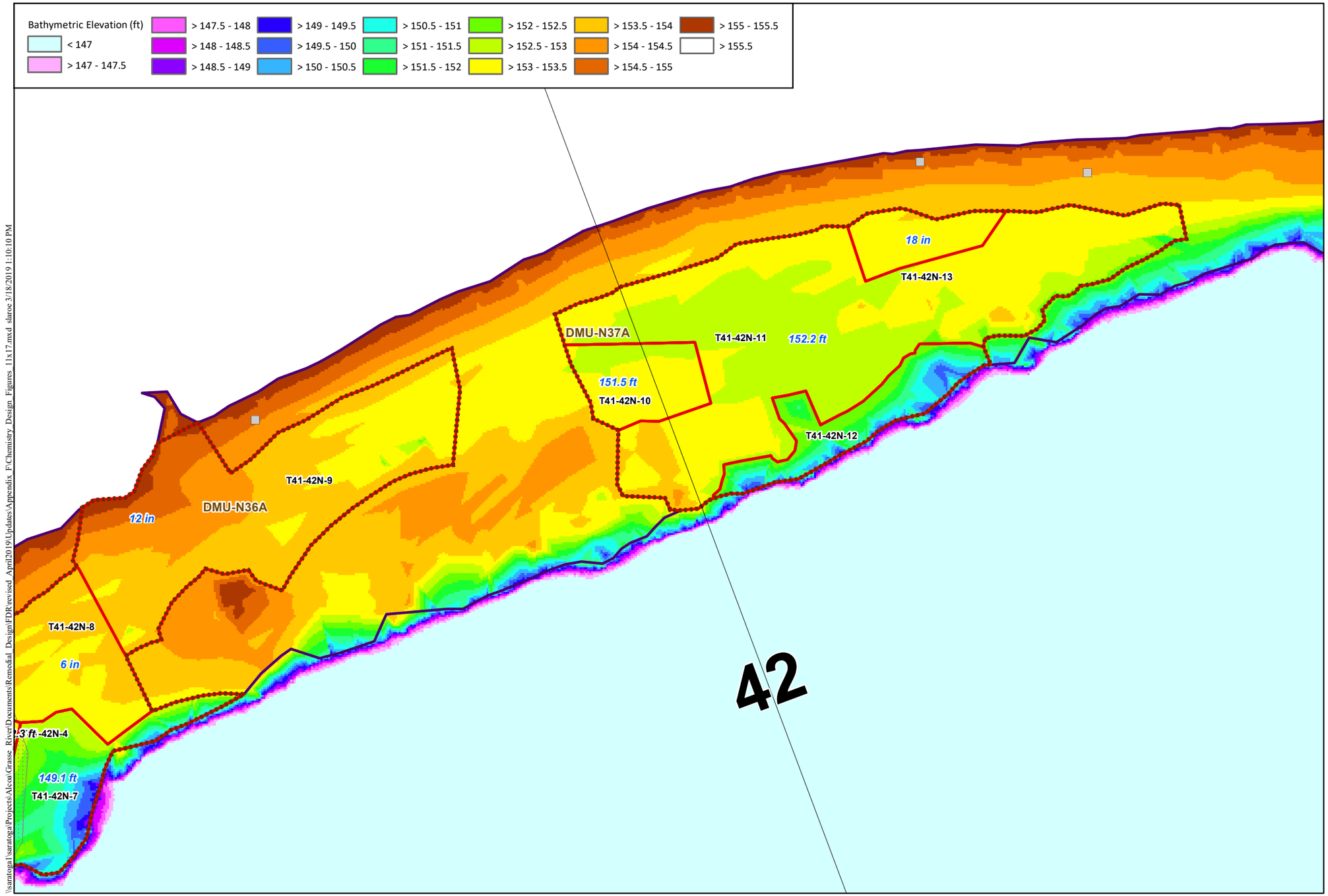


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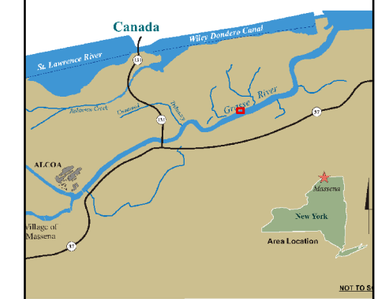


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-28**
Final Design of Chemistry-based Neatline Surface - Area T41-42N
Final Design Report
Grasse River Project/Arconic

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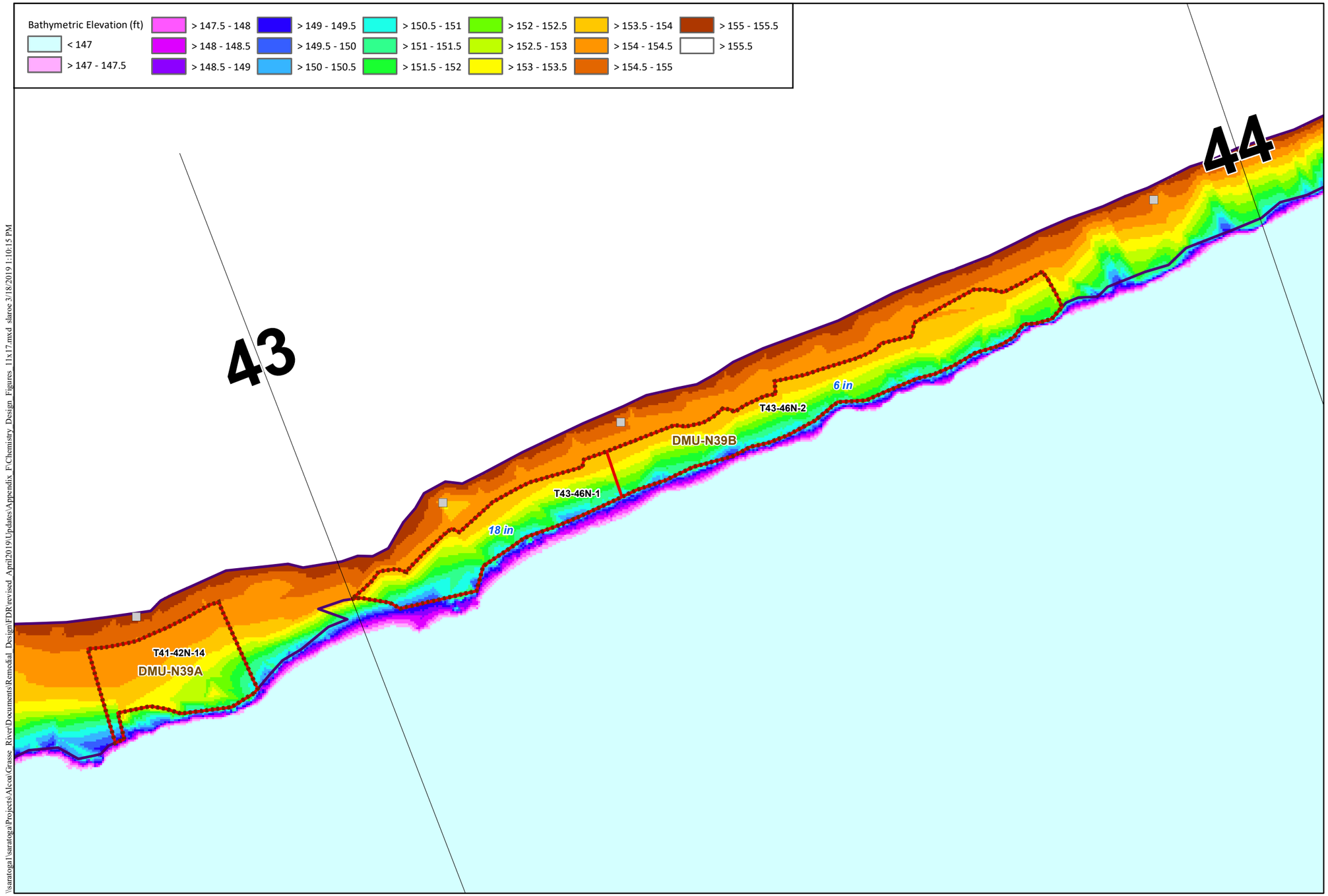


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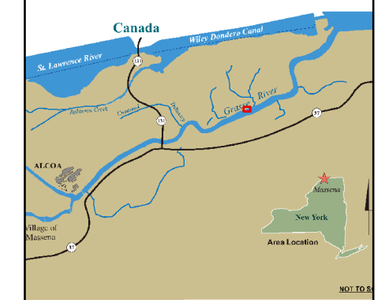


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-29**
Final Design of Chemistry-based Neatline Surface - Area T43-46N
Final Design Report
Grasse River Project/Arconic

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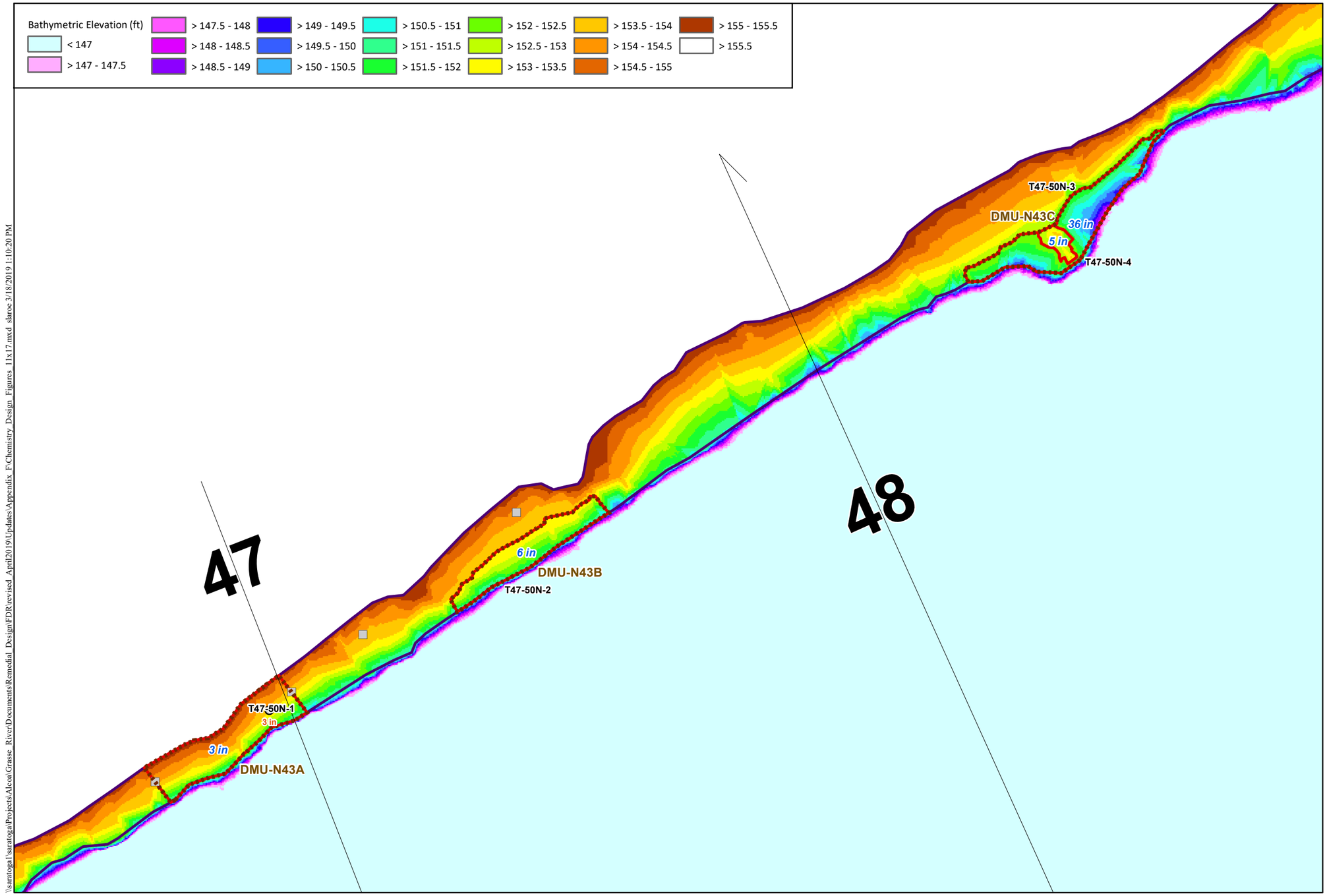


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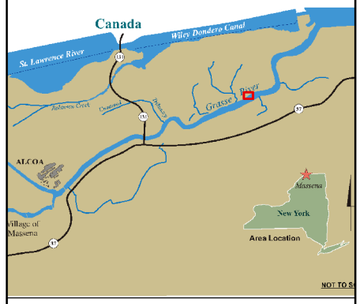


**NOTES:**

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-30**
Final Design of Chemistry-based Neatline Surface - Area T47-50N
Final Design Report
Grasse River Project/Arconic

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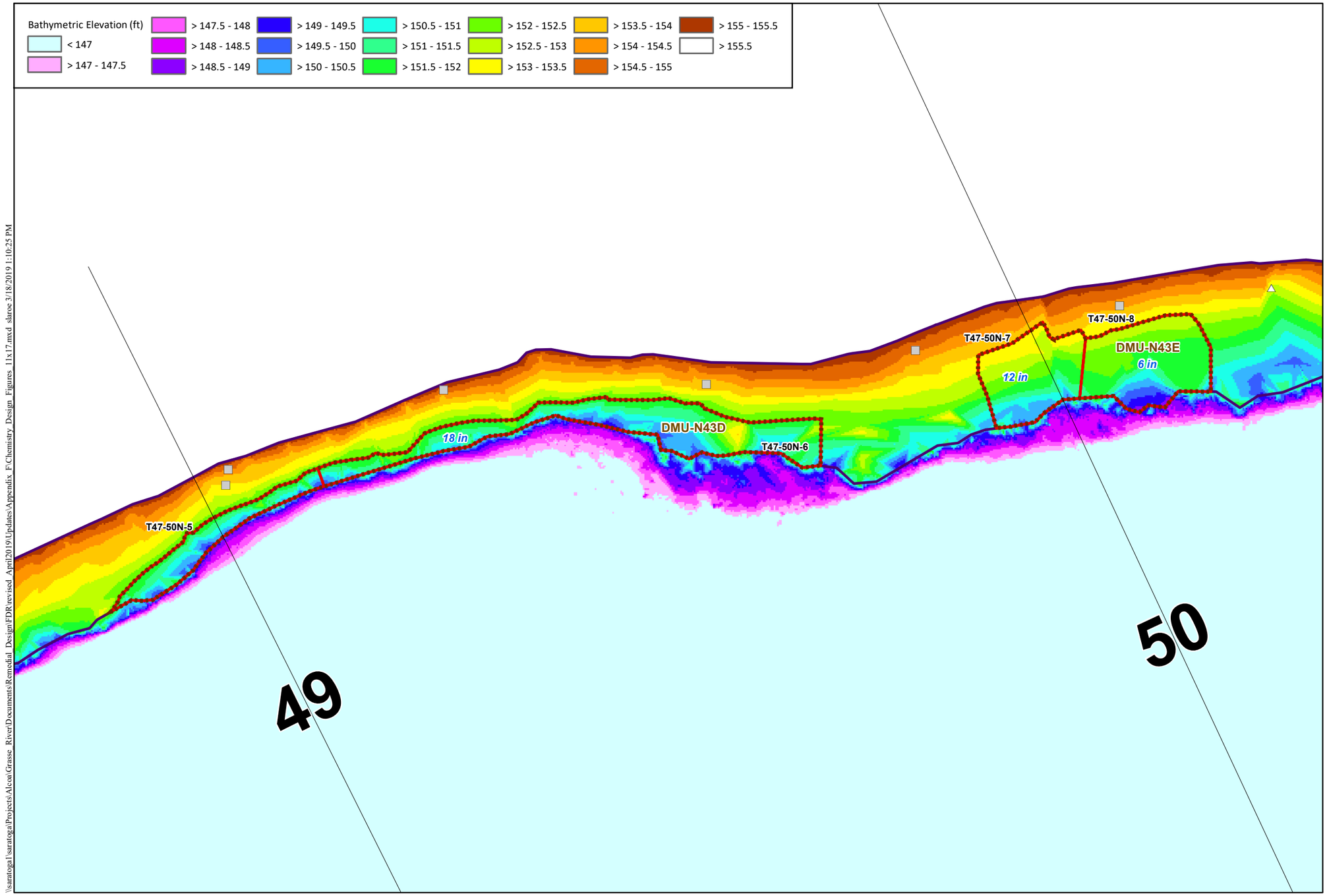


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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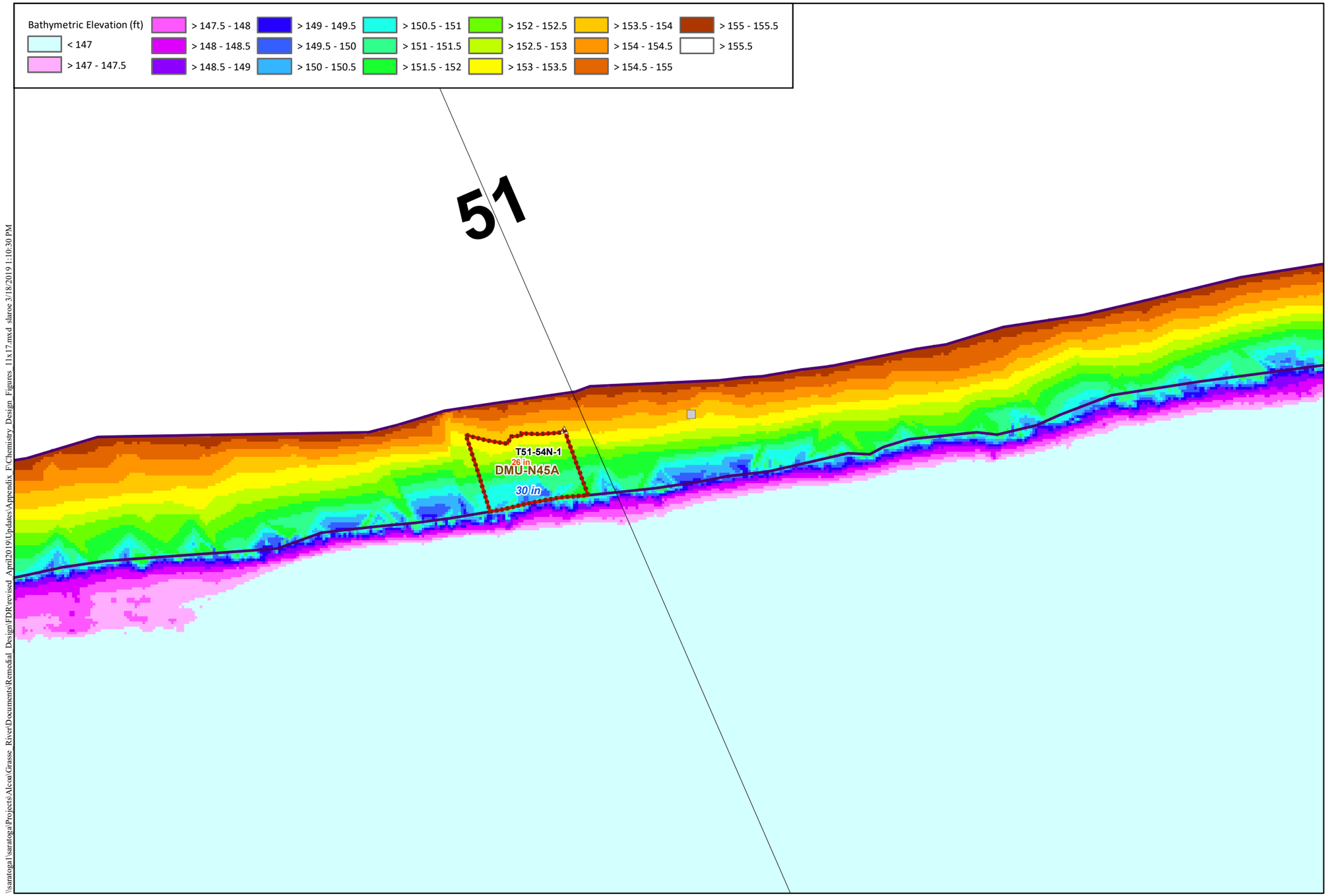
ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-31**
Final Design of Chemistry-based Neatline Surface - Area T47-50N
Final Design Report
Grasse River Project/Arconic

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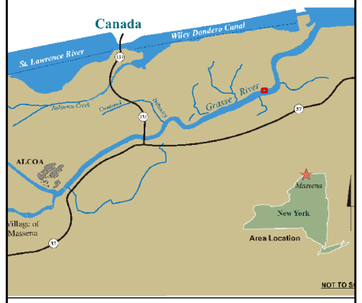


**NOTES:**

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-32**
Final Design of Chemistry-based Neatline Surface - Area T51-54N
Final Design Report
Grasse River Project/Arconic

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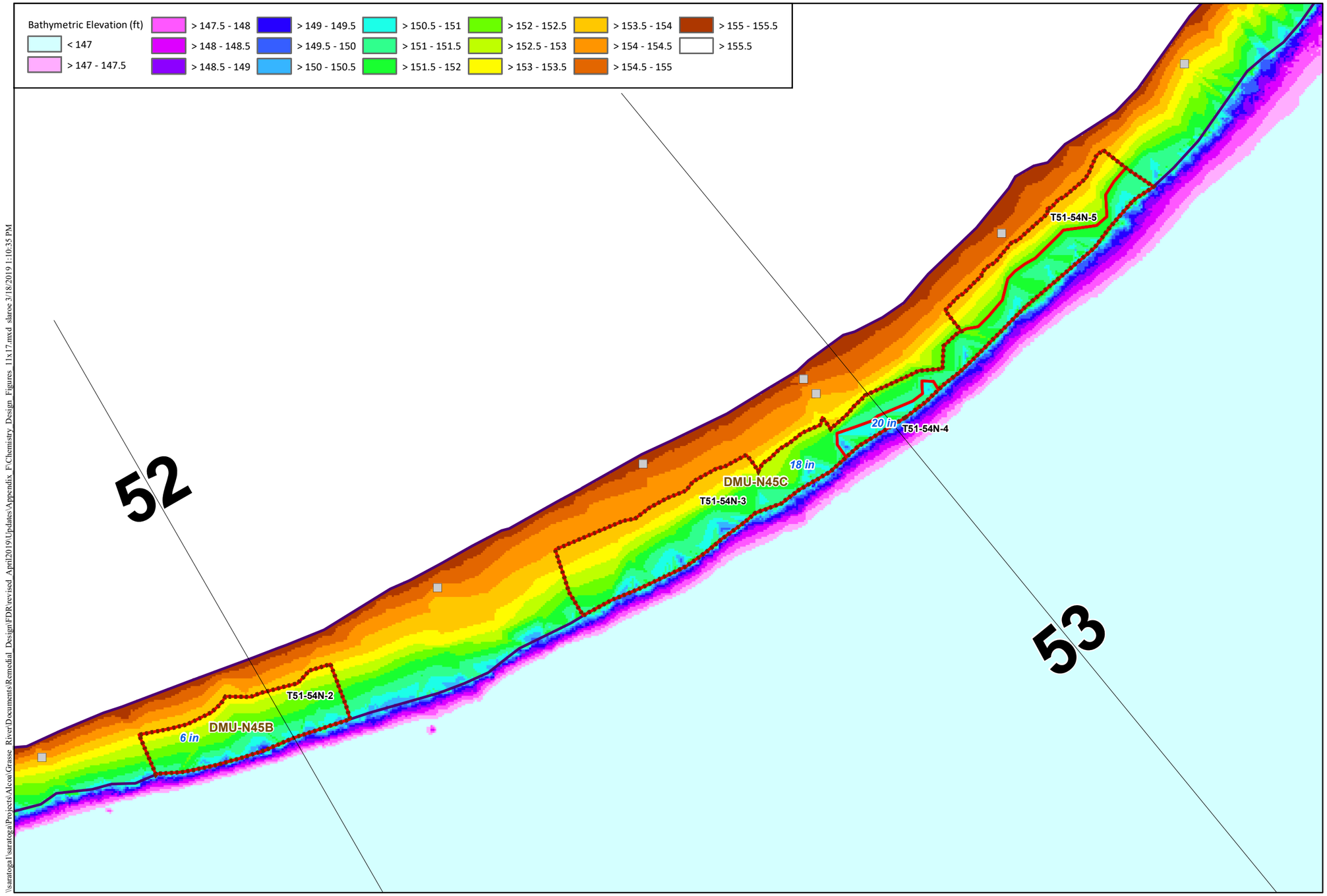


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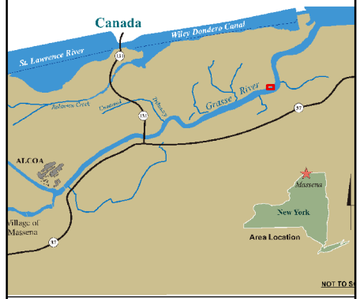


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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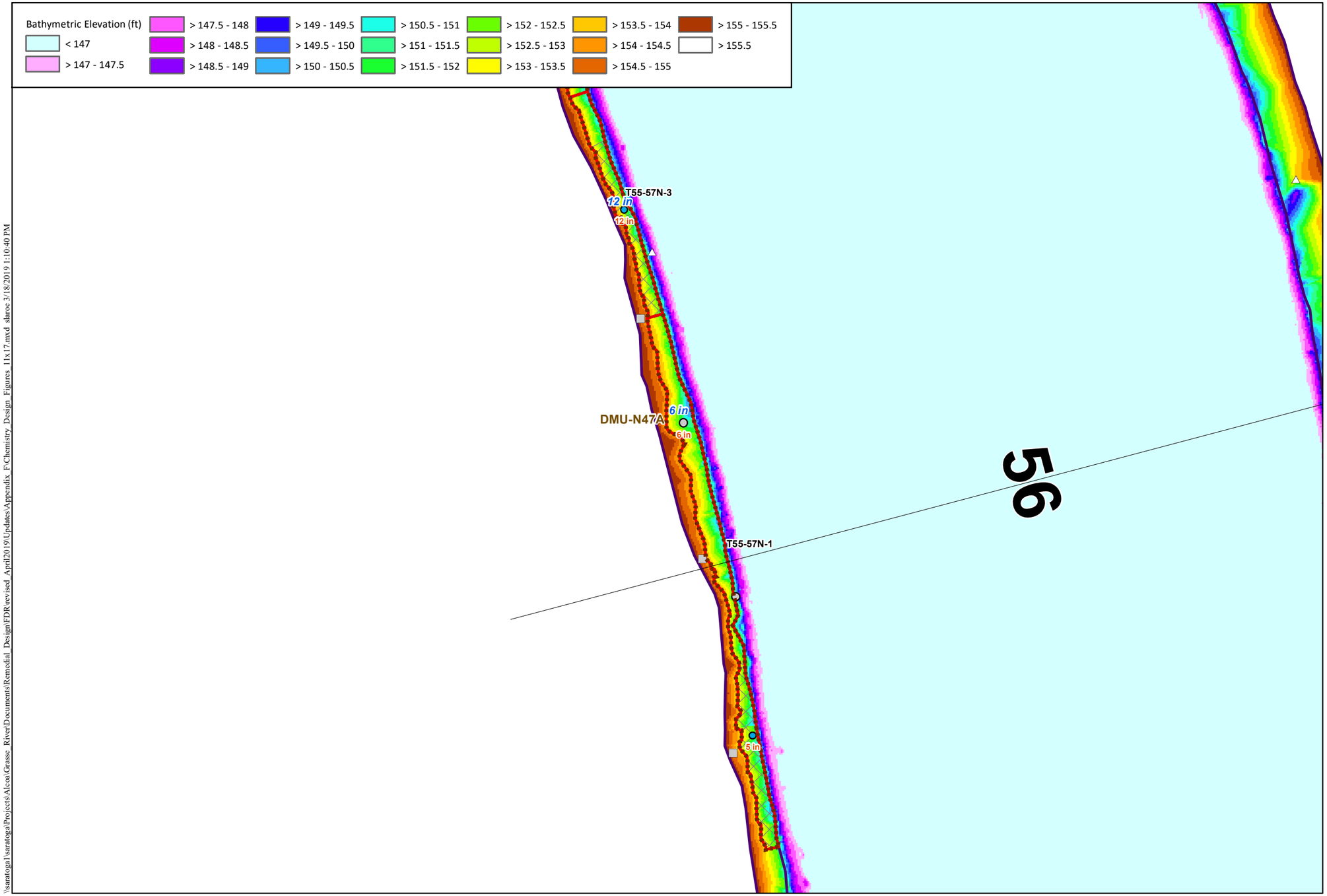
ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-33**
Final Design of Chemistry-based Neatline Surface - Area T51-54N
Final Design Report
Grasse River Project/Arconic




## Locator Map

**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-34**
Final Design of Chemistry-based Neatline Surface - Area T55-57N
Final Design Report
Grasse River Project/Arconic

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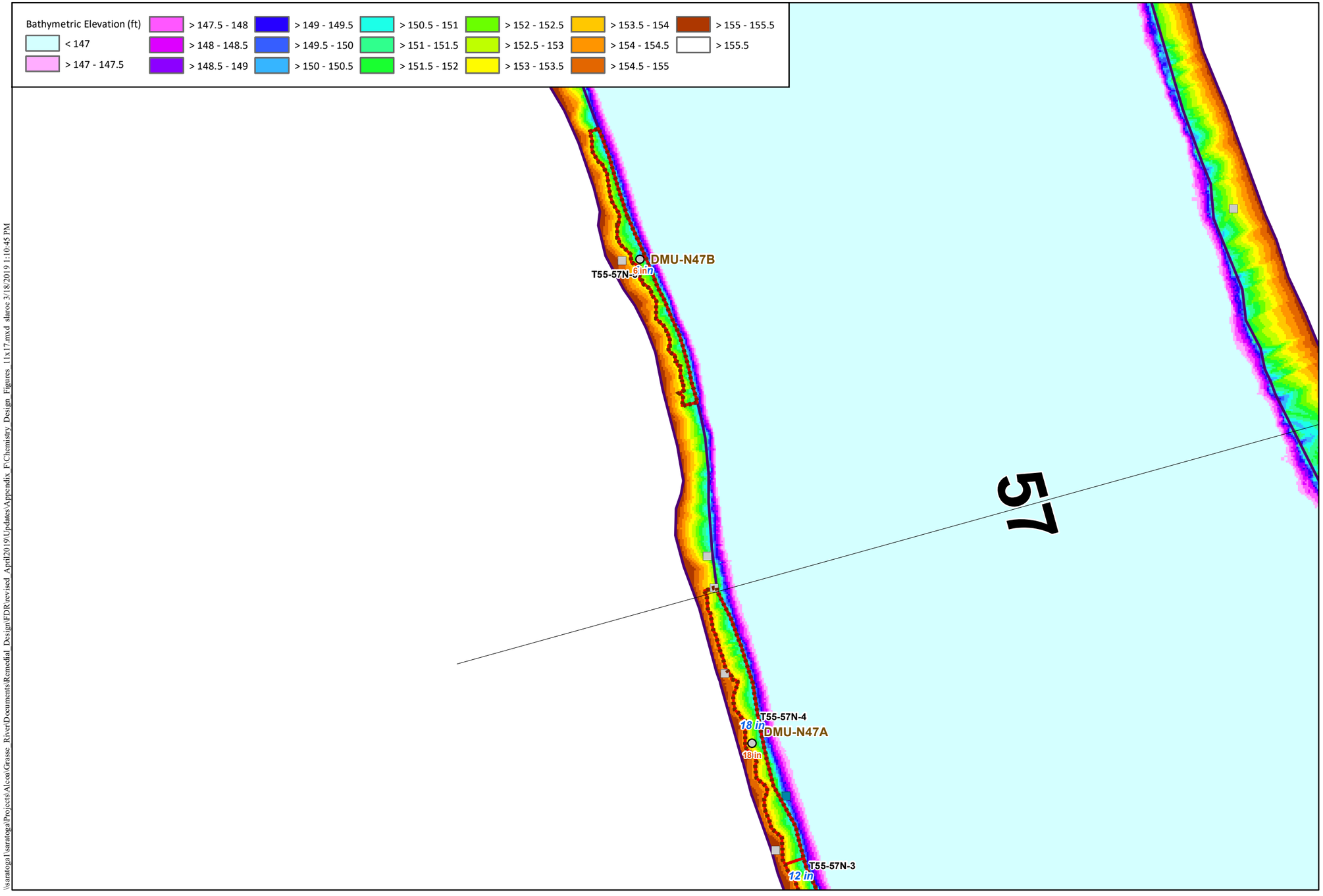
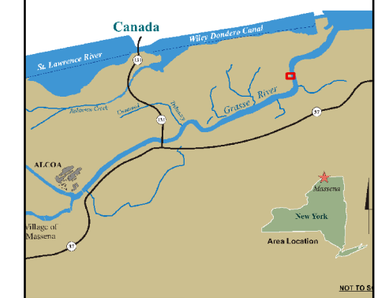



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 15 30 60 Feet

**Figure F1-35**
Final Design of Chemistry-based Neatline Surface - Area T55-57N
Final Design Report
Grasse River Project/Arconic

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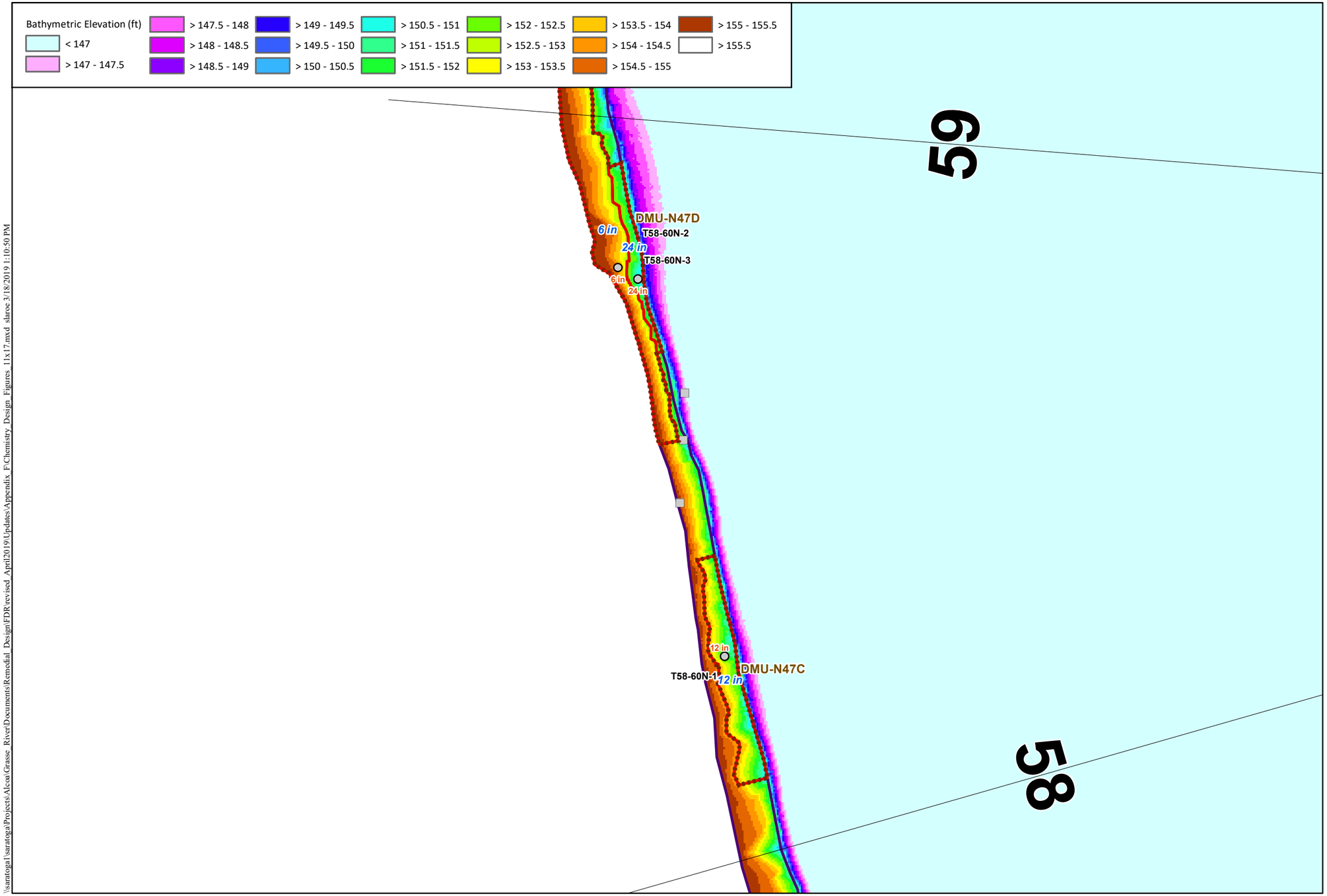


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-36**
Final Design of Chemistry-based Neatline Surface - Area T58-60N
Final Design Report
Grasse River Project/Arconic

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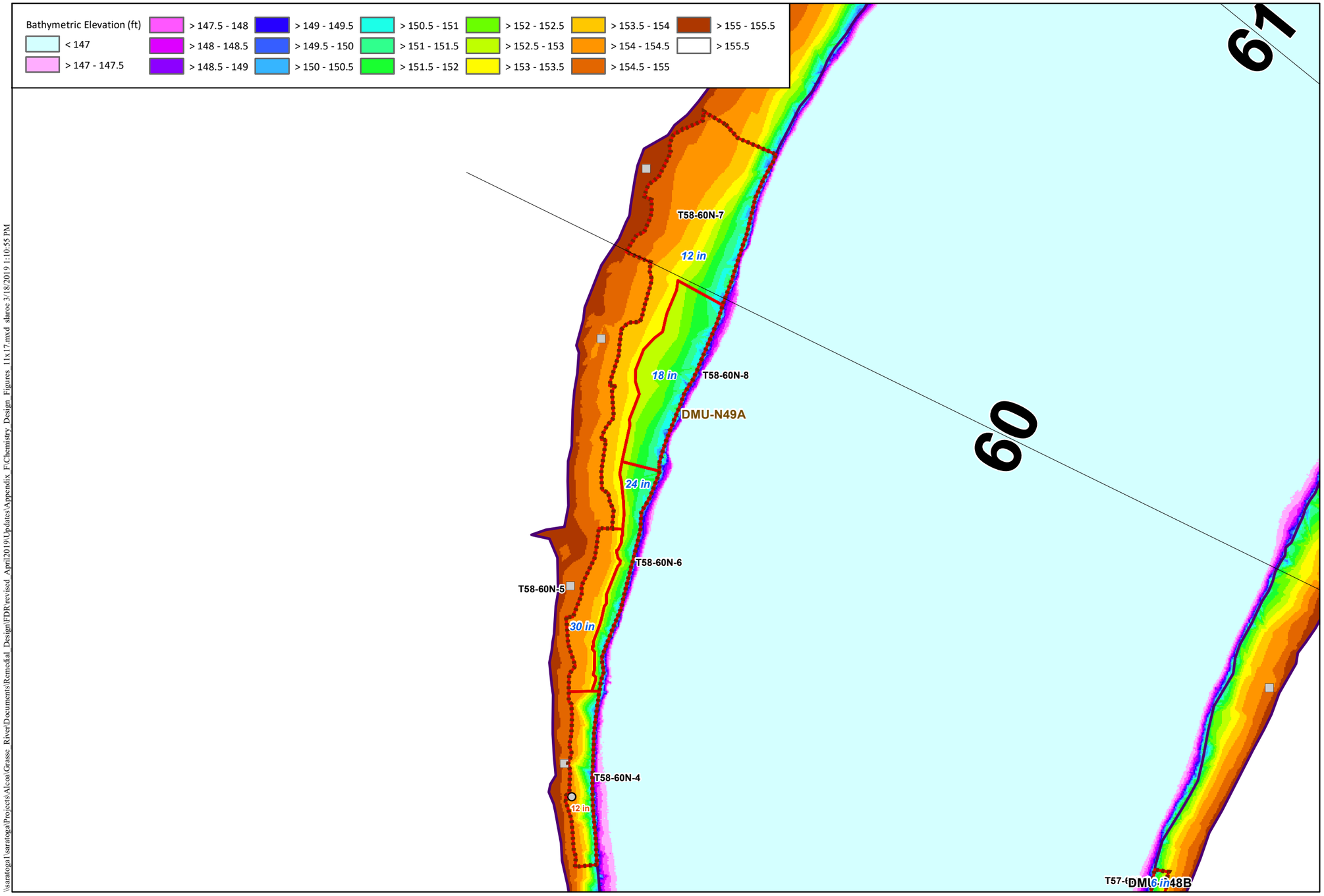
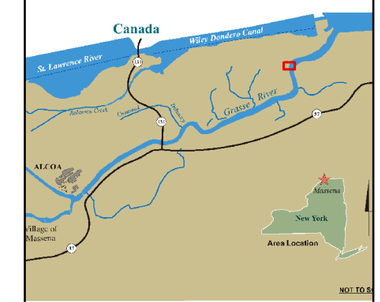



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 20 40 80 Feet

**Figure F1-37**
Final Design of Chemistry-based Neatline Surface - Area T58-60N
Final Design Report
Grasse River Project/Arconic

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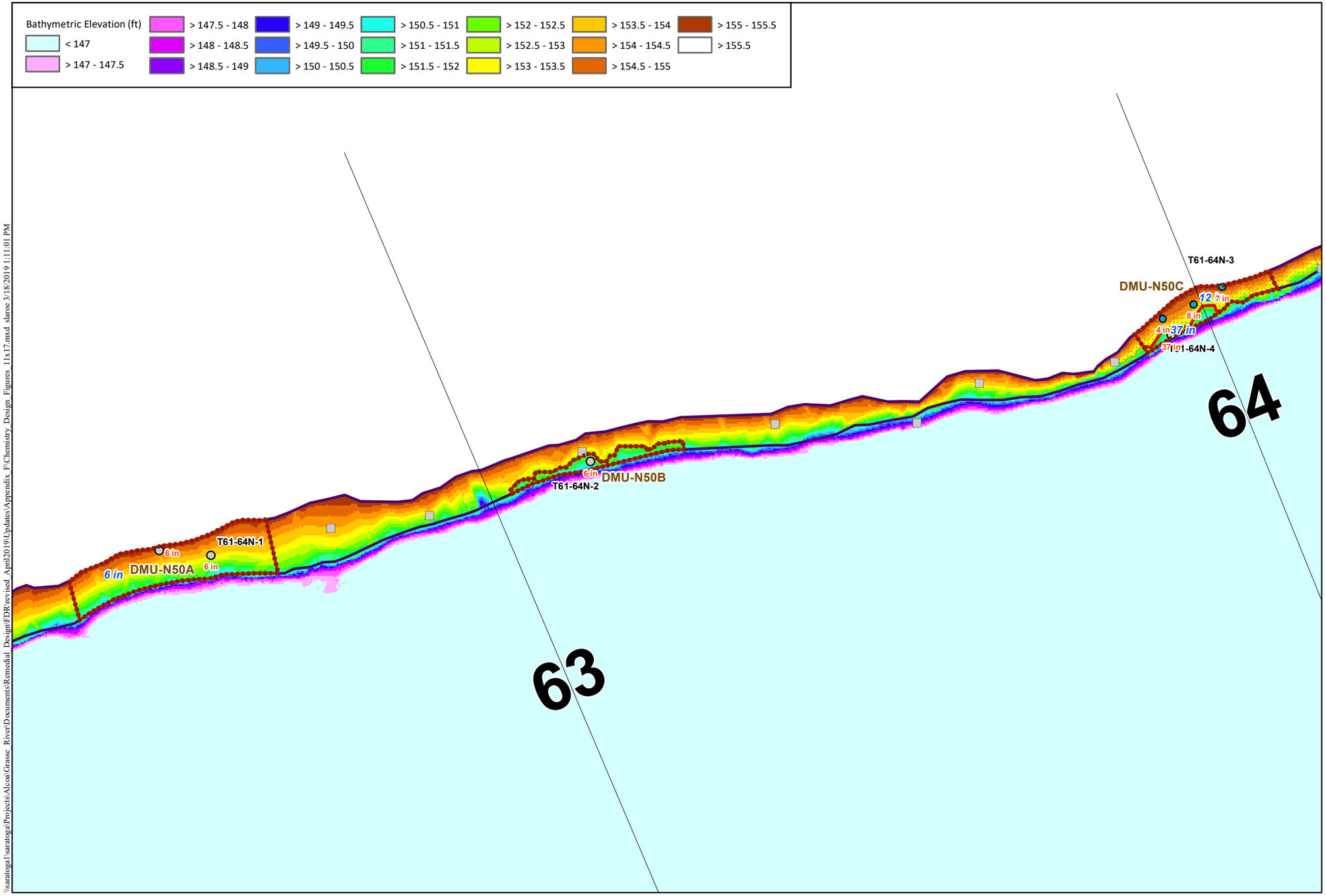


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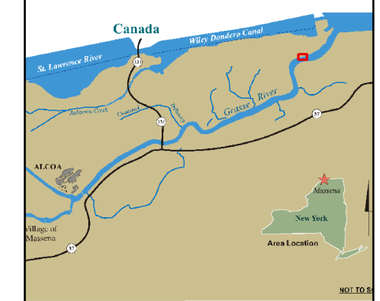


**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-38**
Final Design of Chemistry-based Neatline Surface - Area T61-64N
Final Design Report
Grasse River Project/Arconic

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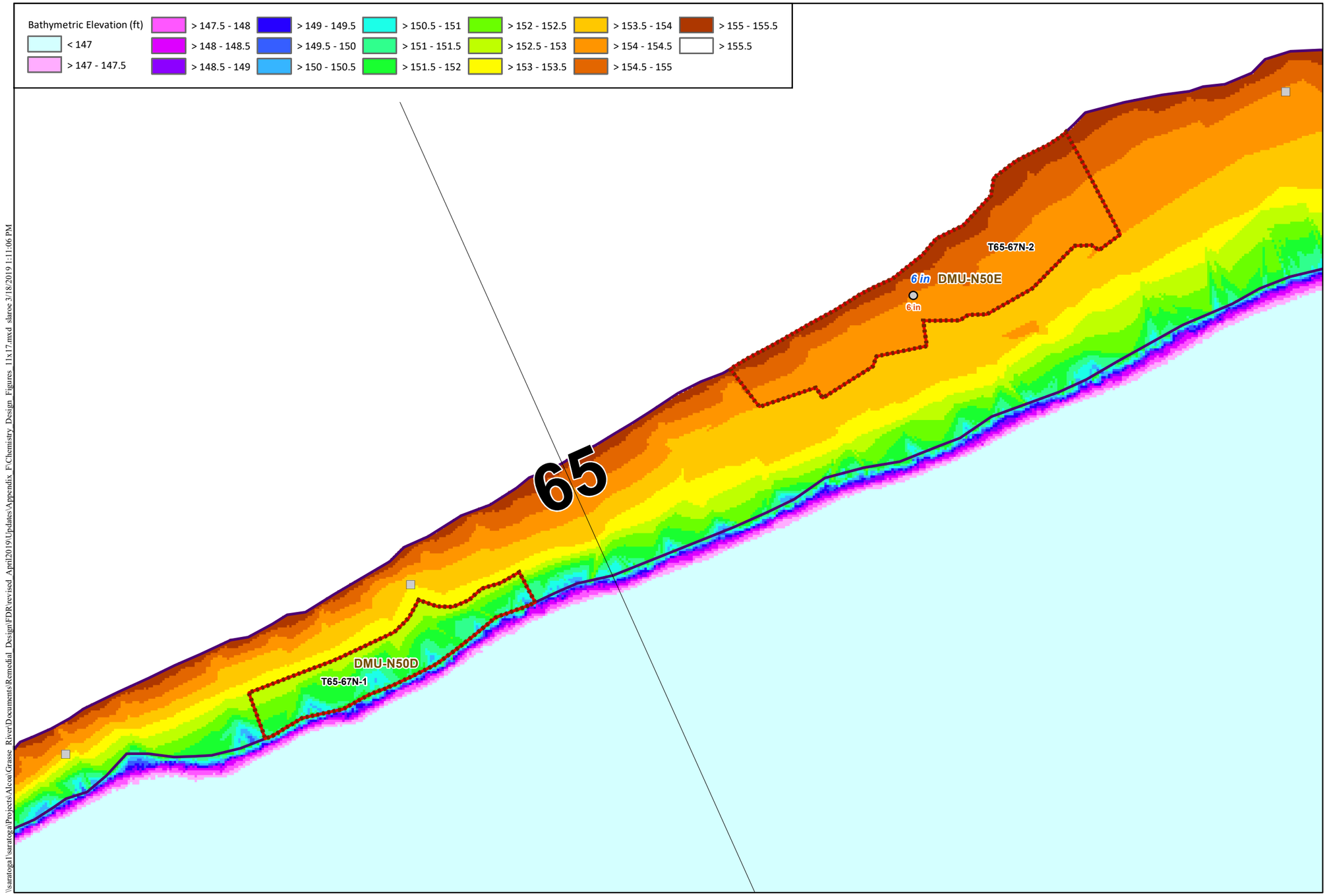


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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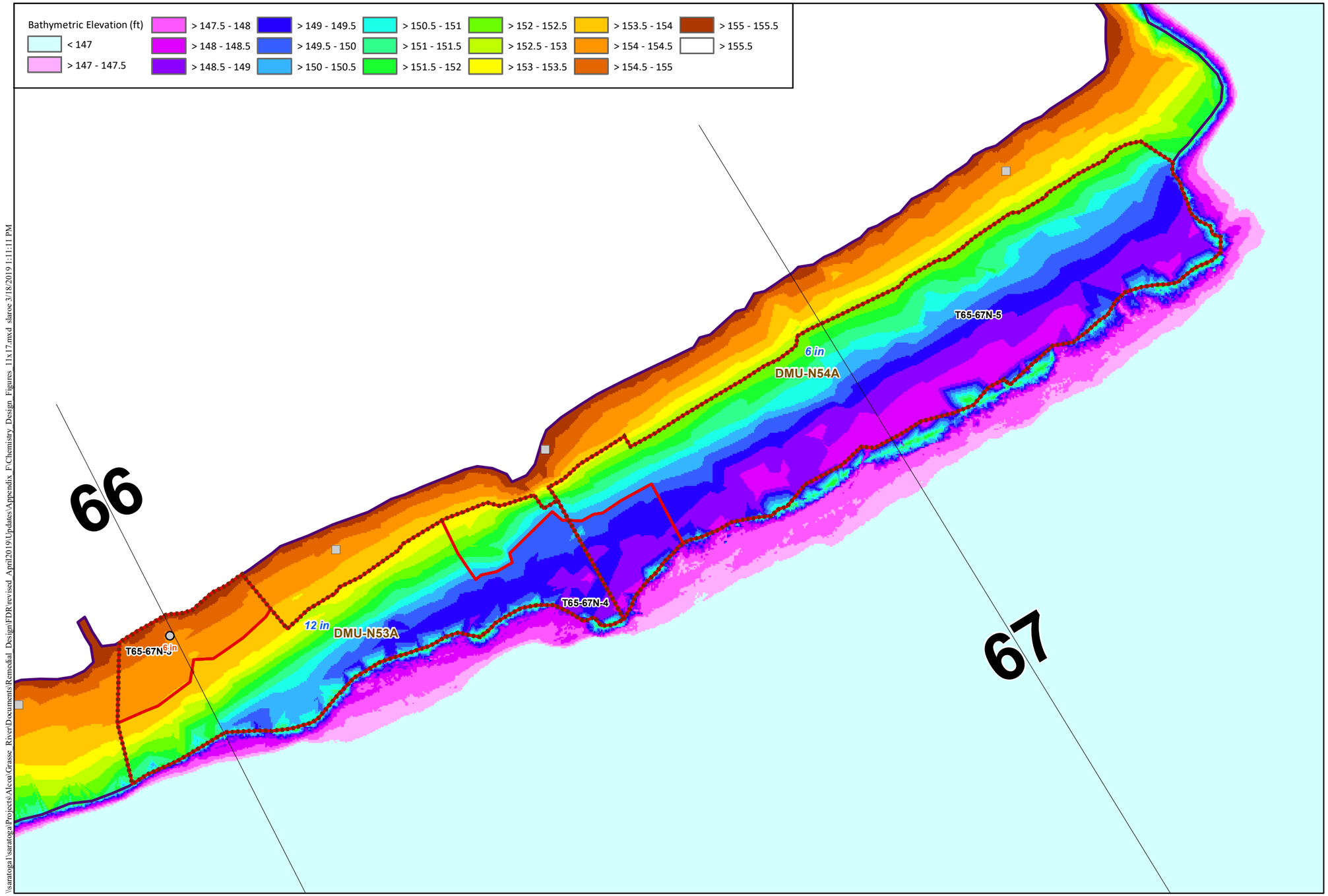
ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-39**
Final Design of Chemistry-based Neatline Surface - Area T65-67N
Final Design Report
Grasse River Project/Arconic

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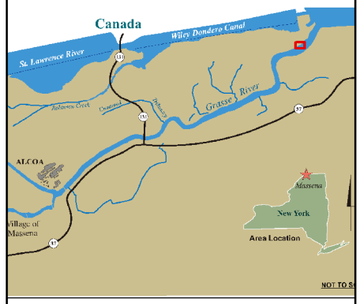


**NOTES:**

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-40**
Final Design of Chemistry-based Neatline Surface - Area T65-67N
Final Design Report
Grasse River Project/Arconic

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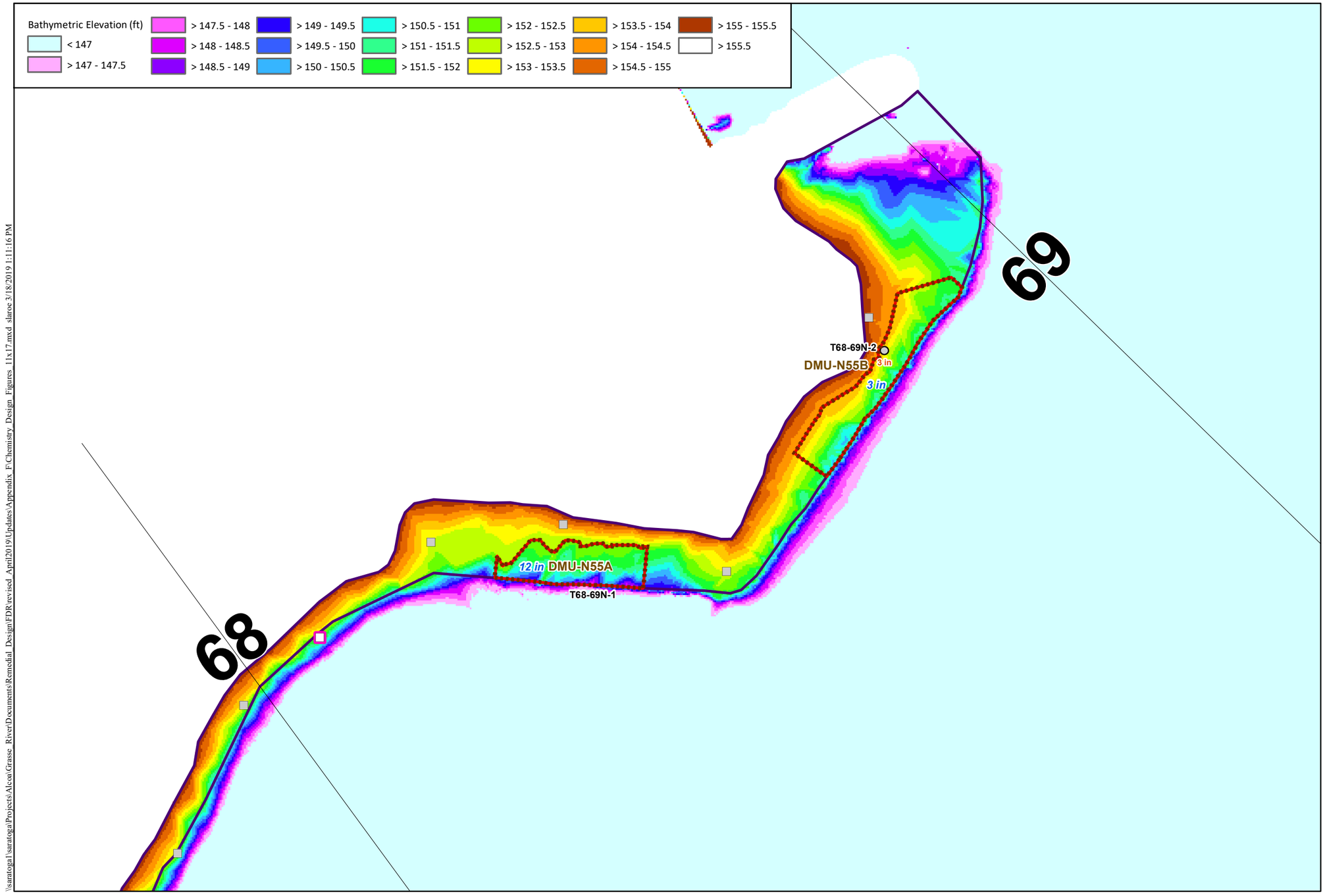


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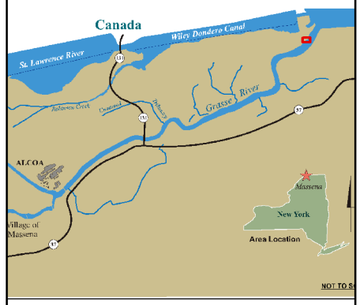


**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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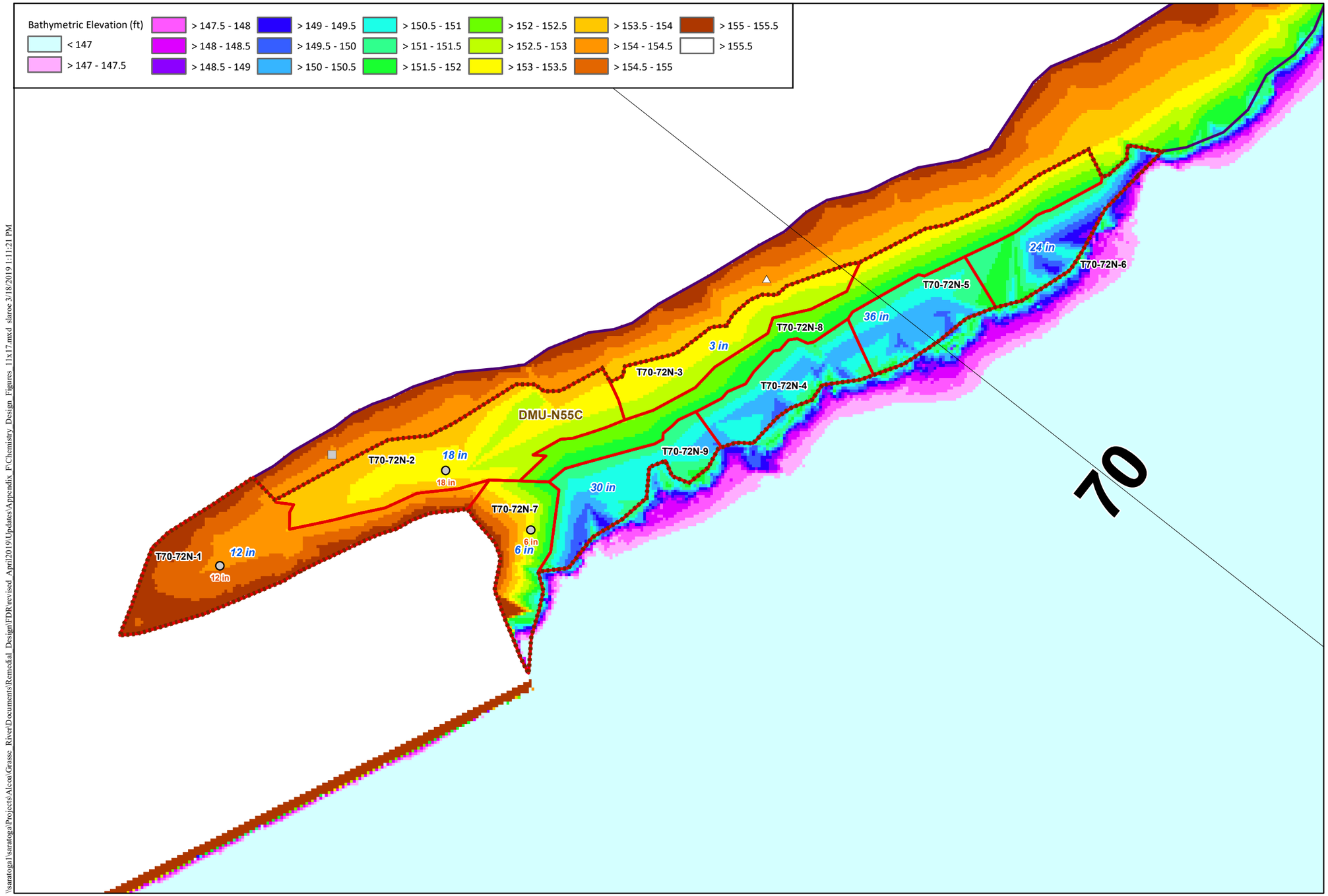
ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-41**
Final Design of Chemistry-based Neatline Surface - Area T68-69N
Final Design Report
Grasse River Project/Arconic

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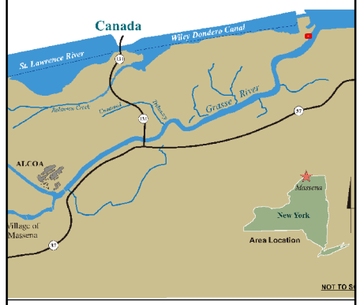


**NOTES:**

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 5 10 20

**Figure F1-42**
Final Design of Chemistry-based Neatline Surface - Area T70-72N
Final Design Report
Grasse River Project/Arconic

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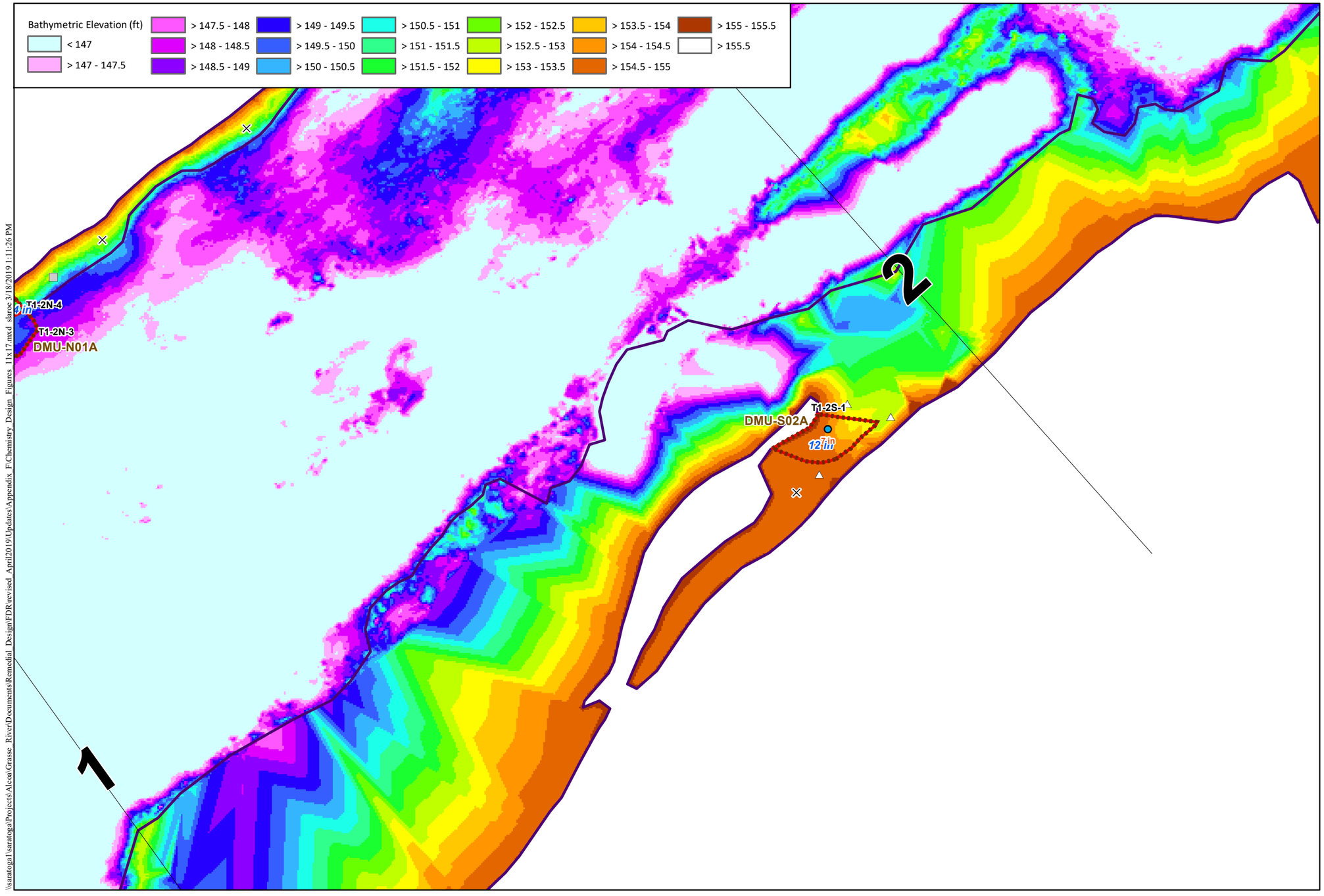


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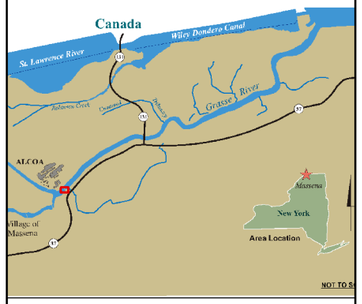


**NOTES:**
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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-43**
Final Design of Chemistry-based Neatline Surface - Area T1-2S
Final Design Report
Grasse River Project/Arconic

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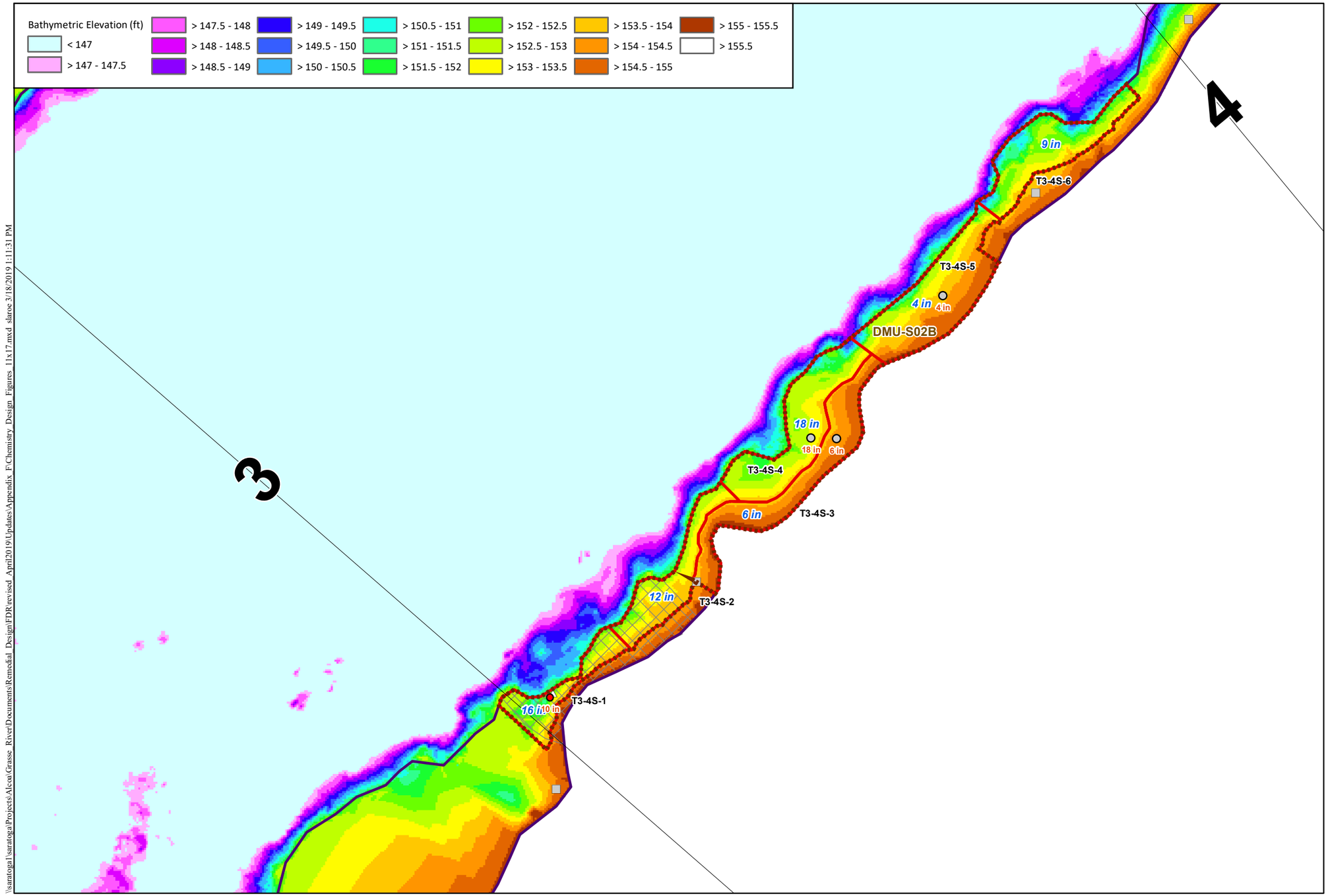


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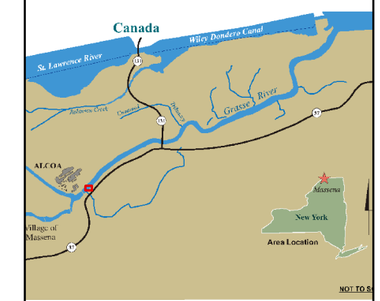


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-44**
Final Design of Chemistry-based Neatline Surface - Area T3-4S
Final Design Report
Grasse River Project/Arconic

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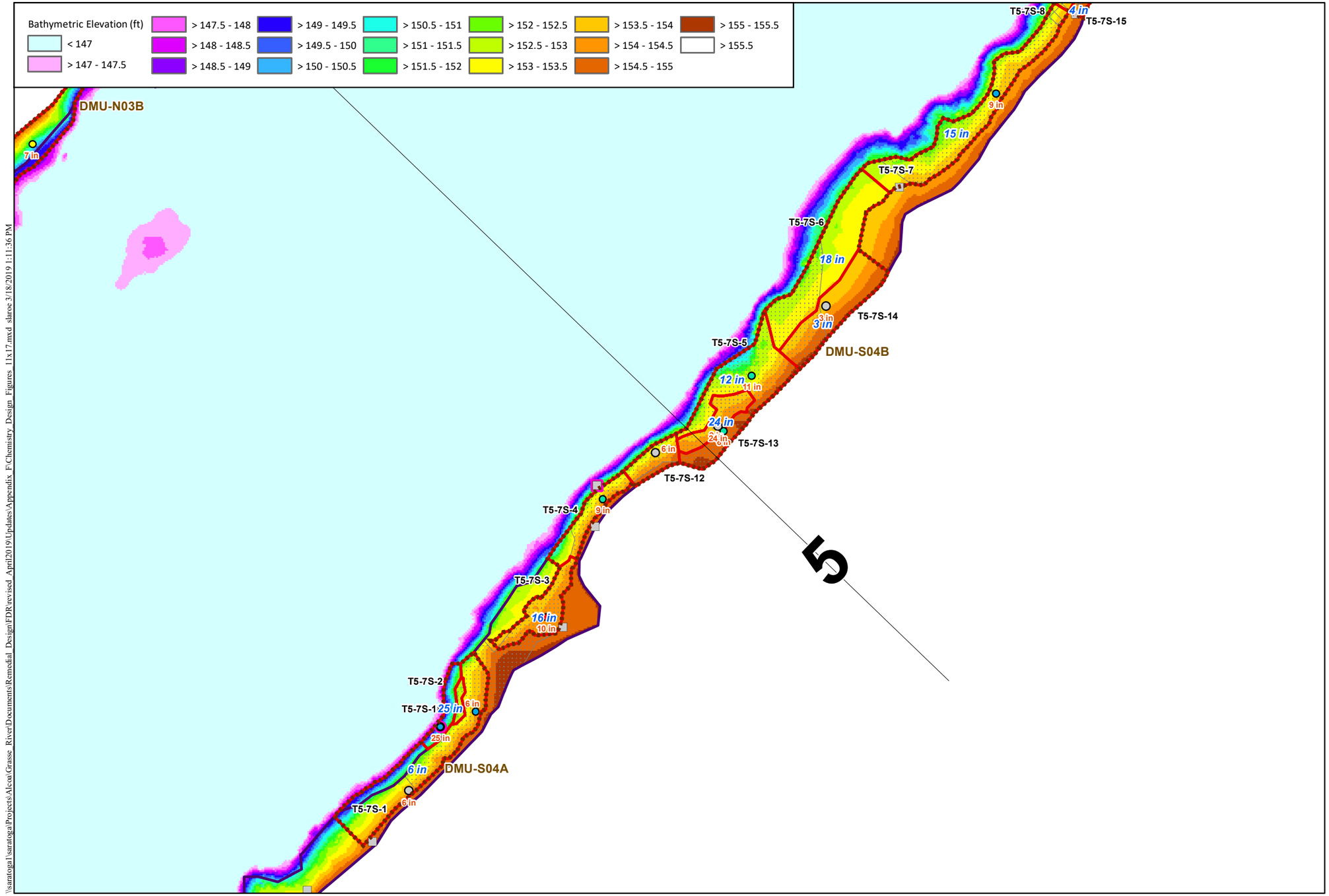


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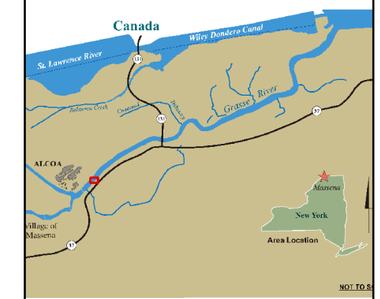


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 15 30 60 Feet

**Figure F1-45**
Final Design of Chemistry-based Neatline Surface - Area T5-7S
Final Design Report
Grasse River Project/Arconic

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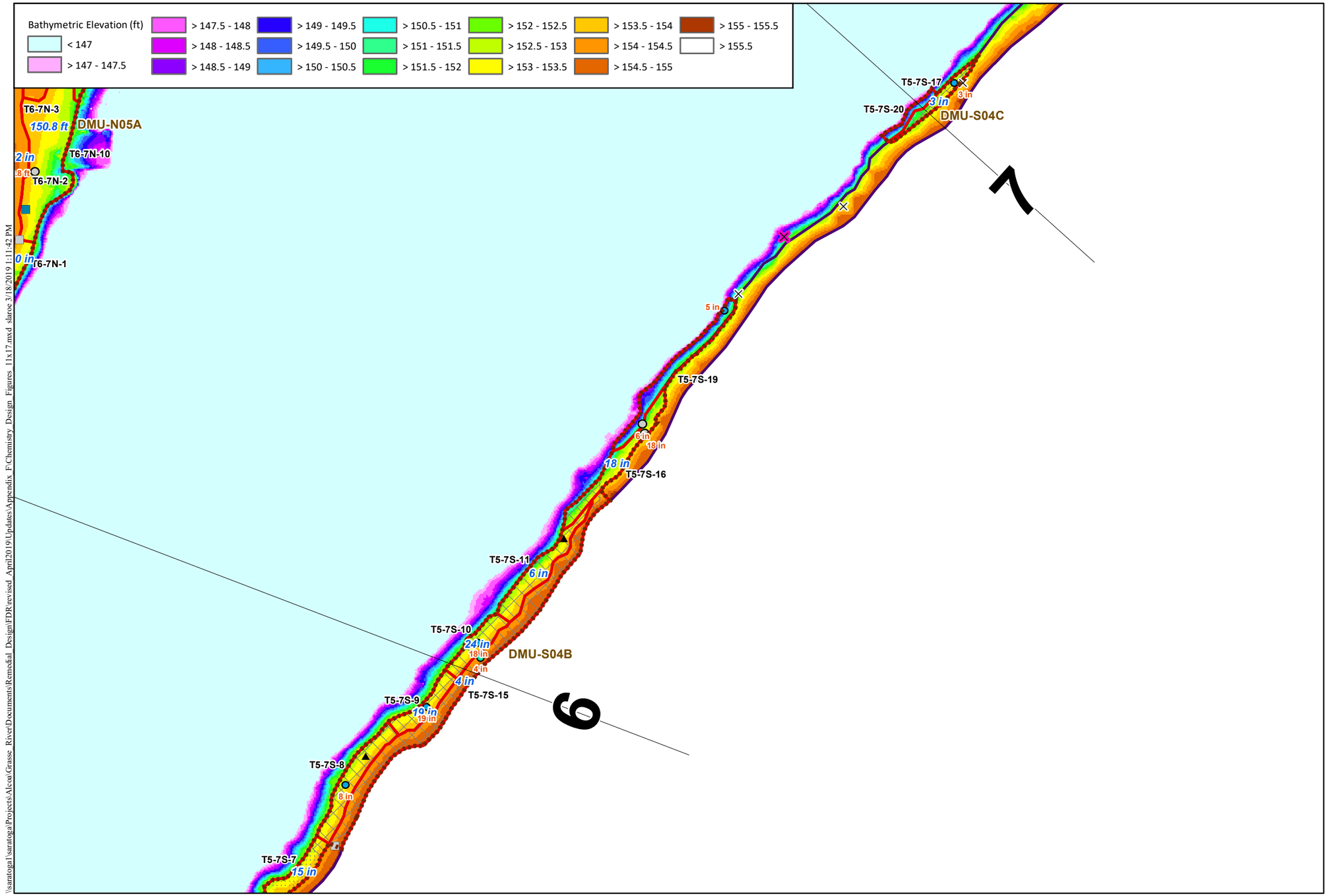
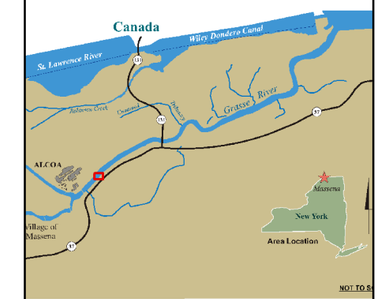



## Locator Map




**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-46**
Final Design of Chemistry-based Neatline Surface - Area T5-7S
Final Design Report
Grasse River Project/Arconic

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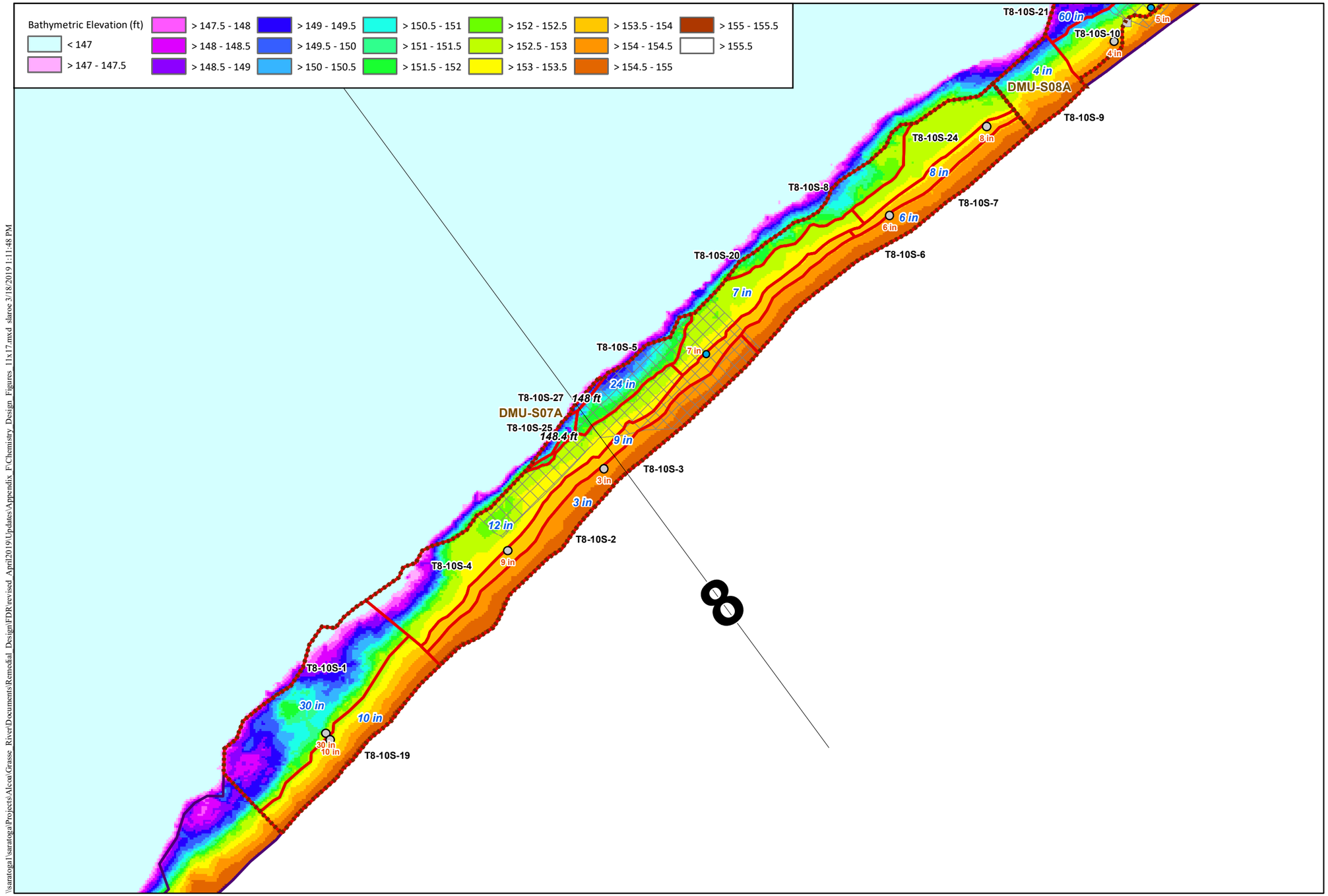


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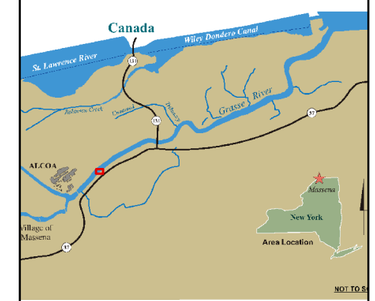


**NOTES:**
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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-47**
Final Design of Chemistry-based Neatline Surface - Area T8-10S
Final Design Report
Grasse River Project/Arconic

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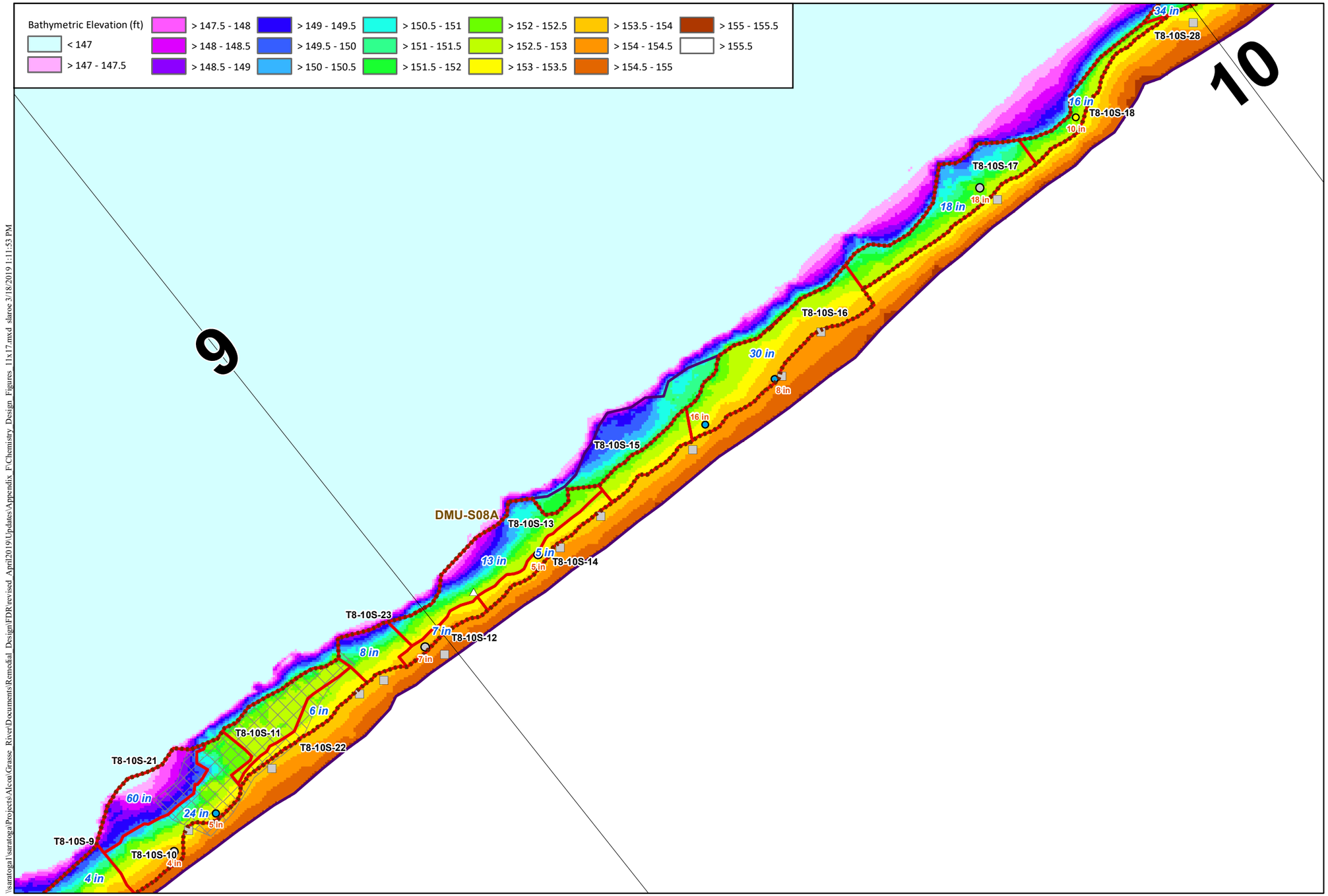


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 12.5 25 50 Feet

**Figure F1-48**
Final Design of Chemistry-based Neatline Surface - Area T8-10S
Final Design Report
Grasse River Project/Arconic

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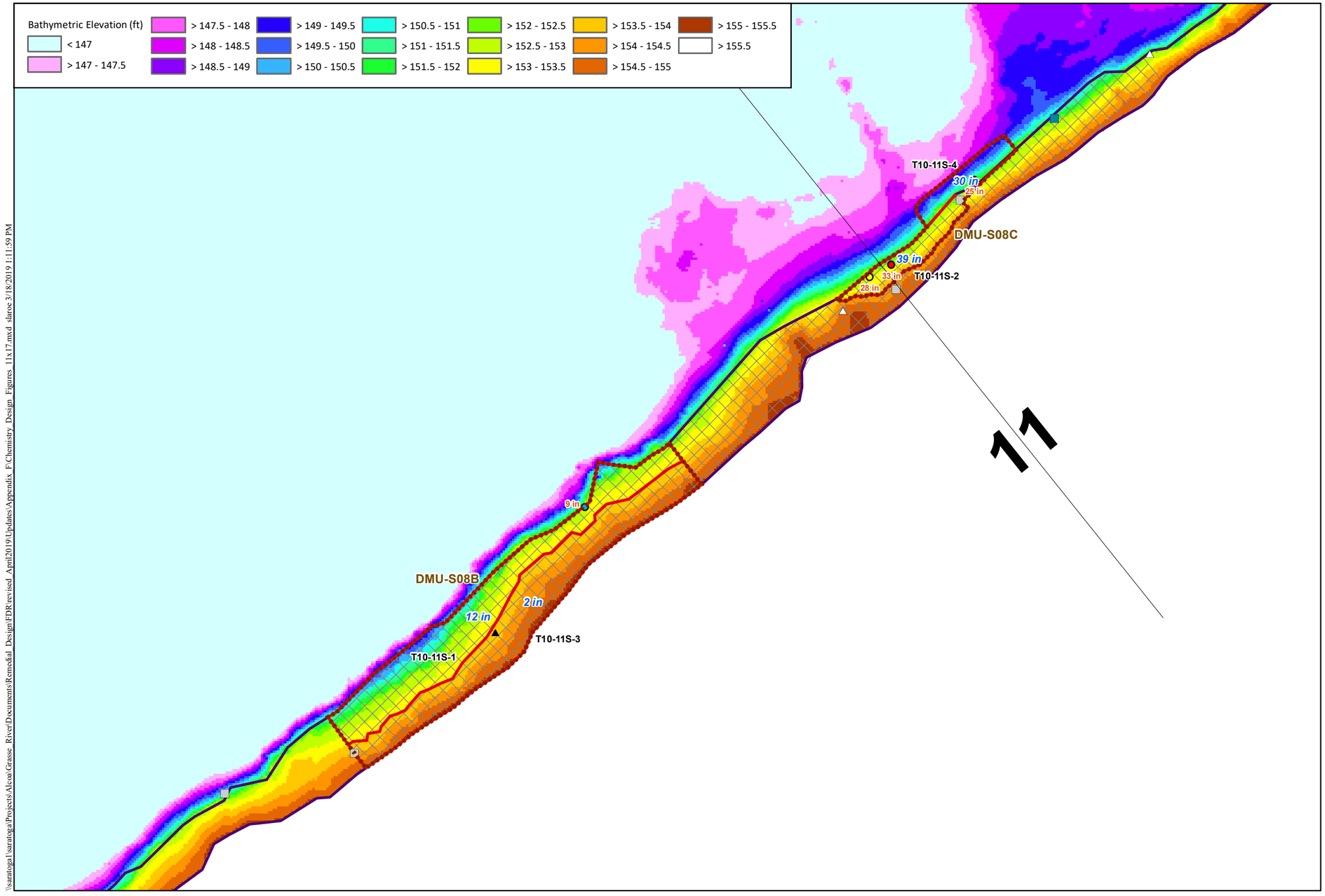
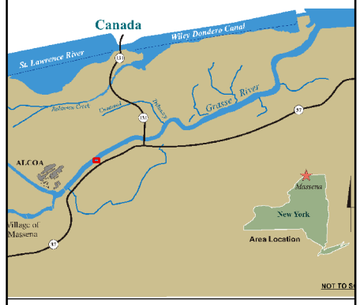



## Locator Map

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-49**
Final Design of Chemistry-based Neatline Surface - Area T10-11S
Final Design Report
Grasse River Project/Arconic

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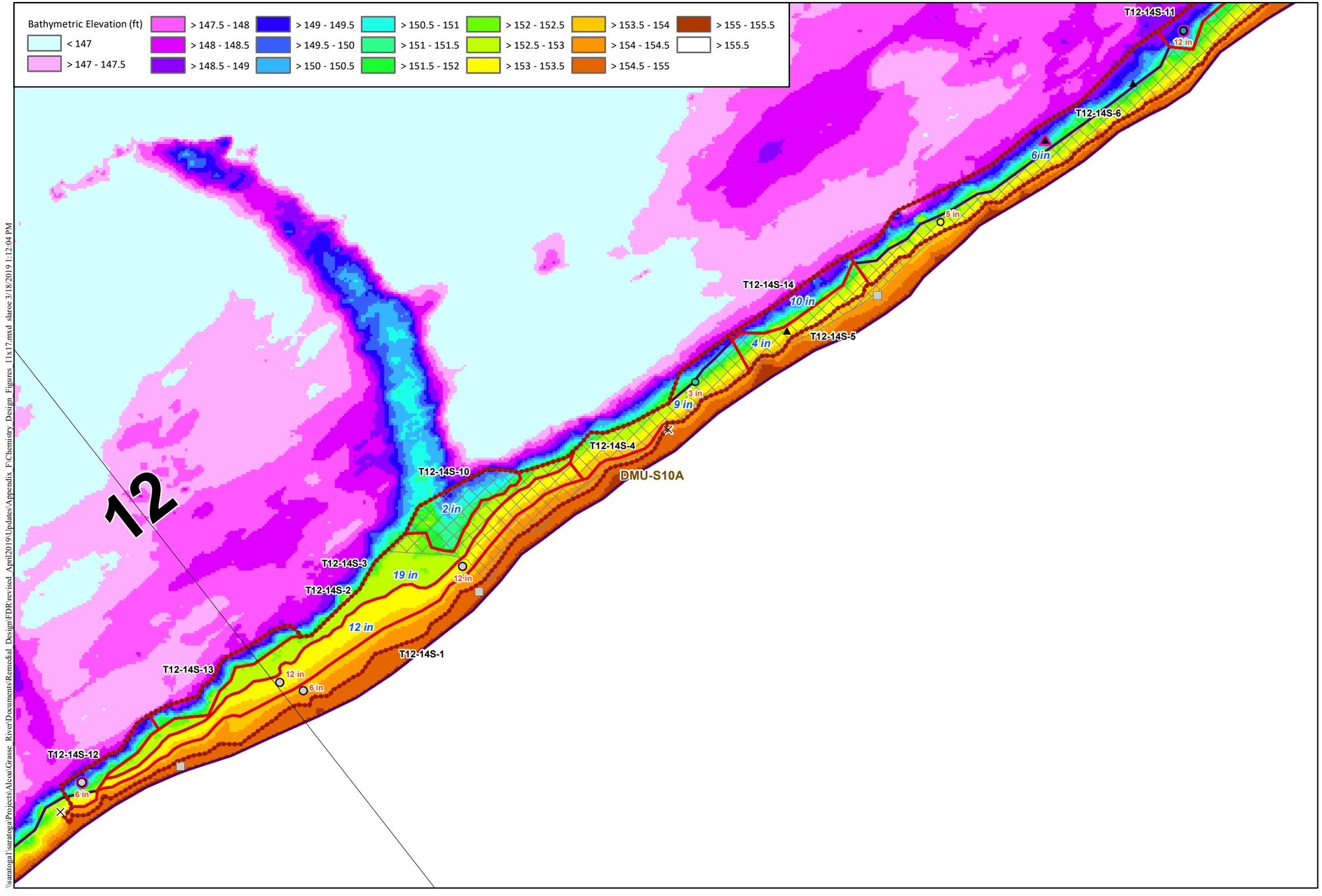
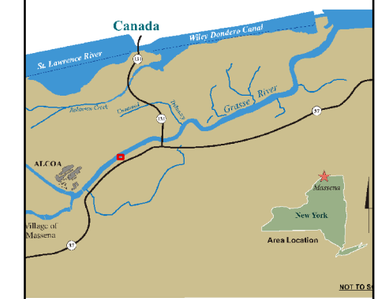



## Locator Map




**NOTES:**
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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-50**
Final Design of Chemistry-based Neatline Surface - Area T12-14S
Final Design Report
Grasse River Project/Arconic

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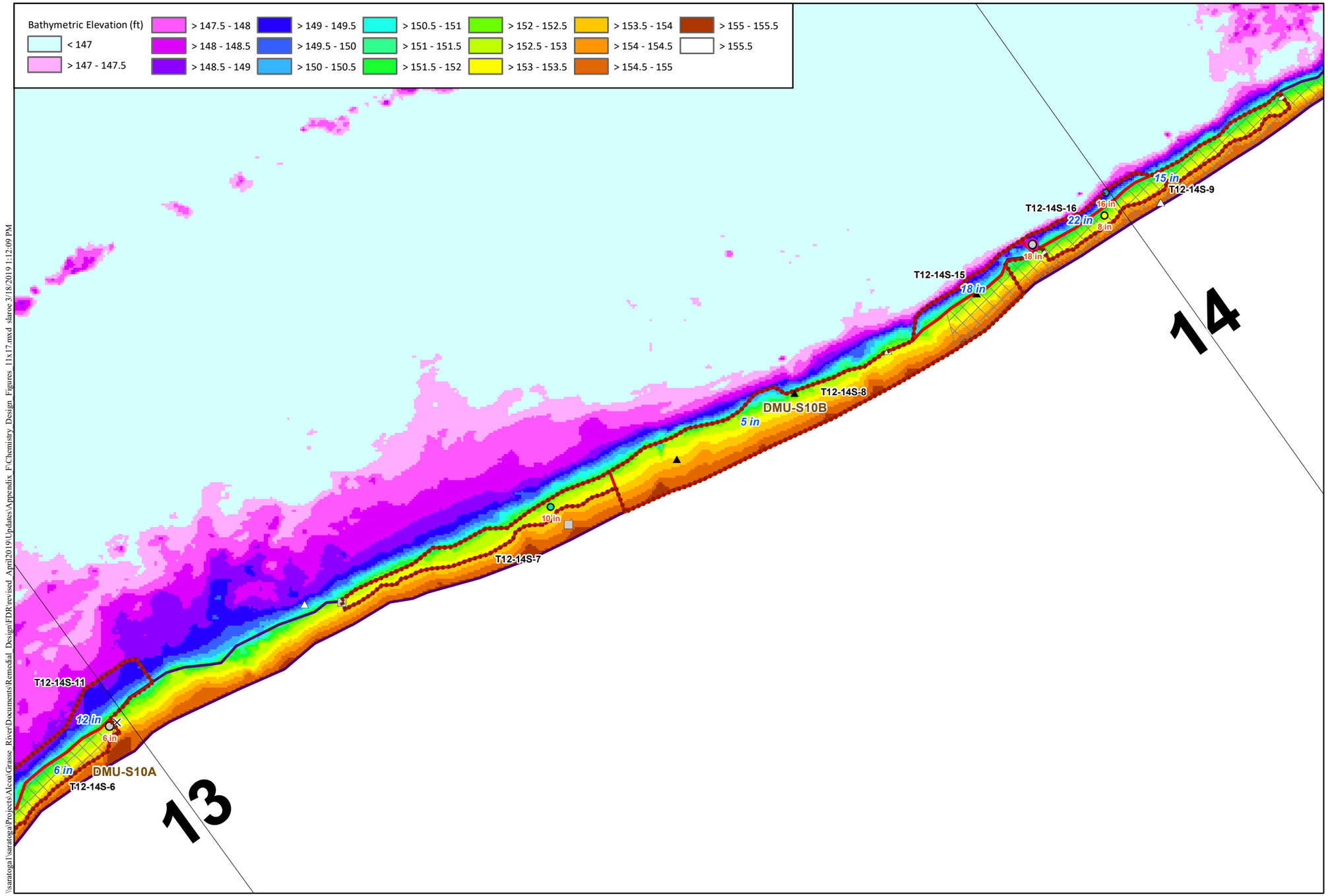


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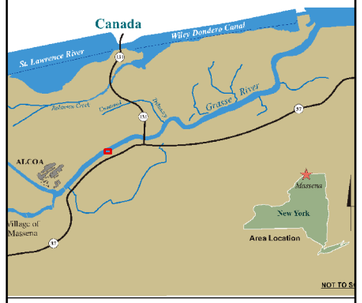


**NOTES:**

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 12.5 25 50 Feet

**Figure F1-51**
Final Design of Chemistry-based Neatline Surface - Area T12-14S
Final Design Report
Grasse River Project/Arconic

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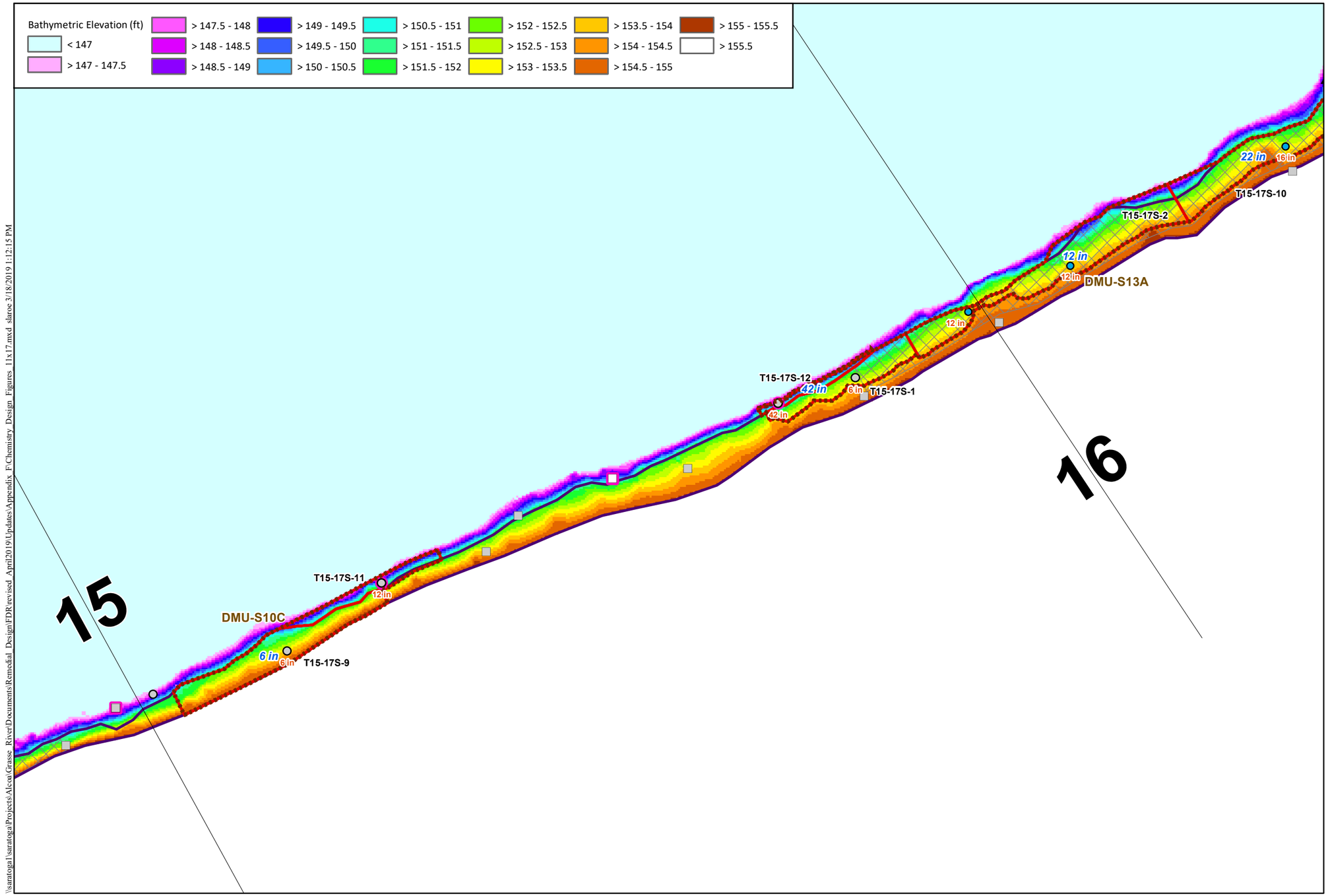


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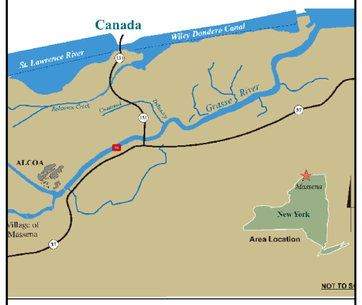


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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-52**
Final Design of Chemistry-based Neatline Surface - Area T15-17S
Final Design Report
Grasse River Project/Arconic

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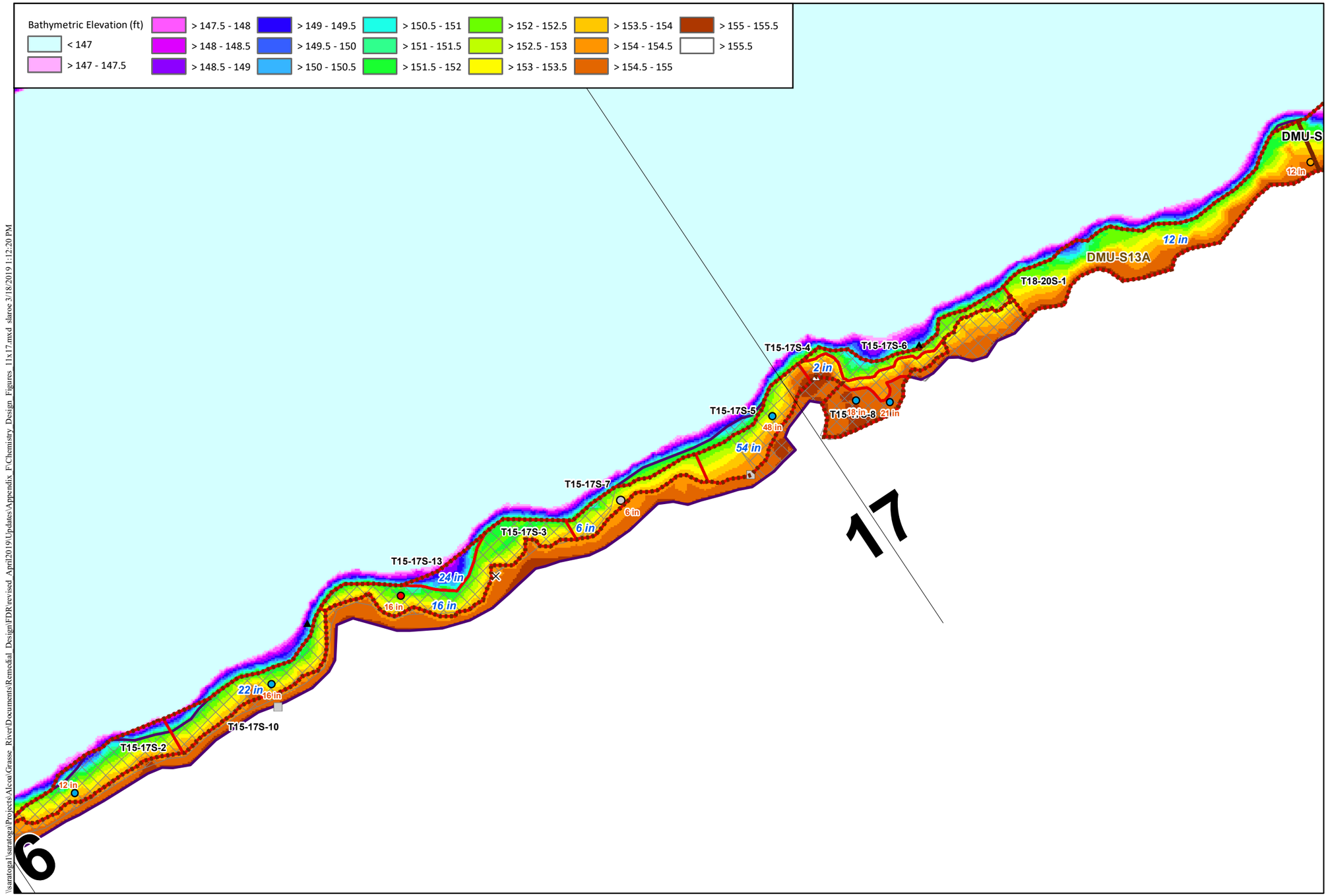


## Locator Map

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-53**
Final Design of Chemistry-based Neatline Surface - Area T15-17S
Final Design Report
Grasse River Project/Arconic

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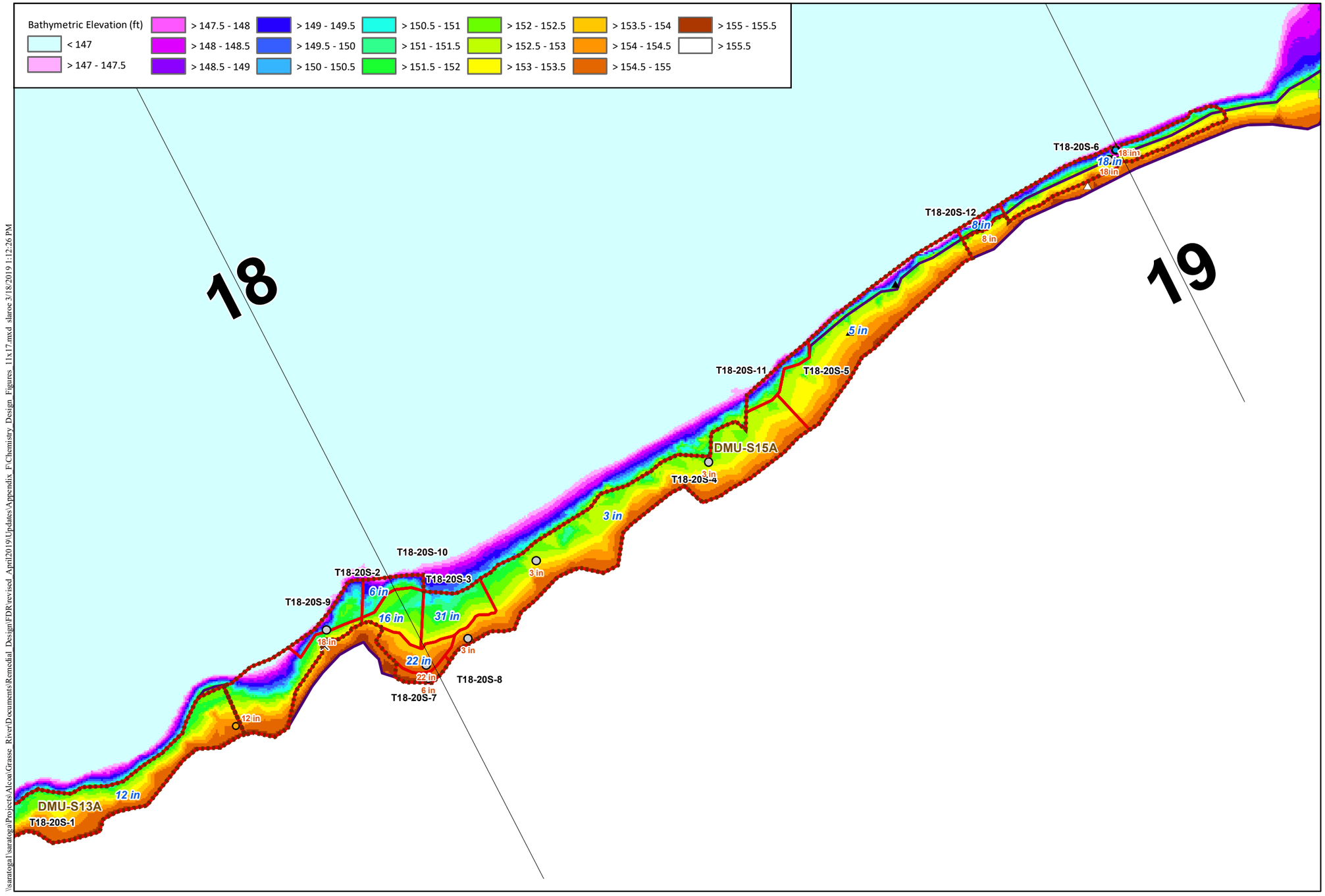


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-54**
Final Design of Chemistry-based Neatline Surface - Area T18-20S
Final Design Report
Grasse River Project/Arconic

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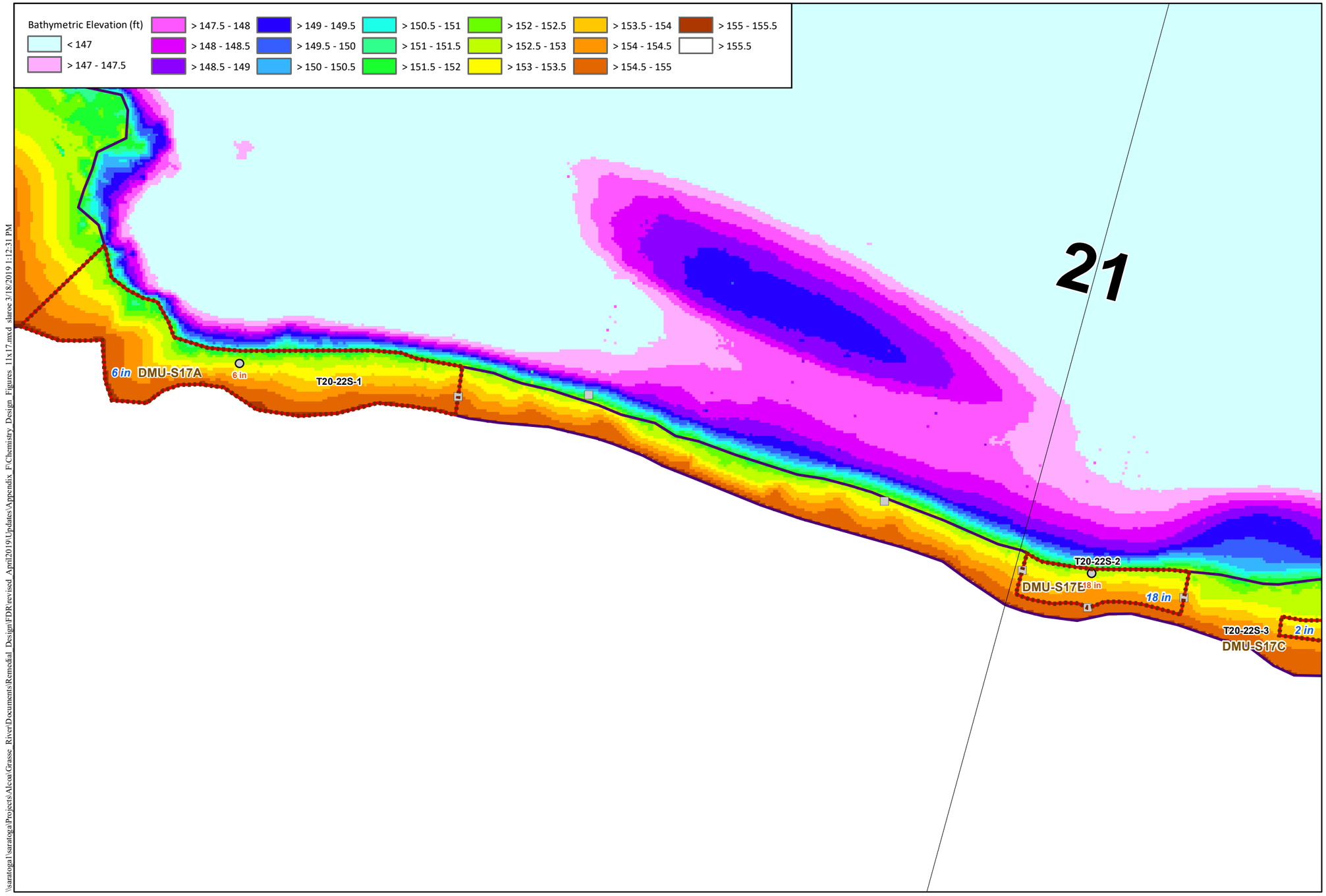


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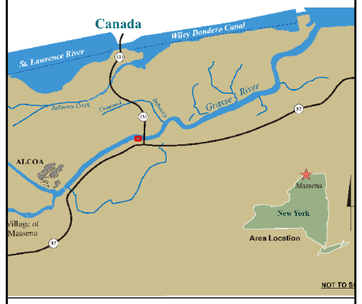


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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-55**
Final Design of Chemistry-based Neatline Surface - Area T20-22S
Final Design Report
Grasse River Project/Arconic

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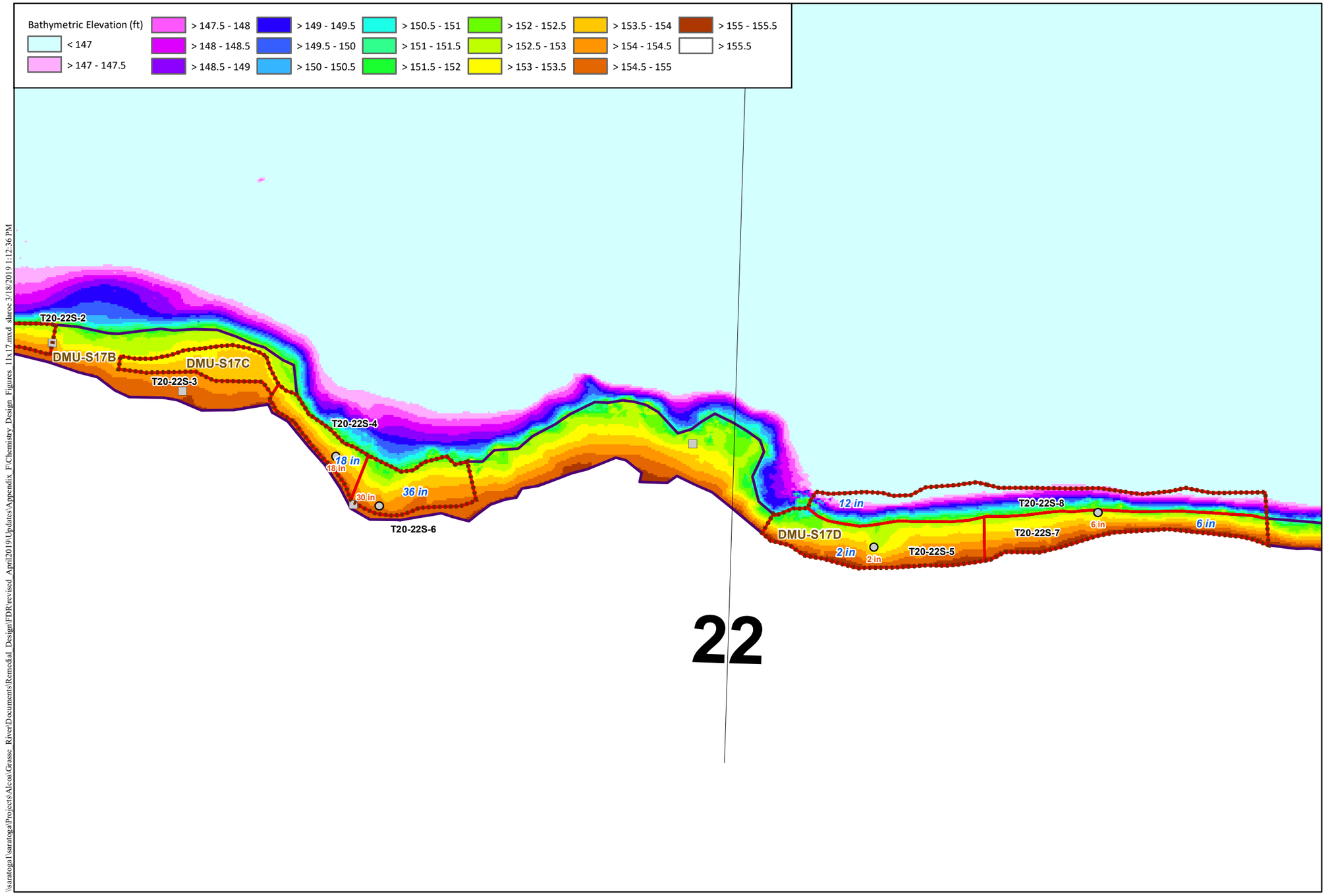
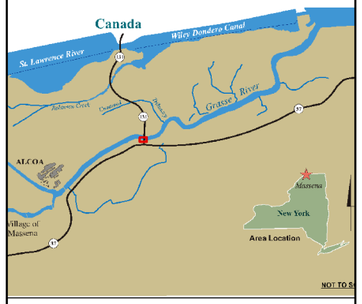



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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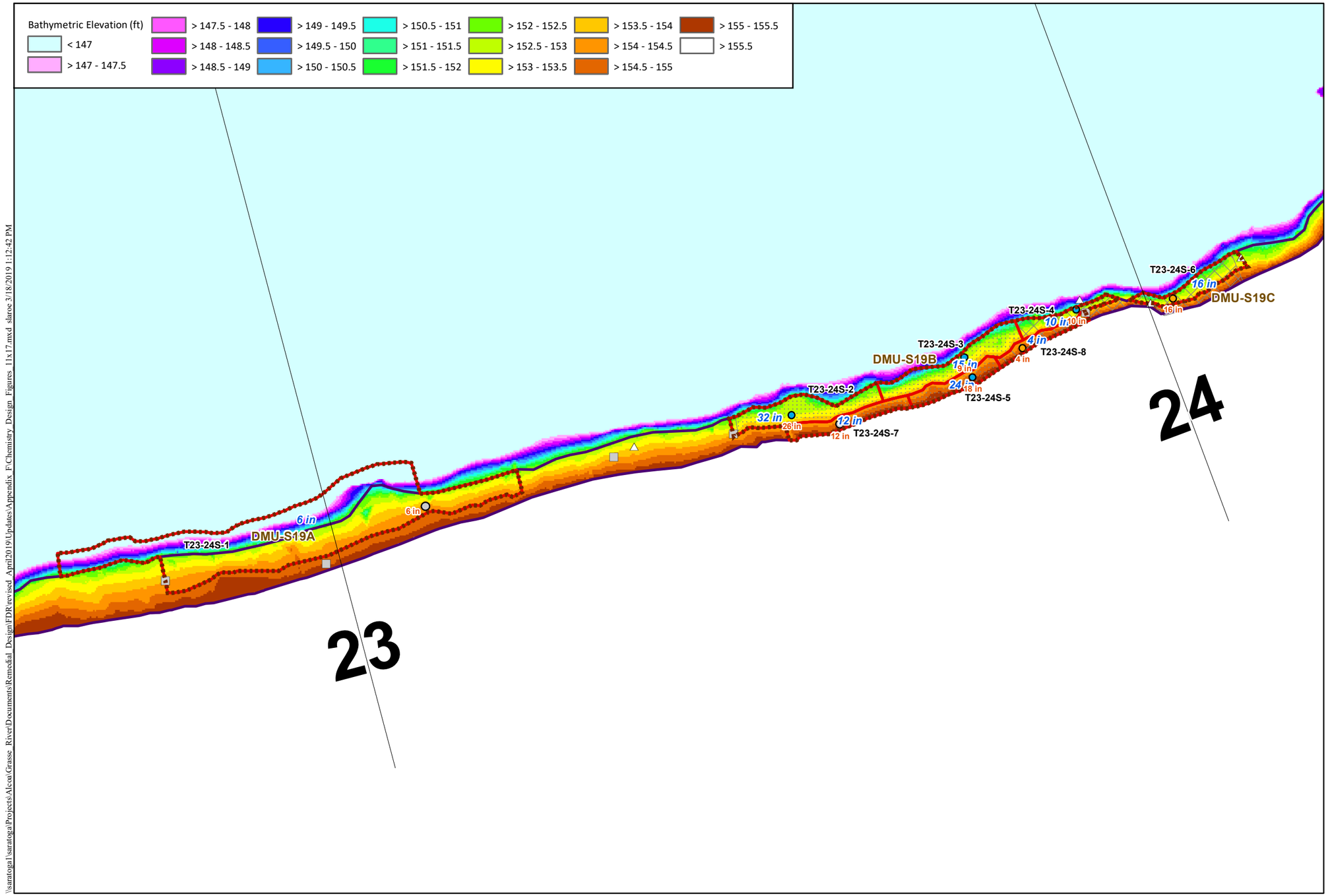
ARCONIC

GRAPHIC SCALE
0 15 30 60 Feet

**Figure F1-56**
Final Design of Chemistry-based Neatline Surface - Area T20-22S
Final Design Report
Grasse River Project/Arconic




## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-57**
Final Design of Chemistry-based Neatline Surface - Area T23-24S
Final Design Report
Grasse River Project/Arconic

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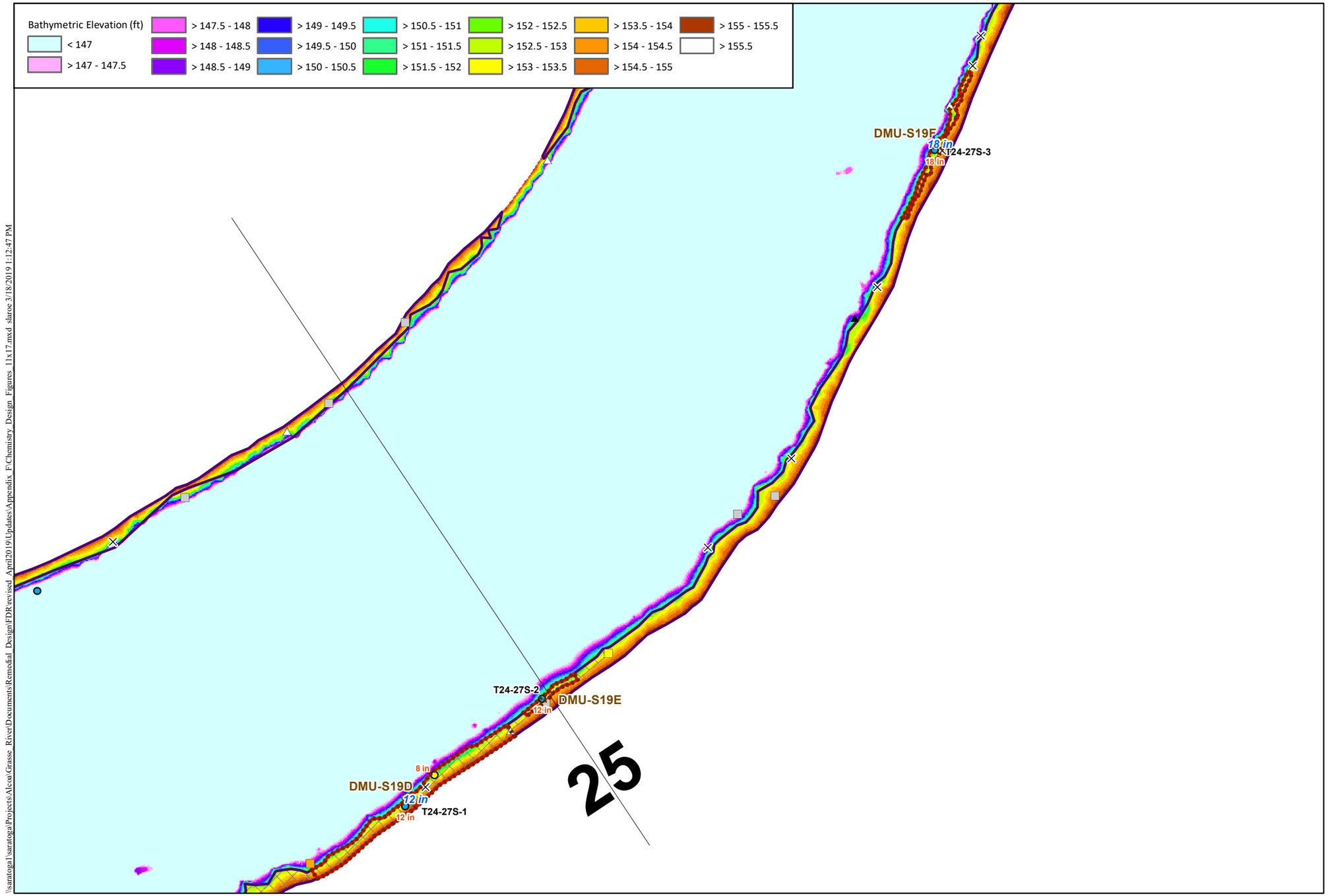


## Locator Map

**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 20 40 80

**Figure F1-58**
Final Design of Chemistry-based Neatline Surface - Area T24-27S
Final Design Report
Grasse River Project/Arconic

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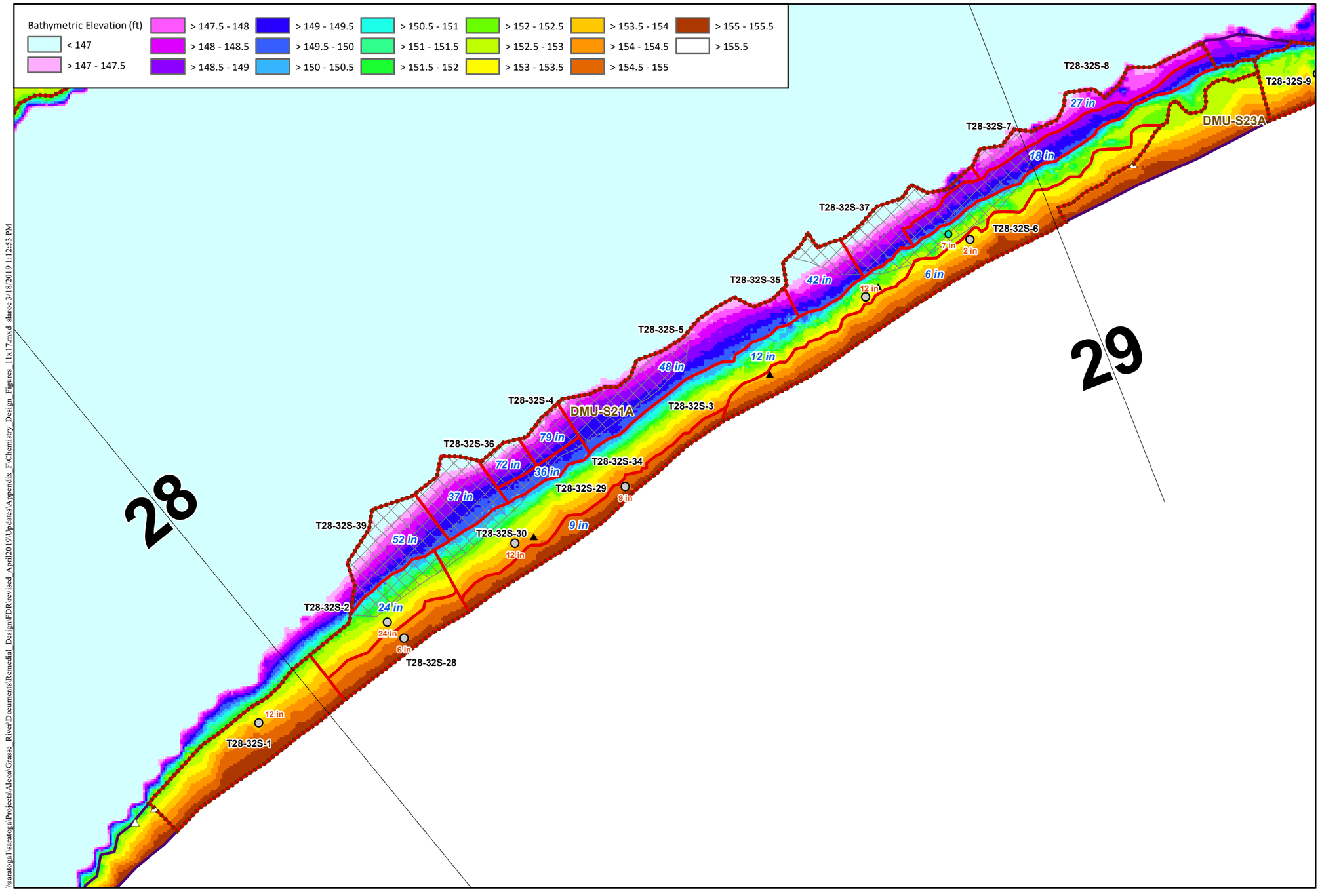


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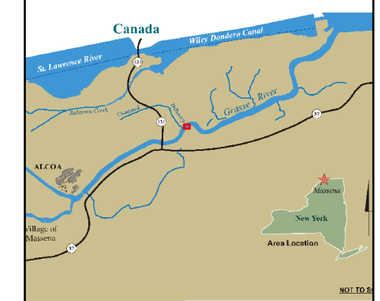


**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-59**
Final Design of Chemistry-based Neatline Surface - Area T28-32S
Final Design Report
Grasse River Project/Arconic

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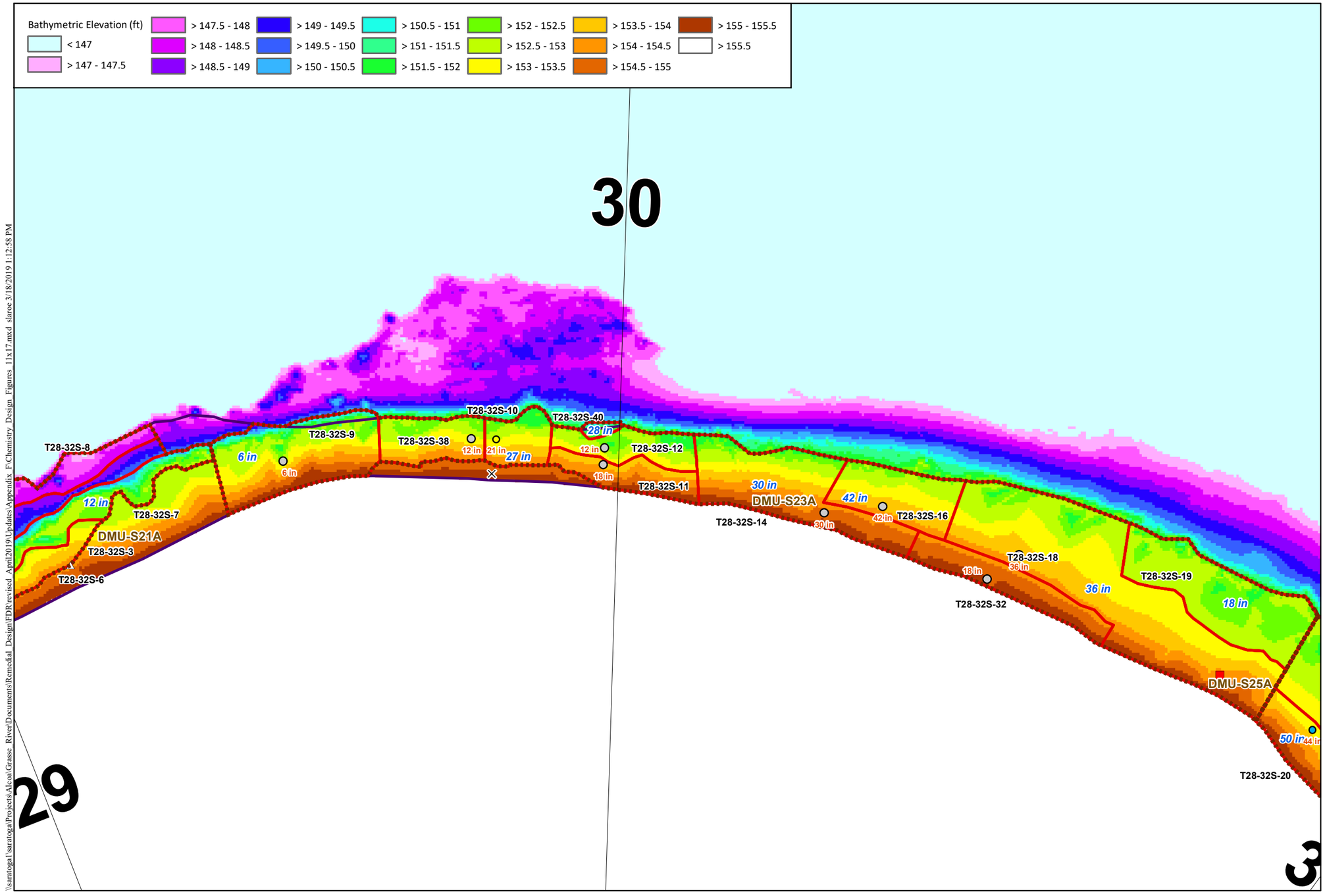


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-60**
Final Design of Chemistry-based Neatline Surface - Area T28-32S
Final Design Report
Grasse River Project/Arconic

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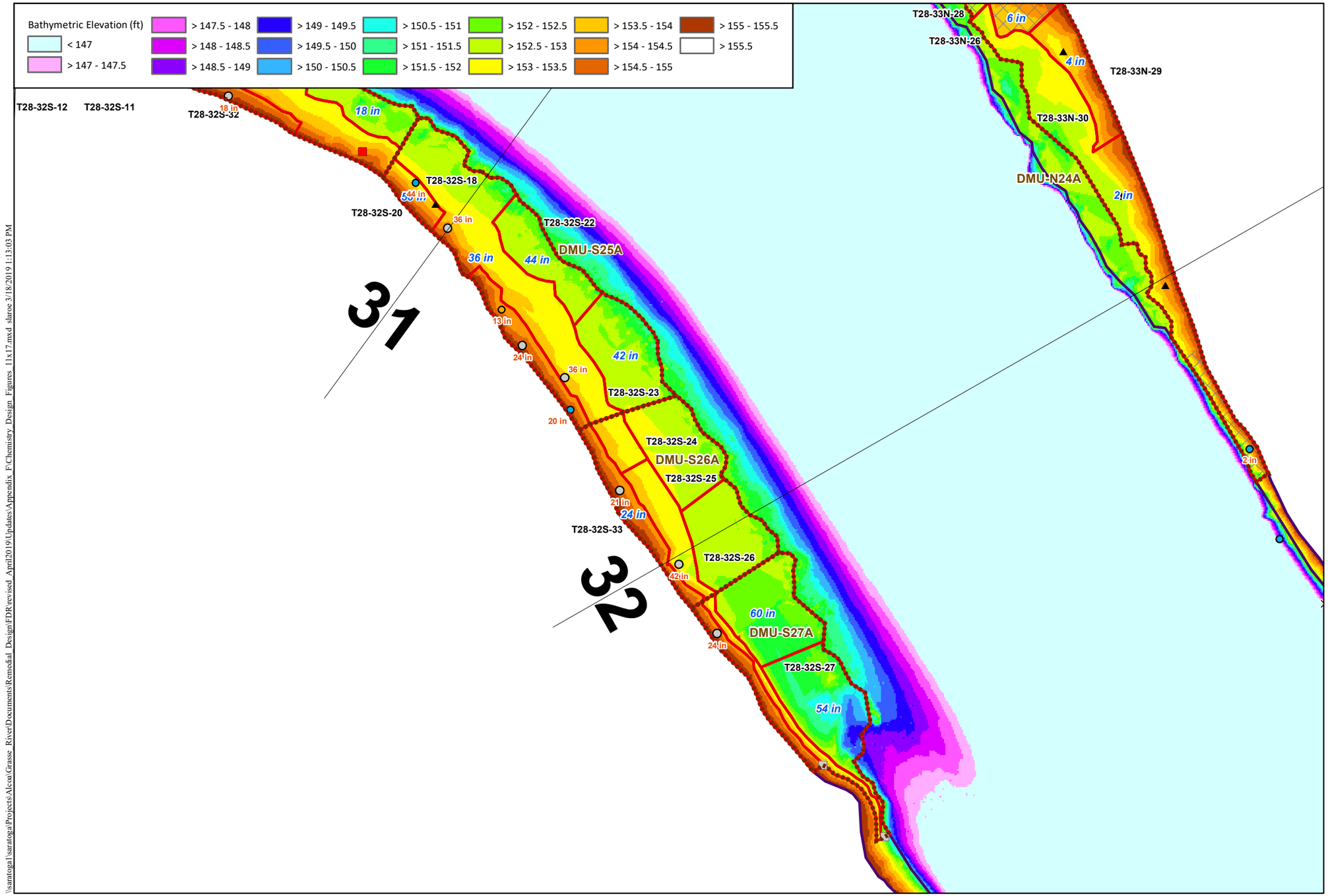
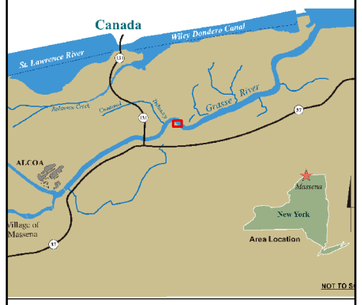



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-61**
Final Design of Chemistry-based Neatline Surface - Area T28-32S
Final Design Report
Grasse River Project/Arconic

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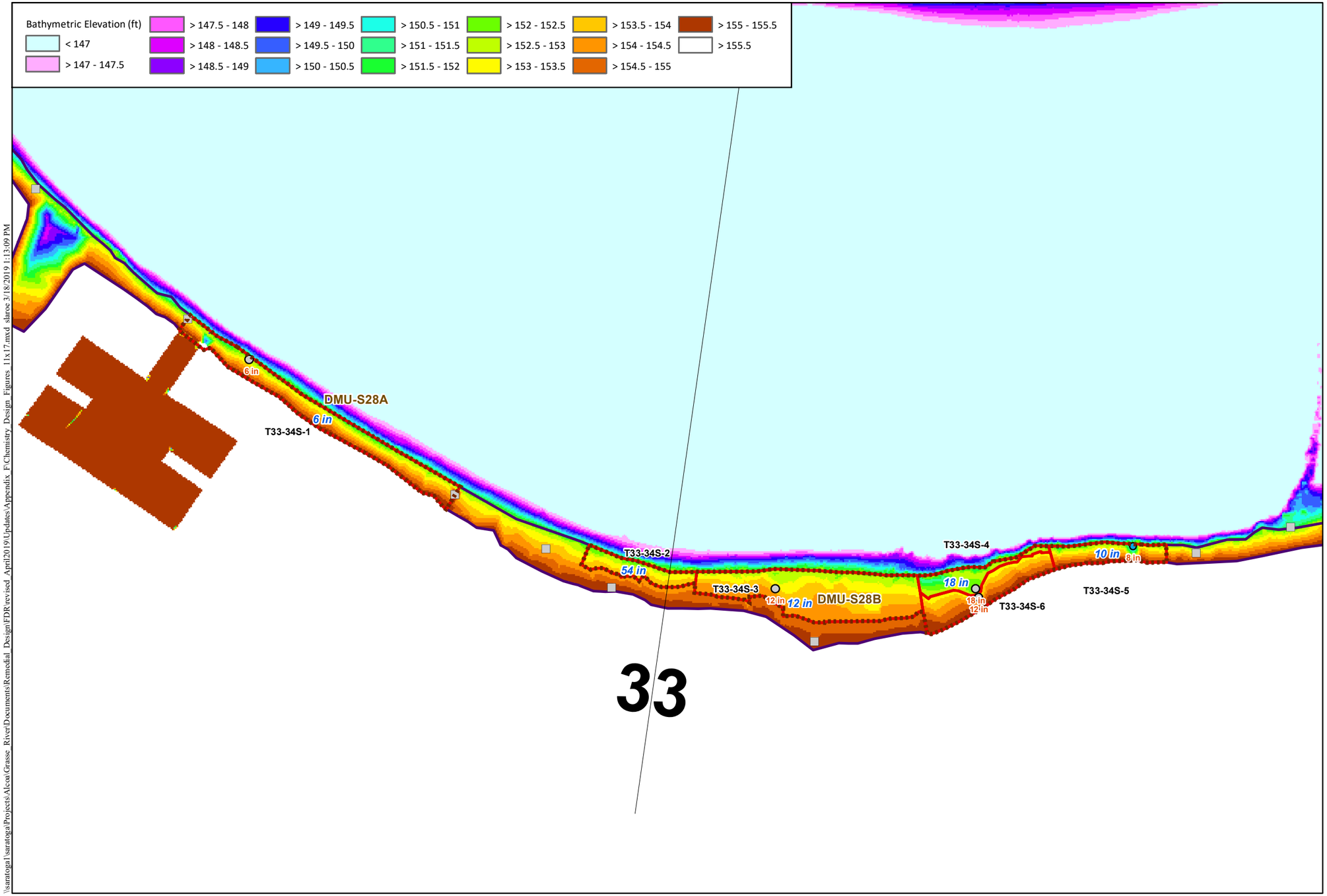


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-62**
Final Design of Chemistry-based Neatline Surface - Area T33-34S
Final Design Report
Grasse River Project/Arconic

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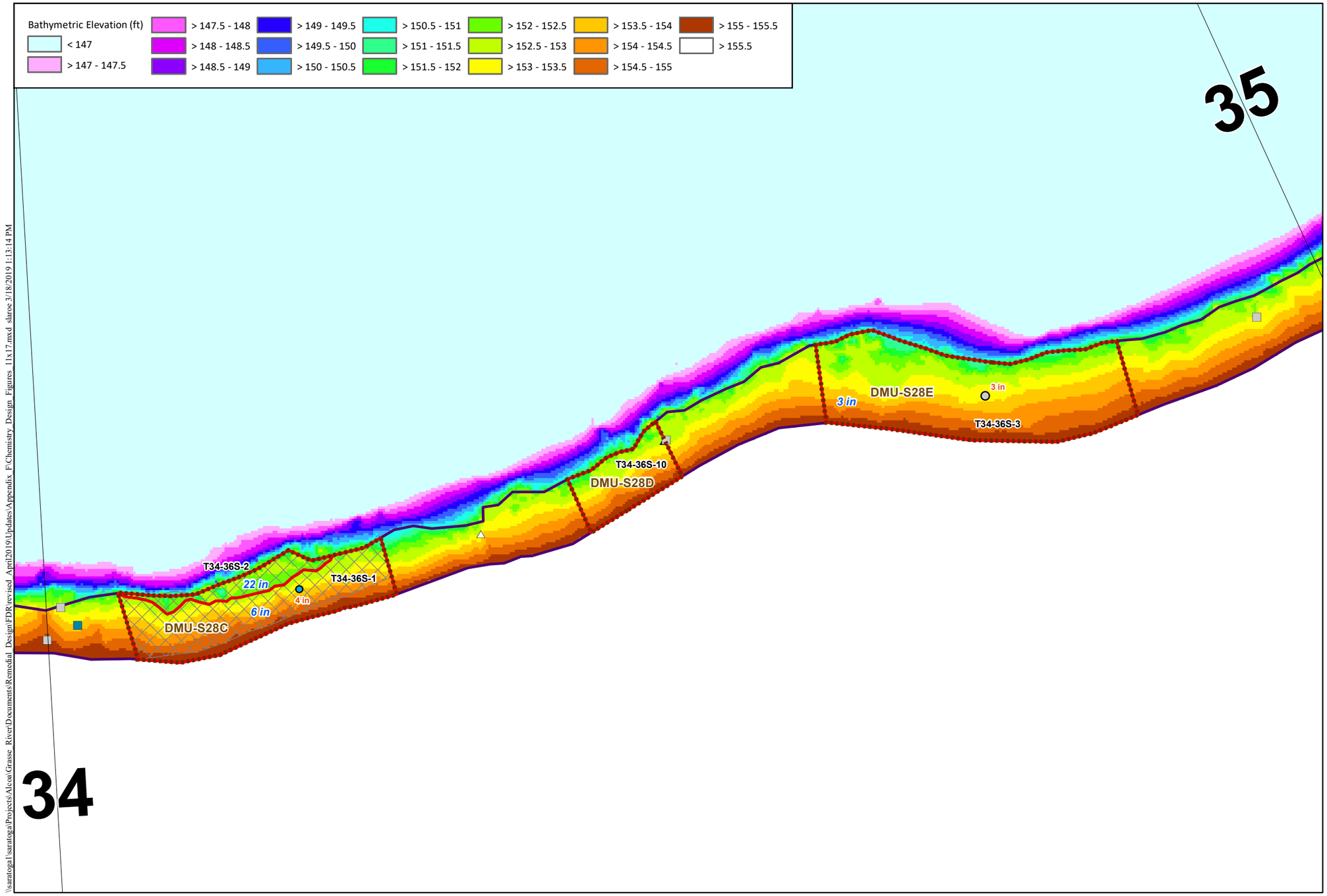
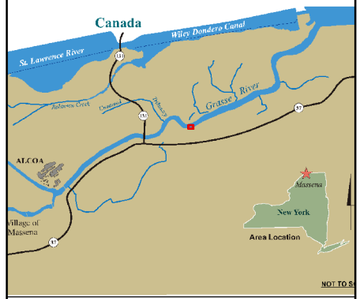



## Locator Map

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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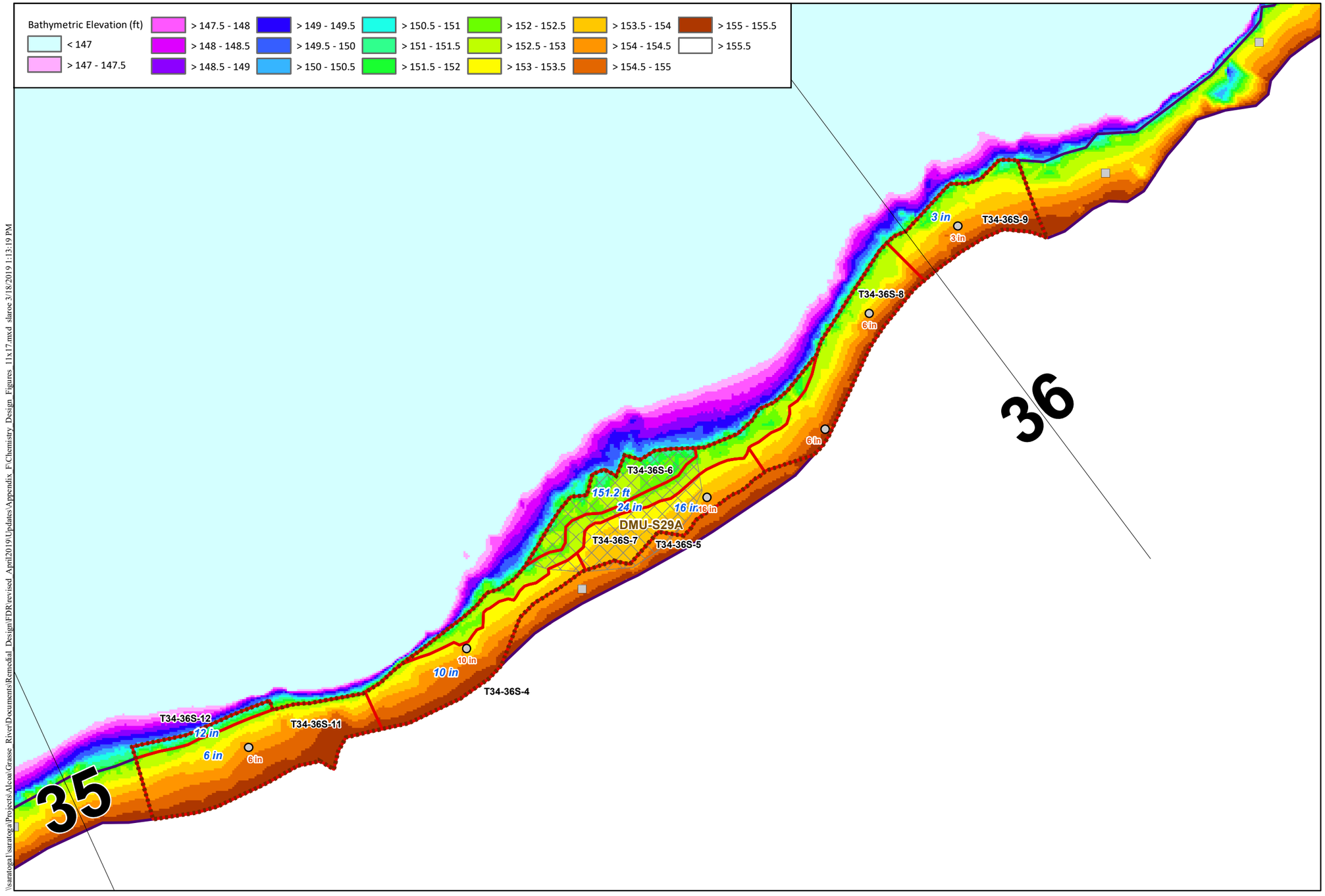
ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-63**
Final Design of Chemistry-based Neatline Surface - Area T34-36S
Final Design Report
Grasse River Project/Arconic




## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-64**
Final Design of Chemistry-based Neatline Surface - Area T34-36S
Final Design Report
Grasse River Project/Arconic

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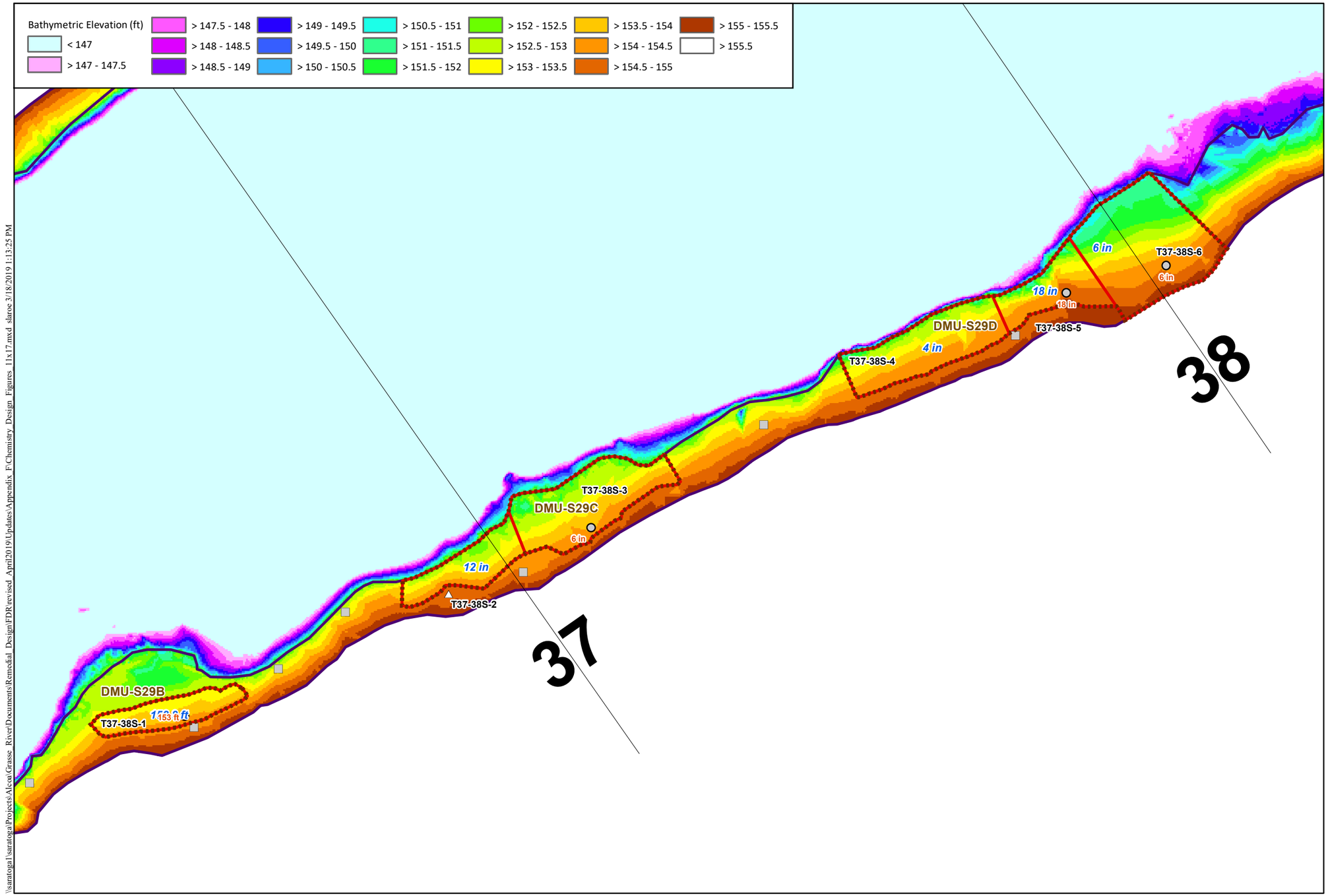
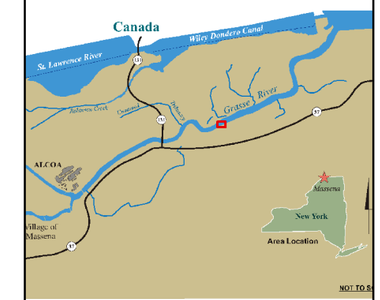



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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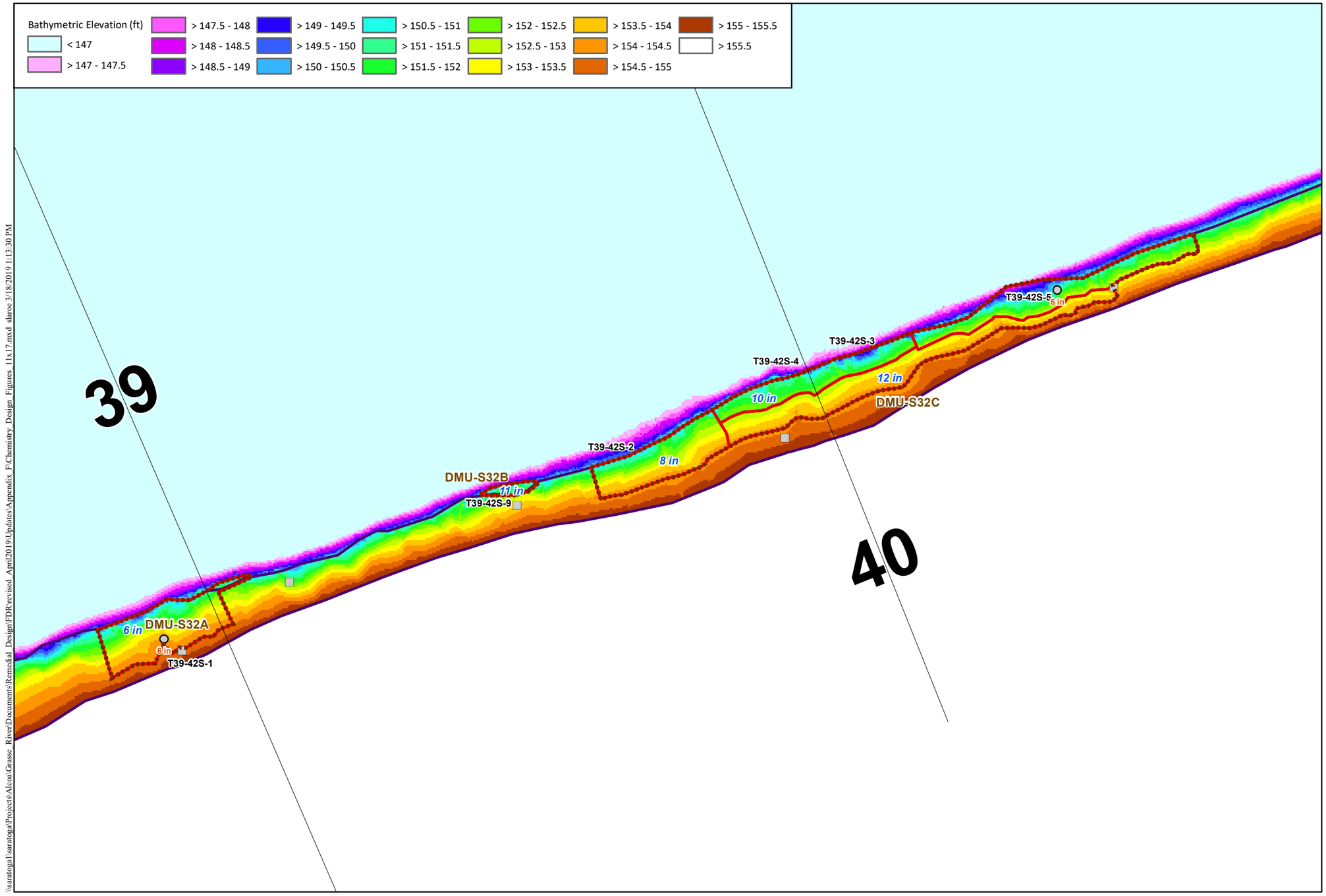
ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-65**
Final Design of Chemistry-based Neatline Surface - Area T37-38S
Final Design Report
Grasse River Project/Arconic




## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 15 30 60 Feet

**Figure F1-66**
Final Design of Chemistry-based Neatline Surface - Area T39-42S
Final Design Report
Grasse River Project/Arconic

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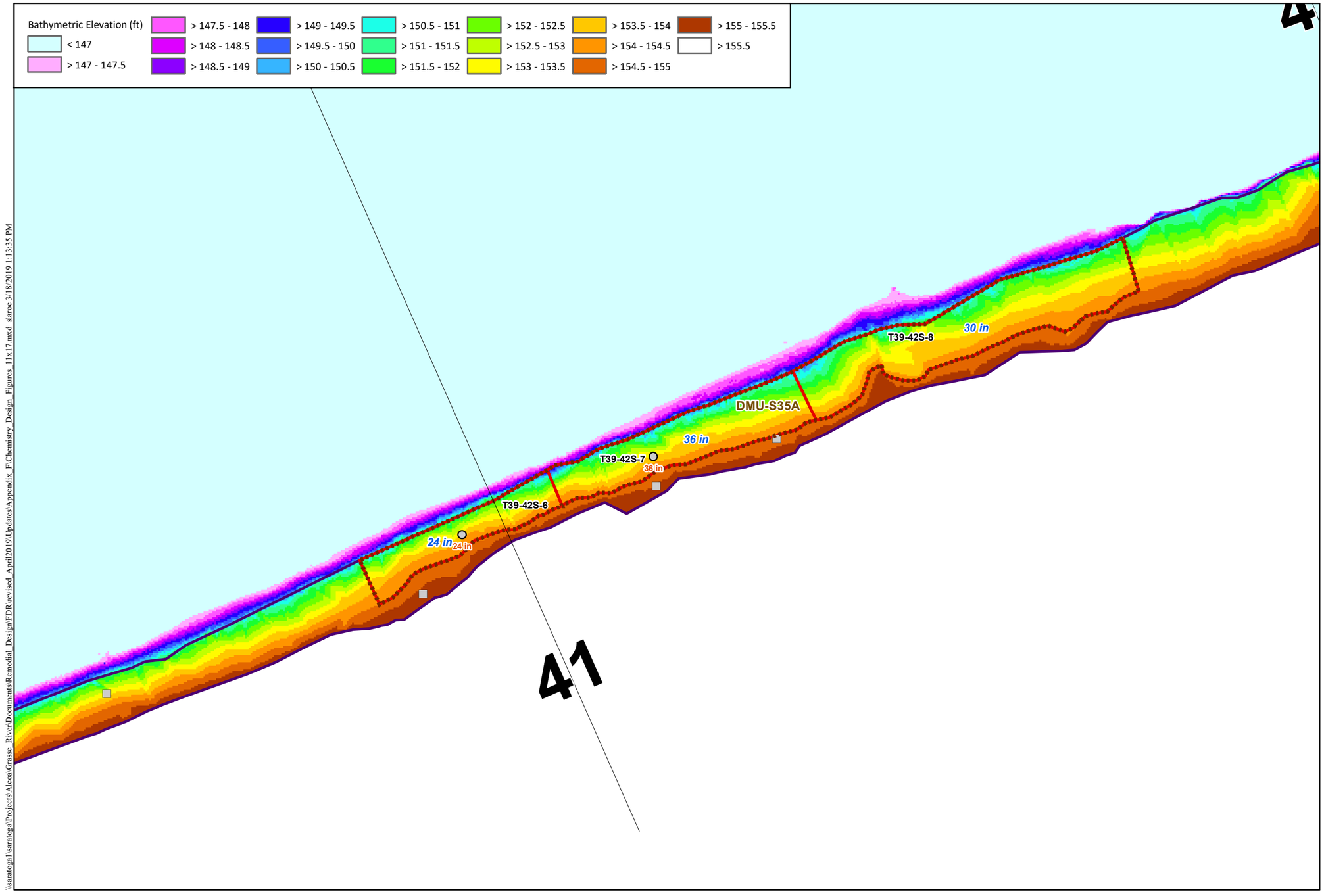
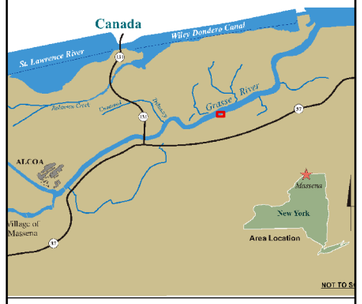



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 15 30 60 Feet

**Figure F1-67**
Final Design of Chemistry-based Neatline Surface - Area T39-42S
Final Design Report
Grasse River Project/Arconic

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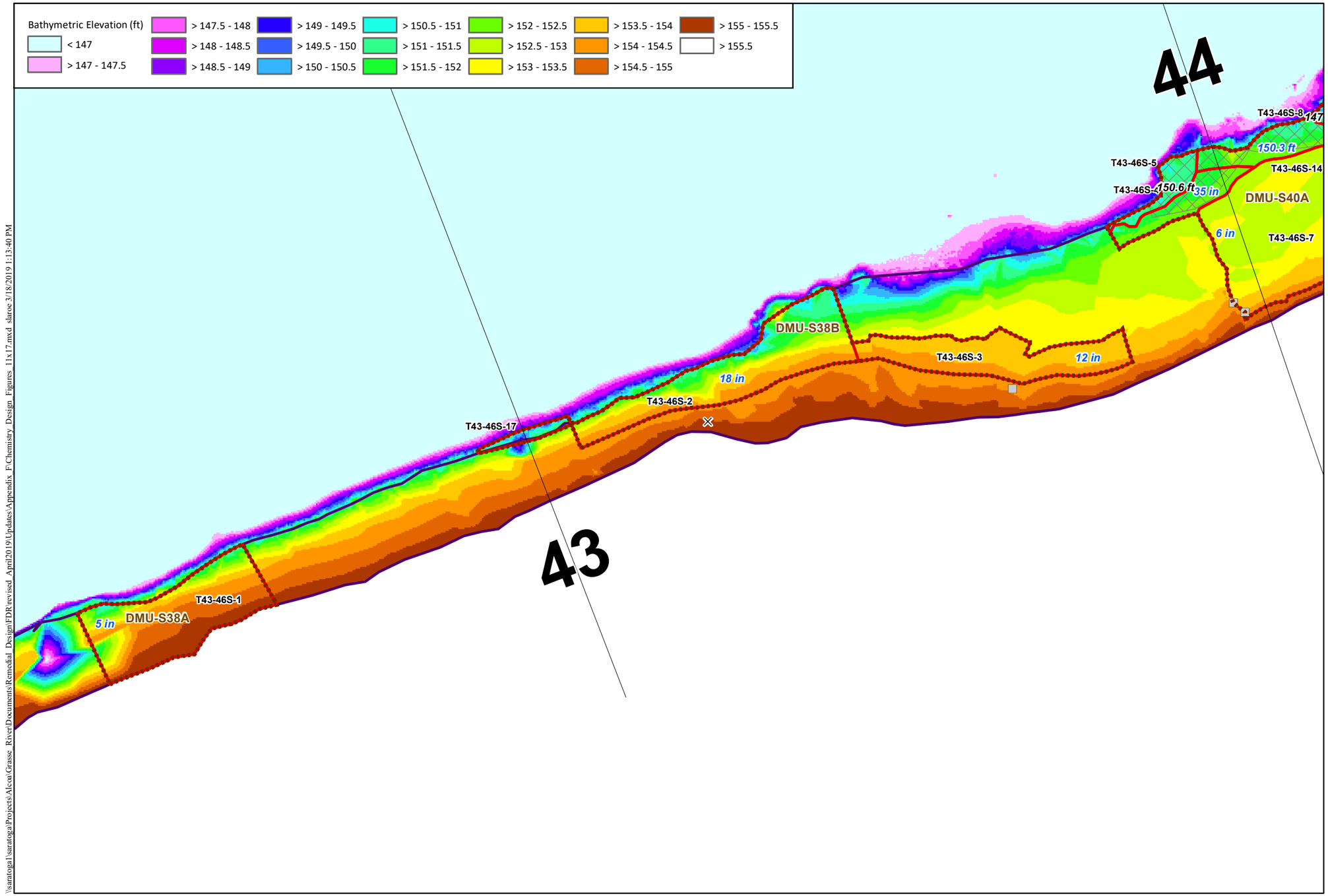


## Locator Map

**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-68**
Final Design of Chemistry-based Neatline Surface - Area T43-46S
Final Design Report
Grasse River Project/Arconic

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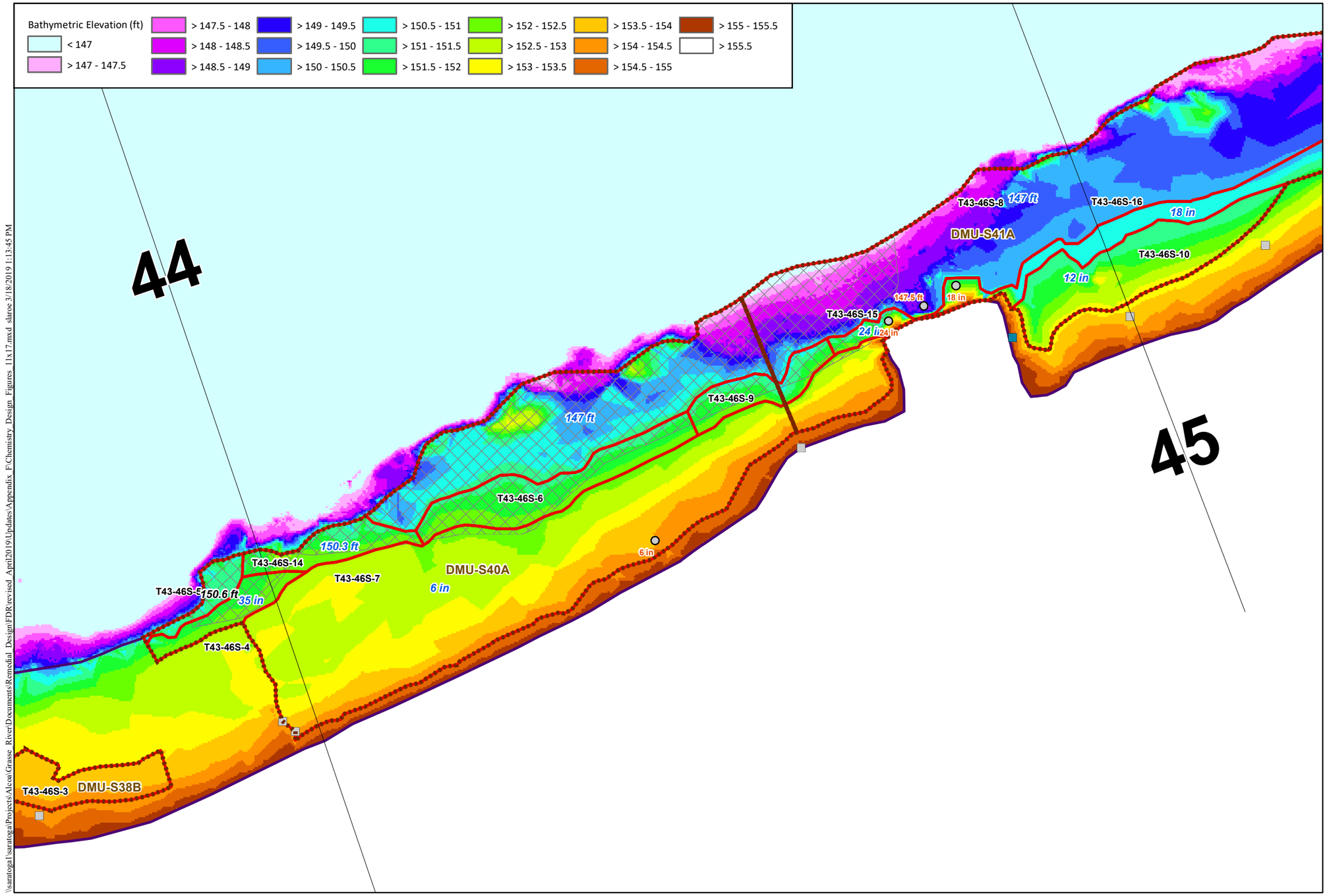


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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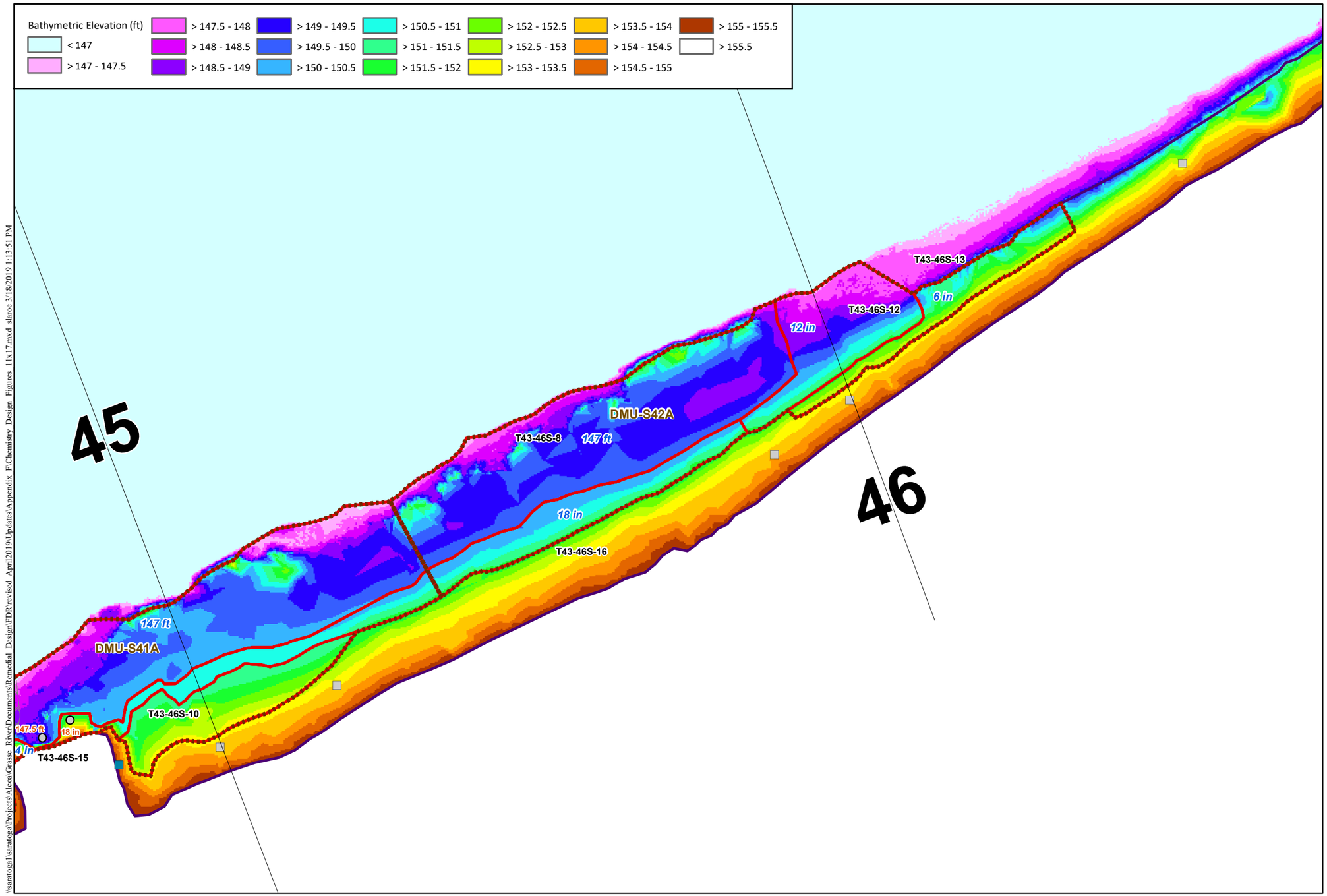
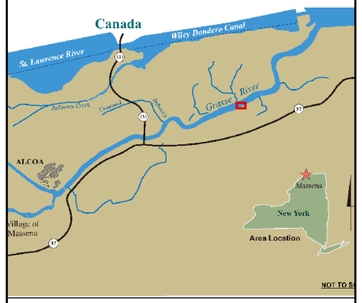
ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-69**
Final Design of Chemistry-based Neatline Surface - Area T43-46S
Final Design Report
Grasse River Project/Arconic




## Locator Map




**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-70**
Final Design of Chemistry-based Neatline Surface - Area T43-46S
Final Design Report
Grasse River Project/Arconic

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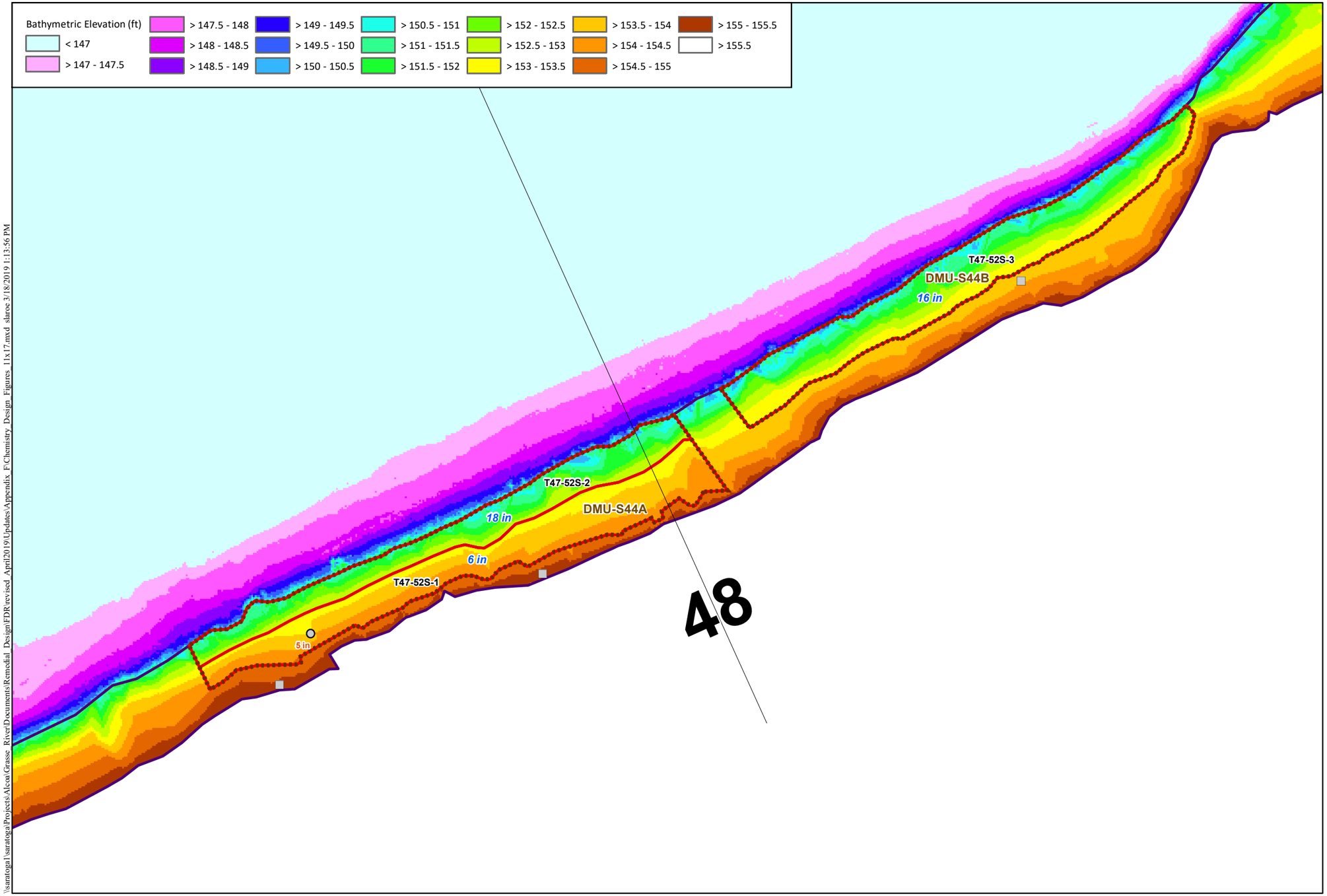


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 15 30 60 Feet

**Figure F1-71**
Final Design of Chemistry-based Neatline Surface - Area T47-52S
Final Design Report
Grasse River Project/Arconic

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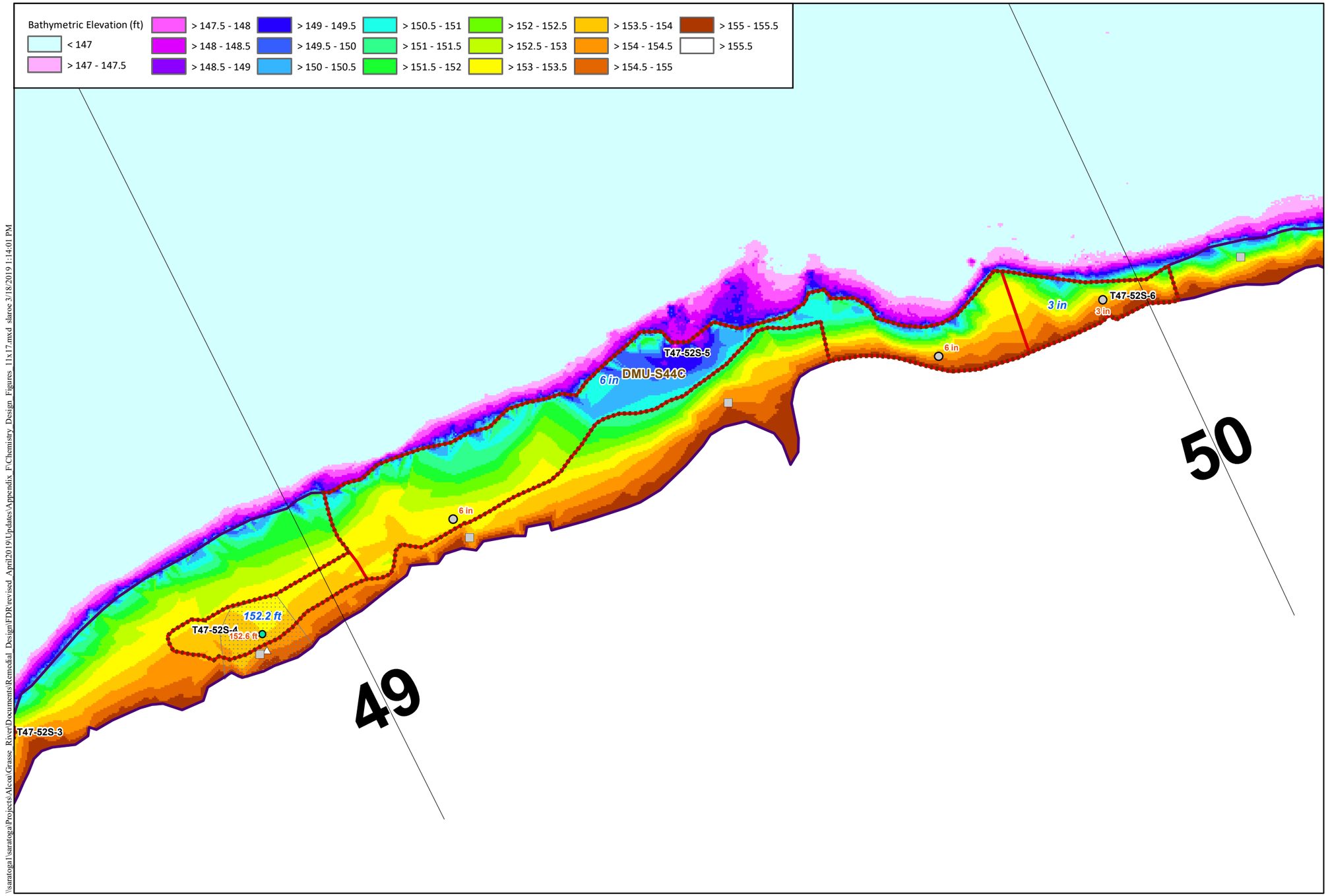


## Locator Map

**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

## LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
0 15 30 60 Feet

**Figure F1-72**
Final Design of Chemistry-based Neatline Surface - Area T47-52S
Final Design Report
Grasse River Project/Arconic

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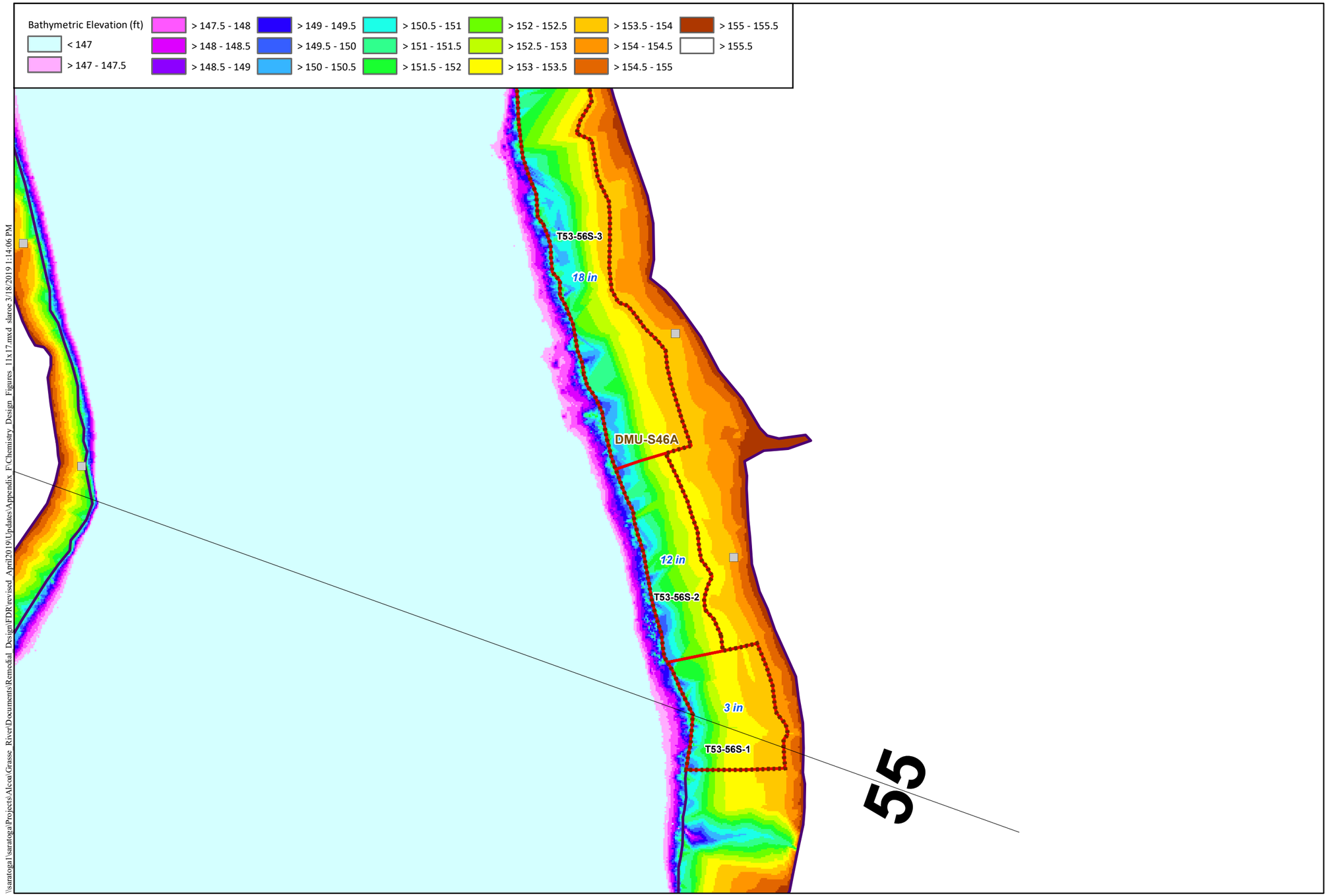
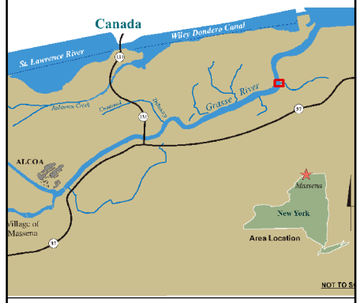



## Locator Map




**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-73**
Final Design of Chemistry-based Neatline Surface - Area T53-56S
Final Design Report
Grasse River Project/Arconic

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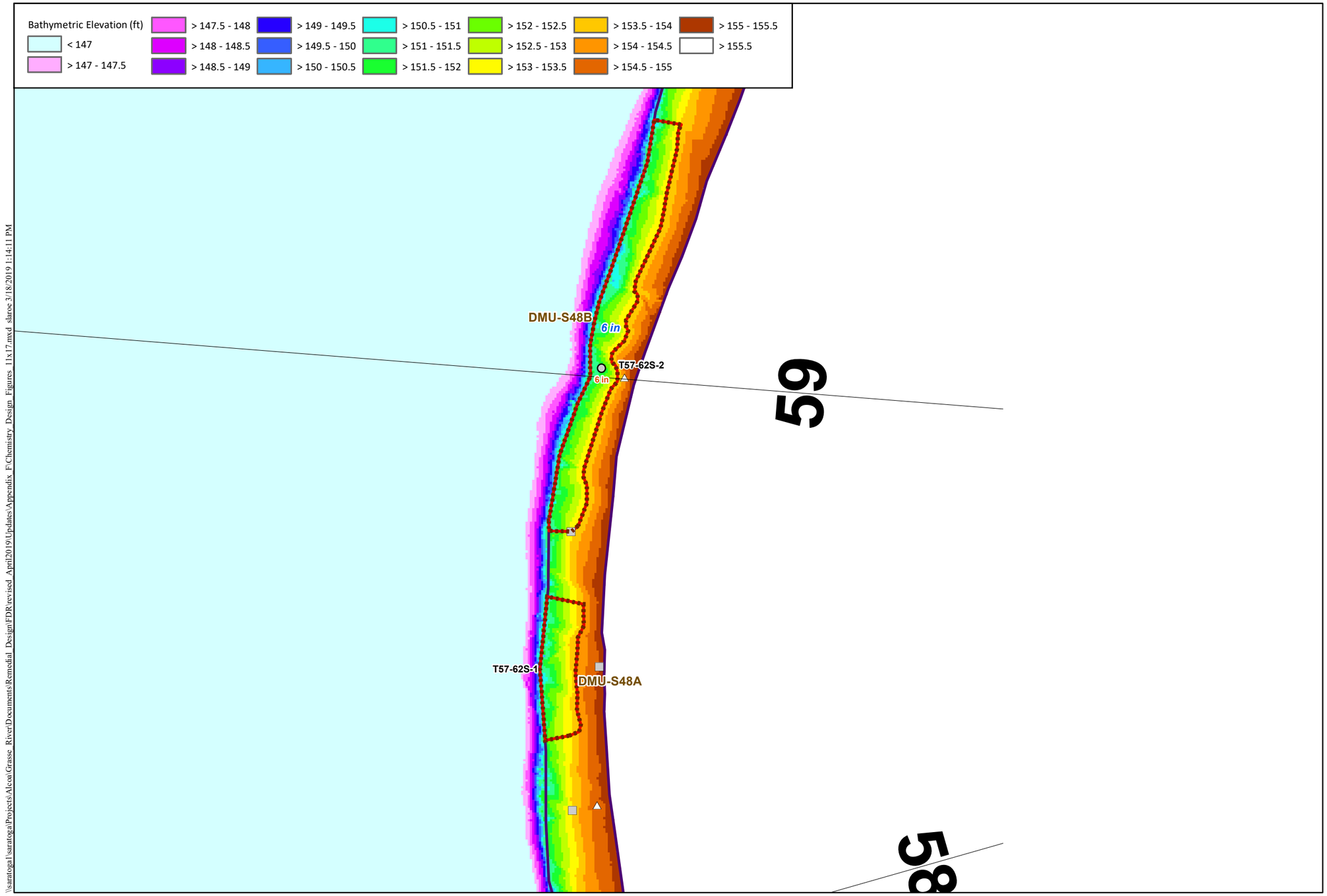


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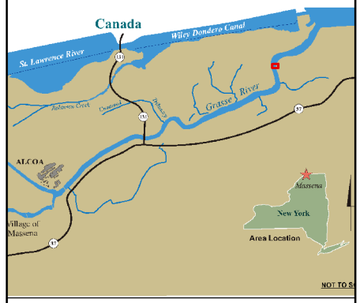


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 10 20 40

**Figure F1-74**
Final Design of Chemistry-based Neatline Surface - Area T57-62S
Final Design Report
Grasse River Project/Arconic

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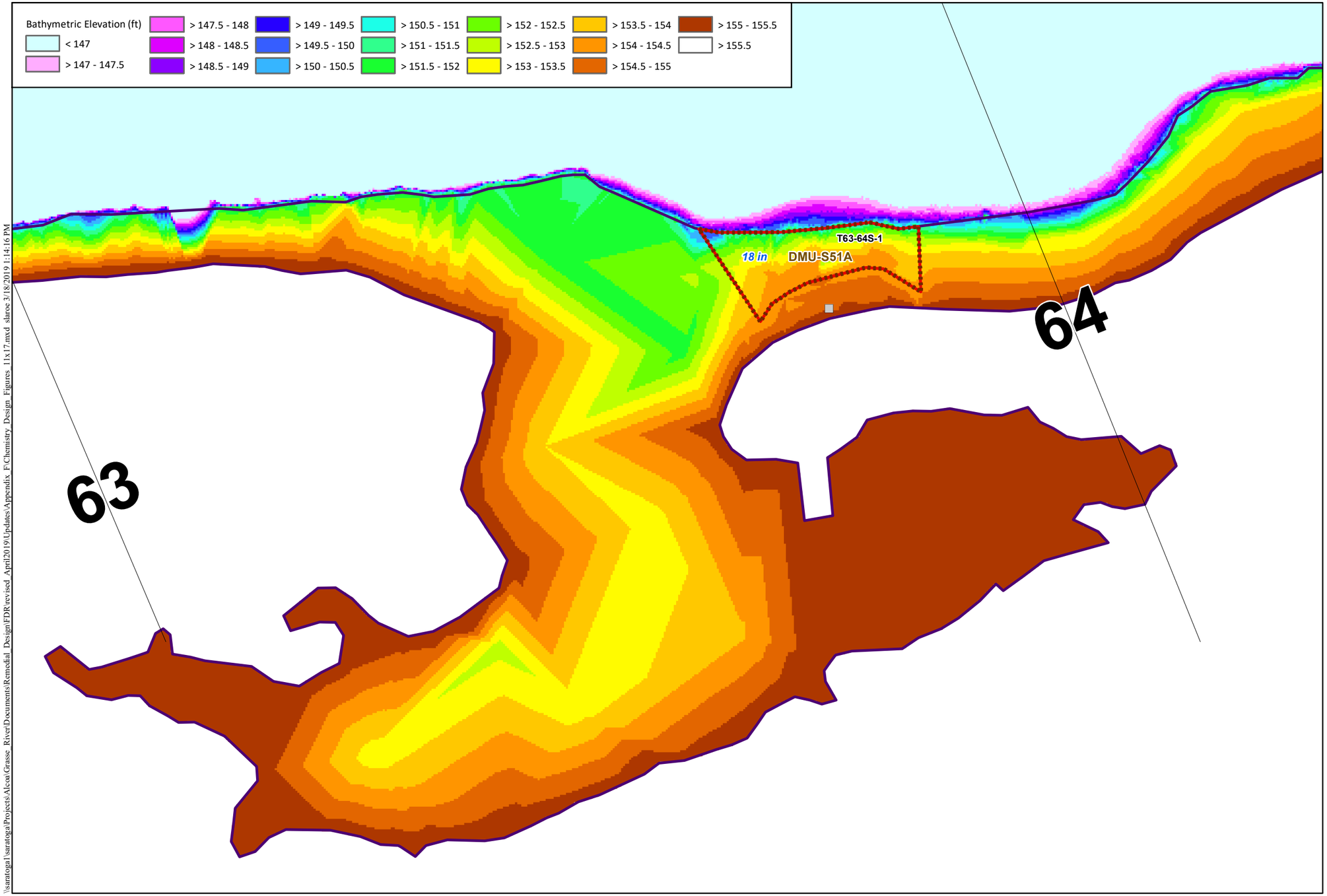


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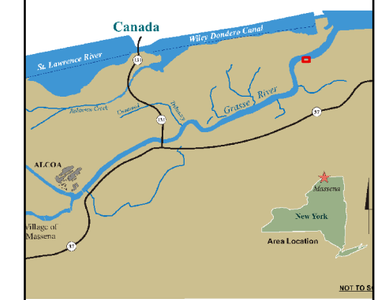


**NOTES:**

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T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 12.5 25 50

**Figure F1-75**
Final Design of Chemistry-based Neatline Surface - Area T63-64S
Final Design Report
Grasse River Project/Arconic

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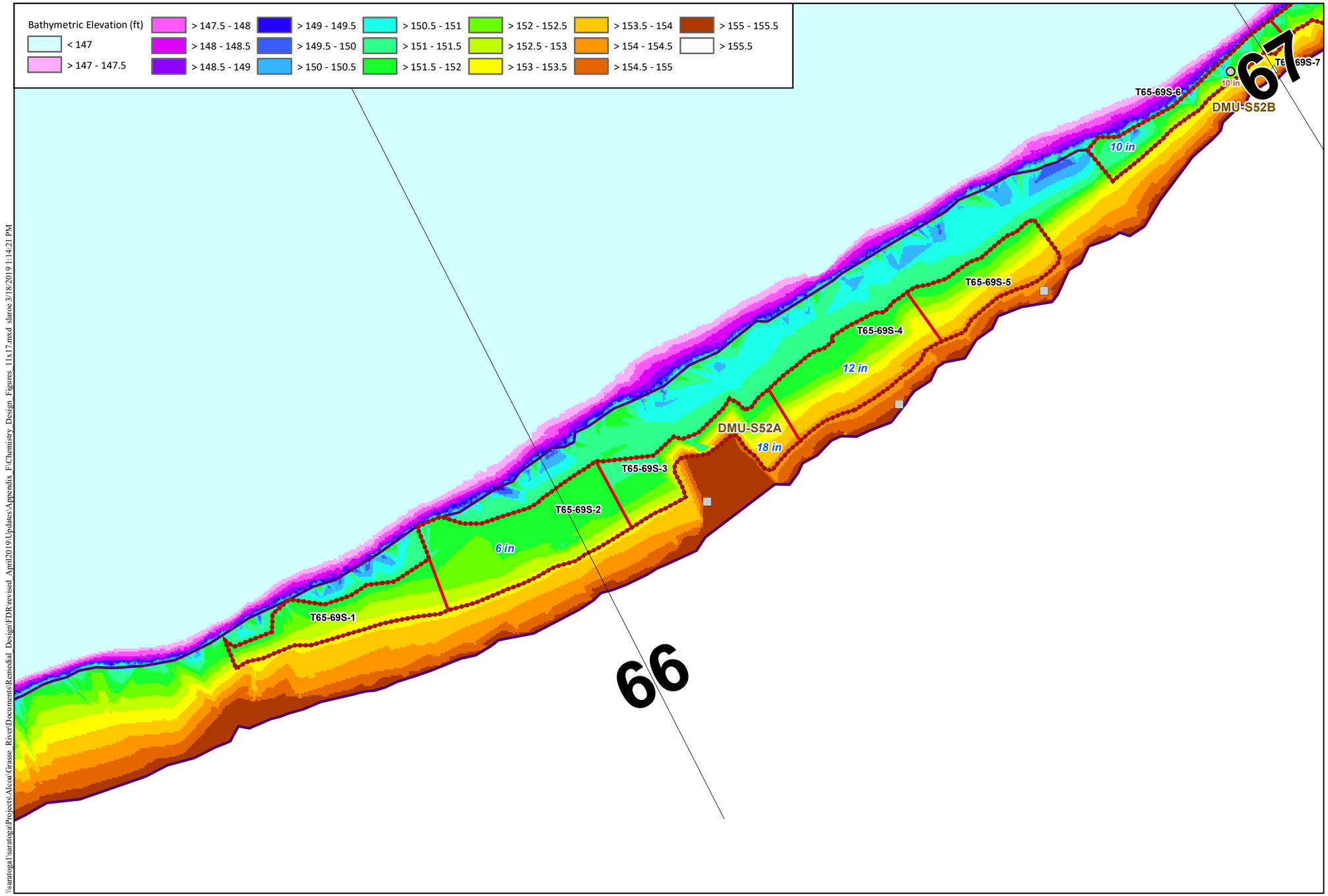


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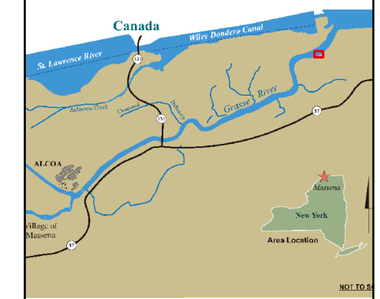


**NOTES:**

Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-76**
Final Design of Chemistry-based Neatline Surface - Area T65-69S
Final Design Report
Grasse River Project/Arconic

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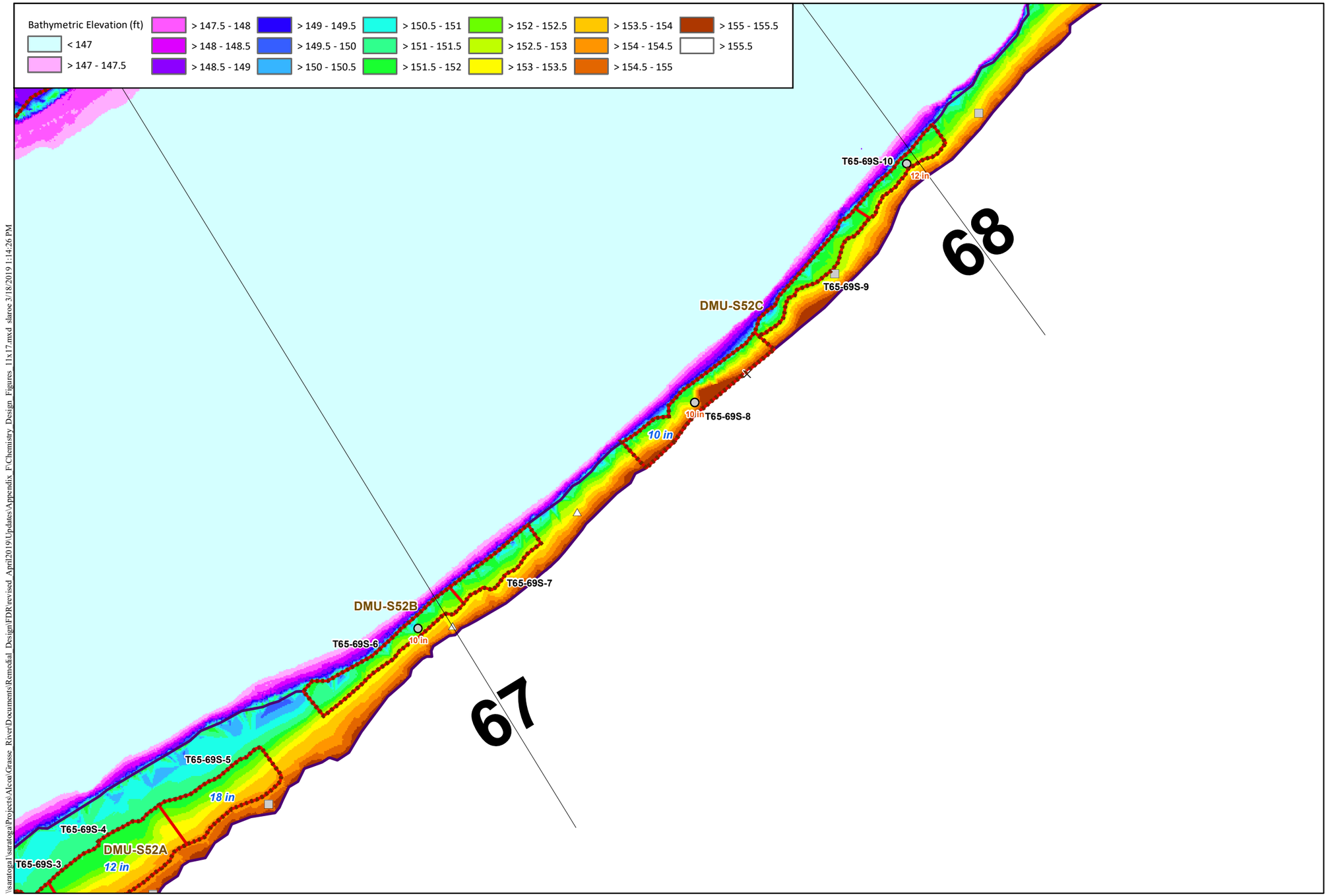


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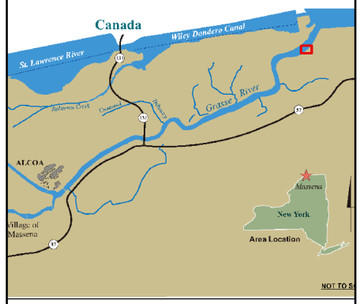


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

### LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

ARCONIC

GRAPHIC SCALE
Feet
0 20 40 80

**Figure F1-77**
Final Design of Chemistry-based Neatline Surface - Area T65-69S
Final Design Report
Grasse River Project/Arconic

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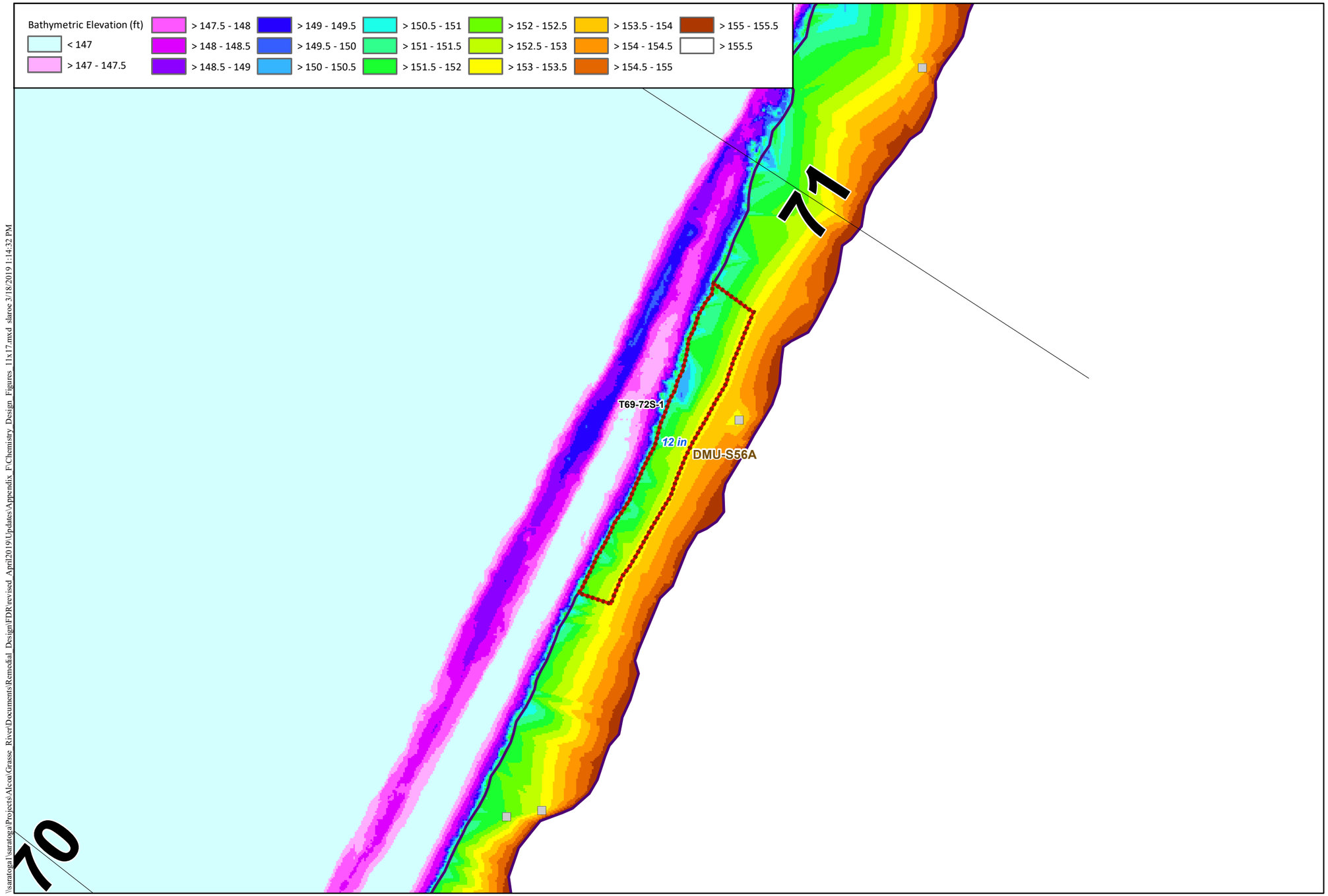


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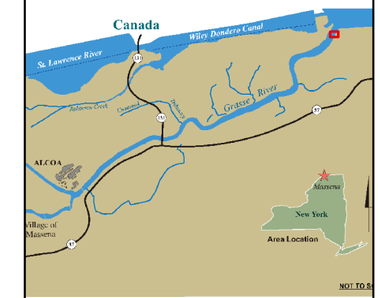


**NOTES:**
Locations exceeding the dredge criteria are labeled (orange) with their associated depth (in.) or elevation (ft.) of contamination. Design areas are labeled with the area name (black) and selected target design (blue) depth (in.) or elevation (ft.). DMU subarea names are labeled in brown. Bathymetric surface is based on all design survey data (2003-July 2018) and includes interpolation across data gaps. Near shore extent is based on the area between the shoreline and the break point at the top of the slope where evident, or 5-ft. water depth using bathymetry. Shoreline is based on the 155.5 ft. contour. Near shore remedial criteria:
T1-T21: SLWA or surface (0-12 in.) max. PCB >1 mg/kg
T21-T72: Surface (0-12 in.) max. PCB >1 mg/kg

LEGEND

**Core Classification**
- Above Dredge Criteria
- Below Dredge Criteria

**PCB Conc. at Bottom of Core (mg/kg)**
- < 1
- 1 - 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

**Grab Samples**
- Above Criteria
- Below Criteria
- No Recovery
- 2017/2018 Locations (pink halo)
- Near Shore Extent
- Final Design Dredge Area
- Dredge Management Units (DMUs)
- Low Confidence Area (No hard bottom noted)
- Area of incomplete DoCs over hard bottom
- Sediment Probing Transects

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ARCONIC

GRAPHIC SCALE
Feet
0 15 30 60

**Figure F1-78**
Final Design of Chemistry-based Neatline Surface - Area T69-72S
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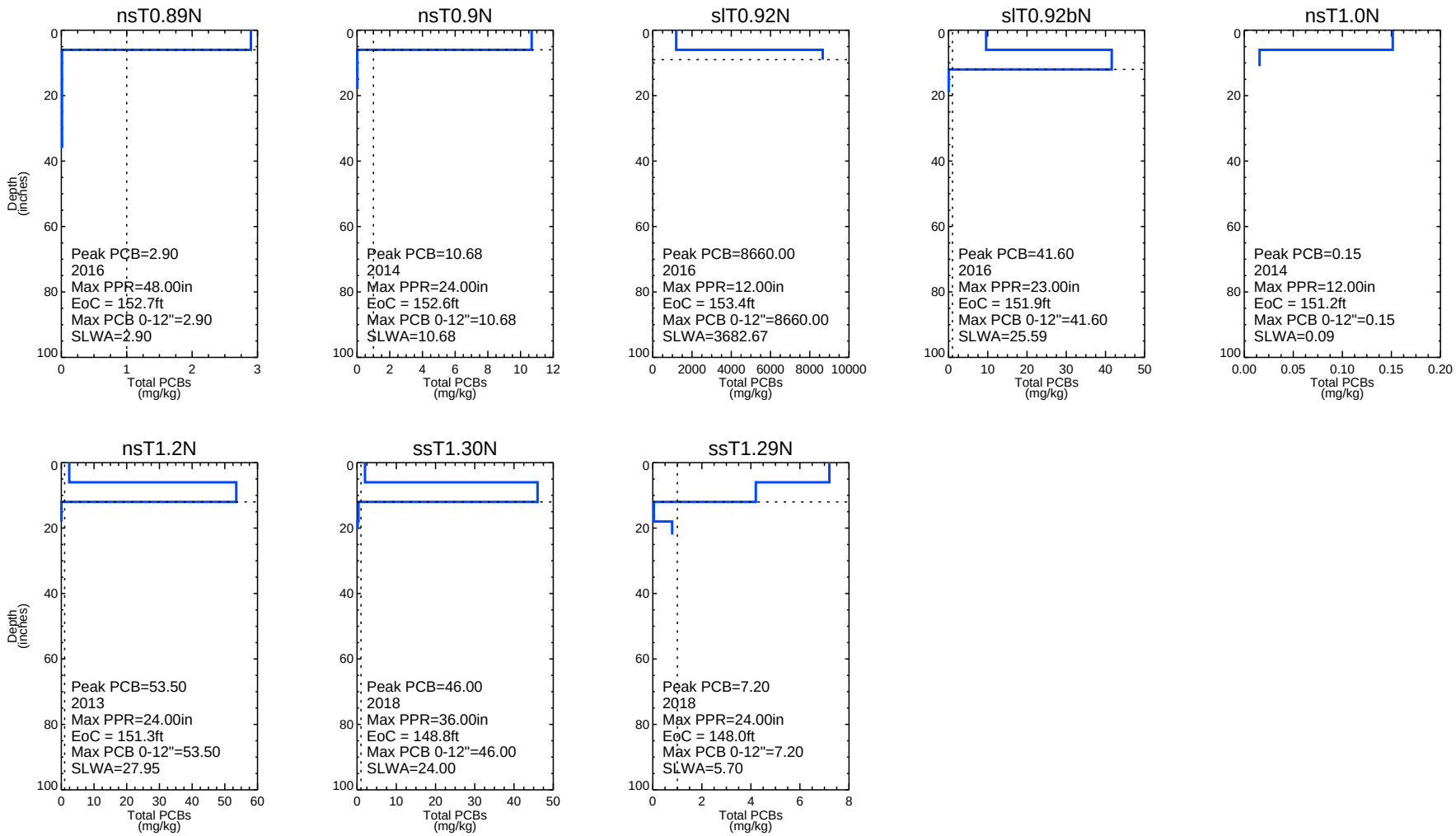
# DMU-N01




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-1**
**PCB Profiles of DMU-N01 Sediment Cores**

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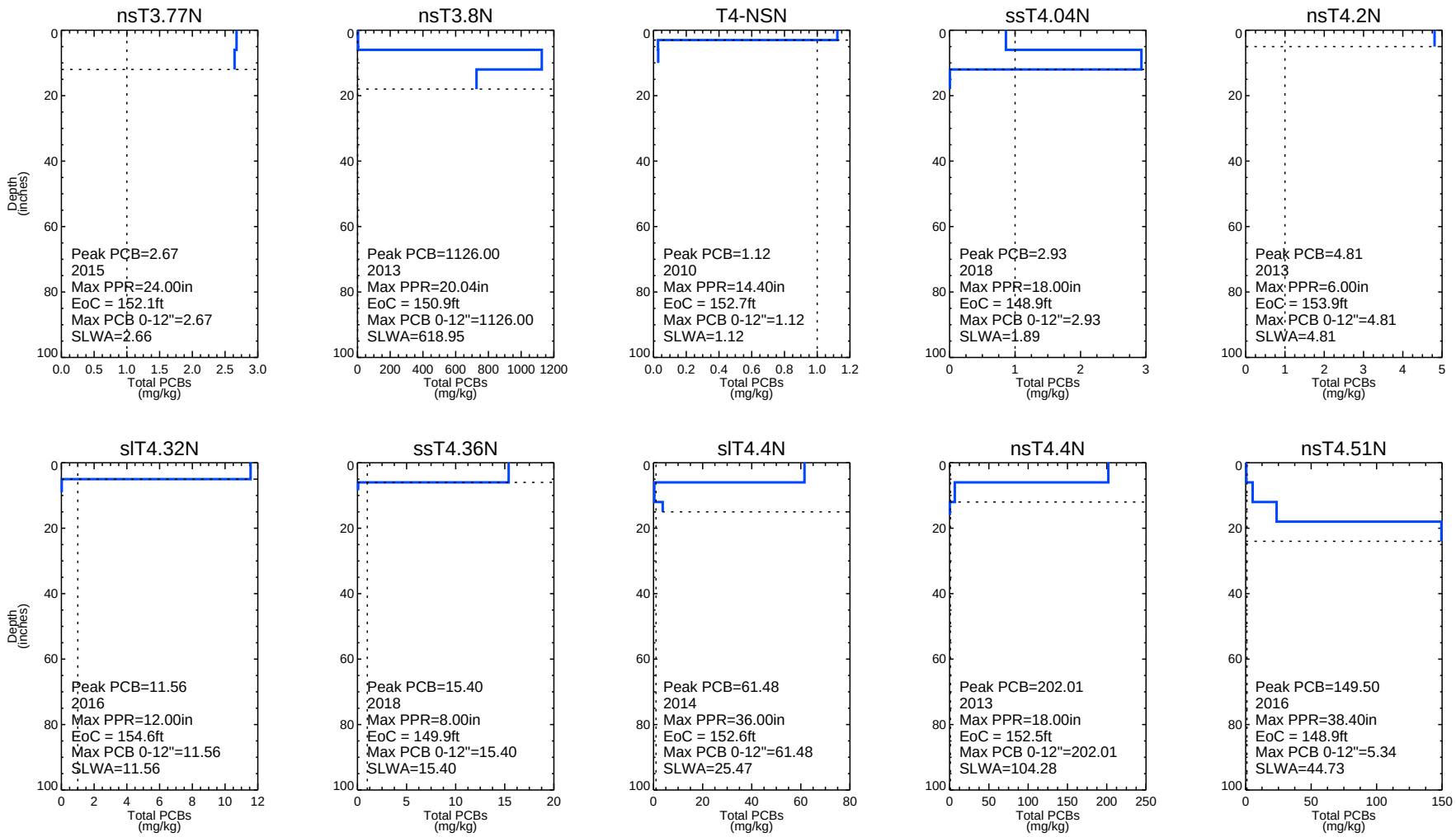
# DMU-N03




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-2**
**PCB Profiles of DMU-N03 Sediment Cores**

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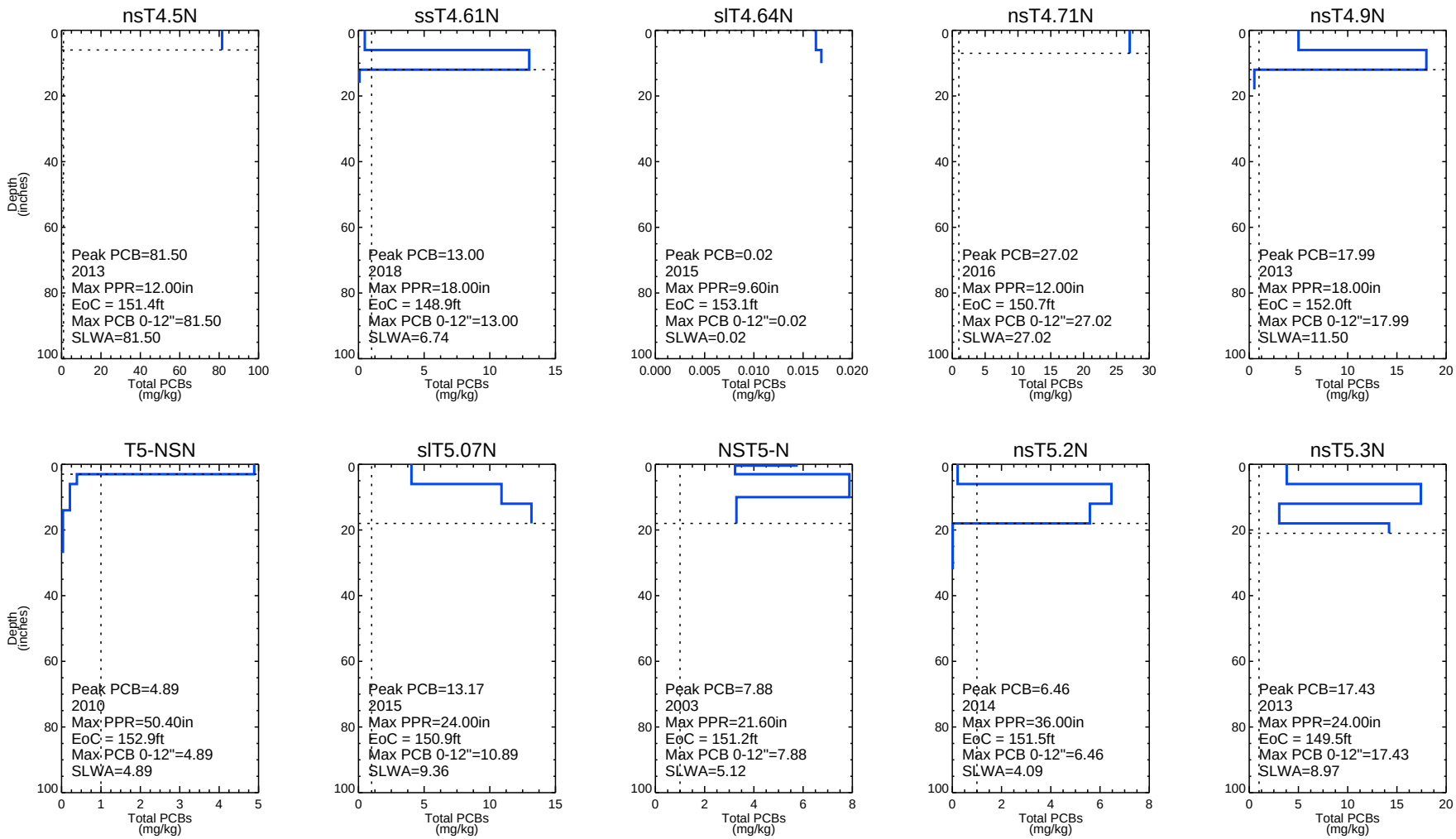
# DMU-N03




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-3**
**PCB Profiles of DMU-N03 Sediment Cores**

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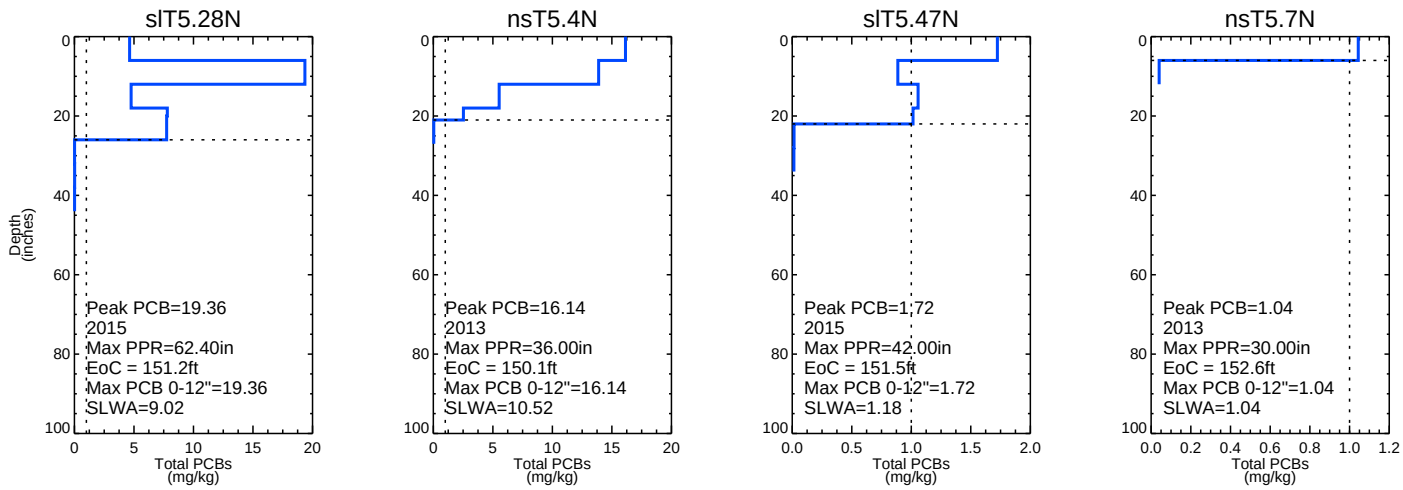
# DMU-N03




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-4**
**PCB Profiles of DMU-N03 Sediment Cores**

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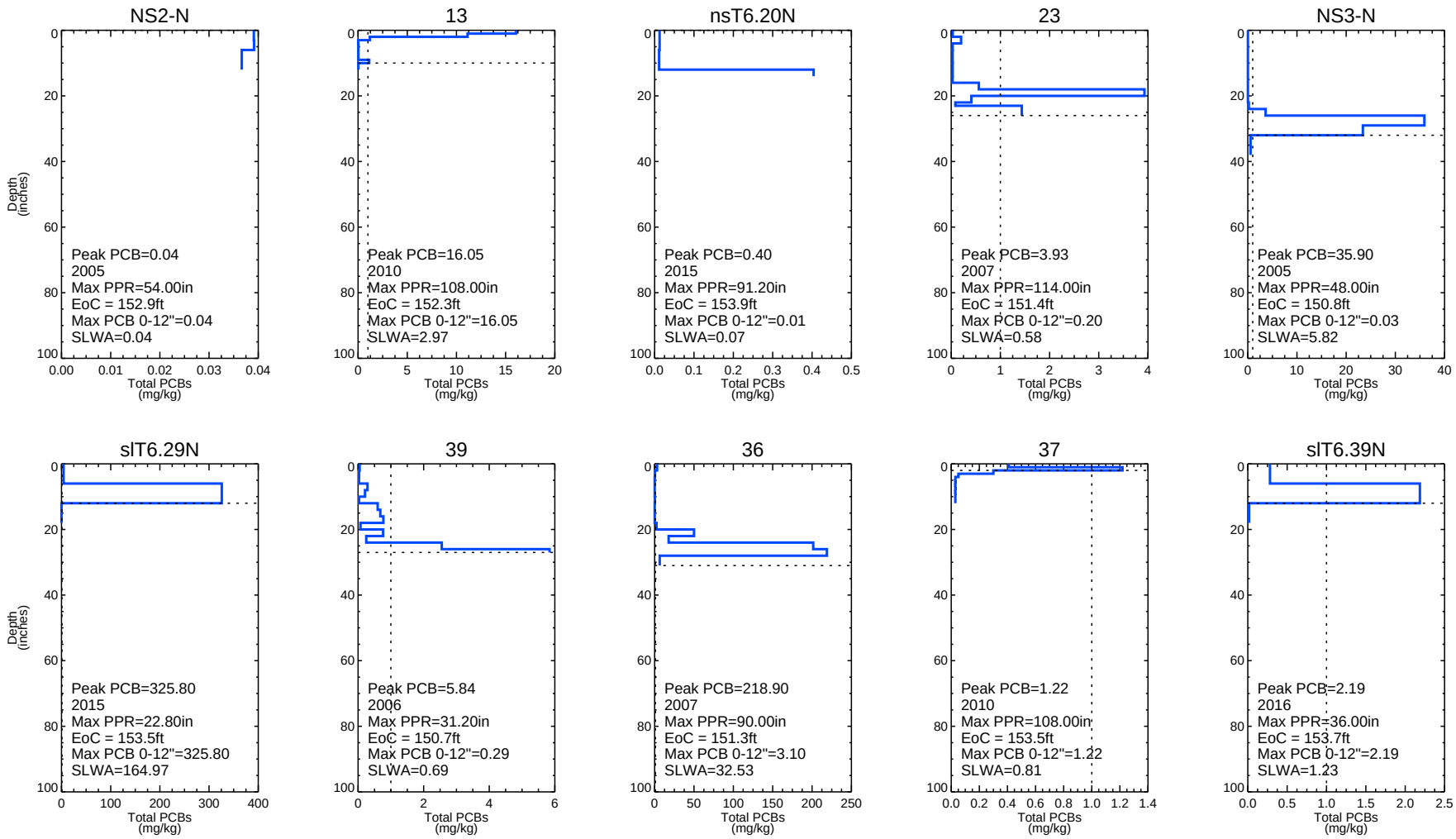
# DMU-N05




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-5**
**PCB Profiles of DMU-N05 Sediment Cores**

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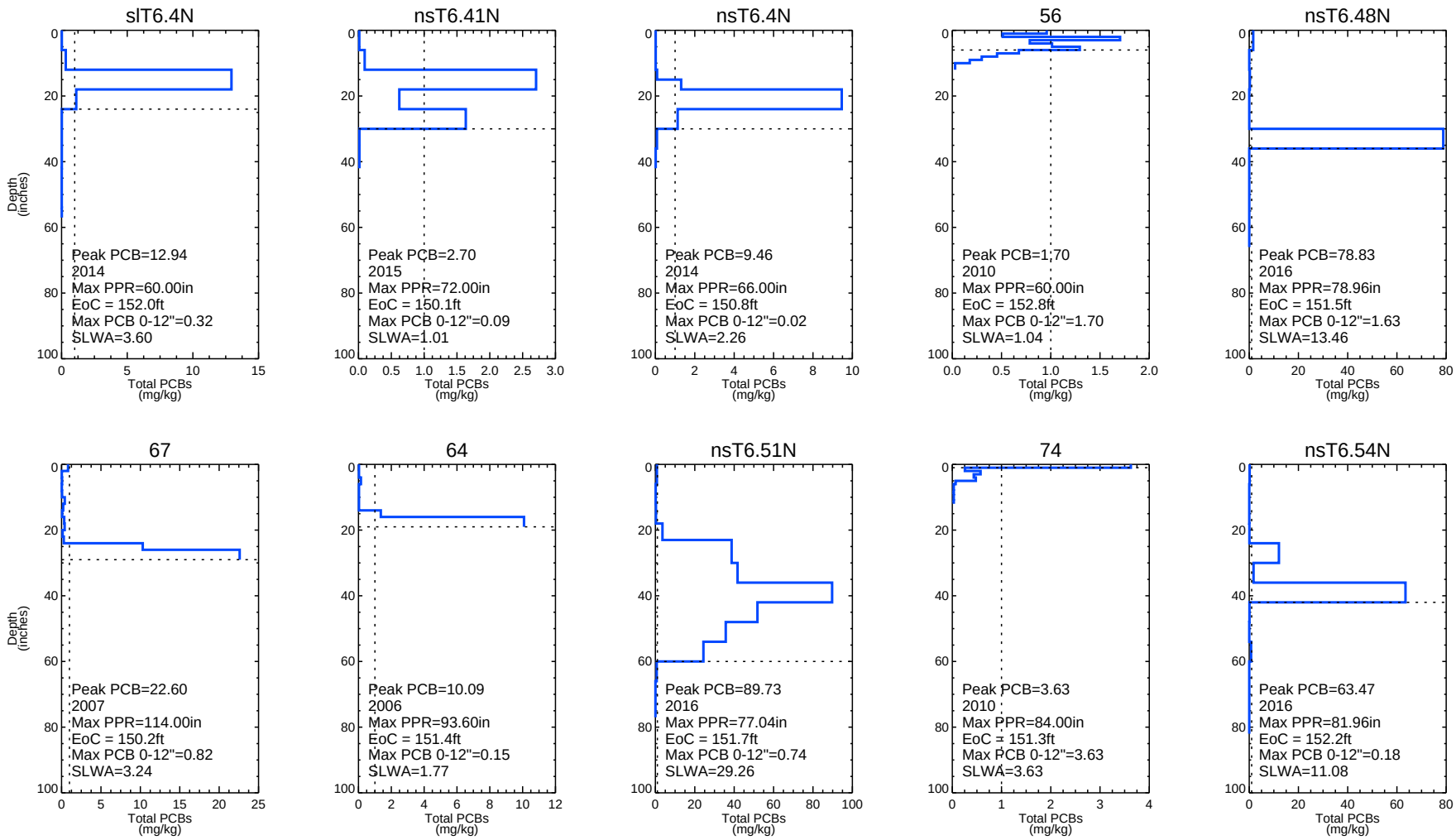
# DMU-N05




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-6**
**PCB Profiles of DMU-N05 Sediment Cores**

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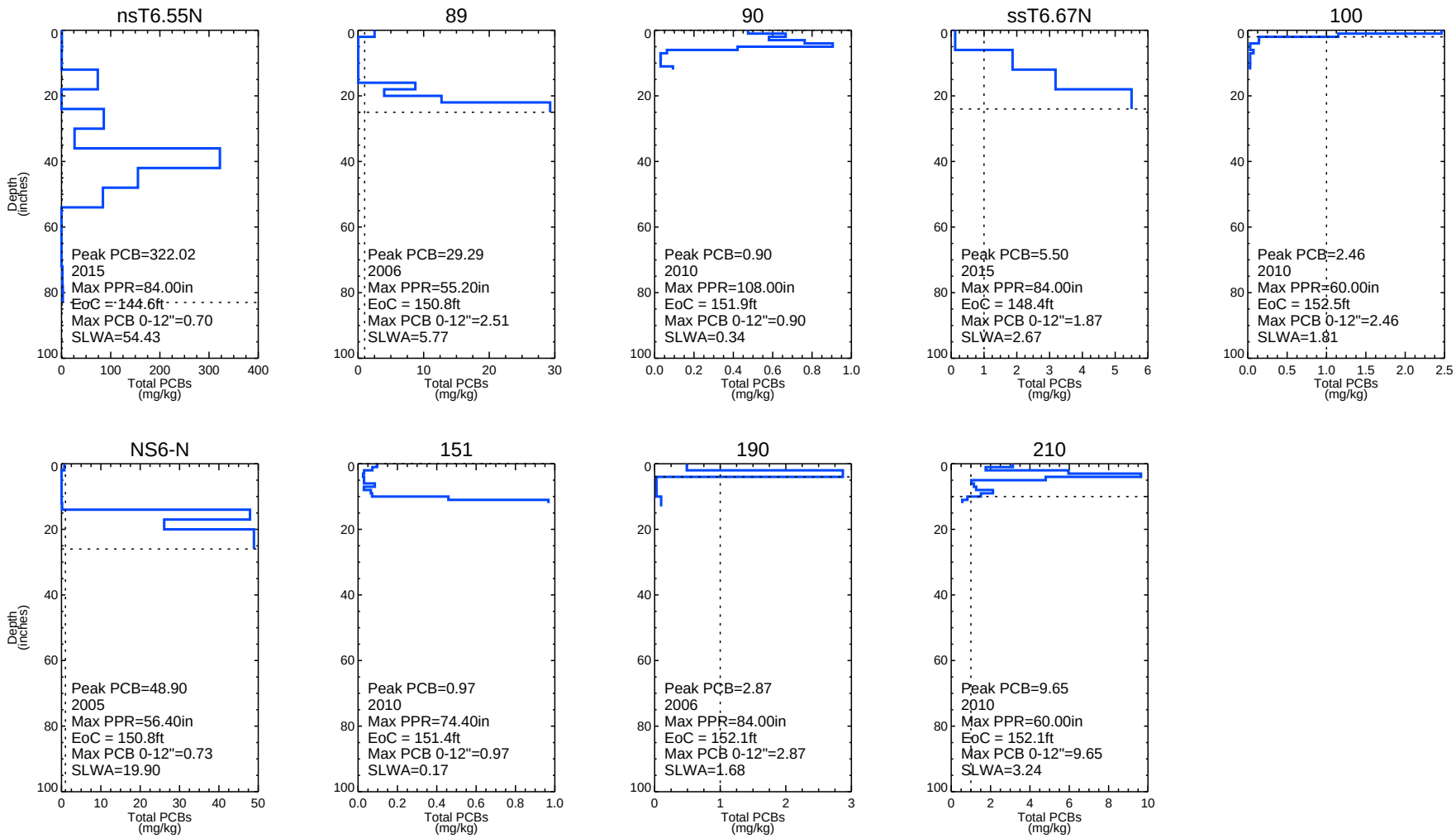
# DMU-N05




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-7**
**PCB Profiles of DMU-N05 Sediment Cores**

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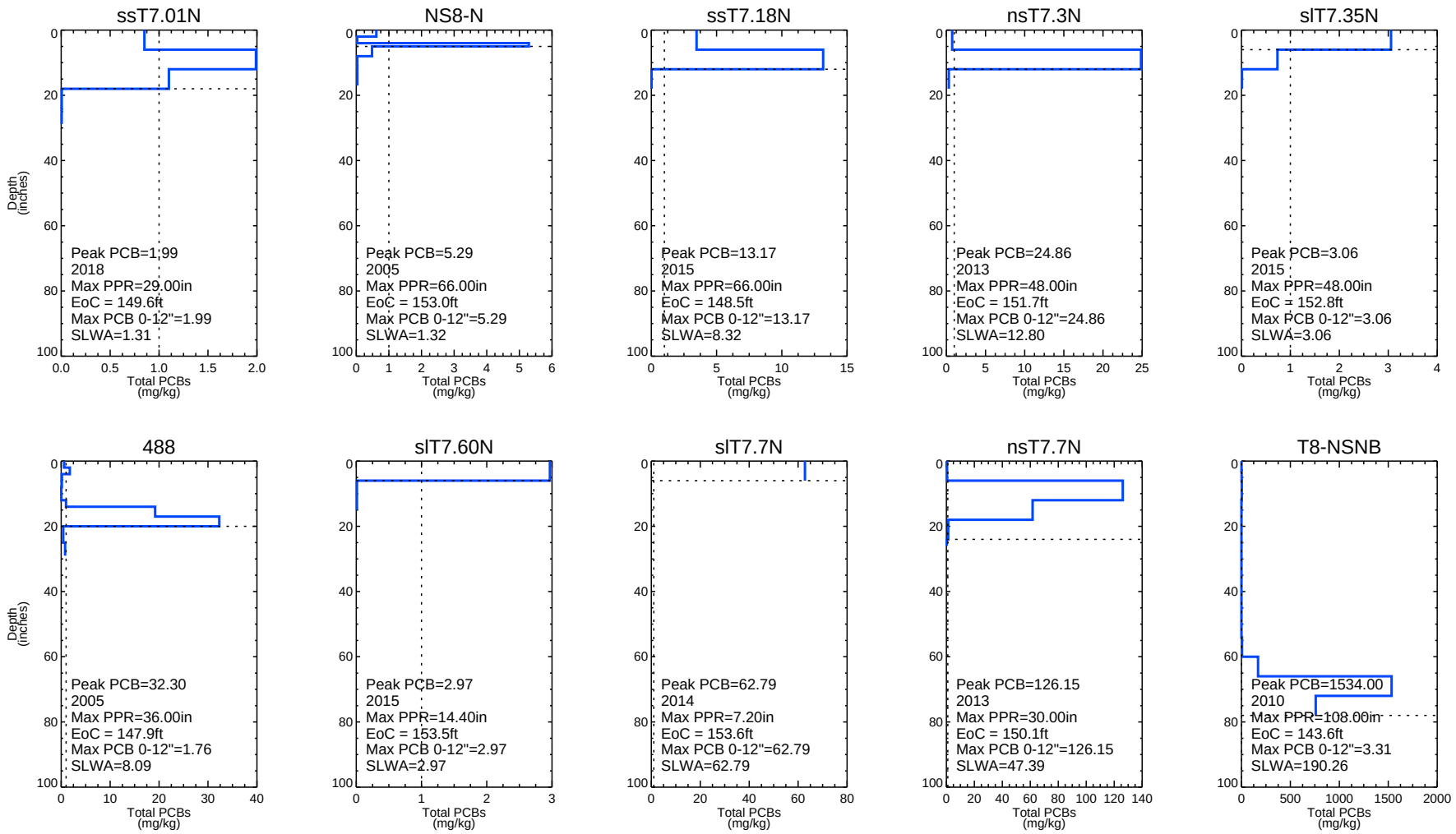
# DMU-N06




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-8**
**PCB Profiles of DMU-N06 Sediment Cores**

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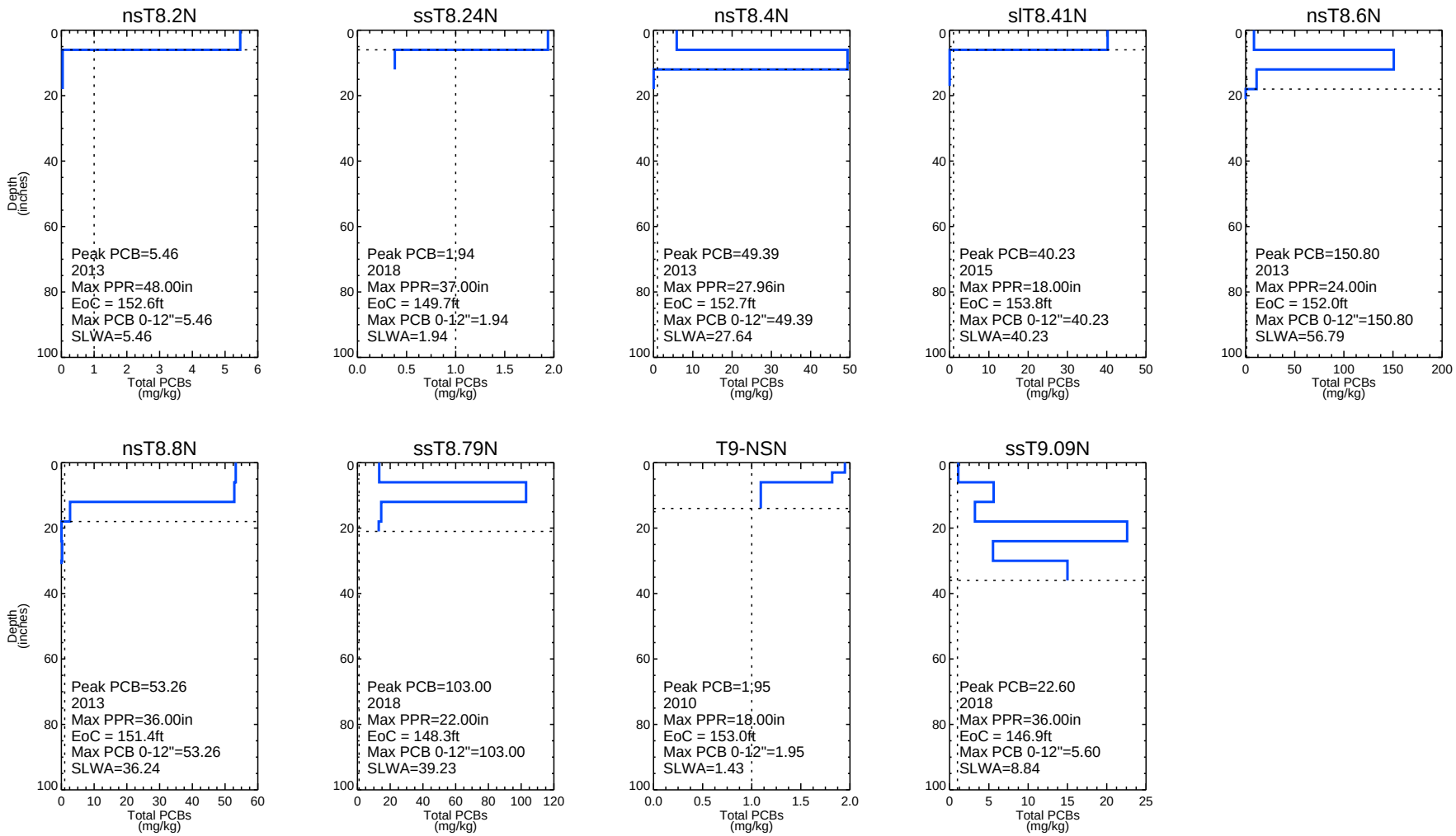
# DMU-N06




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-9**
**PCB Profiles of DMU-N06 Sediment Cores**

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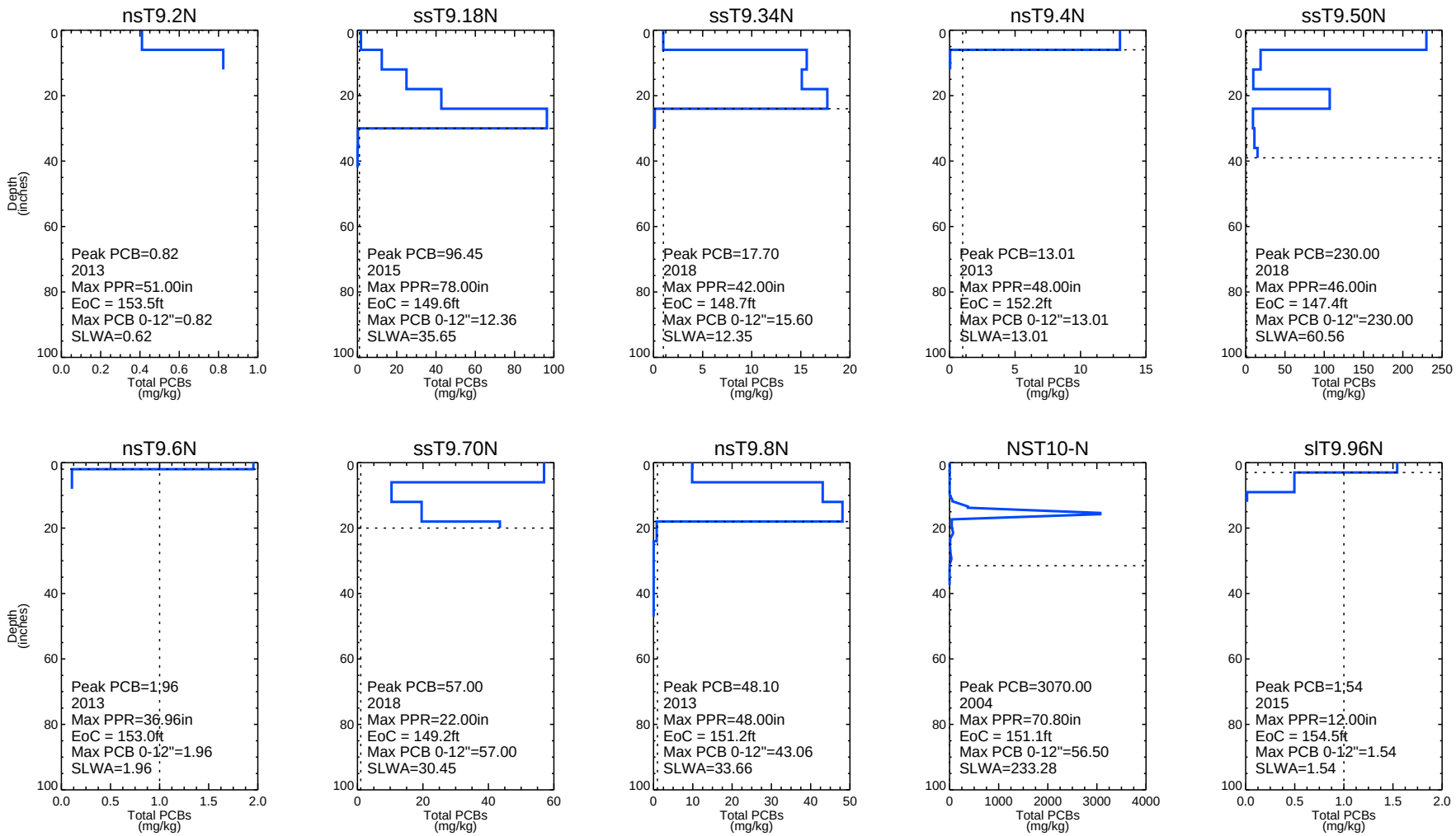
# DMU-N09




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-10**
**PCB Profiles of DMU-N09 Sediment Cores**

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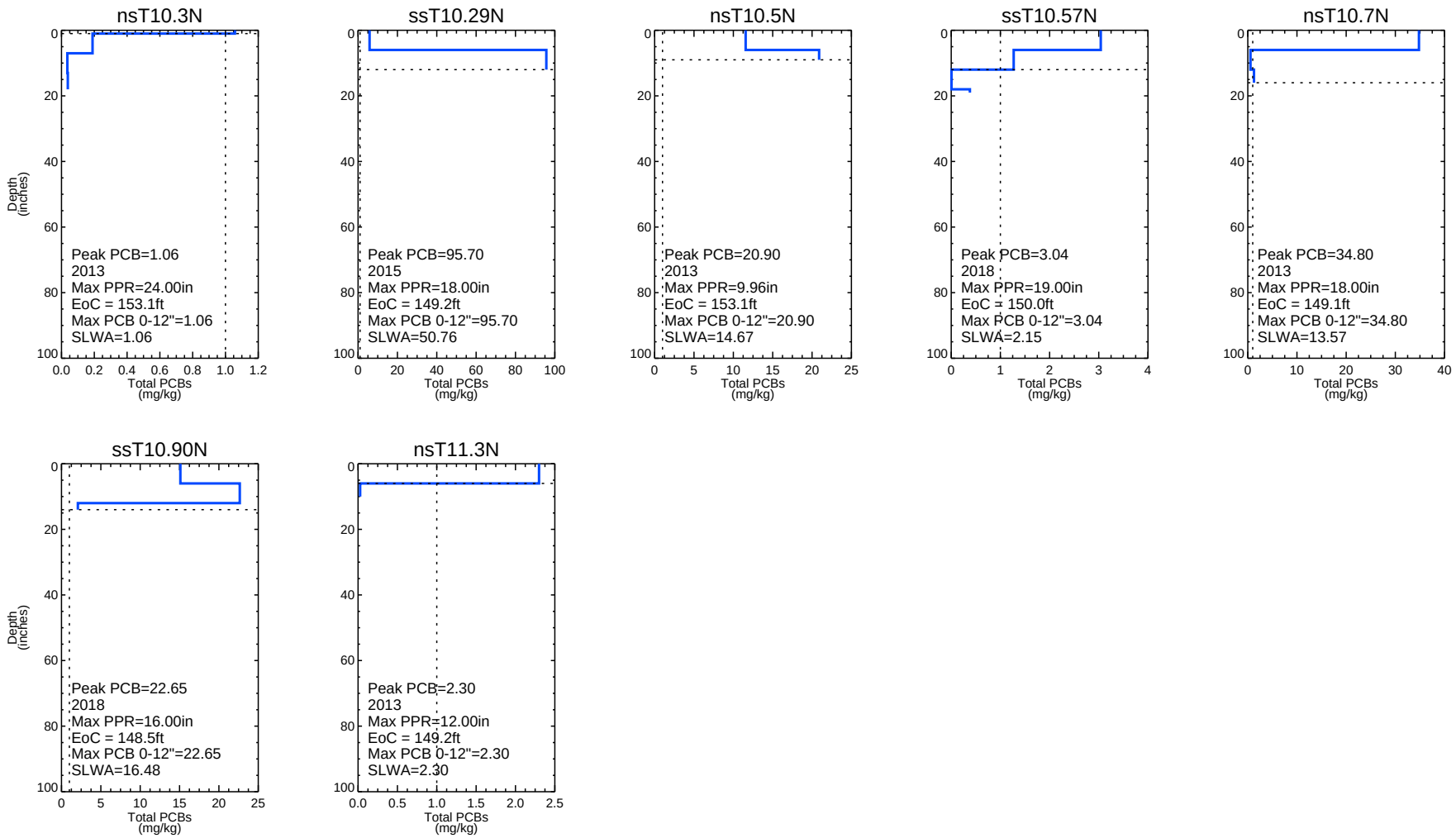
# DMU-N09




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-11**
**PCB Profiles of DMU-N09 Sediment Cores**

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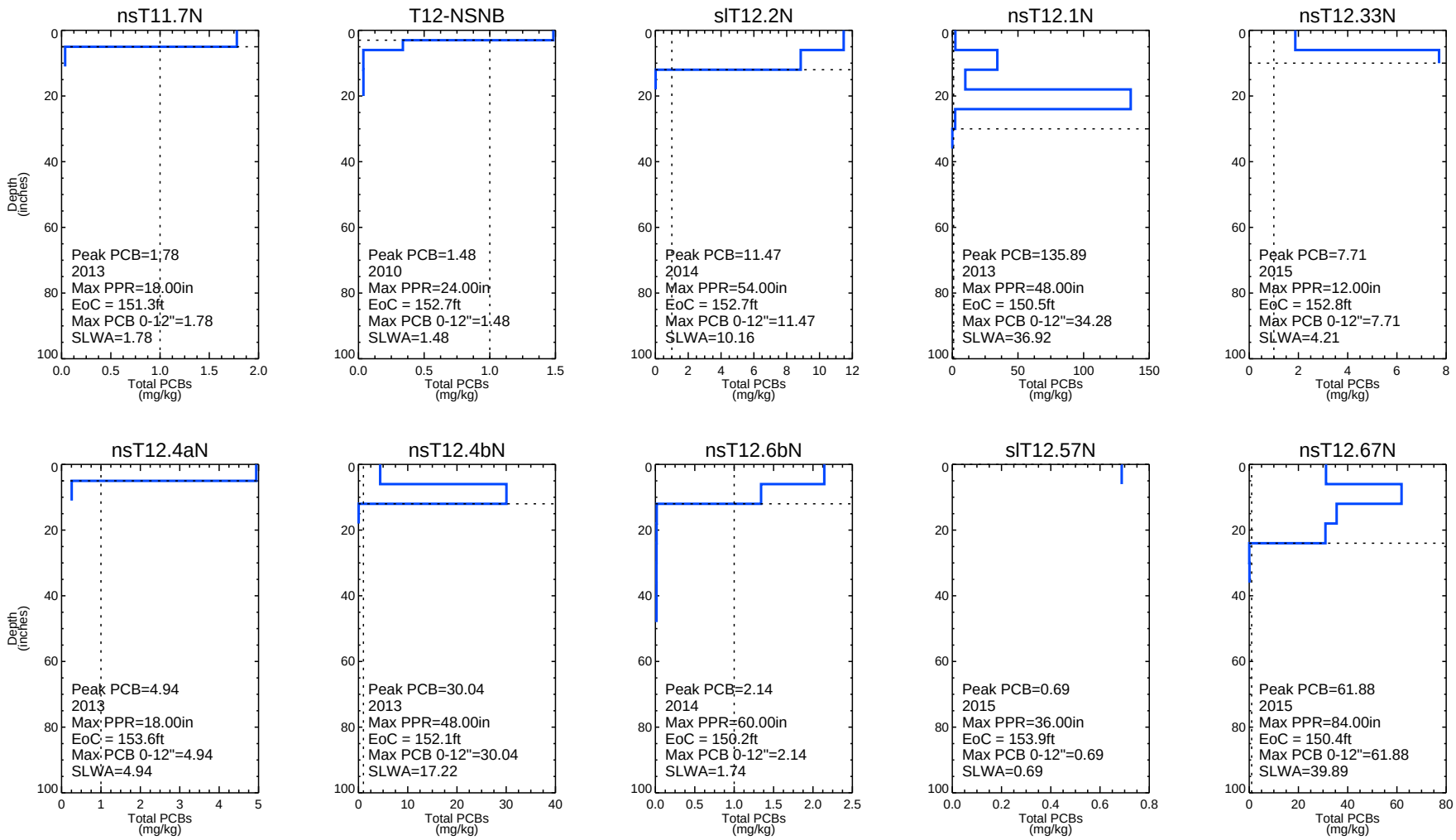
# DMU-N11




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-12**
**PCB Profiles of DMU-N11 Sediment Cores**

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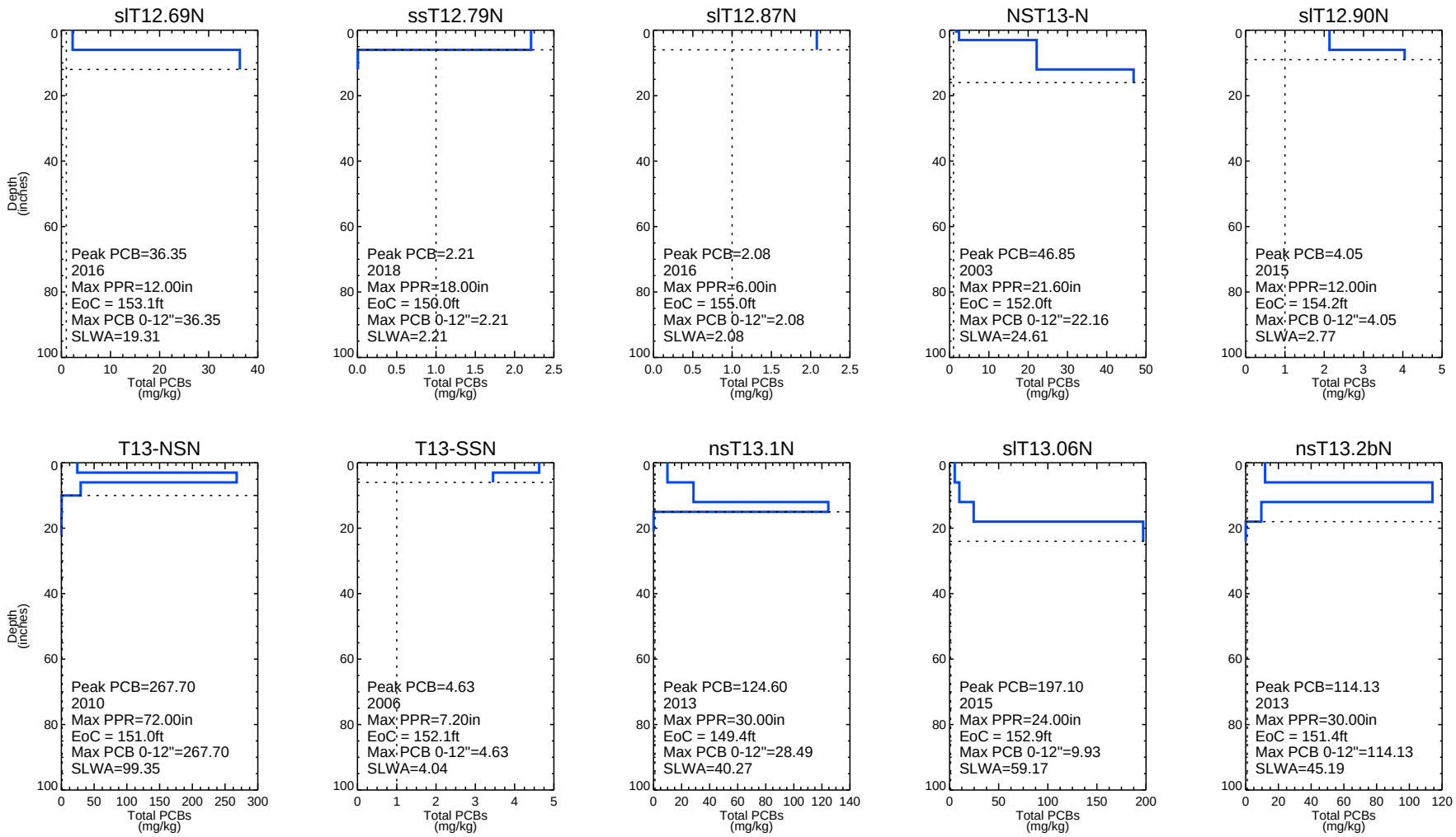
# DMU-N11




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-13**
**PCB Profiles of DMU-N11 Sediment Cores**

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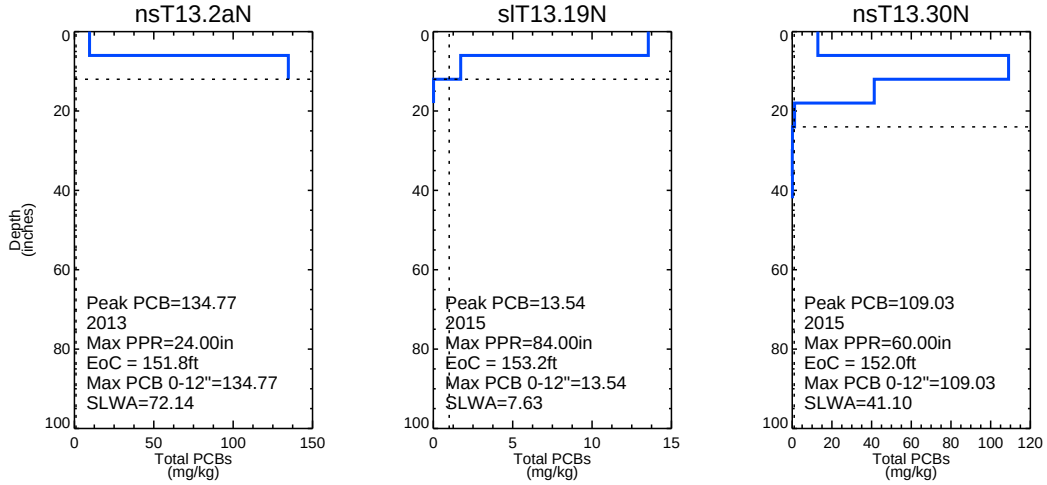
# DMU-N11




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-14**
**PCB Profiles of DMU-N11 Sediment Cores**

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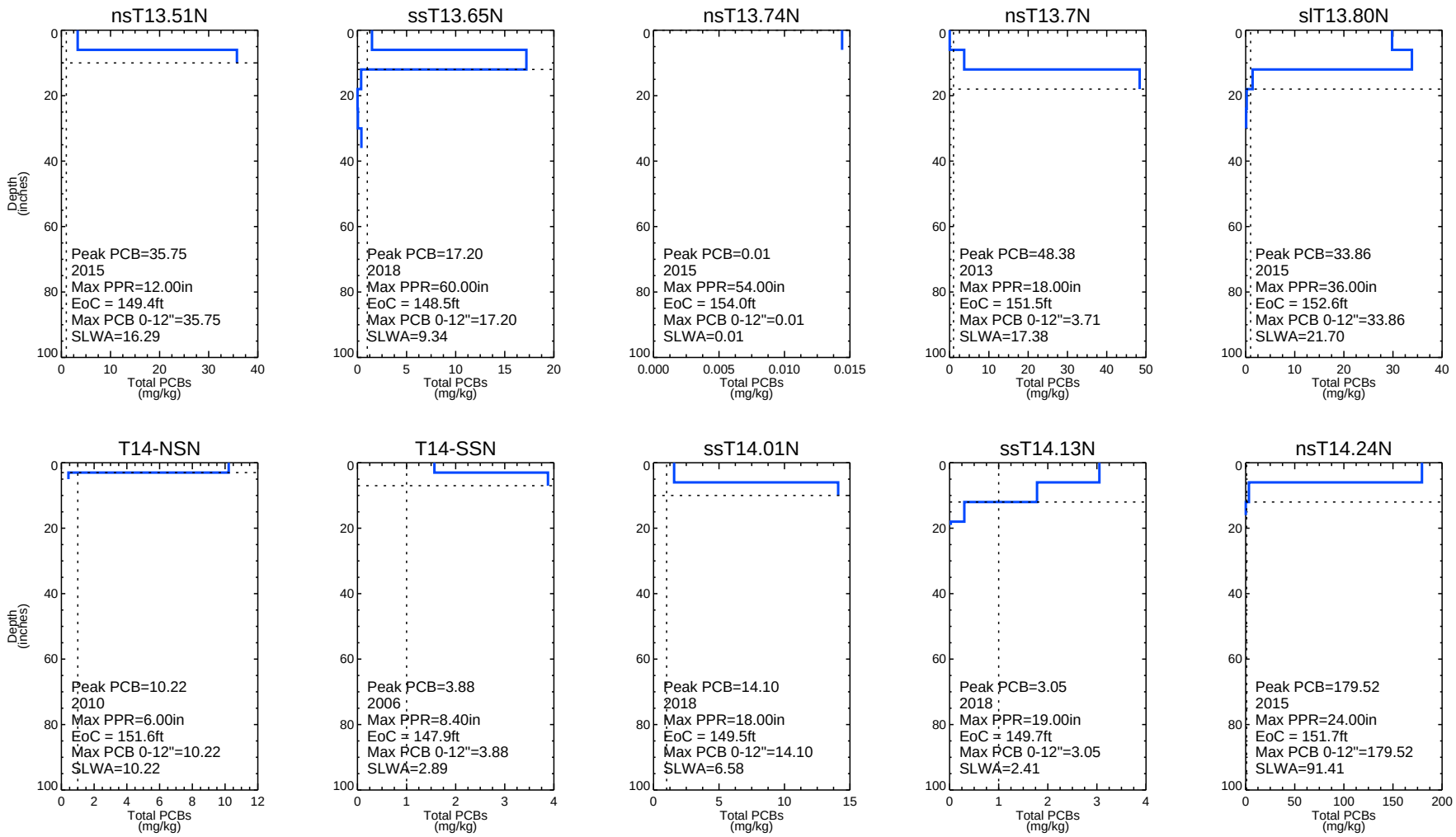
# DMU-N12




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-15**
**PCB Profiles of DMU-N12 Sediment Cores**

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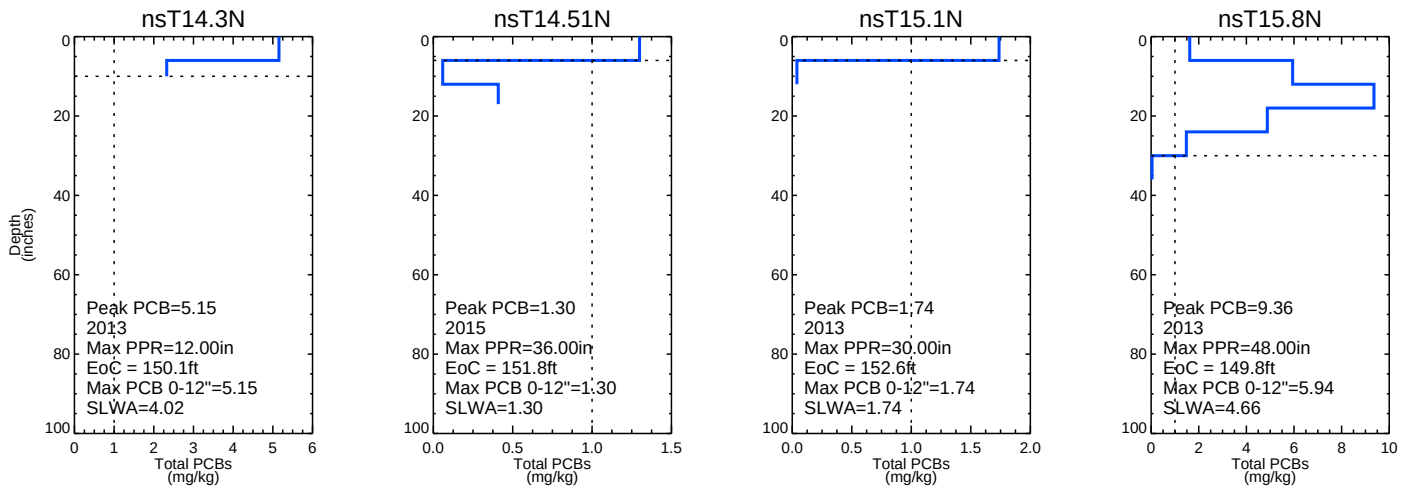
# DMU-N12




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-16**
**PCB Profiles of DMU-N12 Sediment Cores**

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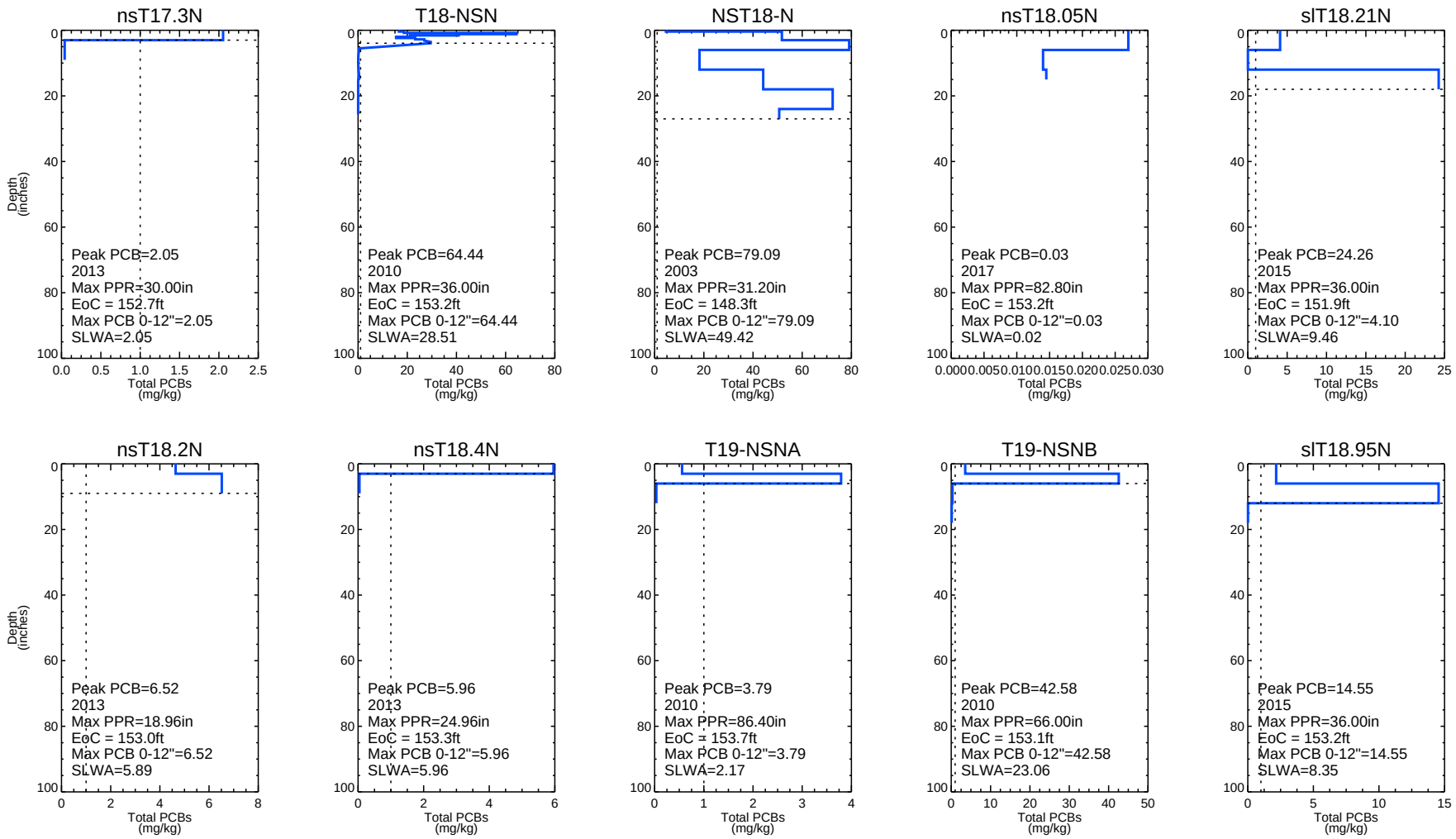
# DMU-N14




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-17**
**PCB Profiles of DMU-N14 Sediment Cores**

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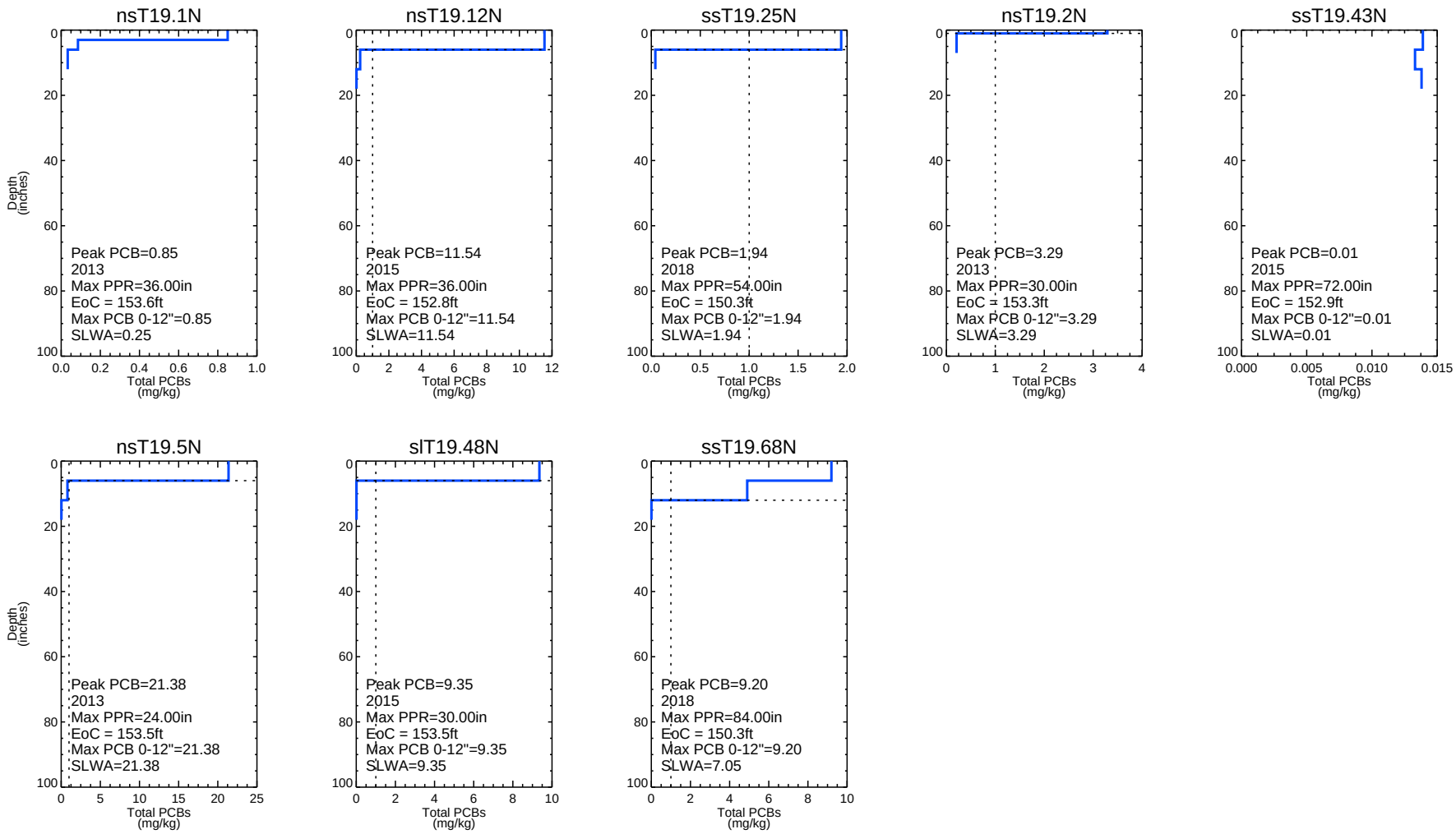
# DMU-N14




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-18**
**PCB Profiles of DMU-N14 Sediment Cores**

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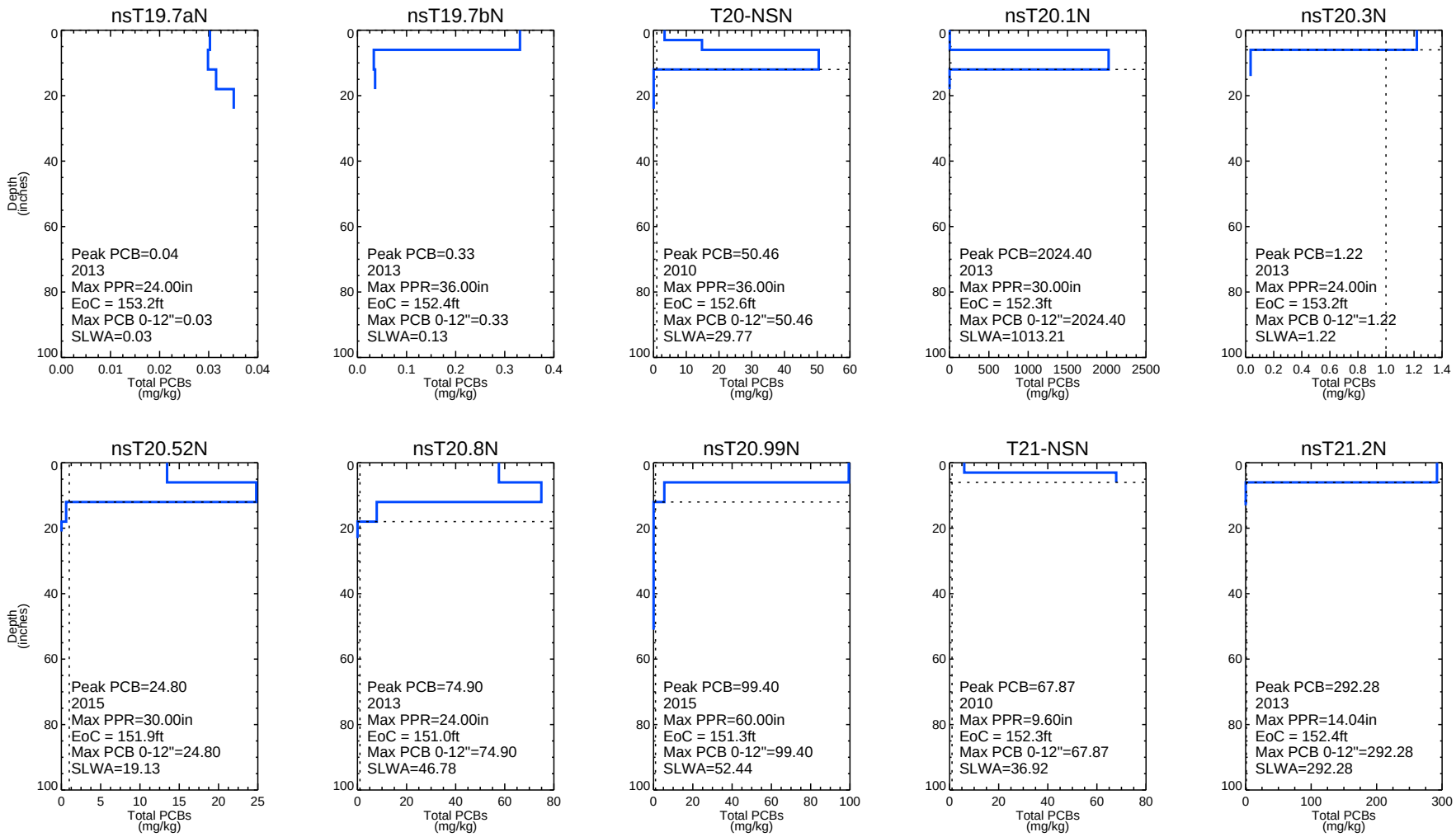
# DMU-N16




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-19**
**PCB Profiles of DMU-N16 Sediment Cores**

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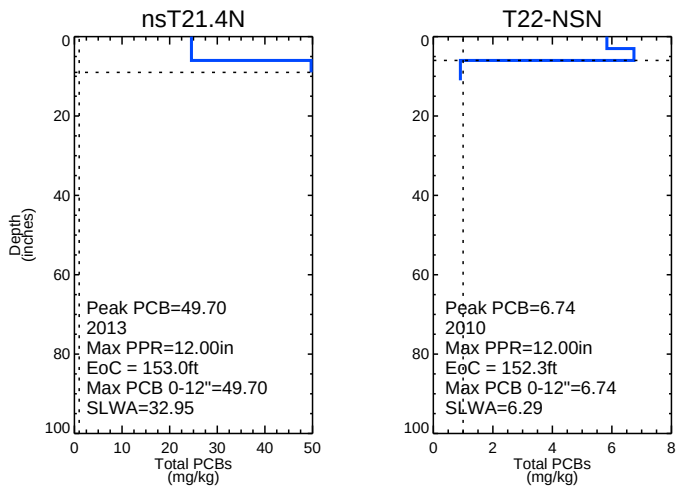
# DMU-N16




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-20**
**PCB Profiles of DMU-N16 Sediment Cores**

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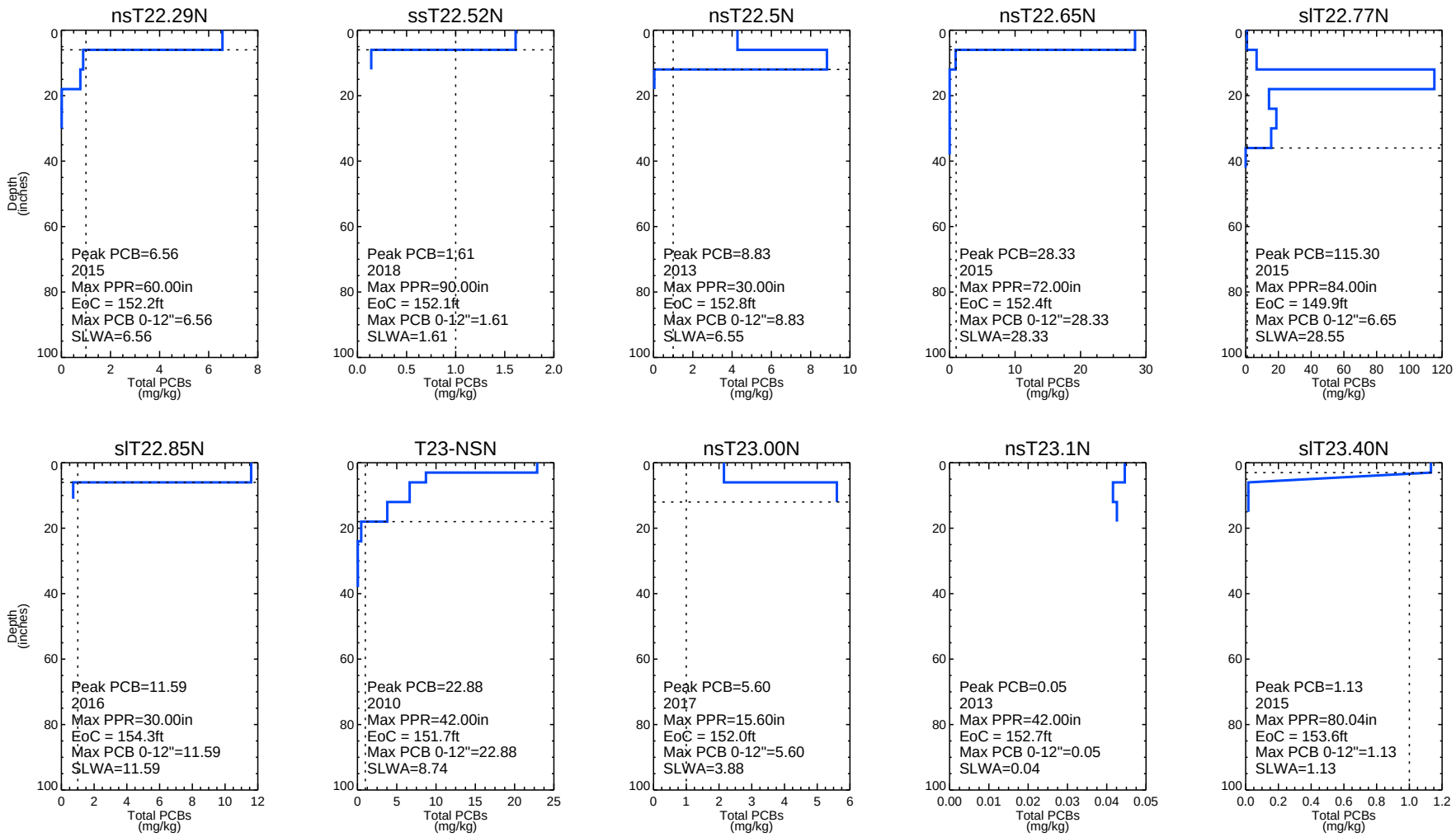
# DMU-N18




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-21**
**PCB Profiles of DMU-N18 Sediment Cores**

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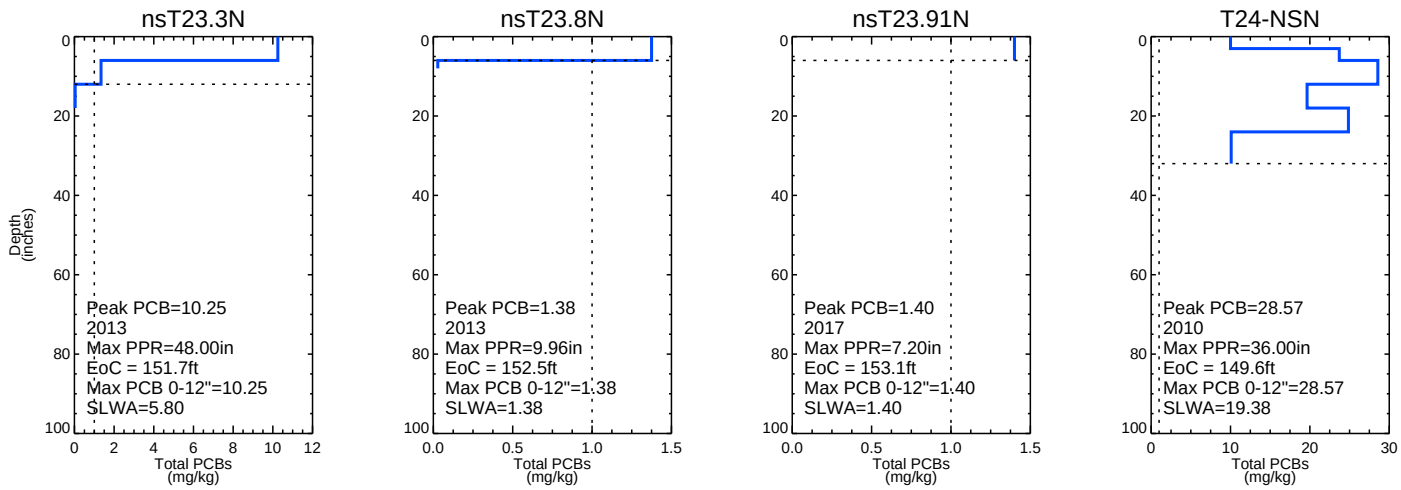
# DMU-N18




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-22**
**PCB Profiles of DMU-N18 Sediment Cores**

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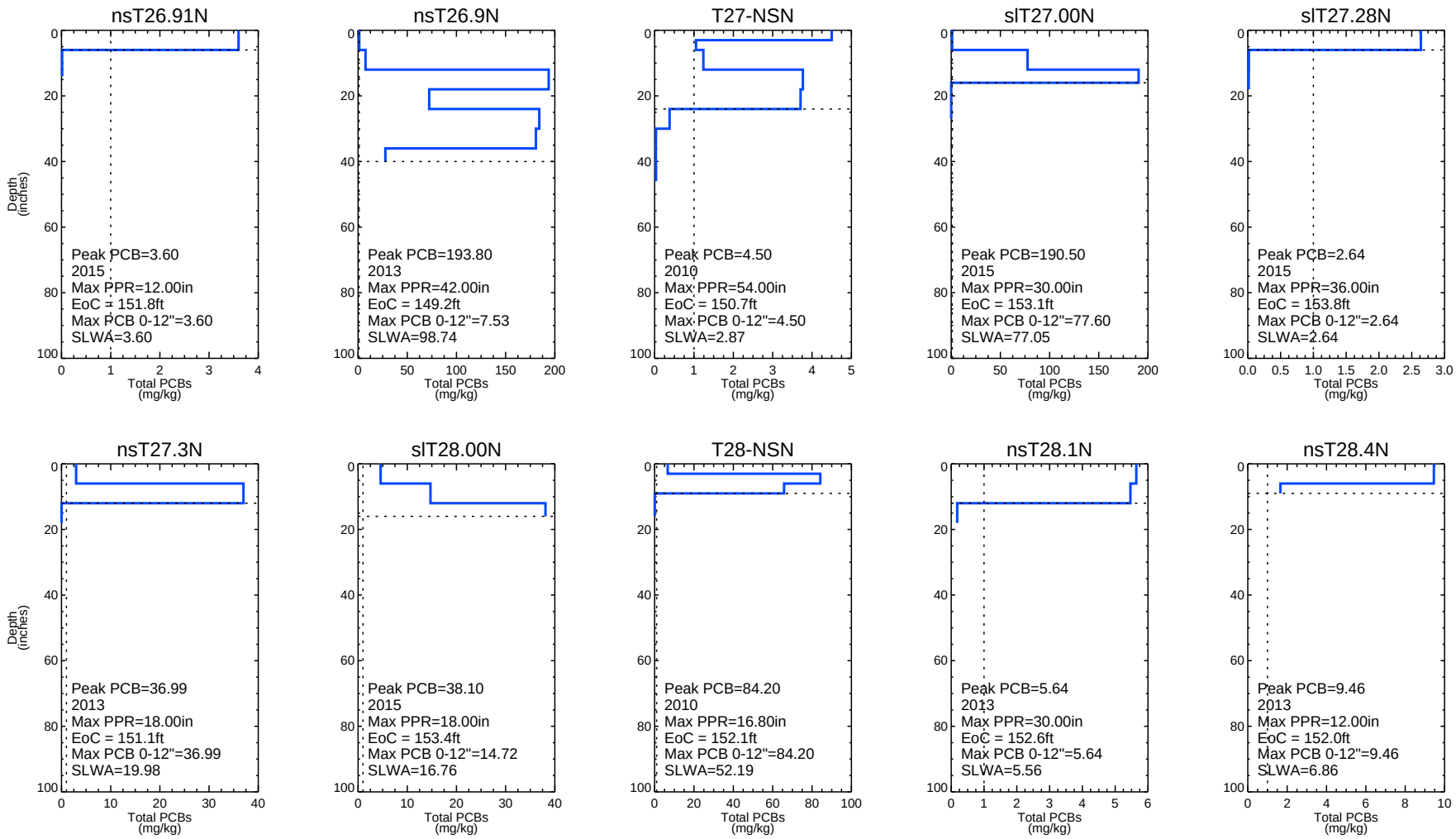
# DMU-N20




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-23**
**PCB Profiles of DMU-N20 Sediment Cores**

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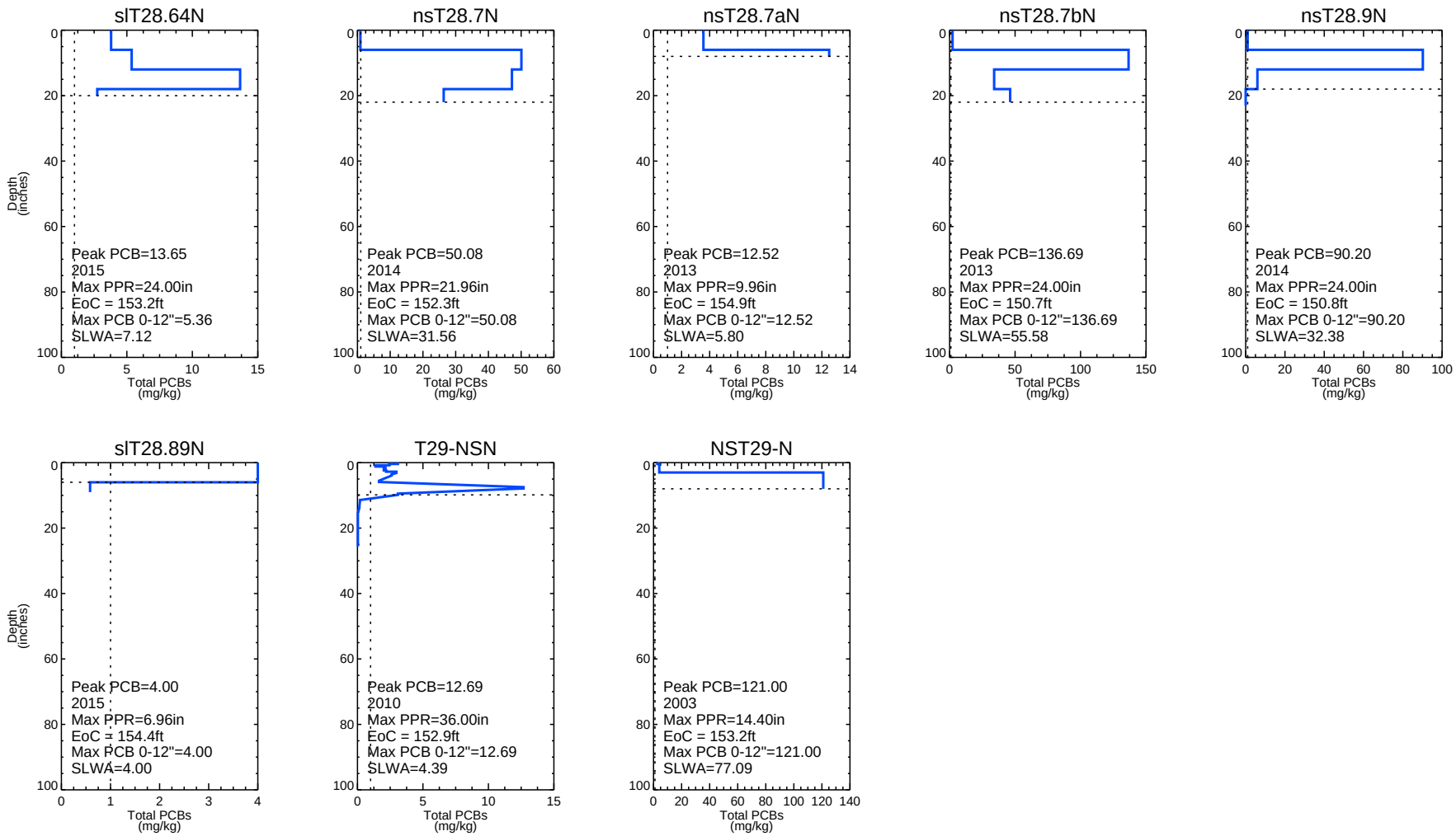
# DMU-N20




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-24**
**PCB Profiles of DMU-N20 Sediment Cores**

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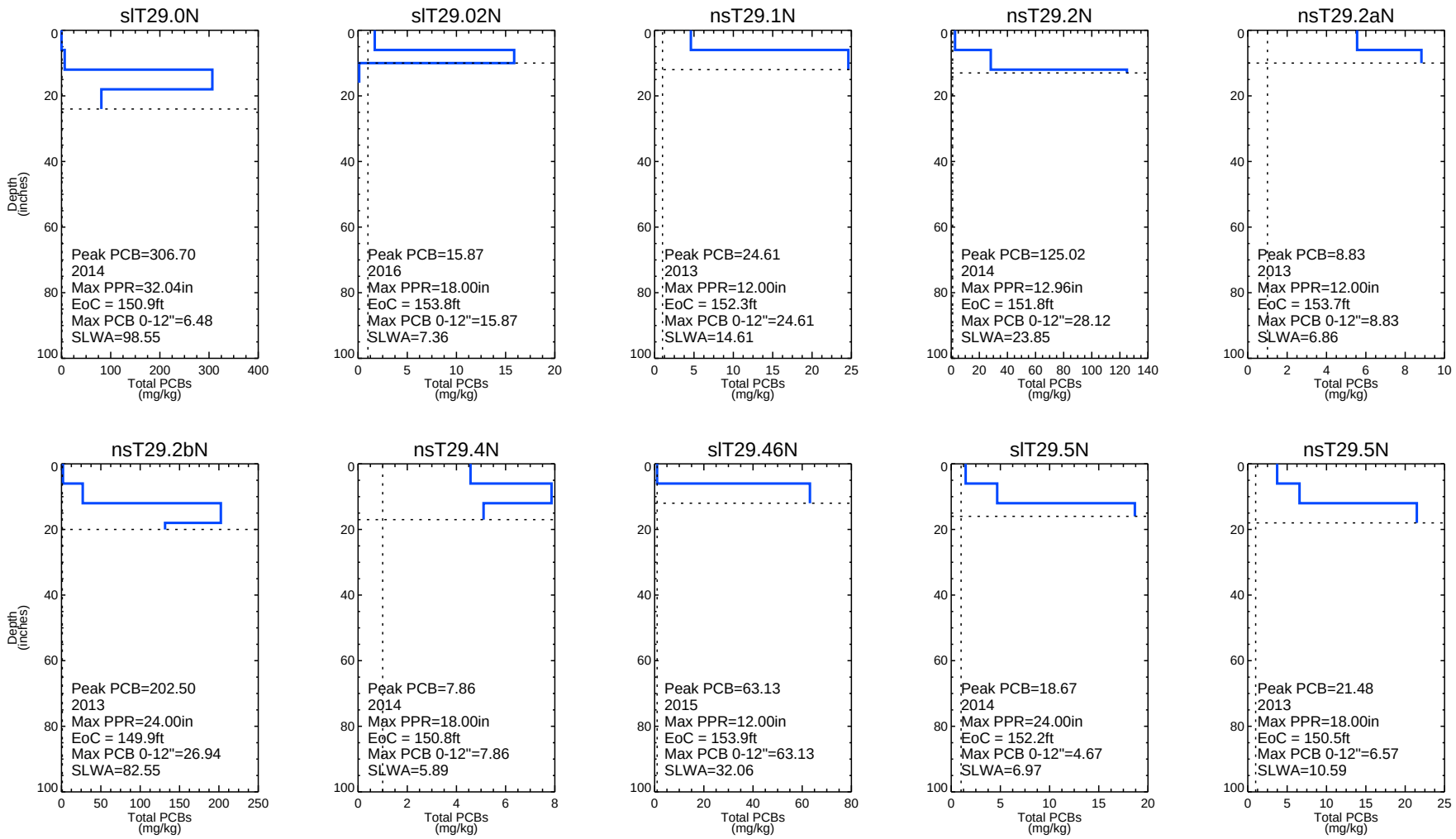
# DMU-N22




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-25**
**PCB Profiles of DMU-N22 Sediment Cores**

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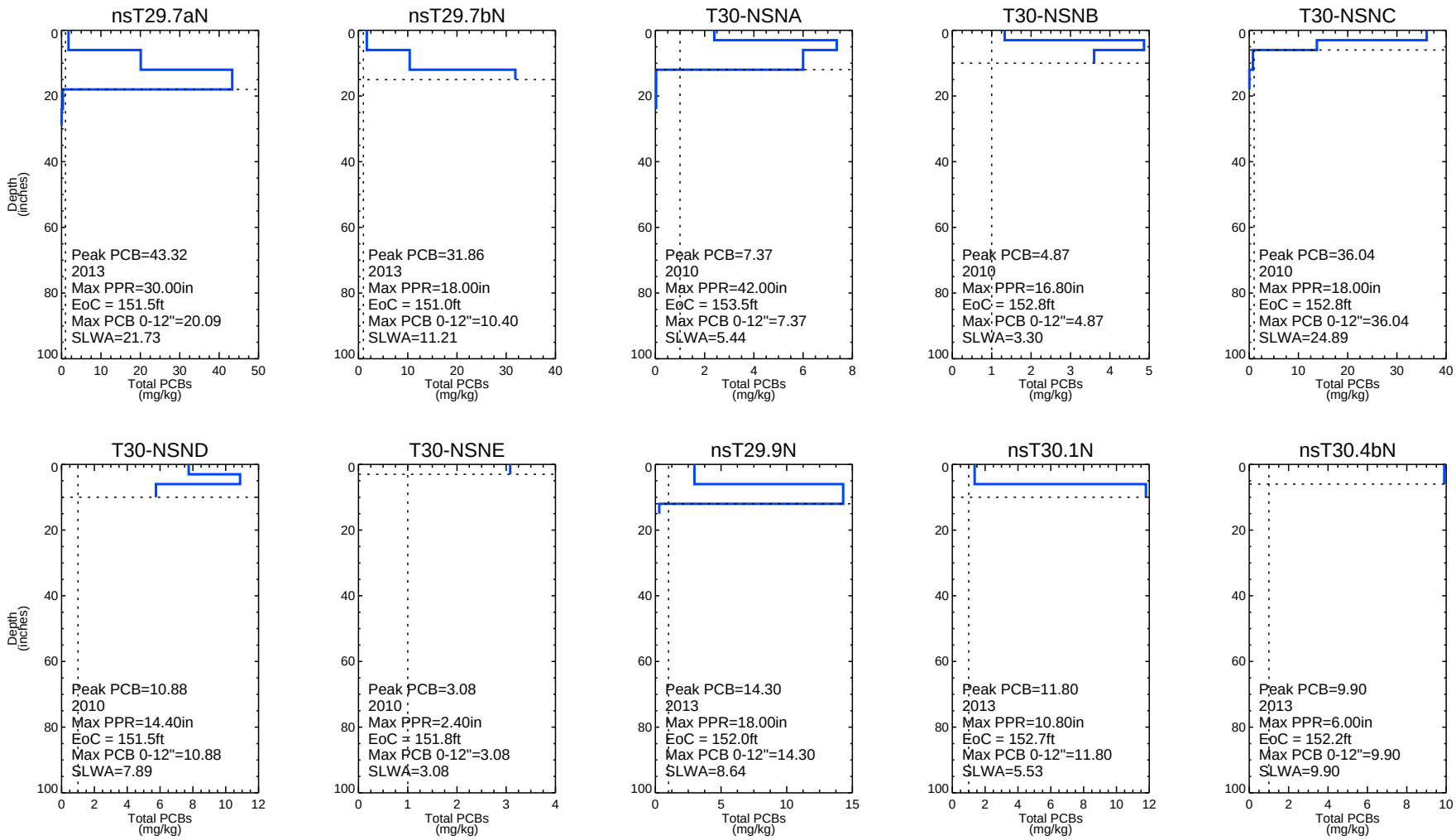
# DMU-N22




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-26**
**PCB Profiles of DMU-N22 Sediment Cores**

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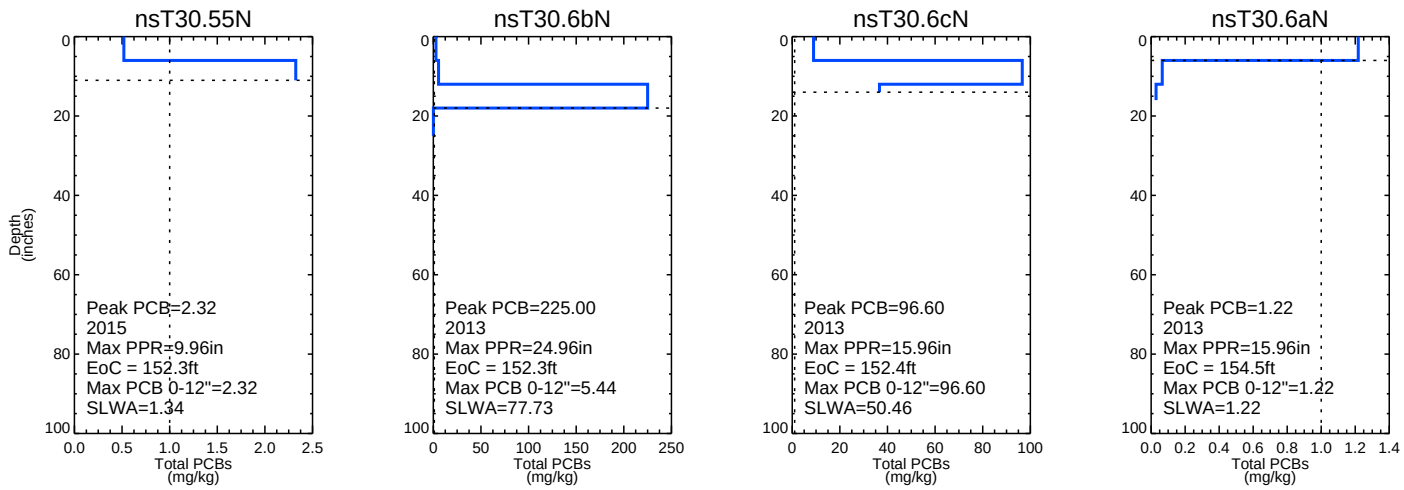
# DMU-N22




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-27**
**PCB Profiles of DMU-N22 Sediment Cores**

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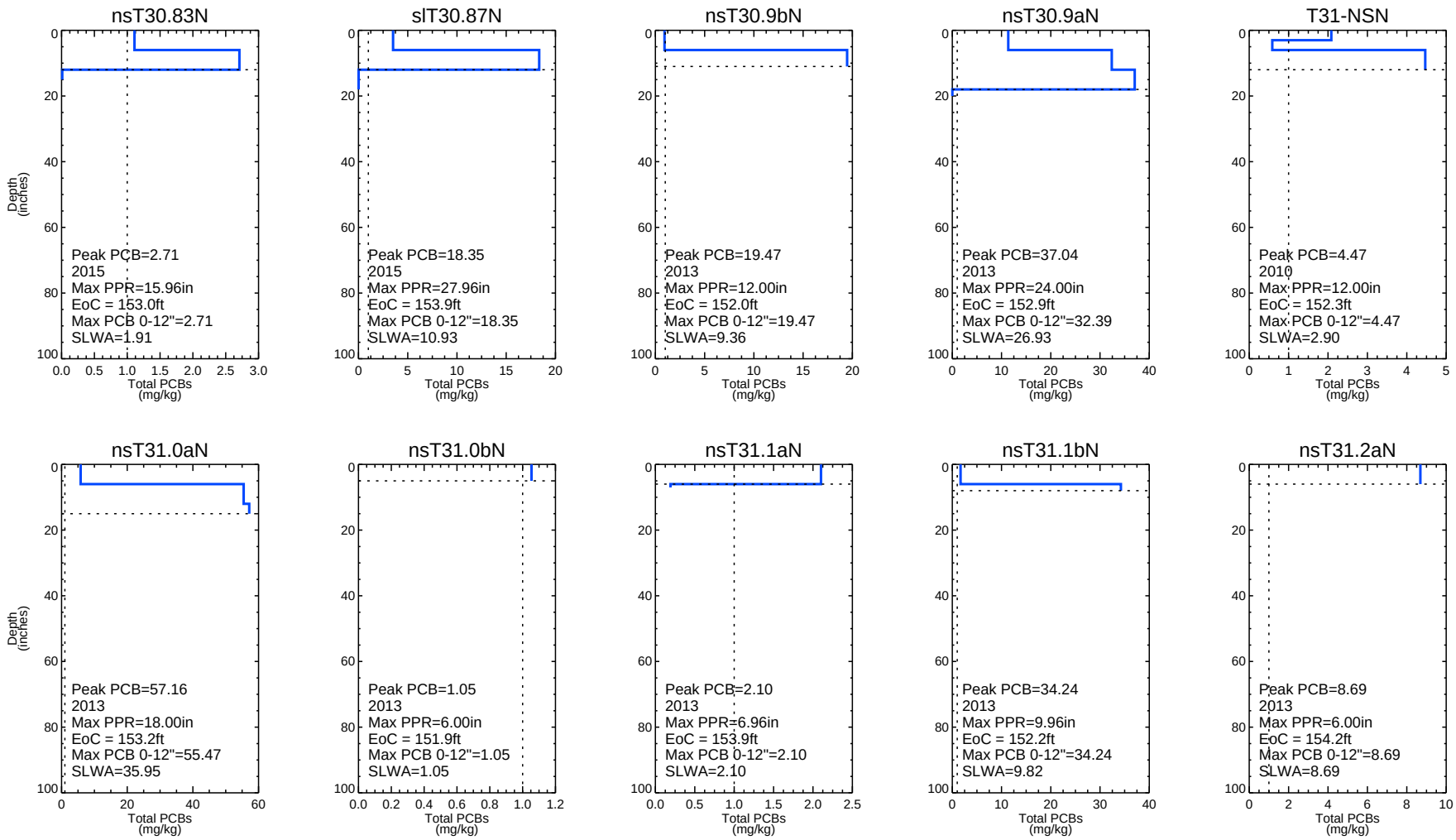
# DMU-N24




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-28**
**PCB Profiles of DMU-N24 Sediment Cores**

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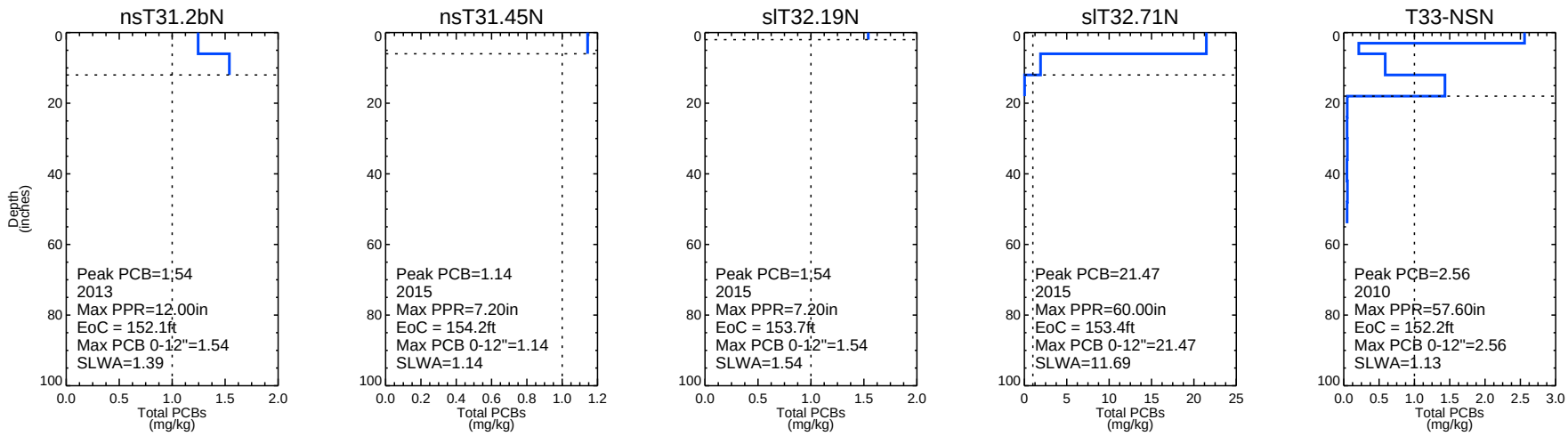
# DMU-N24




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-29**
**PCB Profiles of DMU-N24 Sediment Cores**

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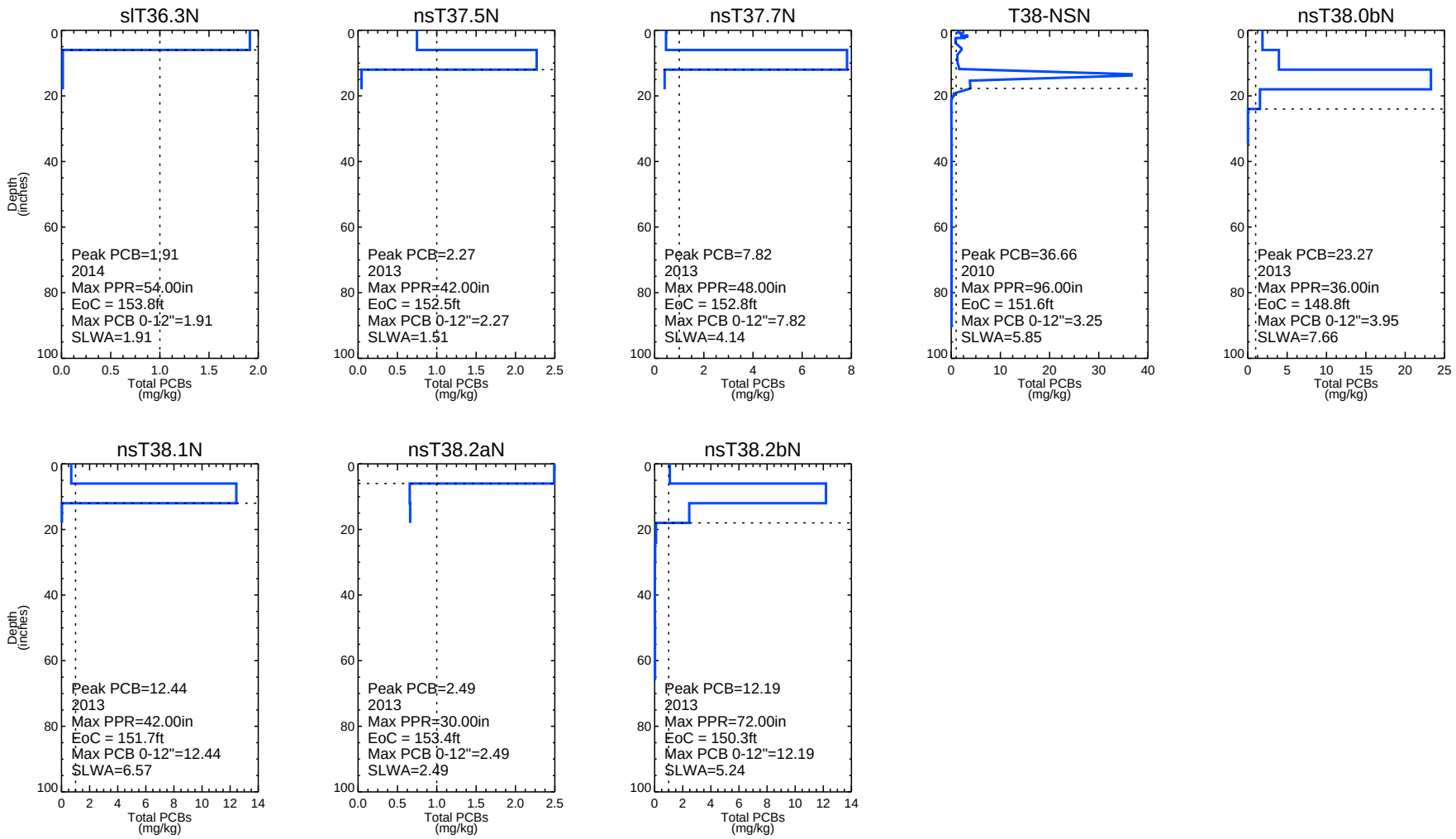
# DMU-N30




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-30**
**PCB Profiles of DMU-N30 Sediment Cores**

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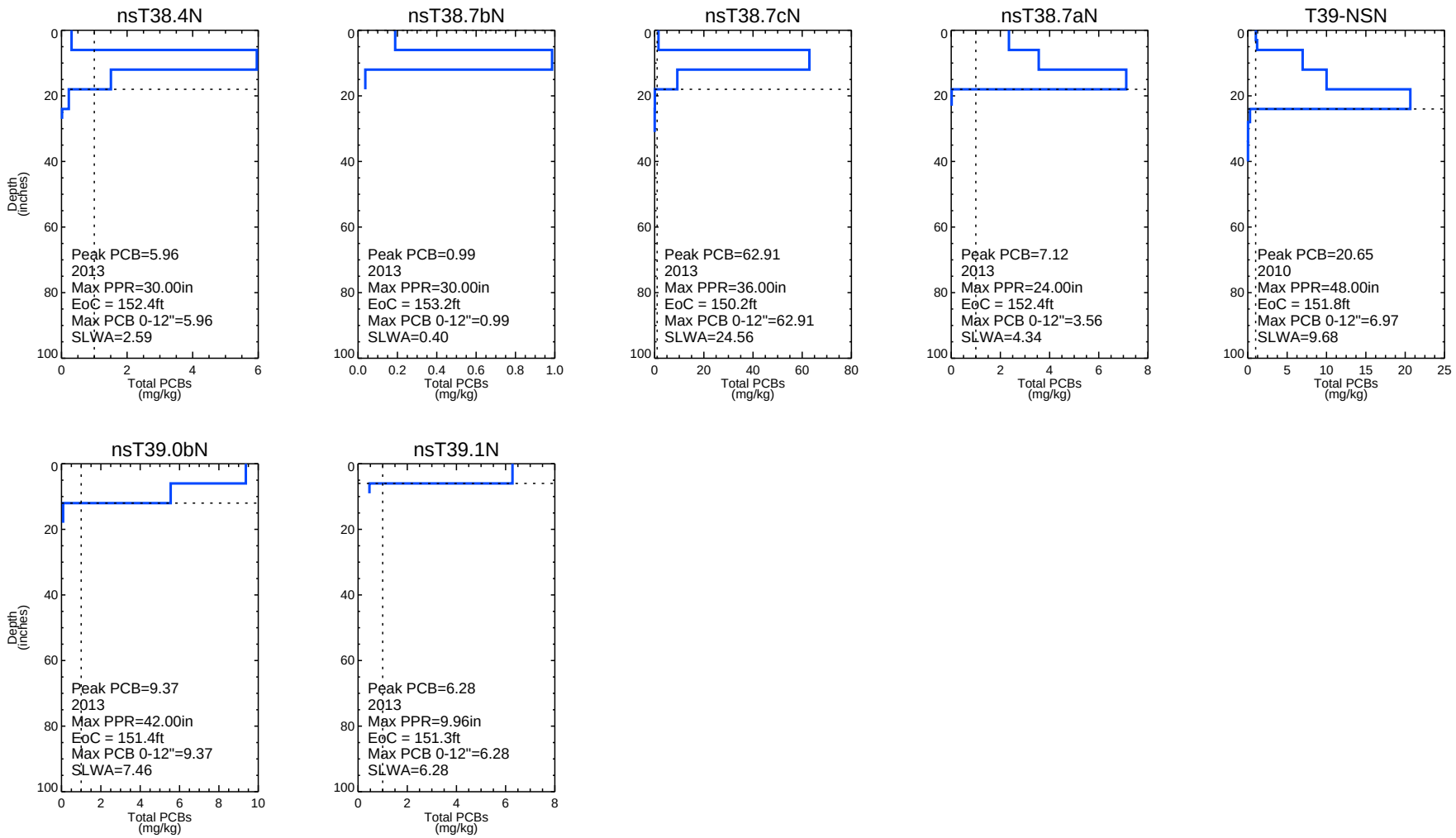
Grasse River Project/Arconic

# DMU-N31




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-31**
**PCB Profiles of DMU-N31 Sediment Cores**

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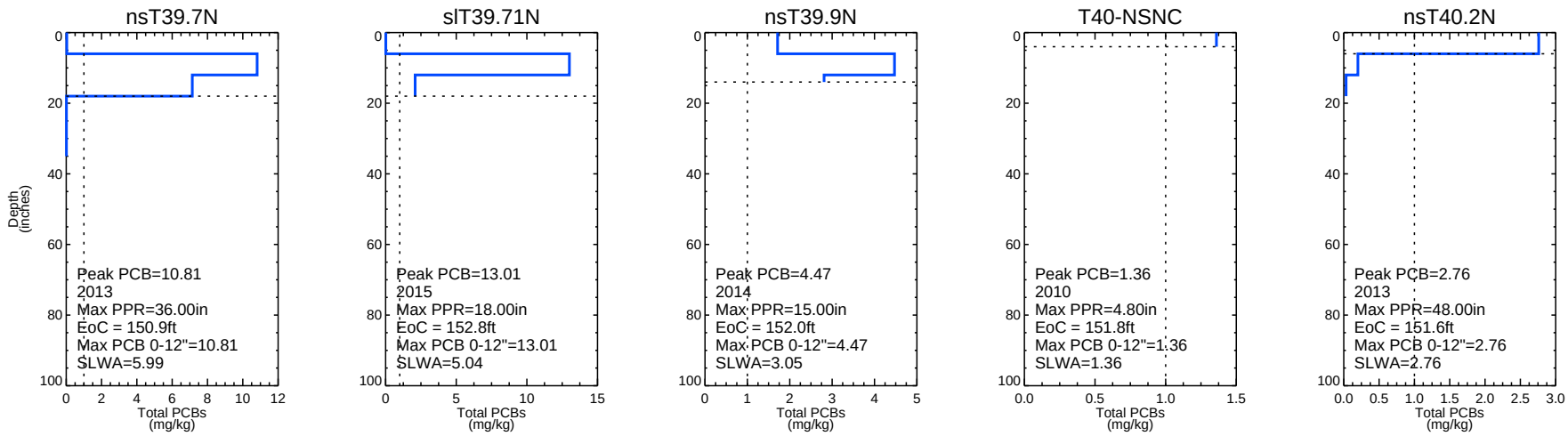
# DMU-N33




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-32**
**PCB Profiles of DMU-N33 Sediment Cores**

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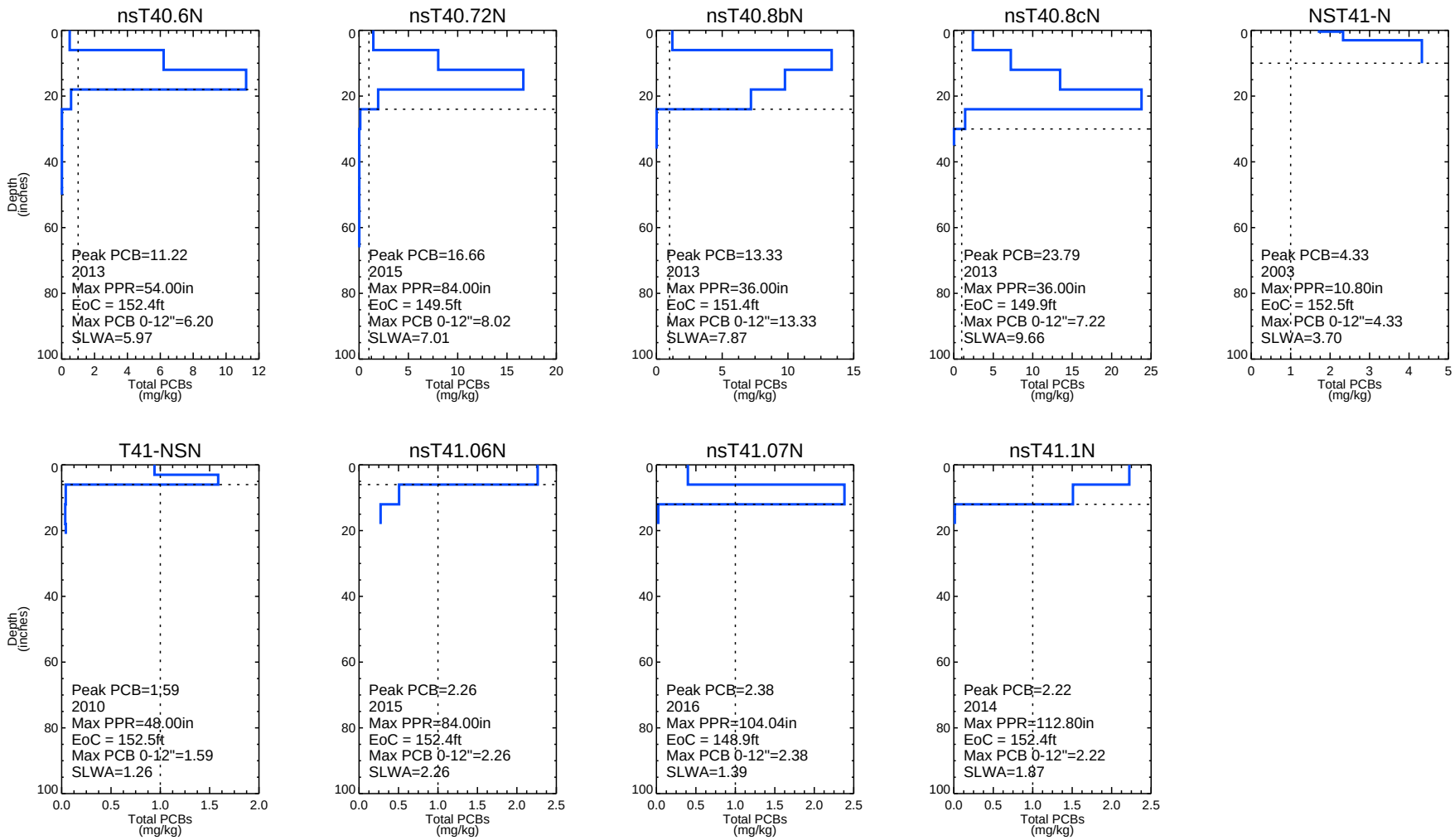
# DMU-N34




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-33**
**PCB Profiles of DMU-N34 Sediment Cores**

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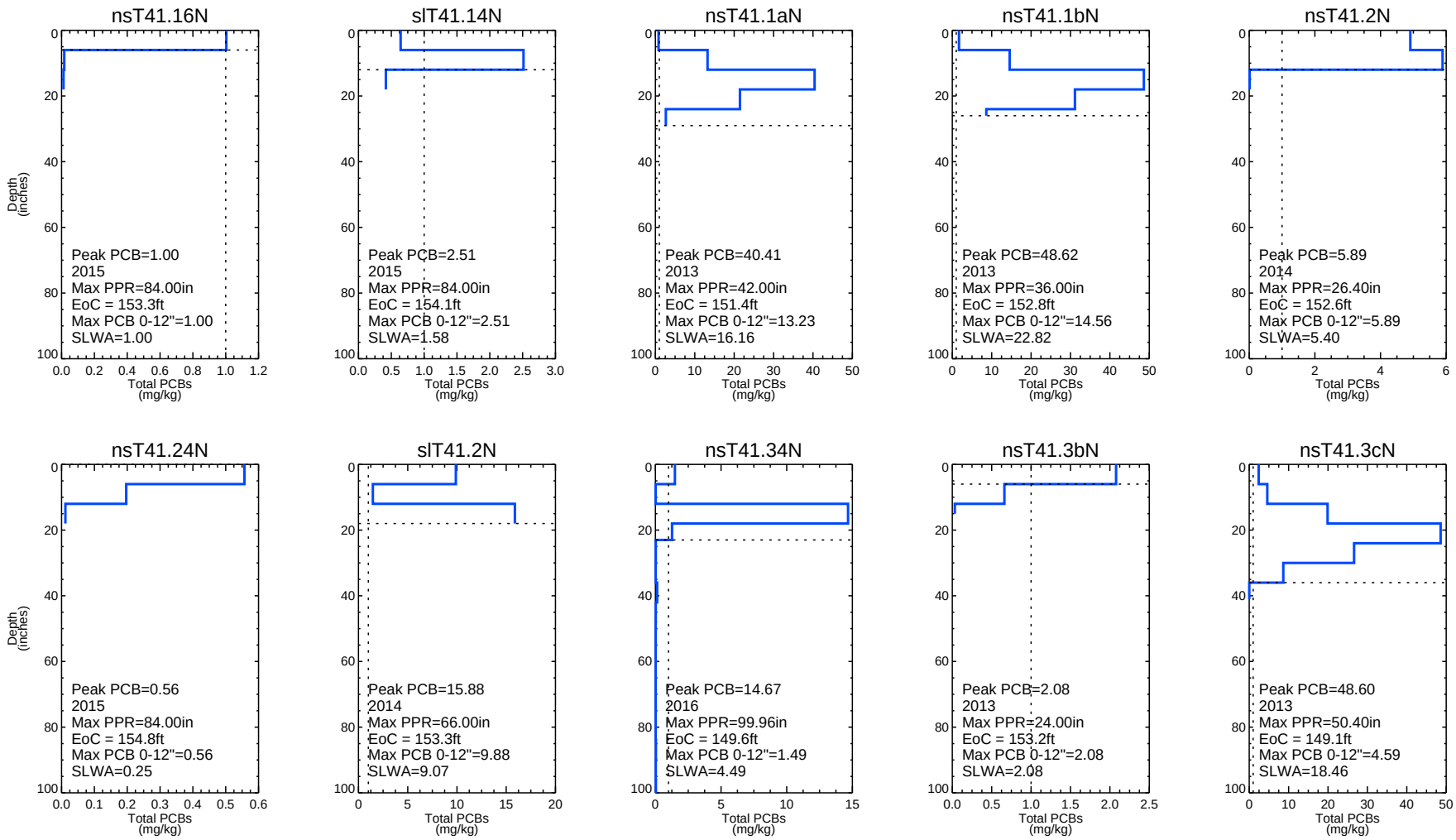
# DMU-N36




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-34**
**PCB Profiles of DMU-N36 Sediment Cores**

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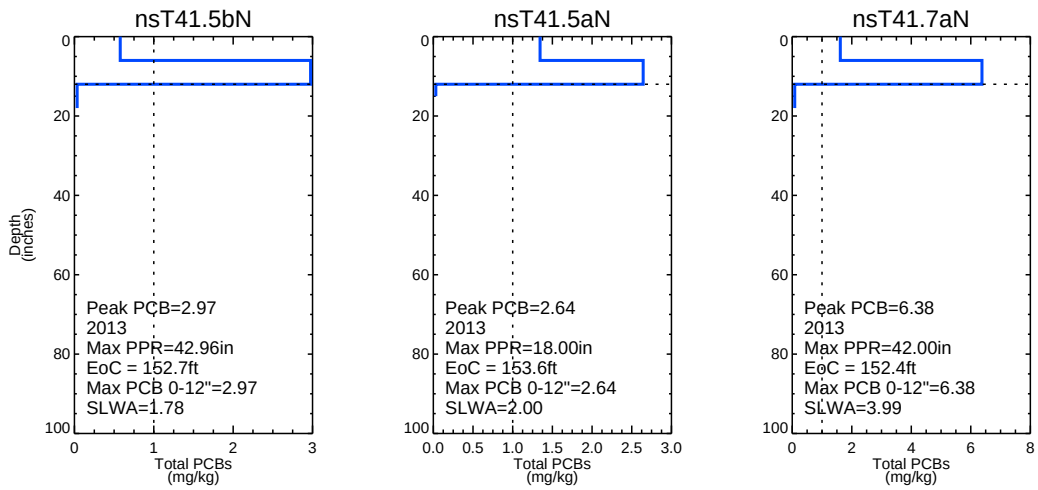
# DMU-N36




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-35**
**PCB Profiles of DMU-N36 Sediment Cores**

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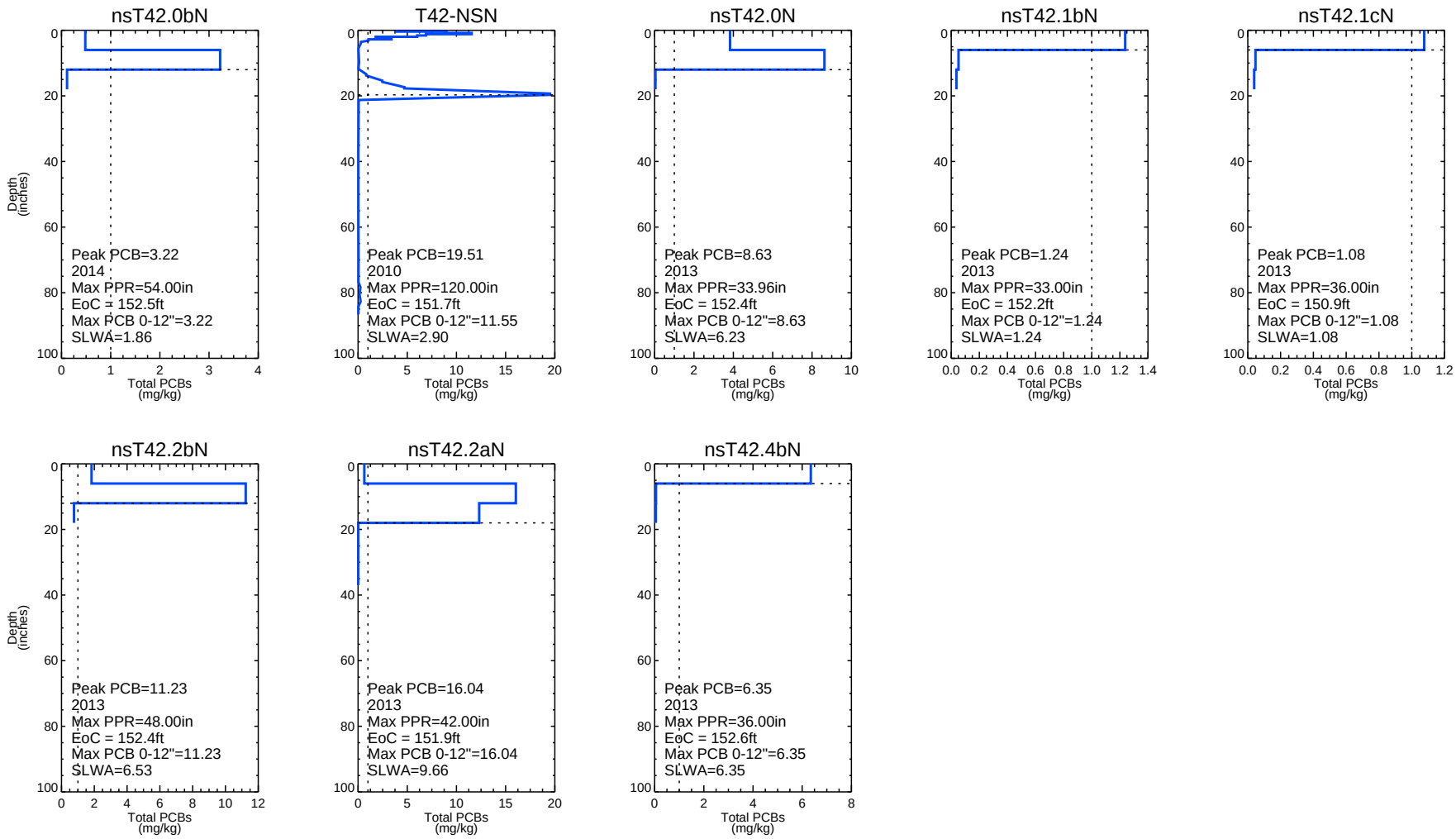
# DMU-N37




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-36**
**PCB Profiles of DMU-N37 Sediment Cores**

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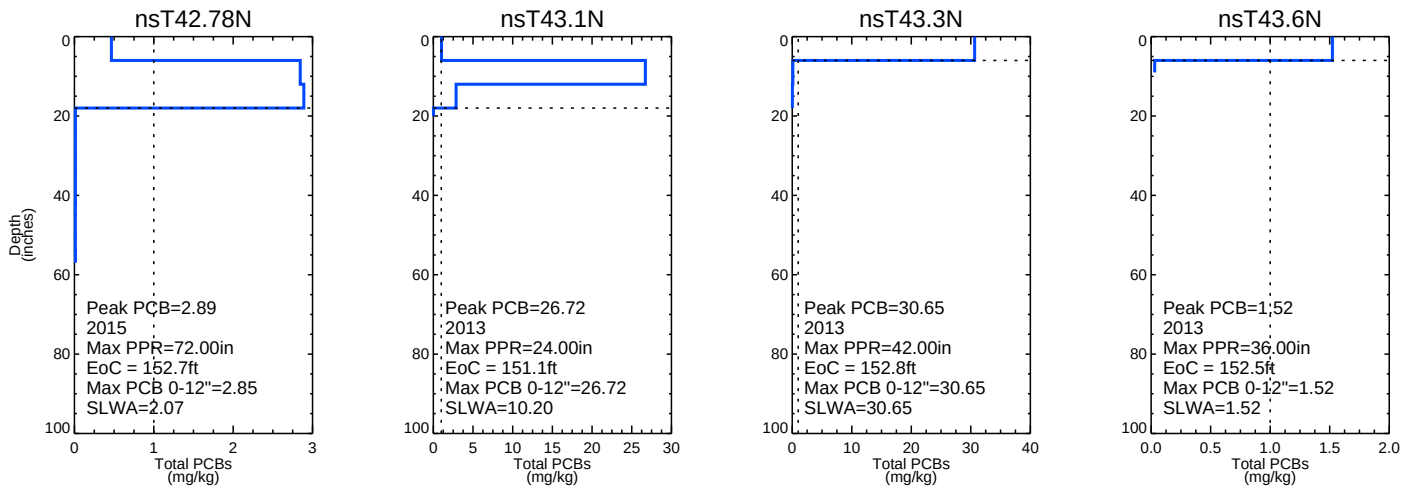
# DMU-N39




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-37**
**PCB Profiles of DMU-N39 Sediment Cores**

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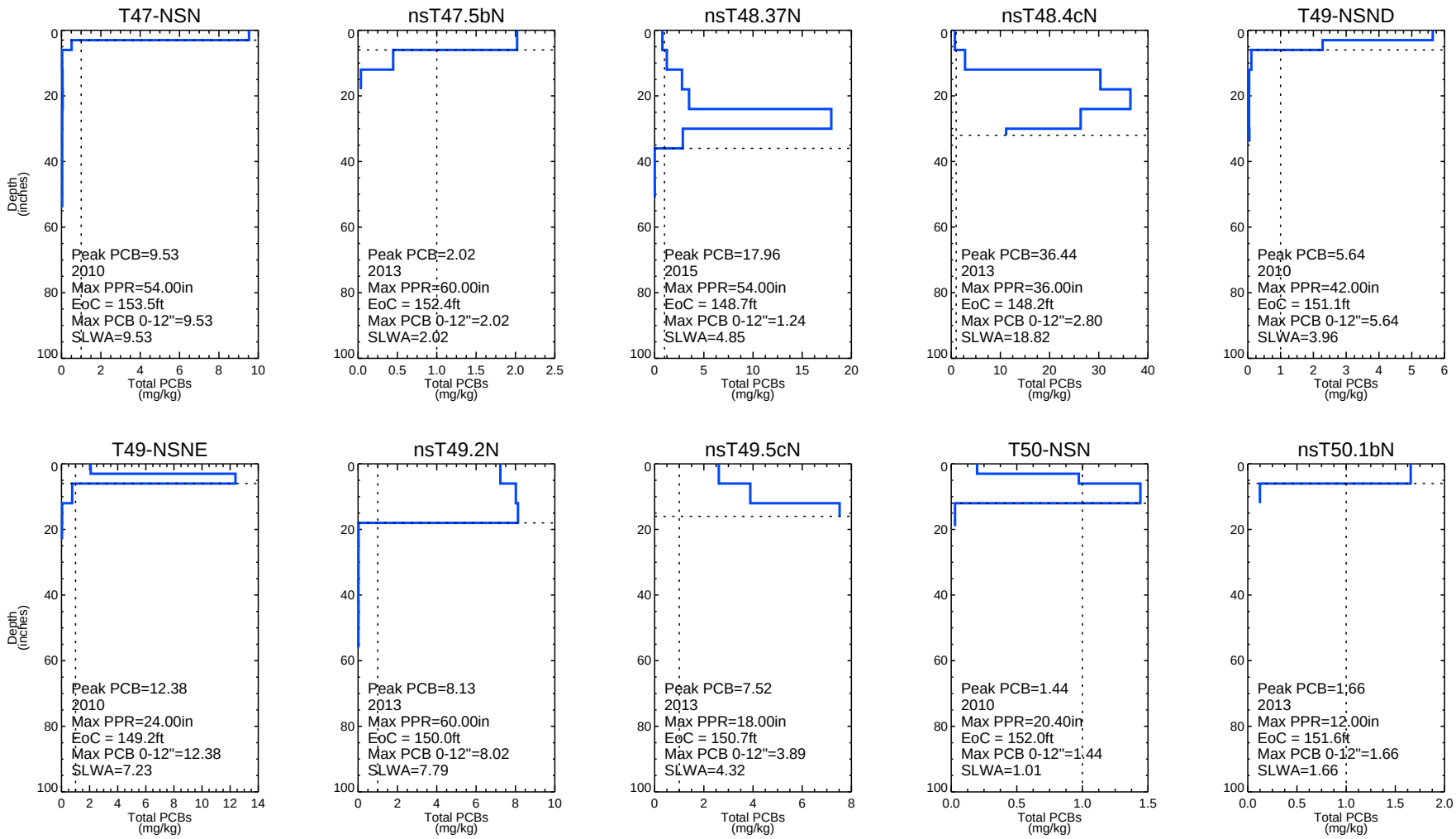
# DMU-N43




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-38**
**PCB Profiles of DMU-N43 Sediment Cores**

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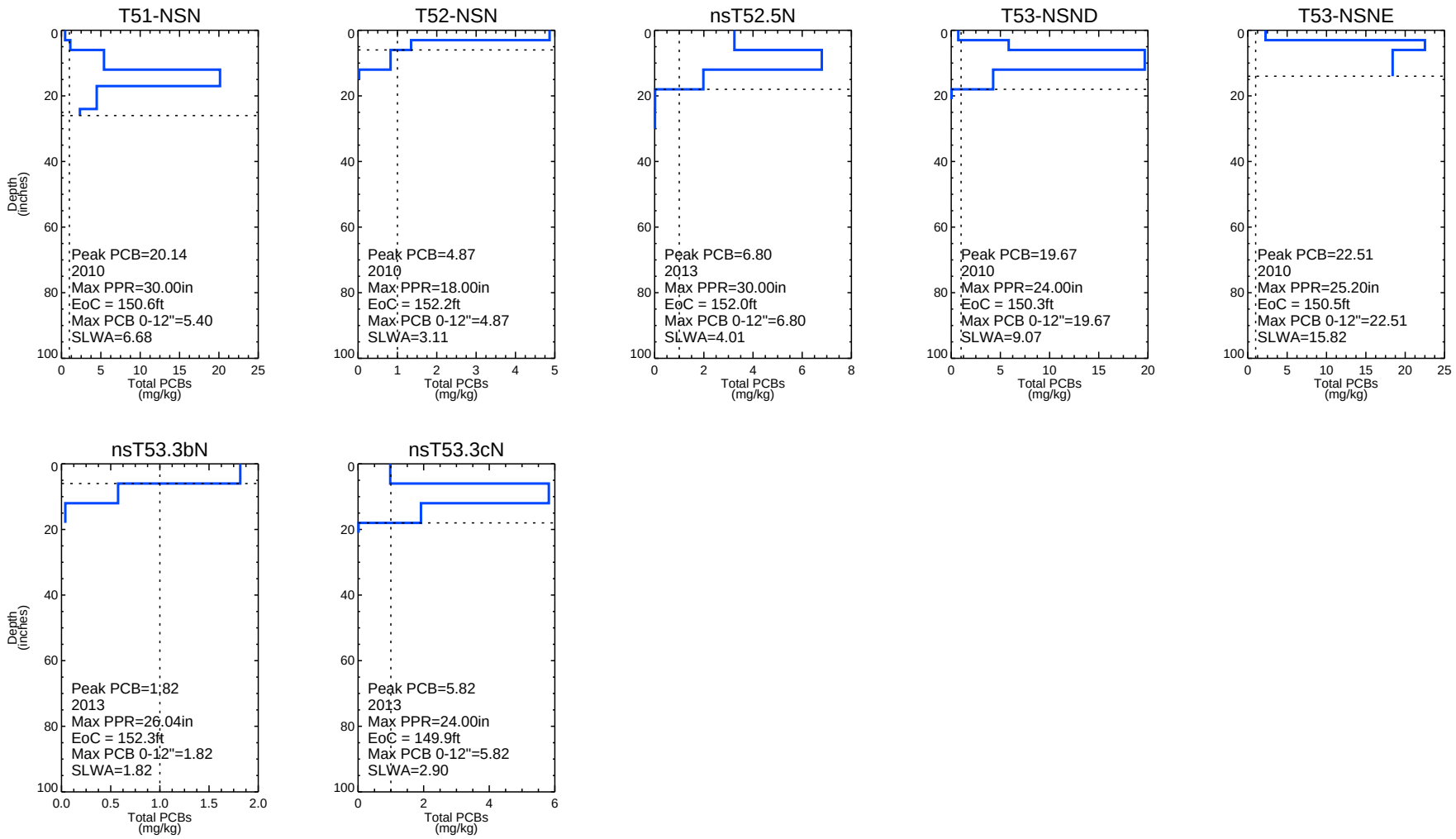
# DMU-N45




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-39**
**PCB Profiles of DMU-N45 Sediment Cores**

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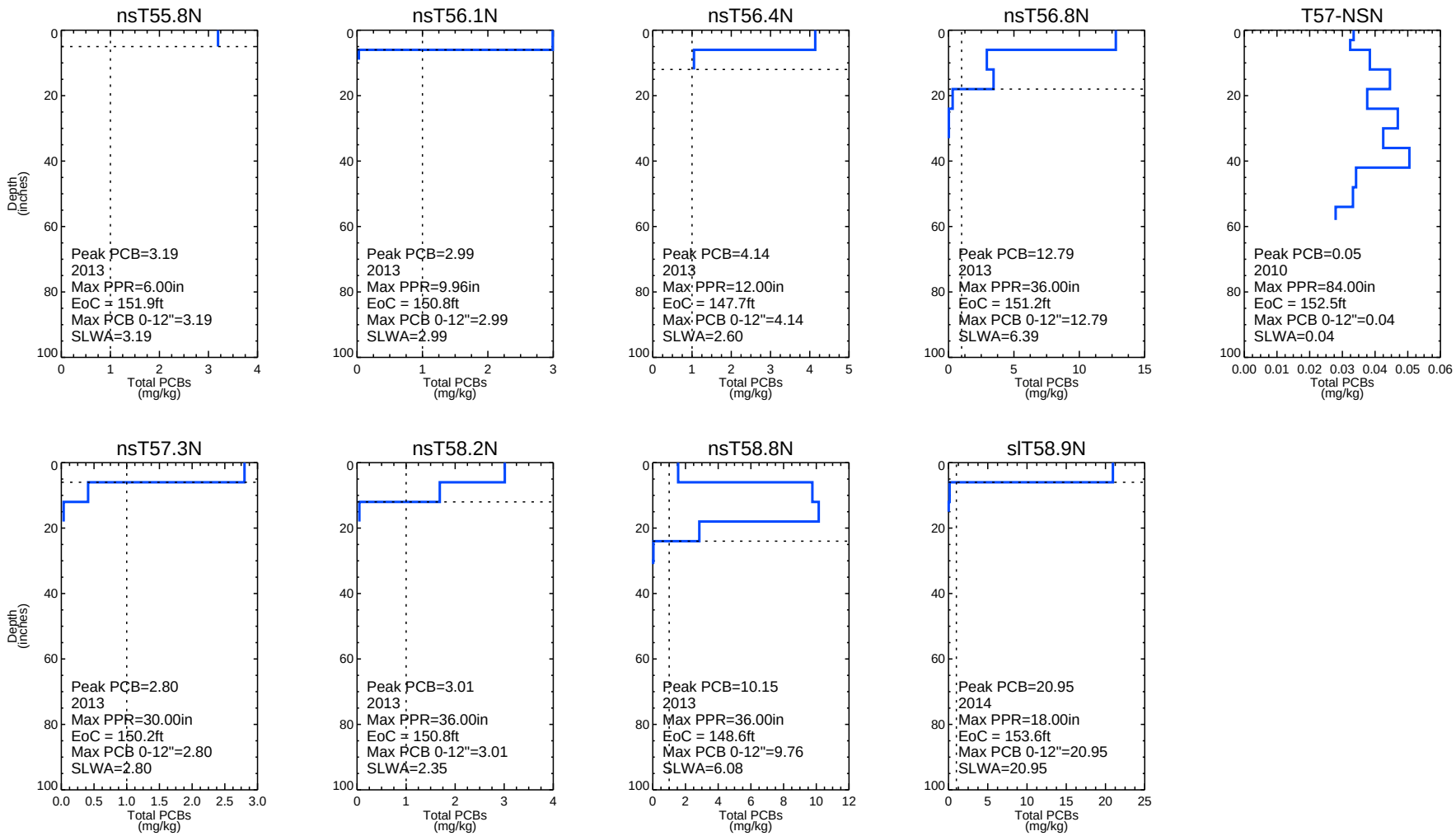
# DMU-N47




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-40**
**PCB Profiles of DMU-N47 Sediment Cores**

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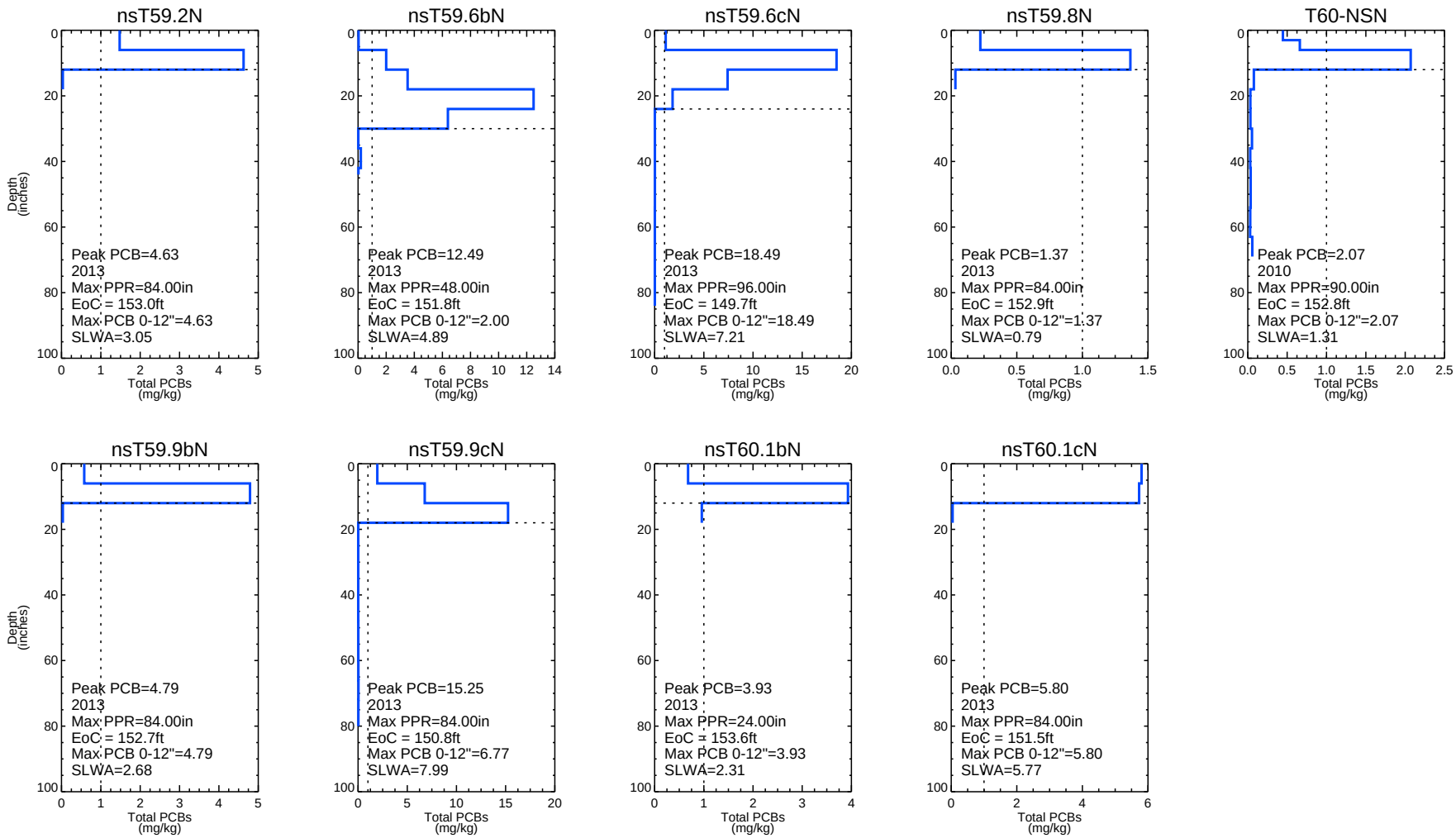
# DMU-N49




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-41**
**PCB Profiles of DMU-N49 Sediment Cores**

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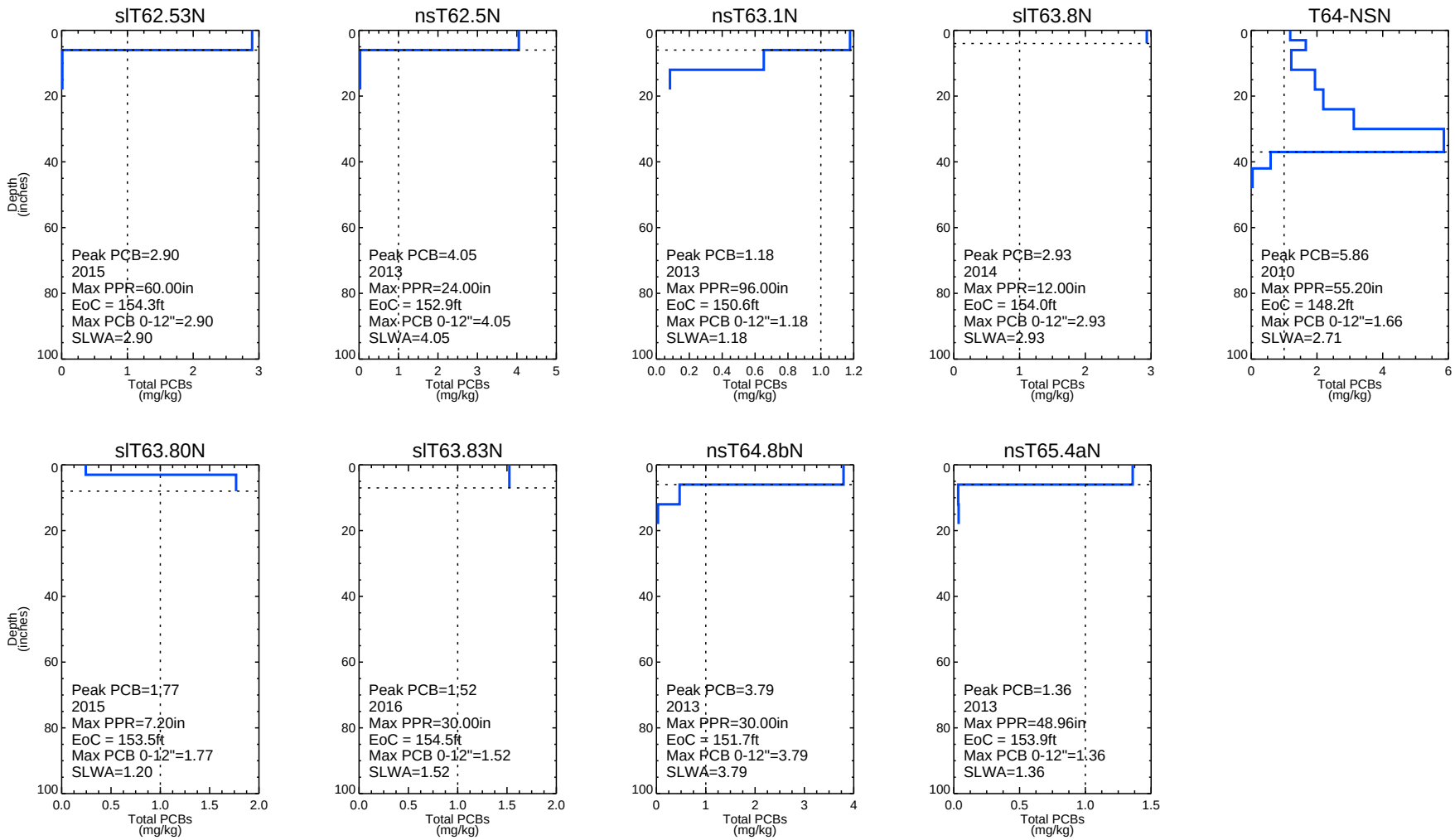
# DMU-N50




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-42**
**PCB Profiles of DMU-N50 Sediment Cores**

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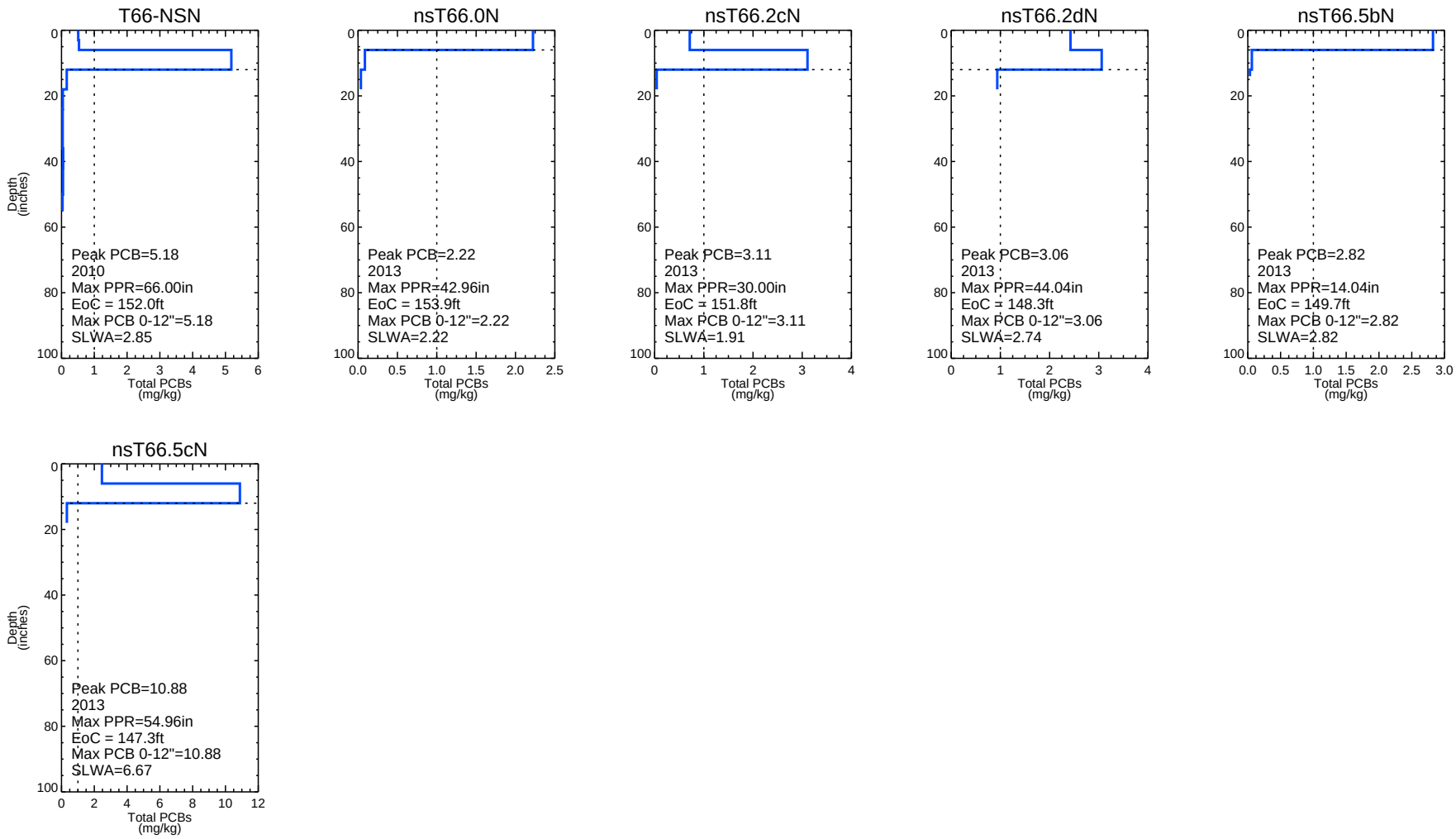
# DMU-N53




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-43**
**PCB Profiles of DMU-N53 Sediment Cores**

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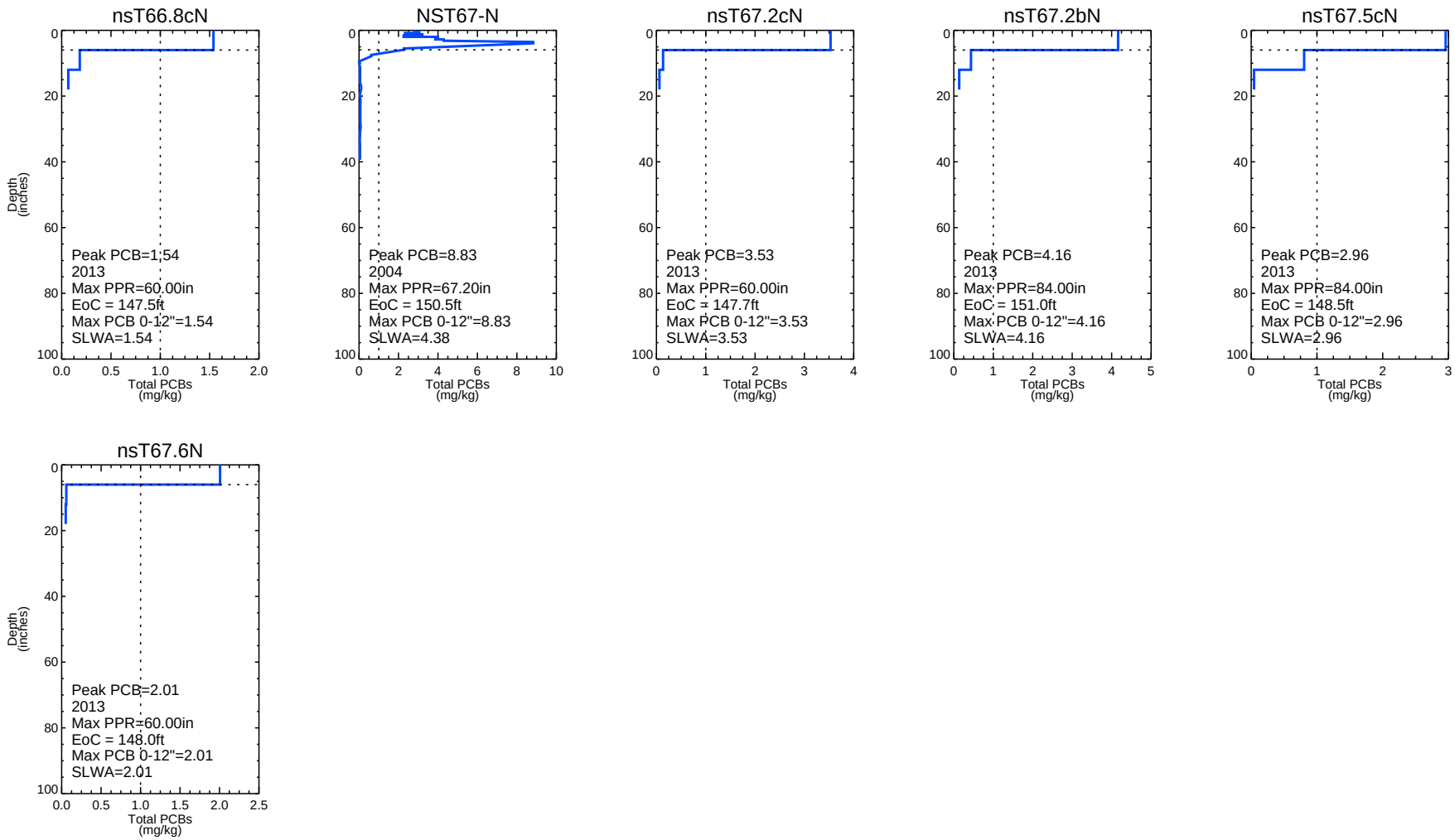
# DMU-N54




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-44**
**PCB Profiles of DMU-N54 Sediment Cores**

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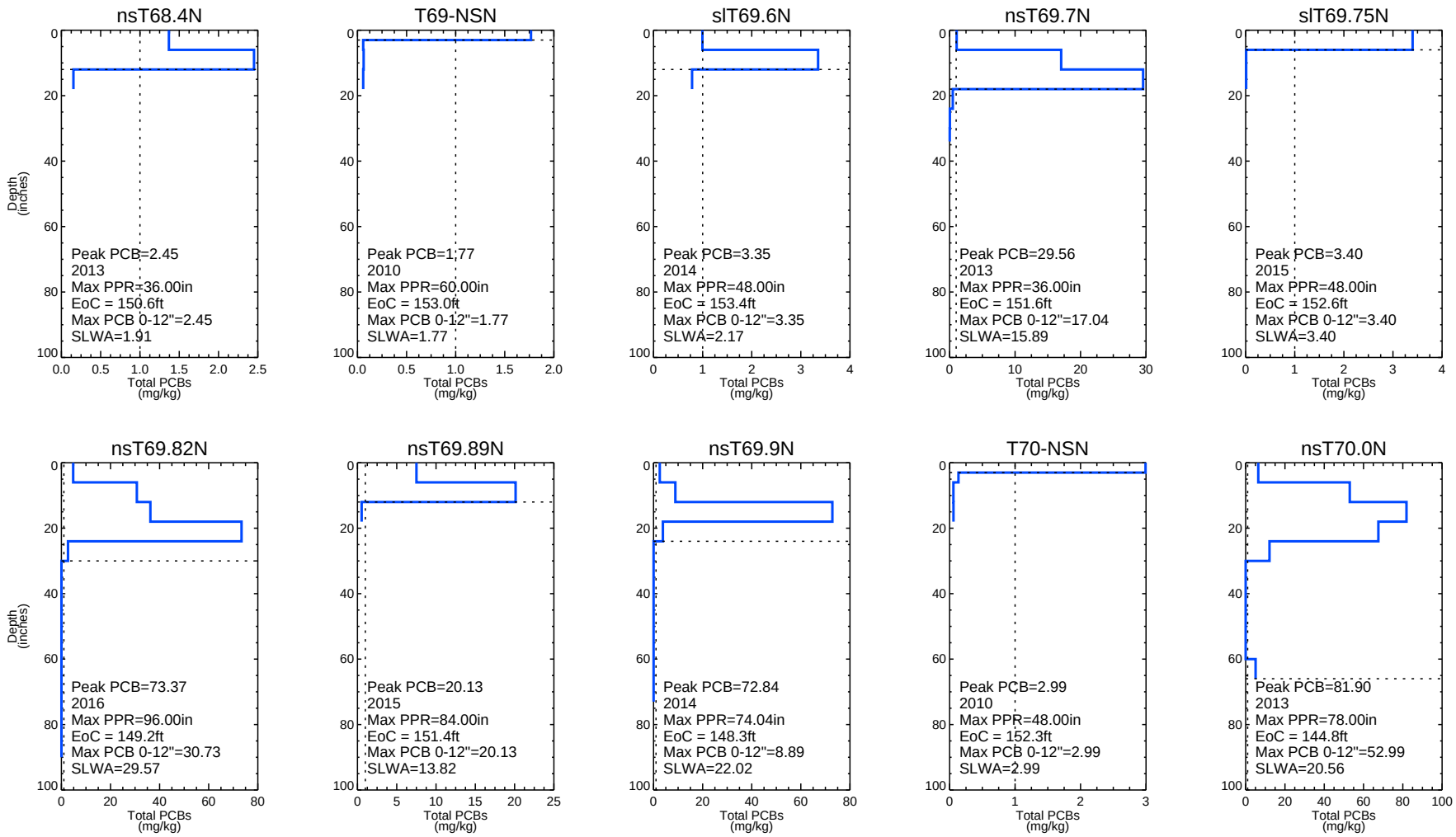
# DMU-N55




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-45**
**PCB Profiles of DMU-N55 Sediment Cores**

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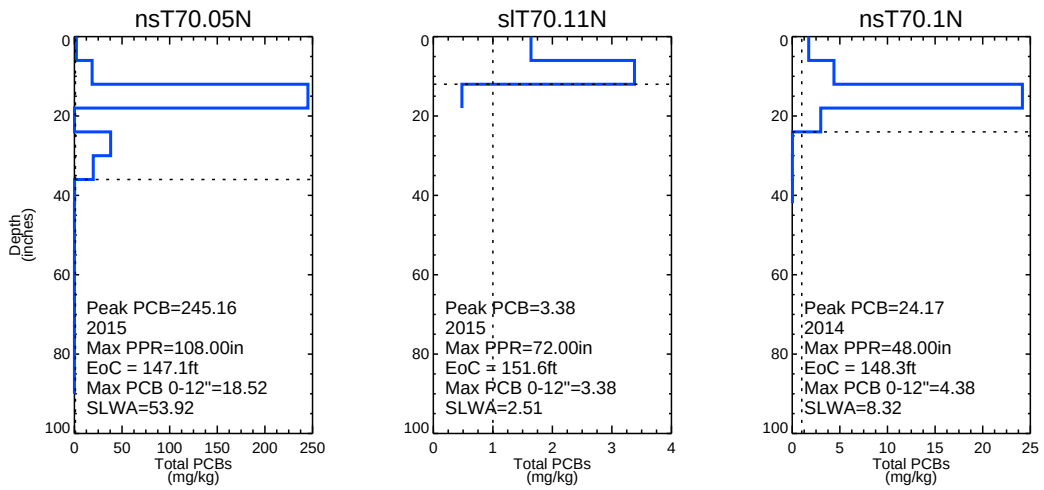
# DMU-N55




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-46**
**PCB Profiles of DMU-N55 Sediment Cores**

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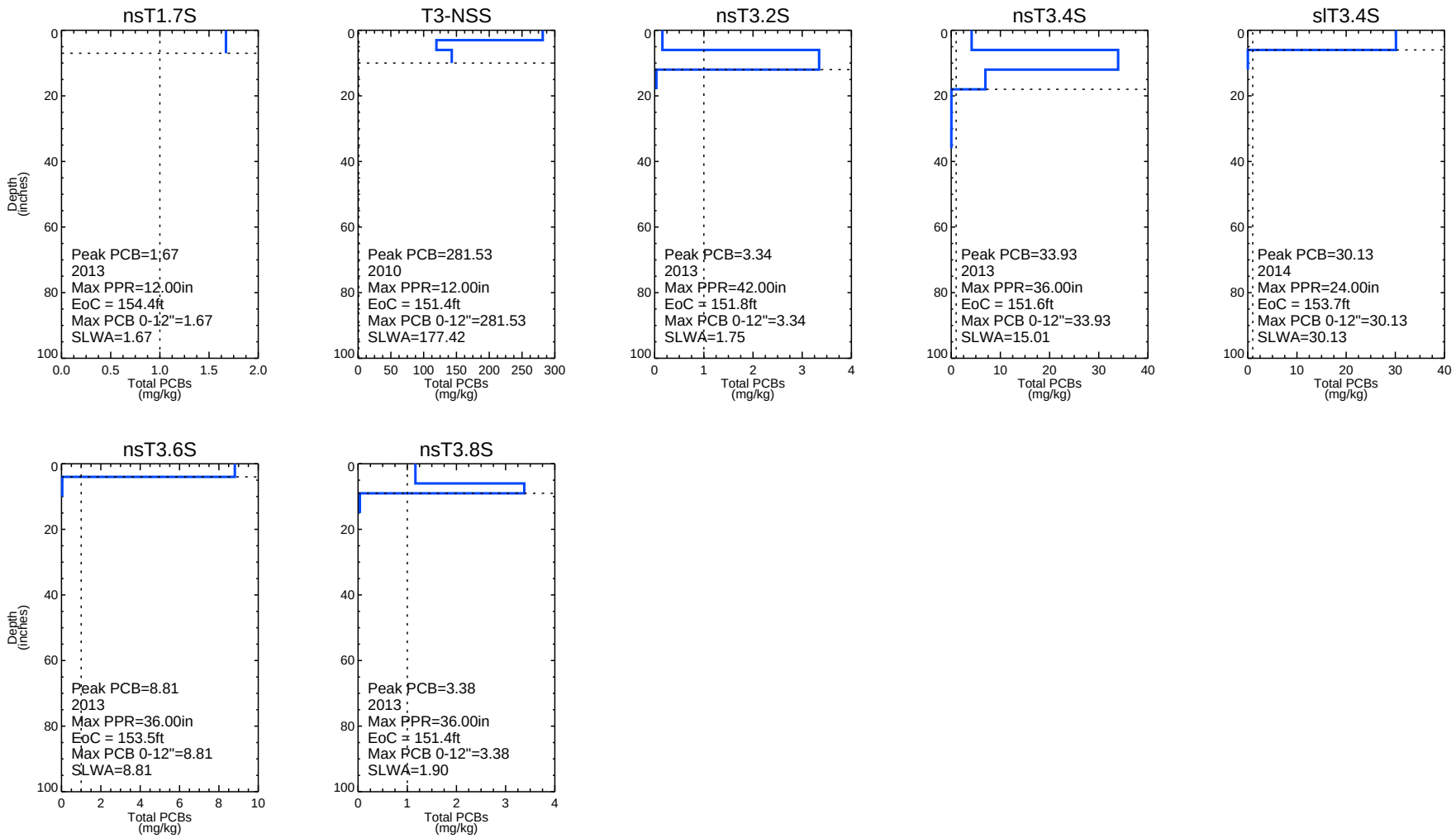
# DMU-S02




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-47**
**PCB Profiles of DMU-S02 Sediment Cores**

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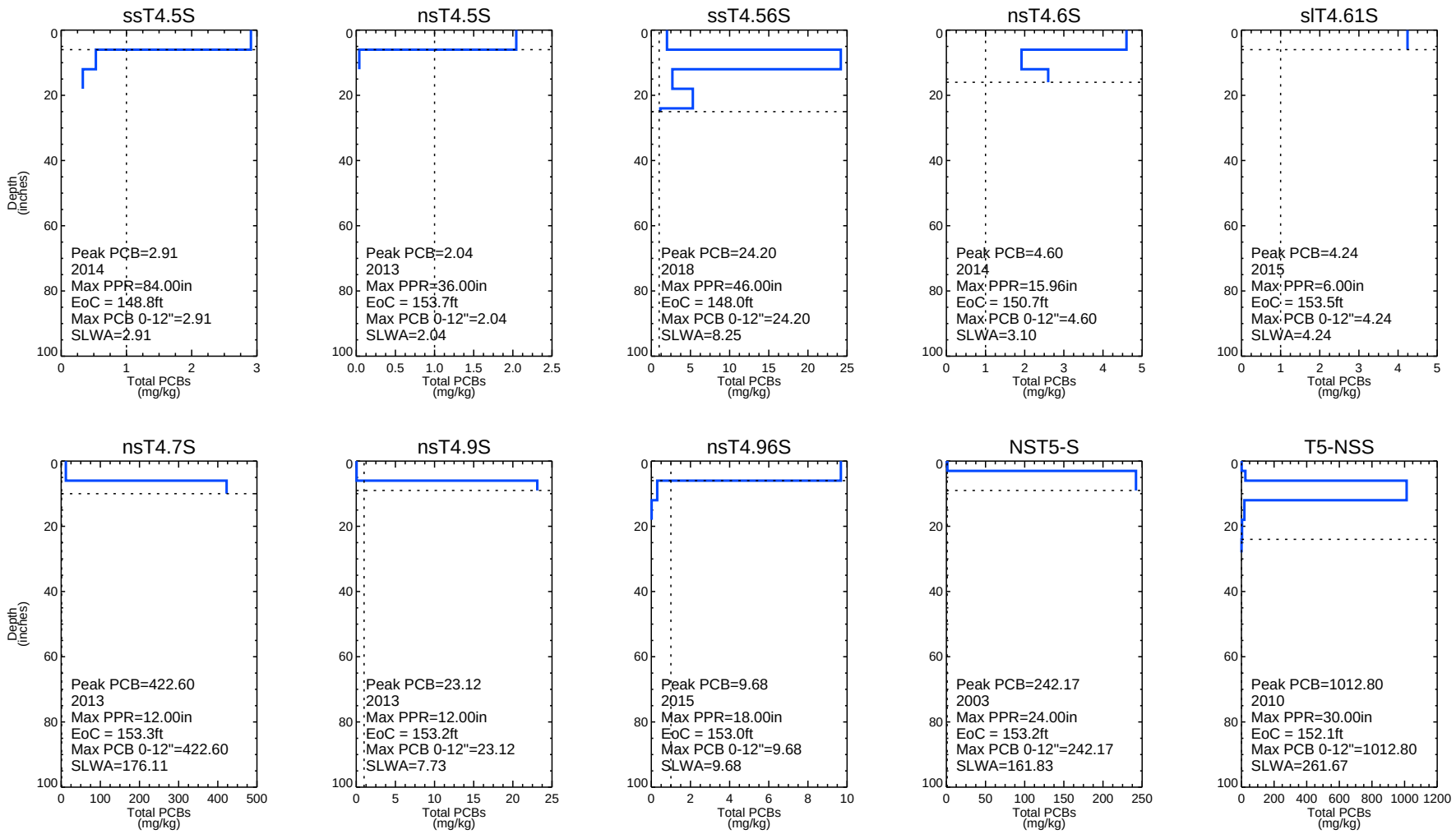
# DMU-S04




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-48**
**PCB Profiles of DMU-S04 Sediment Cores**

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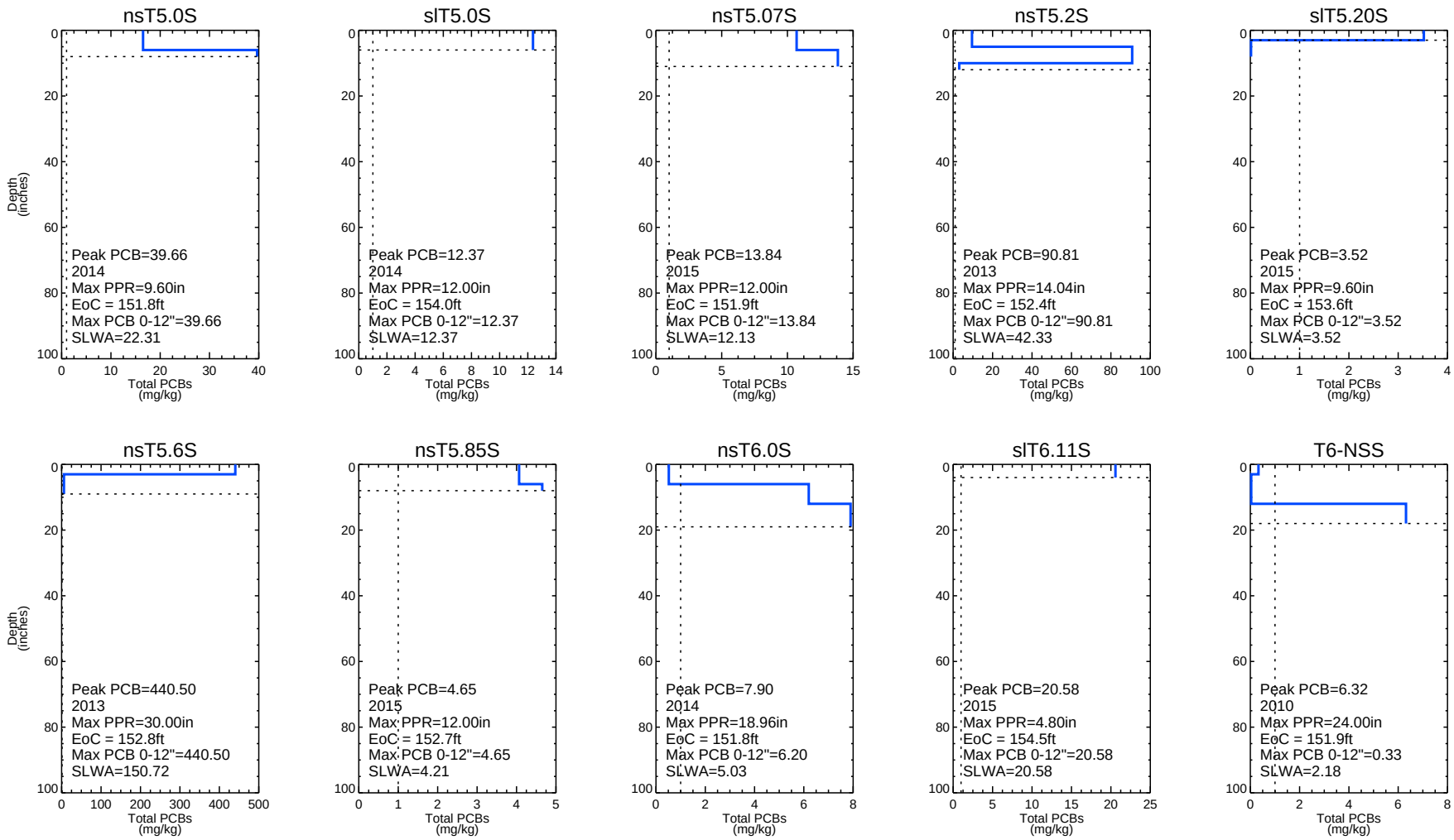
# DMU-S04




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-49**
**PCB Profiles of DMU-S04 Sediment Cores**

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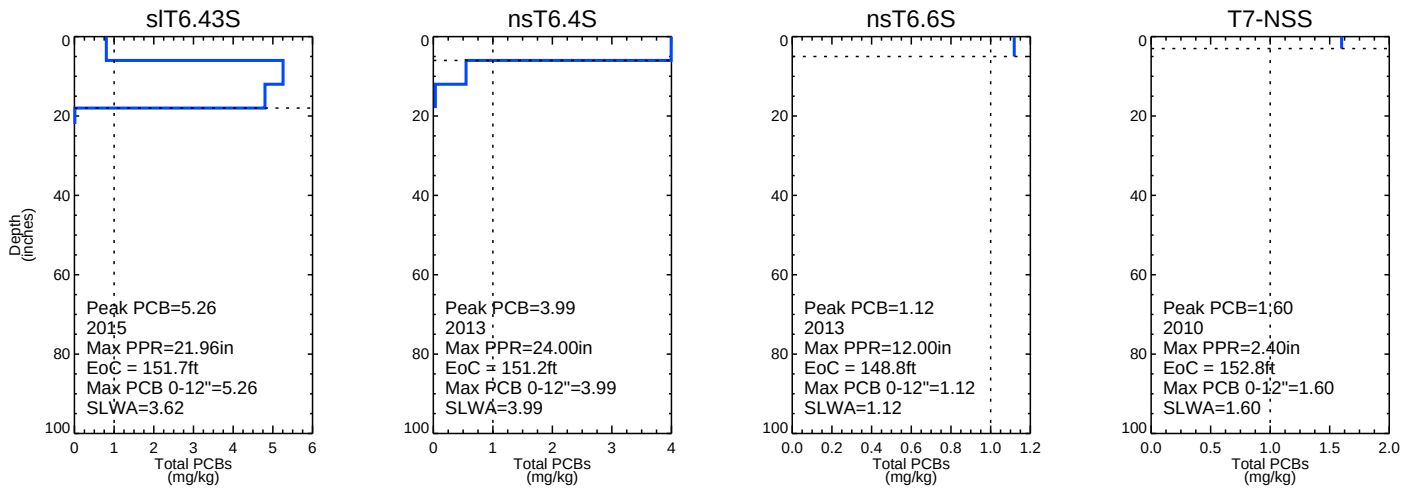
# DMU-S04




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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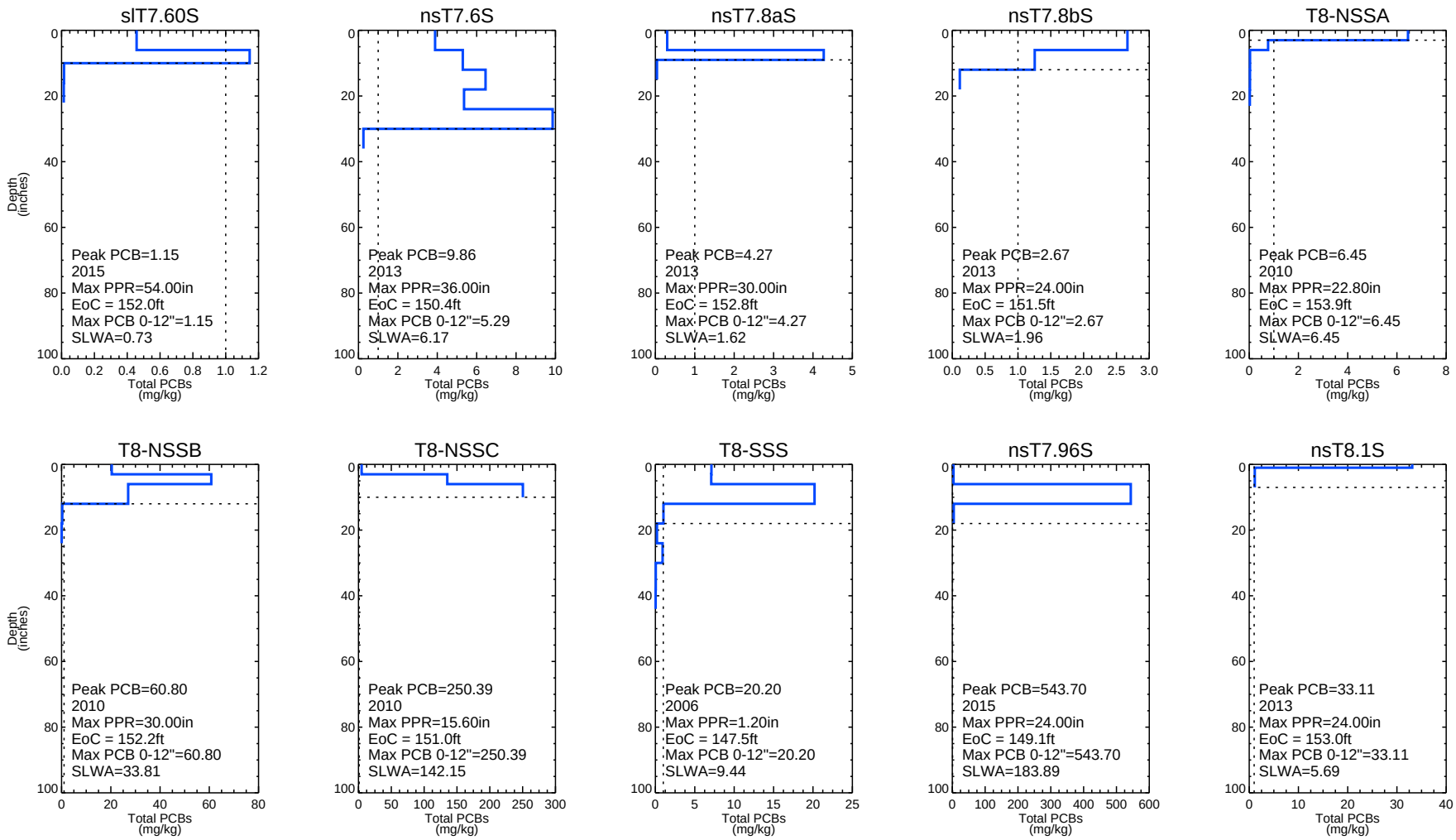
**Figure F2-50**
**PCB Profiles of DMU-S04 Sediment Cores**

# DMU-S07




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-51**
**PCB Profiles of DMU-S07 Sediment Cores**

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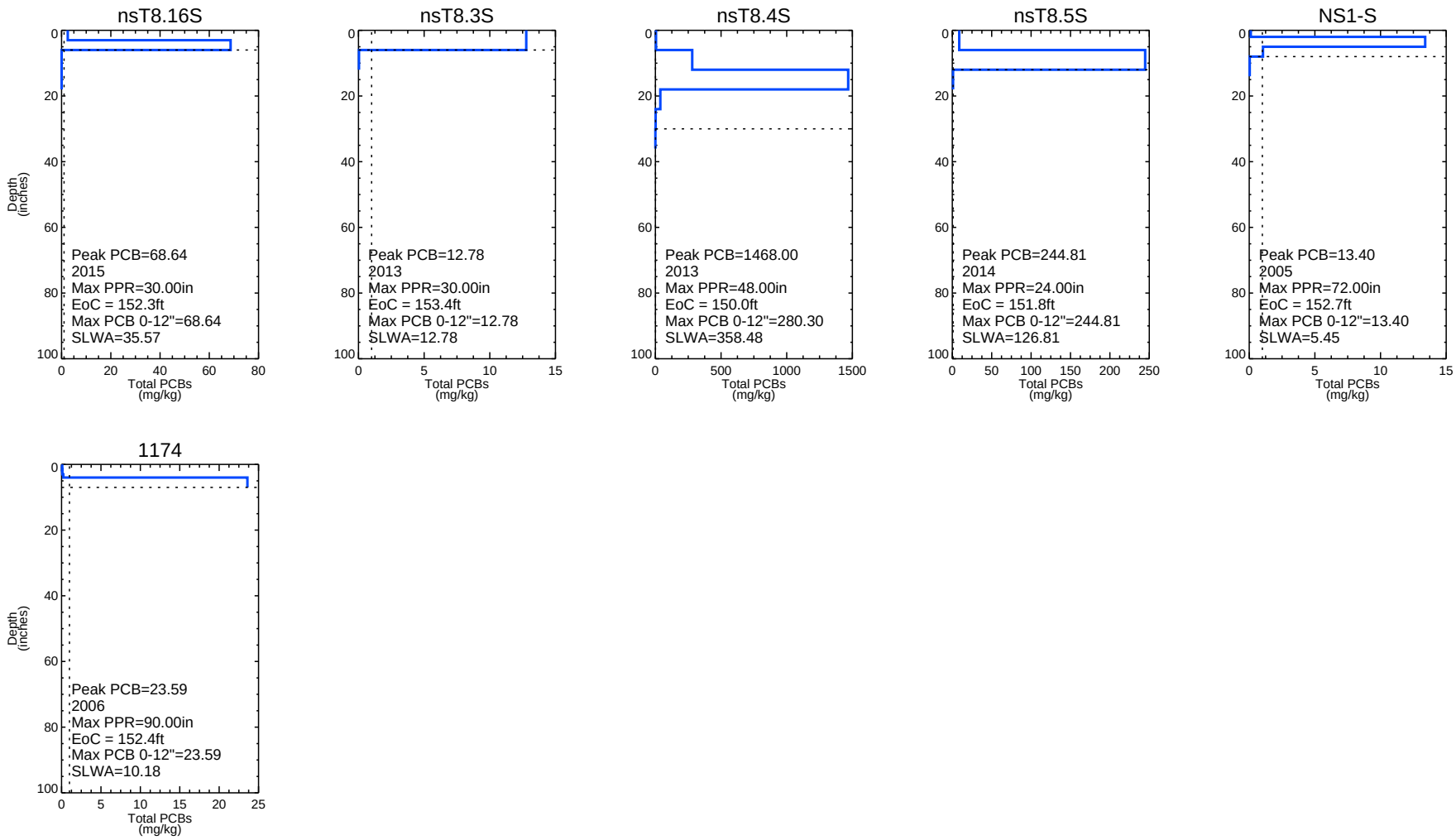
# DMU-S07




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-52**
**PCB Profiles of DMU-S07 Sediment Cores**

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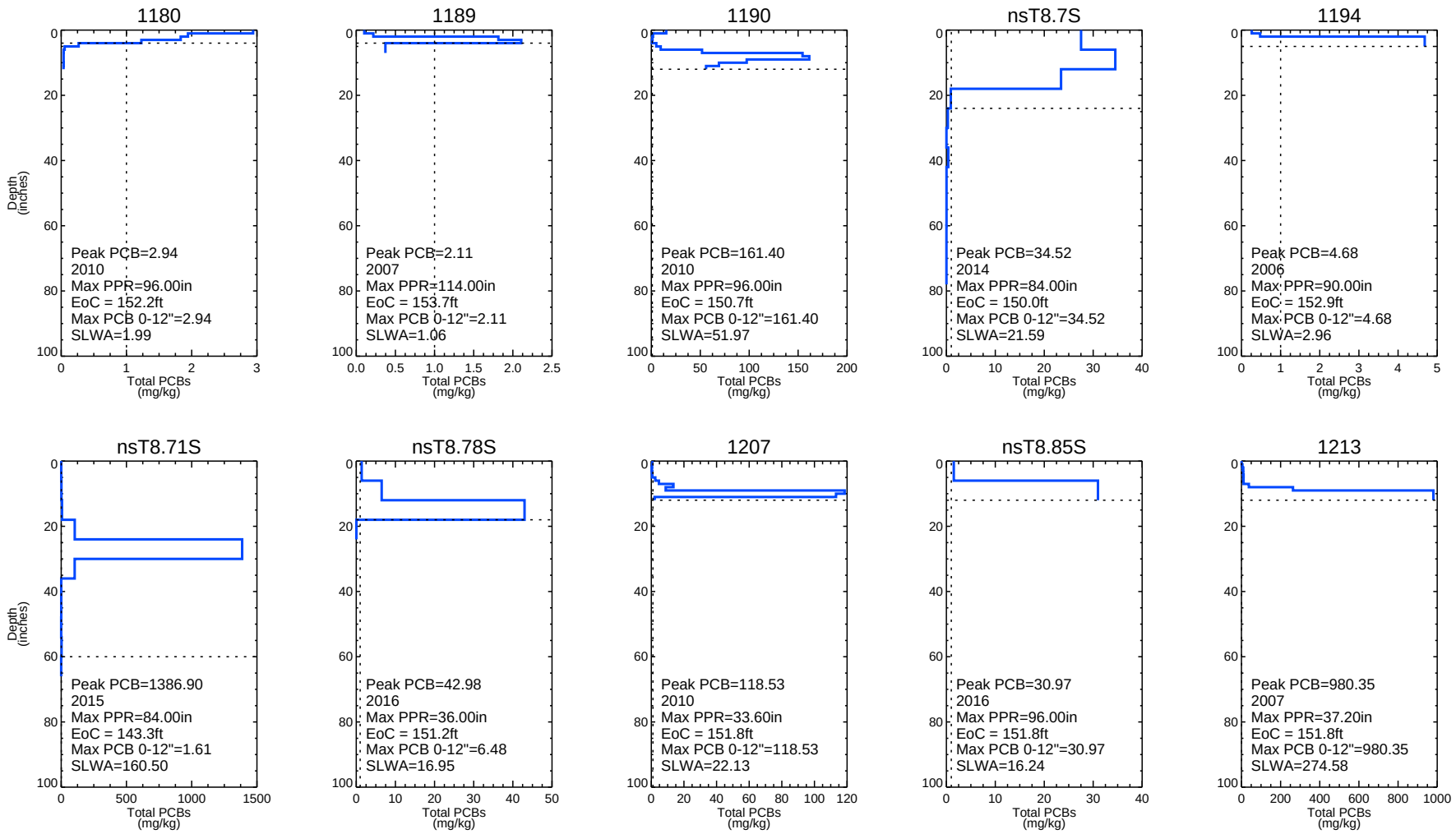
# DMU-S08




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-53**
**PCB Profiles of DMU-S08 Sediment Cores**

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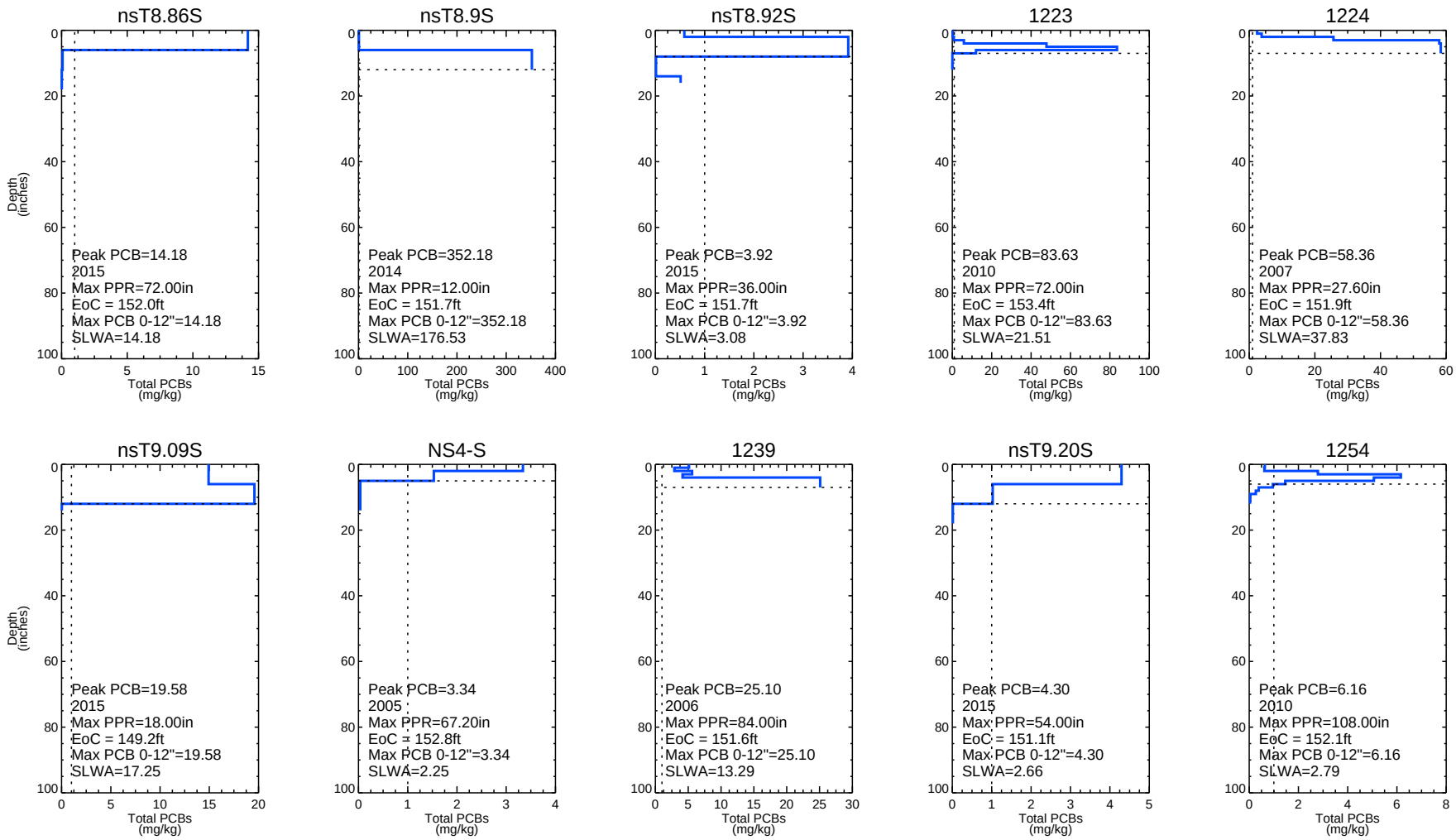
# DMU-S08




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-54**
**PCB Profiles of DMU-S08 Sediment Cores**

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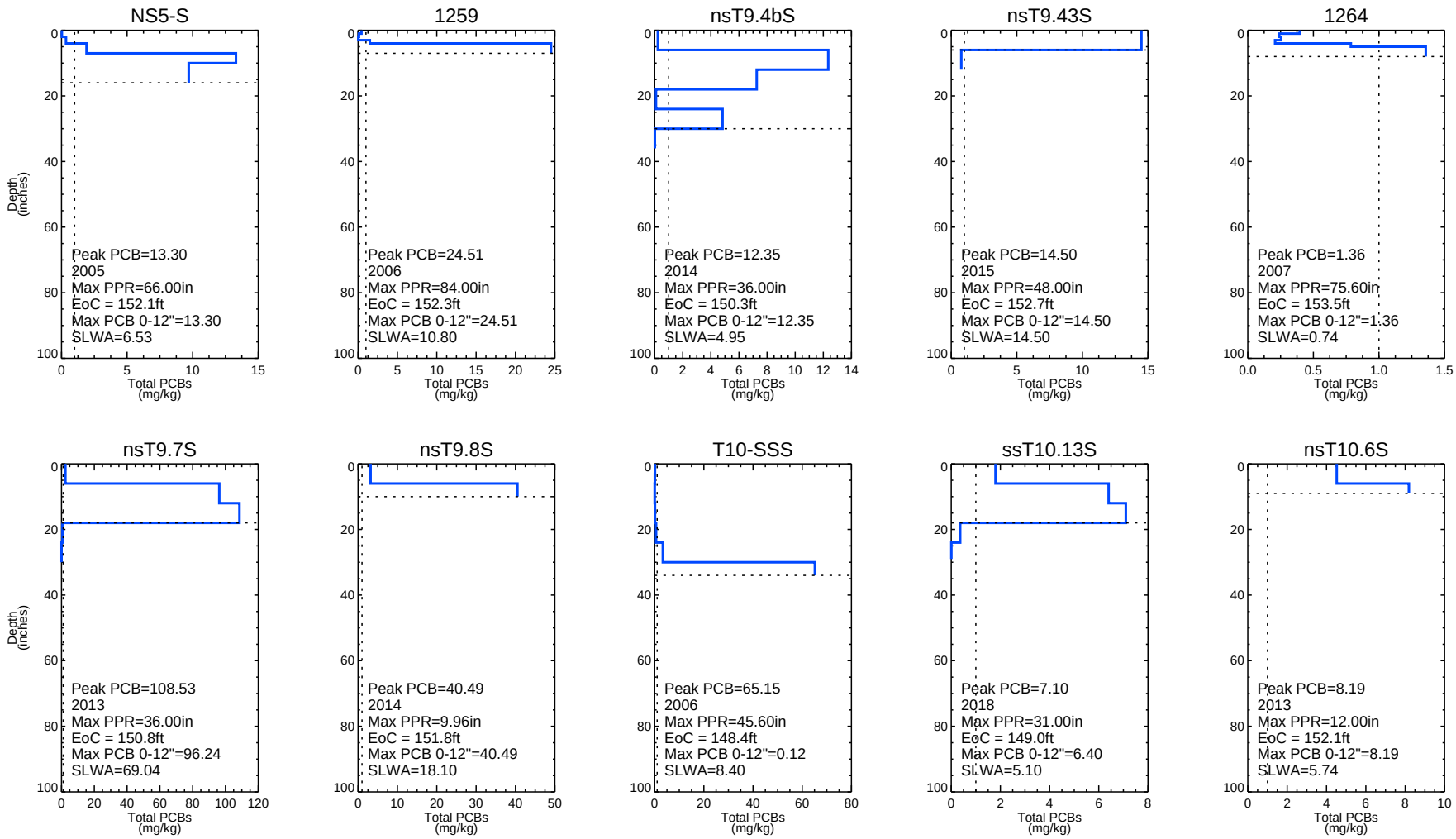
# DMU-S08




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-55**
**PCB Profiles of DMU-S08 Sediment Cores**

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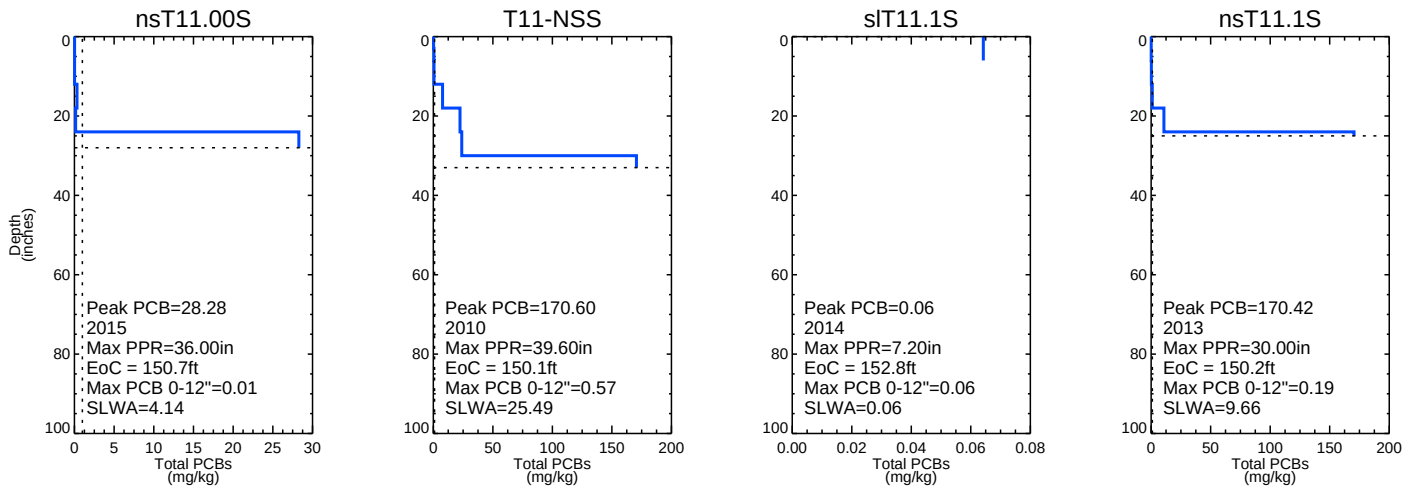
# DMU-S08




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-56**
**PCB Profiles of DMU-S08 Sediment Cores**

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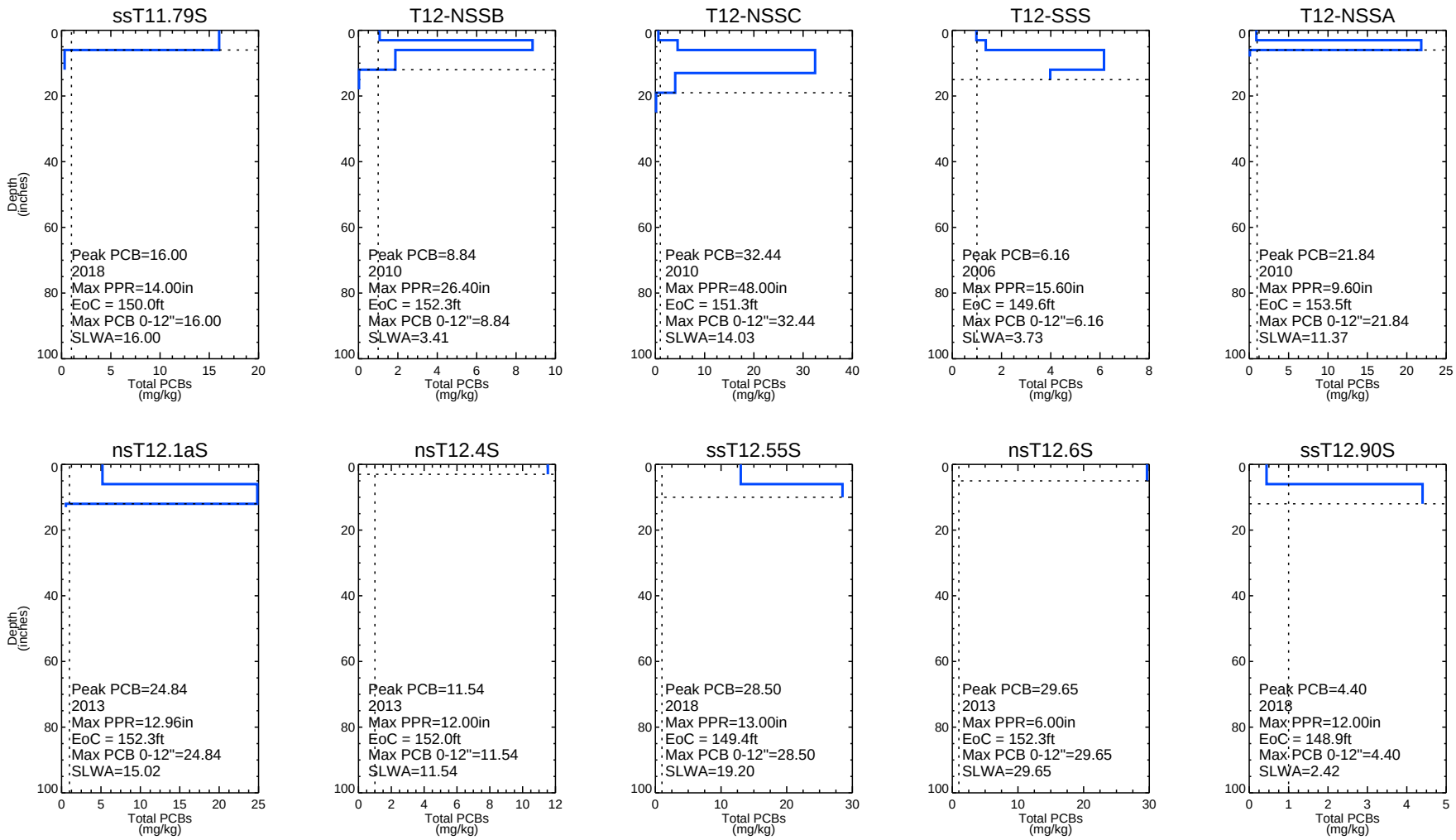
Grasse River Project/Arconic

# DMU-S10




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-57**
**PCB Profiles of DMU-S10 Sediment Cores**

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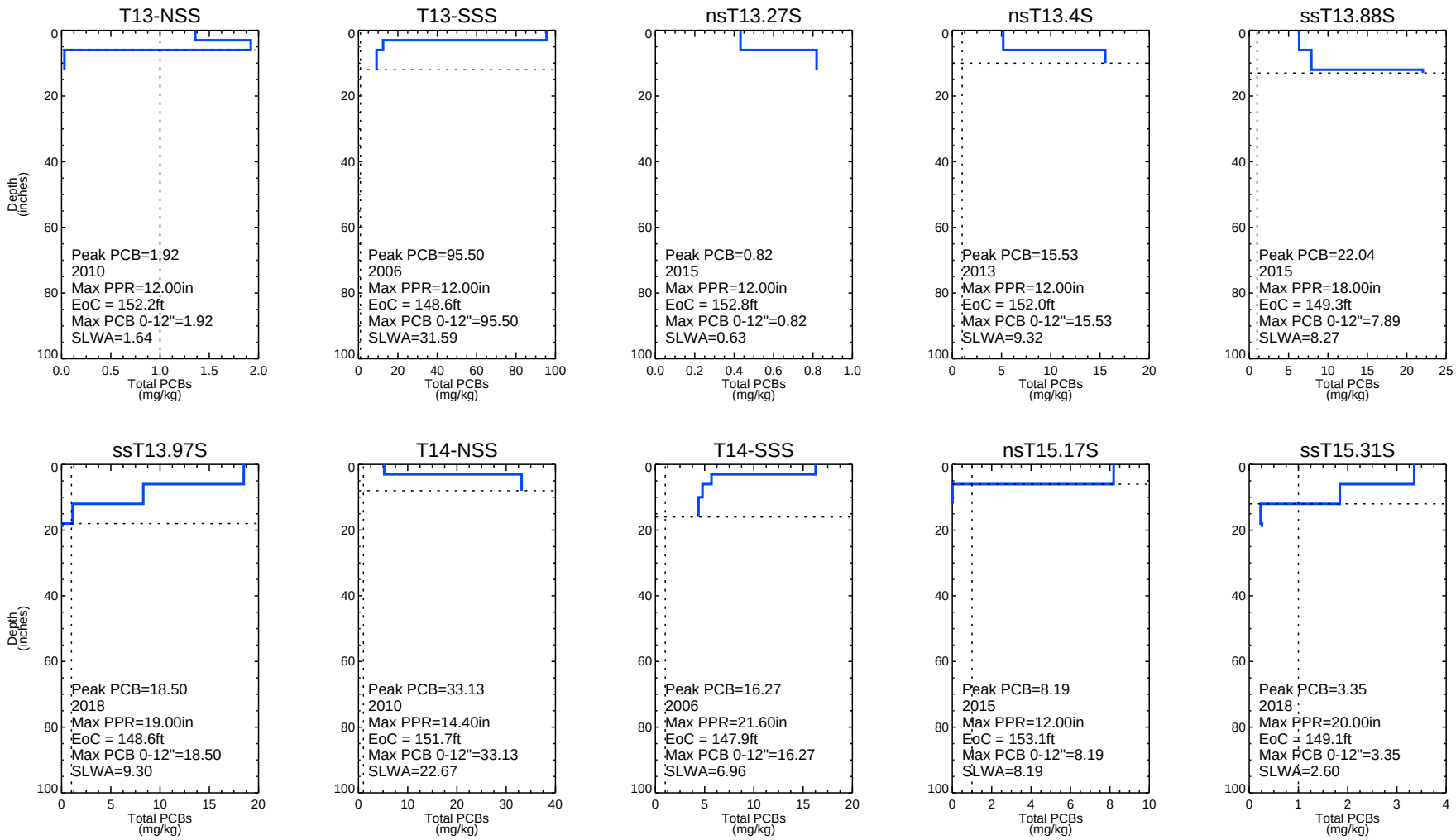
# DMU-S10




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-58**
**PCB Profiles of DMU-S10 Sediment Cores**

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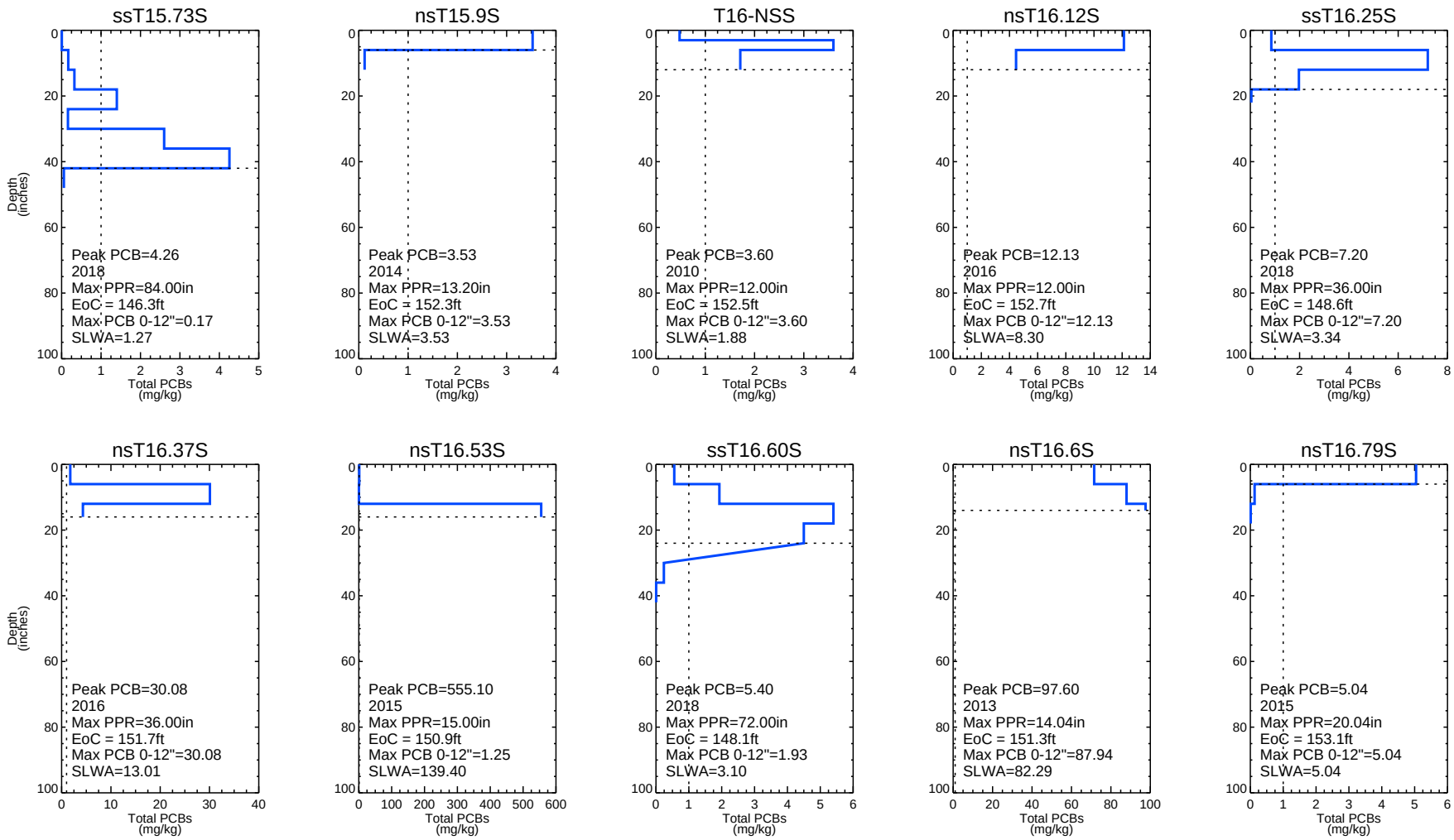
# DMU-S13




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-59**
**PCB Profiles of DMU-S13 Sediment Cores**

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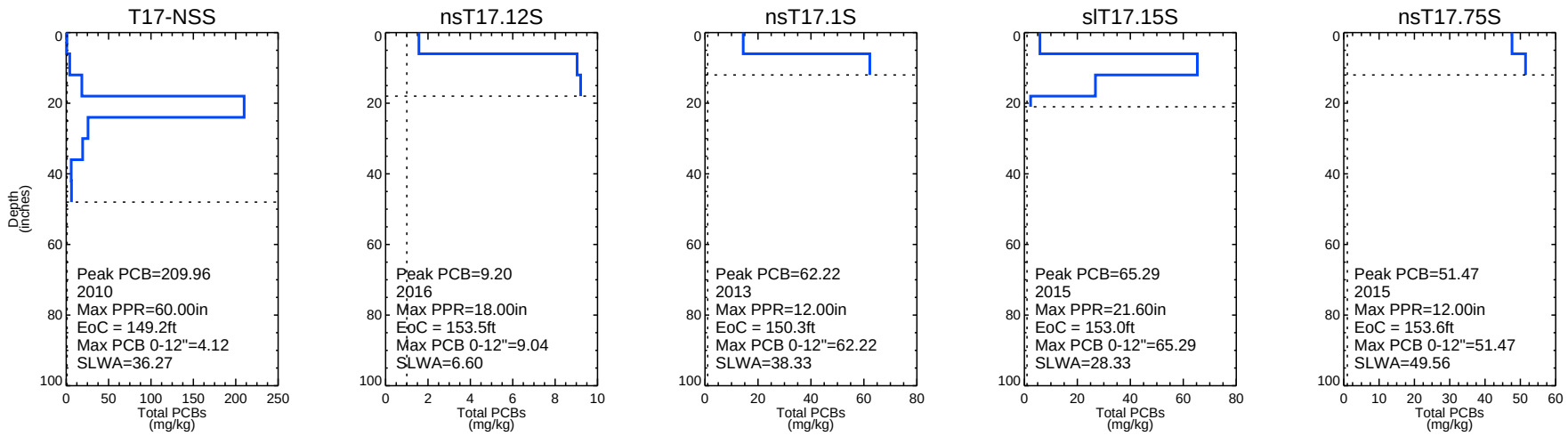
# DMU-S13




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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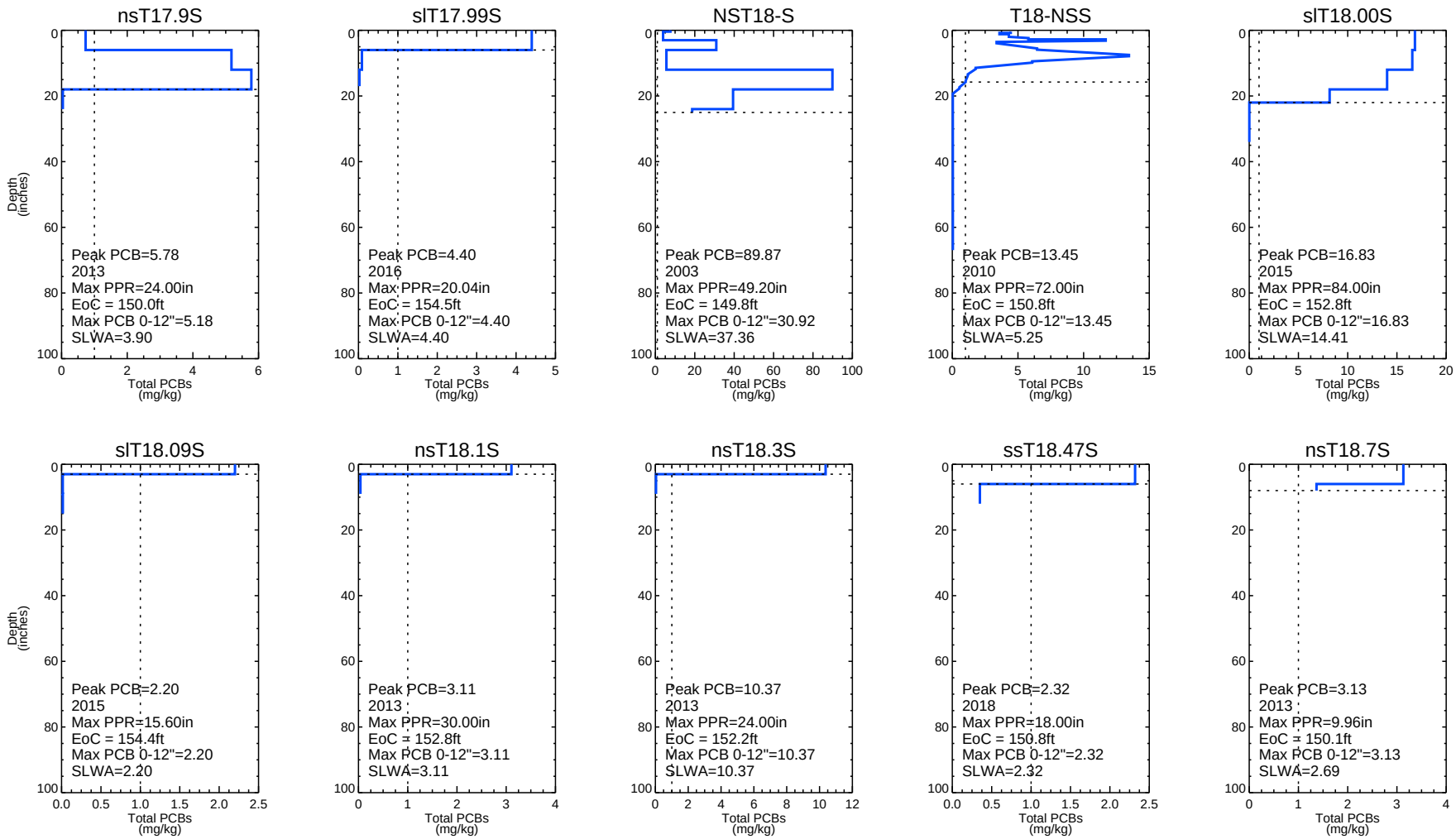
ARCONIC

**Figure F2-60**
**PCB Profiles of DMU-S13 Sediment Cores**

# DMU-S15




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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ARCONIC

**Figure F2-61**
**PCB Profiles of DMU-S15 Sediment Cores**

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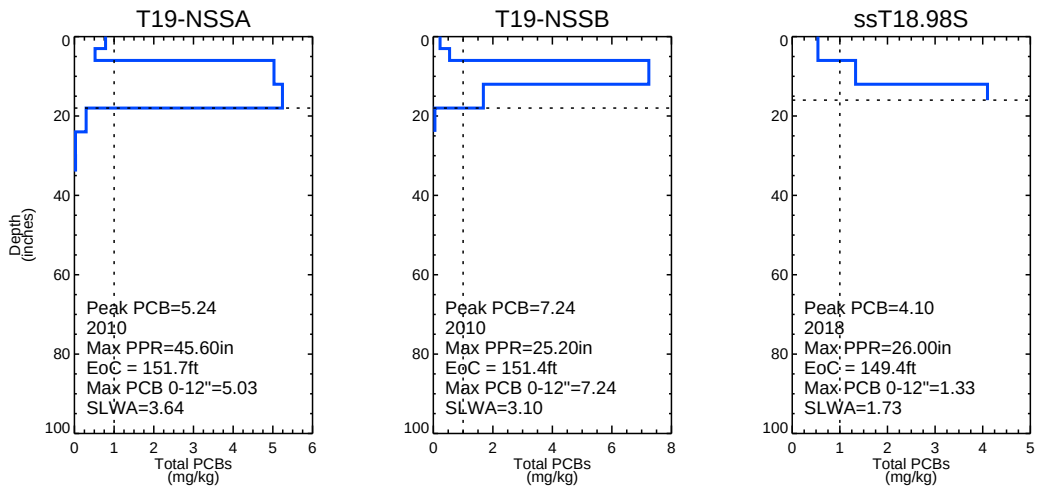
# DMU-S15




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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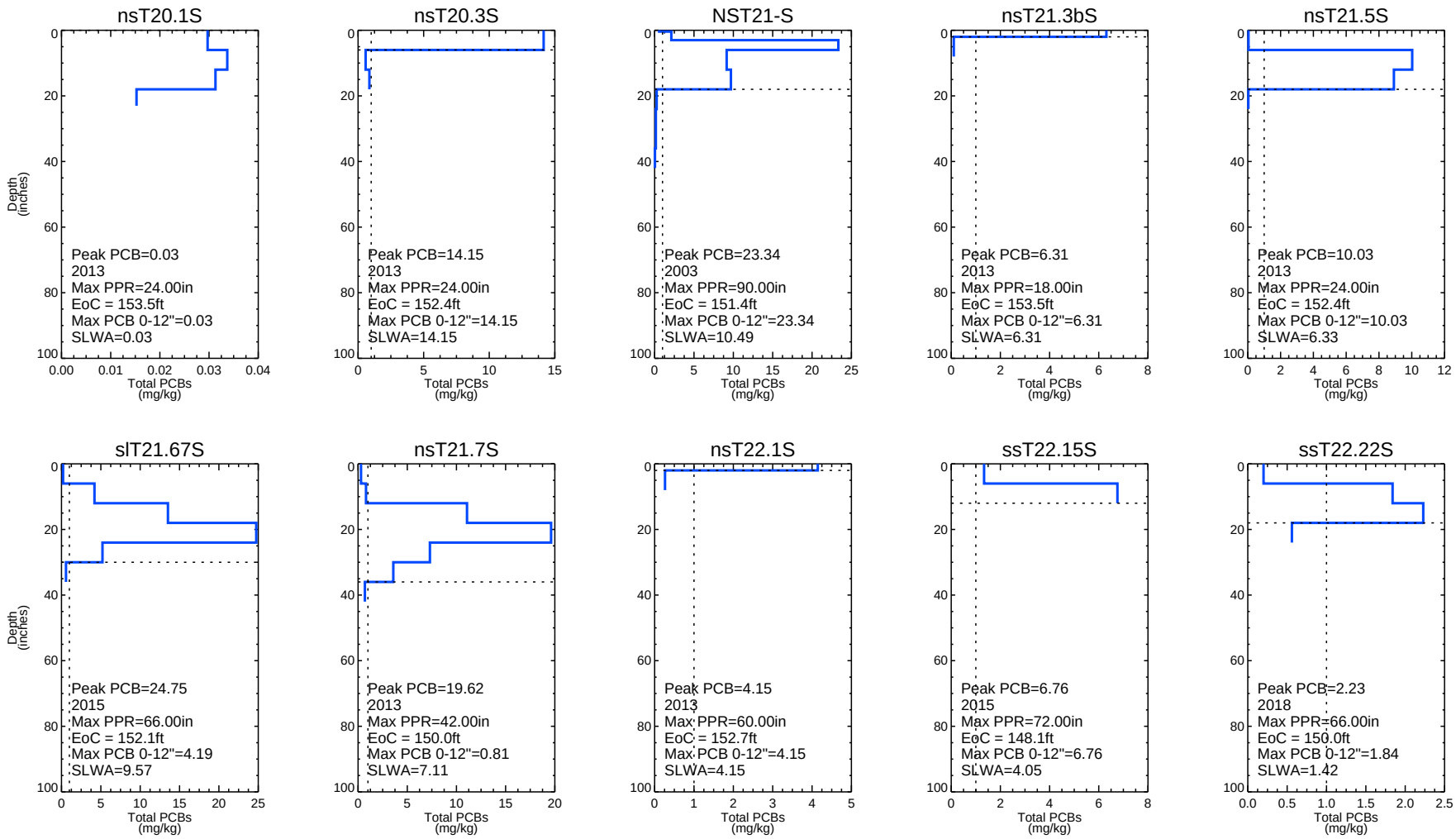
ARCONIC

**Figure F2-62**
**PCB Profiles of DMU-S15 Sediment Cores**

# DMU-S17




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-63**
**PCB Profiles of DMU-S17 Sediment Cores**

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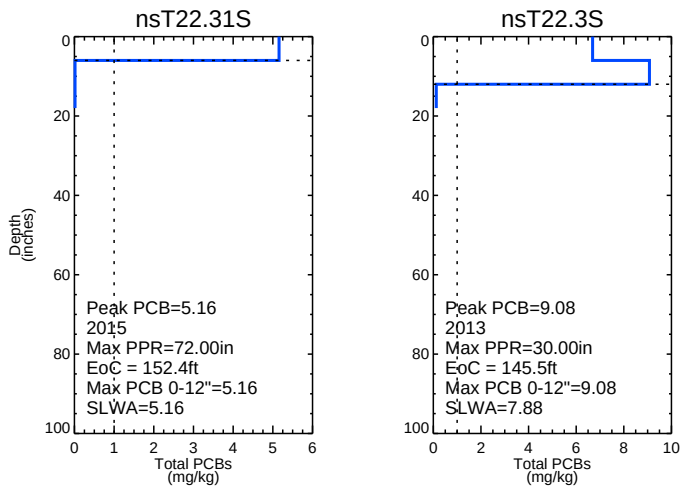
# DMU-S17




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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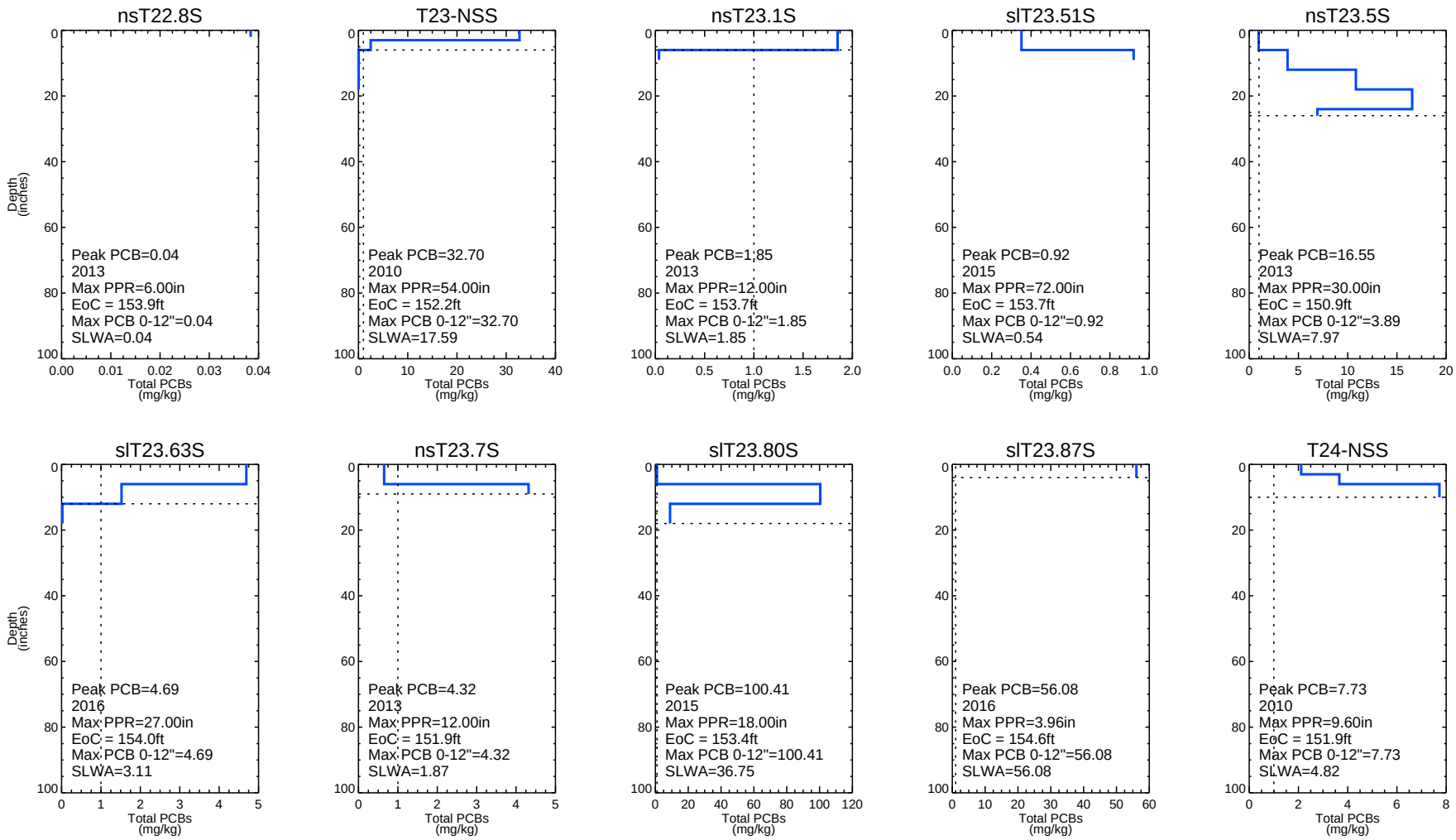
ARCONIC

**Figure F2-64**
**PCB Profiles of DMU-S17 Sediment Cores**

# DMU-S19




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-65**
**PCB Profiles of DMU-S19 Sediment Cores**

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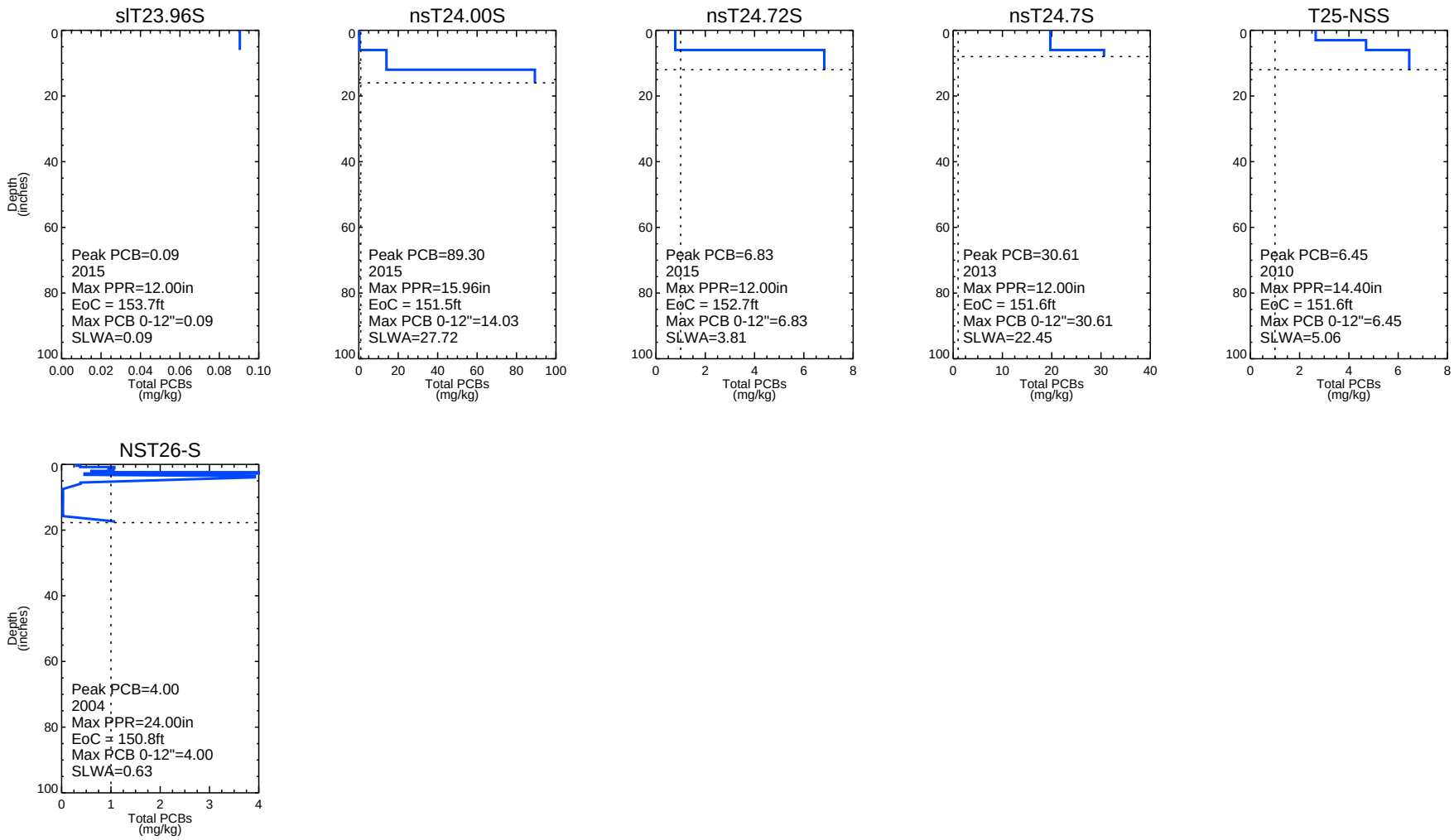
# DMU-S19




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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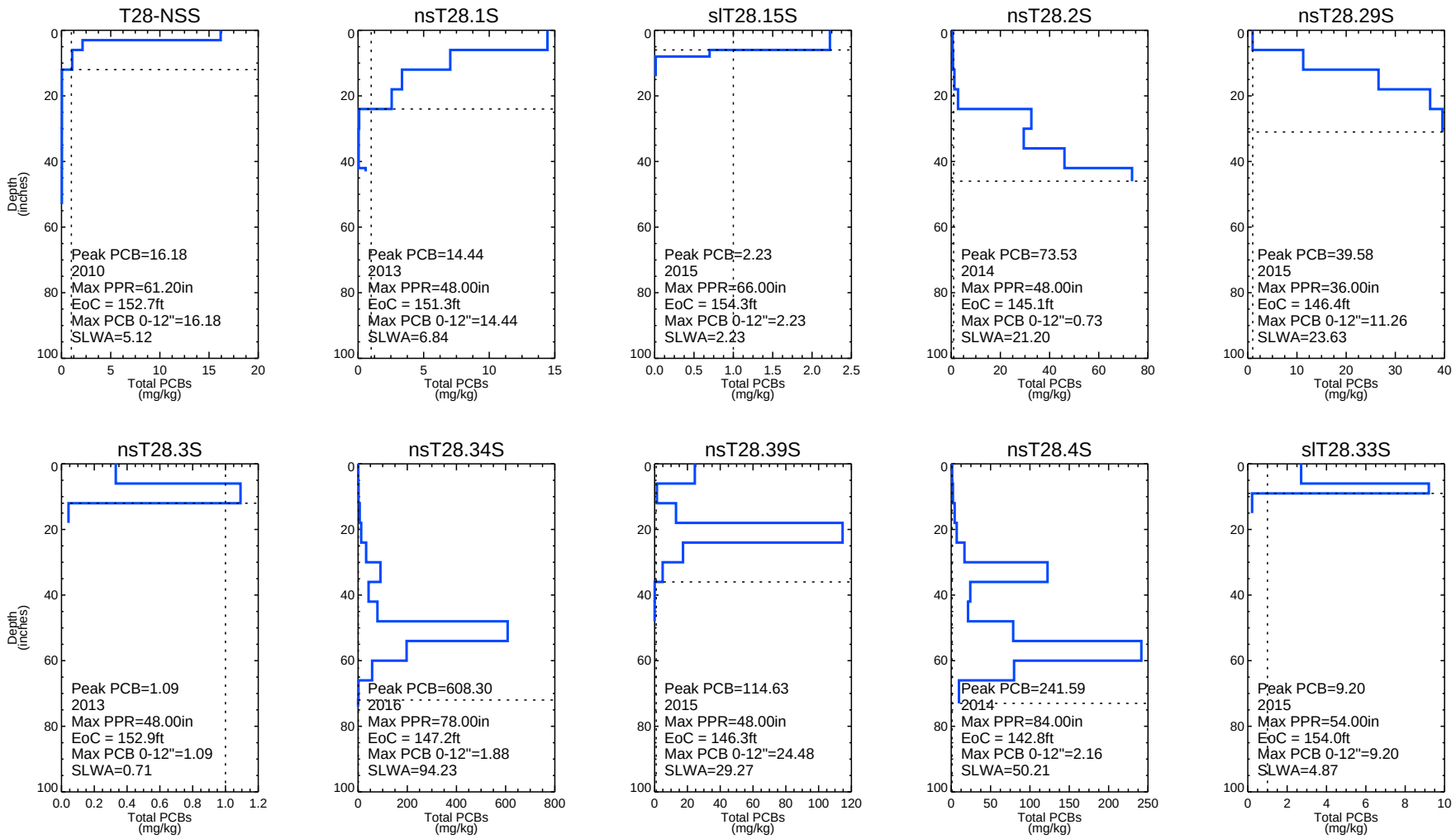
**Figure F2-66**
**PCB Profiles of DMU-S19 Sediment Cores**

# DMU-S21




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-67**
**PCB Profiles of DMU-S21 Sediment Cores**

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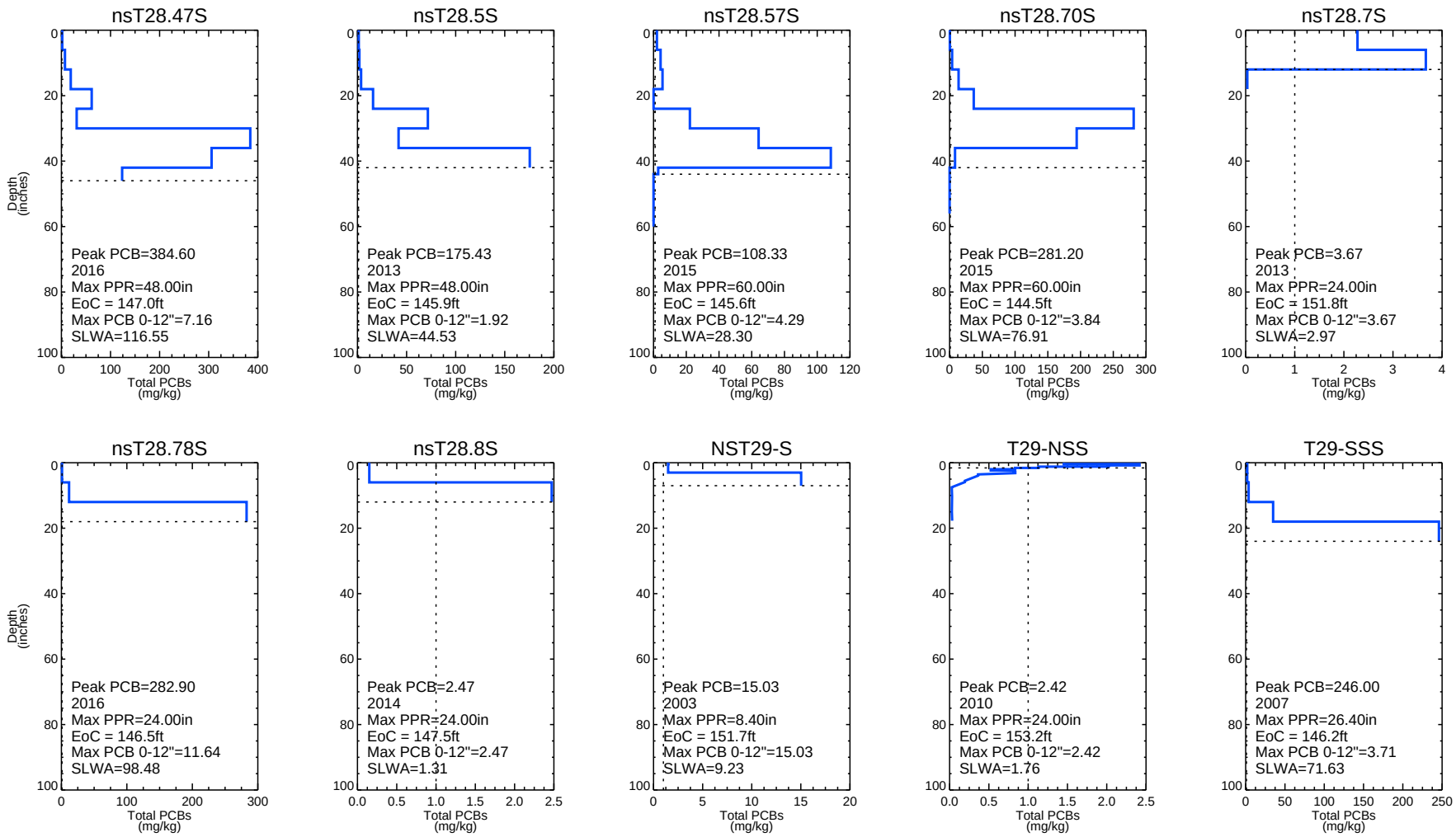
# DMU-S21




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-68**
**PCB Profiles of DMU-S21 Sediment Cores**

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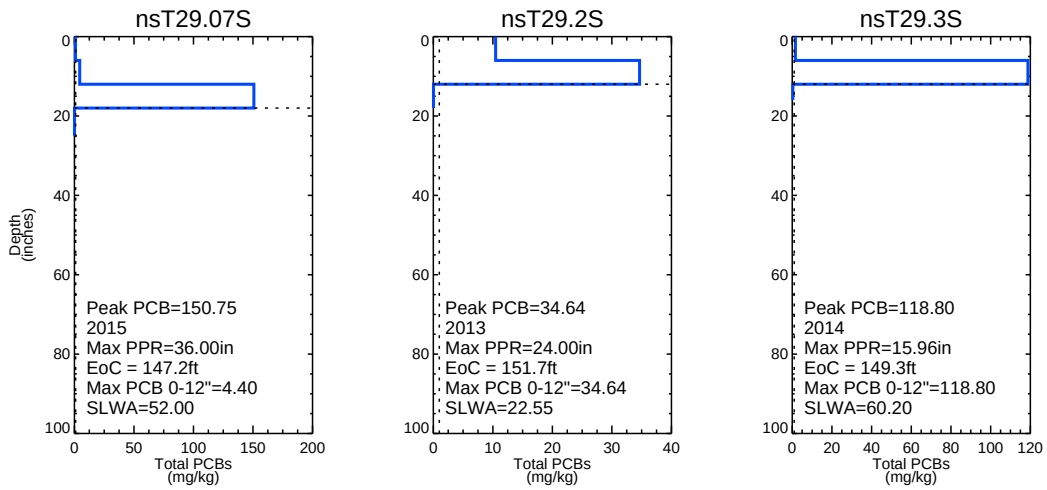
# DMU-S21




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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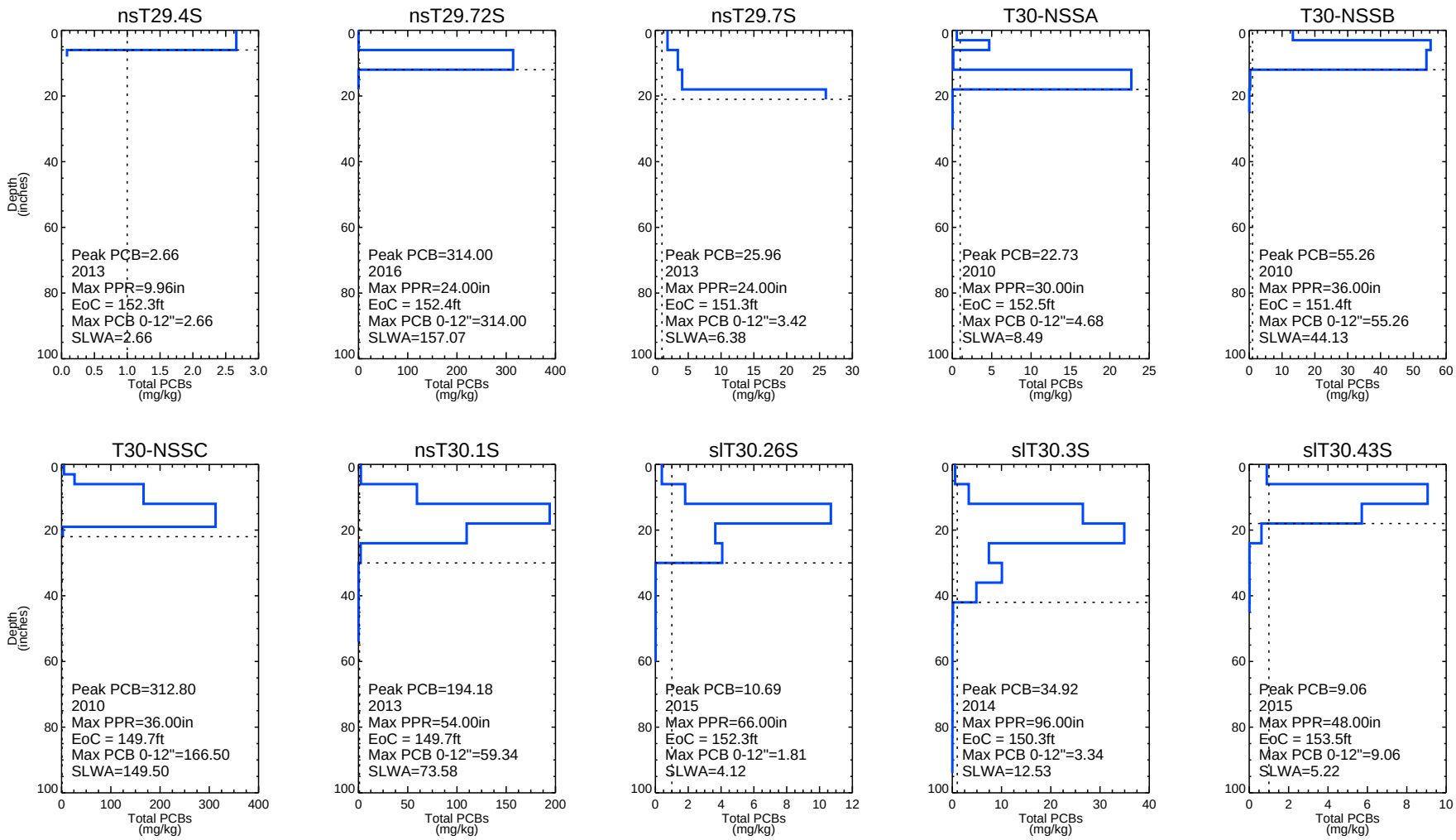
**Figure F2-69**
**PCB Profiles of DMU-S21 Sediment Cores**

# DMU-S23




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-70**
**PCB Profiles of DMU-S23 Sediment Cores**

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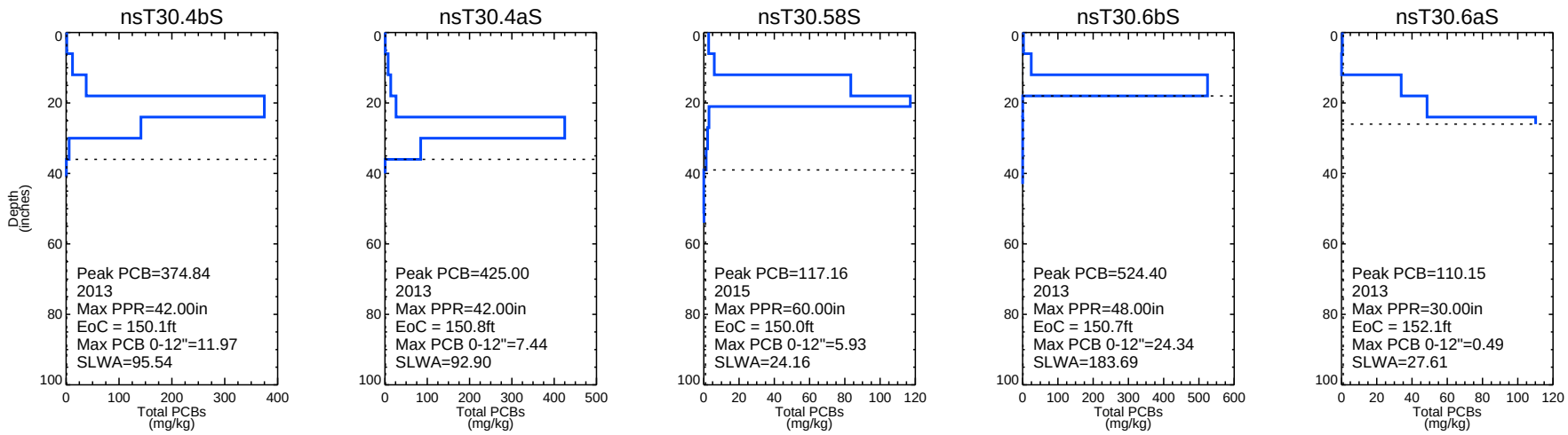
# DMU-S23




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-71**
**PCB Profiles of DMU-S23 Sediment Cores**

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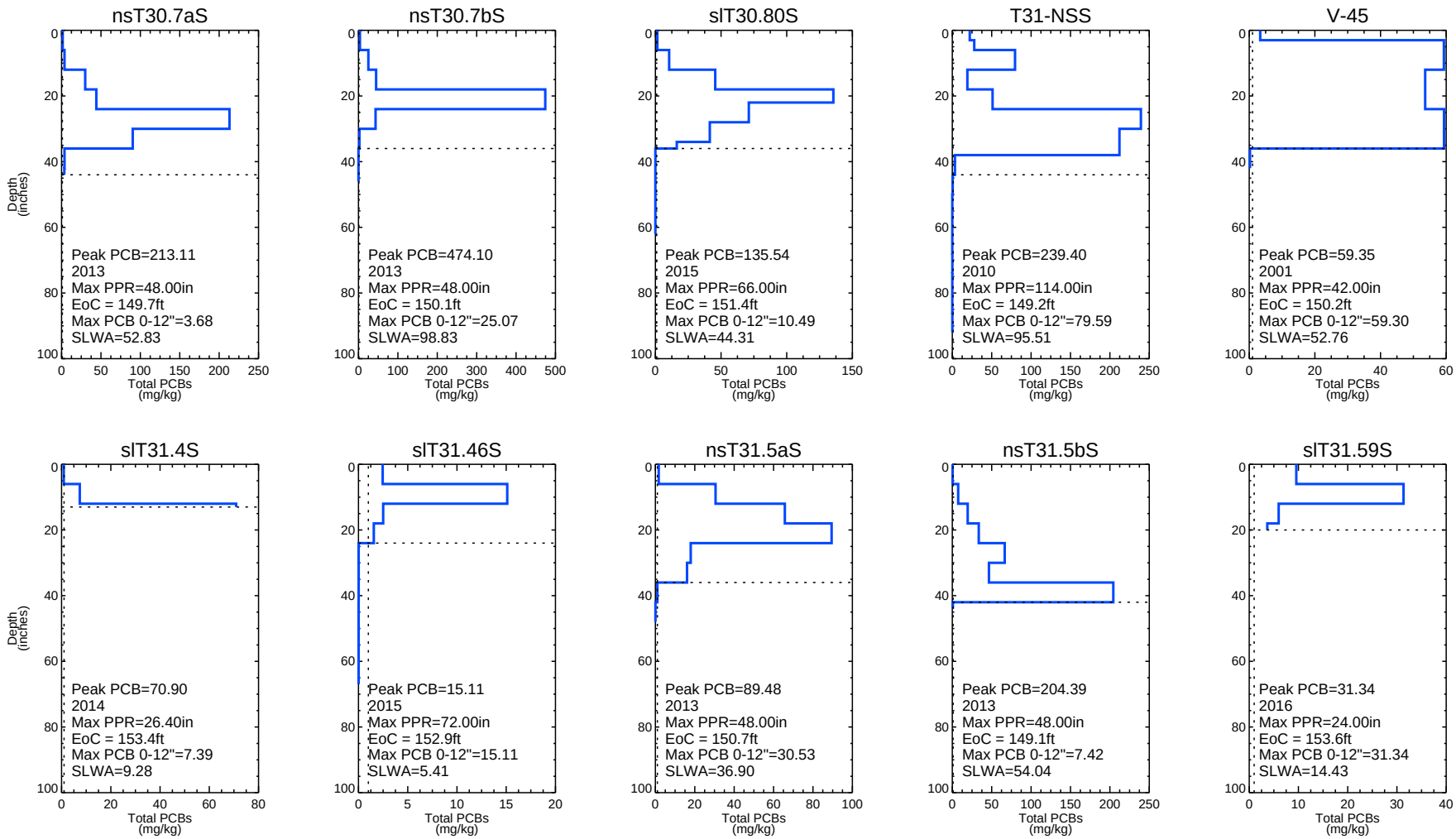
# DMU-S25




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-72**
**PCB Profiles of DMU-S25 Sediment Cores**

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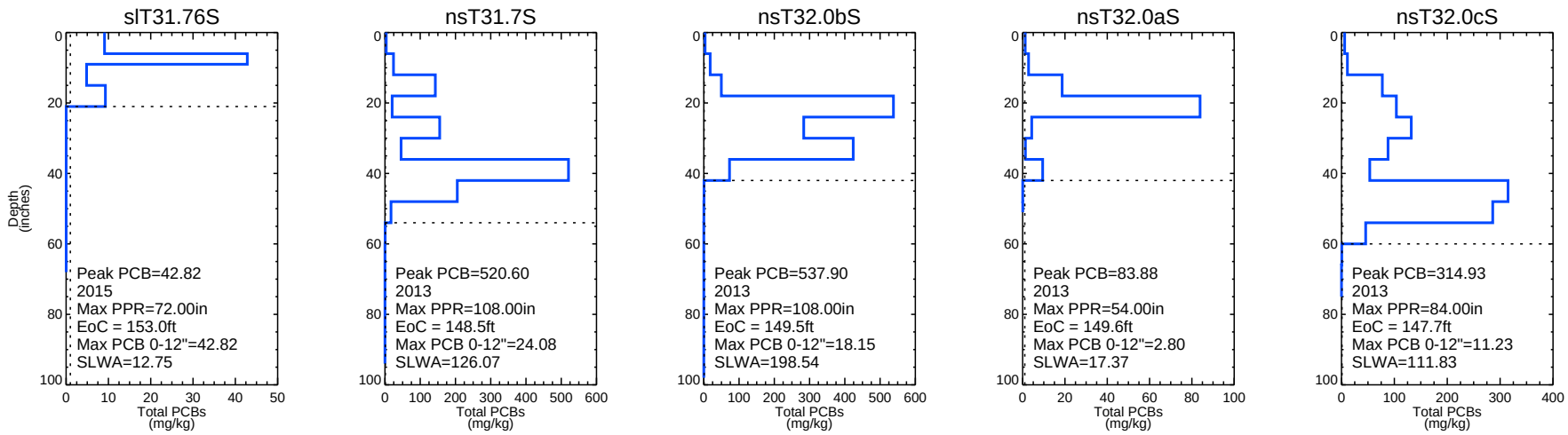
# DMU-S26




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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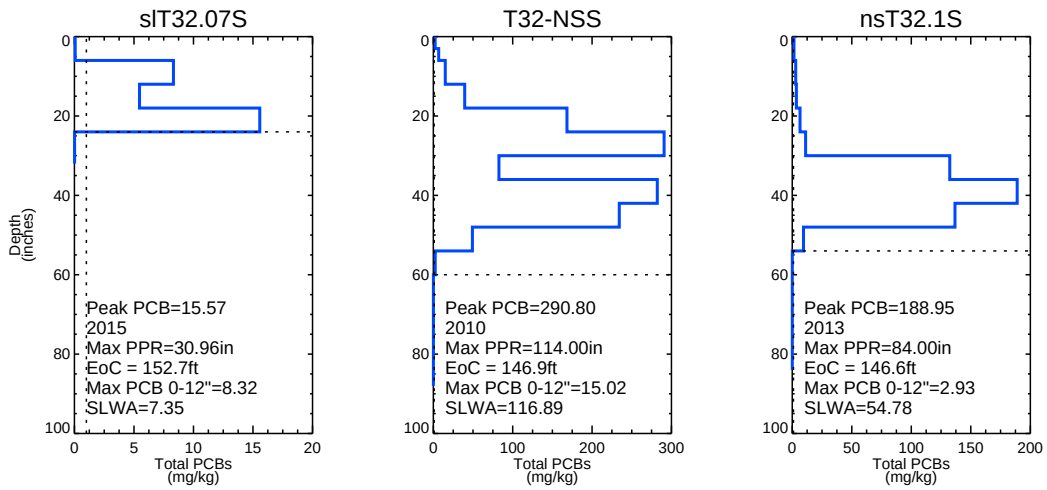
**Figure F2-73**
**PCB Profiles of DMU-S26 Sediment Cores**

# DMU-S27




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-74**
**PCB Profiles of DMU-S27 Sediment Cores**

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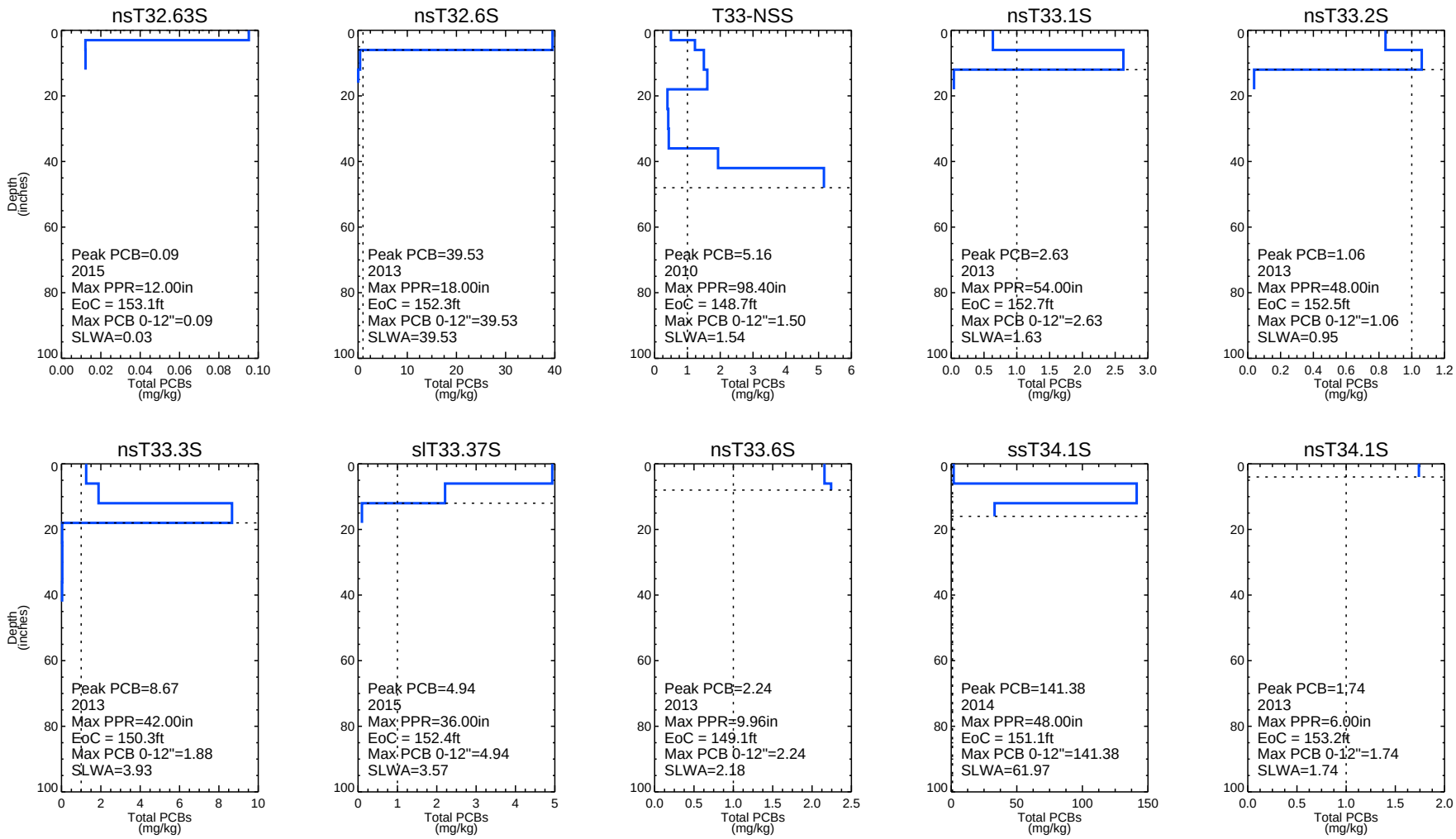
Grasse River Project/Arconic

# DMU-S28




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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**Figure F2-75**
**PCB Profiles of DMU-S28 Sediment Cores**

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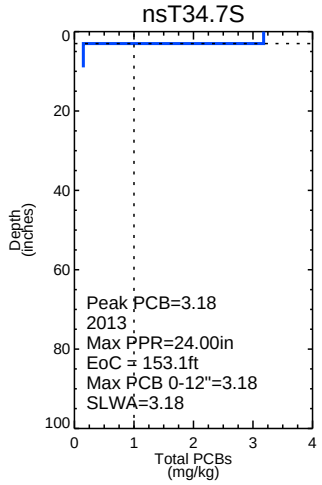
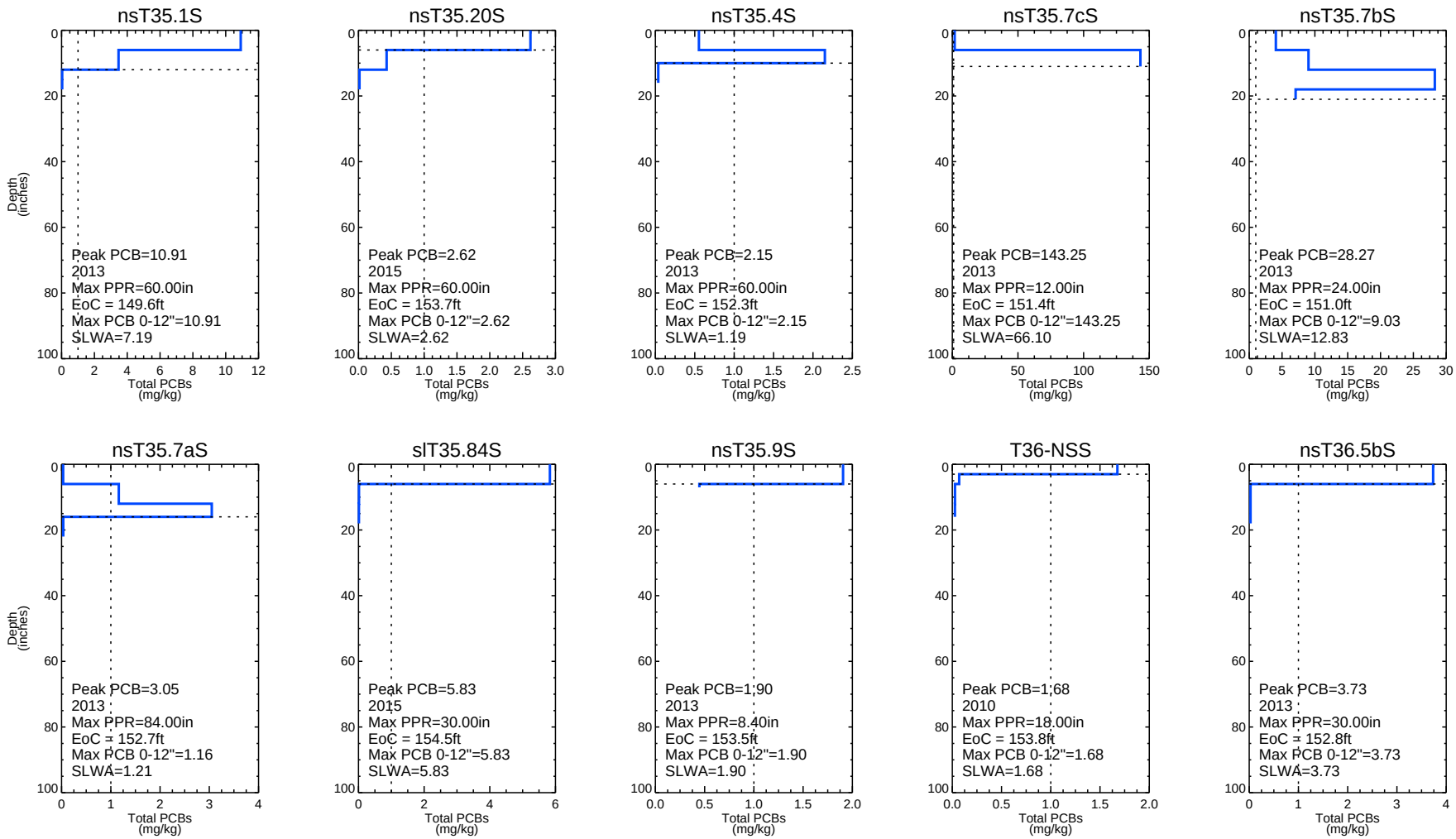
# DMU-S28




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

# DMU-S29




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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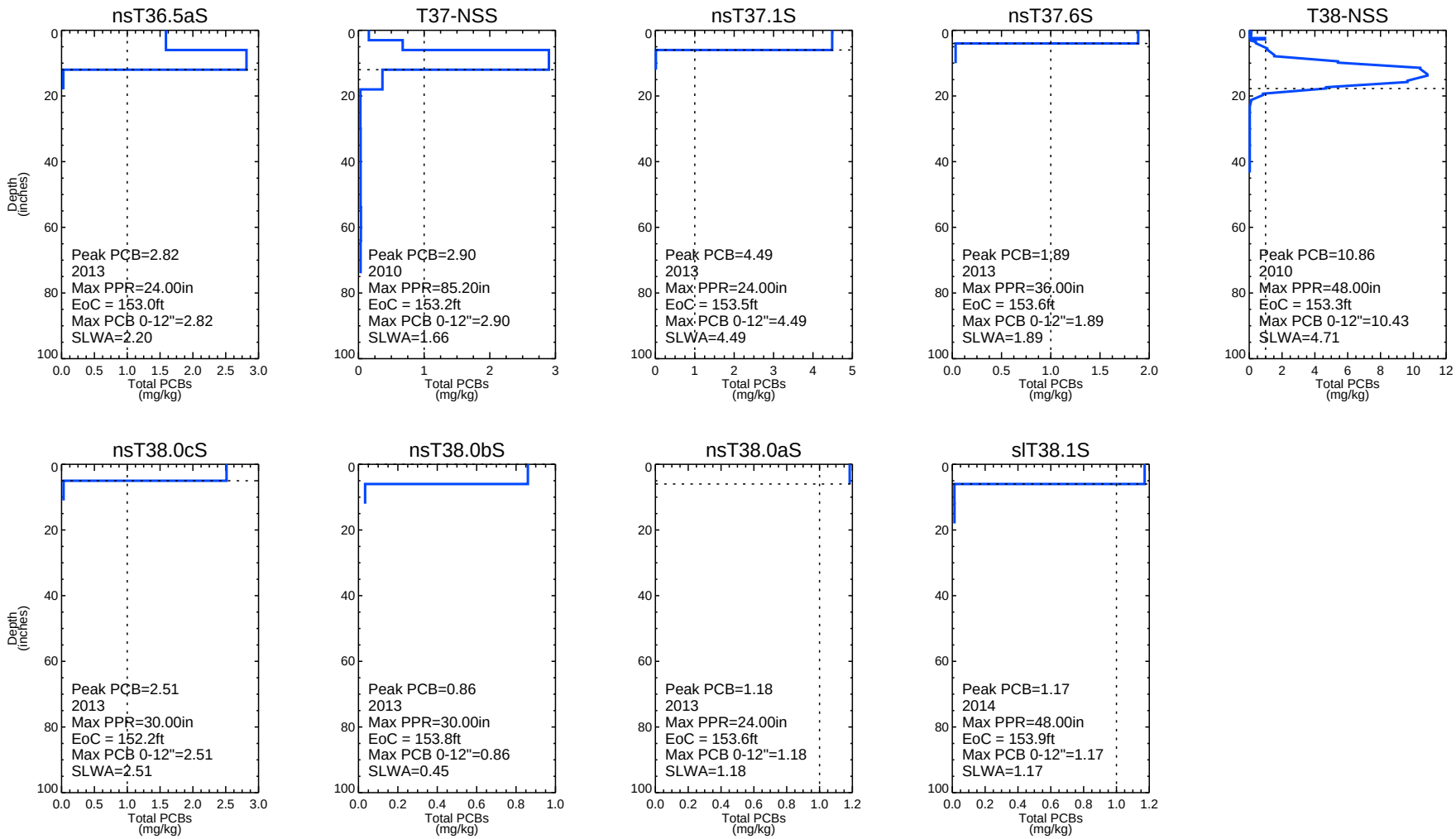
ARCONIC

**Figure F2-77**
**PCB Profiles of DMU-S29 Sediment Cores**

Final Design Report
Grasse River Project/Arconic

# DMU-S29




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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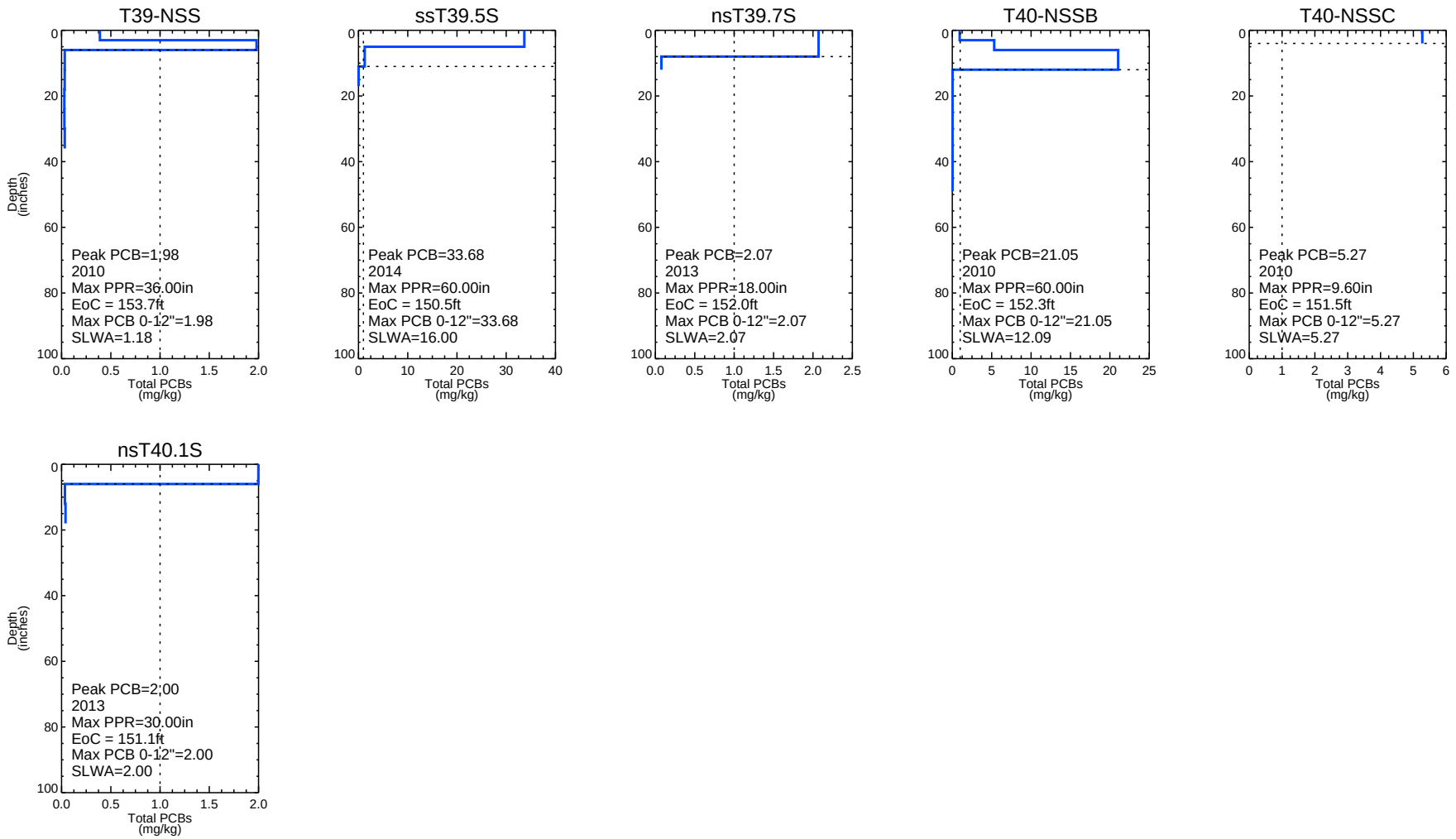
File Path: \\Saratoga1\Saratoga\Projects\Alcoa\Grasse_River\Documents\Remedial_Design\FDR\revised_April2019\Updates\Appendix_F\F2_Series_Dredge_Core_Profiles.pro

ARCONIC

**Figure F2-78**
**PCB Profiles of DMU-S29 Sediment Cores**

Final Design Report
Grasse River Project/Arconic

# DMU-S32



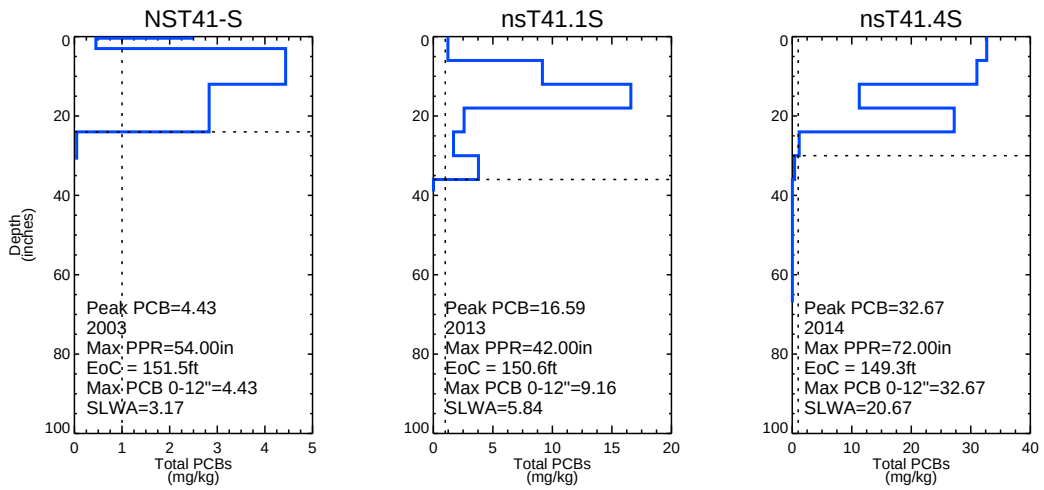

*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

Publish Date: 03/19/2019 15:31 | User: SL
File Path: \\Saratoga1\Saratoga\Projects\Alcoa\Grasse_River\Documents\Remedial_Design\FDR\revised_April2019\Updates\Appendix_F\F2_Series_Dredge_Core_Profiles.pro

ARCONIC

**Figure F2-79**
**PCB Profiles of DMU-S32 Sediment Cores**

# DMU-S35




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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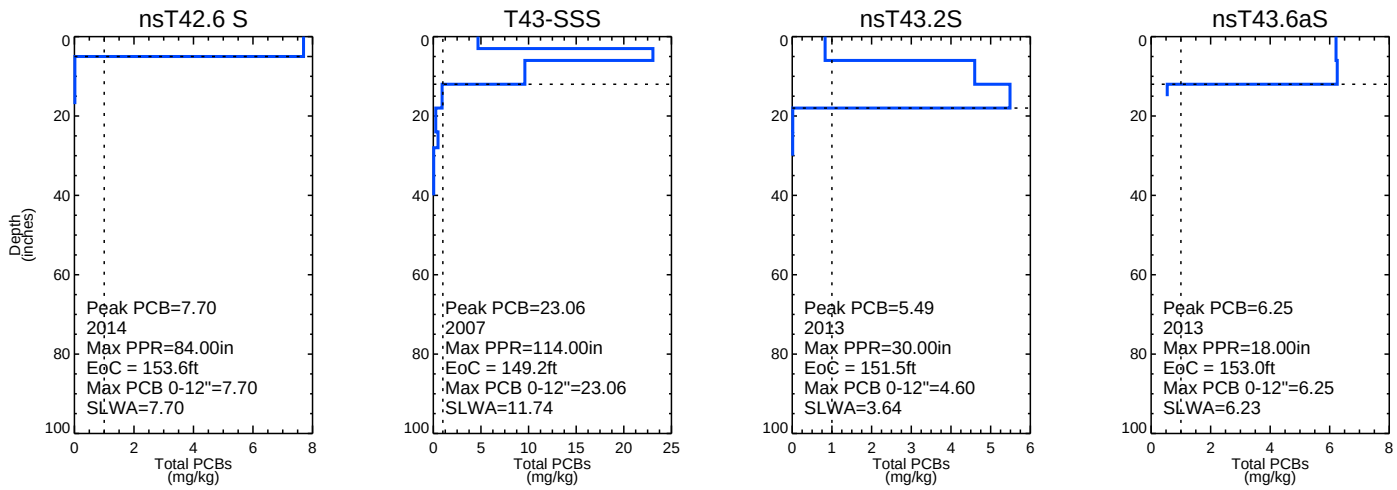
ARCONIC

**Figure F2-80**
**PCB Profiles of DMU-S35 Sediment Cores**

Final Design Report
Grasse River Project/Arconic

# DMU-S38




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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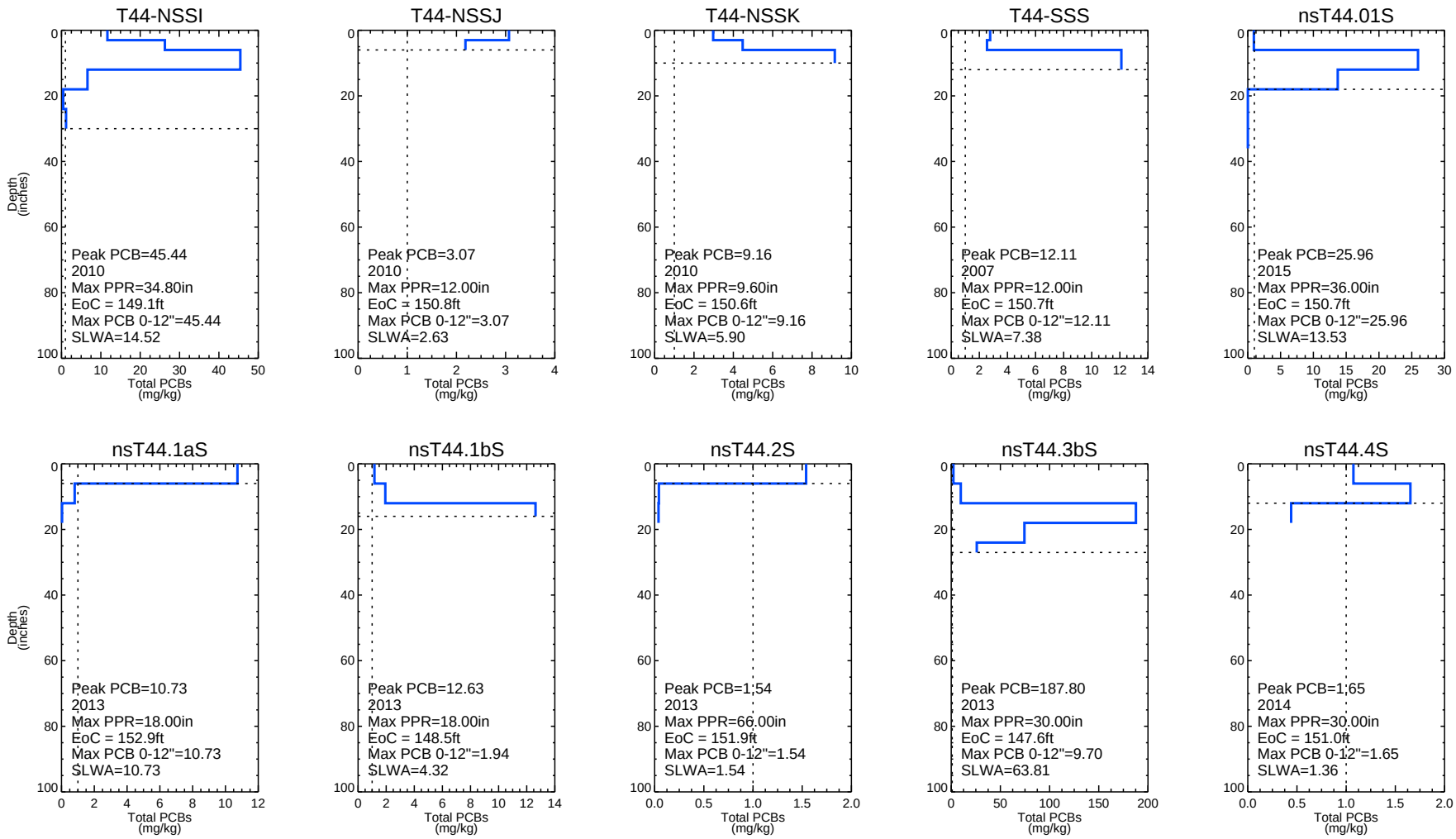
ARCONIC

**Figure F2-81**
**PCB Profiles of DMU-S38 Sediment Cores**

Final Design Report
Grasse River Project/Arconic

# DMU-S40




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

Publish Date: 03/19/2019 15:31 | User: SL
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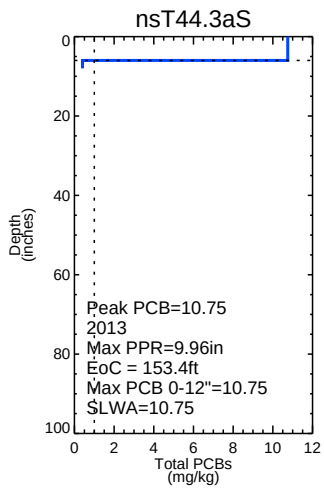
ARCONIC

**Figure F2-82**
**PCB Profiles of DMU-S40 Sediment Cores**

Final Design Report
Grasse River Project/Arconic

# DMU-S40




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

Publish Date: 03/19/2019 15:31 | User: SL
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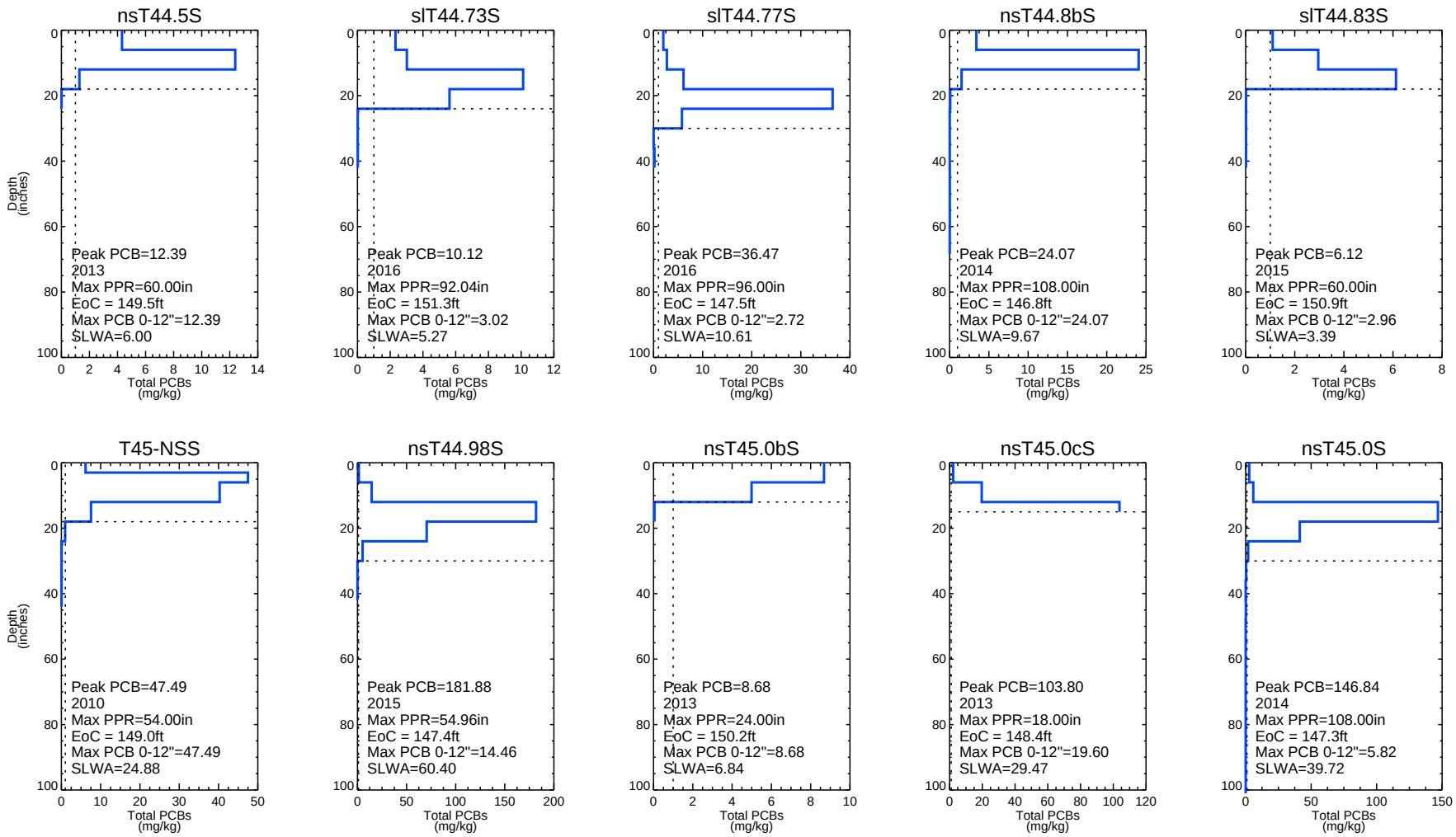
ARCONIC

**Figure F2-83**
**PCB Profiles of DMU-S40 Sediment Cores**

# DMU-S41




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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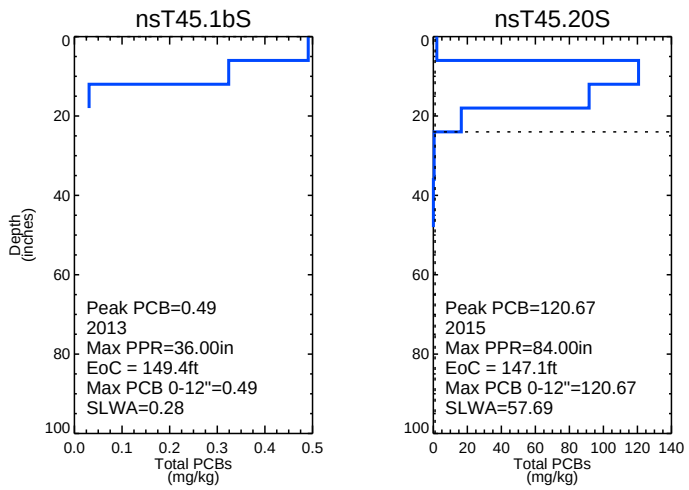
ARCONIC

**Figure F2-84**
**PCB Profiles of DMU-S41 Sediment Cores**

Final Design Report
Grasse River Project/Arconic

# DMU-S41




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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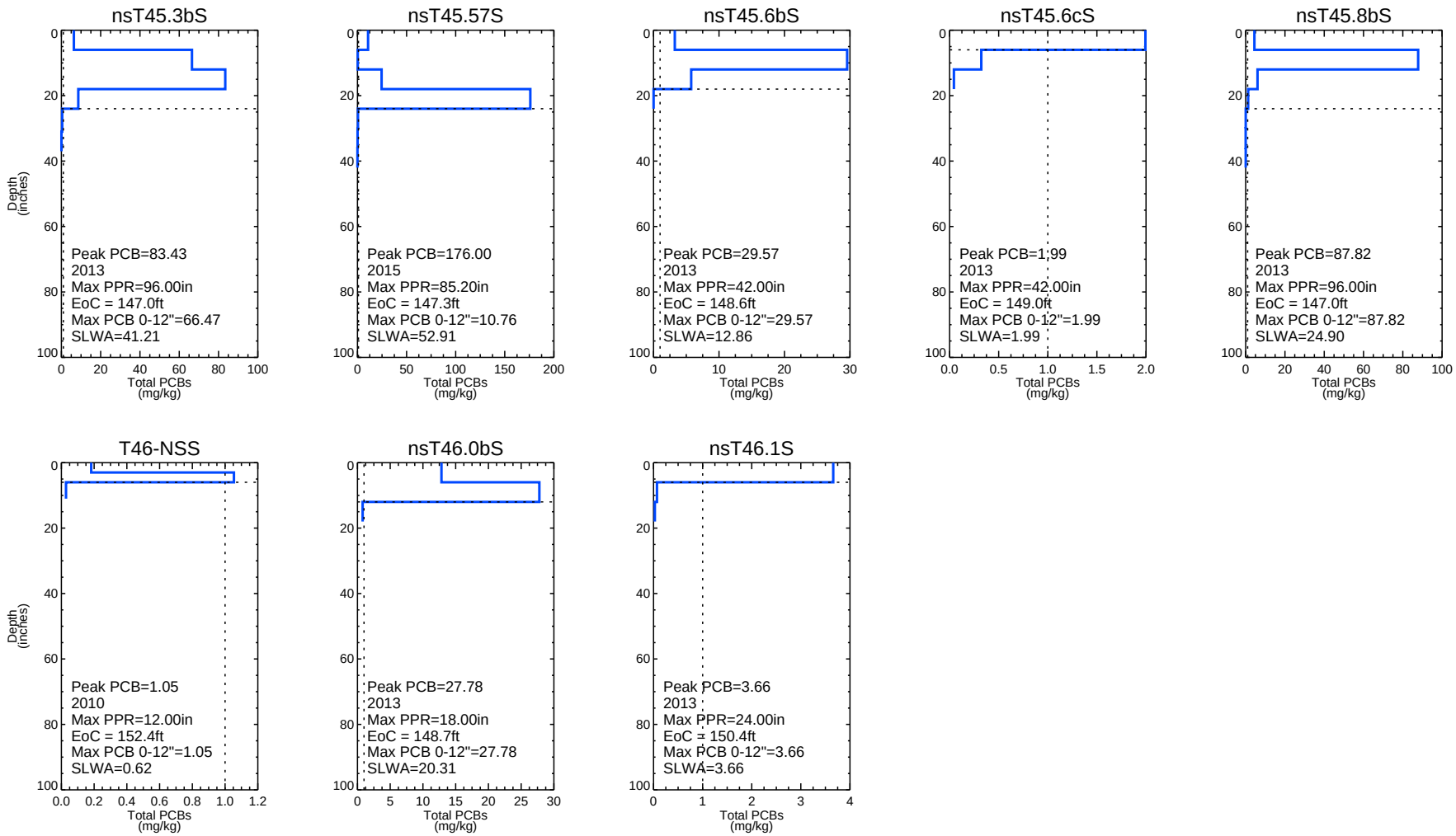
ARCONIC

**Figure F2-85**
**PCB Profiles of DMU-S41 Sediment Cores**

# DMU-S42




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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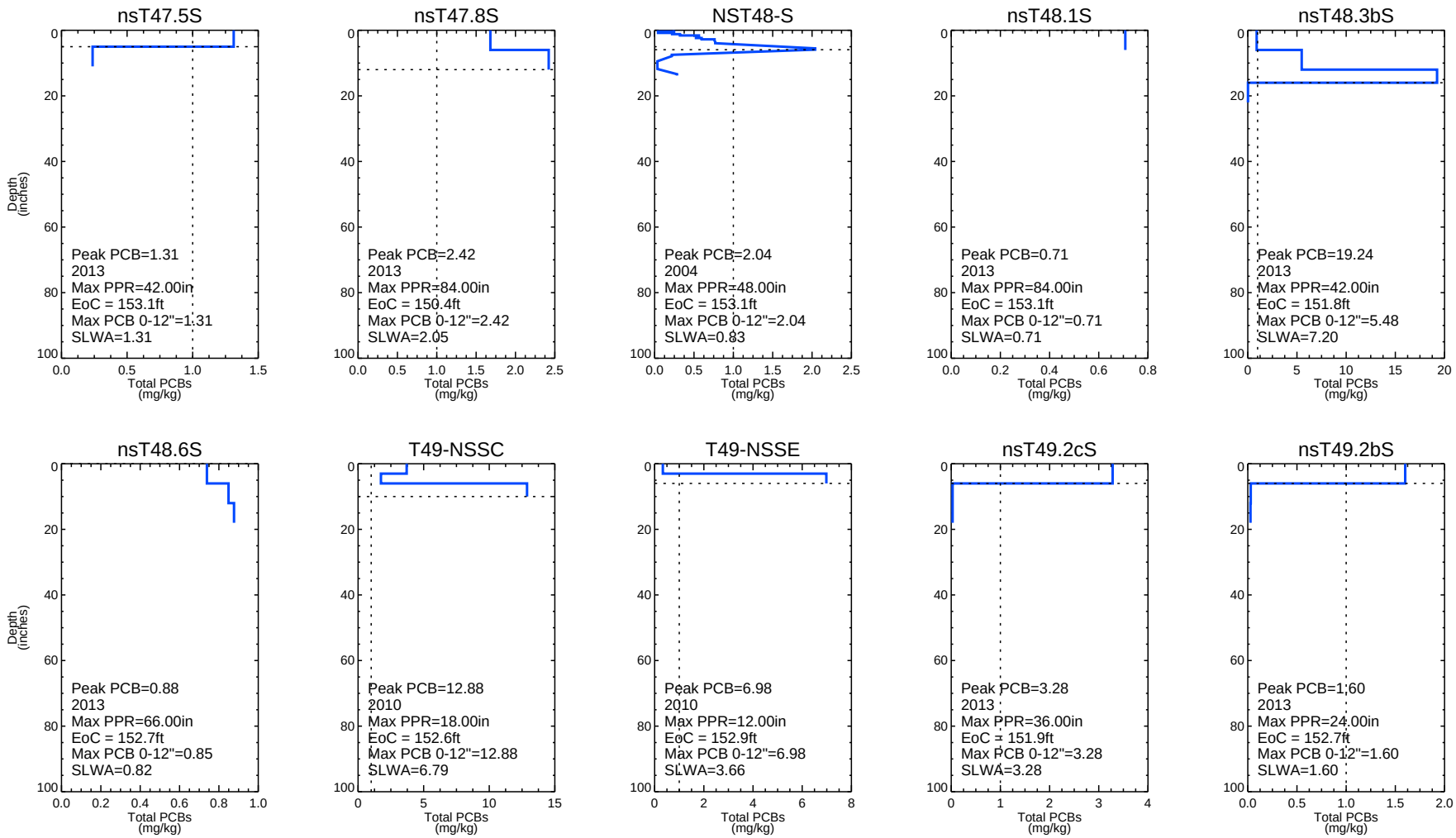
ARCONIC

**Figure F2-86**
**PCB Profiles of DMU-S42 Sediment Cores**

Final Design Report
Grasse River Project/Arconic

# DMU-S44




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

Publish Date: 03/19/2019 15:31 | User: SL
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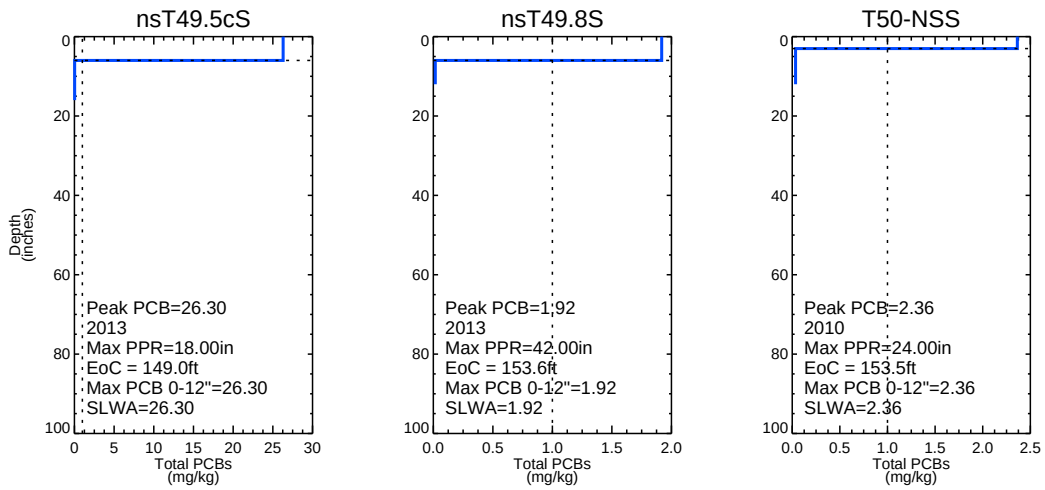
ARCONIC

**Figure F2-87**
**PCB Profiles of DMU-S44 Sediment Cores**

Final Design Report
Grasse River Project/Arconic

# DMU-S44




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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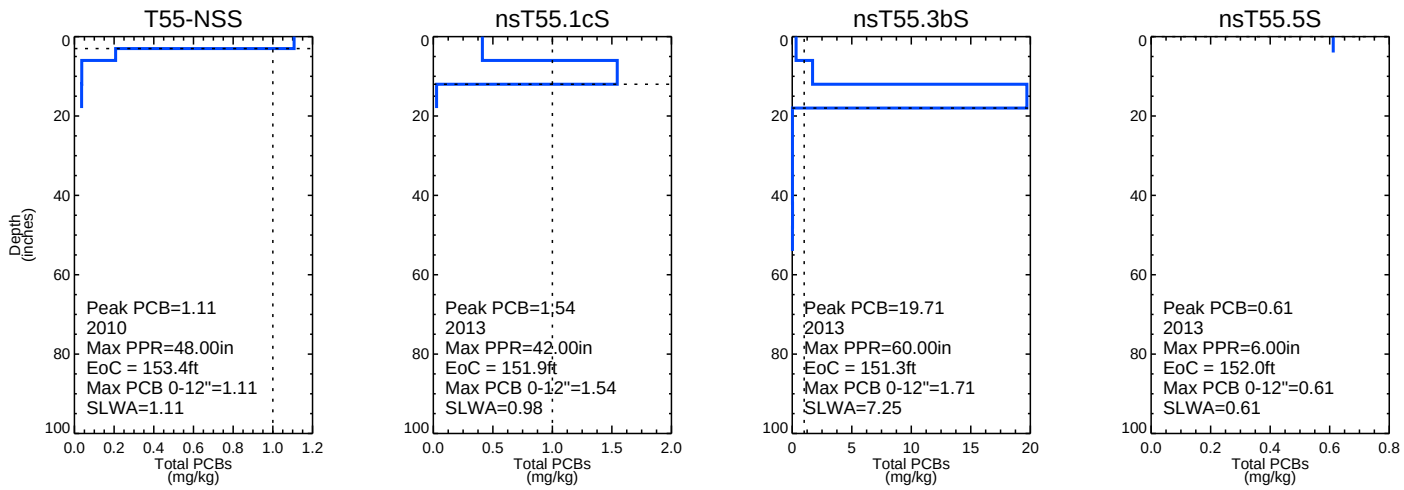
ARCONIC

**Figure F2-88**
**PCB Profiles of DMU-S44 Sediment Cores**

# DMU-S46




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

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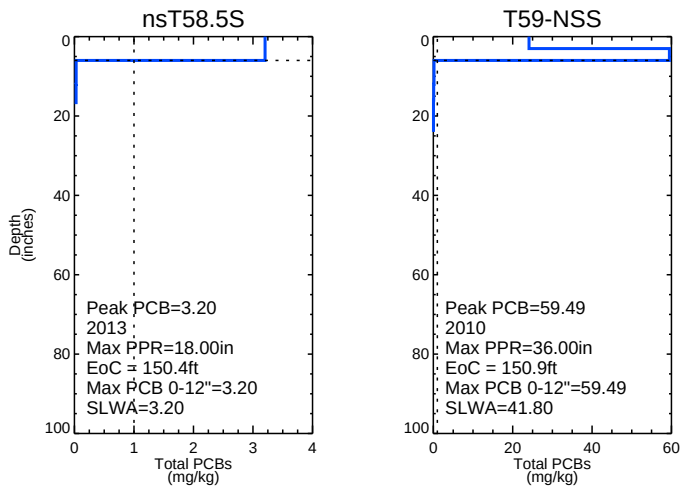
ARCONIC

**Figure F2-89**
**PCB Profiles of DMU-S46 Sediment Cores**

# DMU-S48




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

Publish Date: 03/19/2019 15:31 | User: SL
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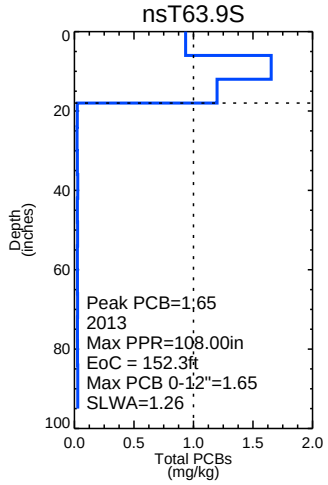
ARCONIC

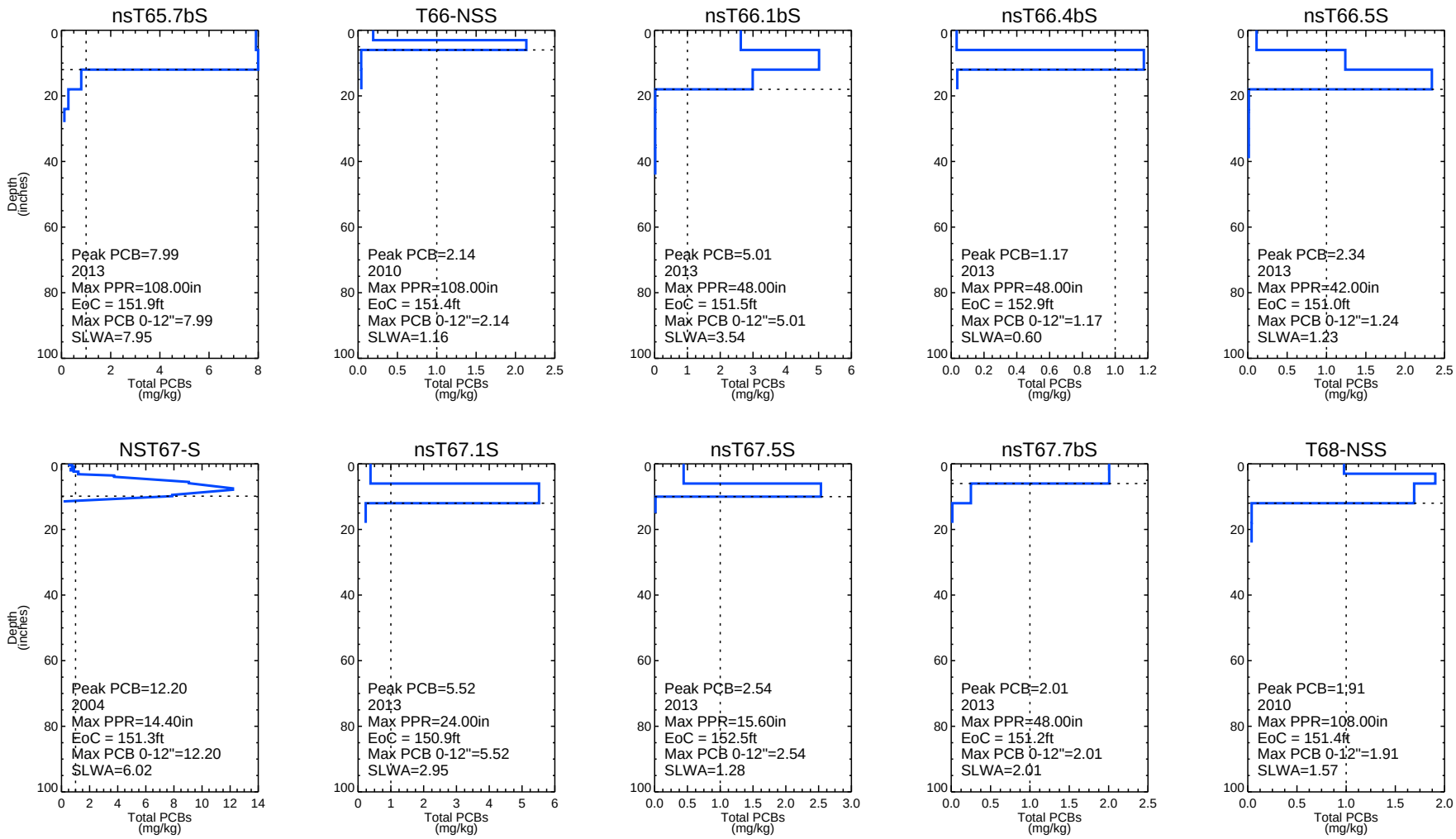
**Figure F2-90**
**PCB Profiles of DMU-S48 Sediment Cores**

# DMU-S51




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

# DMU-S52




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

Publish Date: 03/19/2019 15:31 | User: SL
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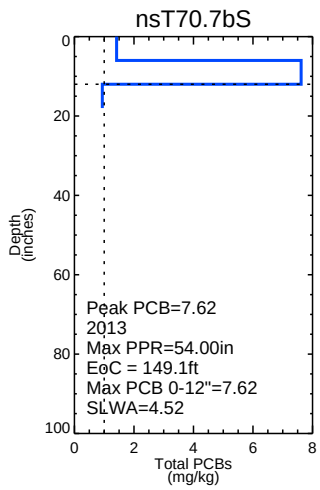
ARCONIC

**Figure F2-92**
**PCB Profiles of DMU-S52 Sediment Cores**

Final Design Report
Grasse River Project/Arconic

# DMU-S56




*Dashed horizontal line represents the depth of contamination (DoC); dashed vertical line represents 1 mg/kg. Non-detects are plotted at half the detection limit. Duplicates are averaged.*
*Cores are labeled with their maximum surface PCB concentrations, EoC, and SLWA based on applicable remedial criteria at that location.*
*Data tables: sediment_aro_181128, sediment_bz2_140123, sed_aro_ROPS_140127*
*Max PPR: maximum depth (in inches) of probing, penetration, and recovery as recorded in the field*
*EoC: elevation of contamination*
*SLWA: section length weighted average*

Publish Date: 03/19/2019 15:31 | User: SL
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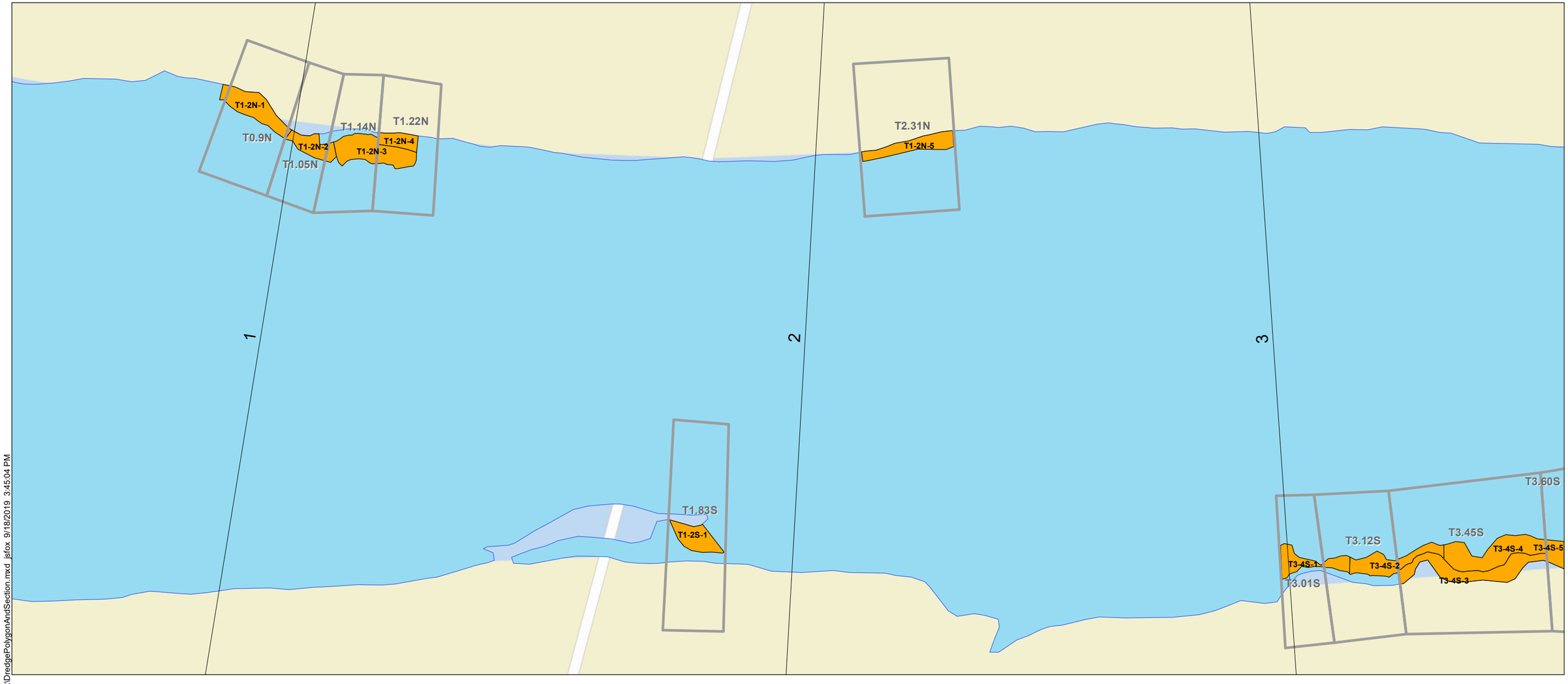
ARCONIC

**Figure F2-93**
**PCB Profiles of DMU-S56 Sediment Cores**




**Legend**

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
0 100 200

\\orcas\GIS\Jobs\100002-02_Grasse_River\Maps\FDR\DredgePolygonAndSection.mxd jsfox 9/18/2019 3:45:04 PM

ARCONIC

**Figure F3-1**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic

## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
0 100 200

ARCONIC

**Figure F3-2**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic

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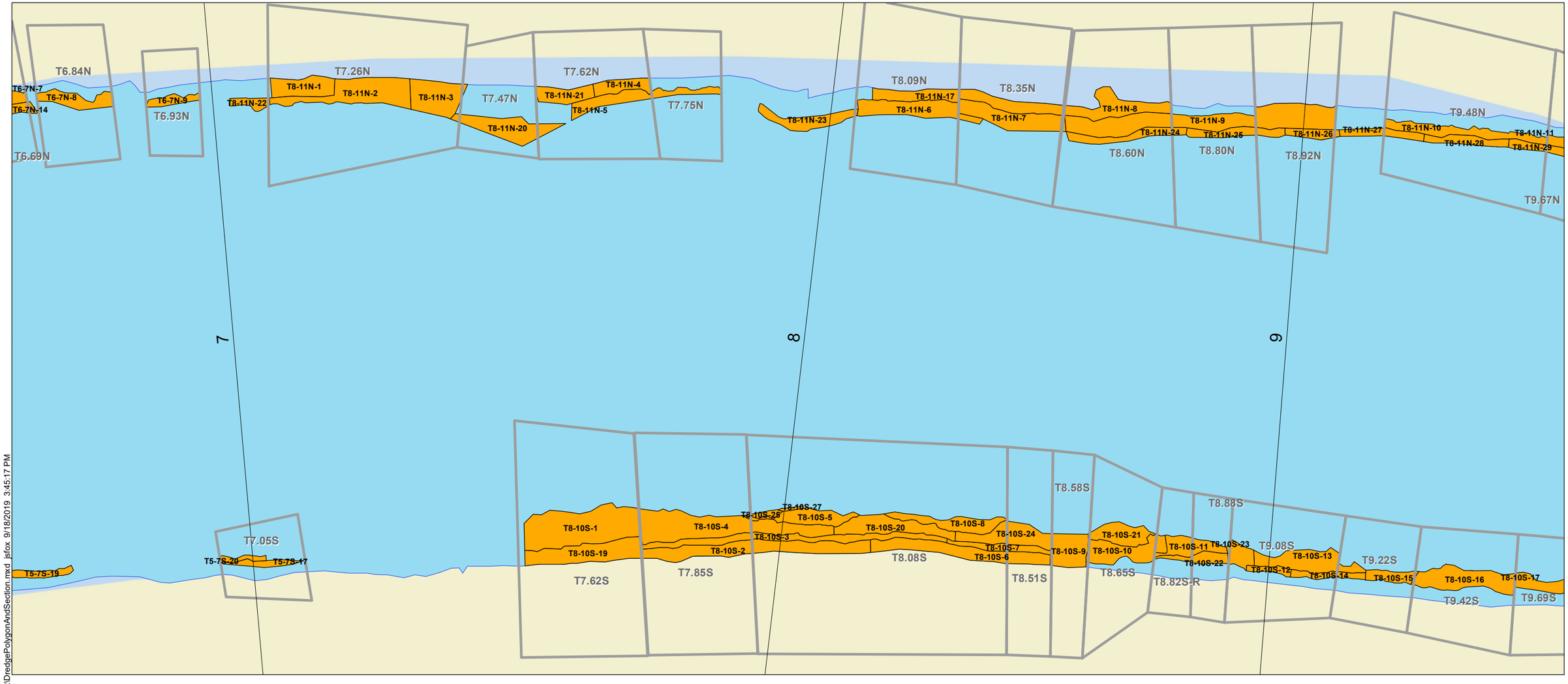



## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

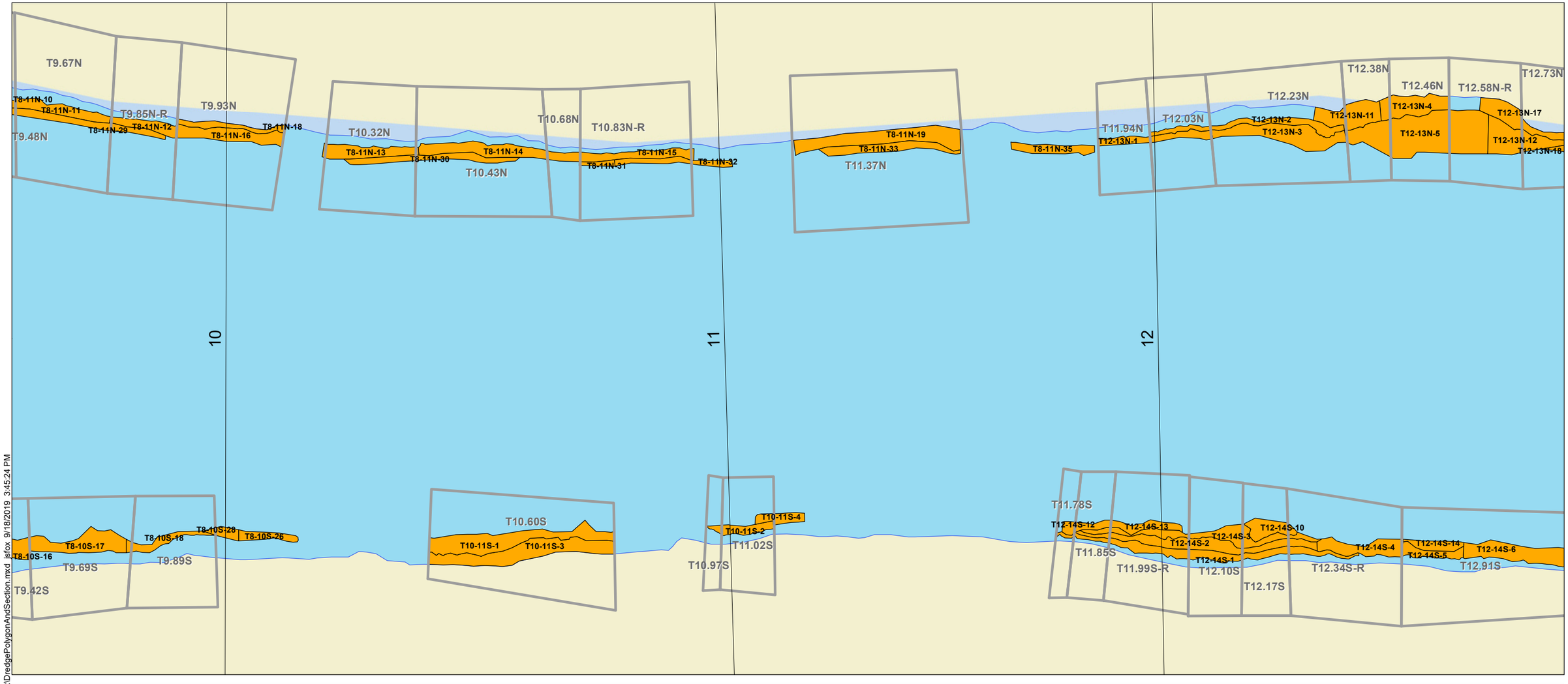
**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
0 100 200

\\orcas\GIS\Jobs\100002-02_Grasse_River\Maps\FDR\DredgePolygonAndSection.mxd jsfox 9/18/2019 3:45:17 PM

ARCONIC

**Figure F3-3**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

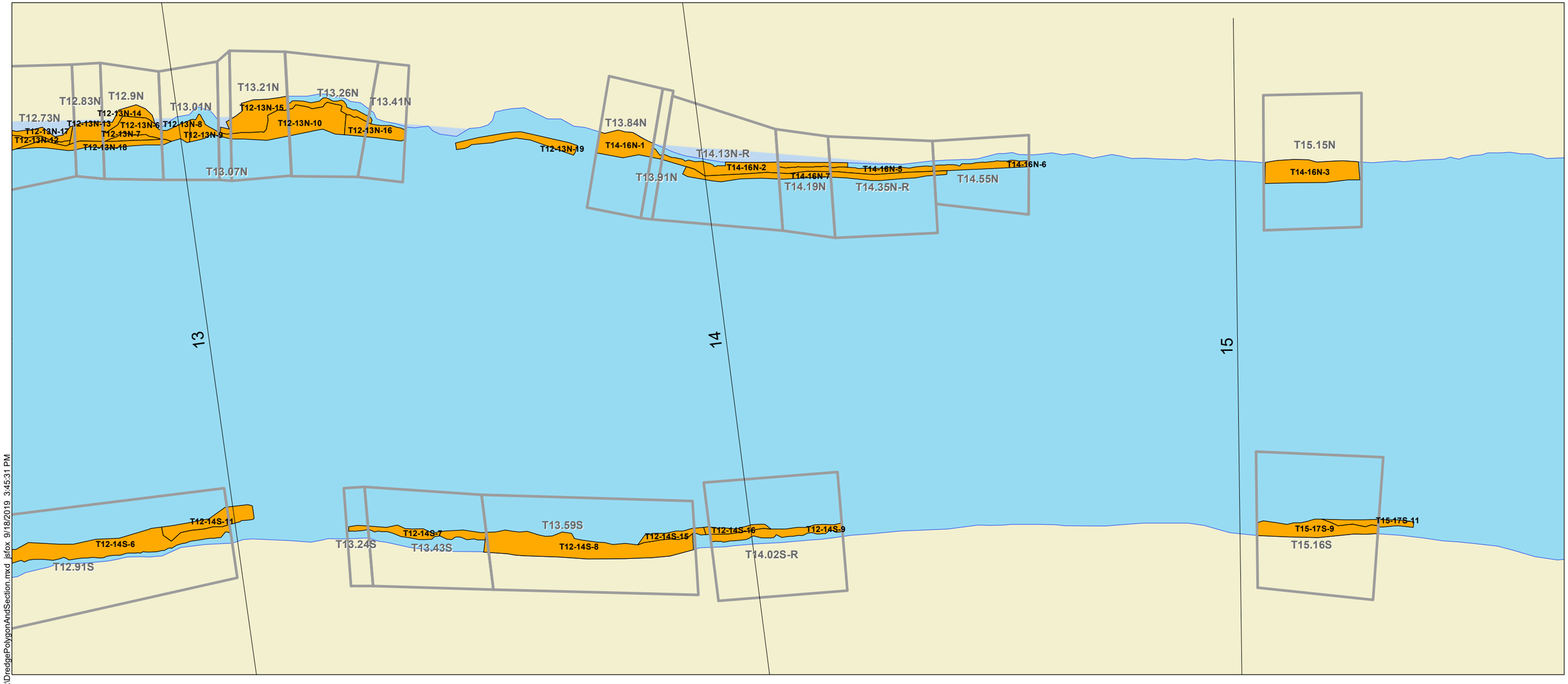
**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
0 100 200

\\orcas\GIS\Jobs\100002-02_Grasse_River\Maps\FDR\DredgePolygonAndSection.mxd jsfox 9/18/2019 3:45:24 PM

ARCONIC

**Figure F3-4**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

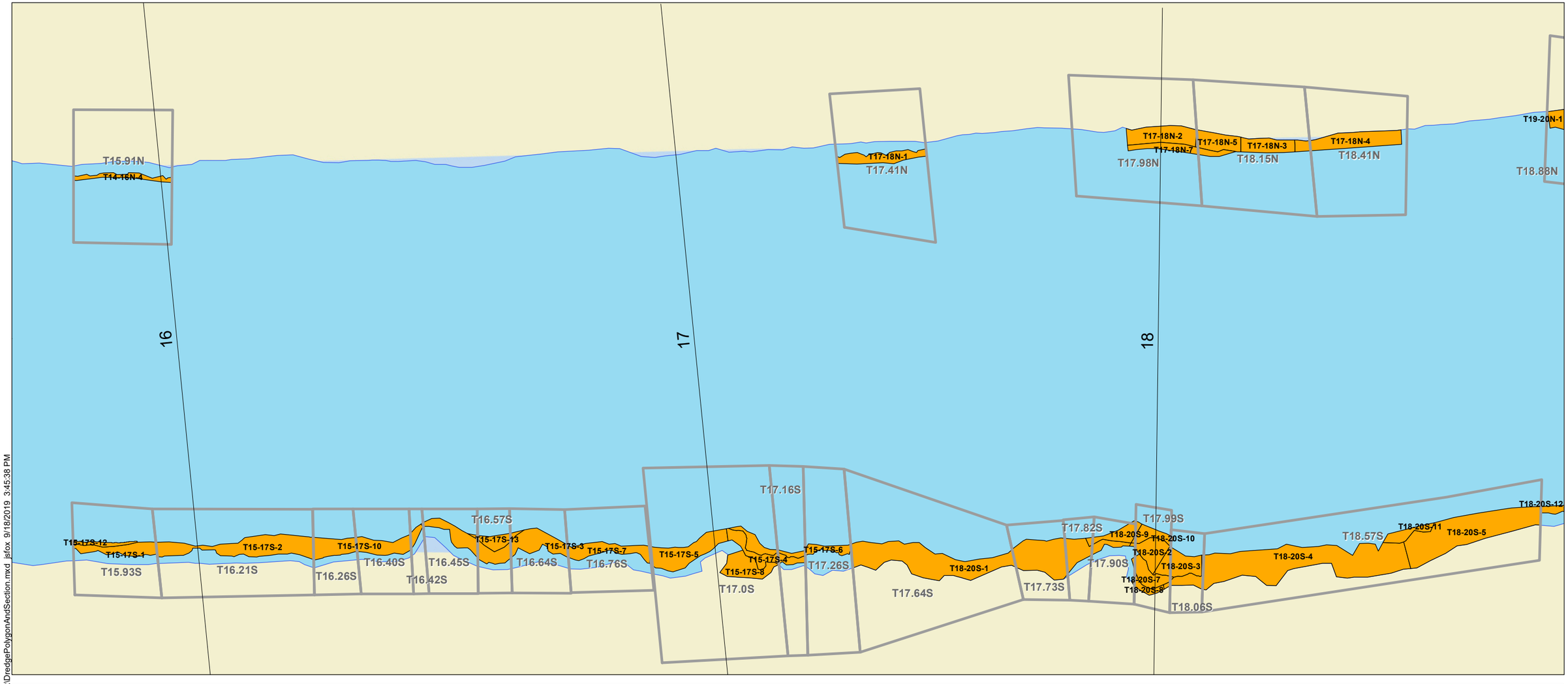
**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
0 100 200

\\orcas\GIS\Jobs\100002-02_Grasse_River\Maps\FDR\DredgePolygonAndSection.mxd jsfox 9/18/2019 3:45:31 PM

ARCONIC

**Figure F3-5**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

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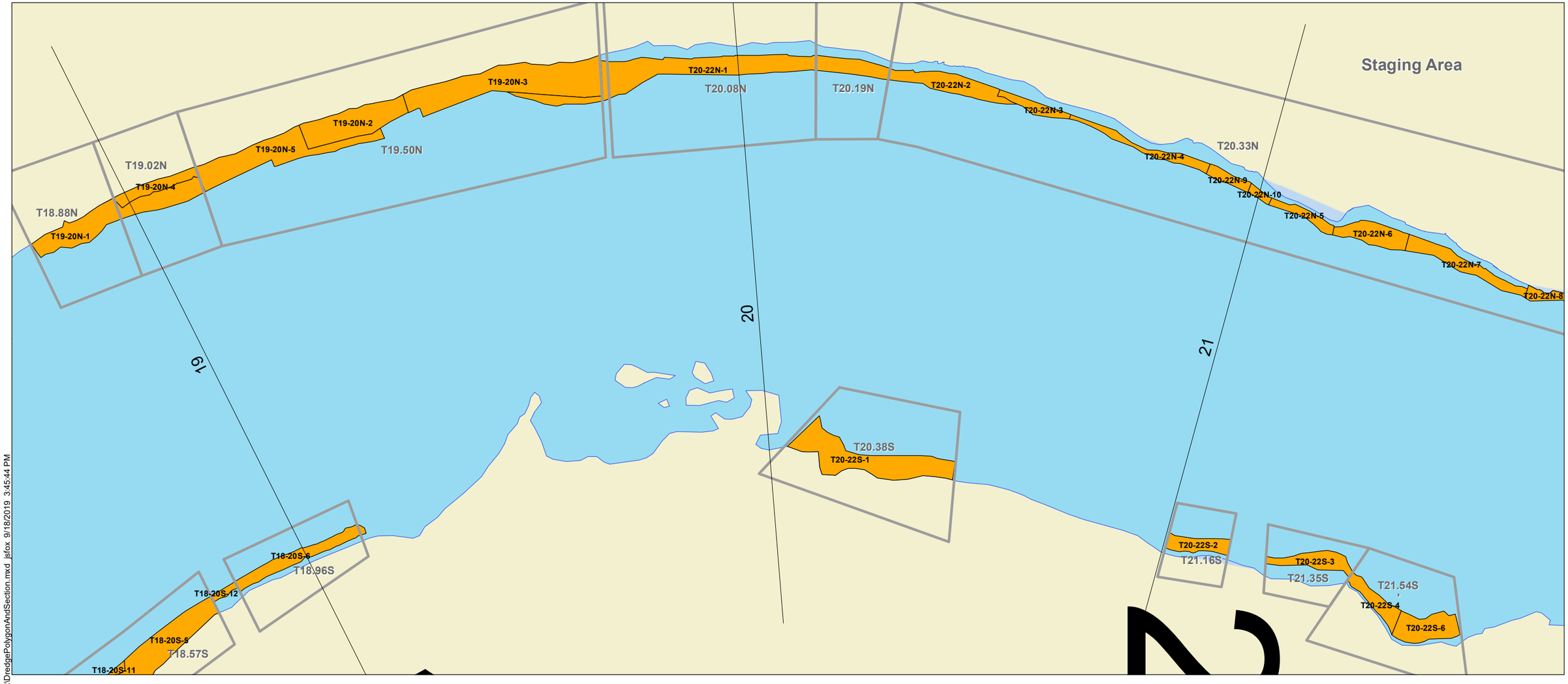
**Figure F3-6**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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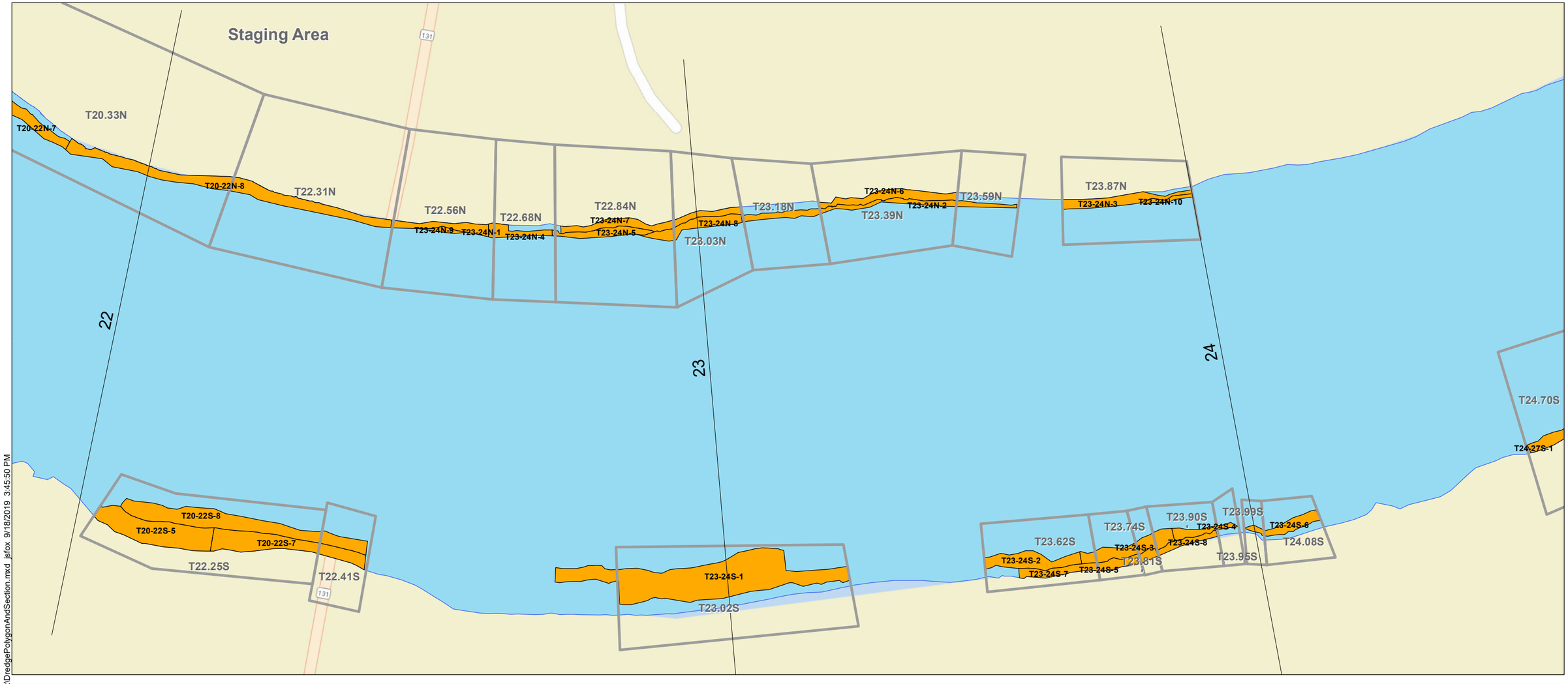
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




## Legend

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- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

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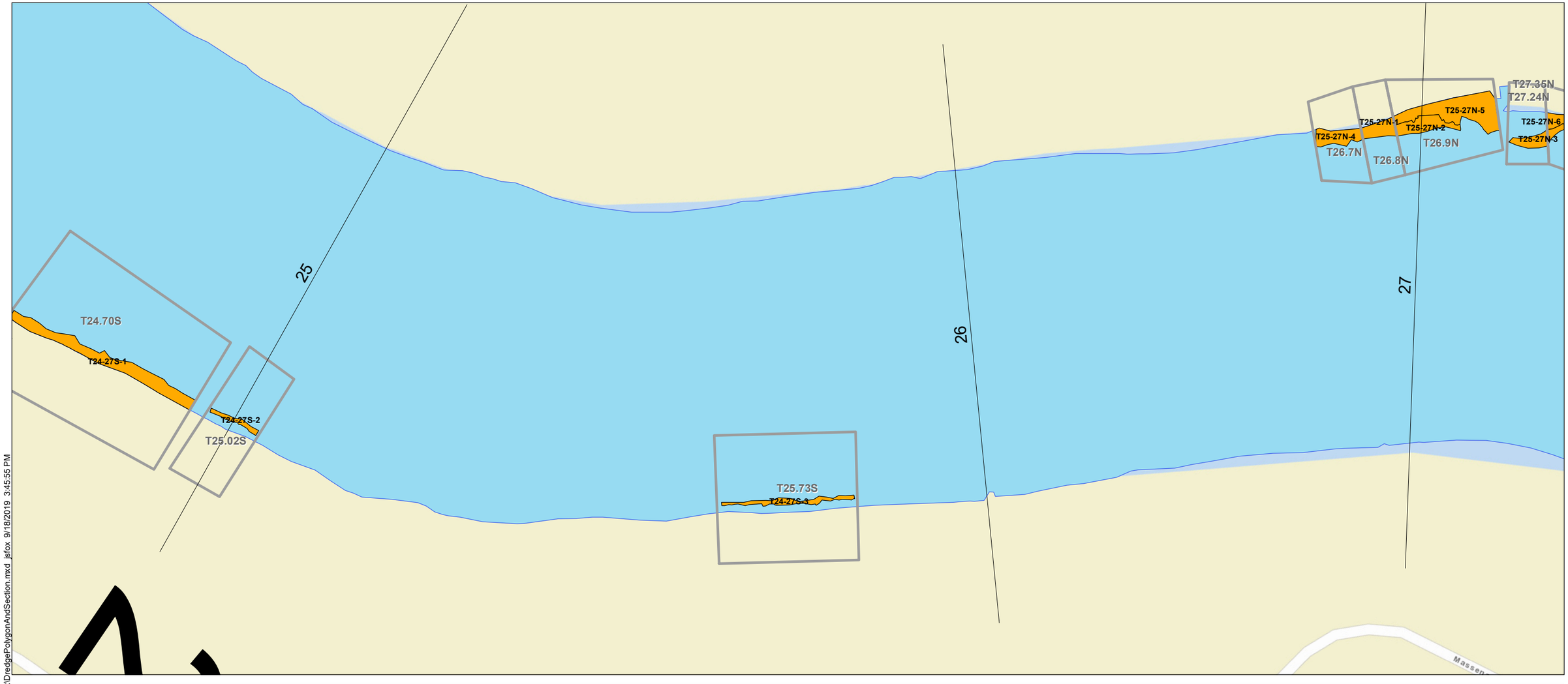
Final Design Report
Grasse River Project/Arconic




**Legend**

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

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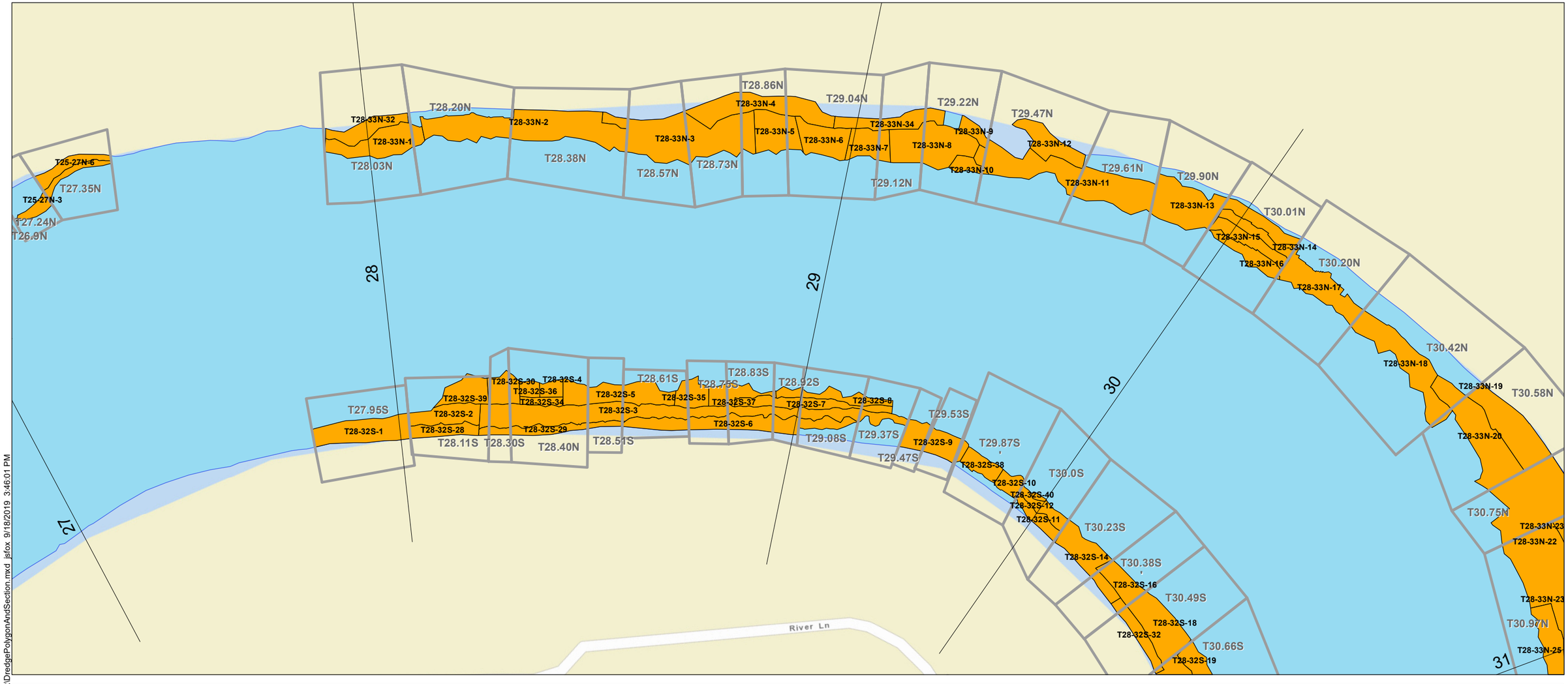


## Legend

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- Final Dredge Areas and Subarea Label
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**NOTE:**
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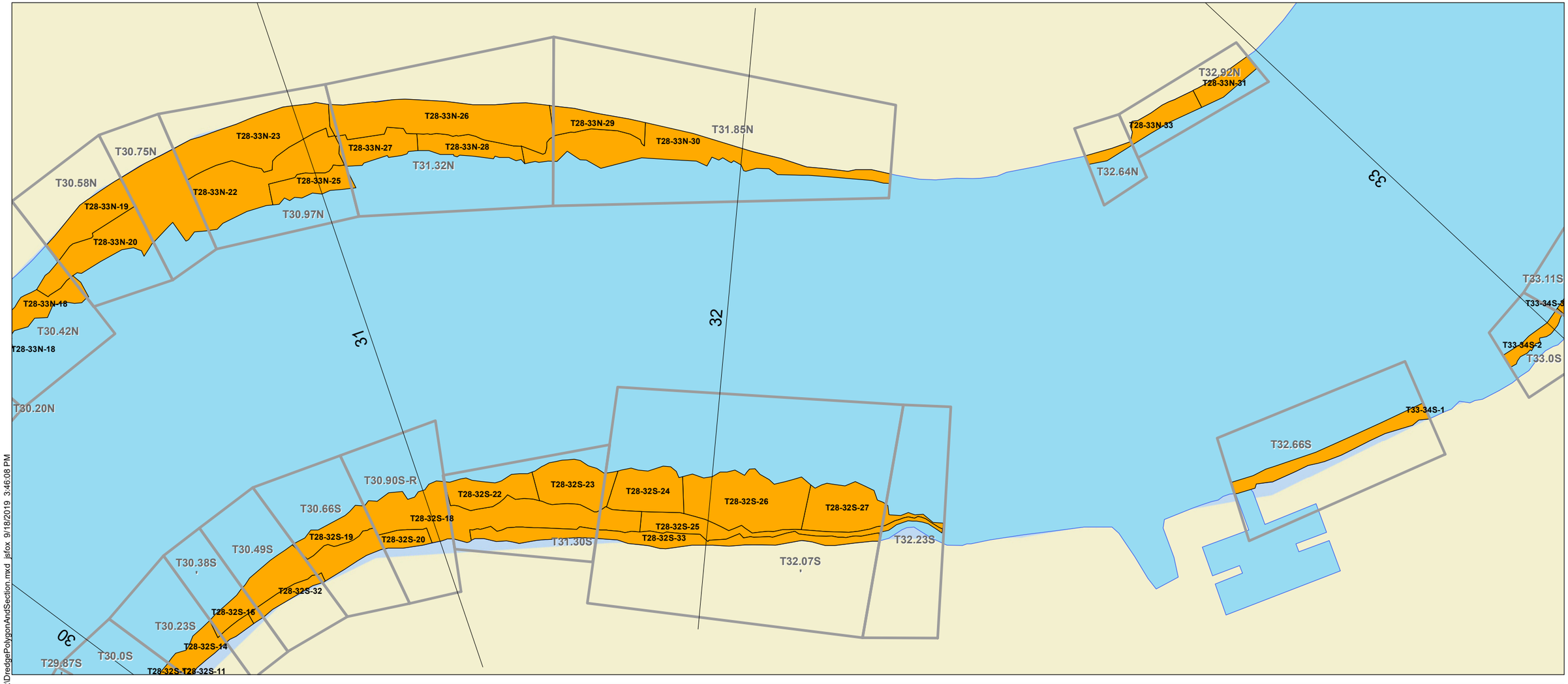
Final Design Report
Grasse River Project/Arconic




## Legend

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- Final Dredge Areas and Subarea Label
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**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

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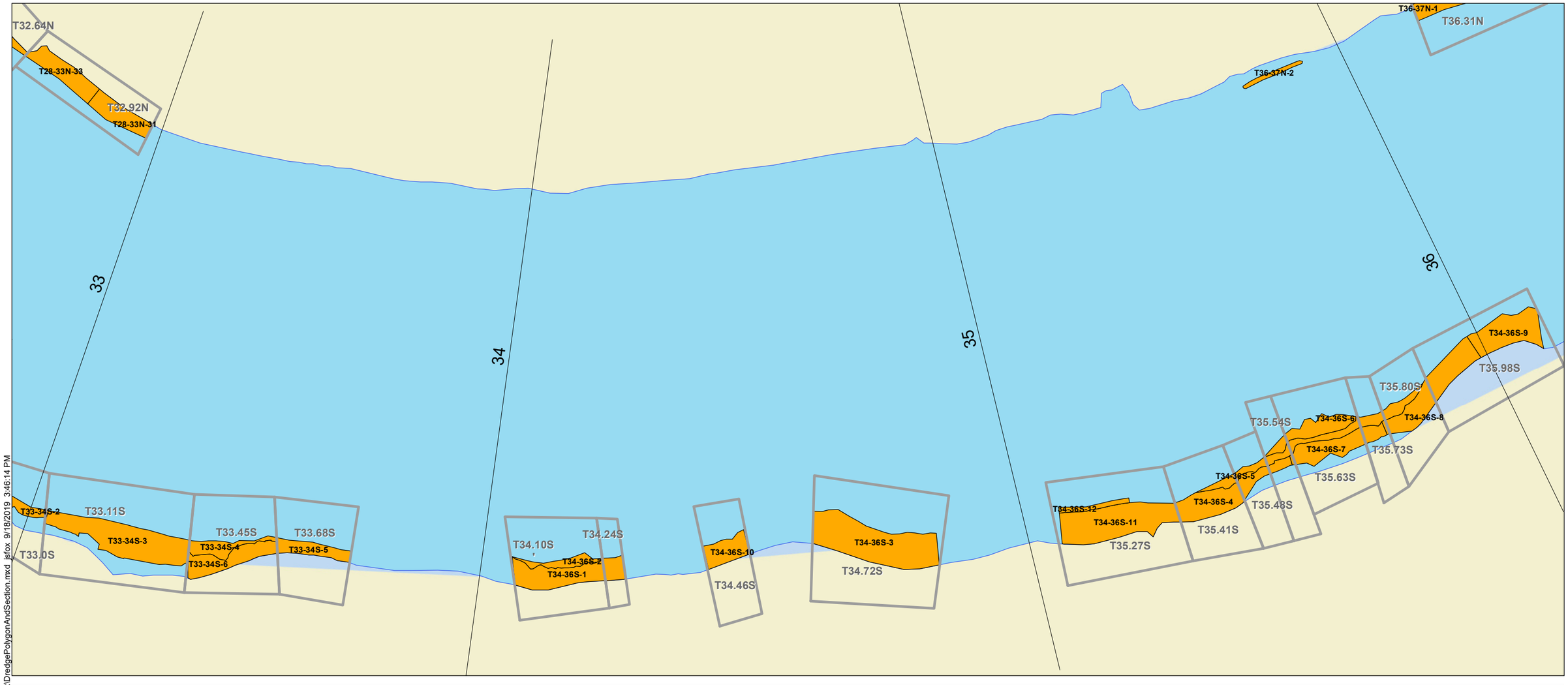


## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
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**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

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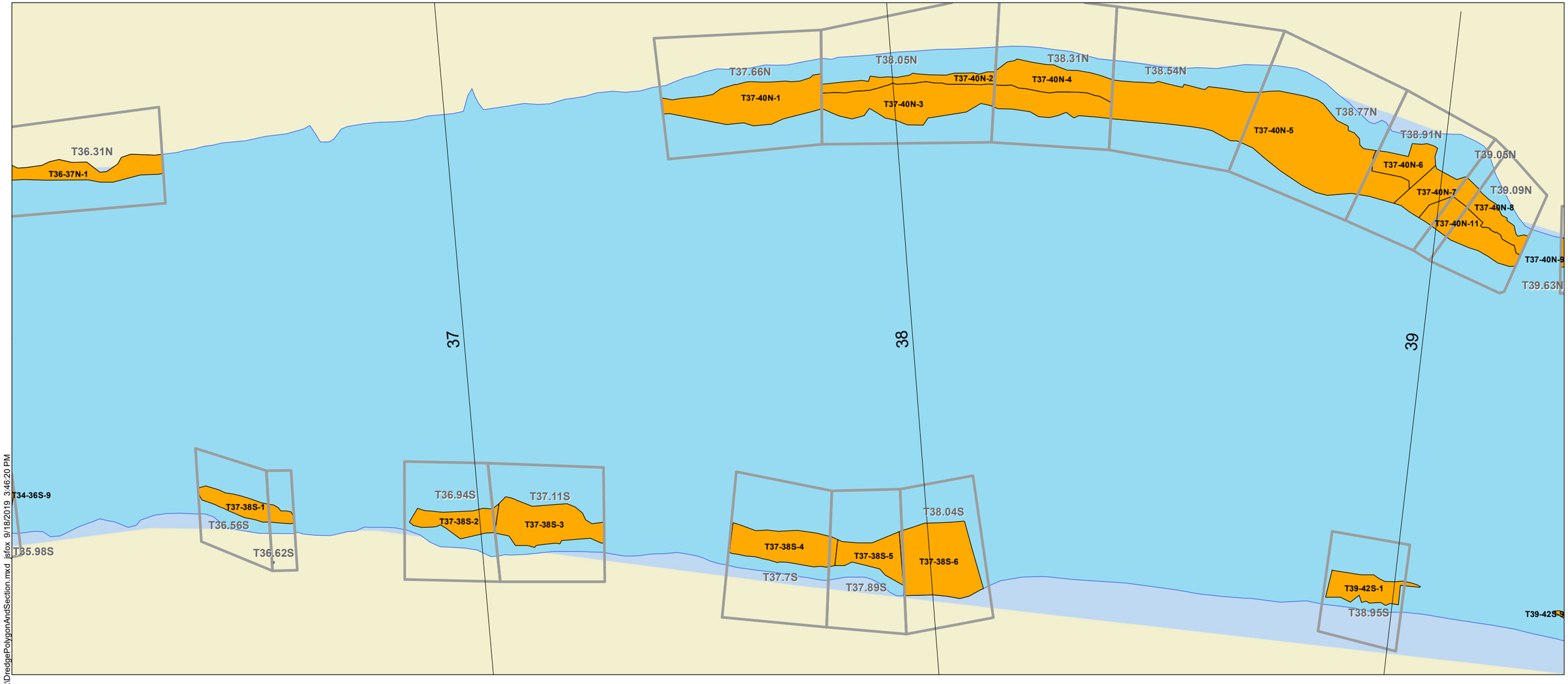
**Figure F3-12**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
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**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

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**Figure F3-13**
Near Shore Dredge Polygon and Section IDs
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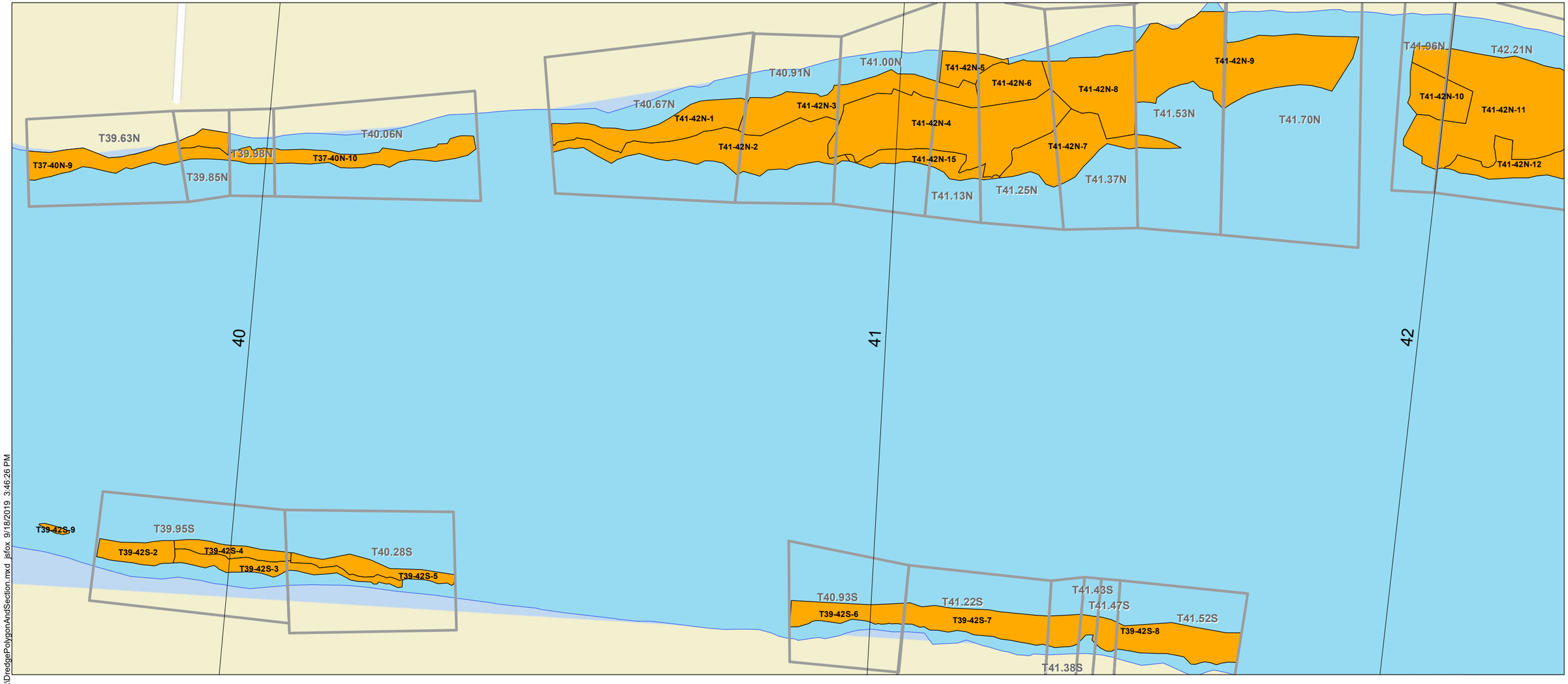


## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

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**Figure F3-14**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic

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## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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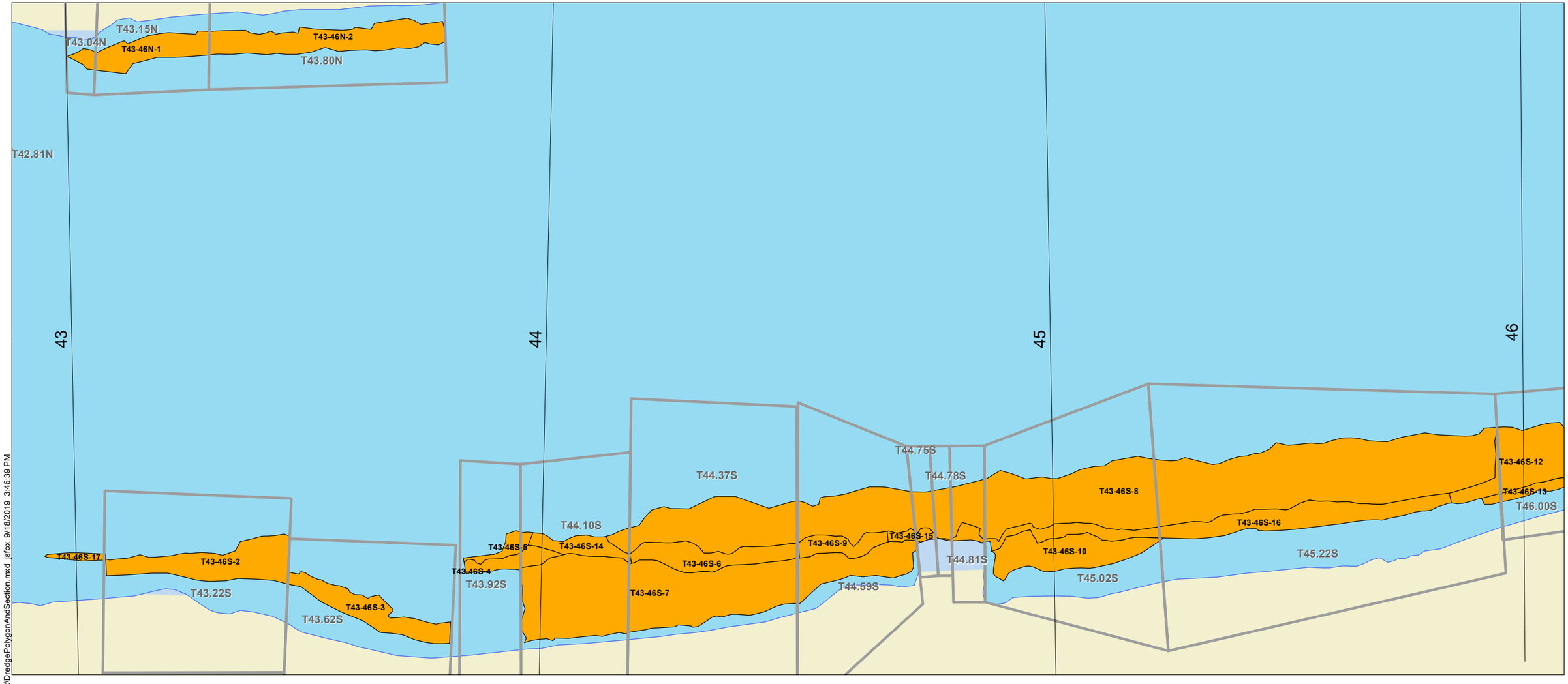
**Figure F3-15**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
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**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

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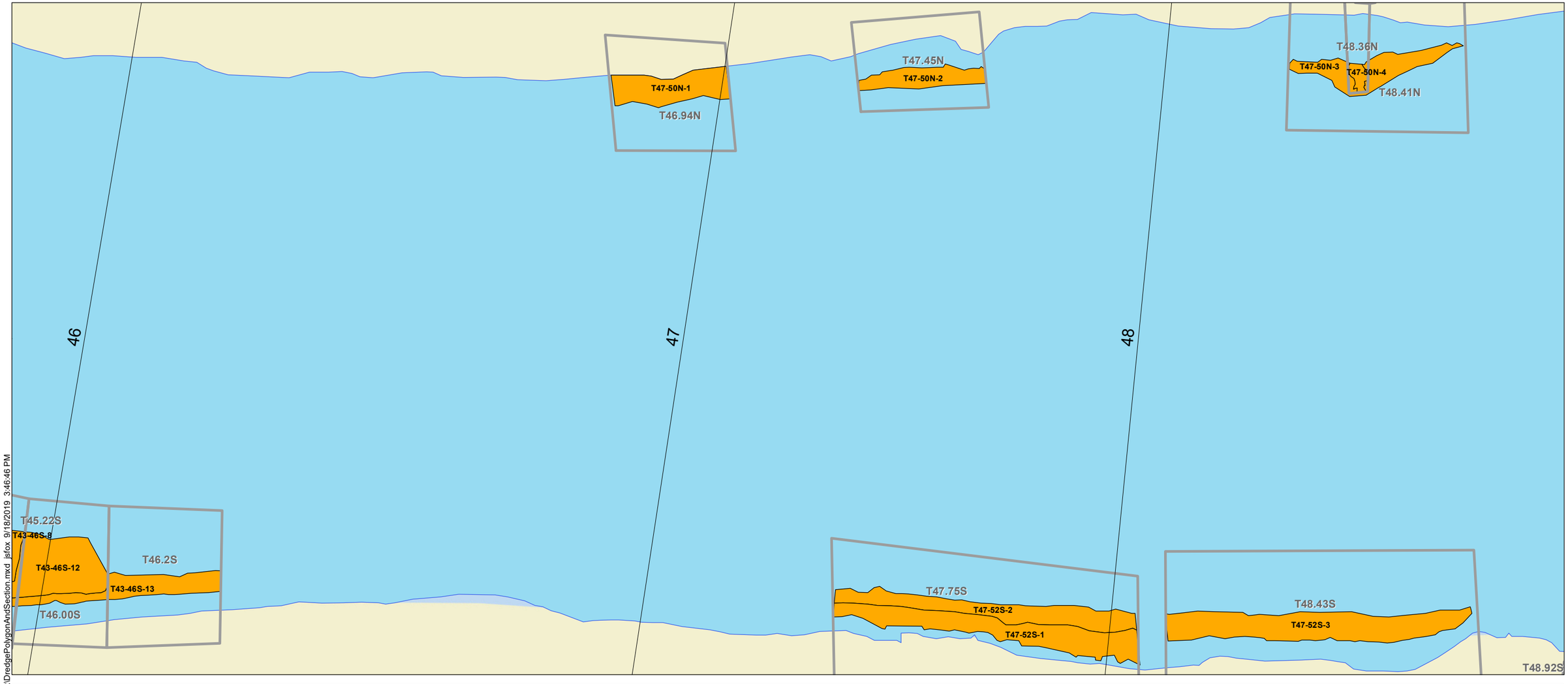
**Figure F3-16**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




**Legend**

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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**Figure F3-17**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic

**Legend**

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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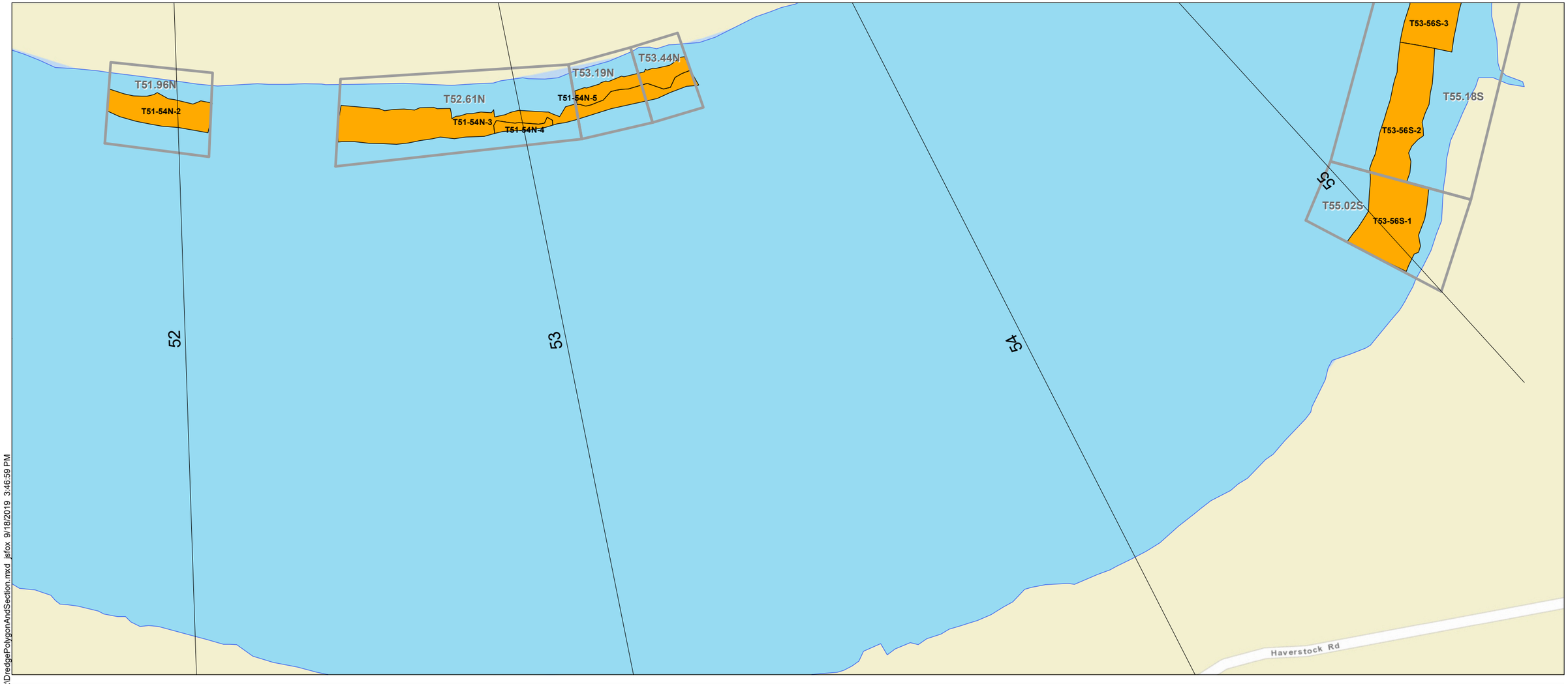
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




**Legend**

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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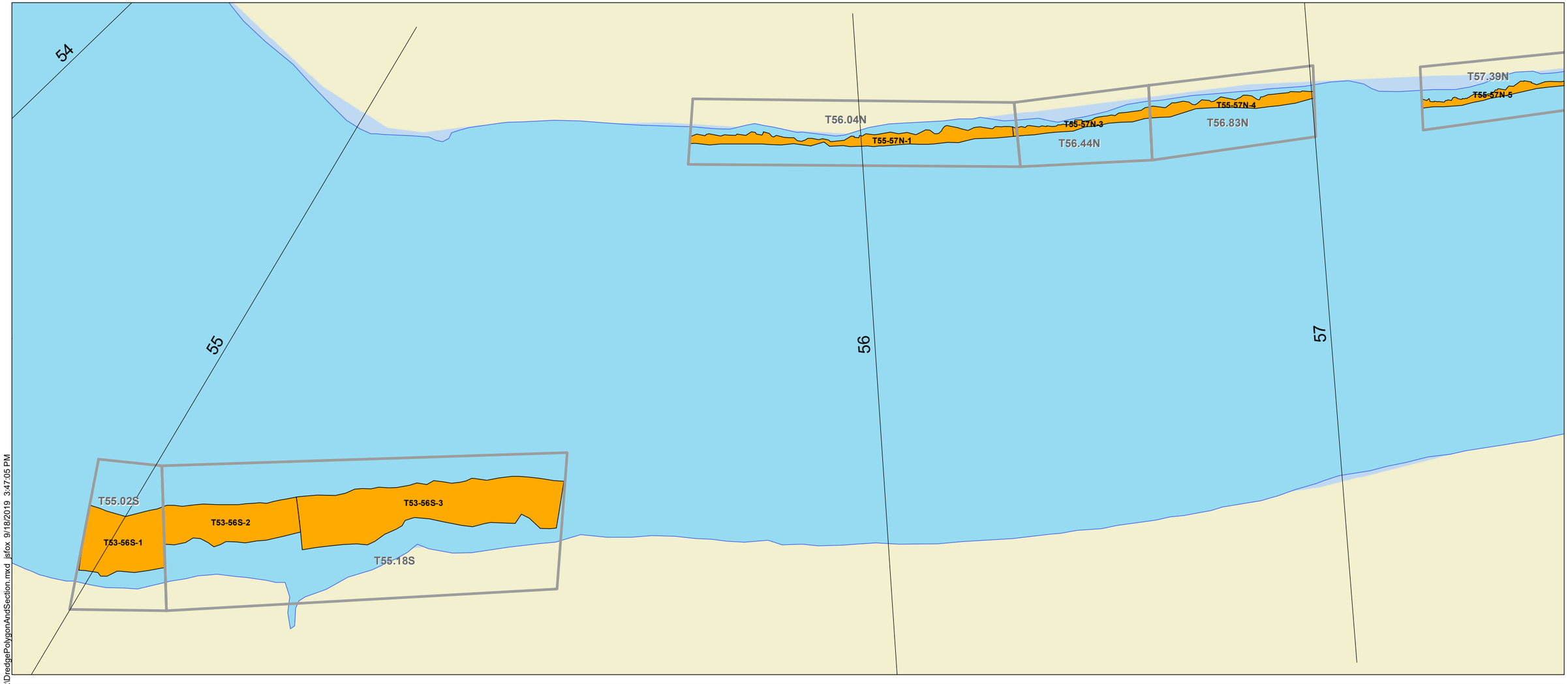
**Figure F3-19**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




**Legend**

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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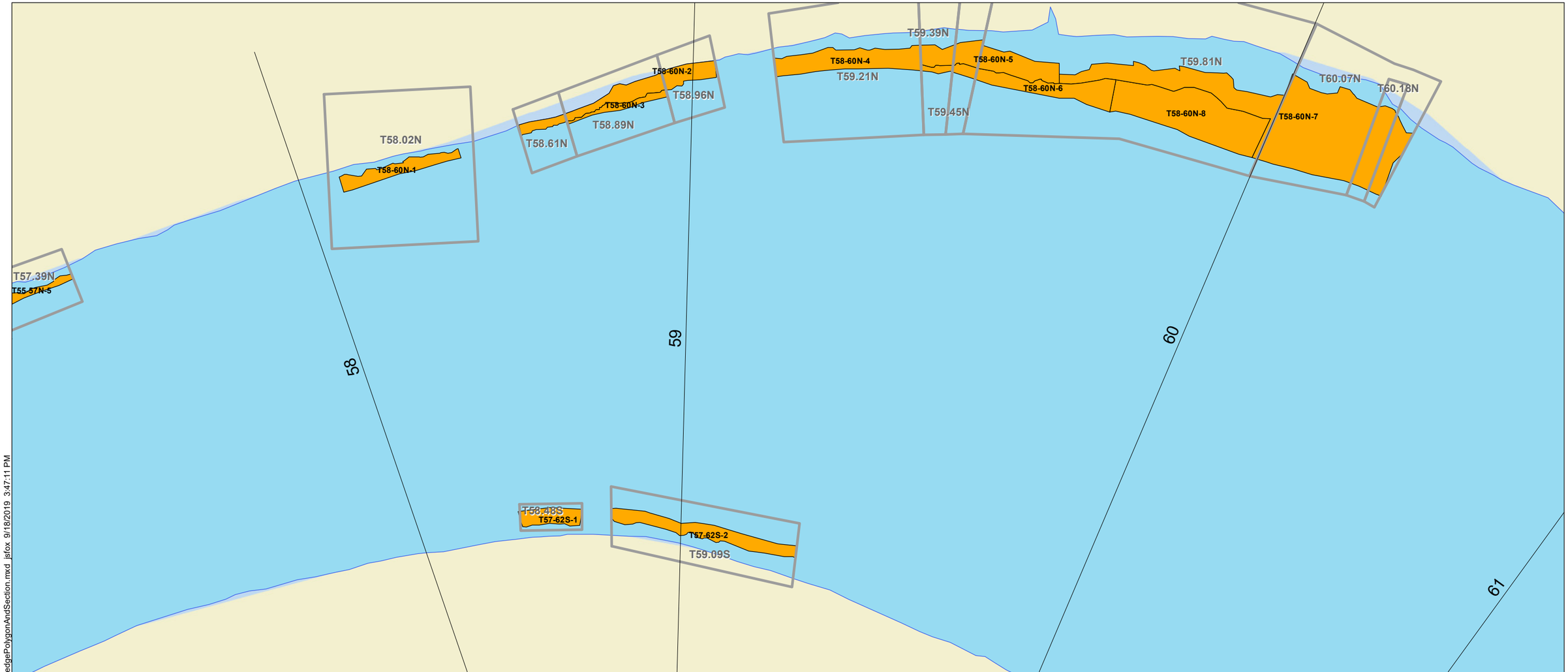
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




**Legend**

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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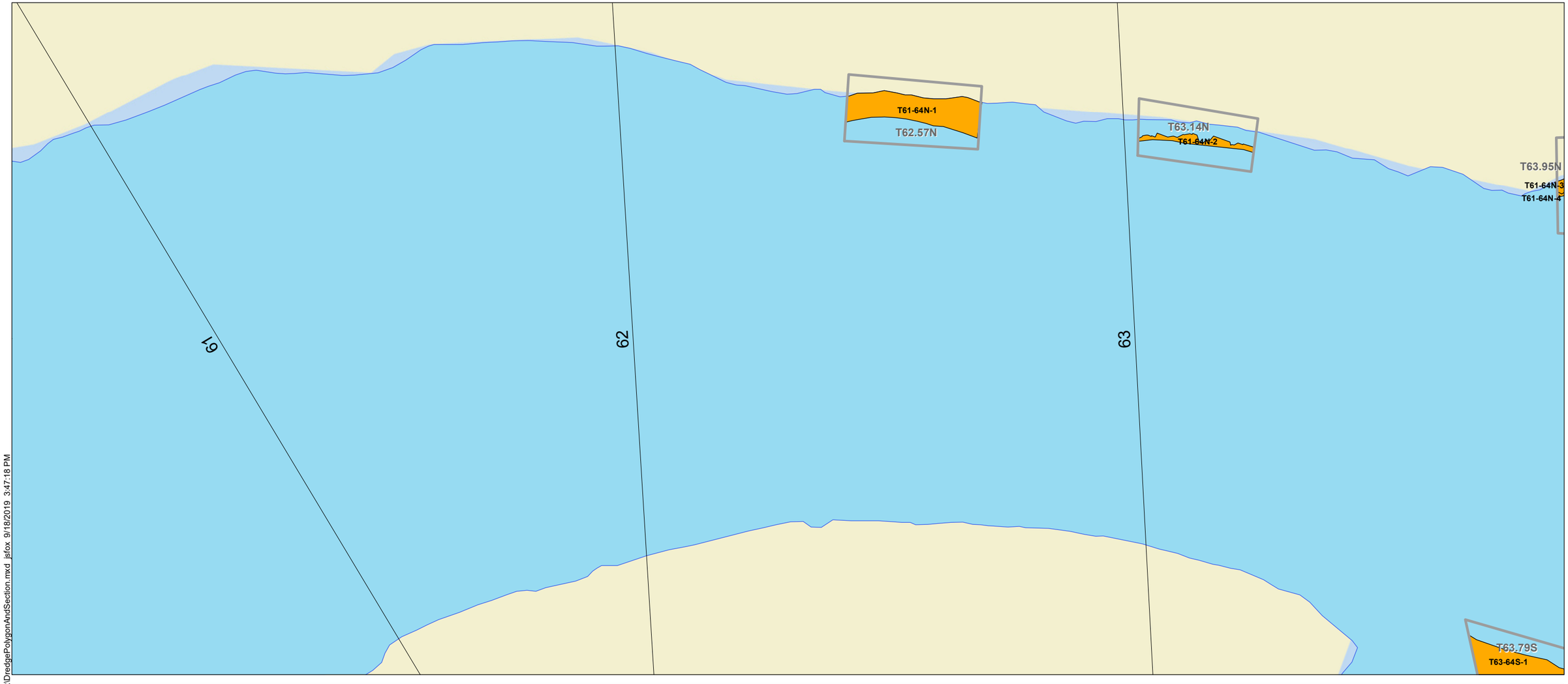
**Figure F3-21**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




**Legend**

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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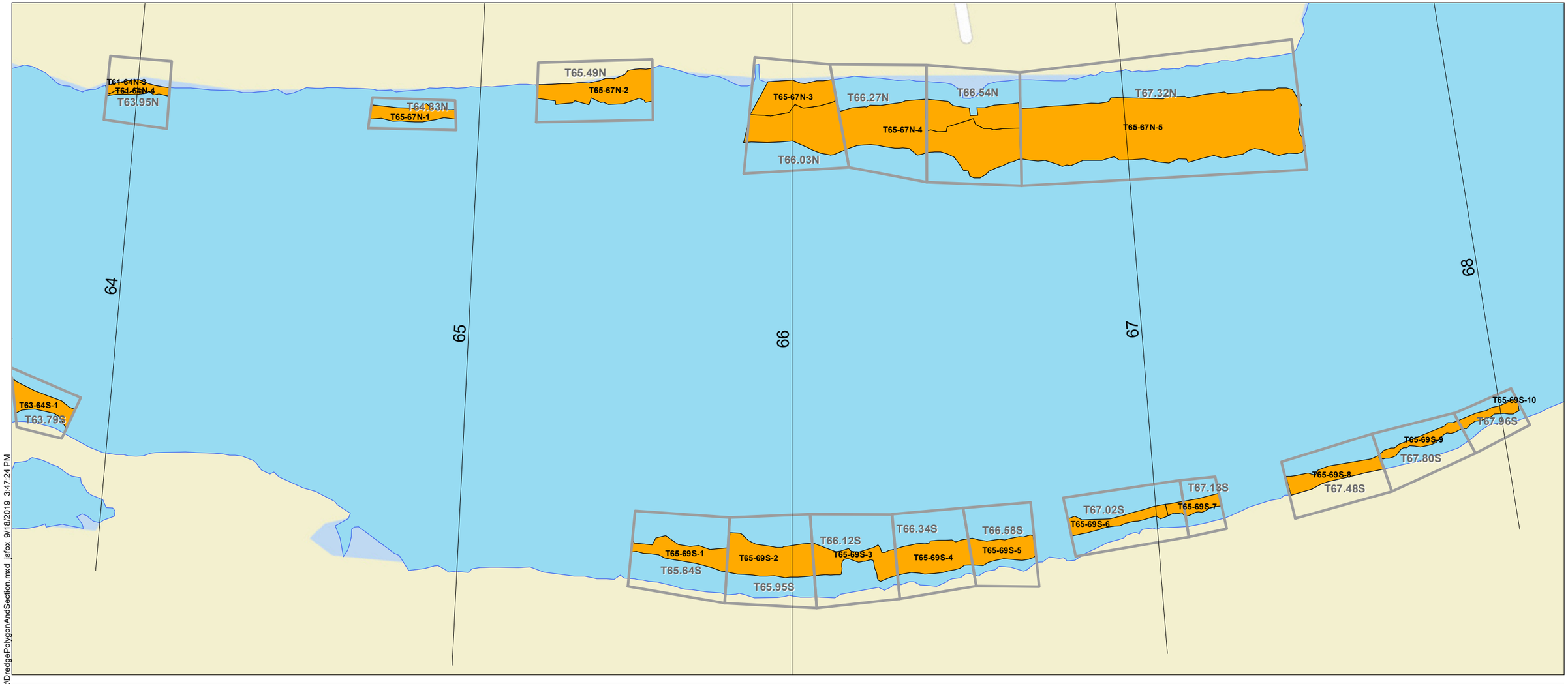
**Figure F3-22**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




## Legend

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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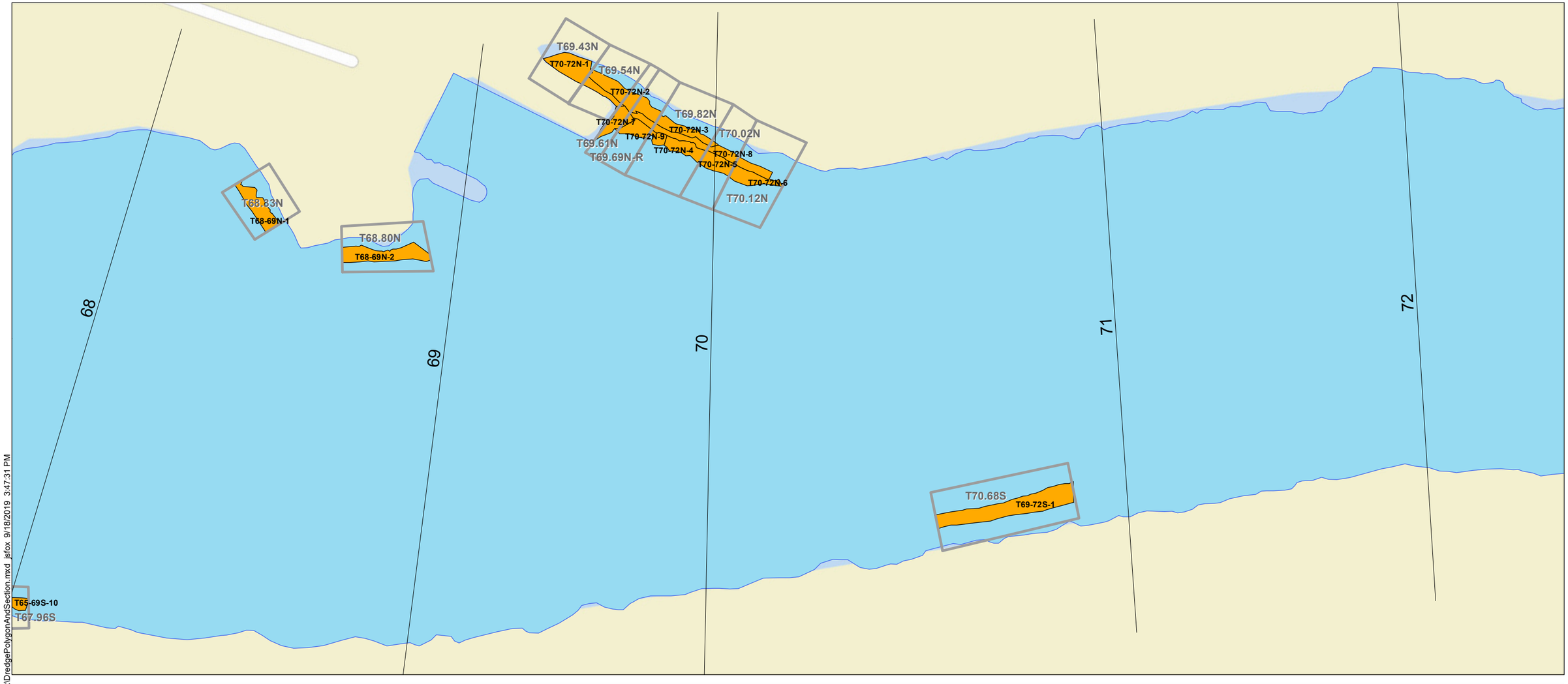
**Figure F3-23**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic




**Legend**

- Grasse River Transects
- Cross-section Areas and Label
- Final Dredge Areas and Subarea Label
- Grasse River

**NOTE:**
1. Remedial areas based on Final Design as of June 2019.

Feet
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ARCONIC

**Figure F3-24**
Near Shore Dredge Polygon and Section IDs
Final Design Report
Grasse River Project/Arconic

# Route 131 Staging Area
# Basis of Design
# Grasse River Remediation Project
# Massena, New York

**Prepared For:**
**Alcoa Remediation Management**
**100 Technical Drive**
**Alcoa Center, PA 15069-0001 USA**

**90% DESIGN SUBMITTAL**
**BID SET**

November, 2016

CDM Smith

# Table of Contents


**Section 1 Introduction ..... 1-1**

**Section 2 General Description of Staging Area Layout and Operations ..... 2-1**

2.1 Staging Area Layout ..... 2-1
2.2 Staging Area Operations ..... 2-2

**Section 3 Staging Area Facilities ..... 3-1**

3.1 Lower Platform Components ..... 3-1
3.1.1 Bulkhead ..... 3-1
3.1.2 Capping Material Laydown Area ..... 3-2
3.1.3 Sediment Processing Area ..... 3-3
3.1.4 On-Site Deceleration & Staging Lanes ..... 3-4
3.1.5 Boat Ramps and Anchor Points ..... 3-5
3.1.6 Monitoring Well Network ..... 3-5
3.2 Upper Platform Components ..... 3-5
3.2.1 Site Perimeter and Substation Fence ..... 3-5
3.2.2 Truck Scales ..... 3-6
3.2.3 Air Monitoring Stations ..... 3-6
3.2.4 Equipment Maintenance Areas ..... 3-6
3.3 Roadway Logistics ..... 3-7
3.3.1 Off-Site Construction Truck Route and Site Approach ..... 3-8
3.3.2 On-Site Loop Road ..... 3-9
3.3.3 Truck Staging Area ..... 3-9
3.3.4 Project Parking ..... 3-10
3.3.5 On-Site Pavement Design ..... 3-10
3.3.6 Pedestrian Safety ..... 3-11

**Section 4 Utilities ..... 4-1**

4.1 Electrical ..... 4-1
4.2 Miscellaneous Site Electrical Needs ..... 4-2
4.3 Potable Water ..... 4-3

**Section 5 Site Management ..... 5-1**

5.1 Water Management ..... 5-1
5.1.1 Process Water ..... 5-1
5.1.2 Groundwater ..... 5-1
5.1.3 Stormwater ..... 5-1
5.2 Water Pre-Treatment ..... 5-3
5.3 Soil Erosion and Sediment Control ..... 5-4
5.4 Waste Management ..... 5-6
5.4.1 Waste Management of Contaminated Sediment from Site Construction ..... 5-6
5.4.2 Disposal of Contaminated Sediment Waste ..... 5-6

**Section 6 Permitting ..... 6-1**
6.1 Federal ..... 6-1
6.2 State ..... 6-1
6.3 County ..... 6-2
6.4 Local ..... 6-2

**Appendix A**
Drawing Number B-203203-JM
Waste Management Process
Drawing Number B-203223-JM

# List of Tables


Table 1-1 Staging Area – Division of Work ..... 1-2
Table 3-1 Backfill and Capping Operations Summary ..... 3-2
Table 3-2 Anticipated Maximum 7-Day Material Volumes and Corresponding Approximate Processing Area Stockpile Sizes ..... 3-3
Table 3-3 Assumed Dredge Operation Summary ..... 3-4
Table 3-4 Construction Haul Road Design Criteria ..... 3-4
Table 3-5 Project Construction Traffic ..... 3-7
Table 3-6 County Route 42 Design Criteria ..... 3-9
Table 3-7 Summary of Project Parking Spaces ..... 3-10
Table 3-8 Summary of Heavy Vehicles ..... 3-10
Table 4-1 Lighting Average Maintained Illuminance Design Criteria ..... 4-1
Table 4-2 Lighting Fixture Details ..... 4-2
Table 5-1 Summary of Stormwater Management Zones ..... 5-1
Table 5-2 Sump and Sump Pump Sizing ..... 5-2
Table 5-3 Construction Sediment Trap Schedule ..... 5-5

# Section 1

# Introduction

This document outlines the Basis of Design for the Route 131 Staging Area to support the Grasse River Remediation project. The Grasse River dredging and capping construction is expected to take between 4 and 6 years. The Staging Area is being designed to support the in river construction. Since the shortest duration of the dredging, backfill and capping in the river represents the conservative assumption in regards to staging area layout, design, and operations, a 4 year construction and operation period is currently being assumed. This 4 year schedule is based upon 2 years of near shore dredging and backfill, overlapping with a minimum of 3 years of Main Channel Capping. Under this schedule work will take place during 12 hours shifts and over a 6 day work week. During this 4 year period the following major work activities are assumed as the basis of this design:

- Year 1 – Staging Area Construction
- Year 2 – Near Shore Dredging and Backfill
- Year 3 – Near Shore Dredging, Backfill and Main Channel Capping
- Year 4+ – Main Channel Capping until completion.

Construction associated with the Staging Area, taking place Year 1, will be completed by a selected Construction Contractor who will be responsible for the land based civil construction. In-river dredging and operations associated with the river remediation will be completed by a selected In-River Contractor. The In-River Contractor is responsible for operating the Staging Area, therefore several key site components will be associated with their scope of work. Table 1-1 provides a division of work associated with the Staging Area for both the Construction Contractor and the In-River Contractor.

The intent of the document is to provide the basis for which the Staging Area construction design has been developed. This document is both a guidance document used to develop the design, as well as a basis for parameters relied upon to ensure that operations will be successful. This Basis of Design provides parameters to establish sizing of facility components based upon planned river operations, to ensure safety during construction and operations, and to allow for adequate movements by vehicles, equipment and pedestrians around the site during operations. This document is not intended to detail means and methods of how construction of the facility will take place. Instead it will be incumbent upon the selected Construction Contractor to provide details on performance based operations. This Basis of Design provides an understanding of design development and based on the identified parameters will guide construction by the selected Construction Contractor. Selected Construction Contractor may submit equals to meet the intent of the BODR for approval by Alcoa.

**Table 1-1**
**Staging Area - Division of Work**

| Construction Contractor (Site Civil) | Remediation Contractor (In-River) |
|---|---|
| Site Civil – Grading, entrance points, roadways, entrances parking, subgrade, paving, swales and culverts | In water docks |
| Sheet pile wall | Moorings |
| Boat ramp and shoreline anchors | Water pre-treatment equipment – tanks, pumps, piping |
| Scale and scale foundations on grade | Project trailers – trailer complex and lower trailer |
| Utilities – water to meter and stub ups/electrical to MCC and light poles, conduits and pull string to other power needs, including security cameras | Water connections from stub ups/Electrical wiring from MCC to power needs |
| Substation Power – lighting and MCCs | Sanitary facilities and tanks |
| One site entrance trailer, Scale Operator Booth and Project Trailer | Tarping Stations |
| Buried water force main – single walled HDPE to 005 Impoundment | Wheel wash station and tanks |
| Contaminated sediments removal and prep for disposal from footprint of boat ramp and behind sheet pile wall | Air monitoring stations |
| | Dredging of river sediment south of bulkhead wall |
| | Fuel systems and tanks |
| | Sump pumps |

# Section 2

# General Description of Staging Area Layout and Operations

The Staging Area design is part of a larger project being conducted by Alcoa as a Remediation Design under Comprehensive Environmental Response Compensation, and Liability Act (CERCLA). Located adjacent to the Route 131 Bridge, the site of the Staging Area was selected for several reasons including: available acreage, proximity to the Secure Landfill and 005 Impoundment, accessibility for truck traffic to County Route 42 and State Route 131, the property is owned by Alcoa, as well as it being centrally located within the planned in river work. The property is composed of approximately 19 acres, of which approximately 15 acres will be used for Staging Area operations. The property has an approximate 50 foot difference in elevation from County Route 42 to the Grasse River, with areas of moderate grade that have been integrated into the design of the facility. Staging Area layout design considered these parameters to allow for safe operations to take place during the in river work.

Facilities are designed to provide security to the site, segregation of vehicle types and pedestrians, and the ongoing operations needed for both near shore sediment dredging and processing as well as nearshore backfill and main channel capping.

In addition to the Staging Area site both the Secure Landfill and Alcoa's water treatment facilities will support this operation. Processed sediment will be transported to the Secure Landfill for ultimate disposal. Pretreated process and contact water from the Staging Area exclusion zone will be conveyed through a single walled HDPE force main to the 005 Impoundment, then final treatment for PCBs at Alcoa's water treatment plant prior to discharge to the Grasse River at Outfall 004 under SPDES Permit NY-0001732.

## 2.1 Staging Area Layout

The Staging Area layout is provided on Drawing B-203203-JM presented in Appendix A. Due to the existing surface topography the site grade lends itself to a terraced approach. The site layout provides for an upper and lower working platform. Grading has also been developed to support access for both truck traffic along a one way construction loop road as well as a separate access road to the project trailers and boat ramp for smaller vehicles. The project layout consists of the following major facilities.

The upper platform will include the following major facilities:

1. Facility entrance and security
2. Two truck weighing facilities including an elevated operator booth
3. Security Trailer and Project Trailer
4. Locations for two tarping station

5. Additional Cap Laydown Area (if required)
6. Equipment Maintenance and General Laydown Yard
7. Project parking
8. Project In-River Contractor trailers
9. Water and electric utilities

The lower platform will include the following major facilities:

1. Capping Material Laydown Area
2. Sediment Processing Area
3. Water Pre-Treatment Area
4. Equipment Maintenance Yard
5. Location of wheel wash station
6. Boat ramp, project dock anchors and boat trailer parking
7. Location for fueling station
8. Location for sanitary waste pump out and storage
9. Barge unloading/loading zone
10. Bulkhead for marine operations

## 2.2 Staging Area Operations

Operations at the Staging Area will be largely driven by the management and handling of dredged sediments, backfill and capping materials and associated water. Dredged materials will be managed in an exclusion zone that has been established, which includes the Sediment Processing Area and associate bulkhead offloading zone, the Water Pre-Treatment Area (lower and upper terrace) and the lower Equipment Maintenance Yard. A contaminant reduction zone and support area is located just to the southeast of the exclusion zone and will include a decontamination area for workers, a support trailer and storage shed for spill response. Additionally there is a designed wheel wash area located at the exit point for the loading zone for the Sediment Processing Area to wash trucks tires/equipment exiting this area. The In-River Contractor will be responsible for providing and installing decontamination equipment.

Solids management and handling will be built around the processing of sediments, and the delivery and placement of backfill and capping material occurring along the bulkhead. For the receipt and dewatering of sediments at the bulkhead the following process is envisioned by the In-River Contractor. Sediments will be allowed to gravity drain on scows prior to offload. Decant water from the scows will then be pump off and pretreated at the Staging Area prior to conveyance to 005 Impoundment. Cement may be added on the scows prior to sediment offload

to support bulking and stabilization needs, as required. Materials will then ultimately be offloaded to the Sediment Processing Area for further dewatering and stabilization. Once the material meets the required transport and placement conditions it will be loaded into trucks and transported to the Secure Landfill under regulated waste manifests. A graphical representation of how this process is envisioned is provided in **Appendix A**. Backfill and capping material will be mixed as needed and loaded into scows/marine platforms for placement in the river. Ultimate means and methods of how sediment, backfill and capping materials are handled will be left up to the selected In-River Contractor.

Water management at the Staging Area will be completed for process water, stormwater and groundwater. Water for the project falls into two categories, 1) contact and 2) non-contact water.

1. Contact water includes process water generated from the scows and the Sediment Processing Area, stormwater located within the exclusion zone and water produced from the wheel wash.

2. Non-contact water includes stormwater and groundwater collected from the site outside the exclusion zone within Zone 2, Zone 2A and Zone 3. Drawing B-203223-JM presented in Appendix A shows the stormwater management zones: Zone 1, Zone 1A, Zone 2, Zone 2A and Zone 3.

Zone 1, which is the exclusion zone for the project is managed to collect process, storm and wheel wash water. This water will be pretreated at the Staging Area for solids, then conveyed to 005 Impoundment through a 4 - inch single walled HDPE force main for further treatment prior to discharge at Outfall 004.

Stormwater from Zone 2, Zone 2A and Zone 3 along with groundwater from the interceptor trench will be allowed to flow to the Grasse River and will be visually monitored in accordance with the project's Stormwater Pollution Prevention Plan (SWPPP). Water flow velocity will be reduced and settling using rock lined swales with check dams will take place prior to water discharge to the Grasse River under standard operating procedures.

# Section 3

# Staging Area Facilities

## 3.1 Lower Platform Components

### 3.1.1 Bulkhead

A sheet pile bulkhead will be installed at the shoreline adjacent to the Capping Material Laydown Area and Sediment Processing Area to facilitate mooring of hopper barges and other vessels for loading and unloading of cap/backfill materials and dredged sediment. Key basis of design for the bulkhead include:

- Type of bulkhead: Steel sheet pile
- Normal water level in river: El. 155.5 ft. USLS35
- Design draft at bulkhead: El. 145.0 ft. to El 140.0 ft.
- Top of Bulkhead Steel: El. 165.5 ft.
- Bulkhead sheeting tip elevation: El 130 ft. to 125 ft.
- Height to top of bulkhead from MHW: 10 ft.
- Steel sheet pile material: 50 ksi steel
- Surcharge Load: 750 psf set 10 ft. behind the bulkhead
- Allowable crane loading at bulkhead: 40 tons
- Maximum width of loading/unloading zone at bulkhead: 30 ft.
- Anchor system: Deadman anchor slab
- Spacing of ladders along water side of bulkhead: 100 ft.
- Groundwater level: 3 ft. below ground surface
- Tie rod: 3 ft. below ground surface, 10 ft. on center
- Bulkhead length: 600 ft.
- Design Life: 6 yrs.
- The design draft and bulkhead length are based on upper bound estimates previously provided by potential In-River Contractors.

### 3.1.2 Capping Material Laydown Area

The Capping Material Laydown Area is expected to be used for staging during backfilling operations in Year 2 and Year 3 and capping operations from Year 3 through completion.

In Year 2, an estimated 0.34 acres of the Capping Material Laydown Area on the lower platform will be covered with stockpiles. As indicated in Table 3-1 below, during Year 3, a total stockpile area of about 1.4 acres is estimated, which will require partial staging in the Additional Capping Material Laydown Area located on the upper platform. Upon completion of dredging activities in Year 3, the Sediment Processing Area will become available for backfill and capping material storage (following appropriate decontamination), thus reducing the potential further need for the Additional Capping Material Laydown Area. In Year 4 and until project completion, a total of approximately 2.6 acres (including the former Sediment Processing Area) will be available for capping material laydown, about 1.4 acres of which may be used for stockpiles. This assumes a 7 day stockpile of bulk materials.

The In-River Contractor will dredge for a single 12-hour shift per day, six days per week, and is estimated to dewater 454 CY of sediment per day.

**Table 3-1**
**Backfill and Capping Operations Summary**

| Operation | Year 2 | Year 3 | Year 4 and Beyond |
|---|---|---|---|
| Estimated Backfill Volume | 101,170 | 42,314 | 0 |
| Backfill Production Rate (CY/day) | 604 | 604 | 0 |
| Dredging Production Rate (CY/day) | 454 | 454 | 0 |
| T1-T21 Cap Volume (CY) | 0 | 359,953 | 0 |
| T1-T21 Production Rate (CY/day) | 0 | 1,892 | 0 |
| T21 – T72 Cap Volume (CY) | 0 | 9,933 | 662,475 |
| T21- T72 Production Rate (CY/day) | 0 | 1,892 | 1,892 |
| Stockpile Area (min. acres) | 0.3 | 1.4 | 1.4 |
| Average Daily Volume Staged (All Materials) (CY) | 3,624 | 12,373 | 6,851 |
| Maximum Volume Staged (All Materials) (CY) | 3,624 | 14,976 | 11,352 |

The key Basis of Design for the Capping Material Laydown Area layout are presented below:

- Capping Material Laydown Area to be used for temporary stockpiling of sand, topsoil, gravel, and armor stone for capping and backfilling operations.
- Total area: 1.4 acres to provide 7 calendar days storage (excluding additional acreage in Sediment Processing Area)
- Material Handling Method to Load Barges: Front end loader, hopper, and conveyor (assumed)
- The In-River Contractor works a single 12-hour shift per day, six days per week

The estimated maximum 7-day volumes for the different materials and corresponding stockpile areas during backfilling and capping operations are summarized in Table 3-2.

**Table 3-2**
**Anticipated Maximum 7-Day Material Volumes and Corresponding Approximate Processing Area Stockpile Sizes**

| Material | Year 2 | | Year 3 | | Year 4 and Beyond | |
|---|---|---|---|---|---|---|
| | Volume (CY) | Stockpile Area (Acre) | Volume (CY) | Stockpile Area (Acre) | Volume (CY) | Stockpile Area (Acre) |
| Sand | 1,812 | 0.17 | 3,174 | 0.29 | 5,676 | 0.53 |
| Topsoil | 1,812 | 0.17 | 3,174 | 0.29 | 5,676 | 0.53 |
| Gravel | - | - | 2,724 | 0.25 | - | - |
| Armor Stone | - | - | 5,903 | 0.55 | - | - |

### 3.1.3 Sediment Processing Area

Dredged sediment from the Grasse River will be loaded onto barges, which will be unloaded at the Sediment Processing Area using long reach excavators or other means as determined by the selected In-River Contractor. Sediments will first be allowed to gravity drain on scows prior to offload. Cement may be added on the scows prior to sediment offload to support the bulking and stabilization needs, as required. Materials will then be offloaded to the Sediment Processing Area for further dewatering and stabilization. The key design basis for the Sediment Processing Area discussed above are summarized below:

- Sediment Processing Area is sized at 1.25 acres to provide a maximum storage capacity for up to approximately 3,500 CY of sediment. Sediment will be stored in stockpiles in an area of up to 170 feet long and 170 feet wide with an approximate height of 10 feet.
- Duration of sediment stockpiling operations: Year 2 – Year 3
- An anticipated stockpile area: 0.66 acre
- Typical percent area occupied by stockpile: 50%
- The sediment processing area will be lined with a 40 mil high density polyethylene (HDPE) liner overlain by a 24 oz./yd$^2$ protective non-woven geotextile or approved equal.
- A minimum 8-inch thick layer of gravel will be placed atop the geotextile with asphalt paving, consisting of a 3-inch base course and 1.5-inch top course at the surface to provide a trafficable surface.
- Dredged material will be stockpiled for a duration of approximately 7 days to allow gravity dewatering prior to disposal in the on-site Secure Landfill.
- After completion of dredging activities in Year 3, the Sediment Processing Area may be used for staging of backfilling and capping materials after appropriate decontamination.

- Material handling method: Dredged sediment from barge will be unloaded and deposited in processing area using long reach excavator or other approach by selected In-River Contractor. Alternative methods proposed by the contractor will be considered by Alcoa.
- Material may be spread using low ground pressure bull dozer, front end loader, or other similar equipment. After an appropriate period of dewatering, sediment will be loaded on to trucks for disposal in Secure Landfill.

**Table 3-3**
**Assumed Dredge Operation Summary**

| Sediment Process Area Operation | Year 2 | Year 3 |
|---|---|---|
| In-Situ Removal Volume (CY) | 89,665 | 19,035 |
| Number of Dredges | 2 | 2 |
| Number of Barges (min) | 6 | 6 |
| Production Rate (CY/day) | 454 | 454 |
| Total Disposal (tons) | 130,660 | 27,738 |
| Truck Trips per day | 37 | 37 |
| Required Trucking Days | 189 | 51 |

### 3.1.4 On-Site Deceleration & Staging Lanes

Deceleration/staging lanes will be provided on the approaches to the Capping Material Laydown Area and Sediment Processing Areas. This will minimize delays for construction traffic waiting to approach each of the areas and improve overall traffic flow and safety. The road will be designed to meet the standards in the Construction Haul Road Design Criteria Table 3-4 below. The selected Construction Contractor may propose alternative standards and materials of construction that will be considered by Alcoa for off road application.

**Table 3-4**
**Construction Haul Road Design Criteria**

| Description | NYSDOT | AASHTO | Design |
|---|---|---|---|
| Minimum Radius | N/A | 40’-0” (Exhibit 2-13) | 50’-0” |
| Lane Width | 9’-0” (Exhibit 2-7) | 9’-0” (Exhibit 5-5) | 12’-0” |
| Shoulder Width | 2’-0” (Exhibit 2-7) | 2’-0” (Exhibit 5-5) | 2’-0” |
| Max. Grade | 11% (Exhibit 2-7) | 11% (Exhibit 5-4) | 8% |
| Acceleration Taper Lane Length | 80’-0”[1] | 80’-0”[1] | 80’-0” |
| Deceleration Lane Taper Length | 80’-0”[1] | 80’-0”[1] | 80’-0” |
| Pavement Thickness | 4 ½” asphalt<br>8” gravel subbase | 4 ½” asphalt<br>8” gravel subbase | 4 ½”[2] asphalt<br>8” gravel subbase |

Sources: NYSDOT Highway Design Manual & AASHTO Policy on Geometric Design of Highways at Streets, 2004.

1 – Taper length design criteria are not available for this type of roadway and design speed. Taper length is calculated using the formula L = WS2/60

2 – Pavement shall be placed in two courses with 1.5” top course over 3” base course over 8” gravel subbase. See pavement design for calculations.

### 3.1.5 Boat Ramps and Anchor Points

A boat ramp will be located in the southeast portion of the site at the south end of the access road. The key design basis for the boat ramp and anchor points are summarized below:

- The parking lot entrance and ramp will have a 14% slope and have a minimum submergence of 3 feet when the water surface of the river is at an elevation of 154.3 ft. USLS35.
- Installation of the Boat Ramp is anticipated to take place in the dry.
- The ramp will be approximately 20 feet wide.
- The parking area immediately north of the boat ramp is designed to be large enough to allow small vessels (approximately 21 feet and vehicles towing them) to drive down the access road and maneuver such that the vessels can be backed down the boat ramp and launched into the river.
- Boat ramp parking includes parking spots for up to five boat trailers and tow vehicles, as well as up to five full size pickup trucks.

### 3.1.6 Monitoring Well Network

A monitoring well network will be installed as part of the construction effort. Five monitoring wells will be installed to support groundwater monitoring during site operations. Two wells will be installed upgradient of the Exclusion Zone near the site truck entrance and the contractor parking lot. Three wells will be installed downgradient of the operations within the bulkhead wall baffles. Locations and specifications are provided on Drawing B-203203-JM in Appendix A. The selected Construction Contractor will be responsible for installation; the In-River Contractor will be responsible for maintenance.

## 3.2 Upper Platform Components

### 3.2.1 Site Perimeter and Substation Fence

A 7-foot-high chain link fence will be installed along landside limits of the site to prevent access and help ensure the safety of the public. The north facing side along County Route 42 the fence will be installed with 4 ft. deep sonotube footings at each fence post.

- The Truck Staging Area will be outside of the fence line.
- A power sliding security gate and trailer between the Truck Staging Area and the Construction Loop Road will control access to the Staging Area.
- A manual sliding security gate and a keycard access gate will be located at the entrance to the Project Parking Lot.
- Per Alcoa standard practices, fences running parallel to overhead wires (within 10 feet), directly under overhead wires or around substations will include grounding.

### 3.2.2 Truck Scales

Two truck scales are located at the main entrance/exit gate. The entrance/exit lanes will be divided with physical separation. A small maned Scale Operator Booth (8 ft. by 12 ft.) will be located between both scales and be elevated to allow for transfer of paperwork from the outgoing trucks to the booth. Scales will have wireless readout within the Scale Operator Booth. The foundations for the proposed scales may be designed for a maximum allowable bearing capacity of 1.0 tsf, and the site should be considered as a Site Class "D" for determining design earthquake forces. The small trailer will allow load weights to be recorded and/or manifesting to be completed without having drivers exit their truck and without site staff having to routinely cross active traffic lanes.

- Designed to include two truck scales based on projected max truck volume and trip frequency (Year 3). The maximum number of truck trips assumed 64 tri-axle trucks and 113 semi-trailer trucks each day during dredging and capping operations.
- Two scales are projected to allow trucks 4 minutes to approach the scale and would decrease backup and avoid opposing traffic at one scale.
- Truck scale dimensions shall have 11 ft. wide clear zone width by 72 foot length.
- Truck scales will require 10 ft. of concrete pavement on each approach and an asphalt ramp from the roadway grade to the truck scale grade. The truck scale will be approximately 20 inches above the roadway grade.
- Truck scales will have a concentrated load capacity of 100,000 lbs. with 75,000 analog compression column load cell capacity.
- Truck scales will have digital indicators and printers to eliminate the need for truck drivers to exit their vehicles.
- Truck scales will have a minimum of 3/8" steel decking with ¾" welded steel end plates.

### 3.2.3 Air Monitoring Stations

Locations reserved for air monitoring stations will be located on the site to allow for continuous monitoring of air quality, the number and exact locations are not currently finalized. Air monitoring stations are not included in this contract and supplying and installing will be the responsibility of the In-River Contractor. These stations will be part of the Community Health and Safety Plan (CHASP) when issued. One downwind station will be located in the vicinity of the Sediment Processing Area and Water Pre-Treatment Area; the second downwind station will be located in the northeast corner of the Staging Area near the project parking lot. One upwind station will be located on the western side of the Staging Area, near the Construction Loop Road. These stations will allow for the monitoring of air quality as part of the operations plan.

### 3.2.4 Equipment Maintenance Areas

The Staging Area will have two Equipment Maintenance Areas (upper and lower) where various equipment can be maintained, serviced, or stored. The upper area, located near the trailer complex and project parking area will be used to address general equipment laydown and

storage for non-contact equipment. The lower area, located within the Exclusion Zone will be used to maintain any vehicles or equipment that are operating within the Exclusion Zone.

## 3.3 Roadway Logistics

Off-site and on-site improvements will be made to allow for safe operations of construction traffic (both truck and worker vehicles) entering the project site. These improvements will also minimize the disruption of traffic on County Route 42.

Table 3-5 below summarizes the anticipated average construction traffic volumes and vehicle types for each year of the project under the most probable four year operations scenario and have been used to complete the design of the Staging Area.

**Table 3-5**
**Project Construction Traffic**

| Operation Year | Operation | Vehicle Type | Vehicles/Day |
|---|---|---|---|
| Year 2 | Dredging Trucking | Tri-axle Trucks | 37 |
| | Backfill Trucking | Semi-Trailer Trucks | 22 |
| | Misc. Staffing | Passenger | 17 |
| | Indirect Staffing | Passenger | 17 |
| | Dredging Staffing | Passenger | 24 |
| | Backfill Staffing | Passenger | 17 |
| Year 3 | Dredging Trucking | Tri-axle Trucks | 37 |
| | Backfill and Capping Trucking | Semi-Trailer Trucks | 131 |
| | Misc. Staffing | Passenger | 17 |
| | Indirect Staffing | Passenger | 17 |
| | Dredging Staffing | Passenger | 24 |
| | Backfill and Capping Staffing | Passenger | 48 |
| Year 4 | Backfill and Capping Trucking | Semi-Trailer Trucks | 64 |
| | Misc. Staffing | Passenger | 17 |
| | Indirect Staffing | Passenger | 17 |
| | Dredging Staffing | Passenger | 24 |
| | Backfill and Capping Staffing | Passenger | 48 |
| Year 4+ | Capping Trucking | Semi-Trailer Trucks | 64 |
| | Misc. Staffing | Passenger | 17 |
| | Indirect Staffing | Passenger | 17 |
| | Dredging Staffing | Passenger | 24 |
| | Capping Staffing | Passenger | 31 |

Misc. Staffing to include Alcoa Staff, Engineers, Oversight, Monitoring and Visitors

### 3.3.1 Off-Site Construction Truck Route and Site Approach

The construction truck route has been designed to promote safety as well as the control of vehicles and to provide separation of construction/worker vehicles from pedestrians. The following provides the basis for off-site construction truck operations that have been included in the design.

- Off-Site Construction Truck Movements
  - Bulk material delivery trucks will cross the Alcoa Bridge and enter the site from the west, minimizing lane crossings.
  - Bulk material delivery trucks will leave the site to the east and cross the Route 131 Bridge, once again minimizing lane crossings.
  - Contaminated sediment trucks will travel to and from the Staging Area to the Secure Landfill via County Route 42 and enter at the Denison Cross Road gate.
- Off-Site Worker Vehicle Movements
  - To separate construction and site worker vehicle traffic, site workers will enter a separate gate to the east for project parking and access to the boat ramp.
  - Project parking area gate will be via key card access or equal. New to the job site visitors and employees will conduct a site specific health and safety indoctrination and be issued a temporary or project key card.
- Off-Site Pavement Design
  - A deceleration/turn lane will be constructed in the eastbound lane of County Route 42 to minimize the disruption to the existing traffic network.
  - Pavement for the deceleration lane will be adequate to accommodate construction vehicles for the duration of the project
  - Deceleration/turn lane designed to be 100 feet in length to accommodate the speed limit of 45 mph on County Route 42 and to meet NYDOT and AASHTO Design Criteria.
  - Off-site pavement will follow the criteria provided in the following Table 3-6.
  - Pavement design will match the existing pavement courses and depths of the County Route 42 roadway.
- Off-Site Traffic Control
  - Temporary work zone traffic control during construction on County Route 42 will be accomplished by a shoulder closure or a single-lane closure, depending on the existing roadway width.

- Work zone traffic control shall conform to the Contract Specifications and Section 619 of the NYSDOT Standard Construction Details and Specifications.
- Traffic control on County Route 42 will conform to Sections 619 and 685 of the NYSDOT Standard Construction Details and Specifications.

**Table 3-6**
**County Route 42 Design Criteria**

| Description | NYSDOT | AASHTO | Design |
|---|---|---|---|
| Lane Width | 10'-0" min, 12'-0" desired (Exhibit 2-5) | 12'-0" (Exhibit 6-5) | 10'-6" (Match Existing) |
| Shoulder Width | 8'-0" (Exhibit 2-5) | 8'-0" (Exhibit 6-5) | 3'-6" (Match Existing) |
| Max. Grade | 8% (Exhibit 2-5) | 8% (Exhibit 6-4) | 8% |
| Deceleration Lane Taper Length | 100'-0" (§5.9.8.2) | 100'-0" (Exhibit 9-95) | 100'-0" |
| Deceleration Length | 360'-0" (Exhibit 5-30) | 385'-0" (Exhibit 10-73) | 385'-0" |

Sources: NYSDOT Highway Design Manual & AASHTO Policy on Geometric Design of Highways at Streets, 2004.

## 3.3.2 On-Site Loop Road

The roadway layout within the Staging Area will be constructed to provide a logical traffic flow for construction and worker vehicles. A one-way loop throughout the Staging Area provides construction truck separation from both site worker vehicle traffic and pedestrians. Vehicles will enter the Staging Area from the west through the Truck Staging Area, travel through the on-site one way loop road then exit towards the center of the site. Both the entrance and exit are through one main security gate.

- The loop road has been designed at a 16 foot width with 3 foot wide shoulders. The inner radius of the truck route is widened around the turns to allow adequate line of sight around corners to ensure that drivers are able to see potential backup in traffic while navigating steeper grades.
- A construction access roadway connecting the main inner loop roadway with the boat ramp access roadway is included to accommodate heavy equipment vehicles that may need to access the boat ramp. The volume of vehicles that will need to be accommodated through this access point should be minimal.

On-site roadway construction will follow the criteria provided in Table 3-4.

## 3.3.3 Truck Staging Area

The Truck Staging Area has been designed to allow for up to nine tractor trailer size construction vehicles to temporarily be staged and allow drivers to check in with security prior to entering the site as needed. The eastern most lane in the Truck Staging Area will be reserved for construction traffic to pass through without stopping. The pavement for the truck staging area will be 4 ½" of asphalt pavement with 1 ½" top course over 3" base over 8" gravel subbase.

### 3.3.4 Project Parking

On-site parking will be provided for truck staging, project workers, and boat trailers. The Table 3-7 below summarizes the number of spaces, dimensions, and minimum radii for each of the project parking areas.

**Table 3-7**
**Summary of Project Parking Spaces**

| Area | # of Spaces | Angle | Width | Length | Min. Radius |
|---|---|---|---|---|---|
| Trailer/Truck Staging | 9 | 45˚ | 18'-0" | 60'-0" | 50'-0" |
| Project Staffing | 82 | 90˚ | 10'-0" | 20'-0" | 15'-0" |
| Boat Trailers | 5 | 30˚ & 45˚ | 12'-0" | 50'-0" | 20'-0" |
| Boat Ramp Standard Vehicle Parking | 5 | 90 ˚ | 10'-0" | 20'-0" | 20'-0" |

### 3.3.5 On-Site Pavement Design

The pavement design will be adequate to accommodate the construction vehicles for the duration of the project.

- The anticipated total number of heavy vehicles entering the site for the duration of the project is summarized in the following Table 3-8:
- Heavy vehicle volumes combined with existing soil data was used to determine a proposed pavement design of 4.5" hot mix asphalt with 1 ½" top course over 3" base course over 8" of gravel subbase.

**Table 3-8**
**Summary of Heavy Vehicles**

| Operation | Vehicle Type | Total Vehicles | Factor[1] | ESAL's[2] |
|---|---|---|---|---|
| Dredging | Tri-Axle | 9,566 | 6.25 | 59,788 |
| Capping/Backfill | Semi-Trailer | 48,648 | 7.68 | 373,616.64 |
| | | | TOTAL | 433,404.64[3] |

1 – Factor to convert load from design vehicle type to equivalent 18,000 lb. single axle load (ESAL). See Pavement Design Report for calculations.

2 – Equivalent Single Axle Load. Used to establish a damage relationship for pavement design based on an 18,000 lb. single axle load with dual tires.

3 – For conservative design purposes, the total ESAL load was rounded up to 450,000.

### 3.3.6 Pedestrian Safety

To increase pedestrian safety, the following measures will be installed:

- A separate site access for project staffing and boat ramp vehicles.
- Pedestrian paths established throughout the project connecting each of the key site components to separate pedestrians from vehicle traffic.
- Barrier between the construction vehicle roadway and boat access roadway, via a soil berm, curbing, or guardrail.
- Guardrails provided in areas where pedestrian paths are in close proximity to vehicle traffic and equipment operations.
- Minimizing the number of locations where pedestrian traffic cross roadways.
- Proper signage and striping to delineate locations where a conflict between the roadway and pedestrian paths exist.
- Automated truck scale readings, key card gates, and ticket gate to reduce the need for construction vehicle drivers to exit their trucks.

# Section 4

# Utilities

## 4.1 Electrical

The utility power feed for the Staging Area site will come from 23kV overhead conductors located along the north side of Route 42. The 23kV utility feed will be routed overhead from existing Pole #54 to a new riser pole (Pole #54-1) at the northeast corner of the site. From there the feed will be routed underground to a 750 kVA, 23 kV – 480/277 V transformer provided by Massena Electric Department (MED). The transformer, along with other major distribution equipment, will be located within a fenced electrical distribution center. All underground conduits shall be direct buried at a minimum depth of 24" below grade utilizing consolidated fill and polyethylene warning tape.

A NEMA 3R aisle walk-in enclosure housing a new motor control center (MCC) will be located will be located by the Pre-Treatment area at the southeast part of the site to minimize distance between the load centers and major mechanical equipment. The motor control center will be equipped with an automatic transfer switch with manual throw-over for optional connection to a portable generator. The MCC and enclosure will have minimum equipment requirements. The staging area electrical contractor and the In-River Contractor shall coordinate exact MCC equipment, lineup, and other requirements.

There will be three major electrical distribution centers on site: one by the trailer complex, one by the entrance, and the other at the MCC enclosure. There will be three major 480V - 208/120V transformers on site – one at each of the distribution centers. All lighting circuits will be powered from panels at the distribution centers. The foundations for the electrical pads may be designed for a maximum allowable bearing capacity of 0.75 tsf, and the site should be considered as a Site Class "D" for determining design earthquake forces.

Lighting on the site was designed based on the recommendations found in the Illuminating Engineering Society of North America (IESNA) Handbook. Lighting will be focused on the project footprint and operations and will limit offsite disturbance. Lighting was designed with uniformity and average values exceeding recommended performance levels for enhanced safety. Criteria are summarized below.

**Table 4-1**
**Lighting Average Maintained Illuminance Design Criteria**

| | | |
|---|---|---|
| | | |
| | | |
| | | |

Site lighting will be powered at single phase, 208 Volts to minimize voltage drop. Fixtures will be type LED, utilizing weatherproof and corrosion resistant roadway type fixtures as well as floodlights. Fixtures will be pole mounted at 30' to maximize lighting distribution and overhead

clearance. Fixtures will be controlled by astronomical time clocks at lighting control panels. There will be a master lighting control panel and two auxiliary panels so that all site lighting circuits can be controlled simultaneously. The contractor shall be permitted to adjust lighting fixture tilt based on work area needs after coordinating with others. Lighting details are summarized below.

**Table 4-2**
**Lighting Fixture Details**

| Location | Description | Mounting Height & Orientation | Manufacturer | | |
|---|---|---|---|---|---|
| Roadway & Area Lighting | LED area lighting fixture, downward facing type 3 medium distribution | Pole mounted at 30', no tilt | RAB | Lithonia | Or Equal |
| Work Areas (Cap Laydown, Staging Area) | High Lumen LED Floodlight | Pole mounted at 30', 45 degree tilt | RAB | Lithonia | Or Equal |

## 4.2 Miscellaneous Site Electrical Needs

- Wheel wash station – to be provided by In-River Contractor
- Future air monitoring stations provided by the In-River Contractor
- Future Trailers: (6) trailers in northeast lot of site, and (1) trailer near the boat ramp provided by the In-River Contractor
- Trailers: (1) truck gate/security trailer, (1) Project Trailer, and (1) Elevated Scale Operator Booth
- Sliding gate access: automatic electric operator with an instantly reversing motor, magnetic brake, safety disk clutch, automatic limit switch, and an emergency release for manual operation
- Water Management pumps and controls
- Surveillance cameras – to be provided by In-River Contractor
- Water treatment plant operations – to be provided by In-River Contractor
- Bulkhead wall
- Offloading equipment for capping operations

Electrical grounding at the site will comply with the National Electric Code and Alcoa standards, including the Low Voltage and High Voltage Electrical Safety standards.

## 4.3 Potable Water

Potable water will be brought onto the site from a 12-inch supply line to the east along Route 131. The connection will be made with a 4-inch tap and line which will be metered near the trailer complex. The meter readout will be located on one of the construction trailers to allow for the Town of Massena to read. A 4-inch water line will continue to a stub up and fill point located in

the Equipment Maintenance and General Laydown Yard. The intent of this stub up and fill point will be to fill water trucks for the purpose of dust suppression. The 2-inch water lines will be used to service the remainder of the site including the trailer complex and sanitary facilities, the lower trailer and sanitary facilities near the boat ramp, the wheel wash, and water stub ups will be provided in the Capping Material Laydown Area, Water Pre-Treatment Area and bulkhead. The water lines will be buried at a minimum depth of 5 feet below ground surface and will run along the eastern edge of the property.

# Section 5

# Site Management

## 5.1 Water Management

Water produced from operations (process water), groundwater from the underdrain system and stormwater will be managed at the site. Stormwater zones are presented in Drawing B-203223-JM located in Appendix A. All process and stormwater pumps and equipment will be provided and installed by the In-River Contractor.

### 5.1.1 Process Water

Process water will be collected from two sources at the site; one from the pump used to remove free standing water from the scows that unload at the bulkhead, and the other from the sump located in the southeast corner of the Sediment Processing Area in Zone 1,which will receive water that dewaters from sediment pile(s). This process water is estimated to be approximately 31,100 gallons per day during peak dredging operations.

### 5.1.2 Groundwater

The groundwater table is high and therefore will be lowered via an underdrain system located along the lower loop road. Groundwater discharge is estimated to be approximately 14,000 gallons per day. This water will be combined with runoff water from Zone 3 and allowed to travel and settle particulates out using riprap lined swales and stone check dams.

### 5.1.3 Stormwater

Stormwater will be managed across the entire 15.65 acre site and has been divided into five primary zones shown in Table 5-1 and on Drawing B-203223-JM located in Appendix A. The stormwater runoff design is based on a 24-hour 10-year storm event of 3.14 inches. A 24-hour 10-year storm design is appropriate given the anticipated project duration of less than 6 years.

**Table 5-1**
**Summary of Stormwater Management Zones**

| Zone | Size (acres) | 24-hr 10-yr Storm Runoff (gallons) | Basis % Impervious | Stormwater Management |
|---|---|---|---|---|
| 1 | 1.80 | 180,000 | 100 | Capture and treat or Manage with BMPs |
| 1A | 0.50 | 40,000 | 100 | Capture and treat or Manage with BMPs |
| 2 | 4.80 | 320,000 | 50 | Manage with BMPs per the SWPPP |
| 2A | 1.05 | 80,000 | 100 | Manage with BMPs per the SWPPP |
| 3 | 7.50 | 510,000 | 60 | Manage with BMPs per the SWPPP |

When Zone 1 and Zone 1A are an exclusion zone, the stormwater in these zones will be considered impacted by PCBs, and therefore captured and treated. When the project progresses beyond the handling of PCB impacted material (Year 3+) and Zones 1 and 1A are verified cleaned

to not operate as an exclusion zone, the stormwater will be directed to Zone 3 for eventual discharge to the river.

Zones 2 and 2A stormwater will not be impacted by PCBs and therefore will be managed with best management practices (BMPs) as described in a site specific stormwater pollution prevention plan (SWPPP) and will be discharged to the river in a manner that minimizes erosion and turbid conditions to the river. Routine visual monitoring of discharges are anticipated to be required as per the SWPPP.

Zone 3 stormwater will also not be impacted by PCBs. This zone will be conveyed to the shoreline west of the bulkhead wall for discharge to the river. Sediment transported in stormwater runoff from Zone 3 will be managed by BMPs as described in a site specific SWPPP and will include riprap lined swales and stone check dams designed for a 24-hour 10-year storm event per the New York State Standards and Specifications for Erosion and Sediment Control. Routine visual monitoring of discharges are anticipated to be required as per the SWPPP.

HydroCAD was used to model the catchment areas that drain to the sumps. The sumps are expected to remain in operation throughout the project; therefore, a 24-hour 10-year design storm was used for their sizing. Also considered in the sizing was pump on/off switch elevations, lengths of piping, elevation heads and pump rates. The In-River Contractor will be required to deliver and operate equipment to meet these specifications. The sump and sump pump sizing results are shown in Table 5-2.

**Table 5-2**
**Sump and Sump Pump Sizing**

| Zone | Area (acres) | Sump Sizing | Sump Bottom Elev. (ft.) | Pump On Elev. (ft.) | Pump Off Elev. (ft.) | Pump Rate (gpm) |
|---|---|---|---|---|---|---|
| 1-Sediment Processing Area | 1.80 | 35'x35'x4' | 159.00 | 160.25 | 159.00 | 850 |
| 1A-North | 0.30 | 14’x15’x4’ | 163.00 | 164.25 | 163.00 | 200 |
| 1A-South | 0.20 | 10’x10’x4’ | 158.00 | 159.75 | 158.00 | 200 |

The sumps are designed using nearly vertical walls. The layout of the sumps are not constrained to the length and width dimensions shown, however the areas should be equivalent. The sumps should not exceed a depth of 4 feet.

At present there is a 12-inch-diameter culvert that conveys runoff from an area north of Route 42 discharging onto the site. To eliminate the potential for additional stormwater into the project limits the culvert will be plugged and abandoned (pumped with flowable fill) and runoff will be diverted to the west. A drainage ditch will be constructed parallel to Route 42 and Horton Road to convey runoff to a series of existing culverts under Horton Road and Route 42, ultimately discharging to the Grasse River via an existing channel west of the site. The drainage ditch has been designed to maintain a foot of freeboard during a 10-year, 24-hour storm event with velocities below 5 feet per second. As part of these modifications an existing 12-inch-diameter

culvert under a gravel driveway will need to be re-laid such that it is sloped from east to west, preventing potential ponding on the east side of the driveway.

## 5.2 Water Pre-Treatment

Water pre-treatment will occur in the Water Pre-Treatment Area located in Zone 1A. Pre-treated water will be conveyed to the 005 Impoundment via a forcemain. Waters being pre-treated will consist of the process water and stormwater runoff from the exclusion zone (Zones 1 and 1A). The maximum amount of stormwater runoff from the exclusion zone from a 24-hour 10-year storm is estimated at 220,000 gallons. It is expected the In-River Contractor would use both a 100,000 and a 200,000 gallon capacity equalization tank in the Water Pre-Treatment Area. The In-River Contractor is also expected to run the tanks at no more than 20% combined capacity (60,000 gallons) in normal conditions to accommodate for the design storm event. In the post-exclusion zone portion of the project, the In-River Contractor will need to continue to maintain the equalization tanks to provide capacity for the runoff from Zones 1 and 1A.

Secondary containment will be required for vessels in the Water Pre-Treatment Area. The In-River Contractor shall provide for 110% secondary containment of any tank or vessel used in the Water Pre-Treatment Area. Secondary containment for the 200,000 and 100,000 gallon equalization tanks is expected to be accomplished with a double liner and leak detection system within the tanks to contain 100% of the volume, and the remaining 10% by the volume of the sump, due to limited area in the Water Pre-Treatment Area. The foundations for the proposed tanks shall be designed for a maximum allowable bearing capacity of 1.5 tsf, and the site should be considered as a Site Class “D” for determining design seismic forces.

The pre-treated water being conveyed to the 005 Impoundment will be pumped through a 4-inch diameter forcemain, SDR 17, HDPE pipe material PE 4710 or PE 3710 or approved equal, and will be approximately 6,500-feet in length. This forcemain sizing is based on a design flow of 150 gpm with a tolerance range of 120-200 gpm. The specified piping will be able to maintain its structure against stresses due to surges resulting from flows within this range. The piping shall be designed for 125 psi working pressure with allowance for up to 250 psi due to surge pressure. All flanges, valves and fitting should be designed for a maximum momentary pressure of 250 psi.

The In-River Contractor will be required to select a pump capable of properly conveying water in the forcemain from the Water Pre-Treatment Area. The design of the forcemain is based on a pump operating with a design point of 175 gpm at 148-feet of head. Due to air pockets in the forcemain between pump startups and shutdowns, it is required that the startups and shutdowns slowly accelerate/decelerate the water in the line. This can either be accomplished by the used a variable frequency drive on the pump, or by the use of a globe style silent check valve. For startups the valve is closed until the pump is up to speed and then opened slowly over a minute for the first 20% of the stroke. For shutdowns the valve would be slowly closed over a minute for the last 20% of the stroke and then the pump is shut off.

## 5.3 Soil Erosion and Sediment Control

Soil erosion and sedimentation control measures as defined in the SWPPP will be implemented during construction by the Construction Contractor to ensure protection of the river. A 24-hour 10-year storm event is to be used for sizing swale and check dam riprap. Based upon this is the majority of the site is Class I riprap, with the exception of the swale east for the boat ramp and south of the eastern site culvert. This swale is Class II. The anticipated erosion and sediment control BMPs to be implemented during construction may include the following:

- Installation fiber rolls and/or silt fence with straw bales
- Installation of a stabilized construction entrance and staging area
- Implementation of erosion blankets
- Swales, Riprap and Check Dams
- Culverts

Zone 2 – Swale/Riprap/Culvert Basis for Sizing

- Western Swale - Max Velocity 4.6 fps
  - Use Class I riprap
- Eastern Swale – Max Velocity 4.3 fps
  - Use Class I riprap
- Culvert = 24" diameter
  - Max Velocity out of pipe 3.1 fps
- Outlet Swale – Max Velocity (with culvert at Route 131/42 intersection) 8.2 fps
  - Max Flow Depth (with culvert at Route 131/42 intersection) 1.4'
  - Use Class II riprap, with existing Route 131/42 intersection culvert drainage area included.

Zone 3 – Swale/Riprap/Culvert Basis of Sizing

- Western Swale – Max Velocity 5.6 fps
  - Use Class I riprap
- Eastern Swale – Max Velocity 4.4 fps
  - Use Class I riprap

- Culvert = 24" diameter
  - Max Velocity out of pipe 5.1 fps
- Outlet Swale – Max Velocity 5.6 fps
  - Max Flow Depth 0.8'
  - Use Class I riprap

All sediment controls will be established prior to the Construction Contractor commencing site preparation activities.

- General controls, such as a sediment fence will be installed between the work area and the Grasse River to ensure minimal disturbance.
- During construction, monitoring of the stormwater and erosion control systems will require site inspections with a specific itinerary regarding required observations.
- Inspections will be conducted by the contractor as required by the SWPPP.
- Additional inspections will be conducted after each major storm event to confirm the integrity of the storm water and erosion control system.

During construction the Construction Contractor will be required to manage stormwater on the site. Sediment traps will be developed by the Construction Contractor so that operations are carried out in such a manner that erosion and sediment are controlled. Sediment traps are to be sized at 3,600 cubic feet per acre of contributory drainage. Table 5-3 provides a sediment trap schedule based upon the contributory drainage area size during construction activity. The Construction Contractor shall remove the sediment from the trap and restore the trap to its original dimensions when the sediment has accumulated to half the design depth of the trap.

**Table 5-3**
**Construction Sediment Trap Schedule**

| Drainage Area (acres)[1] | Temporary Sediment Trap Surface Area Required (sq. ft.) | Embankment Depth (ft.)[2] | Required Volume Below Riser (cu. ft.) | Barrel Diameter (in.) | Riser Diameter (in.) | Top of Riser Pipe (feet above bottom of trap)[3] |
|---|---|---|---|---|---|---|
| 1 | 1,100 | 5 | 3,600 | 12 | 15 | 3.5 |
| 2 | 2,100 | 5 | 7,200 | 15 | 18 | 3.5 |
| 3 | 3,100 | 5 | 10,800 | 18 | 21 | 3.5 |
| 4 | 4,200 | 5 | 14,400 | 21 | 24 | 3.5 |
| 5 | 5,200 | 5 | 18,000 | 21 | 27 | 3.5 |

**Notes:**

[1] Pipe Outlet Sediment Traps shall be limited to 5-acre maximum drainage area.

[2] Maximum embankment depth shall be 5 feet.

[3] Top of riser pipe shall be 1.5 feet below the top of embankment.

## 5.4 Waste Management

During dredging operations both solid and liquid wastes will be generated. Wastes will be managed in accordance with Toxic Substance Control Act (TSCA) and New York State Department of Environmental Conservation (NYSDEC) regulations.

For solids waste management, contaminated sediments from the near shore remediation and, if required, for installation of water side features (cofferdam, bulkhead) will be disposed of in Cell 3 at the Massena West Secure Landfill. Dredging operations are anticipated to generate up to 454 cubic yards per day of contaminated sediment that will be processed at the Sediment Processing Area, with up to 64 truck trips of processed material sent to the Secure Landfill per day. Processed sediment will be transported to the permitted Secure Landfill under regulated waste manifests as previously stated.

For liquids waste management, contaminated water from both process operations as well as contact stormwater will be managed within the exclusion zone at the southeast corner of the Staging Area. The design basis for process water and stormwater rates, volumes, and treatment have been previously discussed. Contaminated water will be pre-treated to remove solids at the Staging Area, then sent to Alcoa's existing 005 Impoundment, followed by treatment and discharge to the SPDES permitted Outfall 004.

### 5.4.1 Waste Management of Contaminated Sediment from Site Construction

Contaminated sediment is anticipated to be encountered during construction of the Staging Area. Specifically sediment on the inland side of the wall at or below the water elevation is anticipated to have PCBs present. The volume of this material is estimated to be 110 cubic yards.

The approach for managing the contaminated sediment and soil is to begin with the installation of the sheetpiles that will become the bulkhead wall. Next the contractor will be required to excavate contaminated sediment in the dry until sediment meeting the project cleanup objective for PCBs of 1 mg/kg is achieved. This project clean up objective will also be required for sediment removal associated with the boat ramp installation, which will also be completed in the dry. The project will be required to sample excavation limits behind the wall and at the boat ramp to verify that PCB contaminated material has been removed. All sample locations will be surveyed.

### 5.4.2 Disposal of Contaminated Sediment Waste

Contaminated sediment will be processed and transported by the contractor to Alcoa's Secure Landfill. Prior to transport waste must meet the following Landfill acceptance criteria.

- Waste does not contain any free water – passes a paint filter test
- Waste has an unconfined compressive minimum strength of 6 psi measured by a pocket penetrometer

# Section 6

# Permitting

Several project components will require permitting /permit equivalencies for compliance with federal, state, county, and local agencies, including a joint permit equivalency application for both U.S. Army Corps of Engineers and NYSDEC. These will include the following.

## 6.1 Federal

- **U.S. Army Corps of Engineers**

  ***Clean Water Act – Section 404, NWP 33 Temporary Construction Access/Dewatering***

  - Portions of work along river bank will be constructed above high water line; use settling basin to settle out solids prior to discharge.
  - Includes individual permit and NWP 33.

- **United States Coast Guard (USCG)**

  ***Consultation and Notice to Mariners***

  - In-water structures will include proper signage, reflectors and/or lighting.
  - Coordinate with USCG on placement of structures.

## 6.2 State

- **New York State Department of State (NYSDOS)**

  ***Consistency Approval***

  - Work will be evaluate for consistency with the policies established for work in a designated coastal zone.

- **NYSDEC**

  ***401 Water Quality Certification/Protection of Waters Permit***

  - On-site settling for non-contact stormwater/groundwater prior to discharge, and contact/process water will be collected/treated prior to conveying to Alcoa's existing 005 Impoundment.
  - Water Quality Certification will be completed for ACE Individual Permit.
  - Will address construction/operation activities that may result in discharge into navigable water.

***Stormwater Discharge Associated with Construction Activity Under SPDES General Permit (GP-0-15-002)***

- SWPPP will be developed that includes erosion and sedimentation control (E&SC) measures per NYS Standards and Specifications for E&SC. Work zones will be stabilized.
- Non-contact stormwater will be collected/managed/settled prior to discharge to the river.
- Contact stormwater will be collected/managed/treated for PCBs through Alcoa's existing Outfall 004 treatment system.
- Measures will be provided to address on-site storage of petroleum and chemicals.
- Site management will evolve as operations change.

- **NYSDEC/USFWS**

***Endangered/Threatened/Special Concern Species***

- Consult with USFWS and NY Natural Heritage Program is being completed via consultation and permitting with the USEPA and Grasse River Stakeholders.
- Results of species and habitat surveys will be used to support schedule development.

- **New York State Office of Parks Recreation and Historic Preservation (NYSOPRHP)**

***Section 106 Review***

- Requirements will be reflected as determined by the results of the Phase 1A/Phase 1B assessment.

## 6.3 County

- **County Department of Transportation/State Department of Transportation**

***Highway Work/Road Opening Permits***

- Design will be completed per State/County DOT standards.
- DOT permits will be applied for work within the DOT Right of Way.

## 6.4 Local

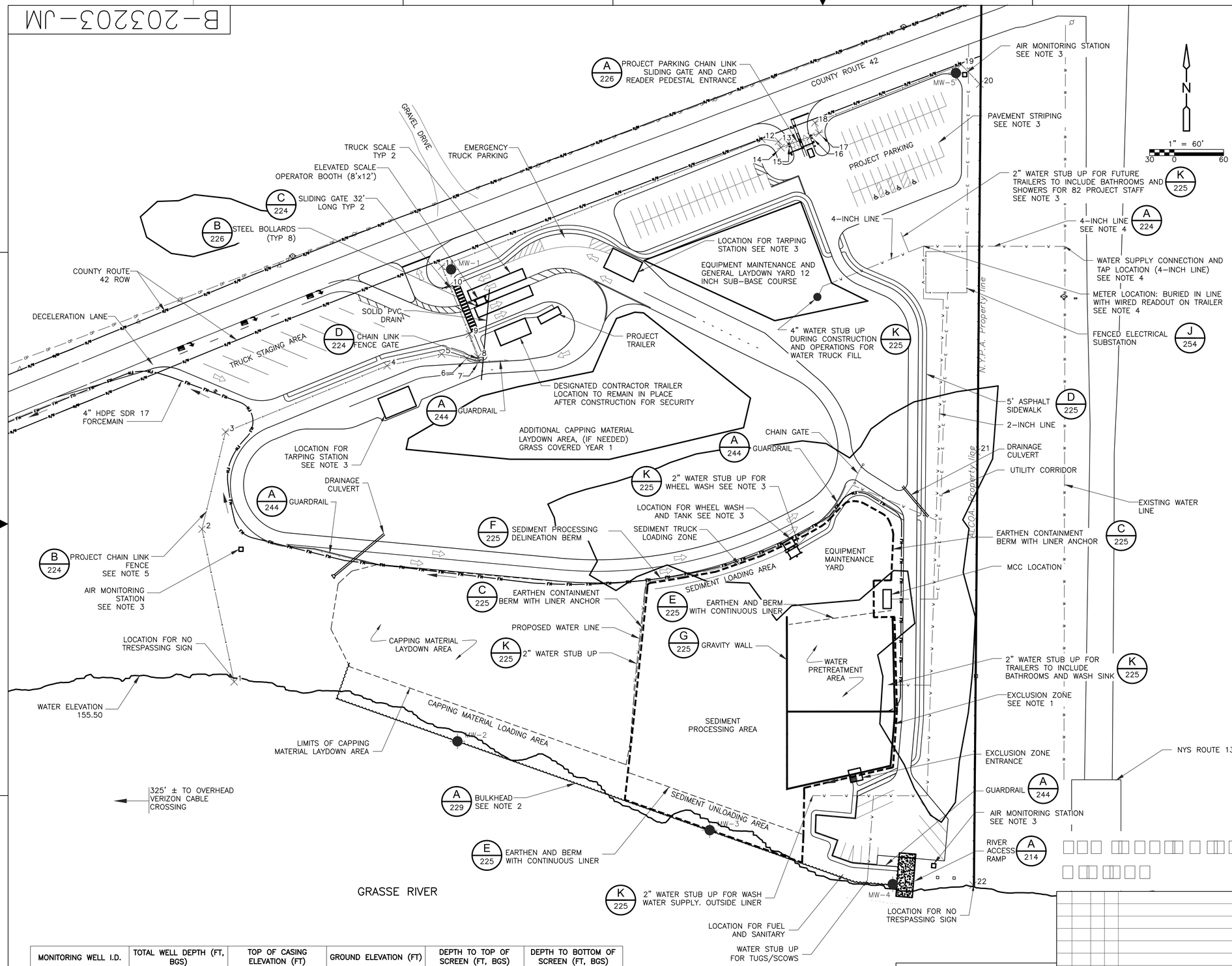
- **Town of Massena**

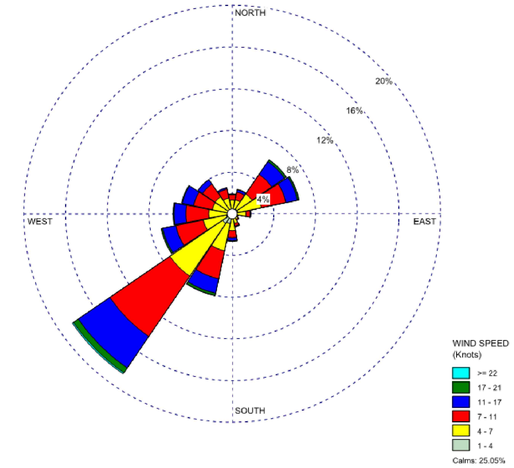
***Massena Building Permit***

- Local building code requirements and inspections will be adhered to.
- Local building permits will be completed as required for on-site structures.

# Appendix A

B-203203-JM




## Wind Rose April 2010 – October 2014

WIND ROSE NOTES:

1. PREDOMINANT WIND DIRECTION IS FROM THE SOUTHWEST.
2. WIND ROSE DEVELOPED BASED UPON THE MASSENA AIRPORT DATA STATION #94725.

NOTES:

1. THE EXCLUSION ZONE SHALL BE LINED (SEE DETAIL A ON SHEET 225) AND INCLUDES THE EQUIPMENT MAINTENANCE YARD, SEDIMENT LOADING AREA, SEDIMENT PROCESSING AREA, SEDIMENT UNLOADING AREA AND WATER PROCESSING AREA. SEE SHEET 207 FOR THE LIMITS OF THE EXCLUSION ZONE.
2. HANDRAILS AND LADDERS SHALL BE INSTALLED ON BULKHEAD PER SPECIFICATIONS.
3. SITE FEATURES NOT INCLUDED IN CONSTRUCTION CONTRACT. THESE FEATURES ARE BEING PROVIDED FOR INFORMATIONAL PURPOSES AND WILL BE INSTALLED/COMPLETED BY IN RIVER CONTRACTOR.
4. WATER SUPPLY CONNECTION AND TAP, WATER METER AND CONNECTING 4" WATER LINE WILL BE SUPPLIED AND INSTALLED BY OTHERS. SEE DETAIL A ON SHEET 224 FOR ADDITIONAL DETAILS.
5. FOR PROJECT CHAIN LINK FENCE LAYOUT COORDINATES, SEE TABLE ON SHEET 199

LEGEND:

MW-1 MONITORING WELL TO BE INSTALLED

IN RIVER CONTRACTOR EXCLUSION ZONE

| MONITORING WELL I.D. | TOTAL WELL DEPTH (FT, BGS) | TOP OF CASING ELEVATION (FT) | GROUND ELEVATION (FT) | DEPTH TO TOP OF SCREEN (FT, BGS) | DEPTH TO BOTTOM OF SCREEN (FT, BGS) |
|---|---|---|---|---|---|
| MW-1 | 21.0 | 207.5 | 205 | 16.0 | 21.0 |
| MW-2 | 10.0 | 165.5 | 163 | 5.0 | 10.0 |
| MW-3 | 10.0 | 165.5 | 163 | 5.0 | 10.0 |
| MW-4 | 10.0 | 165.5 | 163 | 5.0 | 10.0 |
| MW-5 | 23.5 | 210.0 | 207.5 | 18.5 | 23.5 |


CDM Smith
C□□p Dr.□□□r □ McK□□
4 Hig□□nd Rd, S□□□ 1
M□□□□n□, NY 13662
T□□(315) 296-9000


| YEAR | MONTH | DAY | NO. | REVISION RECORD | DR. | CK. | ZONE |
|---|---|---|---|---|---|---|---|
| 15 | 11 | XX | Ø Ø | ORIGINAL DRAWING DATE | PW | JJ | |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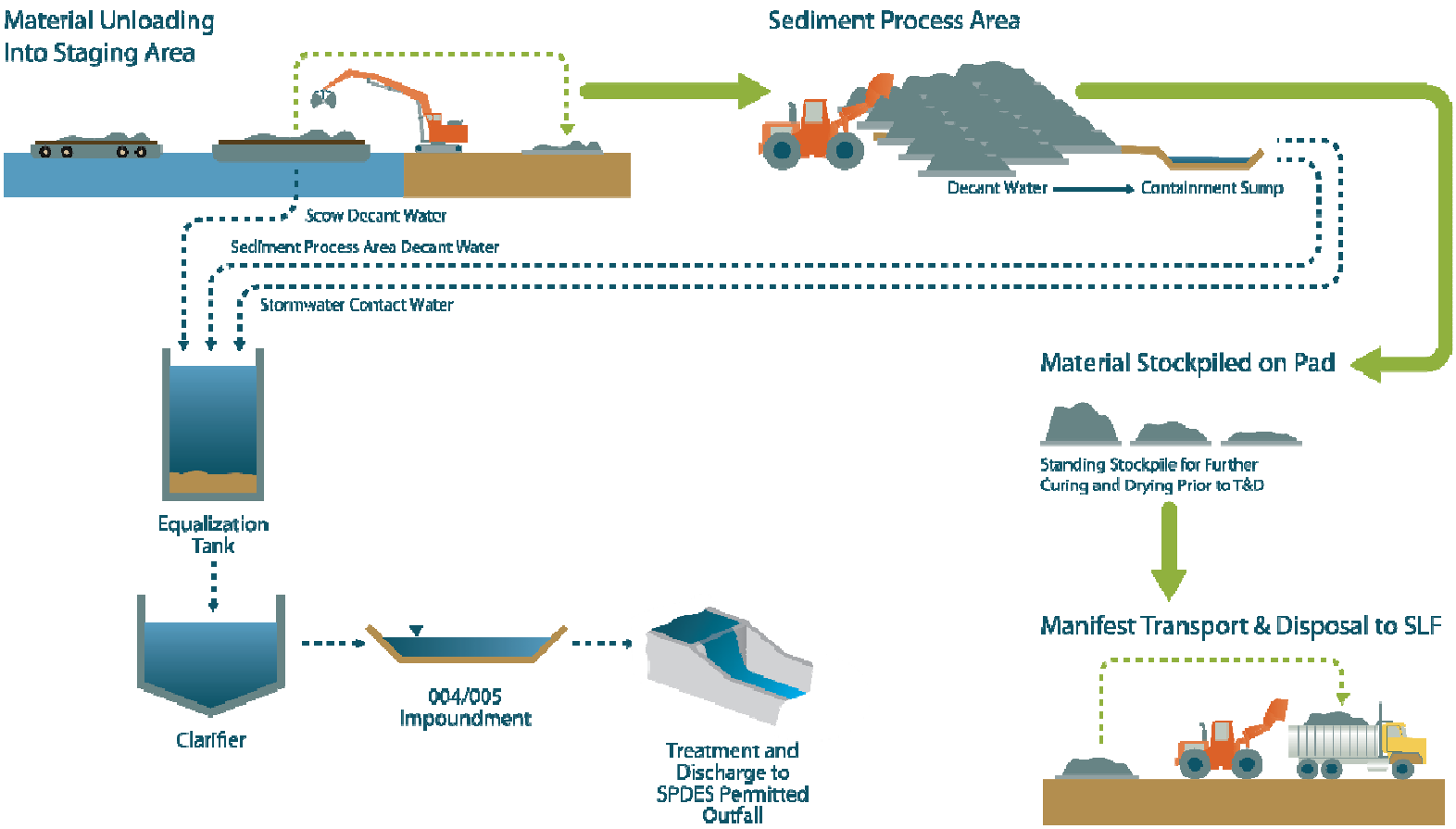
ALCOA INC.
MASSENA OPERATIONS

BLDG. NO. YARD
ENVIR
GRASSE RIVER REMEDIATION–ROUTE 131 STAGING AREA
SITE PLAN

ENGINEER MICHAEL S. SCHULTZ, P.E.
PLANT CODE JM
DESIGNED BY R. NAGEL
SCALE 1" = 60'
ORIGIN JM
DWG. CLASS CAD
DRAWN BY P. WATSON
DRAWING NUMBER B-203203-JM
CHECKED BY J. JATHAL
APPROVED BY M. SCHULTZ

# Waste Management



B-203223-JM

COUNTY ROUTE 42

GRAVEL DRIVE

PROJECT PARKING

OVERHEAD POWER

EQUIPMENT MAINTENANCE AND GENERAL LAYDOWN YARD

TRUCK STAGING

ZONE 2A = 1.05 ac

ZONE 2 = 4.80 ac

ADDITIONAL CAPPING MATERIAL LAYDOWN AREA

6.5% SLOPE

ZONE 3 = 7.50 ac

3:1 SLOPE

DRAINAGE SWALE

8% SLOPE

1.6 ACRES

0.3 ACRES

0.2 ACRES

EQUIPMENT MAINTENANCE YARD

ZONE 1 = 1.80 ac

ZONE 1A = 0.5ac

CAPPING MATERIAL LAYDOWN AREA

SEDIMENT PROCESSING AREA

BOAT RAMP AREA

325' ± TO OVERHEAD VERIZON CABLE CROSSING

GRASSE RIVER

ALCOA Property line

N.Y.P.A. Property line

NYS ROUTE 131

N

1" = 60'

30 0 60

M

0.2 ACRES

CDM Smith

C□□p Dr□□□r □ McK□□
4 Hig□□nd Rd, S□□1
M□□□n□, NY 13662
T□□(315) 296-9000

| YEAR | MONTH | DAY | NO. | REVISION RECORD | DR. | CK. | ZONE |
|---|---|---|---|---|---|---|---|
| 15 | 11 | XX | Ø Ø | ORIGINAL DRAWING DATE | PW | JJ | |

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ALCOA INC.
MASSENA OPERATIONS

BLDG. NO. YARD
ENVIR
GRASSE RIVER REMEDIATION-ROUTE 131 STAGING AREA
WATER MANAGEMENT ZONES

ENGINEER: MICHAEL S. SCHULTZ, P.E.
PLANT CODE: JM
DESIGNED BY: R. NAGEL
SCALE: 1" = 60'
ORIGIN: JM
DWG. CLASS: CAD
DRAWN BY: P. WATSON
DRAWING NUMBER: B-203223-JM
CHECKED BY: J. JATHAL
APPROVED BY: M. SCHULTZ

Table 1
Opinion of Probable Cost

| ITEM NO. | DESCRIPTION | UNIT OF MEASUREMENT | TOTAL UNITS | ESTIMATED UNIT COST | ESTIMATED TOTAL COSTS |
|---|---|---|---|---|---|
| **PRIMARY CONTRACTOR COSTS** | | | | | |
| 1.0 | FINAL REMEDIAL DESIGN SUPPORT | LS | 1 | $ 272,321 | $ 272,321 |
| 1.1 | FINAL REMEDIAL DESIGN SUPPORT | T&M NTE / DAY | 76 | $ 3,591 | $ 272,321 |
| 2.0 | WORK PLANS AND SUBMITTALS | LS | 1 | $ 1,039,500 | $ 1,039,500 |
| 2.1 | WORK PLANS AND SUBMITTALS (2019) | LS | 1 | $ 462,000 | $ 462,000 |
| 2.2 | WORK PLANS AND SUBMITTALS (2020) | LS | 1 | $ 288,750 | $ 288,750 |
| 2.3 | WORK PLANS AND SUBMITTALS (2021) | LS | 1 | $ 288,750 | $ 288,750 |
| 3.0 | MOBILIZATION | LS | 1 | $ 4,317,465 | $ 4,317,465 |
| 3.1 | MOBILIZATION (2019) | LS | 1 | $ 2,878,310 | $ 2,878,310 |
| 3.2 | MOBILIZATION (2020) | LS | 1 | $ 719,578 | $ 719,578 |
| 3.3 | MOBILIZATION (2021) | LS | 1 | $ 719,578 | $ 719,578 |
| 4.0 | SURVEYS | LS | 1 | $ 1,298,617 | $ 1,298,617 |
| 4.1 | PRE-CONSTRUCTION RIVER SURVEY | LS | 1 | $ 402,766 | $ 402,766 |
| 4.2 | PRE-WORK SURVEYS - REMEDIATION AREAS (2019) | LS | 1 | $ 90,852 | $ 90,852 |
| 4.3 | PRE-WORK SURVEYS - REMEDIATION AREAS (2020) | LS | 1 | $ 136,284 | $ 136,284 |
| 4.4 | PRE-WORK SURVEYS - REMEDIATION AREAS (2021) | LS | 1 | $ 68,273 | $ 68,273 |
| 4.6 | PRE-CONSTRUCTION CONDITIONS SURVEYS | YEAR | 3 | $ 100,074 | $ 300,221 |
| 4.7 | POST-CONSTRUCTION CONDITIONS SURVEYS | YEAR | 3 | $ 100,074 | $ 300,221 |
| 5.0 | SITE PREPARATION AND MAINTENANCE | LS | 1 | $ 4,566,299 | $ 4,566,299 |
| 5.1 | STAGING AREA FINAL PREPARATION | LS | 1 | $ 1,731,120 | $ 1,731,120 |
| 5.2 | TEMPORARY FACILITIES AND MAINTENANCE | LS | 1 | $ 2,091,215 | $ 2,091,215 |
| 5.3 | TEMPORARY FACILITIES AND MAINTENANCE - OFFSEASON | MONTH | 24 | $ 30,998 | $ 743,963 |
| 6.0 | PROJECT MANAGEMENT AND ADMINISTRATION | MONTH | 18 | $ 766,055 | $ 13,653,503 |
| 6.1 | PROJECT MANAGEMENT/ADMINISTRATION (2019) | MONTH | 6 | $ 502,624 | $ 3,015,743 |
| 6.2 | PROJECT MANAGEMENT/ADMINISTRATION (2020) | MONTH | 6 | $ 973,118 | $ 5,838,706 |
| 6.3 | PROJECT MANAGEMENT/ADMINISTRATION (2021) | MONTH | 6 | $ 824,136 | $ 4,799,054 |
| 7.0 | DREDGING AND DREDGED MATERIAL HANDLING/PROCESSING | LS | 1 | $ 15,027,758 | $ 15,027,758 |
| 7.1 | SHORELINE TREE TRIMMING AND REMOVAL | LS | 1 | $ 1,155,000 | $ 1,155,000 |
| 7.2 | REMOVE INACTIVE NATURAL GAS LINE | LS | 1 | $ 87,356 | $ 87,356 |
| 7.3 | REMOVE AND DISPOSAL OF ABANDONED BOAT | LS | 1 | $ 115,500 | $ 115,500 |
| 7.4 | ACCESS DREDGING - ADJACENT TO STAGING AREA BULKHEAD (DREDGING, HANDLING, DISPOSAL) | LS | 1 | $ 205,163 | $ 205,163 |
| 7.5 | ACCESS DREDGING - NEAR SHORE DREDGE AREAS (DREDGING, OFFLOADING, HANDLING, DISPOSAL, BACKFILL) | LS | 1 | $ 1,530,747 | $ 1,530,747 |
| 7.6 | STANTON ROAD SHEETPILE PREPARATION | LS | 1 | $ 194,779 | $ 194,779 |
| 7.7 | DOCK REMOVAL | LS | 1 | $ 155,925 | $ 155,925 |
| 7.8 | DREDGING AND DREDGED MATERIAL TRANSPORT - DESIGN DREDGING AND DEBRIS REMOVAL | IN-SITU CY | 53,873 | $ 44 | $ 2,367,265 |
| 7.9 | DREDGING AND DREDGED MATERIAL TRANSPORT - DESIGN DREDGING - ALLOWABLE OVERDREDGE | IN-SITU CY | 23,700 | $ 36 | $ 859,291 |
| 7.10 | DREDGING AND DREDGED MATERIAL TRANSPORT - ADDITIONAL PASS DREDGING | DAY | 49 | $ 16,014.46 | $ 782,929 |
| 7.13 | FLOODPLAIN REMOVAL/TRANSPORT - T27N, T43.2S, T64S - DESIGN DEPTH | IN-SITU CY | 1,920 | $ 114 | $ 218,704 |
| 7.14 | FLOODPLAIN REMOVAL/TRANSPORT - T27N, T43.2S, T64S - ADDITIONAL DEPTH | DAY | 0 | $ 1,961,181 | $ 40,858 |
| 7.15 | DREDGED MATERIAL UNLOADING/PROCESSING/STAGING AND EQUIPMENT DECONTAMINATION | IN-SITU CY | 77,622 | $ 31 | $ 2,414,393 |
| 7.16 | DREDGED MATERIAL TRANSPORT FOR DISPOSAL | IN-SITU CY | 77,622 | $ 40 | $ 3,101,408 |
| 7.17 | DREDGING, DREDGE MATERIAL TRANSPORT, AND BACKFILL - DIB AREAS | IN-SITU CY | 6,332 | $ 284 | $ 1,798,437 |
| 8.0 | WATER PRETREATMENT | LS | 1 | $ 1,432,229 | $ 1,432,229 |
| 8.1 | WATER PRETREATMENT SYSTEM - FURNISH, INSTALL, STARTUP, AND REMOVE | LS | 1 | $ 1,193,341 | $ 1,193,341 |
| 8.2 | WATER PRETREATMENT SYSTEM - OPERATE, MAINTAIN, AND TEST | MONTH | 3 | $ 37,060 | $ 129,201 |
| 8.3 | WATER PRETREATMENT SYSTEM - OPERATE, MAINTAIN, AND TEST - OFFSEASON | MONTH | 12 | $ 9,237 | $ 109,687 |
| 9.0 | BACKFILL PLACEMENT | IN-SITU CY | 106,814 | $ 64 | $ 6,845,554 |
| 9.1 | BACKFILL PLACEMENT - DREDGED AREAS | IN-SITU CY | 104,891 | $ 64 | $ 6,759,685 |
| 9.3 | BACKFILL PLACEMENT - FLOODPLAIN REMOVAL AREAS T27N, T43.2S, T64S | IN-SITU CY | 1,923 | $ 45 | $ 85,869 |

Table 1
Opinion of Probable Cost

| ITEM NO. | DESCRIPTION | UNIT OF MEASUREMENT | TOTAL UNITS | ESTIMATED UNIT COST | ESTIMATED TOTAL COSTS |
|---|---|---|---|---|---|
| 10.0 | MAIN CHANNEL CAPPING | LS | 1 | $ 84,129,485 | $ 84,129,485 |
| 10.1 | MAIN CHANNEL ARMORED CAP - T1-T19 | ACRE | 38 | $ 402,774 | $ 15,184,584 |
| 10.2 | MAIN CHANNEL ARMORED CAP - 12-INCH ISOLATION LAYER - T1-T19 | ACRE | 1 | $ 463,809 | $ 371,048 |
| 10.3 | MAIN CHANNEL CAP - T21-T72 | ACRE | 221 | $ 243,494 | $ 53,714,784 |
| 10.4 | MAIN CHANNEL CAP - 12-INCH ISOLATION LAYER - T21-T72 | ACRE | 2 | $ 316,098 | $ 632,195 |
| 10.5 | MAIN CHANNEL ARMORED CAP/MODIFIED ARMOR CAP - HABITAT LAYER - T6-T21 | ACRE | 29 | $ 31,169 | $ 891,431 |
| 10.6 | MAIN CHANNEL CAP - SLOPE GRADING FILL - T1-T21 | IN-SITU CY | 9,880 | $ 107 | $ 1,057,551 |
| 10.7 | MAIN CHANNEL CAP - SLOPE GRADING FILL - T21-T72 | IN-SITU CY | 20,020 | $ 108 | $ 2,152,236 |
| 10.8 | STAGED CAP CONSTRUCTION - 6" CHEMICAL ISOLATION LAYER - T1-T72 | ACRE | 22 | $ 133,533 | $ 2,924,382 |
| 10.9 | STAGED CAP CONSTRUCTION - GRAVEL FILTER LAYER - T1-T19 | ACRE | 11 | $ 85,189 | $ 945,597 |
| 10.10 | STAGED CAP CONSTRUCTION - ARMOR LAYER - T1-T19 | ACRE | 10 | $ 222,274 | $ 2,289,422 |
| 10.11 | STAGED CAP CONSTRUCTION - MODIFIED ARMOR LAYER - T19-T21 | ACRE | 7 | $ 162,731 | $ 1,139,116 |
| 10.12 | STAGED CAP CONSTRUCTION - MAIN CHANNEL CAP HABITAT LAYER - T21-T72 | ACRE | 4 | $ 99,699 | $ 388,827 |
| 10.14 | STAGED CAP CONSTRUCTION - SLOPE GRADING FILL - T21-T72 | IN-SITU CY | 19,440 | $ 125 | $ 2,438,311 |
| 11.0 | HABITAT FEATURES CONSTRUCTION/SHORELINE RESTORATION | LS | 1 | $ 714,860 | $ 714,860 |
| 11.1 | ROCK CLUSTER PLACEMENT | EACH | 22 | $ 4,908 | $ 107,972 |
| 11.2 | ANCHORED ROOTWAD PLACEMENT | EACH | 16 | $ 19,146 | $ 306,337 |
| 11.3 | SHORELINE RESTORATION | SF | 20,700 | $ 11 | $ 237,176 |
| 11.4 | SHORELINE RESTORATION - RIPRAP AREA | SF | 5,800 | $ 11 | $ 63,376 |
| 12.0 | DEMOBILIZATION | LS | 1 | $ 2,680,678 | $ 2,680,678 |
| 12.1 | DEMOBILIZATION (INCLUDING WINTERIZATION) (2019) | LS | 1 | $ 225,566 | $ 225,566 |
| 12.2 | DEMOBILIZATION (INCLUDING WINTERIZATION) (2020) | LS | 1 | $ 1,128,590 | $ 1,128,590 |
| 12.3 | DEMOBILIZATION (INCLUDING WINTERIZATION) (2021) | LS | 1 | $ 865,191 | $ 865,191 |
| 12.5 | SEDIMENT PROCESSING AREA DECONTAMINATION AND DECOMMISSIONING | LS | 1 | $ 48,774 | $ 48,774 |
| 12.6 | RECORD DRAWINGS - DREDGING | LS | 1 | $ 105,983 | $ 105,983 |
| 12.7 | RECORD DRAWINGS - CAPPING | LS | 1 | $ 155,267 | $ 155,267 |
| 12.8 | RECORD DRAWINGS - HABITAT FEATURES CONSTRUCTION | LS | 1 | $ 69,966 | $ 69,966 |
| 12.9 | RECORD DRAWINGS - STAGING AREA | LS | 1 | $ 81,342 | $ 81,342 |
| 13.0 | EXCUSABLE WORK STOPPAGE | DAY | 0 | $ 51,632 | $ - |
| 14.0 | STAGED CAP CONSTRUCTION PILOT TEST | LS | 1 | $ 3,313,290 | $ 3,313,290 |
| 14.1 | MOBILIZATION, SITE PREPARATION, DEMOBOLIZATION (2018) | LS | 1 | $ 1,629,473 | $ 1,629,473 |
| 14.2 | PILOT TEST WORK PLANS AND SUBMITTALS | LS | 1 | $ 115,500 | $ 115,500 |
| 14.3 | STEEP SLOPE ARMORED CAP STAGED CONSTRUCTION PILOT TEST | LS | 1 | $ 683,412 | $ 683,412 |
| 14.4 | ARMORED CAP STAGED CONSTRUCTION PILOT TEST | LS | 1 | $ 884,906 | $ 884,906 |
| | **SUBTOTAL PRIMARY CONTRACTOR** | | | | **$ 139,291,560** |
| | **CONTINGENCY PRIMARY CONTRACTOR (10%)** | | | | **$ 13,929,156** |
| | **SUBTOTAL PRIMARY CONTRACTO WITH CONTINGENCY (10%)** | | | | **$ 153,220,716** |
| | | | | | |
| **NON-PRIMARY CONTRACTOR COSTS** | | | | | |
| 15.0 | UPLAND CONSTRUCTION | LS | 1 | $ 1,669,088 | $ 1,669,088 |
| 15.3 | CELL 3 LANDFILL CAP (2020) | LS | 1 | $ 1,669,088 | $ 1,669,088 |
| | OTHER COSTS | LS | 1 | $ 39,637,988 | $ 39,637,988 |
| 16.1 | CELL 3 LANDFILL OPERATIONS | LS | 1 | $ 2,200,000 | $ 2,200,000 |
| 16.3 | CONSTRUCTION MANAGEMENT AND OVERSIGHT | LS | 1 | $ 15,204,564 | $ 15,204,564 |
| 16.4 | CONSTRUCTION INSPECTORS | LS | 1 | $ 4,769,802 | $ 4,769,802 |
| 16.5 | ENVIRONMENTAL MONITORING | LS | 1 | $ 8,596,649 | $ 8,596,649 |
| 16.6 | COMMUNITY RELATIONS | LS | 1 | $ 1,547,358 | $ 1,547,358 |
| 16.7 | OTHER COSTS (FUEL, TOUR BOAT, PRIVATE DOCK REPLACEMENTS, SITE SECURITY) | LS | 1 | $ 1,241,668 | $ 1,241,668 |
| 16.8 | STAGING AREA RESTORATION (SEPARATE CONTRACT) | LS | 1 | $ 1,567,207 | $ 1,567,207 |

Table 1
Opinion of Probable Cost

| ITEM NO. | DESCRIPTION | UNIT OF MEASUREMENT | TOTAL UNITS | ESTIMATED UNIT COST | ESTIMATED TOTAL COSTS |
|---|---|---|---|---|---|
| 16.9 | HABITAT RESTORATION (SEPARATE CONTRACT) | LS | 1 | $ 4,510,739 | $ 4,510,739 |
| | **SUBTOTAL UPLAND CONSTRUCTION AND OTHER COSTS** | | | | **$ 41,307,076** |
| | **CONTINGENCY UPLAND CONSTRUCITON AND OTHER COSTS (5%)** | | | | **$ 2,065,354** |
| | **SUBTOTAL UPLAND CONSTRCUTION AND OTHER COSTS WITH CONTINGENCY (10%)** | | | | **$ 43,372,429** |
| | | | | | |
| | **SUBTOTAL ESTIMATED PROJECT COSTS** | | | | **$ 180,598,635** |
| | LONG-TERM MONITORING | | | | $ 8,500,000 |
| | ENGINEERING AND DESIGN - PRECONSTRUCTION (2018) | | | | $ 500,000 |
| | ENGINEERING AND DESIGN (2019) | | | | $ 1,200,000 |
| | ENGINEERING AND DESIGN (2020) | | | | $ 1,200,000 |
| | ENGINEERING AND DESIGN (2021) | | | | $ 1,200,000 |
| | ENGINEERING AND DESIGN (2022) | | | | $ 550,000 |
| | **TOTAL ESTIMATED PROJECT COST** | | | | **$ 193,748,635** |
| | | | | | |
| | **ENGINEERING AND DESIGN CONTINGENCY (5%)** | | | | $ 232,500 |
| | **CONTINGENCY PRIMARY CONTRACTOR (10%)** | | | | $ 13,929,156 |
| | **CONTINGENCY UPLAND CONSTRUCTION AND OTHER COSTS (5%)** | | | | $ 2,065,354 |
| | **TOTAL CONTINGENCY** | | | | $ 16,227,010 |
| | | | | | |
| | **TOTAL ESTIMATED PROJECT COST WITH CONTINGECY (10%)** | | | | $ 209,975,645 |
| | **ROUNDED TOTAL ESTIMATED COST (MM)** | | | | **$ 210,000,000** |

General Cost Estimate Notes:

- This estimate is for the sediment remediation to address polychlorinated biphenyls (PCBs) in the Grasse River Site, located in Massena, New York. Sediment remediation work includes dredging, sediment processing, sediment transport and disposal, post-dredge backfilling, capping activities, habitat restoration, and any associated activities that are performed in support of the remediation project as detailed in the *Final Design Report* (Arconic, September 2018).
- All costs are subject to revision. Costs are rounded as appropriate.
- All cost estimates include materials and labor unless otherwise noted. Unit costs are estimated using pricing information from vendors, standard estimating guides such as Rental Rate Blue Book, professional engineering judgment, contractor quotes, and experience from other projects.
- The estimates presented were developed using current and generally accepted engineering cost estimation methods. Note that these estimates are not based on assumptions concerning future events and actual costs may be affected by known and unknown risks, including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates, and such variations may be material.
- Costs do not include property costs (if necessary), access costs (if not on Arconic property), legal fees, permitting fees, or agency oversight.
- These costs have been developed using currently available information regarding site characteristics such as site bathymetry, potential debris, physical properties of the existing sediment, local geotechnical and geological conditions, and characteristics of the river system at the site. These estimates may be subject to revision if additional data and information become available.
- It is assumed that active remediation work will be conducted 12 or 24 hours per day depending on the work activity, 6 days per week, with in-water work commencing in Fall 2018 as stated in the *Final Design Repo*rt. Project commencement is subject to final selection of the remedial contractor(s) and Agency approval. Due to local winter conditions, cost estimates assume all in-water construction elements take place between approximately April 1 and November 15 of each year, resulting in a 7.5-month construction season (not including mobilization and preparation and demobilization and site restoration activities). The contractor is expected to begin in-water operations following river ice-out, which may occur prior to April 1 or after April 1. Remediation work is estimated to take three construction seasons to complete. The overall schedule is subject to change pending the selection of the remedial contractor(s) and the conclusions of the Staged Cap Placement Test in 2018.
- All remedial activities that begin in a construction season are expected to be completed prior to demobilization within the same year to reduce potential for loss or damage to incomplete work during winter months (i.e., any dredged area will have backfill placed before the end of the construction season).

- Dredging will commence downstream of Transect 6 (T6) during the biological exclusion period prior to June 15. After June 15, dredging will proceed to the uppermost dredge areas to complete T1 to T6.
- The following start times and delays between construction activities are assumed for verification sampling and/or surveying and/or residual dredging. It should be noted that the following are minimum delays that may be modified based on the progression of work.
  - Backfill lags 1 week after dredging and begins at T1.
  - Residual dredging, where needed, is assumed to occur concurrent with dredging and backfill operations during the 1-week lag time between dredging and backfill operations.
  - Armored capping begins at T1 1 week after all backfill in T1 to T6 (approximately 3-day duration) has been completed.
  - One half week delay between subsequent cap layers and after backfill placement to allow for verification.
- Activities included in this estimate are expected to span multiple contracts and contractors. Operations are assumed to proceed in a manner to allow for direct coordination between entities where feasible should separate contracts be employed.
- Contingency is assumed at 10% of total costs for the in-river construction work performed by the primary contractor and at 5% of total costs for engineering and design and other separate contract costs.

**Remediation Cost Estimate Notes:**

**Item No. 1.0 – Final Remedial Design Support:**

Includes Remedial Contractor's engineering support prior to construction.

**Item Nos. 2.1 through 2.3 – Work Plans and Submittals:**

Includes Remedial Contractor's work plans and submittals on an annual basis. Work plans and submittals include construction work plans, shop drawings, product data, samples, critical materials, or other submittals relating to products.

**Item Nos. 3.0 through 3.3 - Mobilization:**

This estimate includes mobilization of labor, equipment, and materials necessary to implement the remediation project. Overall mobilization comprises an initial mobilization cost, as well as subsequent re-mobilization costs for each season. The mobilization costs were assumed to be 7.5% of the subtotal capital remediation construction costs. Due to the variability associated with contractor location, equipment, and costing strategy, the mobilization costs were split between years with 10% in year 0 (2018), 60% in year 1 (2019), and 15% in each of years 3 and 4 (2020-2021). Due to the extensive downtime associated with winter shutdown, remobilization efforts will vary and may include full remobilization of some project elements; other items may be stored on site or in the local area depending on use and storage costs.

**Item Nos. 4.1 through 4.7 – Surveys:**

Multi-beam bathymetric surveys (supplemented by single beam and traditional topographic surveys, where appropriate) will be conducted prior to and following dredging, backfilling, and capping. Pre- and post-construction conditions surveys will be conducted in upland locations and include traditional topographic surveys.

**Item No. 5.1 – Staging Area Final Preparation:**

Temporary construction costs include the construction of a secondary staging area to support remedial operations and final preparations of the existing Route 131 staging area.

**Item Nos. 5.2 and 5.3 – Site Facilities, Controls and Utilities, Erosion and Sedimentation Controls, and General Refuse Disposal:**

Site facilities, controls, and utilities include equipment anticipated to remain on site throughout duration of project. They also include items such as telecommunications, sanitary facilities, utilities, fuel holding tanks, marine radios, and GPS control, among others. Offices, docks, marine radios, and tarping station scaffolding are assumed as purchased equipment. Costs include electrical and water utilities for the project duration as installed in Item 5.

Erosion and sedimentation controls will be installed at the staging and processing area to be used during in-water construction activities and at nearshore dredge areas, as necessary. Such controls are assumed to contain silt fence, straw wattles, spill kits, and absorbent booms.

General construction transportation and disposal assumes 40-cy dumpster pickup occurring twice per week for the duration of construction. It also assumes municipal solid waste bulk density of 250 pounds/cy with disposal at an Alcoa-approved landfill.

**Item No. 6.0 – Project Management and Administration:**

This estimate includes Contractor coordination of all activities of their own employees, subcontractors, suppliers, and offsite fabricators. Includes all labor, equipment, services, and materials for the Contractor's project management and supervision, project administration, health and safety management, quality control manager, project meetings, reporting, and any other project management function.

**Item No. 7.1 – Tree Trimming:**

Tree trimming will be conducted to provide access and support in nearshore remedial activities.

**Item No. 7.2 – Removal of Inactive Natural Gas Line:**

The removal of a natural gas line at river transect T6 will be conducted prior to dredging to facilitate dredging in the nearshore remedial area.

**Item No. 7.3 – Removal of Abandoned Boat:**

The removal of an abandoned boat at river transect T27 will be conducted prior to dredging to facilitate dredging in the nearshore remedial area.

**Item Nos. 7.4 and 7.5 – Access Dredging Near Bulkhead of Staging Area and in Nearshore Areas:**

This includes access dredging at the Route 131 Staging Area bulkhead and at nearshore dredge units as necessary to provide adequate water depth for access by floating construction equipment. It is assumed that the bulkhead at the staging area will be dredged mechanically from the upland at 1,280 cy/day. Access dredging and dredging of nearshore impacted sediment assumes in-water mechanical removal techniques. Removal is assumed to be 705 cy/day total. Access dredging volumes were determined based on prospective contractor input. Best management practices will be employed to control turbidity during all dredging activities.

**Item Nos. 7.6 – Stanton Road Sheet Pile Preparation:**

Includes excavation behind existing sheet pile wall and steel sheet pile support to facilitate dredging, followed by import and placement of fill material and surface restoration (erosion control and seeding) after dredging is complete.

**Item No. 7.7 – Dock Removal:**

Includes removal of private docks within target dredge areas.

**Item Nos. 7.8 through 7.10 – Dredging and Dredge Material Transport Debris Removal:**

Dredging volumes include engineering considerations such as over-dredging and stable side slopes. An allowable over-dredge of 0.5 foot is assumed for dredging. Operations assume one tug per dredge platform, four scows, and two support work boats. Impacted sediment will be dredged from the project area and transported to the staging area sediment unloading/processing area for offloading. Best management practices will be employed to control turbidity during all dredging activities.

Debris removal is assumed in support of operations. Debris in dredging footprints is assumed to be removed concurrent with nearshore dredging and is estimated at 2.5% of the total neat line dredge volume. Debris would be disposed of at the Cell 3 landfill or in an appropriate disposal facility via truck.

It is assumed that additional dredging based on concentrations of residual material in post-dredge confirmation sampling will need to take place within limited areas, assumed as a second-pass removal. Additional dredging will be performed in the same manner as first pass dredging utilizing the same equipment. Total second-pass volumes are based on assumptions described in the *Final Design Report*. Production is assumed to be approximately 50% of the dredging production rate.

**Item Nos. 7.13 through 7.14 – Floodplain Excavation and Material Transport:**

Excavation volumes include engineering considerations such as over-excavation and stable side slopes. Operations assume a typical dredging barge as an in-water support and material transfer

platform with a Skid Steer in the upland for initial excavation and material movement to the shoreline for transfer to in-water scows via the dredging barge equipment. Excavation is assumed at 202 cy/day. Best management practices will be employed to control turbidity during all excavation and material handling activities.

**Item No. 7.15 – Dredge Material Offloading and Processing at Staging Area and Equipment Decontamination:**

Includes unloading sediment/soil/debris/water from barges, debris processing/sizing, sediment dewatering, water collection, sampling/testing of dewatered sediment, and inspection/maintenance of the sediment processing area. Includes dewatering/processing of dredged sediment, excavated floodplain soil, and debris. After material is transported to the staging area sediment unloading/processing area for offloading, stabilization will be performed as needed for transportation and landfill disposal. Best management practices will be employed to control turbidity during all offloading activities.

Equipment decontamination is assumed to occur during sediment processing and transport. Equipment entering and leaving the sediment unloading/processing or debris processing areas will undergo thorough decontamination procedures. Decontamination is assumed to be conducted via dry means with brushing and scrubbing of equipment followed by wet means via wheel washes. Wheel washes will be utilized for transport trucks prior to departure from the staging area. Decontamination costs assume the installation of a Conline 400 MC wheel wash, including the use of one 55-gallon 2% drum of liquifloc per month. Labor and equipment associated with general decontamination activities such as dredging buckets, processing pad decontamination following completion of dredging, water treatment plant equipment decontamination, and other activities are included under separate operations and demobilization efforts where applicable.

**Item No. 7.16 – Dredge Material Transport to Cell 3 for Disposal:**

Assumes 10 cy dump trucks for material transport to the Cell 3 Landfill.

**Item No. 7.17 – Dredge and Immediate Backfill Areas:**

Assumes same equipment as for other dredging and backfill items but with a third the dredging rate and half the backfill rate with extra surveying costs added for daily surveying. Includes transport and placement costs for backfill with aggregate procurement costs included in Item 9.1.

**Item No. 8.1 through 8.3 – Water Treatment:**

Water treatment costs assume preliminary water treatment at the staging area prior to conveyance to the Alcoa 005 impoundment and eventual final treatment and discharge through Alcoa Outfall 004 under existing State Pollution Discharge Elimination System (SPDES) permitting. Costs include the use of coagulants and flocculants to promote settling.

**Item No. 9.1 – Backfill in Dredge Areas:**

Following the verification of successful dredging activities, backfill will be placed via in-water mechanical means assuming use of similar equipment as used for dredging. Operations assume two backfill platforms, one tug per platform, two scows, and two support boats. Placement is assumed at 588 cy/day. Three different backfill types include Type A, Type B, and Type C, with similar placement rates. All backfill types assume a 30% increase in volume to account for over placement and material loss.

**Item No. 9.3 – Backfill in Floodplain Areas:**

Following the verification of successful floodplain excavation activities, backfill will be placed via mechanical means assuming use of similar equipment as used for excavation. Operations assume a typical capping barge as an in-water support and material transfer platform with a Skid Steer in the upland for material movement and grading. Placement is assumed at 302 cy/day. Backfill Type B is assumed with a 0.75-foot topsoil cover (including overreplacement) on top of backfill to bring surface back to pre-construction grade. Backfill volume assumes a 5% increase in volume to account for material loss.

**Item Nos. 10.1 and 10.2 – Armored Cap:**

Armored capping includes material procurement, delivery, loading, and placement of cap material between transects T1 and T21. The armored cap is assumed to be placed using in-water mechanical placement techniques. Operations assume four capping platforms, one tug per platform, ten scows, and five support work boats. Armored caps assume a sand chemical-isolation layer of 6 inches or 12 inches of sand/granular activated carbon (GAC) mix (assumed at 0.1% addition by weight) overlain by 6 inches of a gravel filter layer, and 13 inches of cobble armor stone (6-inch $D_{50}$). Placement is assumed at an average of 3,152 cy/day for four platforms operating 24 hours/day. Armored capping assumes a material loss factor of 25%, 15%, and 10% for sand isolation layer, filter layer, and armor layer, respectively. Armored capping assumes a 0.25 foot over placement for sand and gravel layers and a 0.5 foot over placement for the cobble armor layer. Material will be sourced from multiple local borrow sources depending on quantity and availability.

**Item Nos. 10.3 and 10.4 – Main Channel Cap:**

Main channel capping includes material procurement, delivery, loading, and placement of cap material between transects T21 and T72. Material will be sourced from multiple local borrow sources depending on quantity and availability. Main channel cap material will be placed using in-water mechanical placement techniques. Operations assume four capping platforms, one tug per platform, eight scows, and four support work boats. The main channel cap assumes a minimum total thickness of 1 foot constructed in two lifts. The first lift assumes a sand chemical-isolation layer of 6 inches of sand/GAC mix (assumed at 0.1% addition by weight) overlain by 6 inches of sand with organic material. Placement is assumed at an average of 3,152 cy/day for four platforms operating 24 hours/day. Capping assumes a 0.25 foot over placement and 25% material loss factor.

**Item No. 10.5 – Habitat Layer T1-T21:**

Following installation and verification of primary armored cap materials, habitat layer construction will be conducted in a portion of the armored cap area. Habitat layer construction assumes the placement of a layer of sand with organic material, assumed at a volume equating to an approximate 6-inch layer. Habitat layer assumes installation across two-thirds of the main channel cap footprint (excluding side slopes) from T6 through T21 and utilizes the same equipment as primary capping activities.

**Item Nos. 10.6 and 10.7 – Slope Grading Fill:**

In some sections of the river the side slopes to the main channel are too steep for cap placement and extra fill material will be placed on those slopes before primary cap placement to reduce the slope angle. Slope grading fill assumes the same equipment as primary capping activities will be used but with a reduced production rate of 184 cy/day per platform per 12-hour shift.

**Item Nos. 10.8 through 10.14 – Staged Cap Construction Layers:**

Some portions of the Armored Cap and Main Channel Cap require wait times between each individual cap layer due to slope stability concerns to allow for consolidation of the underlying cap materials and sediment. These cap layers will be placed using the same means and methods as normal capping described in Item Nos. 10.1 through 10.7 and with the same production rates. Extra time has been added to each staged construction task to account for extra time for relocating platforms up and down stream and other logistical issues that might arise from disrupting the typical work flow progression from up- to downstream.

**Item Nos. 11.1 through 11.4 – Habitat Features Construction and Shoreline Restoration:**

Habitat construction includes the procurement of materials and the placement of habitat features and plantings. Feature installation is assumed to be conducted via in-water mechanical placement techniques and is assumed to include construction and installation of woody debris structures and boulder clusters at select locations. Restoration of shoreline areas disturbed as part of bank removal includes placement of erosion control fabric and seeding. A limited portion of the shoreline restoration near T23S/T24S includes the placement of riprap.

**Item Nos. 12.1 through 12.3 – Site Restoration and Demobilization:**

Site cleanup and restoration include staging area operations prior to winterization between construction seasons, shoreline restoration in select locations due to remediation activity impacts (armoring and sheeting), replacement of landscape (topsoil and seeding), limited roadway repair, and private dock restoration.

This estimate includes demobilization of labor, equipment, and materials necessary to implement the remediation project. Overall demobilization comprises interim demobilization costs after each season, as well as a final demobilization cost. The demobilization costs were assumed to be 2.5% of the subtotal capital remediation construction costs. Due to the variability associated with contractor location, equipment, and costing strategy, the demobilization costs were split between years with

10% in year 0 (2018), 10% in year 1 (2019), 30% in year 3 (2020), and 50% in year 4 (2021). Due to the extensive downtime associated with winter shutdown, interim demobilization/winterization efforts will vary and may include full demobilization of some project elements; other items may be stored on site or in the local area depending on use and storage costs.

**Item No. 12.5 – Sediment Processing Area Decontamination and Decommissioning:**

Includes cleaning and decommissioning of the Sediment Processing Area after dredging is complete, removal of asphalt, subbase materials, and geomembrane liner. Includes placement of structural fill material to restore grades for continued use of the area during subsequent seasons.

**Item Nos. 12.6 through 12.9 – Record Drawings:**

Includes all contractor labor and associated expenses to produce final record drawings and documentation.

**Item No. 13.0 – Excusable Work Stoppage:**

Daily rate for equipment on site for 12-hour one-shift days with no labor included based on the assumption that an excusable work stoppage would have enough forewarning that labor could be sent home for the duration of the work stoppage.

**Item Nos. 14.1 through 14.4 – Staged Cap Construction Pilot Tests:**

This item covers all costs associated with conducting a 2018 Staged Cap Placement Test. Assumes the development and submittal of preliminary project plans and submittals. Includes mobilization of equipment and labor, diver installation of sensors and settlement plates, cap material sourcing, purchase, testing, transport, staging, blending as necessary, barge loading, transport to the placement location, and placement. Includes verification surveys.

**Item Nos. 15.1 through 16.1 – Landfill Operations and Cap**

Includes the costs to operate the Cell 3 Landfill and place a final cap on the landfill.

**Item Nos. 16.3 and 16.4 – Construction Management, Oversight, and Inspectors:**

Construction monitoring/oversight includes daily oversight of construction activities and is assumed to be conducted during pre-construction activities, work plan submittal review, all in-river activities (e.g., dredging, backfilling, and capping), and all Cell 3 landfill activities. Construction management and oversight costs include Alcoa consultant personnel to manage contractor and construction activities.

**Item No. 16.5 – Environmental Monitoring:**

Environmental monitoring includes water-quality monitoring to be conducted during debris removal, dredging, backfilling, and cap placement, as well as environmental monitoring to be performed at active remediation areas and at the staging area and Cell 3 landfill. In-water monitoring of water quality assumes three buoys containing monitoring units for dissolved oxygen and turbidity at one water depth (Years 1, 2, 3, and 4). In-water monitoring also includes PCB analysis of discrete

water column samples from the Grasse River and at Alcoa East Plant (years 1 and 2)/Saint Regis Mohawk Tribe (SRMT) water intakes (Years 1, 2, 3, and 4). Environmental monitoring includes air, water, and noise monitoring at the Cell 3 landfill, staging area, and active remediation areas during active operations at each during Years 1, 2, 3, and 4.

**Item No. 16.6 – Community Relations:**

This task assumes a public relations firm to manage community involvement and additional project personnel to assist with access agreements.

**Item No. 16.7 – Other Costs:**

Includes costs for fuel for third-party boat operations during construction, the operation of a tour boat for visitors to the site, the replacement/repair of private docks that were removed from the nearshore dredge area, and site security for the Route 131 Staging Area.

**Item No. 16.8 – Staging Area Restoration:**

This covers the cost for the restoration of the Route 131 Staging Area.

**Item No. 16.9 – Habitat Restoration:**

Habitat restoration incorporates emergent vegetation and subaquatic vegetation plantings in dredge areas and floodplain removal areas.

**Long-Term Monitoring:**

Long-term monitoring assumes annual water column and resident fish monitoring for a duration of 30 years. Cap maintenance is assumed at approximately 10% of the cost to construct caps plus interim mobilization and interim demobilization cost (assumed to cover the cost of all maintenance and monitoring activities mobilization/demobilization). Cap maintenance is assumed every 5 years following construction for a duration of 30 years. Cap monitoring assumes diver inspections and bathymetric surveys every 5 years following construction for a duration of 30 years. All long-term monitoring cost were calculated using the present worth analysis process outlined by the U.S. Environmental Protection Agency (USEPA, July 2000). A discount rate of 7% was used for the present worth calculation, and expenditures are assumed to occur at the start of construction and assume a discount rate of 7%.

**Engineering and Design:**

Engineering and design services is assumed for each year from the submittal of the *Final Design Report* until the commencement of construction activities.

**Acronyms**

**cy = cubic yards**

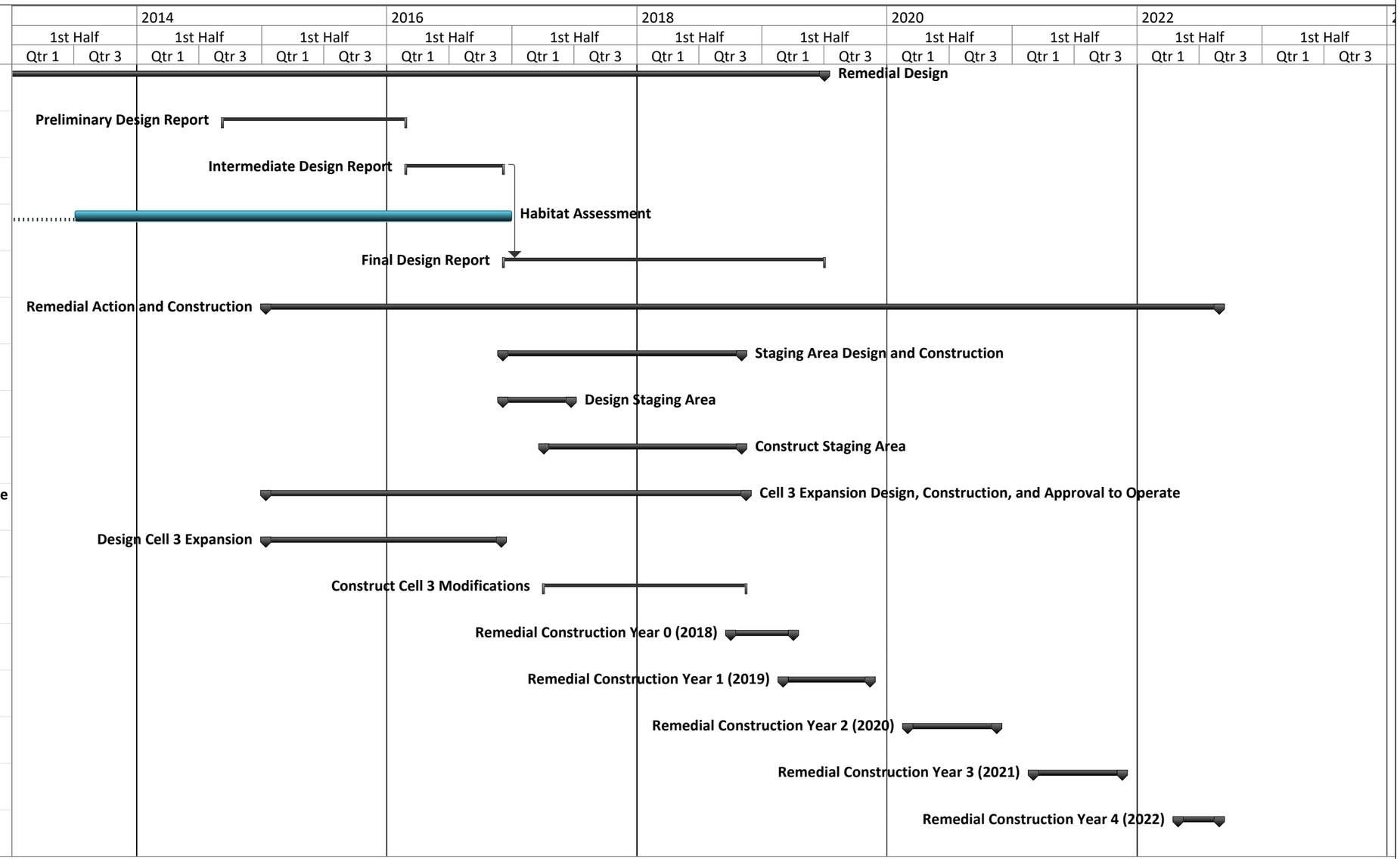
**T = transect**

**GRASSE RIVER PROJECT**
**ARCONIC**

Grasse River Remediation Conceptual Construction Schedule

DRAFT
NOT FOR CONSTRUCTION

| ID | Task Name |
|---|---|
| 1 | **Remedial Design** |
| 2 | **Preliminary Design Report** |
| 5 | **Intermediate Design Report** |
| 8 | **Habitat Assessment** |
| 9 | Final Design Report |
| 13 | **Remedial Action and Construction** |
| 14 | Staging Area Design and Construction |
| 15 | Design Staging Area |
| 17 | Construct Staging Area |
| 27 | **Cell 3 Expansion Design, Construction, and Approval to Operate** |
| 28 | Design Cell 3 Expansion |
| 34 | Construct Cell 3 Modifications |
| 40 | **Remedial Construction Year 0 (2018)** |
| 45 | **Remedial Construction Year 1 (2019)** |
| 55 | **Remedial Construction Year 2 (2020)** |
| 63 | **Remedial Construction Year 3 (2021)** |
| 69 | **Remedial Construction Year 4 (2022)** |




Task Split Milestone Summary

# DRAFT GRASSE RIVER STUDY AREA OPERATIONS, MAINTENANCE, AND MONITORING PLAN

# GRASSE RIVER, MASSENA, NEW YORK

**Prepared for**

ARCONIC

Arconic Inc.

**October 2018**

# TABLE OF CONTENTS


1 INTRODUCTION ..... 1
1.1 Site Description ..... 1
1.2 Summary of Remedial Action ..... 3
1.3 Remedial Action Objectives and Preliminary Remediation Goals ..... 4
1.4 Purpose of Operations, Maintenance, and Monitoring ..... 6
1.5 Modifications to the Monitoring Program ..... 6
2 METHODS ..... 7
2.1 Fish Monitoring ..... 7
2.1.1 Data Quality Objectives ..... 7
2.1.2 Sampling Locations and Frequency ..... 7
2.1.3 Size, Preparation, and Number of Fish ..... 8
2.1.4 Sampling Procedures ..... 9
2.1.5 Analytical Program ..... 10
2.1.6 Criteria Attainment Determination ..... 10
2.1.7 Contingency Actions ..... 12
2.2 Water Column Monitoring ..... 12
2.2.1 Data Quality Objectives ..... 12
2.2.2 Sampling Locations and Frequency ..... 13
2.2.3 Sampling Procedures ..... 14
2.2.4 Analytical Program ..... 14
2.2.5 Criteria Attainment Determination ..... 14
2.2.6 Contingency Actions ..... 15
2.3 Cap Monitoring ..... 15
2.3.1 Data Quality Objectives ..... 17
2.3.2 Routine Physical Monitoring ..... 18
2.3.2.1 Measurement Performance Criteria ..... 18
2.3.2.2 Survey Locations and Frequency ..... 19
2.3.2.3 Event-Based Physical Monitoring ..... 19
2.3.2.4 Response Actions ..... 20
2.3.3 Chemical Effectiveness Monitoring ..... 22
2.3.3.1 Sampling Locations and Frequency ..... 22

2.3.3.2 Sampling Procedures ..... 23
2.3.3.3 Response Actions ..... 24
2.3.3.4 Analytical Program ..... 25

**3 GENERAL DATA ACQUISITION PROCEDURES ..... 26**
3.1 Sample Handling and Custody Requirements ..... 26
3.1.1 Field Activities Sample Custody ..... 26
3.1.2 Laboratory Receipt and Custody ..... 27
3.2 Quality Control Requirements ..... 28
3.2.1 Field Quality Control Samples ..... 28
3.2.1.1 Equipment Blanks and Homogenization Blanks ..... 28
3.2.1.2 Field Duplicates ..... 29
3.2.1.3 Matrix Spikes/Matrix Spike Duplicates ..... 30
3.2.2 Laboratory Quality Control Procedures ..... 31
3.2.2.1 Method and Homogenization Blanks ..... 31
3.2.2.2 Laboratory Control Samples ..... 32
3.2.2.3 Surrogate Spikes ..... 32

**4 DATA MANAGEMENT ..... 33**
4.1 Field Data Recording ..... 33
4.2 Data Verification and Validation ..... 33

**5 REPORTING ..... 35**

**6 SCHEDULE ..... 36**

**7 REFERENCES ..... 37**

## List of Tables

Table 2-1 Contingency Fish Species ..... 9
Table 6-1 Grasse River Post-Construction Monitoring Schedule ..... 36

## List of Figures

Figure 1-1 Location Map ..... 40
Figure 1-2 Site Map ..... 41
Figure 2-1 OMM – Resident Fish Locations ..... 42

Figure 2-2 OMM – Water Column Locations ..... 43
Figure 2-3 Fish Monitoring Decision Tree ..... 44
Figure 2-4 SPMD Sampler ..... 45

## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| %R | percent recovery |
| Alcoa | Alcoa Inc. |
| ARAR | Applicable or Relevant and Appropriate Requirement |
| BMP | Baseline Monitoring Program |
| CCLGR | Comprehensive Characterization of the Lower Grasse River |
| cm | centimeter |
| COC | chain of custody |
| CQAP | Construction Quality Assurance Plan |
| CT | Central Tendency |
| DoC | depth of contamination |
| DQO | data quality objective |
| EDD | electronic data deliverable |
| EQuIS | Environmental Quality Information System |
| EST | Environmental Sampling Technologies |
| FDR | Final Design Report |
| LCS | laboratory control sample |
| LD | lab duplicate |
| LOAEL | Lowest Observed Adverse Effect Level |
| mg/kg | milligram per kilogram |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| NFG | National Functional Guidelines |
| ng/L | nanogram per liter |
| NOAEL | No Observed Adverse Effect Level |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| OMM | Operations, Maintenance, and Monitoring |

| | |
|---|---|
| PCB | polychlorinated biphenyl |
| PDI | Pre-Design Investigation |
| PDR | Preliminary Design Report |
| Power Canal | Massena Power Canal |
| PRC | performance reference compound |
| PRG | Preliminary Remediation Goal |
| QA | Quality Assurance |
| QAPP | Quality Assurance Project Plan |
| QC | Quality Control |
| RAO | Remedial Action Objective |
| RL | reporting limit |
| RME | Reasonable Maximum Exposure |
| ROD | Record of Decision |
| RPD | relative percent difference |
| sf | square foot |
| SLWA | segment length-weighted average |
| SOP | Standard Operating Procedure |
| SPMD | semi-permeable membrane device |
| Study Area or site | Grasse River Study Area |
| T | Transect |
| TSS | total suspended solid |
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Survey |
| WC | water column transect |
| WC131 | Water Column Route 131 Bridge |
| WCMSB | Water Column at Main Street Bridge |
| WQC | Water Quality Criteria |
| YOY | young-of-year |

# 1 INTRODUCTION

In April 2013, the United States Environmental Protection Agency (USEPA) issued the Grasse River Superfund Site Record of Decision (ROD) that set forth the remedy USEPA has selected to address polychlorinated biphenyls (PCBs) in the Grasse River Study Area (Study Area or site) in Massena, New York. The selected remedy includes dredging followed by backfilling and capping. In July 2013, Alcoa Inc. (Alcoa) submitted the Remedial Design Plan, which provided the framework for developing the design necessary to implement the selected remedy. In June 2015, Alcoa submitted the Preliminary Design Report (PDR), which identified the technical requirements of the design elements and how they apply to the overall remedial action. In September 2016, Alcoa (now Arconic) submitted the Intermediate Design Report, which included more detailed plans, specifications, and consideration of data collected after the submission of the PDR. This draft Operations, Maintenance, and Monitoring (OMM) Plan is being submitted in conjunction with the Final Design Report (FDR; Arconic, September 2018a), which targets the removal of 85,300 cubic yards of contaminated sediment in the near shore and the placement of a cap over 281 acres of the main channel. This plan will be finalized after in-river remediation is completed.

This draft OMM Plan presents the approach for verifying achievement of the Preliminary Remediation Goals (PRGs) relating to fish and water PCB concentrations, as well as the cap verification set forth in the ROD. This draft OMM Plan also describes a comprehensive program that will provide data to track the progress of and ultimately verify remedy effectiveness in achieving the PRGs and, therefore, the Remedial Action Objectives (RAOs). An OMM Plan for the verification of PRGs and RAOs for ecosystem protection and habitat restoration is presented in the Habitat Reconstruction Plan (Arconic, September 2018b).

## 1.1 Site Description

The Study Area is located along the northern boundary of New York State in the Town and Village of Massena and encompasses approximately 8.5 miles of the Grasse River. It includes the 7.2-mile stretch of the river between the Massena Power Canal (Power Canal) and the St. Lawrence River, which is termed the lower Grasse River, and a 1.3-mile upstream background reach from just downstream of the Route 37 Bridge in Massena to the Power Canal confluence (Figure 1-1). For the purposes of the site investigations, 72 transects along

the lower river have been delineated, beginning with Transect (T)1 near the upstream boundary and ending with T72 at the downstream boundary near the mouth of the river (Figure 1-2).

The Arconic Massena Operations are located on the north shore of the lower Grasse River near Massena. Two other large former manufacturing facilities, the Alcoa Massena-East Plant (formerly Reynolds Metals Company) and the former General Motors Corporation site, are located adjacent to the St. Lawrence River approximately 7 miles northeast of Massena and downstream of the confluence with the Grasse River.

The Study Area includes the Power Canal and Robinson Creek (which discharges to the St. Lawrence River). The Power Canal, constructed between 1898 and 1903, connects the Massena Intake Dam on the St. Lawrence River to the former Power Dam at the Power Canal-Grasse River confluence. The former Power Dam was the original source of hydroelectric power for the Alcoa Massena-West facility and discharged water that was diverted from the St. Lawrence River through the Power Canal to the Grasse River. From approximately 1914 to 1918, the lower Grasse River was deepened from the Power Dam to the confluence with the St. Lawrence River to accommodate this discharge. Use of the Power Canal for power generation was terminated in the 1950s, coincident with the construction of new power-generating facilities on the St. Lawrence River.

The deepening of the lower Grasse River significantly altered its physical and ecological characteristics. Its expanded cross section ranges from approximately 5,000 square feet (sf) near Outfall 001 (Figure 1-1) to approximately 9,000 sf at the mouth. Its banks are steep; the bottom is underlain by bedrock, hard till, and marine clays, and there are minimal floodplains. The river channel is 15 to 25 feet deep, and areas shallow enough to support aquatic vegetation typically extend 25 feet from the bank. The shallow near shore areas are defined in the ROD as "the submerged area between the upland and the location where the gentle bathymetric slope along the shoreline meets the steep slope of the main channel side walls. In general, the near shore areas have water depths of five feet or less during normal summer flow and extend approximately 25 feet from shore" (USEPA, April 2013).
The 100- and 500-year floodplains extend minimally beyond the riverbanks, with little, if any, difference between the two limits (Figure 1-2). Additionally, the majority of land areas

adjacent to the Power Canal and Robinson Creek have been designated as areas of minimal flooding (Federal Emergency Management Agency, June 1986). There are also wetland areas contiguous to the Study Area as defined by the National Wetlands Inventory (United States Department of the Interior, May 1981).

Detailed discussions of the Study Area's hydrology and hydraulics, floodplains, wetlands, river use, and fish habitat are provided in the Comprehensive Characterization of the Lower Grasse River (CCLGR) Report (Alcoa, April 2001) and the Draft Addendum to the CCLGR Report (Alcoa, April 2009).

## 1.2 Summary of Remedial Action

The scope of the remedial action of the USEPA-selected remedy, with refinements made during the development of the Final Design, includes the following major components:

- Dredging of near shore sediment between T1 and T21, with sediment PCB concentrations greater than or equal to 1 milligram per kilogram (mg/kg) on a segment length-weighted average[1] (SLWA) or maximum surface[2] (0 to 12 inches) concentration basis followed by backfilling to grade.
- Dredging of near shore sediment between T21 and T72, with maximum surface (0 to 12 inches) sediment PCB concentrations greater than or equal to 1 mg/kg, followed by backfilling to grade.
- Placement of an armored cap over the main channel sediments between T1 and T21 where either the SLWA or the maximum surface (0 to 6 inches) sediment PCB concentration is greater than or equal to 1 mg/kg.
- Placement of a main channel cap over sediments between T21 and T72, with maximum surface (0 to 6 inches) sediment PCB concentrations greater than or equal to 1 mg/kg.

[1] SLWA concentrations are calculated over the interval from the surface of the sediments to the depth of contamination (DoC) or, when a DoC is not observed, to the depth of recovered sediments.

[2] The maximum surface concentration is defined herein as the maximum of any sample interval collected within the top 6 (main channel, T21 to T72) or 12 (main channel T1 to T21, near shore T1 to T72) inches of sediment.

- Within the near shore areas targeted for dredging, removal of PCB-containing sediments above 1 mg/kg.[3] Areas dredged will be backfilled to grade with clean backfill.
- Backfill, capping, and placement of habitat material using clean material that meets the acceptance criteria specified in Section 2.1.4 of the Final Design.
- Treatment of process water from the sediment dewatering facilities to meet New York State Department of Environmental Conservation (NYSDEC) discharge limits.
- A Cultural Resources Survey during the pre-remedial design prior to any disturbance or in-river work.
- Additional sampling and analysis of the relatively small area of floodplains present along the river concurrent with the design phases of the project to determine whether additional actions are warranted in any of the floodplain areas.[4]
- Monitoring (during remedial construction and long-term) to demonstrate the effectiveness of the remedial action in meeting the RAOs outlined in the ROD. This includes monitoring of the Power Canal.
- Air monitoring to ensure remedy implementation is protective.
- Institutional controls in the form of informational devices to limit exposure to PCBs, including the existing New York State Department of Health (NYSDOH) fish consumption advisories.

Development of a Habitat Reconstruction Plan 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.

## 1.3 Remedial Action Objectives and Preliminary Remediation Goals

The following RAOs and PRGs have been established by USEPA in the ROD for the site (USEPA, April 2013):

- **"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 PRG for the protection of human health is 0.05 mg/kg (wet weight) PCBs in fish fillet based on

[3] The remedial action selected in the ROD targets removal, with residual sediment concentrations less than 1 mg/kg; however, the approved post-dredge verification approach (Arconic, January 2017) allows for residual concentrations up to 5 mg/kg after dredging to meet the ROD criteria.

[4] The majority of this work has been completed. Five discrete floodplain areas have been identified and aerially delineated for soil removal. The details of this effort are provided in the FDR (Arconic, September 2018a).

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 PRG 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 the CT [Central Tendency] or average angler, who consumes one half-pound meal every two months.

- **"Reduce the risks to ecological receptors by reducing the concentration of PCBs in fish.** The risk-based PRG 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 NOAEL [No Observed Adverse Effect Level] and the LOAEL [Lowest Observed Adverse Effect Level] for consumption of fish by the mink. The ecological PRG 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.
- **"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, and ice-jam event scour). 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.
- **"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.
- **"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."

## 1.4 Purpose of Operations, Maintenance, and Monitoring

The purpose of OMM activities is to provide data to assess whether the remedial objectives set forth in the ROD (summarized in Section 1.3) are being met. The objectives for the OMM for water, fish, and cap verification are as follows:

- Conduct long-term monitoring of water column PCB levels to document changes in concentration over time and assess whether the RAOs and PRGs set forth in the ROD are being achieved.
- Conduct long-term monitoring of fish tissue PCB levels to document changes in concentration over time, assess whether the RAOs and PRGs are being achieved, and support decisions regarding the consumption advisories that are currently in place.
- Collect information to evaluate the physical integrity of the caps and assess whether the caps have experienced erosion or other disturbances.
- Collect PCB concentration data from water overlying the caps to evaluate their effectiveness at mitigating PCB transport.

To meet these overall objectives, data quality objectives (DQOs) have been developed for each component of the OMM program and are presented in Section 2.

## 1.5 Modifications to the Monitoring Program

Each component of the OMM program will be reviewed and updated as needed as part of the 5-year review process. The first 5-year review is expected to occur in 2022 based on the start of remedial construction activities in 2017. Monitoring will continue until USEPA determines that the relevant RAOs and PRGs in the ROD have been achieved. Data will be provided to the NYSDOH for consideration in modifying fish consumption advisories. Additionally, if Arconic concludes that monitoring is no longer necessary to achieve the PRGs and RAOs or that a modification in scope is appropriate, Arconic may submit a proposal for termination or modification of the monitoring program to USEPA for review and approval.

# 2 METHODS

## 2.1 Fish Monitoring

### *2.1.1 Data Quality Objectives*

In accordance with the PRGs and RAOs presented in the ROD, the DQOs for the fish monitoring program are as follows:

1. Measure PCB concentrations in fish over time to assess whether the RAOs, PRGs, and target levels set forth in the ROD are being achieved.
    a. For human consumption of fish, interim target PCB concentrations in fish fillets are as follows:
        i. 0.26 mg/kg (based on one 0.5-pound meal per month)
        ii. 0.36 mg/kg (based on one 0.5-pound meal every 2 months)
    b. For fish consumption by ecological receptors, concentrations are as follows:
        i. Whole body PCB concentrations of 0.44 mg/kg (LOAEL) to 0.22 mg/kg (NOAEL) in brown bullhead and spottail shiner
        ii. Fillet PCB concentrations of 0.2 mg/kg (LOAEL) to 0.1 mg/kg (NOAEL) in brown bullhead
    c. For human consumption of fish, the risk-based target PCB concentrations in fillets are as follows[5]:
        i. 0.05 mg/kg (based on RME consumption rates)
        ii. 0.01 mg/kg (protective of Mohawk human health)
2. Provide data on PCB concentrations in Grasse River fish to the NYSDOH for evaluation of fish consumption advisories.

### *2.1.2 Sampling Locations and Frequency*

Samples will be collected on a biennial basis on Years 1, 3, and 5 post-remedy. To facilitate comparison of post-remedial data with historical data, fish species and sampling locations for OMM activities will be consistent with those outlined in the Proposed Modifications to the Grasse River Supplemental Remedial Studies Monitoring Program (Alcoa, March 2013). As

[5] Section 13.1 of the ROD states that these PRGs are not expected to be met during the 30-year post remedial period, as predicted by the modeling analysis presented in the Analysis of Alternatives Report (Alcoa, July 2012).

part of the 5-year review process, the fish monitoring program will be reviewed to assess whether the data are adequate for the determination of trends, and modifications in frequency and/or locations may be made with USEPA approval. Sampling of adult fish, which comprise smallmouth bass (*Micropterus dolomieu*) and brown bullhead (*Ictalurus nebulosus*), will take place in the Background, Upper, Middle, and Lower Stretch designations sampled historically in the lower Grasse River (see Figure 2-1). Adult smallmouth bass will also be collected from the Power Canal (see Figure 2-1).

Long-term monitoring will also include sampling of young-of-year (YOY; less than 6.5 centimeters [cm]) spottail shiner (*Notropis hudsonius*). Composite samples will be collected from five locations: 1) in the Background Stretch; 2) near Outfall 001 (Upper Stretch at about T4); 3) near the Unnamed Tributary (Middle Stretch at about T27); and 5) upstream of the river mouth at about T72 (see Figure 2-1). These transect locations are consistent with more than 20 years of historical data, which will provide the ability to accurately describe post-remedial trends. For practicality, one modification will be made at the northern shore of T72. Because field teams have had difficulty obtaining the required number of fish in this location, they will begin at T72 and continue upstream until the requisite number of samples are collected. This will maintain as much continuity with the historical sampling location as is practical.

### 2.1.3 Size, Preparation, and Number of Fish

Sampling of adult fish will be conducted in the late summer/early fall and target the collection of adult specimens 25 cm or more in length. Smallmouth bass will be prepared for analysis as skin-on, scales-off fillets, whereas brown bullhead will be prepared as skin-off fillet samples. Fillet procedures will follow the Standard Operating Procedures (SOPs) presented in Appendix B of the Pre-Design Investigation (PDI) Quality Assurance Project Plan (QAPP; Alcoa, October 2013) and will include the ribcage.

A total of 17 smallmouth bass will be targeted in the Upper, Middle, and Lower Stretches, as well as the Power Canal. Five smallmouth bass will be targeted in the Background Stretch and the St. Lawrence River. A total of 18 brown bullhead will be targeted in each area, with the exception of the Power Canal, where no brown bullhead will be taken. Note that

previous sampling efforts have shown that adequate sample size in each target reach and location is dependent on actual species availability. As a result, the targeted numbers of fish may not be achieved for all species at all locations. In the event that target numbers cannot be achieved, contingency species will be collected instead. A list of contingency species is provided in Table 2-1.

YOY spottail shiner (less than 6.5 cm) will also be collected in the late summer/early fall as whole-body composites, with a minimum of 15 individual fish per sample. Three composites will be collected from the northern shore of the three lower Grasse River locations, as well as the Background Stretch. Yearling spottail shiner may be substituted if YOY fish are not available. In the event that spottail shiner are not present in sufficient quantities, alternative species will be identified for collection. A list of contingency species is provided in Table 2-1.

**Table 2-1**
**Contingency Fish Species**

| Monitoring Species | Contingency Species[1] |
|---|---|
| Smallmouth bass | Largemouth bass (*Micropterus salmoides*)<br>Walleye (*Sander vitreus*) |
| Brown bullhead | White sucker (*Catostomus commersonii*)<br>Redhorse (*Maxostoma* spp.*)* |
| YOY spottail shiner | Yearling spottail shiner<br>Common minnow/shiner species<br>YOY or yearling bass, sunfish, or perch |

Note:
1. Contingency species will be collected in the event the monitoring species are not available.

### *2.1.4 Sampling Procedures*

All fish sampling activities will be conducted in accordance with Appendix A of the PDI QAPP (Alcoa, October 2013). Fish sampling will be performed primarily using a boat-mounted electrofishing unit or gill netting, trap netting, or angling as needed. A Scientific Collectors Permit will be requested from NYSDEC prior to commencement of sampling. The following supplementary data will be recorded: fish length and fillet weight for smallmouth bass and brown bullhead, minimum and maximum fish lengths, and sample

counts for the spottail shiner composite samples. Field data will be recorded in a field notebook and loaded into the electronic Environmental Quality Information System (EQuIS) database currently being used for the PDI and Baseline Monitoring Program (BMP) activities. Quality assurance (QA) and quality control (QC) measures for the sampling program are presented in Section 3.2.

### 2.1.5 Analytical Program

All resident fish samples will be submitted to an analytical laboratory for analysis of total PCBs (Aroclors) and lipid content. Analytical SOPs for Pace Analytical Services, LLC, are provided in Appendix B of the PDI QAPP (Alcoa, October 2013); however, if an alternative analytical laboratory is selected for these analyses, the applicable SOPs will be submitted to USEPA for review. Samples will be handled, packaged, and shipped in accordance with SOP No. 6, which is presented in Appendix A of the PDI QAPP.

### 2.1.6 Criteria Attainment Determination

Biennial sampling of adult fish fillets will continue until adult resident fish fillet concentrations approach the interim target PCB concentration for human consumption of fish (0.26 mg/kg), at which time sampling frequency will increase from biennial to annual. Upon achieving the interim target fillet PCB concentration within each species for 3 consecutive sampling years or 4 out of 5 consecutive sampling years, biennial sampling will resume. Annual species averages will be calculated river-wide (which excludes the Background Stretch and the Power Canal). PCB levels in these adult fish species consistently show little spatial variation. This finding is consistent with other natural history information, as well as site-specific tagging studies that show these fish species traverse the entire river and are not local to any specific portion of the river. This indicates that the fish are integrating PCBs from across the entire lower Grasse River, which supports a river-wide averaging approach.

When the river-wide average PCB concentration in brown bullhead fillets decreases to 0.11 mg/kg or less, a subset of brown bullhead will be prepared for both skin-off fillets and whole-body carcass/offal (minus the fillet) analyses, which additively allow calculation of whole-body concentrations. Addition of whole-body analysis will allow monitoring of

whole-body brown bullhead concentrations as they approach the whole-body NOAEL of 0.22 mg/kg for fish consumption by ecological receptors. The analysis presented in the 2017 Draft PDI Data Summary Report Addendum No. 1 (Arconic, March 2017) calculated the whole-body to fillet concentration ratio at 2.0, which indicates that whole-body brown bullhead concentrations will be approximately 0.22 mg/kg when the whole-body analysis is triggered. Biennial sampling of brown bullhead, including the analysis of whole-body concentrations for a subset of samples, will continue until the computed whole-body PCB concentrations are less than the 0.22 mg/kg threshold for 3 consecutive sampling years or 4 out of 5 consecutive sampling years. Annual averages will be determined on a river-wide basis. After this time, analysis of whole-body brown bullhead samples will be discontinued, and samples will be prepared for fillet analysis only.

Sampling of YOY spottail shiner will continue biennially for the length of the program and will be discontinued after river-wide average PCB concentrations are below the whole-body NOAEL of 0.22 mg/kg for fish consumption by ecological receptors for 3 consecutive sampling years or 4 out of 5 consecutive sampling years.

Lastly, adult fish fillets will be collected biennially for PCB analysis until the concentrations are less than the risk-based PRG for the protection of general human health (0.05 mg/kg) and Mohawk human health (0.01 mg/kg) for 3 consecutive sampling years or 4 out of 5 consecutive sampling years, or sooner if supported by additional trend analyses or future changes in criteria. Annual averages will be determined on a river-wide basis. After this time and with USEPA approval, the fish monitoring program will be discontinued.

As data are received, they will be provided to NYSDOH to assess whether fish consumption advisories for the Grasse River should be modified. Once brown bullhead and smallmouth bass fillets approach the fish consumption advisory threshold, sampling of the fillets of additional high-lipid species (e.g., common carp) will be considered for addition into the monitoring program. The scope of the fish sampling program may also warrant re-evaluation when data from the smallmouth bass and brown bullhead monitoring program indicate that fish tissue PCB levels are low enough to support a relaxation of the current advisory.

### 2.1.7 Contingency Actions

If results indicate that RAOs and PRGs in the ROD have been achieved, then, following consultation with USEPA, the monitoring program will be discontinued. Discontinuation of monitoring may occur earlier for some species than others depending on criteria attainment. In the event that other elements of the remedy attain their respective performance criteria and fish tissue concentrations do not, or if downward trends are delayed longer than anticipated, response actions may be implemented. Potential measures include the following:

- Conduct additional analysis or modeling of existing data to better understand the reasons the criteria have not been attained. For example, tissue contaminant concentration and the size or age of individual fish may be evaluated to assess whether specific size ranges are limiting attainment of the performance criteria or whether younger or smaller fish are on a new trajectory that will likely result in lower tissue concentrations in the future. Additional information to be considered may include water quality data, cap monitoring data, and background data to determine whether significant further reductions are practicable, with or without further remedial action.
- Collect additional data to help better understand existing results. Additional data may include water column and fish PCB sampling at a higher spatial resolution than that used under the existing program. These additional fish tissue data will also be evaluated in the context of the performance of other elements of the remedy.
- Finally, if results are showing that performance criteria are not being met or trending toward being met, then alterations to the sampling program, additional remedial activities, or an adaptive management scheme will be evaluated and potentially implemented as warranted with USEPA approval.

## 2.2 Water Column Monitoring

### 2.2.1 Data Quality Objectives

In accordance with the Applicable or Relevant and Appropriate Requirements (ARARs) presented in the ROD, the DQOs for the water monitoring program are as follows:

1. Provide water column PCB concentration data to assess whether the RAOs and the following PRGs (expressed in Total PCBs) are being achieved:
    a. 1 nanogram per liter (ng/L) ambient USEPA Water Quality Criteria (WQC) for navigable waters
    b. 14 ng/L in freshwater, the USEPA WQC for freshwater aquatic life
2. Determine whether the remedy has been effective in minimizing long-term downstream transport of PCB load into the St. Lawrence River.

In addition to these DQOs, ARARs listed in the Analysis of Alternatives Report (Alcoa, July 2012) cite two additional WQC:

- 0.001 ng/L NYSDEC Surface Water and Groundwater Quality Standards for the protection of human health
- 0.12 ng/L NYSDEC Surface Water and Groundwater Quality Standards for the protection of wildlife

However, these ARARs were waived in the ROD (Section 13.2), which cited technical impracticability. Therefore, these ARARs will not be used as DQOs in this draft OMM Plan.

### *2.2.2 Sampling Locations and Frequency*

Water column samples will be consistent with baseline monitoring locations. These consist of four locations in the Grasse River (Figure 2-2). Locations include the following: 1) Main Street Bridge in Massena (WCMSB); 2) Route 131 Bridge (WC131); 3) water column transect (WC) 011; and 4) WC013.

Samples will be taken biennially on Years 1, 3, and 5 post-remedy. During each sampling year, samples will be taken monthly from June through September. Historical seasonal trends indicate that annual maximum water column concentrations are typically observed during these months. As part of the 5-year review process, the water monitoring program will be reviewed to assess if the data are sufficient for the determination of trends and modifications in frequency and/or locations may be made with USEPA approval.

### 2.2.3 Sampling Procedures

All monitoring activities will be conducted in accordance with the baseline monitoring as described in Appendix A of the PDI QAPP (Alcoa, October 2013). During each event, samples will be collected at each location using a stainless-steel Kemmerer water sampler. At WC131, WC011, and WC013, one sample will be collected mid-channel from each location at 0.2 and 0.8 times the total water column depth (i.e., total of two samples per location). At WCMSB, one sample will be collected at 0.5 times the total water column depth just downstream of the Main Street Bridge from the north shore. Samples will be collected from the shoreline because water depths preclude collection with a boat.

Prior to the collection of samples at WC131, WC011, and WC013, the total water column depth will be recorded, and specific conductivity and water temperature measurements will be obtained every 2 feet in the water column (at mid-channel) to check for the presence of stratification. Based on previous evaluations, differences of approximately 3 to 5°C in water temperature and approximately 20 microsiemens per centimeter in specific conductivity between the two water masses will be used to identify the existence of stratification. Field water quality measurements of specific conductivity, water temperature, pH, turbidity, and dissolved oxygen will also be collected at 0.2 and 0.8 times the total water column depth (at mid-channel). Similarly, these field parameters will be collected at WCMSB at 0.5 times the total water column depth.

### 2.2.4 Analytical Program

Samples will be packaged and submitted to an analytical laboratory for analysis of PCB congeners by USEPA Method 1668 and total suspended solids (TSS). Samples will be handled, packaged, and shipped in accordance with SOP No. 6 presented in Appendix A of the PDI QAPP (Alcoa, October 2013). Sample handling is also outlined in Section 3 of this document.

### 2.2.5 Criteria Attainment Determination

Arconic will monitor surface water data and perform analyses of concentration trends. Once the annual river-wide average surface water concentration is below the ambient USEPA

WQC for navigable waters (1 ng/L) for a total of 2 consecutive sampling years, sampling will be discontinued with USEPA approval.

To determine the effectiveness of the remedy on PCB transport to the St. Lawrence River as specified in DQO 2, the PCB concentrations measured at WC013 will be used in conjunction with flow data recorded at the United States Geological Survey (USGS) Grasse River gaging station (station number 04265432) at Chase Mills to calculate the PCB load originating from the Grasse River. Attainment of DQO 2 will be evaluated by USEPA in conjunction with the attainment of DQO 1.

### *2.2.6 Contingency Actions*

Surface water data will be reviewed as part of the 5-year review process and as necessary to verify that sampling is adequate to meet program objectives. The decisions regarding the need for implementation of response actions will be largely driven by trends in compliance with surface water quality standards. If surface water quality standards have not been attained or are not trending towards attainment within 5 years after completion of the remedy, then response actions may be implemented, and potential measures include the following:

- Conduct additional analysis or modeling of existing data. Additional information to be considered may include fish monitoring, cap monitoring, and background data.
- Collect additional data to inform existing results. Additional data may include water column sampling at a higher spatial resolution than that used under the existing program. These additional data will also be evaluated in the context of the performance of other elements of the remedy.
- Finally, if results are showing that performance criteria are not being met or trending toward being met, then alterations to the sampling program, additional remedial activities, or an adaptive management scheme will be evaluated and potentially implemented as warranted.

## 2.3 Cap Monitoring

As described in the FDR (Arconic, September 2018a), the sediment caps have been designed to provide long-term chemical isolation and stability, integrity, and protectiveness under the

anticipated range of potential erosional forces. Specifically, the caps were designed and are being constructed to meet the following objectives:

- Physical isolation of PCBs in the sediment from the benthic environment
- Erosion protection to maintain cap stability against forces resulting from open-water river flows, ice jam-related floes upstream of T21, and propwash from boats
- Chemical isolation (i.e., mitigation of the flux of dissolved PCBs from capped sediments to the water column)

Different cap designs have been developed to address the range of potential erosional forces anticipated within different areas of the lower Grasse River. PCBs in buried sediments in the main channel upstream of T19 are potentially vulnerable to ice jam-related scour,[6] and PCBs in buried sediments in the main channel downstream of T19 are currently stable and effectively sequestered (i.e., the downstream reaches are not susceptible to ice jam-related scour; Alcoa, April 2009). Therefore, armored caps capable of withstanding ice jam-related scour, such as the event that occurred in 2003, have been designed for main channel sediments in the upper stretch (T1 to T21) of the river. The downstream boundary of the armored cap was extended from T19 to T21 to address the presence of a continuous fine sediment deposit in that reach of the river, although the type of armor material is smaller than the material from T1 to T19 for geotechnical considerations (i.e., modified armored cap). Caps without an armoring component have been designed for the main channel sediments in the downstream reach (T21 to T72).

In summary, the following three cap types are to be monitored:

- Main Channel Armored Cap (T1 to T19)
- Modified Main Channel Armored Cap (T19 to T21)
- Main Channel Cap (T21 to T72)

[6] Results of the river-ice investigation identified the T1 to T19 reach of river as potentially vulnerable to ice jam-induced scour (Alcoa, April 2009). However, for the purposes of remedy development, T21 was used to define the downstream extent of this reach. This was done to recognize the fact that the contiguous fine sediment deposit in this portion of the river extends beyond T19 down to T21, and the remedy developed to address this deposit would consider the entire deposit and not just the portion that is susceptible to ice jam-induced scour.

USEPA's *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (USEPA, December 2005) recommends that the physical cap integrity be monitored routinely and after certain episodic events; therefore, a long-term field monitoring program was developed to monitor the effectiveness of the cap in meeting the objectives described in this section, including the following:

- Routine monitoring of capped areas
- Event-based monitoring of capped areas
- Additional cap monitoring or sampling based on the results of routine and event-based monitoring, if appropriate

### 2.3.1 Data Quality Objectives

The long-term monitoring of the sediment cap areas will include routine physical and chemical monitoring. Physical monitoring will be performed to verify the presence and stability of the erosion protection layer and underlying chemical isolation layer. Chemical monitoring will be performed to verify that PCBs are sufficiently isolated from the benthic environment.

The DQOs for the cap monitoring program are as follows:

- **Physical Monitoring**: Monitoring for physical integrity of the capped portions of the site will be performed using bathymetric surveys and other physical measurements, if necessary, to verify that the surface layer (armor in T1 to T21 and sand in T21 to T72) remains intact and continues to physically isolate the sediments below. It should be noted that the habitat layer material placed above the armor layer between T1 and T21 is anticipated to redistribute to some extent over the long-term and will therefore not be maintained as part of the long-term cap monitoring and maintenance program.
- **Chemical Monitoring**: Chemical monitoring of the capped portions of the site will be performed though the collection of semi-permeable membrane devices (SPMDs) to verify the cap mitigates the flux of dissolved PCBs from the capped sediments to the water column (see Section 2.3.3).

### 2.3.2 Routine Physical Monitoring

Following the initial post-construction bathymetric surveying of the capped areas as described in the Construction Quality Assurance Plan (CQAP; Appendix C of the FDR; Arconic, September 2018c), long-term physical monitoring of the cap areas will be performed using multibeam bathymetric surveying. The long-term monitoring will be performed in all cap areas. If an area appears to be disturbed based on the results of the bathymetric survey (e.g., loss of cap material as opposed to anticipated widespread consolidation settlement), additional surveys, probing, coring, or diver-assisted assessments could be performed to confirm the initial conclusions from the bathymetric surveying and to evaluate the mechanism(s) responsible for the potential disturbance. If these additional measurements confirm the presence of the cap material (e.g., if probing clearly indicates the presence of the armored layer from T1 to T19), then the caps will be considered stable. If the caps show physical stability over time, the frequency of monitoring may be reduced as part of adaptive management for the monitoring program pending approval by USEPA.

#### 2.3.2.1 Measurement Performance Criteria

Multibeam bathymetric surveys will be performed to measure the post-construction surface elevation of the sediment caps. Surveying will be performed using the same methods and QA/QC procedures as described in the CQAP (Appendix C of the FDR; Arconic, September 2018c) to allow direct comparison of the cap elevations between post-construction monitoring surveys.

Bathymetric surveys will be assessed on a 10-foot by 10-foot grid. Survey data within each 10-foot by 10-foot grid cell (or portion thereof when constrained by the remedial boundaries) will be averaged to produce a single average elevation value for each cell. Cap thickness difference (isopach) maps will be created to compare the measured cap surface elevation to previous post-construction multibeam bathymetric survey of the capped areas (see Section 2.3.4).

In the event that differences in bathymetric survey data indicate a decrease in cap elevation greater than 0.5 foot over a contiguous area greater than 5,000 sf that is not attributable to anticipated settlement, then additional data evaluations will be performed, and additional

data collection may be triggered as described in Section 2.3.4. The need for additional data collection will consider the effects of settlement, which could be greater than 0.5 foot in some areas, as further detailed in Appendix D of the FDR (Arconic, September 2018a). For example, large contiguous areas of the cap that have relatively uniform changes in elevations consistent with the predicted settlement rates would be representative of settlement as opposed to loss of cap materials.

#### *2.3.2.2 Survey Locations and Frequency*

Multibeam bathymetry surveying will be performed over all capped areas on an annual basis for the first 2 years after construction. If the results of the first 2 years of monitoring indicate that the physical integrity of the sediment caps remains intact and functioning as expected, a subset of the capping areas will be identified to continue annual monitoring from Years 3 through 5 after construction. The physical monitoring program will be reviewed and updated at the 5-year review. If the caps show physical stability over time, the frequency of monitoring may be reduced pending approval by USEPA.

#### *2.3.2.3 Event-Based Physical Monitoring*

USEPA's *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (USEPA, December 2005) recommends that the physical cap integrity be monitored after events with certain recurrence intervals. Therefore, in addition to the routine monitoring, physical monitoring will be performed after significant events to verify the integrity of the cap.

Bed velocities and associated bed shear stresses as a result of open-water high river flows are not considered to be significant forces in the river over the capping areas. The dominant erosive force in the upstream reach of the river is caused by velocities and associated turbulence under the toe of a severe ice jam. As such, supplemental bathymetric surveys will be performed in the capping areas potentially affected by ice jams (T1 to T19) following major ice jam events. Surveying will be triggered by an exceedance of 160 feet (United States Lake Survey 1935) at Outfall 001 during ice breakup, which is approximately 5 feet above mean water surface elevation. As with routine monitoring, if an area appears to be disturbed based on the results of the bathymetric survey as compared to the baseline condition, additional surveying, probing, coring, or diver-assisted assessments will be performed to

confirm the initial conclusions from the bathymetric surveying and to evaluate the mechanism(s) responsible for the disturbance. Provided that cap integrity and stability are verified after an extreme event in the areas subject to impacts from an ice jam (T1 to T19), stability in other capping areas will be inferred based on the observations from past ice jams and from extensive ice jam modeling. If the caps show physical stability following significant events, the event-based triggers for monitoring may be refined as part of the flexible monitoring program.

Arconic will continue to annually monitor ice conditions, the presence of ice jams, and ice breakup in the Grasse River. The annual monitoring program will determine whether a major ice jam may have occurred in the river.

#### *2.3.2.4 Response Actions*

The purpose of post-construction cap maintenance, if required, is to preserve the long-term permanence and protectiveness of the cap. This section presents the framework for response actions for the cap areas based on the results of physical monitoring. If the initial physical monitoring data (i.e., bathymetric surveying, probing, and coring results) indicate that the cap armor layer remains intact, as discussed in this section, maintenance actions will not be required. Given natural hydrodynamic fluctuations, small, localized disturbances to the cap would be expected to "self-heal," meaning they will level over time such that the cap armor material will sustain minor disturbances without requiring maintenance.

Potential changes to the physical integrity of the cap will be considered in conjunction with chemical monitoring data and evaluations using as-built information to evaluate whether the cap is functioning as expected. If data resulting from either the routine or event-based monitoring show evidence of significant loss of material such that the potential protectiveness of the cap may be impacted, additional data collection will be initiated. The results of the physical cap monitoring and subsequent discussions with USEPA will determine if a response action is necessary.

Additional site investigations, including probing, cores, or diver-assisted surveys to provide visual evidence of cap layer thicknesses, may be performed in the areas where survey data

suggest a loss of 0.5 foot or more. The following will be considered to determine if, or where, additional data collection is required:

- Uniformity of the bathymetry change. Uniform changes in bathymetry over a large area may be more indicative of settlement than erosion, whereas smaller localized areas of bathymetry change may be more indicative of material loss.
- Anticipated magnitude and rate of settlement of underlying sediment, as documented in Appendix D of the FDR (Arconic, September 2018a).
- Location of bathymetric change versus anticipated high erosional areas, such as in the potential ice-jam related areas (upstream of T19) or propeller wash areas.
- Long-term trends based on prior monitoring events.
- Cap surface substrate. In some areas, the cap includes a habitat layer that is finer than the underlying armor layer. Some movement of this finer habitat material is anticipated, as discussed in Section 2.3.1.

If significant cap erosion is confirmed by the additional data collection, an evaluation will be completed to determine whether the protectiveness of the cap has been or could be compromised to determine whether additional response actions are required. This evaluation will include a comprehensive review of all available data considering multiple lines of evidence, including spatial and temporal trends in data, rather than isolated data points as follows:

- Review prior physical and chemical monitoring data (the chemical effectiveness monitoring is described in Section 2.3.5).
- Review information pertaining to the as-built conditions of the cap (e.g., construction verification data).
- Define the extent of potential impacts and the significance to cap performance and protection of human health and the environment.
- Determine likely cause(s) of physical changes to cap.
- Evaluate the potential for additional cap material losses.
- Determine if further action is required to maintain protectiveness of the remedy and meet the RAOs.

Any specific response actions would depend on location, observations of the physical integrity of the cap, and other factors such as those noted in this section. If, after consideration of the design and as-built cap details, it is determined that the loss of capping material in an area may have significantly compromised the protectiveness of the cap, additional response actions will be considered. Appropriate response actions to repair degraded cap areas will be performed after the cause of cap degradation has been determined so that repairs address the underlying cause of the observed changes. The need for physical repair of the cap will be determined based on a review of all available information and in consultation with USEPA. The Route 131 Staging Area will be maintained for a minimum of 5 years following completion of the in-river remedial action in the event that cap maintenance is required during this initial monitoring period.

### *2.3.3 Chemical Effectiveness Monitoring*

The objective of the cap is to reduce PCB flux to the water column, as described in the FDR (Arconic, September 2018a). Therefore, the primary purpose of the chemical monitoring is to measure PCB concentrations within the water column above the cap to verify that the chemical isolation layer of the cap is performing as expected.

SPMDs will be used as a means of evaluating PCBs in surface water in the cap area. This approach is consistent with the Capping Pilot Study (Alcoa, April 2002). SPMDs are usually deployed over relatively long periods (i.e., weeks to months) and accumulate PCBs in proportion to average surface water concentrations during the deployment period. SPMDs do not measure concentrations directly but are useful for measuring relative differences in average concentrations to which biota may be exposed spatially and over time.

#### *2.3.3.1 Sampling Locations and Frequency*

Passive samplers will be placed mid-channel at 0.5-mile spatial increments, including one upstream and one downstream of the cap extent (16 locations total). Samplers will be placed near bottom (depth greater than 0.8 times the total water column depth) and deployed for 1 month at a time to obtain time-integrated measurements. These measurements provide a time-integrated measurement that will capture monthly or seasonal variations. Monitoring will occur two times per year (early and late summer) in Years 1, 3, and 5 following the

completion of the remedial action (anticipated in 2021). The frequency of sampling will be revisited after Year 5.

Spatial and temporal patterns in PCB mass measured by passive samplers will be used to identify increases in water column contamination beyond those expected based on remedy performance. Year 1 (anticipated to be in 2022) of sampling will be treated as a baseline from which data collected each subsequent year may be compared.

#### *2.3.3.2 Sampling Procedures*

The procedures for this sampling will be consistent with previous sampling events performed during the Capping Pilot Study (Alcoa, April 2012). SPMDs consist of low-density polyethylene (LDPE), lay-flat tubing, and high-purity synthetic triolein (less than 95%). The SPMDs that will be used for this study are LDPE tubes that are 2.5 cm wide by 91.4 cm long (75 to 90 micrograms wall thickness) and contain 1 milliliter of triolein as a thin film spread over the entire tube. The SPMDs are heat sealed at both ends. SPMDs will be obtained from a supplier that specializes in preparation of SPMDs (i.e., currently, Environmental Sampling Technologies [EST] has been identified as the supplier for baseline monitoring). SPMDs will be delivered pre-mounted on a deployment rack or "spider" and sealed in gas-tight, solvent-rinsed gallon cans or gas-phase sampling bags for transport to the deployment site. The spider device consists of a stainless-steel disk with ten 2-inch vertical pegs on the outer edge, around which the SPMD is wrapped. The deployment devices consist of a stainless-steel mesh cylinder 6 inches in diameter and 5 inches high (Figure 2-4).

As discussed in Section 2.3.9, a performance reference compound (PRC) from the SPMD can provide a means of correcting for biofouling and any other differences in environmental conditions, such as flow and temperature, that affect the uptake/sampling rate. The PRC can help normalize results from different years and seasons to account for differences in environmental conditions that would affect the uptake rate.

During each event, a duplicate sample will be collected at 1 of the 16 locations. A trip blank and a field blank sample will also be prepared for QA/QC purposes.

#### *2.3.3.3 Response Actions*

As with the physical monitoring and maintenance framework, the response actions will be based on an overall review of the data collected considering multiple lines of evidence including spatial and temporal trends in data, rather than isolated data points. Response action(s) will be implemented as necessary subject to USEPA approval.

Data collected the first year of monitoring (anticipated to be in 2022) will be considered the baseline dataset for which data from subsequent sampling events will be compared. If SPMD data in subsequent years indicate that the mass of PCBs measured in the SPMDs is consistent across the site and consistent with prior sampling events (accounting for differences in temperature and flow), response actions will not be required. However, if SPMD results, when evaluated spatially and temporally, indicate that PCB flux from the cap may be occurring, the response action could include one or a combination of the following:

- Continue monitoring to assess temporal trends.
- In locations where SPMD results may indicate PCB flux from the cap, additional SPMDs may be installed to validate the initial results and to refine the footprint over which the PCB flux is occurring (i.e., area of concern).
- Measure PCBs in sediment and cap within the area of concern.
  - Vertical trends in PCBs (concentration and composition) may help to identify whether transport of PCBs from the sediment through the cap is occurring.
  - Verify whether PCBs in the cap are above or below levels of concern (e.g., above 1 mg/kg PCB).
- Measure in situ granular activated carbon content within the area of concern to evaluate whether the dosage meets the design requirements.

If it is determined that actions are required to address PCB movement through the cap as reflected in SPMD and other relevant measurements, an evaluation of options will be developed and recommendations provided to USEPA based on the available data.

#### *2.3.3.4 Analytical Program*

EST will prepare sample extracts using dialysis and gel permeation chromatography. The extracts will then be submitted to an analytical laboratory for PCB analysis using USEPA Method 1668. Biofouling can act to impede the flux across the SPMD membrane and thus lower the effective sampling rate. Based on the assumption that the uptake rate of a chemical by an SPMD is proportional to its rate of loss, measuring the loss of a permeability/PRC from the SPMD can provide a means of correcting for biofouling and any other differences in environmental conditions that affect the uptake/sampling rate. The PRCs to be chosen are analytically non-interfering compounds with a relatively high SPMD fugacity and will be chosen in coordination with the analytical laboratory so that they can be accurately quantified. The PRCs will be spiked into the triolein of the SPMDs (including all QA/QC samples) by EST prior to shipping the devices to the site. The PRCs will be used to account for membrane biofouling and other variables (e.g., temperature, flow velocity) that could affect sampling/uptake rates and will provide a means to normalize SPMD data accordingly.

# 3 GENERAL DATA ACQUISITION PROCEDURES

An overview of the data acquisition and handling procedures is presented in this section. All procedures will be conducted in accordance with the PDI QAPP and associated addenda (Alcoa, October 2013). Please refer to the PDI QAPP and associated addenda for a detailed account of procedures.

## 3.1 Sample Handling and Custody Requirements

### *3.1.1 Field Activities Sample Custody*

Appropriate chain-of-custody (COC) procedures will be followed throughout the sampling program. These procedures include sample custody in the field and in the laboratory. The COC records will be created during sample collection. The COC record will include field logs, as well as COC forms for each monitoring program. See PDI QAPP Appendix B (Alcoa, October 2013) and associated addenda for an example of a COC form.

Sample containers and preservatives will be provided by the laboratory. The laboratory will maintain documentation certifying the cleanliness of bottles and the purity of preservatives provided. Container requirements are listed in the PDI QAPP, Worksheets 19 and 30, but may vary depending on laboratory requirements (Alcoa, October 2013).

Each sample collected in the field will be clearly labeled with a unique sample ID that will be logged on the field log and COC form generated by an electronic field database. At a minimum, the sample label will contain the following:

- Company name
- Field sample ID number
- Sampling location (except for blind duplicates)
- Sample type (e.g., composite, grab)
- Date and time collected
- Preservation required
- Required analysis
- Custodian's initials

Immediately after sample collection, labeling, and logging, each sample container designated for analysis will be placed into an insulated cooler with wet ice or icepacks and appropriate packing materials for shipment to the laboratory. The laboratory will measure the temperature of the samples in each cooler upon receipt of each shipment. Sample coolers will be delivered to the analytical laboratory by either direct courier or 24-hour delivery courier (e.g., United Parcel Service [UPS]) at regular intervals and at the end of the sample collection and processing activities. The use of a direct courier or commercial courier will be dictated by the associated sampling program and the turnaround time necessary for analytical results. Packing slips or air bills for the samples shipped by commercial courier will be retained to the extent possible by the laboratory as part of the login documentation.

### *3.1.2 Laboratory Receipt and Custody*

Once samples are received at the laboratory, the field COC record will be signed by laboratory personnel. The laboratory personnel will measure the temperature of the cooler upon receipt and check the sample labels against the corresponding information listed on the field COC records. The cooler temperature and any discrepancies, including any damaged or missing sample containers, will be recorded on the cooler receipt form and will be communicated to the project QA Manager within 24 hours of sample receipt so that appropriate corrective action can be determined and implemented.

After the sample receipt information is checked and recorded, samples will be logged in at the laboratory for analyses. Electronic versions of the COC test request information will be provided to reduce keystroke errors during sample login, when possible. Completed field COC forms will be provided in the laboratory data package.

Samples will be stored in secure, limited access areas in an environment that maintains any required temperature preservation noted in the PDI QAPP, Worksheets 19 and 30 (Alcoa, October 2013). Samples for most water analyses are required to be refrigerated at a temperature of 2 to 6 °C. Sediment and fish samples are required to be frozen at a temperature of -18 ± 10 °C. Sample extracts and homogenized tissue from fish samples will be held at -10 ± 10 °C. The temperature of the refrigerators or freezers used to store samples will be monitored by the project laboratories according to their internal SOPs. Unused raw

sample volumes will be retained until Arconic approves of the disposal of that material. Disposal of unused sample extracts and sample digestates will be in accordance with each laboratory's waste management procedures. However, if requested, Arconic will provide those remaining raw samples to USEPA following receipt of the analysis report.

## 3.2 Quality Control Requirements

### *3.2.1 Field Quality Control Samples*

QC samples will be collected in the field to evaluate data quality. Field QC samples for water column and cap sediment samples include equipment blanks, blind duplicates, and extra sample mass or volume for MS/MSD/lab duplicates (LDs). Fish sampling does not facilitate the use of field QC samples (e.g., duplicates) as part of the study design; all QC samples for the fish sampling program will be generated in the laboratory. During the OMM program, USEPA may request split or duplicate samples of any material. The types and frequency of field QC samples to be collected for each parameter are provided in the PDI QAPP, Worksheets 12 and 28, and further described in the following sections (Alcoa, October 2013).

#### *3.2.1.1 Equipment Blanks and Homogenization Blanks*

Equipment blanks ensure that sampling procedures do not result in contamination of the environmental samples and evaluate the effectiveness of the decontamination of field equipment. For the water and sediment cap sampling, equipment blanks will be collected once at the start of each sampling day and once at the conclusion of all sampling activities if using non-disposable equipment. Water blanks will be analyzed using USEPA Method 1648 and sediment blanks will be analyzed using USEPA Method 8082. Equipment blanks will not be collected for fish tissue; instead, homogenization blanks will be collected by the laboratory (Section 3.2.2.1).

An equipment blank for water sampling will be collected in the same type of container used for sample collection in accordance with the water column sample collection SOPs, using reagent water. Equipment blanks are not applicable to TSS analysis.

An equipment blank for sediment sampling will be generated by running reagent grade water over decontaminated sampling equipment and collecting the water in appropriate containers for analysis. All equipment that comes into contact with sediment samples will be included when generating the equipment blank. Equipment blanks are not applicable to total organic carbon analysis.

If compounds/analytes of interest are detected in the equipment blanks at levels greater than the reporting limit (RL), the sampling crew will be notified so that the source of contamination can be identified (if possible) and corrective measures taken prior to the next sampling event. If the concentrations in the associated samples are less than five times the concentrations in the equipment blank, the results for the samples may be affected by contamination and may be qualified during validation.

#### *3.2.1.2 Field Duplicates*

Field duplicates demonstrate the precision of the sampling and analytical processes. Sample duplicates for water and sediment will be collected in the field following sampling procedures and submitted to the analytical laboratory "blind" without any indication of the actual sample location. Water sample field duplicates for TSS will be collected at a rate of 5% of the total number of samples collected (one per group of up to 20 samples). One water and one sediment sample field duplicate will be collected at a rate of 5% or more of the total number of environmental samples (or one field duplicate per 20 samples). Water blanks will be analyzed using USEPA Method 1648, and sediment blanks will be analyzed using USEPA Method 8082. Fish tissue duplicates will be generated in the laboratory after homogenization if there is sufficient mass to collect a duplicate.

When the detected concentrations are greater than five times the sample-specific RLs, the relative percent difference (RPD) of the two measurements of the sample is calculated using the following equation:

$$RPD = [(D1 - D2)/((D1 + D2)/2)] \times 100\% \qquad (6\text{-}1)$$

where:

$D1$ = the greater of the measured values

$D2$ = the lesser of the measured values

When at least one result is less than or equal to five-times the sample-specific RL, the absolute difference between the two measurements of the sample is calculated using the following equation:

$$Difference = D1 - D2 \tag{6-2}$$

where:

$D1$ = the greater of the measured values

$D2$ = the lesser of the measured values

Note that the RL is used in the calculation if the analyte is "not-detected."

Precision criteria are listed in the Measurement Performance Criteria tables included in the PDI QAPP, Worksheets 12 and 28 (Alcoa, October 2013). If the RPD or absolute difference of field duplicate results is greater than (exceeds) the QC acceptance criteria, the results for the field duplicate pair will be qualified as estimated. The Field Sampling Manager will be notified so that the source of sampling variability can be identified (if possible) and corrective action taken.

#### *3.2.1.3 Matrix Spikes/Matrix Spike Duplicates*

Matrix spikes (MSs) and matrix spike duplicates (MSDs) are analyzed to assess the analytical precision and accuracy of analytes of interest in a particular sample matrix. LDs are typically substituted for MSDs for inorganic chemistry analyses. MS/MSD/LDs will be analyzed as specified in the PDI QAPP, Worksheets 12 and 28 (Alcoa, October 2013).

The MS/MSD/LDs will be analyzed at the rate of one per sample batch (up to 20 samples) if sufficient sample mass or volume is available. Each MS will consist of an aliquot of a laboratory-fortified environmental sample. The laboratory-fortification solution will contain the analytes specified in the PDI QAPP, Worksheet 15 (Alcoa, October 2013). Preferably, a sample of low-level concentration should be used so that the spike level is greater than the

background level of the chosen sample. The MS samples will be extracted and analyzed in the same manner along with normal sample analyses.

The percent recovery (%R) of the MS/MSD will be calculated using the following equation:

$$\%R = (A - B)/T \times 100\% \tag{6-3}$$

where:

| | | |
|---|---|---|
| $A$ | = | concentration of analyte in the spike sample aliquot |
| $B$ | = | background concentration of compound or analyte in the un-spiked sample aliquot |
| $T$ | = | known true value of the spike concentration |

MS recovery information will be used to assess the long-term accuracy of a method. The recovery criteria are listed in the PDI QAPP (Alcoa, October 2013). If the %R of the MS or MSD is outside the limits, all calculations should be checked, and the data will be qualified as necessary.

### *3.2.2 Laboratory Quality Control Procedures*

Laboratory QC procedures include method and homogenization blanks, Laboratory control samples (LCSs), and surrogate spikes.

#### *3.2.2.1 Method and Homogenization Blanks*

Method blanks are analyzed to demonstrate that the analytical procedures do not result in sample contamination from the laboratory solvents, reagents, or glassware used in processing the samples. Method blanks will be prepared and analyzed by the laboratory at a rate of at least one per analytical batch (less than or equal to 20 samples). Method blanks for water will consist of laboratory-prepared blank water processed along with the batch of environmental samples including all manipulations performed on actual samples. Method blanks for fish and sediment consist of sodium sulfate processed along with the batch of environmental samples, including all manipulations performed on actual samples.

Homogenization blanks for tissue sampling evaluate the effectiveness of the decontamination of laboratory dissection equipment. Homogenization blanks will be collected for PCB Aroclor analysis using USEPA method 8082 at a rate of 1 per 20 samples or one per day, whichever is less frequent. A homogenization blank will be generated by running reagent grade water over decontaminated dissection equipment and collecting the water in appropriate containers for analysis. All laboratory equipment that comes into contact with the tissue samples will be included when generating the homogenization blank.

The method and homogenization blanks should be analyzed at the beginning of the analytical sequence (i.e., analyzed before the associated environmental samples). If the method or homogenization blank results are greater than the RL (PDI QAPP, Worksheet 15), the source of contamination will be eliminated or reduced, and the associated samples will be reanalyzed. If reanalysis is not possible, the laboratory will flag the associated data and note the deviation in the case narrative.

#### *3.2.2.2 Laboratory Control Samples*

LCSs are analyzed to verify the accuracy of the analysis. LCSs consist of laboratory-fortified method blanks and will be analyzed at a rate of one per sample batch (up to 20 samples). Accuracy criteria are listed in PDI QAPP, Worksheets 12 and 28 (Alcoa, October 2013). If recoveries are outside of this range but within laboratory required limits, data may be reported and the need for qualification evaluated during validation. If recoveries are outside of laboratory control limits, the sample batch should be re-extracted and reanalyzed if possible. Data qualification will be evaluated during data validation. The %R of the LCS will be calculated using Equation 6-3.

#### *3.2.2.3 Surrogate Spikes*

Surrogate spikes are compounds that are similar in composition to, but not likely to interfere with, the compounds of interest for organics analyses. Surrogate spikes are added to every sample in a known quantity and add a measure of accuracy for each sample analyzed. Surrogate spike recoveries are calculated using the same equation as that used for MS recoveries. Data will be qualified as necessary if surrogate spike recoveries are outside of control limits.

# 4 DATA MANAGEMENT

## 4.1 Field Data Recording

Data entry applications will be installed on laptop computers or other portable devices that will be used by sampling personnel to facilitate data entry and management of the collected field data for the project. Prior to initiating field activities, information such as target coordinates for sampling locations, analytical test information, and location and sample identifier templates will be provided to the field crew. Location-specific information (e.g., date, time, and observations) will be recorded in field notebooks at the time of sample collection and transcribed into the data entry application. Automated QC checks will be performed through use of controlled data entry fields and checks for valid values. After all required field information has been logged, sample labels and COC reports will be generated through the field applications. Data will be reviewed by field leads and then uploaded to the project database. After completion of each sampling event, a backup of the field database will be archived.

## 4.2 Data Verification and Validation

Data verification and validation will be performed on 100% of the OMM data in accordance with the procedures specified in the PDI QAPP and Addendum No. 1 (Alcoa, October 2013 and December 2014) and by following USEPA National Functional Guidelines (NFG) for data validation (USEPA, January 2017a, 2017b).

Analytical laboratories will transmit electronic data deliverables (EDDs) in a format specified by Arconic for loading into the Grasse River data management system. PDF reports will also be provided by the laboratory. Once data are received from the laboratory, a number of QC procedures will be followed to verify that the EDD adheres to structural requirements and the valid values used by the laboratory are in accordance with project standards. A Stage 2A data quality review (USEPA, January 2009) will be performed for all testing parameters to assure data are in accordance with NFG, as outlined in the PDI QAPP and Addendum No. 1.

Data will be validated in accordance with the project-specific DQOs (PDI QAPP, Worksheets 12 and 28), analytical method criteria, and the laboratory's internal performance standards based on its SOPs. The results of the data validation, including assigning qualifiers

in accordance with the NFG and a tabular summary of qualifiers will be generated by the database manager and submitted to the QA/QC Manager for final review and confirmation of data validity.

Laboratory data, which will be electronically provided and loaded into Anchor QEA's project database, will undergo a check against the laboratory PDF report. Data will be validated or reviewed manually, and qualifiers, if assigned, will be entered manually. The accuracy of all manually entered data will be verified by a second party.

# 5 REPORTING

Results from this monitoring program will be provided to USEPA on an annual basis. Any approved changes to the monitoring program will be included in addenda to this draft OMM Plan.

The annual report will include the following:

- Description of any deviations
- Presentation of data
- Confirmation that data are consistent with expectations; if data are not consistent with expectations, further discussion will be included
- Recommendations for any revisions to the monitoring program or response actions, including backup documentation, based on the need for decision points or as a result of unexpected data
- A data usability summary report for the laboratory analyses

In addition to the information included in annual reports, a comprehensive report will be issued approximately every 5 years with an anticipated start date in 2022. The comprehensive report will summarize the preceding 5 years of monitoring data and will include evaluations of trends over time, which is particularly applicable to components for which changes are more gradual, such as fish tissue concentrations. Additional analyses, as warranted, will be included in this comprehensive 5-year report.

# 6 SCHEDULE

**Table 6-1**

**Grasse River Post-Construction Monitoring Schedule**

| Monitoring Component | Sub-Component | Post-Construction Monitoring Period | | | | | Long-Term Period |
|---|---|---|---|---|---|---|---|
| | | 2022[b] | 2023 | 2024 | 2025 | 2026 | 2027+ |
| Fish Tissue[c] | Adult resident fish and young-of-year spottail shiner | Late summer/ early fall | -- | Late summer/ early fall | -- | Late summer/ early fall | |
| Water Column | Compliance sampling | Monthly[d] | -- | Monthly[d] | -- | Monthly[d] | |
| | Monitoring of load to St. Lawrence | Monthly[d] | -- | Monthly[d] | -- | Monthly[d] | |
| Cap Effectiveness | Routine physical monitoring | Annually | Annually | Annually | Annually | Annually | |
| | Event-based physical monitoring for thickness, integrity, and stability | As needed | As needed | As needed | As needed | As needed | As needed |
| | Routine chemical monitoring | Early and late summer | -- | Early and late summer | -- | Early and late summer | |

Notes:

a. Hatched arrows indicate that the need and/or schedule for continued monitoring is dependent on evaluation of prior results.

b. Assuming commencement of project activities in 2017, the first USEPA 5-Year Review is anticipated for 2022.

c. Includes smallmouth bass fillet samples and brown bullhead fillet and whole-body samples. Several DQOs must be met before termination of sampling.

d. Water column monitoring will occur monthly from June through September.

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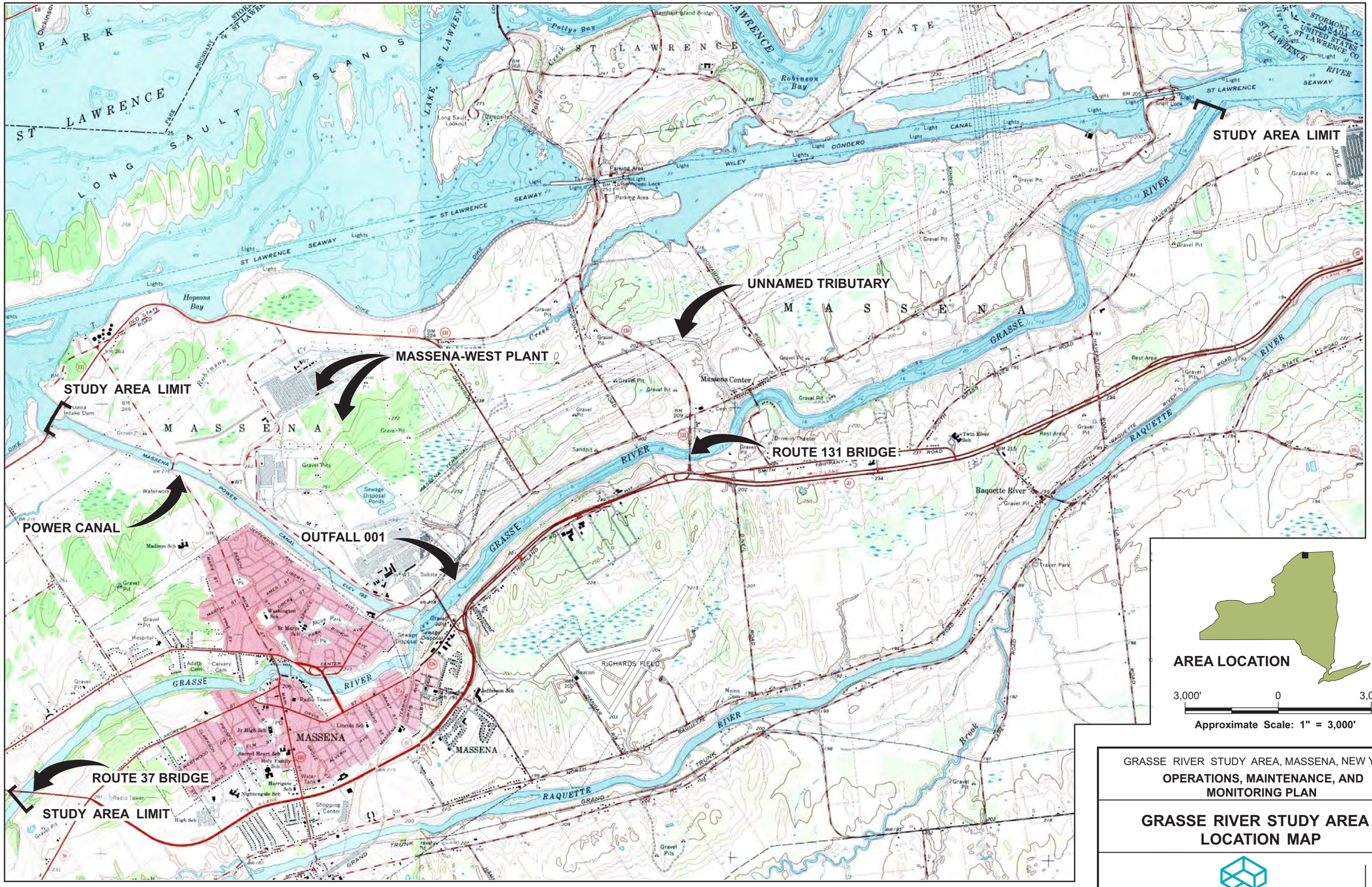
# FIGURES




GRASSE RIVER STUDY AREA, MASSENA, NEW YORK

**OPERATIONS, MAINTENANCE, AND MONITORING PLAN**

## GRASSE RIVER STUDY AREA - LOCATION MAP

ARCONIC

FIGURE
**1-1**

10/2018 SYRACUSE, NY-ENV/CAD-DJHOWES
B0010886/0016/00001/CDR/10886N02.CDR, sh

**REFERENCE:** MASSENA, NEW YORK-ONTARIO USGS QUAD. 1964 RAQUETTE RIVER, NEW YORK-ONTARIO USGS QUAD. 1964

NOTES:

1. BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. RIVER OUTLINE EXTENDING FROM THE RT. 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.
2. EXTENT OF NEAR SHORE AREAS PROVIDED BY ANCHOR QEA, LLC ON 9/21/18. ST. LAWRENCE RIVER WATERLINE GENERATED USING 5/1/01 AERIAL PHOTOGRAPHY.
3. EXTENT OF FLOODPLAIN DIGITIZED FROM FLOOD INSURANCE RATE MAP (TOWN/VILLAGE OF MASSENA, NEW YORK, ST. LAWRENCE COUNTY) COMMUNITY - PANEL NUMBERS 360705 0001 B (FEMA, NOVEMBER 1980) AND 361182 0025 B (FEMA, JUNE 1986) AND IS SHOWN IN FOR THE GRASSE RIVER, THE MASSENA POWER CANAL AND ROBINSON CREEK ONLY.

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**OPERATIONS, MAINTENANCE, AND MONITORING PLAN**

**SITE MAP**

ARCONIC

FIGURE
**1-2**

CITY: SYRACUSE, NY DIV/GROUP: EBC-IM/DV DB: L.POSENAUER PIC/PM: H.VANDEWALKER TM: S.HILL LYR:ON=*;OFF=*REF*
C:\U□□□\d□□mdg\On□Dri□□-ARCAD\SIBIM.360 Doc.\Arconic, Inc\GRASSE RIVER FDR □RFP SUPPORT\2018\B0010886.0036\01-DWG\B0010886.0016 SM-OMMP.dwg LAYOUT: 1-2 SAVED: 10/2/2018 10:56 AM ACADVER: 21.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED:
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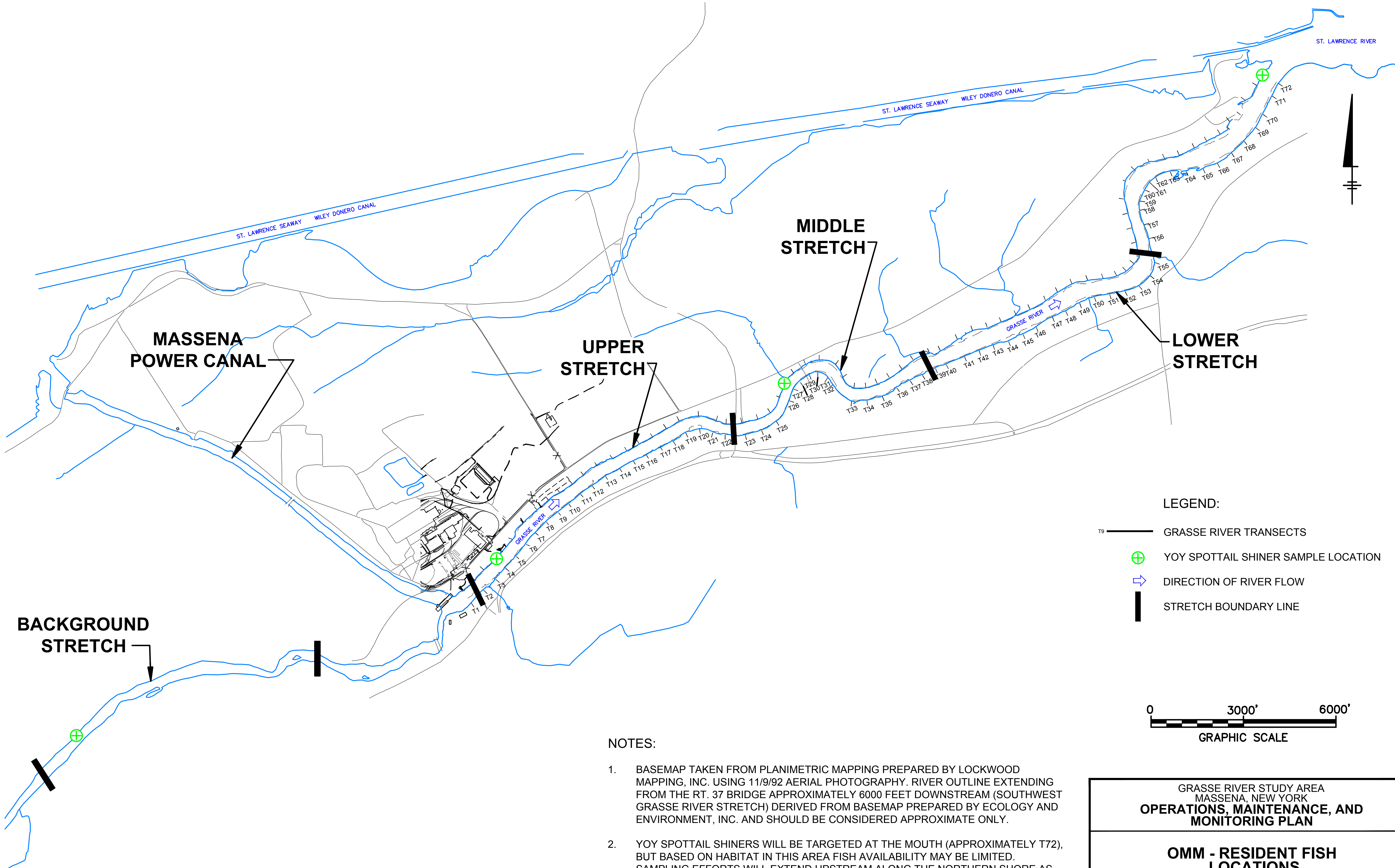
10876X02-2018 Arconic.jpg 10888XBL
PROJECTNAME: ---




NOTES:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. RIVER OUTLINE EXTENDING FROM THE RT. 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.

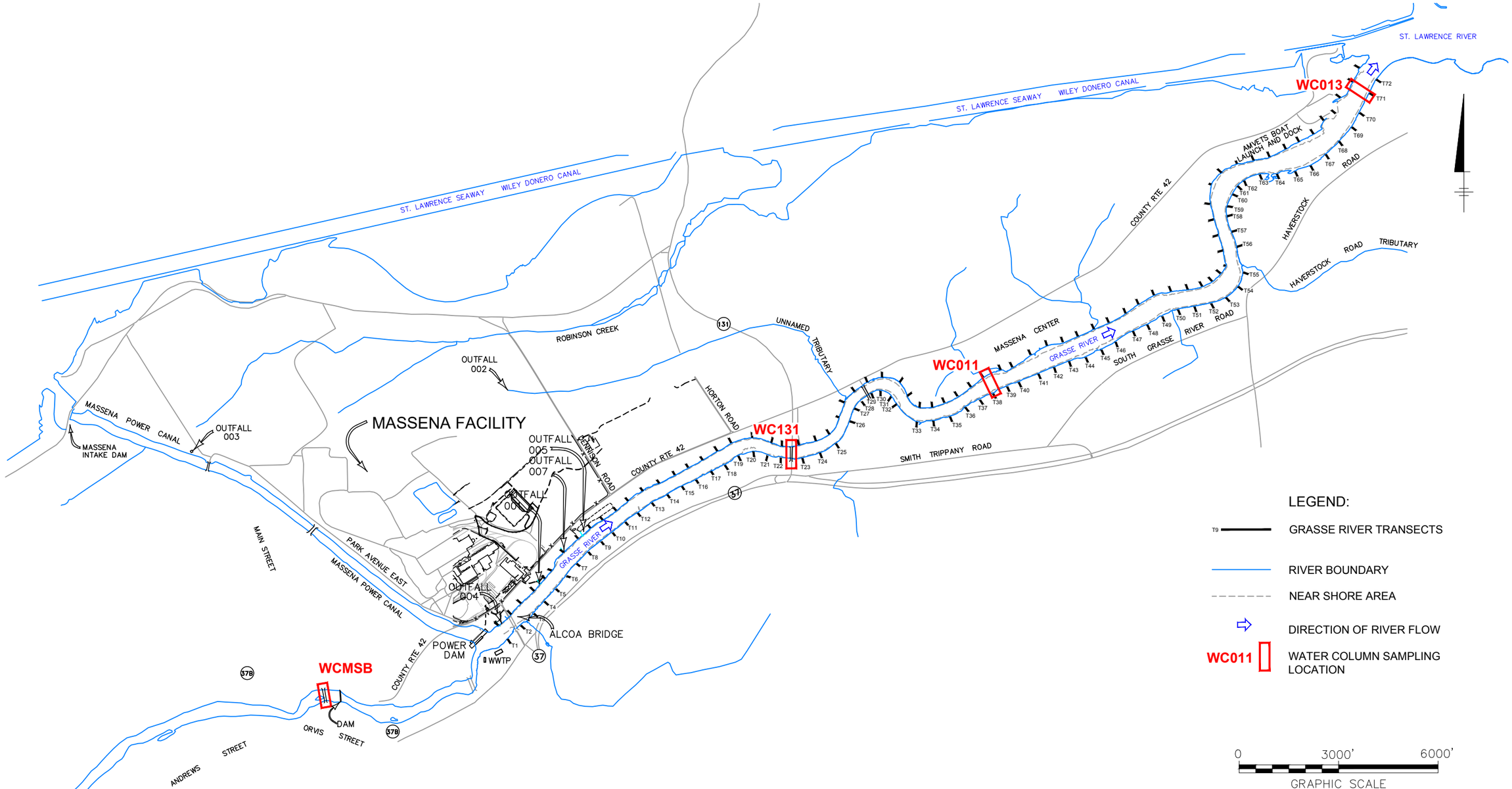
2. YOY SPOTTAIL SHINERS WILL BE TARGETED AT THE MOUTH (APPROXIMATELY T72), BUT BASED ON HABITAT IN THIS AREA FISH AVAILABILITY MAY BE LIMITED. SAMPLING EFFORTS WILL EXTEND UPSTREAM ALONG THE NORTHERN SHORE AS NEEDED TO COMPLETE THE TARGET SAMPLE SIZE.

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**OPERATIONS, MAINTENANCE, AND MONITORING PLAN**

**OMM - RESIDENT FISH LOCATIONS**

ARCONIC

FIGURE
**2-1**




LEGEND:

- T9 — GRASSE RIVER TRANSECTS
- RIVER BOUNDARY
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW
- WC011 — WATER COLUMN SAMPLING LOCATION

0 3000' 6000'
GRAPHIC SCALE

NOTE:

1. GRASSE RIVER BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA). ST. LAWRENCE RIVER WATERLINE GENERATED USING 5/1/01 AERIAL PHOTOGRAPHY.

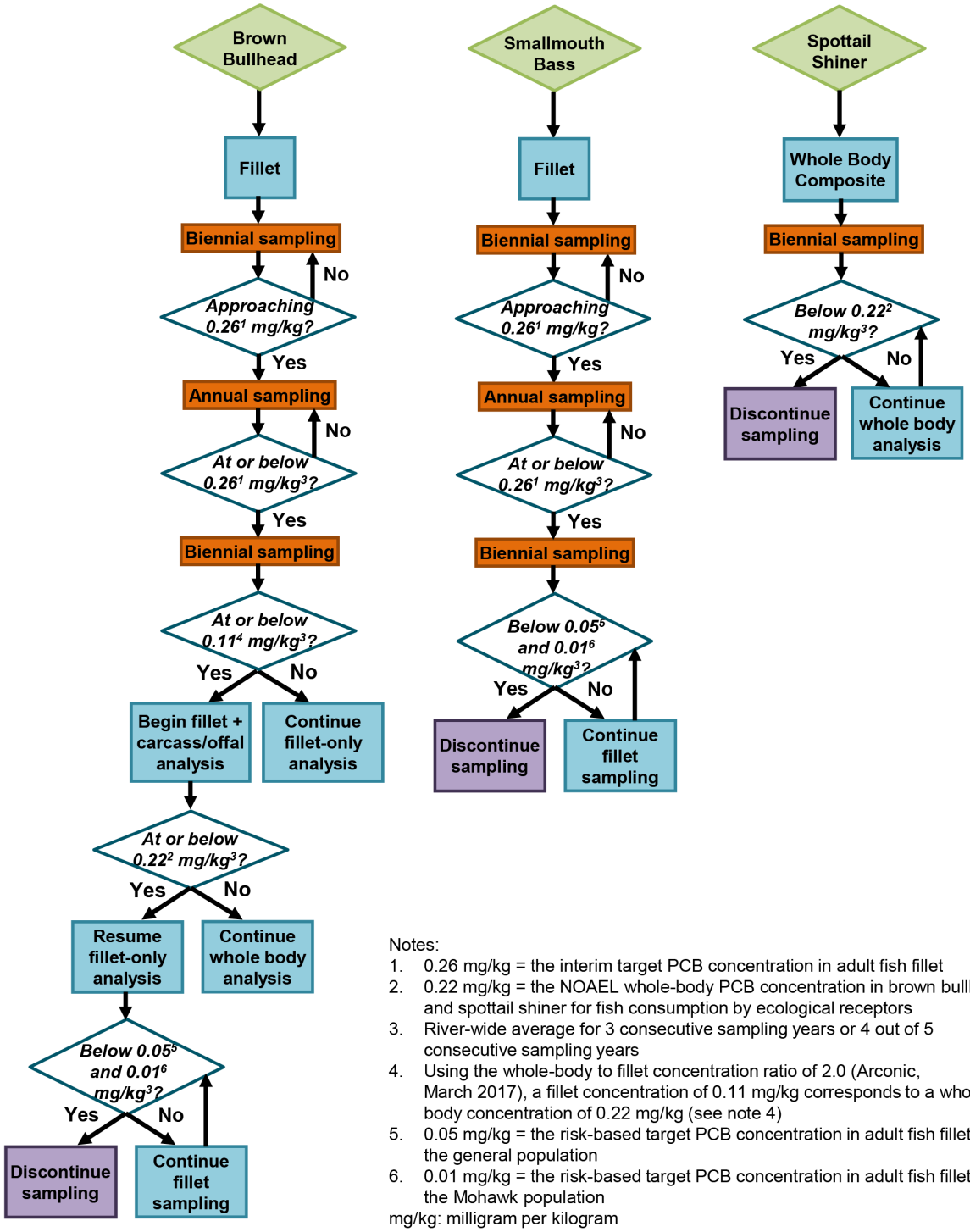
GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**OPERATIONS, MAINTENANCE, AND MONITORING PLAN**

## OMM - WATER COLUMN LOCATIONS

ARCONIC

FIGURE
**2-2**

CITY: SYRACUSE, NY DIV/GROUP: EBC-IM/DV DB: L.POSENAUER PIC/PM: H.VANDEWALKER TM: S.HILL LYR:ON=*;OFF=*REF*
C:\U□□□□d□□ndg\On□Dri□□ - ARCAD\SIBIM 360 Doc□\Arconic, Inc\GRASSE RIVER FDR □RFP SUPPORT\2018\B0010886.0036\01-DWG\B0010888 W□□r Co□□n□d□g LAYOUT: 2-2 SAVED: 9/26/2018 4:30 PM ACADVER: 21.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 10/3/2018
10:44 AM BY: BERNDGEN, WENDY
XREFS: 10888X02 10888XBL
IMAGES: Arconic.jpg




Notes:
1. 0.26 mg/kg = the interim target PCB concentration in adult fish fillet
2. 0.22 mg/kg = the NOAEL whole-body PCB concentration in brown bullhead and spottail shiner for fish consumption by ecological receptors
3. River-wide average for 3 consecutive sampling years or 4 out of 5 consecutive sampling years
4. Using the whole-body to fillet concentration ratio of 2.0 (Arconic, March 2017), a fillet concentration of 0.11 mg/kg corresponds to a whole-body concentration of 0.22 mg/kg (see note 4)
5. 0.05 mg/kg = the risk-based target PCB concentration in adult fish fillet for the general population
6. 0.01 mg/kg = the risk-based target PCB concentration in adult fish fillet for the Mohawk population

mg/kg: milligram per kilogram
NOAEL: no observed adverse effect level
PCB: polychlorinated biphenyl

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ARCONIC

**Figure 2-3**
**Fish Monitoring Decision Tree**
Operations, Maintenance, and Monitoring Plan
Grasse River Project/Arconic

Stainless-steel disk with ten 2-inch vertical pegs on the outer edge, around which the semipermeable membrane device (SPMD) is wrapped

Stainless-steel disk inserted into stainless-steel mesh cylinder

Assembled SPMD (6 inches in diameter and 5 inches high)

SPMD deployment

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ARCONIC

**Figure 2-4**
**SPMD Sampler**

Operations, Maintenance, and Monitoring Plan
Grasse River Project/Arconic

# COMMUNITY HEALTH AND SAFETY PLAN GRASSE RIVER

**Prepared for**

Arconic, Inc.

**April 2019**

# TABLE OF CONTENTS


1 INTRODUCTION....1
1.1 Site Description....2
1.2 Summary of Grasse River Remedial Design....2
1.3 Remediation Schedule....3
2 POTENTIAL COMMUNITY CONCERNS AND CONTROL MEASURES....5
2.1 Potential Air Impacts, Community Monitoring, and Mitigation Measures....5
2.1.1 Air Monitoring Stations....6
2.1.1.1 SLF Air Monitoring Stations....7
2.1.1.2 Staging Area Air Monitoring Stations....8
2.1.1.3 Near Shore Dredging and Floodplain Removal Mobile Air Monitoring Stations....10
2.1.2 Real-Time Meter Monitoring....10
2.1.3 PCB Monitoring....11
2.1.4 Corrective Action Levels and Mitigation Measures....12
2.1.5 Odors....15
2.2 Potential Water Impacts, Community Monitoring, and Mitigation Measures....15
2.2.1 Water Monitoring Stations....16
2.2.2 Solids Monitoring....17
2.2.3 PCB, Metals, and PAH Monitoring....18
2.2.4 Advisory and Corrective Action Levels and Mitigation Measures....19
2.2.4.1 Water Column Monitoring....19
2.2.4.2 Water Intake Monitoring....22
2.3 Traffic-Related Impacts and Mitigation Measures....23
2.3.1 Potential Traffic Impacts and Mitigation Measures....23
2.3.2 Potential Boating and Marine Impacts and Mitigation Measures....25
2.4 Potential Noise Impacts, Community Monitoring, and Mitigation Measures....26
2.5 Lighting and Mitigation Measures....28
2.6 Site Security....28
3 EMERGENCY PLANNING AND RESPONSE....30
3.1 Emergency Planning....30

3.2 Emergency Response .....31

**4 COMMUNITY NOTIFICATIONS .....34**

**5 REFERENCES .....35**

## List of Tables

Table K2-1 SLF – Summary of Wind Direction and Associated Downwind Stations (in text)

Table K2-2 Staging Area – Summary of Wind Direction and Associated Downwind Stations (in text)

Table K3-1 Contact Information for Key Emergency Site Personnel and Local Responders (in text)

## List of Figures

Figure K1-1 Grasse River Study Area – Location Map

Figure K1-2 Lower Grasse River Near Shore Dredging/Backfilling and Main Channel Capping

Figure K2-1 Air Monitoring Locations

Figure K2-2 Water Column Monitoring Locations

Figure K2-3 Water Intake Monitoring Locations

Figure K2-4 Truck Traffic Route in the Vicinity of the Route 131 Staging Area

## List of Attachments

Attachment A West Facility SPDES Permit and Discharge Limits

Attachment B Dredge Corridor Air Monitoring Station Guidelines and Target Locations

## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| 6 NYCRR | Title 6 of the New York Codes, Rules and Regulations |
| µg/L | microgram per liter |
| Arconic, Inc. | Arconic |
| BMP | best management practice |
| CHASP | Community Health and Safety Plan |
| CQAP | Construction Quality Assurance Plan |
| dBA | decibel using the A-weighted scale |
| EMP | Environmental Monitoring Plan |
| FDR | Final Design Report |
| HASP | Health and Safety Plan |
| L/min | liter per minute |
| mg/kg | milligram per kilogram |
| mg/L | milligram per liter |
| $mg/m^3$ | milligram per cubic meter |
| NTU | Nephelometric Turbidity Unit |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| NYSDOT | New York State Department of Transportation |
| OSHA | Occupational Safety and Health Administration |
| PAH | polycyclic aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| $PM_{10}$ | particulate matter less than 10 microns |
| Power Canal | Massena Power Canal |
| ppm | part per million |
| PUF | polyurethane foam |
| RAO | Remedial Action Objective |
| ROD | Record of Decision |

| | |
|---|---|
| SHSO | Site Health and Safety Officer |
| SLF | secure landfill |
| SPDES | State Pollutant Discharge Elimination System |
| SRMT | Saint Regis Mohawk Tribe |
| T | Transect (e.g., T21) |
| TAT | turn-around-time |
| TSS | total suspended solids |
| USCG | U. S. Coast Guard |
| USEPA | U. S. Environmental Protection Agency |
| VOC | volatile organic compound |

# 1 INTRODUCTION

This Community Health and Safety Plan (CHASP) outlines the health and safety measures to be implemented by Arconic, Inc. (Arconic), to protect the surrounding community during remedial construction work to be performed in the Lower Grasse River. As described in the Final Design Report (FDR), remedial activities will include near shore dredging and backfilling, select floodplain excavation and backfilling, armored cap placement in the main channel, cap placement in the main channel, restoration, and associated support such as material processing and landfilling to meet the requirements of the Grasse River Superfund Site *Record of Decision* (ROD; U. S. Environmental Protection Agency [USEPA], April 2013). Remediation efforts in the Lower Grasse River are being implemented per the direction and under the oversight of the (lead Agency), New York State Department of Environmental Conservation (NYSDEC), Saint Regis Mohawk Tribe (SRMT), and New York State Department of Health (NYSDOH). This CHASP was prepared as required by the ROD and specifically identifies potential community concerns during implementation of the remedial activities and actions to be taken to assess and address community concerns if necessary.

This CHASP is an appendix to the FDR. Background information on the site and associated characteristics, as well as details on the remedial activities are summarized here, with additional details provided in the main body of the FDR. In addition, other plans have been prepared to provide details on monitoring activities to be performed to assess impacts associated with remedial construction. Construction-related operations monitoring activities to be conducted during remediation such as post-dredge sampling and noise level monitoring are provided in the Construction Quality Assurance Plan (CQAP; Appendix C to the FDR). Potential impacts to the environment (water and air quality) will be evaluated as described in the Environmental Monitoring Plan (EMP; included as an attachment to the CQAP). Health and safety measures to protect workers during remediation will be provided in a Health and Safety Plan (HASP) to be prepared by the remedial contractor. Information from these plans will be provided throughout this CHASP, and references will be made to these documents as appropriate for additional details.

The remainder of this section summarizes the site and remediation area, remedial action components, and preliminary remedial schedule. Sections 2 through 5 describe the potential project community hazards and associated control measures, emergency planning and response, community engagement and interaction, and references, respectively.

## 1.1 Site Description

The Grasse River Study Area (the project area) is located along the northern boundary of New York State in the Town and Village of Massena and encompasses approximately 8.5 miles of the Grasse River. It includes the 7.2-mile stretch of the river from the Massena Power Canal (Power Canal) to the St. Lawrence River, which is termed the Lower Grasse River, and a 1.3-mile upstream background reach from just downstream of the Route 37 Bridge in Massena to the Power Canal confluence (Figure K1-1). For the purposes of the site investigations, 72 transects across the river have been delineated beginning with Transect (T)1 near the upstream boundary and ending with T72 at the downstream boundary near the mouth of the river (Figure K1-2). The remediation activities outlined in the FDR will occur in the Lower Grasse River between approximately T1 and T72.

## 1.2 Summary of Grasse River Remedial Design

As outlined in the FDR and in accordance with the ROD (USEPA, April 2013), the major remedial action components of the USEPA-selected remedy are as follows:

- Dredging of near shore sediment between T1 and T21 with sediment polychlorinated biphenyl (PCB) concentrations greater than or equal to 1 milligram per kilogram (mg/kg) on a segment length-weighted average or maximum surface (0- to 12-inch) concentration basis, followed by backfill to grade
- Dredging of near shore sediment between T21 and T72 with maximum surface (0- to 12-inch) sediment PCB concentrations greater than or equal to 1 mg/kg, followed by backfill to grade
- Placement of a main channel cap over sediments between T21 and T72 with maximum surface (0- to 6-inch) sediment PCB concentrations greater than or equal to 1 mg/kg
- Restoration of river habitat in accordance with a Habitat Reconstruction Plan

In addition to these components, select floodplain areas will also be remediated and treatment of process water from the sediment dewatering facilities at the staging area will be performed to meet NYSDEC discharge limits. Following water pre-treatment at the staging area, the remedial contractor will pump the water to Arconic's Impoundment 004/005 for secondary treatment through Arconic's existing water treatment system located at the West Plant. Final discharge at Outfall 004 is regulated under Arconic's current New York State Pollution Discharge Elimination System (SPDES) permit (NY0001732 dated May 7, 2018). The SPDES permit discharge limits are included in Attachment A.

Monitoring (during remedial construction and long-term) will be conducted to demonstrate the effectiveness of the remedial action in meeting the Remedial Action Objectives (RAOs) outlined in the ROD.

Figure K1-2 provides an overview of the remedial actions for the Lower Grasse River. Based on design efforts completed through the FDR process, a total of approximately 26 acres are targeted for near shore dredging and backfilling. The average removal depth is approximately 1.3 feet (removal depth ranges from about 6 inches to more than 6 feet). Floodplain excavation will be conducted in approximately 0.7 acre, with a target excavation depth of 1.5 feet; the exception being in Operable Unit 3 of the Unnamed Tributary, in which 2 feet of removal is planned. The main channel armored cap will be placed between T1 and T19 and will have a total minimum thickness of 25 inches (6 inches for the chemical isolation layer overlain by 6 inches of a gravel-filter layer and 13 inches of cobble armor). A modified armored cap will be placed in the main channel between T19 and T21 and will have a total minimum thickness of 18 inches (6 inches for the chemical isolation layer overlain by 12 inches of a gravel armor layer). The main channel cap will be placed from T21 to T72 and will have a minimum thickness of 12 inches (6 inches for chemical isolation component and 6 inches for the erosion/habitat layer).

## 1.3 Remediation Schedule

The following are the key assumptions and related to the overall sequencing of the main elements of the remediation project construction schedule:

- Completion of final design efforts and remedial contractor selection are targeted for completion in first/second quarter 2019.
- Due to winter conditions, in-water construction elements of the schedule are expected to take place between approximately April 1 (or ice out, whichever occurs first) and November 15 (or the onset of cold weather) of each year.
- In-water remedial construction work is anticipated to occur during a 3-year period.
  - Near shore dredging, floodplain removal, and backfilling operations are estimated to occur during the first in-water construction season.
  - Main channel capping operations are estimated to occur during three construction seasons.
  - Habitat reconstruction will begin the year after dredging is complete and continue for one or two construction seasons.
- The remedial contractor may perform work up to 24 hours per day for 6 days a week.

These assumptions and the construction schedules will be further refined during the project.

# 2 POTENTIAL COMMUNITY CONCERNS AND CONTROL MEASURES

This section outlines the possible areas of concern for the community that may result from implementation of the Lower Grasse River remedial action, along with the monitoring and potential control measures to be implemented to mitigate these concerns if necessary. The possible areas of concern were identified considering the site-specific land and water activities to be performed, experience gained from site-specific pilot studies (e.g., 1995 Non-Time-Critical Removal Action, 2001 Capping Pilot Study, 2005 Remedial Options Pilot Study, and 2006 Activated Carbon Pilot Study), and experience gained from other similar sediment sites. The identified areas of concern include:

- Potential air quality issues (including odors) associated with sediment handling and processing activities and backfill/cap material handling
- Potential water quality issues during in-river dredging (and debris removal) activities
- Traffic-related concerns due to ground transport of debris and processed sediment from the staging area to the secure landfill (SLF) and ground transport of backfill and capping material and other necessary construction materials to the staging area
- Boating-related concerns due to on-water movement and dockage of dredge equipment, material scows, and other support vessels
- Nuisance noise associated with mechanical equipment such as dredges, transport trucks, and cap material movement equipment
- Nuisance light due to work on the river or in the staging area at night
- Site security requirements to restrict access of non-project personnel to remediation and support areas

Details regarding each of these concerns and the applicable monitoring and control measures to mitigate the concerns are provided in the subsequent sections.

## 2.1 Potential Air Impacts, Community Monitoring, and Mitigation Measures

The potential for air quality impacts to the surrounding community can occur due to air emissions from equipment, air emissions and odors from sediments, and dust. Air monitoring will be performed during all intrusive activities to assess potential airborne releases that could potentially affect downwind communities (i.e., off-site receptors such as locations where residences, businesses, and off-site workers not directly involved with remedial

activities may be present for a reasonable period of time). Air monitoring will initially be performed for real-time continuous particulate and volatile organic compound (VOC) measurements during ground intrusive activities (e.g., grading). Air monitoring for real-time continuous particulate and VOC measurements and continuous air sampling for PCB analysis will be conducted daily during near shore debris removal, dredging and floodplain excavation, contaminated sediment dewatering and processing, and landfill operations. In addition, air monitoring will also include real-time continuous particulate measurements during backfill and cap material handling at the staging area. Air monitoring results will be evaluated against corrective action levels to determine potential community exposure and the need for corrective actions. Note that no work is planned within 20 feet of potentially exposed individuals or structures; Arconic will consult with USEPA, NYSDEC, NYSDOH, and SRMT if it becomes necessary to perform work within these limits. The air monitoring program is consistent with the program provided in the EMP (included as an attachment to the CQAP in Appendix C of the FDR).

### *2.1.1 Air Monitoring Stations*

Air monitoring stations will be established upwind and downwind of the near shore dredge and floodplain removal areas, the staging area, including the sediment processing and backfill/cap material handling areas, and SLF. To establish these stations, historic wind data were evaluated, and a wind rose developed to determine the predominant wind direction (see Figure K2-1). The wind rose was developed using historical data from the Massena, Federal Aviation Administration Airport Meteorological Station No. 94725 (station located less than 1.5 mile south of the staging area) averaged from 2010 to 2014 for the months of April to October. The predominant historical wind direction was determined to be from the southwest. The upwind and downwind locations will be determined daily using data from the airport based on the prevailing wind through observation of meteorological conditions and data (e.g., wind speed and direction, wind gust speed and direction, temperature, and humidity).

Fixed and mobile air monitoring stations will be established around the staging area, SLF, and near shore dredging and floodplain removal areas. Figure K2-1 provides the monitoring locations.

#### *2.1.1.1 SLF Air Monitoring Stations*

A total of four fixed air monitoring stations will be established around the SLF based on potential receptor locations, historical predominant wind direction, and power availability. In addition, two portable station setups will be established in areas where there is no power available. The upwind and downwind locations will be determined daily based on the meteorological data and will be used to assess corrective action levels.

At the direction of NYSDEC and NYSDOH, air monitoring will be performed 24 hours per day, 7 days per week at the fixed monitoring stations. The portable station setups will only be used during days of active construction at the landfill and will be turned on and off at the beginning and end of each active work period, respectively.

The wind direction will be used to determine whether PCB samples from the portable meters will be analyzed. The wind direction will be reviewed via electronic means and field verified periodically when possible (target approximately every 2 hours) throughout working hours each day through a wind sock located in proximity to the SLF. If at any point during the run time of the portable stations the wind direction indicates that these stations are in a downwind direction or the wind is calm that particular day (i.e., meteorological data from the air reports conditions are calm and there is no wind speed or gusts), PCB samples from either or both portable stations will be analyzed. The four fixed locations will be analyzed daily for PCBs. Table K2-1, below, summarizes the downwind station in consideration of wind direction at 22.5-degree intervals and indicates where analysis of PCBs at a portable monitor would be invoked.

**Table K2-1**
**SLF – Summary of Wind Direction and Associated Downwind Stations**

| Wind Direction | Downwind Fixed Station | | | | Portable Station |
|---|---|---|---|---|---|
| | SLF-Air 1 | SLF-Air 2 | SLF-Air 3 | SLF-Air 4 | |
| N | X | | | | |
| NNE | X | | | | |
| NE | X | | | | |
| ENE | | | | | X (A) |
| E | | | | | X (B) |
| ESE | | | | | X (B) |
| SE | | | | | X (B) |
| SSE | | | | X | X (B) |
| S | | | | X | X (B) |
| SSW | | | | X | |
| SW | | | X | | |
| WSW | | | X | | |
| W | | | X | | |
| WNW | | | X | | |
| NW | | X | | | |
| NNW | | X | | | |

Note:
SLF: secure landfill

Particulate matter less than 10 microns ($PM_{10}$) and VOC data from all stations (including portable stations) will be reported daily.

### *2.1.1.2 Staging Area Air Monitoring Stations*

Air monitoring stations will be established upwind and downwind of the staging area near shore sediment removal and processing areas. The upwind and downwind locations will be determined daily based on the metrological data and will be used to assess corrective action levels. Table K2-2, below, summarizes the downwind station in consideration of wind direction at 22.5-degree intervals.

**Table K2-2**
**Staging Area – Summary of Wind Direction and Associated Downwind Stations**

| Wind Direction | Downwind Station | | | |
|---|---|---|---|---|
| | SA-Air 1 | SA-Air 2 | SA-Air 3 | SA-Air 4 |
| N | | | X | |
| NNE | | X | | |
| NE | | X | | |
| ENE | | X | | |
| E | X | | | |
| ESE | X | | | |
| SE | X | | | |
| SSE | | X | | |
| S | | | | X |
| SSW | | | | X |
| SW | | | | X |
| WSW | | | | X |
| W | | | X | |
| WNW | | | X | |
| NW | | | X | |
| NNW | | | X | |

Note:
SA: staging area

Air monitoring associated with the staging area will be performed continuously during the first month of activities (i.e., 24 hours per day, 7 days per week including construction and non-construction times). This continuous monitoring will result in data collection during both construction and non-construction periods; based on these data, Arconic will then either submit a request to USEPA, NYSDEC, and SRMT to modify monitoring to the period of construction only (i.e., only during days of active operation) or will maintain the continuous monitoring efforts. PCBs from all locations will be sent for analysis each monitoring day. $PM_{10}$ and VOC data from all stations will be reported each monitoring day.

#### *2.1.1.3 Near Shore Dredging and Floodplain Removal Mobile Air Monitoring Stations*

The actual monitoring stations associated with the near shore dredging and floodplain removal and located in the "dredge corridor" (e.g., along the river shoreline) will be determined in the field based on potential receptors and their proximity to the dredging and removal areas. Up to three monitoring stations will be set up along the shoreline between the nearest receptor and dredging/removal activities. Prevailing wind direction is from the southwest; therefore, monitoring stations will be established considering this predominant wind direction. Arconic developed a memorandum that established guidelines and included a series of figures to identify the target mobile air station locations by target area or transect. This document was reviewed/approved by USEPA, NYSDEC, NYSDOH, and SRMT, and is included in Attachment B. These target locations may need to be adjusted based on field conditions, access, etc. The location of the air station will be recorded so the distance from the dredging/removal activity can be determined. The mobile monitoring locations will be moved to new areas as dredging/removal proceeds downstream in accordance with Attachment B. Note also that worker air monitoring will be conducted in the immediate vicinity of the dredging activities in accordance with the remedial contractor's HASP. Air monitoring associated with the near shore dredging and floodplain removal will be performed only during days of active operation for PCBs. Samples will be sent for analysis from all locations during each day of operation.

### *2.1.2 Real-Time Meter Monitoring*

Real-time meter monitoring will include daily continuous particulate and VOC monitoring. Monitoring will be conducted at the staging area and SLF during near shore debris removal and dredging, floodplain excavation, contaminated sediment dewatering and processing, and landfill operations. Particulate monitoring will be performed at the staging area during material handling for backfill or capping activities. Particulate monitoring will be performed using real-time meters for $PM_{10}$ to obtain continuous readings for determining the 24-hour average. The meters selected for use during these monitoring activities will be capable of calculating 15-minute running average concentrations. Meters will be checked periodically during the day by on-site personnel. The meters will be equipped with audible alarms that will indicate whether concentrations exceed an established level. Data from these meters will

be transmitted to the on-site construction management team using telemetry. In addition to the alarms, the telemetry system will notify on-site personnel of exceedances of established levels via text message or email. This will allow any potential exceedances to be investigated immediately. If visible dust is observed leaving the work area, the appropriate meters will be checked as soon as possible after the dust has been observed.

As described in Section 2.1.1, real-time meter monitoring will be performed in the vicinity of sources of potential particulate emissions during sediment handling and processing at the staging area and disposal at the SLF only. Note that real-time meter monitoring is not included in the dredge corridor locations during the near shore dredge and floodplain backfilling, as removal/placement of these materials will be performed in the wet within small work areas, thereby reducing the potential for particulate releases.

### *2.1.3 PCB Monitoring*

PCB monitoring will be performed using continuous 24-hour air samplers during near shore debris removal and dredging, floodplain excavation, contaminated sediment dewatering and processing, and landfill operations. High-volume sampling will be performed at fixed locations around the staging area and SLF, and low-volume samplers will be used for the mobile stations to be established in the vicinity of the SLF and dredge corridor or at fixed locations at the staging area where no power source is available.

High-volume sampling will be conducted in accordance with USEPA Method TO-4A. PCB samples will be collected using high-volume air samplers fitted with quartz fiber filters and sorbent cartridges. The high-volume polyurethane foam (PUF) sampler at each monitoring station will be operated at a flow rate of 200 to 300 liters per minute (L/min) with a sampling period of approximately 24 hours. High-volume samplers require a continuous power source; therefore, these locations will be stationary throughout the required monitoring period.

Low-volume sampling will be conducted in accordance with USEPA Method TO-10A. PCB samples will be collected using a low-volume personal sampling pump equipped with a glass cylinder containing a polyurethane sorbent (i.e., PUF plug). Samples will be collected at a flow rate of approximately 5 L/min with a sampling period of approximately 24 hours.

Low-volume samplers are battery powered, and as such can be relocated as the near shore dredging proceeds downstream. Low-volume sampling locations associated with near shore dredging/backfilling operations will be determined in the field based on potential receptors and their proximity to the dredging areas as described in Section 2.1.1. Portable stations associated with the SLF are shown on Figure K2-1. Air samples will be submitted daily for PCB (Aroclor) analysis using SW-846-8082. Samples will be submitted to the selected laboratory for analysis, with results requested on an accelerated turn-around-time (TAT). Note that sample shipping transport times, the time of day when the sample is collected and submitted, and weekend work may impact the selected laboratory's ability to meet this TAT, and sample results may not be available for 72 to 96 hours after collection.

### *2.1.4 Corrective Action Levels and Mitigation Measures*

Corrective action levels have been established for each monitoring parameter. These levels have been developed in consideration of the NYSDOH Generic Community Air Monitoring Plan provided in DER-10 (NYSDEC, May 2010) and Grasse River pilot projects. The corrective action levels will apply at the downwind location only; in instances of calm, the corrective action levels would be considered at all locations. The overall predominant wind direction will be determined daily based on the meteorological data; however, in the event of any exceedances of the particulate and VOC criteria noted below, the predominant wind direction will be determined at the time of the exceedance to identify the upwind and downwind directions. The following is a summary of the corrective action levels:

- Particulate ($PM_{10}$) – 0.150 milligram per cubic meter ($mg/m^3$) above upwind location for a 15-minute period
  - If the downwind $PM_{10}$ level is 0.100 $mg/m^3$ above the upwind location for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind $PM_{10}$ particulate levels do not exceed 150 $mg/m^3$ above the upwind level and no visible dust is migrating from the work area.
  - If, after implementation of dust suppression techniques, the downwind $PM_{10}$ levels are greater than 0.150 $mg/m^3$ above the upwind location, work must be stopped and site activities must be evaluated. Work may resume only if dust

suppression measures and other controls are successful in reducing $PM_{10}$ levels to less than 0.150 mg/m$^3$ above background and if no visible dust is observed leaving the site.

  - An initial level of 0.100 mg/m$^3$ (15-minute average) at any of the monitoring stations will be established as a conservative assessment level. Readings greater than this conservative assessment level will result in on-site personnel performing a review of the background (upwind perimeter) site level. If the downwind level is determined to be greater 0.100 mg/m$^3$ above the background (upwind perimeter) level, dust-suppression techniques will be employed to avoid an exceedance of the corrective action level.

- VOC – 25 parts per million (ppm) at the downwind station for a 15-minute period
  - If the downwind VOC level is 5 ppm above the upwind station for the 15-minute period, then work activities must be investigated and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can proceed with continued monitoring.
  - If the downwind VOC levels persist at 5 ppm over the upwind station, but are less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume, provided the VOC levels 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less (but in no case less than 20 feet), is below 5 ppm over background for the 15-minute average.
  - If VOC levels at any station are above 25 ppm, activities must be shut down.
- PCB (Aroclor) – 0.100 microgram per cubic meter

Air analytical results will be received on an accelerated schedule. Exceedances of any of these criteria will result in an immediate review of the remediation activities, with adjustments made as needed in accordance with the Contingency Plan included in the FDR (Appendix L). For the real-time meters, the first step of this review will be to evaluate the result to assess whether it is site related or an issue with the meter (e.g., high humidity impacting the meter and readings) or local conditions (e.g., mowing in the vicinity of the meter). Once an exceedance has been verified to be site related, the Construction Manager

will immediately be notified, and an investigation will be performed to identify the conditions causing the exceedance. The Construction Manager will evaluate these factors and identify the likely cause of the exceedance in order to appropriately respond to the issue.

An email will be issued to the Agencies by the next business day documenting the exceedance and the results of the evaluation. The notification email will be sent to the following Agencies and personnel:

- USEPA: Young Chang (chang.young@epa.gov)
- NYSDEC: David Tromp (david.tromp@dec.ny.gov, 518-764-2401), Randi Walker (randi.walker@dec.ny.gov), and Karen Woodfield (karen.woodfield@dec.ny.gov)
- NYSDOH: Scarlett McLaughlin (scarlett.mclaughlin@health.ny.gov)
- SRMT: Jay Wilkins (jay.wilkins@srmt-nsn.gov)

Example response actions and contingency measures could include the following:

- Investigating the cause of the exceedance to confirm whether it is associated with project-related activities
- Performing additional sampling activities
- Making modifications to or increasing mitigation methods, such as additional dust suppression through watering or additional site work observations
- Making modifications to construction activities and associated best management practices (BMPs) such as evaluation/modification of truck tarping procedures and use of poly sheeting if other response actions are not successful

If initial monitoring results indicate no exceedances of the corrective action triggers listed in this section, Arconic may work with USEPA, NYSDEC, and SRMT to modify the frequency or duration of monitoring at certain locations. Any additional proposed changes to the construction activities will be documented for approval as described in the CQAP.

As described in the FDR, the specifications developed for the work provide for the management of these potential sources and include varying BMPs to reduce or negate these potential impacts. An initial listing of these mitigation measures and BMPs include the following:

- Engine-related emissions: Use low-emissions fuel and equipment, Tier IV or newer equipment, hardline power at the staging area with generators used for backup power as necessary, and local sourcing of equipment and materials to reduce mobilization and transport emissions as possible.
- PCB emissions: Reduce exposure of sediments to open air through barge and staging area BMPs.
- Particulate mitigation: Reduce generated dust by watering roadways or using alternate road materials, secure stockpiles to reduce windborne transmission of materials, evaluate dredged sediment stabilization and mixing operations, and consider slurried reagent application.

### *2.1.5 Odors*

Odors may be generated during construction operations, especially the dredging and material handling/processing efforts. The remedial contractor will implement several BMPs to address and mitigate odors, including covering stockpiles, backfilling open excavations, and applying odor/organic vapor-suppression foam. The remedial contractor and Construction Manager will assess odors and implement additional mitigation efforts as needed.

## 2.2 Potential Water Impacts, Community Monitoring, and Mitigation Measures

The potential for water quality impacts are likely due to sediment resuspension during dredging activities based on both site-specific experience as well as experience gained from other sites. Sediment resuspension is not likely during capping. As a result, water quality monitoring will be performed during all intrusive activities with the potential to impact the river including near shore debris removal and dredging, floodplain soil removal, and backfilling, with a reduced program to be implemented during capping.

Water column and water intake monitoring will be performed to assess potential water releases that could potentially affect downstream communities (i.e., off-site receptors including drinking and potable water intakes and recreational users of the river). Discrete grab samples will be collected daily for total suspended solids (TSS) measurements during near shore debris removal and dredging, floodplain soil removal, backfilling and capping

activities. Discrete grab sampling for PCB analysis will be performed daily near shore debris removal and dredging, floodplain soil removal, and backfilling and daily during the first month of capping only. Water monitoring results will be evaluated against advisory levels to inform construction operations and associated adjustments and also corrective action levels to determine potential community exposure and the need for corrective actions. The water monitoring program is consistent with the program provided in the EMP (included as an attachment to the CQAP in Appendix C of the FDR).

### *2.2.1 Water Monitoring Stations*

Water column monitoring stations will be established at three locations throughout the Grasse River at the midpoint across the river and one location in the St. Lawrence River as listed below. The stations are also provided on Figure K2-2.

- Upstream – Fixed station established upstream of all dredging or capping areas at approximately T0 (this is a shallow water station with less than 5 feet of water present)
- Near-field – Mobile station that will be adjusted as activities advance downstream
    - Station will be established approximately 1,000 feet downstream of collective in-river work activities during each monitoring event (e.g., the station will be established mid-river 1,000 feet downstream of the farthest downstream work activities)
    - The near-field location will be eliminated when construction activities reach T71 as the location will then be replaced by the station in the St. Lawrence River (see below)
- T71 – Station established at the historic water column sampling location WC013 (located just upstream of the Grasse River mouth)
    - This station will be eliminated when construction activities reach T69 (within 1,000 feet of the station) as the location will then be replaced by the near-field mobile station
- Far-field or St. Lawrence River – Station established at the water column sampling location in the St. Lawrence River along the southern shoreline immediately downstream of the Grasse River mouth

Stratification occurs in the Lower Grasse River when colder water with greater specific conductivity (relative to the Grasse River water) from the St. Lawrence River enters into and moves upstream along the bottom of the Lower Grasse River. The presence of stratification will alter the water column monitoring approach, as monitoring efforts will focus on the Grasse River water when possible. Therefore, water quality parameters (i.e., temperature and specific conductivity) will be obtained daily at 0.2 and 0.8 times the total water column depth from each sampling station in the Grasse River with depths greater than 5 feet (i.e., mobile station and T71) to assess for the presence of stratification. Based on previous evaluations, differences of 3 degrees Celsius in water temperature or 20 microSiemens per centimeter in specific conductivity between the two water masses will be used to identify the existence of stratification (Alcoa, May 2006). If stratification is not present at a given location, water column grab samples will be collected at 0.2 and 0.8 times the total water column depth and composited to form one sample. If stratification is present at a given location, water column grab samples will only be collected above the stratification (i.e., 0.2 times the total water column depth) for laboratory analysis.

Water intake monitoring will be performed at the Alcoa East Plant and SRMT water intakes located downstream of the Grasse River mouth at approximately 0.75 and 4.5 miles, respectively (Figure K2-3). Monitoring will be performed at the sampling ports of the raw (untreated) sampling port inside the Alcoa East Plant and the raw (untreated) and treated water within the SRMT Water Treatment Building (i.e., a total of three locations).

### *2.2.2 Solids Monitoring*

Water column samples will be collected once daily from each of the in-river stations for TSS analysis using Method SM2540D. If stratification is not present at a given location, water column grab samples will be collected at 0.2 and 0.8 times the total water column depth and composited to form one sample for laboratory analysis. If stratification is present at a given location, water column grab samples will be collected above the stratification only (i.e., 0.2 times the total water column depth) for laboratory analysis. In areas of shallow water (i.e., upstream portion of the river where maximum water depths are approximately 5 feet), samples will be collected at 0.5 times the total water column depth.

Samples will be submitted to the selected laboratory for analysis, with results requested on an accelerated TAT. Note that sample shipping transport times, the time of day when the sample is collected and submitted, and weekend work may impact the selected laboratory's ability to meet this TAT, and sample results may not be available for 48 to 72 hours after collection.

Water intake turbidity measurements will be recorded once daily and at the time of the sampling described in Section 2.2.3 from each intake location using a real-time meter.

### *2.2.3 PCB, Metals, and PAH Monitoring*

Water column and water intake samples will be collected once daily from monitoring stations located downstream of near shore debris removal and dredging, floodplain soil removal, and backfilling operations for PCB (Aroclor) analysis using the project-specific modified SW-846-8082A. Samples will be collected daily from monitoring stations located downstream of operations during the first month of capping activities only, with results then reviewed with USEPA, NYSDEC, and SRMT to determine the need for continued monitoring. Samples will also be collected once a week for the first month of near shore construction activities from the near-field station and submitted for analyses of lead (via SW-846-6020A), mercury (via SW-846-7470A), and polycyclic aromatic hydrocarbons (PAHs, including anthracene, benz(a)anthracene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene via SW-846-8270D-SIM). If stratification is not present, water column grab samples will be collected at 0.2 and 0.8 times the total water column depth once a day at each sampling station and composited to form one sample for laboratory analysis from each designated water column monitoring location. If stratification is present, water column grab samples will be collected above the stratification only (i.e., 0.2 times the total water column depth) at each sampling station for laboratory analysis. In areas of shallow water (i.e., upstream portion of the river where maximum water depths are approximately 5 feet), samples will be collected at 0.5 times the total water column depth.

Water intake samples will be collected once daily for PCB (Aroclor) analysis using the project-specific modified SW-846-8082A, with a subset from the SRMT treatment building

also collected monthly and submitted for PCB congener analysis using USEPA Method 1668A.

Samples will be submitted to the selected laboratory for analysis, with results requested on an accelerated TAT (24 hours), except for the PCB congeners results which will be requested on a standard analytical TAT (approximately 2 weeks) because the data will be used for informational purposes only. Note that sample shipping transport times, the time of day when the sample is collected and submitted, and weekend work may impact the selected laboratory's ability to meet this TAT, and sample results may not be available for 48 to 72 hours after collection.

### *2.2.4 Advisory and Corrective Action Levels and Mitigation Measures*

Advisory and/or corrective action levels have been established for each monitoring criterion. These levels have been developed through consultation with USEPA, NYSDEC, and SRMT and in consideration of the Grasse River pilot projects and other New York State projects. The following summarizes these levels.

#### *2.2.4.1 Water Column Monitoring*

Advisory and/or corrective action (compliance) levels and associated response actions have been identified for the in-river monitoring. These levels and actions are identified based on the water monitoring location. A notification email will be sent to the Agencies and personnel identified in Section 2.1.4 as needed if these levels are exceeded.

**Near-field**:
The water quality criteria at the near-field monitoring station (mobile station) will be considered an advisory level for evaluating potential operational adjustments for near shore debris removal and dredging, floodplain removal, and backfilling and main channel capping. This station will serve as a diagnostic tool. The near-field monitoring station advisory levels will include the following:

- TSS concentrations of 100 milligrams per liter (mg/L) above the upstream station (i.e., ambient conditions)
- Total PCB concentrations of 0.500 microgram per liter (µg/L)

- Metals – As required by NYSDEC, less than standard specified in Title 6 of the New York Codes, Rules and Regulations (6 NYCRR) Part 703.5 for Class C (chronic aquatic);[1] assessed by comparing the sample result at the far-field station against the levels for the following:
  - Lead (dissolved) – 2.3 µg/L
  - Mercury (dissolved) – 0.77 µg/L
    - Lead Formula = {1.46203 – [ln (hardness) (0.145712)]} exp (1.273 [ln (hardness)] – 4.297)
    - Hardness determined as an average of the means from Reaches 4 through 8 in the River and Sediment Investigation Phase I = 63 mg/L
- PAHs – Less than the standard specified in Technical and Operational Guidance Series 1.1.1 for Class C (acute aquatic);[2] assessed by comparing the sample result at the far-field station against the following levels:
  - Anthracene – 35 µg/L
  - Benz(a)anthracene – 0.23 µg/L
  - 2-Methylnaphthalene – 42 µg/L
  - Naphthalene – 110 µg/L
  - Phenanthrene – 45 µg/L
  - Pyrene – 42 µg/L

Exceedance of the advisory levels will trigger work review/evaluation and response actions, as appropriate. An evaluation will be conducted to assess the cause of the exceedance and the need for operational changes or other response actions. Such an evaluation may result in one or more of the following actions:

- Additional monitoring as necessary to investigate the cause of the exceedance such as collecting and analyzing individual grab samples from 0.2 and 0.8 times the total water column depth

[1]Available at: https://govt.westlaw.com/nycrr/Document/I4ed90418cd1711dda432a117e6e0f345?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)

[2] Available at: http://www.dec.ny.gov/docs/water_pdf/togs1112.pdf

- A review of work operations and BMPs, including investigation of the cause of the exceedance
- Identification of possible operational adjustments or BMPs (to the extent practicable) to reduce the concentrations in the water column

Following such evaluation, Arconic will discuss with USEPA, NYSDEC, and SRMT whether operational changes or other response actions are warranted to address the exceedance of the advisory level. This may include active field refinements in operations or equipment while continuing operations. However, exceedance of the advisory levels at the near-field station will not result in a slowdown or shutdown of operations. After one month of operations, Arconic will review the monitoring data with USEPA, NYSDEC, and SRMT, and may request moving the near-field monitoring location farther downstream or adjusting the monitoring frequency. Any additional proposed changes to the construction activities will be documented for approval as described in the CQAP.

**T71**:

At the T71 monitoring station, exceedance of 0.500 ug/L total PCBs advisory level will trigger work review/evaluation and response actions, as appropriate. An evaluation will be conducted to assess the cause of the exceedance and the need for operational changes or other response actions. Such an evaluation may result in one or more of the following actions:

- Additional monitoring as necessary to investigate the cause of the exceedance such as collecting and analyzing individual grab samples from 0.2 and 0.8 times the total water column depth
- A review of work operations and BMPs, including investigation of the cause of the exceedance
- Identification of possible operational adjustments or BMPs (to the extent practicable) to reduce the concentrations in the water column

Following such evaluation, Arconic will discuss with USEPA, NYSDEC, and SRMT whether operational changes or other response actions are warranted to address the exceedance of the advisory level. This may include active field refinements in operations or equipment while

continuing operations; however, exceedance of the total PCBs advisory level at the T71 monitoring station will not result in shutdown of operations in this situation.

**SLR**:
The SLR monitoring station will be used as the compliance location. Exceedance of 0.500 ug/L total PCBs may trigger stop work and examining the BMPs employed and making appropriate modifications.

The specifications included in the FDR provide for implementation of BMPs to reduce potential water column impacts (e.g., use of environmental buckets, limits to re-dredging, and use of spill plates during material transfer from barge to staging area).

#### *2.2.4.2 Water Intake Monitoring*

Corrective action (compliance) levels and associated response actions have been identified for the Alcoa East Plant and SRMT intakes.

- Turbidity – 100 nephelometric turbidity units (NTU) above baseline reading
  - Assessed by comparing the sample during remediation reading against the baseline reading
- PCB (Aroclor) – 0.500 µg/L
  - Assessed by comparing the sample result against the level

Exceedances of any of these criteria will result in an immediate review of the remediation activities with adjustments made as needed in accordance with the Contingency Plan included in the FDR (Appendix L). Example contingency measures could include the following:

- Investigation of the cause of the exceedance to confirm whether it is associated with project-related activities
- Additional sampling activities
- Modifications or increased mitigation methods
- Modifications to construction activities or use of engineering controls

If initial monitoring results indicate no exceedances of the corrective action triggers listed in this section, Arconic may work with USEPA, NYSDEC, and SRMT to modify the frequency or duration of monitoring at certain locations. Any additional proposed changes to the construction activities will be documented for approval as described in the CQAP.

The specifications included in the FDR provide for implementation of BMPs to reduce potential water column impacts (e.g., use of environmental buckets, limits to re-dredging, and use of spill plates during material transfer from barge to staging area).

## 2.3 Traffic-Related Impacts and Mitigation Measures

There will be an increase in both vehicle and boat traffic as a result of the remedial activities. The increased traffic will result from mobilization and demobilization efforts, transport of processed debris and sediments to the SLF for disposal, transport of capping materials (or other necessary construction materials), and amount of personnel needed to implement the project. An increase in boat traffic will occur on the Lower Grasse River with restrictions in navigation likely throughout construction. The increased traffic will result from dredging and capping equipment barges, dredged material and capping material scows, and monitoring personnel.

### *2.3.1 Potential Traffic Impacts and Mitigation Measures*

An increase in both heavy-wheeled vehicles (triaxle and semi-trailer trucks) and passenger vehicles (project personnel cars) will likely be most prevalent in the vicinity of the staging area. For example, it is estimated that 30 to 40 trucks per day will be required to transport dredge material for disposal, 60 to 130 trucks per day for backfill and capping material transport, and 15 to 30 cars per day for project personnel (CDM Smith, June 2015). The site of the staging area was selected in part based on its accessibility for truck traffic to County Route 42 and State Route 131. These roads are currently used for local traffic, Arconic plant workers, and Border Patrol personnel.

The staging area design incorporates the following features to help ease project-related traffic congestion in the vicinity of the staging area (CDM Smith, June 2015):

- Deceleration and staging lanes will be constructed to minimize delays for construction traffic waiting to approach the capping material and sediment processing portions of the staging area and improve overall traffic flow and safety.
- The construction truck route was designed to control vehicles and separate construction and worker vehicles from pedestrians. Site workers will enter a separate gate for project parking and access to the boat ramp.
- A deceleration and turn lane will be constructed in the eastbound lane of County Route 42 to minimize the disruption to the existing traffic network.
- Temporary work zone traffic control during construction on County Route 42 will be accomplished through setup of a shoulder closure or a single-lane closure, depending on the existing roadway width.
- A truck staging area was designed to allow for up to nine tractor trailer-size construction vehicles to be temporarily staged and out of the flow of overall traffic.
- Backfill and capping material trucks will be directed to enter County Route 42 from the Alcoa Bridge and exit from the Route 131 Bridge to facilitate traffic flow (Figure K2-4).

All work zone traffic control shall conform to the Contract Specifications and Section 619 of the New York State Department of Transportation (NYSDOT) Standard Construction Details and Specifications. Traffic control on County Route 42 will conform to Sections 619 and 685 of the NYSDOT Standard Construction Details and Specifications. Arconic will also specifically notify the Village/Town of Massena and local school districts of these expected traffic patterns, volume, and timing.

Once trucks enter the facility, traffic flow will be maintained by using approved roadways designated by Arconic plant personnel. Traffic movement within the Arconic facility will not affect the community because the facility is not accessible to the public.

Truck drivers will participate in training sessions that will include a review of project requirements such as the staging area layout and road pattern, allowable truck speeds on the local roads and within the staging area, right-of-way allowances, use of back-up alarms, and proper procedures for truck cleaning and decontamination prior to exiting the staging area.

Trucks will wash tires and equipment prior to exiting the staging area and entering public roads. A dedicated wheel wash area has been incorporated into the staging area design. The wheel wash area is located at the exit point of the staging area.

### 2.3.2 Potential Boating and Marine Impacts and Mitigation Measures

The Grasse River is used by recreational vessels during the summer months and is designated as a navigable waterway. The dredge, excavator, sediment transport, and capping equipment will not make the river impassable but will likely require restricted access within localized work areas. As such, boaters using the Lower Grasse River will encounter working vessels and barges associated with the remediation activities. The vessels and barges will typically be focused within select work areas (i.e., near shore areas or select portions of the main channel), but these vessels and barges will occasionally travel from the work area to the staging area. During mobilization and demobilization activities, vessels and barges may also travel the extent of the river (e.g., travel from the St. Lawrence River to the staging area). A new bulkhead has been constructed adjacent to the staging area for offloading sediments and backfill/cap materials. Mooring structures for the remedial contractor's equipment, a boat launch for support vessels, and dock space for smaller support, survey, and oversight vessels will also be constructed.

Potential concerns to recreational boaters on the river include standard navigational hazards associated with marine traffic, marine construction, and mooring. All applicable federal and state navigation laws and requirements (e.g., U. S. Coast Guard [USCG] regulations) will be followed during the project. The following are among the mitigation measures that will address boating hazards to recreational users:

- River traffic navigability will be maintained by allowing an area of the river width to remain unrestricted during dredging and capping work.
- All project-related vessels will travel at slow and safe speeds.
- Notifications will be provided to the USCG, Border Patrol, and the community. A "Notice to Recreational Boaters" will be posted at local marinas and community boards prior to project start and will be updated as work activities progress. The notices will advise boaters to avoid the immediate field activity areas (i.e., not pass within 20 feet of the work vessels).

- Buoy markers will be placed along the channel both upstream and downstream of daily field activities. "No wake" warnings and shallow depth signs will be posted for boater traffic adjacent to the work areas.
- Air horns or similar will be used to alert recreational vessels approaching an active work area to keep away. If the recreational project vessel continues to approach a remediation area, project personnel will contact the appropriate authorities for assistance.
- Captains of the work vessels (i.e., construction-related vessels) will be properly trained and licensed to comply with basic navigational safety while on the river. All boat operators will receive training from an experienced boater on navigational laws and USCG regulations. Boater safety on the river will be enforced by the USCG.
- During nighttime operations, all vessels and on-water equipment will be lit for visibility. Lighted buoys will be placed to alert boaters per USCG and New York State regulations, and all river work vessels will be lit in accordance with USCG regulations. Vessels and equipment will be equipped with navigational lighting and checked regularly.

All construction boats will operate under the provisions of the New York State Navigation Law regarding fuel storage and spills. The amount of extra fuel on each vessel at any one time will be kept at a minimum to minimize spills in the event of an accident. In the event of a fuel spill or discharge, the initial response will be to first protect human health and safety and then protect the environment. Identification, containment, treatment, and disposal assessment will comprise the secondary response. Spills will be handled in accordance with the Contingency Plan (Appendix L to the FDR).

## 2.4 Potential Noise Impacts, Community Monitoring, and Mitigation Measures

Noise during operations will vary throughout the day and evening hours. The staging area will contain the largest concentration of equipment with potential for noise impacts, including various generators, pumps, transport trucks, and backup alarms.

Noise monitoring will be performed to assess impacts to the surrounding communities (i.e., off-site receptors including residences and businesses). Noise monitoring will be conducted for one day at the start of a new construction activity (e.g., start of dredging or armored capping) to assess levels. The program will include the use of a real-time sound-level meter to measure levels between the construction activities and the nearest receptor. Meters will run for a full hour every 4 hours over a 24-hour period to assess the levels. If levels are acceptable, routine noise monitoring will be performed monthly to assess overall project levels, and no other specific additional monitoring would be performed until a new activity begins or when the mode of operation changes significantly. Changes in mode of operations during construction will be determined in coordination between the remedial contractor and Construction Manager. This decision will be made considering equipment to be used, any modifications, activities to be performed, and proximity to receptors. Any change in construction methods that will result in an increase in noise will require noise monitoring. The remedial contractor and Construction Manager will discuss the overall process and potential impacts to noise levels to assess the need for additional noise monitoring; this decision will be reviewed with USEPA, NYSDEC, and SRMT. The noise monitoring program will be consistent with the program provided in the CQAP (Appendix C of the FDR).

The Town of Massena does not have regulations or requirements regarding allowable noise levels. As such, sound levels at the perimeter of the site will be evaluated against the criteria provided in this section. These criteria have been developed considering a reasonable range of sound levels with the intent of minimizing nuisance noise. The criteria that follow are expressed in decibels using the A-weighted scale (dBA):

- Residential receptor – 80 dBA in the daytime (7 a.m. to 10 p.m.) and 65 dBA in the evening (maximum hourly average; 10 p.m. to 7 a.m.)
- Commercial receptor – 80 dBA (maximum hourly average)

Exceedances of any of these criteria will result in an immediate review of the remediation activities with adjustments made as needed in accordance with the Contingency Plan included in the FDR (Appendix L). Example contingency measures could include the following:

- Investigate the cause of the exceedance to confirm whether it is associated with project-related activities.
- Conduct additional monitoring activities to isolate the process or equipment causing the exceedance.
- Modify the equipment or process to bring levels into compliance.

The specifications included in the FDR provide for implementation of BMPs to reduce these impacts, and these may include the use of mufflers and silencers on equipment where possible, critically silenced or hospital-grade generators and pumps, hardwired power where possible to reduce the need for generators and engines, and the reduction of some activities during evening hours to lessen generated noise. The staging area will also be configured considering the potential for noise generation, with efforts made to locate equipment and noise sources away from potential receptors or shelter the noise sources to reduce impacts.

## 2.5 Lighting and Mitigation Measures

Artificial lighting will be required during evening hours for worker safety. Specifically, lights or light plants will be installed on land to support efforts in and around the staging area, as well as on the river barges to support dredging, capping, and related activities. Whenever possible, lights will be low-mast and shielded or hooded, with lights directed downward toward the area to be illuminated to mitigate backscatter to the sky and adjacent community receptors. Selected lighting will be the minimum brightness required to provide for worker safety in accordance with Occupational Safety and Health Administration (OSHA) regulations. Areas or equipment not continuously occupied or used will be lit only when in use.

## 2.6 Site Security

Site security will be maintained during all project-related activities at the staging area to mitigate the potential for vandalism, trespass, or accidental entry to the site. Security will be provided at the staging area by a 7-foot high chain link fence along the landside limits to prevent access along with a power sliding security gate and trailer, security cameras, and a key card access gate at the project personnel parking area. The staging area will have project personnel present during all working hours.

Disposal operations will be performed at the SLF located within the Arconic facility gate. Access to the Arconic facility is controlled by Arconic security personnel 24 hours per day, 7 days per week.

Additionally, a sign-in log will be maintained at the office trailer complex to be located at the staging area, and all visitors to the site will be required to sign in at the office during working hours and abide by the visitor health and safety requirements outlined in the remedial contractor's HASP. Unauthorized personnel will not be permitted to enter the site.

# 3 EMERGENCY PLANNING AND RESPONSE

General emergency planning and response activities as they relate to the community are outlined within this section. Further details on the emergency planning and response activities are provided in the Contingency Plan (Appendix L to the FDR). The Contingency Plan was prepared to aid site personnel in responding quickly and effectively should conditions change from those outlined in the FDR to protect workers and the local community in the instance of an accident, emergency, or corrective action exceedance caused by remedial activities.

Potential emergency conditions and scenarios that require implementation of contingency measures include fire or explosion, occurrence of a spill or material release, severe weather conditions, and physical or chemical injury to a worker. Additional emergency conditions that may require implementation of the Contingency Plan will be identified by the remedial contractor's Site Health and Safety Officer (SHSO). In addition, contingency measures will be initiated following an exceedance of the air, water, or noise corrective action levels.

## 3.1 Emergency Planning

Planning for possible emergency situations will be completed by the remedial contractor prior to mobilization and initiation of remedial activities. These measures will include evaluating potential emergency situations, compiling adequate supplies and manpower for responding to an emergency, and completing emergency training for site personnel in proper response procedures. The work areas will be evaluated for the potential for fire, chemical releases, accidents or medical emergencies, or other catastrophic events (e.g., rainstorm exceeding the flash flood level, lightning, severe wind gusts, power loss, and tornado).

The remedial contractor will have adequate equipment and materials on site and dedicated for emergencies only. Examples of this emergency equipment include ABC-type fire extinguishers, first-aid kits, eyewash stations, spill containment/booms/absorbents, and emergency floatation/life line ropes. In addition, air monitoring equipment will be used in accordance with the remedial contractor's HASP and for the environment per this CHASP. Data from the air monitoring equipment will also be used to support emergency responses.

On-site emergency responders will be current with regard to training and medical surveillance programs. All site personnel (remedial contractor, subcontractors, and Construction Manager) will comply with OSHA 29 CFR 1910.120. All site personnel will receive training during their site orientation concerning proper emergency response procedures. Site visitors will be briefed on emergency response procedures. Evacuation routes and assembly areas for the site will be established for all personnel and visitors to the site.

Lines of communication will be established before commencing any activities at the site with all necessary on-site personnel and response agencies. The primary on-site communication device will be two-way radios and air horns to alert personnel of emergency situations. Communications with response agencies in the event of an emergency will be accomplished and completed using commercial telephone lines or mobile phones.

Arconic will notify response agencies from the following organizations of the remedial project activities:

- Massena Fire Department
- Massena Police
- Massena Ambulance
- Massena Memorial Hospital
- USCG
- Border Patrol

These organizations will be provided a copy of the appropriate HASPs, this CHASP, and work plans as necessary and will also be provided a site tour given by the remedial contractor that will include a meeting to discuss questions and concerns. Emergency procedures will be reviewed with each response agency to enable immediate response in case of an incident affecting public health.

## 3.2 Emergency Response

The SHSO will be notified of any emergencies and coordinate any necessary response activities to be carried out at the site, including communication with Arconic, Agency, and

emergency responder personnel. The SHSO will determine the nature of the emergency and take appropriate action. The action to be taken will depend on whether the actual incident threatens human health or the environment.

Appropriate emergency measures will be immediately taken by site personnel to assist those who have been injured and protect others from hazards.

If a release occurred that had the potential to impact downstream water supplies, Arconic would notify the Agencies, and specifically SRMT personnel, to determine next steps. In the event of a petroleum spill, the provisions of the New York State Navigation Law will be followed, and New York State Spill Response and National Response Center will be notified. The SHSO, Arconic personnel, and emergency responders will determine whether and at what levels, if any, community exposure actually occurred, the cause of such exposure, and the means to be taken to prevent similar incidents from occurring in the future. The SHSO will direct response and follow-up actions with the concurrence of Arconic. If the incident could potentially threaten human health or the environment outside of the site, the SHSO will again immediately notify Arconic and Agency personnel to determine whether evacuation of an area outside of the site may be necessary. Notifications to the Police Department or emergency responders will also be made as necessary.

Table K3-1, below, lists the key emergency personnel and primary local responders.

**Table K3-1**

**Contact Information for Key Emergency Site Personnel and Local Responders**

| Personnel (Organization/Title and Specific Individual) | | Phone Number and/or Email |
|---|---|---|
| Construction Project Manager | Mike Elsner (Arconic) | (315) 764-4150<br>michael.elsner@arconic.com |
| Construction Manager | Dan Casey (Arcadis) | (315) 391-0445<br>dan.casey@aradis.com |
| Site Safety Representative and Responsible Person | Toby Topa (CDM-S) | TopaTJ@cdmsmith.com |
| Remedial Contractor Project Manager | Tyler Lee (Brennan) | tlee@jfbrennan.com |
| Remedial Contractor SHSO | Mike Cerda (Brennan) | mcerda@jfbrennan.com |
| USEPA Project Manager (USEPA Field Oversight to be determined) | Young Chang | (212) 637-4253<br>chang.young@epa.gov |
| SRMT Project Manager | Jay Wilkins | (518) 358-5937, ext. 123<br>jay.wilkins@srmt-nsn.gov |
| NYSDEC Project Manager | David Tromp | (518) 402-9786<br>david.tromp@dec.ny.gov |
| Fire Department | Arconic ERTs Gate 1 | (315) 764-4500 |
| | Massena Fire Department | 911 |
| Police | Arconic ERTs Gate 1 | (315) 764-4500 |
| | Massena Police Department | 911 |
| Ambulance | Arconic ERTs Gate 1 | (315) 764-4500 |
| | Massena Ambulance Corp | 911 |
| Massena Memorial Hospital | Not Applicable | (315) 769-4208 |
| SRMT Water Intake Supervisor | Shawn Martin | (518) 358-4205 |

# 4 COMMUNITY NOTIFICATIONS

In accordance with USEPA's *Grasse River Superfund Site Community Involvement Plan* (USEPA, August 2014), multiple communication mechanisms will be used to provide the community with information on the remedial action. USEPA's communication efforts will include the following:

- Distribution of fact sheets and fliers
- Public meetings and information sessions
- Coordination with SRMT and local government leaders
- Updates to the project website[3]
- Public notices, news releases, and media contacts

USEPA intends to use these mechanisms to provide information to the community in advance of and during in-river activities associated with the remediation project.

In addition, Arconic will continue to maintain and update the Grasse River specific website[4] to provide the community updates on the project and have also established a primary community relations contact in the event of concerns or questions (phone number and email address are provided on Arconic's Grasse River website). Arconic will continue to work cooperatively with USEPA to support its ongoing community relations efforts.

USEPA or the on-site USEPA representative(s) will be advised of any community inquiries regarding this project.

[3] Available at: https://www3.epa.gov/region02/superfund/npl/aluminumcompany/
[4] Available at: www.thegrasseriver.com

# 5 REFERENCES

Alcoa (Alcoa, Inc.), May 2006. *Draft Remedial Options Pilot Study Documentation Report*.

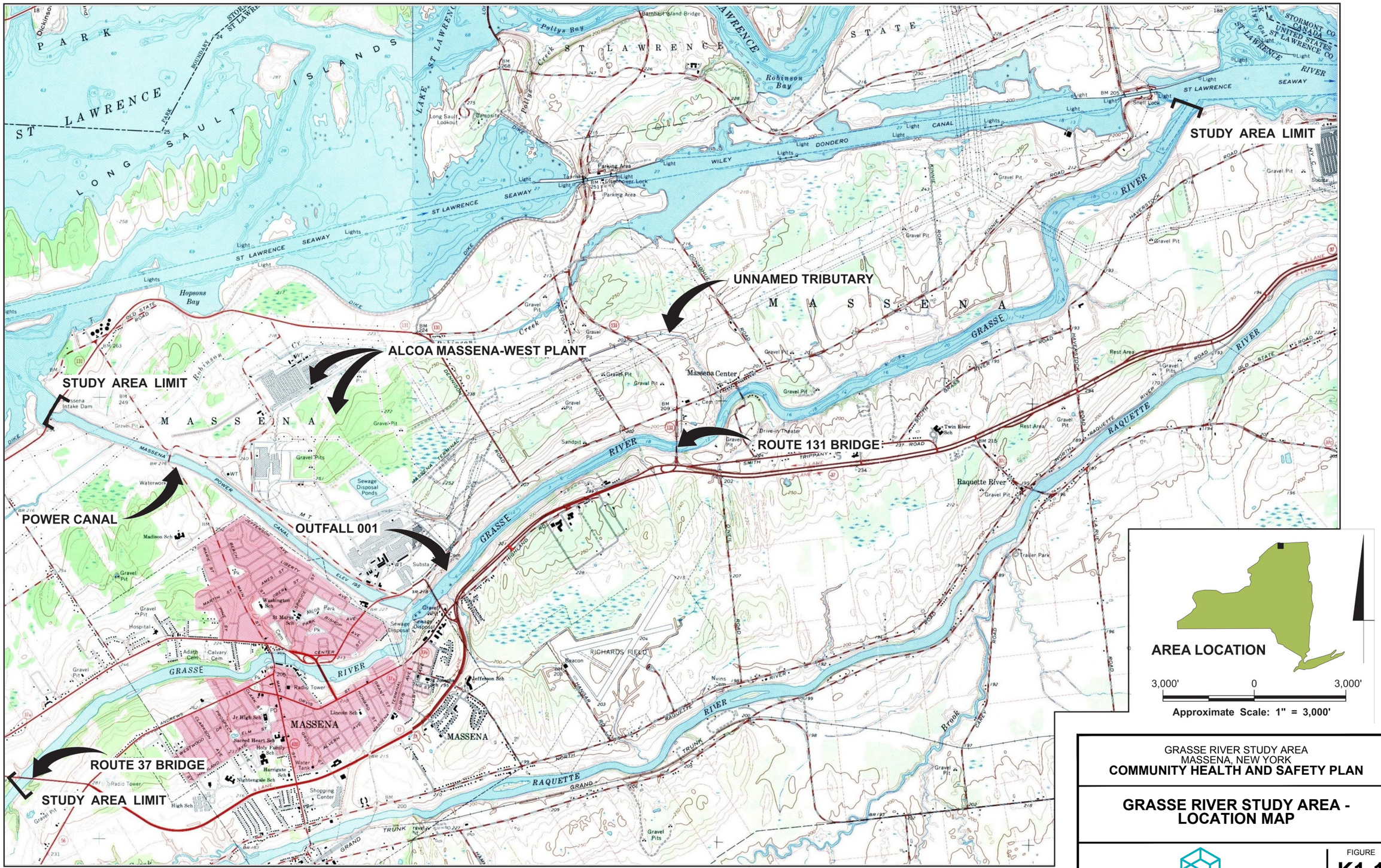
CDM Smith, June 2015. *Route 131 Staging Area Basis of Design, Grasse River Remediation Project, Massena, New York*.

NYSDEC (New York Department of Environmental Conservation), May 2010. *DER-10 Technical Guidance for Site Investigation and Remediation*.

USEPA (U.S. Environmental Protection Agency), April 2013. *Record of Decision*. Grasse River Superfund Site, Massena, St. Lawrence County, New York.

USEPA, August 2014. *Grasse River Superfund Site Community Involvement Plan for Remedial Design and Remedial Action*.

# FIGURES




GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**COMMUNITY HEALTH AND SAFETY PLAN**

**GRASSE RIVER STUDY AREA - LOCATION MAP**

ARCONIC

FIGURE
**K1-1**

SYRACUSE, NY-ENV/CAD-DJHOWES
2016/00004/CDR/10886N03.CDR

**REFERENCE:** MASSENA, NEW YORK-ONTARIO USGS QUAD. 1964 RAQUETTE RIVER, NEW YORK-ONTARIO USGS QUAD. 1964

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: L. FORAKER T. RITSCHEL L. FORAKER LD: PIC:H. VANDEWALKER PM:H. VANDEWALKER TM:S. HILL LYR: ON=*;OFF="REF"
C:\ENVCAD\NEWTOWN\ACT\2016\RETURN-TO\S:\c:\□□-NY\B0010886\00160\0001\CHSP\B0010886B02.dwg LAYOUT: K1-1 SAVED: 9/19/2016 12:15 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/19/2016 12:16 PM BY: WASILEWSKI, MATT
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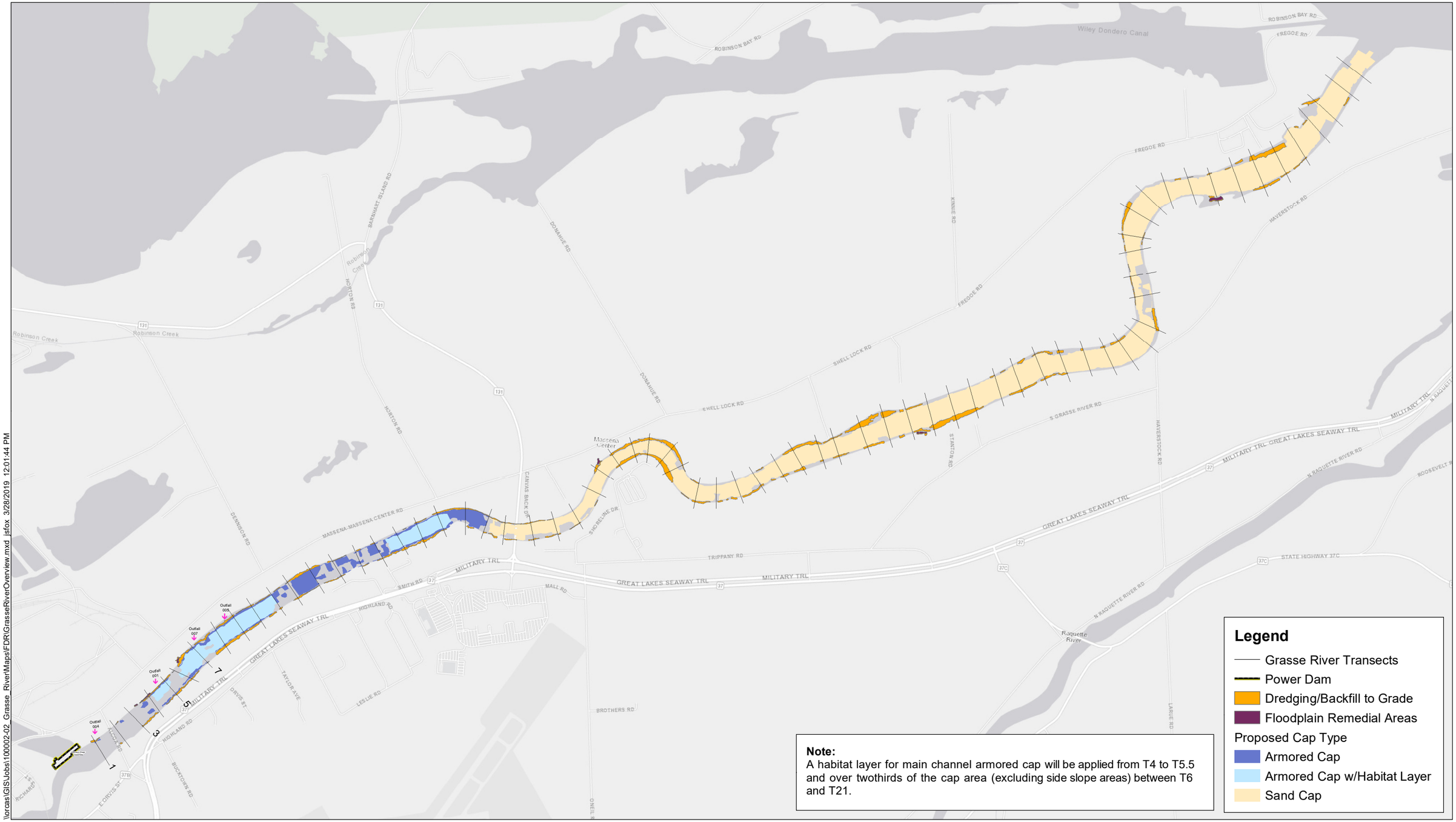


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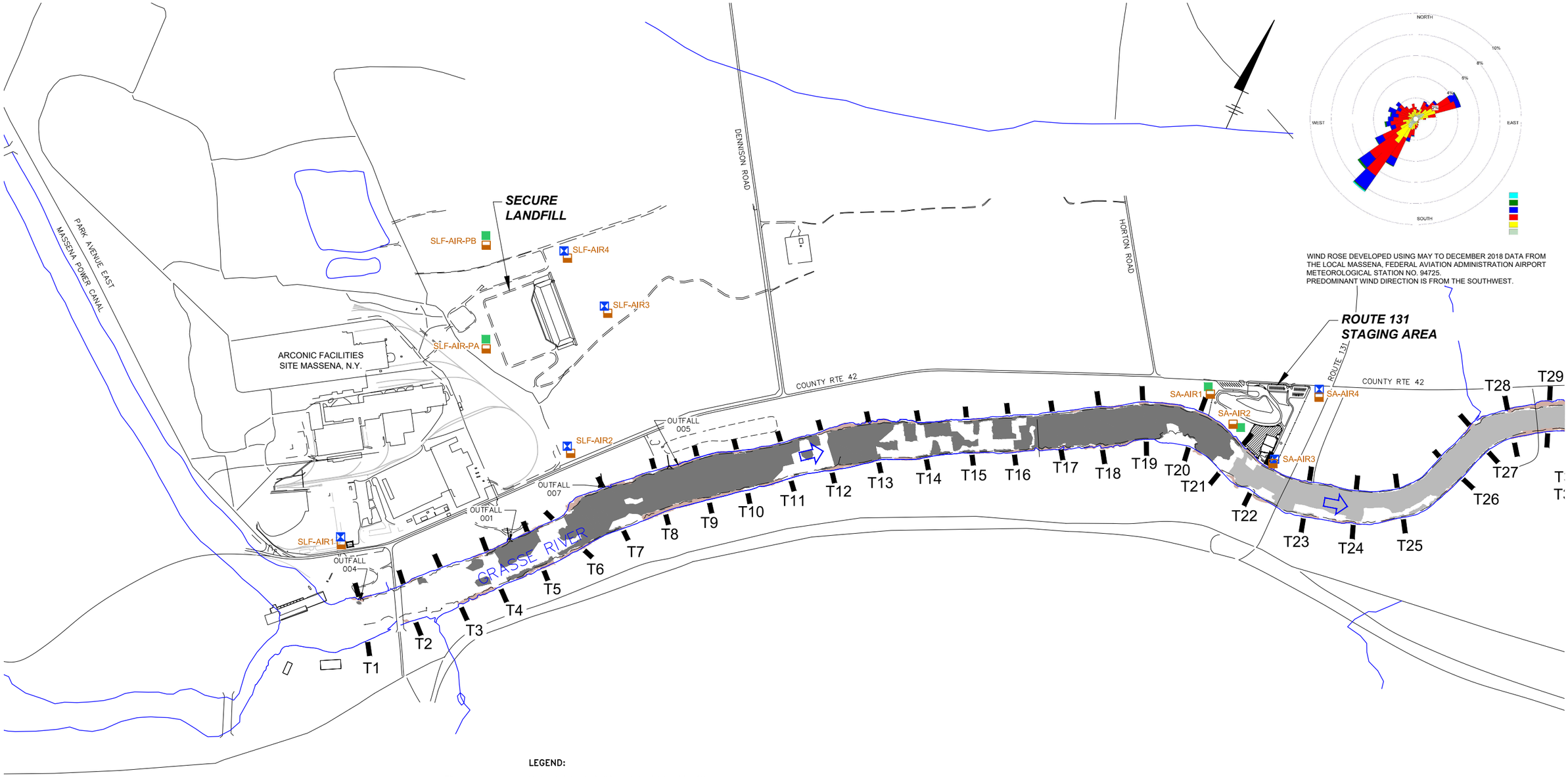
ARCONIC

Feet
0 2,000 4,000

**Figure K1-2**
Lower Grasse River Near Shore Dredging/Backfilling and Main Channel Capping
Community Health and Safety Plan – Final Design Report
Grasse River Project/Arconic




**LEGEND:**

- T9 — 1992 SEDIMENT PROBING TRANSECT LOCATION
- RIVER BOUNDARY
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW
- MAIN CHANNEL ARMORED CAP
- MAIN CHANNEL SAND CAP
- NEAR SHORE DREDGE/BACKFILL

APPOXIMATE AIR MONITORING LOCATIONS:

- PARTICULATE AND VOC
- HIGH VOLUME PCB
- LOW VOLUME PCB

**NOTES:**

1. BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. RIVER BOUNDARY PROVIDED BY ANCHOR QEA ON SEPTEMBER 15, 2016, AND SHOULD BE CONSIDERED APPROXIMATE ONLY.
2. THE FINAL FIXED AIR MONITORING STATION LOCATIONS WILL BE SELECTED IN THE FIELD BASED ON SITE CONDITIONS AND POWER AVAILABILITY.
3. AIR MONITORING STATIONS WILL BE LOCATED IN THE DREDGE CORRIDOR IN CONSIDERATION OF EACH DREDGE MANAGEMENT UNIT (DMU) AND/OR FLOODPLAIN REMOVAL AREA. UP TO 3 MONITORING STATIONS WILL BE ESTABLISHED FOR EACH DMU OR GROUP OF ADJACENT DMUs. THESE MOBILE MONITORING STATIONS WILL BE MOVED AS DREDGING/REMOVAL PROCEEDS DOWNSTREAM. THESE STATIONS ARE NOT SHOWN ON THIS FIGURE. THERE ARE ALSO 4 STATIONS UPSTREAM OF T7 THAT WILL BE MONITORED DURING REMOVAL AT T1N THAT WILL SUPPLEMENT THE DREDGE CORRIDOR STATIONS; THESE STATIONS ARE NOT SHOWN ON THIS FIGURE. ADDITIONAL DETAILS ARE PROVIDED IN APPENDIX B.

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**COMMUNITY HEALTH AND SAFETY PLAN**

# AIR MONITORING LOCATIONS

ARCONIC

FIGURE
**K2-1**

CITY: SYRACUSE, NY DIV/GROUP: IMDV/CAD DB: L.POSENAUER PIC/PM: H. VANDEWALKER TM: S. HILL LYR: ON=*; OFF=*REF*
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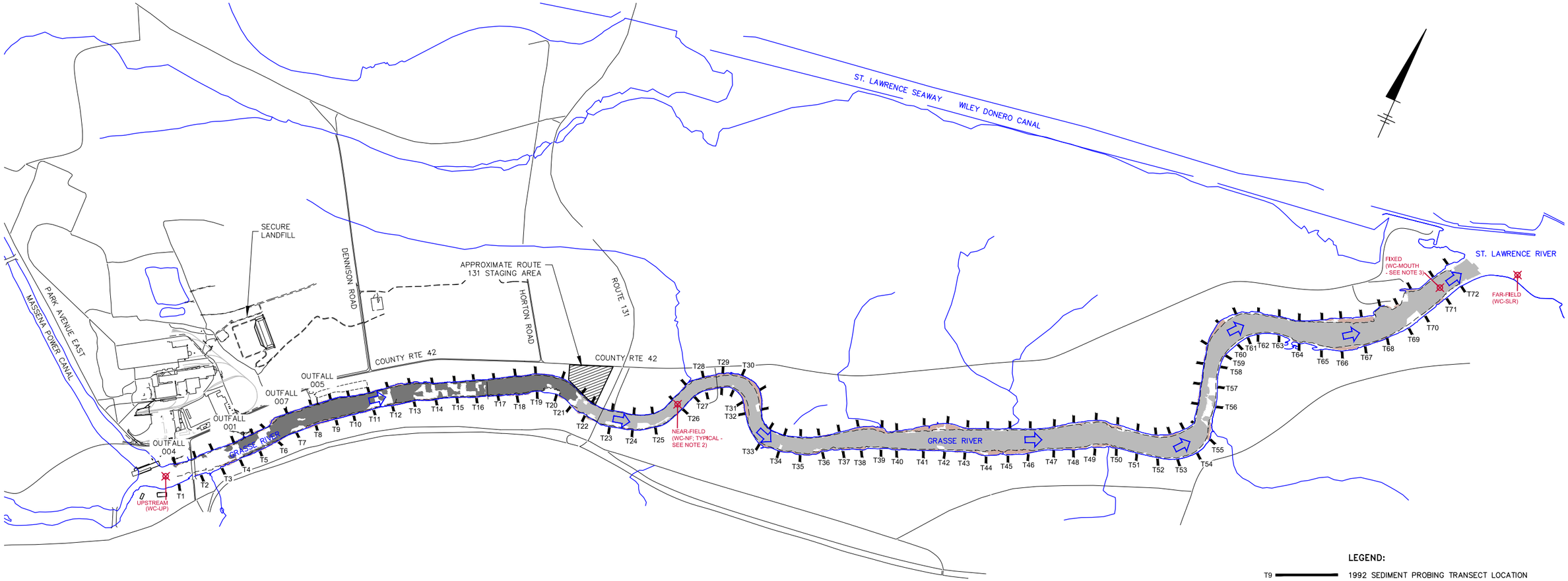
XREFS:
X-BASE2
X-CHSP-DL




**LEGEND:**

- T9 — 1992 SEDIMENT PROBING TRANSECT LOCATION
- RIVER BOUNDARY
- NEAR SHORE AREA
- DIRECTION OF RIVER FLOW
- MAIN CHANNEL ARMORED CAP
- MAIN CHANNEL SAND CAP
- NEAR SHORE DREDGE/BACKFILL
- UPSTREAM (WC-UP) — APPROXIMATE WATER COLUMN MONITORING STATION

0 1200' 2400'
GRAPHIC SCALE

**NOTES:**

1. BASE MAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. RIVER BOUNDARY PROVIDED BY ANCHOR QEA ON SEPTEMBER 15, 2016, AND SHOULD BE CONSIDERED APPROXIMATE ONLY.
2. WC–NF IS A MOBILE STATION THAT WILL BE ESTABLISHED MID–RIVER APPROXIMATELY 1,000 FEET DOWNSTREAM OF COLLECTIVE IN–RIVER WORK ACTIVITIES DURING EACH MONITORING EVENT. THE EXACT LOCATION WILL BE DETERMINED AT THE TIME OF MONITORING. THIS STATION WILL BE ELIMINATED WHEN CONSTRUCTION ACTIVITIES REACH T71 AS IT WILL BE REPLACED BY WC–SLR.
3. WC–MOUTH IS A FIXED STATION THAT WILL BE ELIMINATED WHEN CONSTRUCTION ACTIVITIES REACH T69 (WITHIN 1,000 FEET OF THE STATION) AS IT WILL BE REPLACED BY WC–NF.

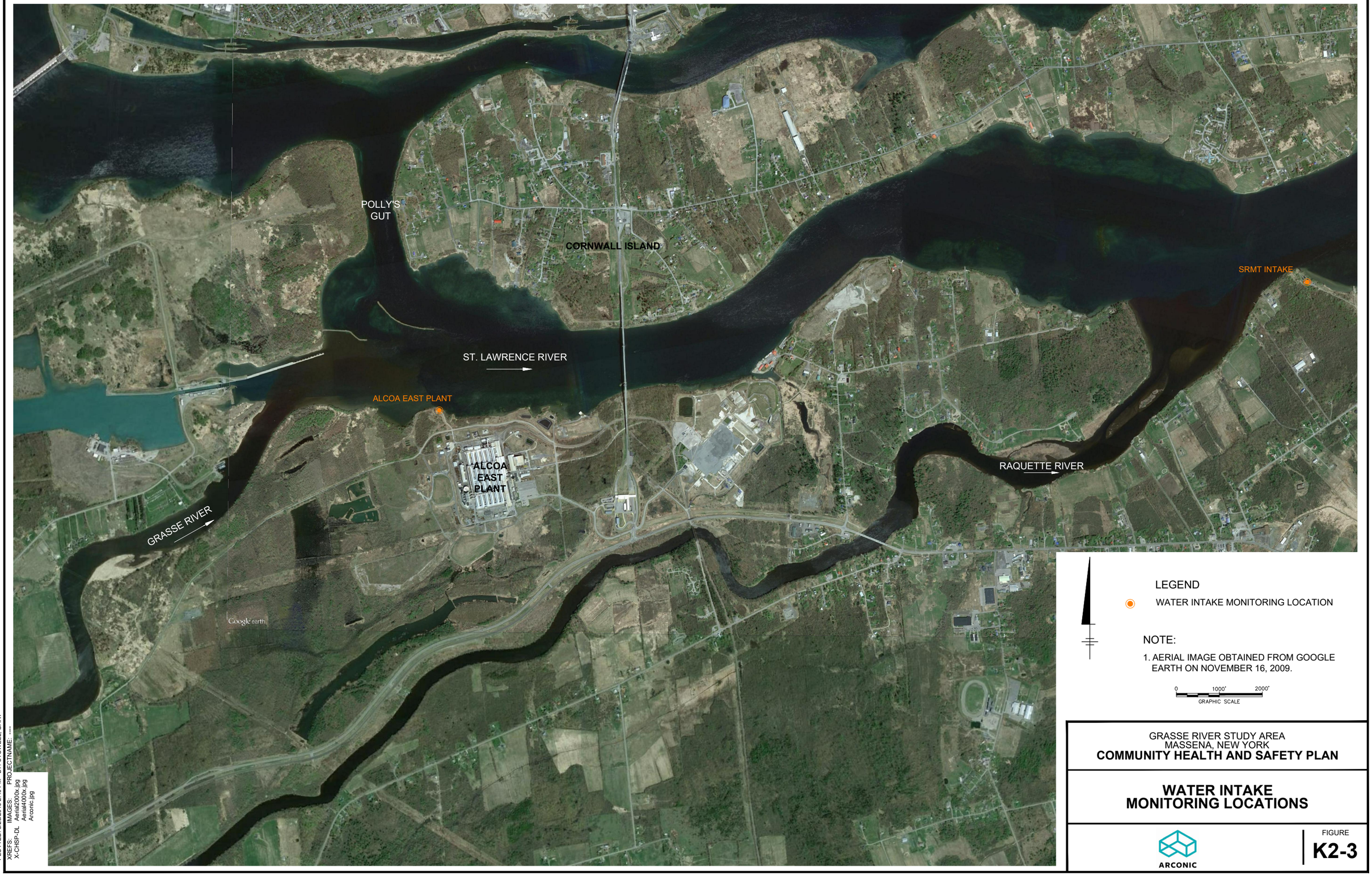
GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**COMMUNITY HEALTH AND SAFETY PLAN**

# WATER COLUMN MONITORING LOCATIONS

ARCONIC

FIGURE
**K2-2**

CITY: SYRACUSE, NY DIV/GROUP: IMDV/CAD DB: L.POSENAUER PIC/PM: H. VANDEWALKER TM: S. HILL LYR: ON=*; OFF=*REF*
C:\BIM\OneDrive - ARCADIS\BIM 360 Docs\ARCONIC INC\GRASSE RIVER FDR & RFP SUPPORT\2019\B0010886.0036\01-DWG\FIGs-K2-1 AND 2-MON-LOCS.dwg LAYOUT: K2-2 SAVED: 3/28/2019 2:46 PM ACADVER: 23.0S (LMS TECH) PAGESETUP: C-LD2B-PDF-GMS PLOTSTYLETABLE:
PLTFULL.CTB PLOTTED: 3/28/2019 2:49 PM BY: STOWELL, GARY
XREFS: X-BASE2, X-CHSP-DL
IMAGES: Wind Rose 2018.tif, Arconic.jpg




LEGEND

WATER INTAKE MONITORING LOCATION

NOTE:

1. AERIAL IMAGE OBTAINED FROM GOOGLE EARTH ON NOVEMBER 16, 2009.

0 1000' 2000'
GRAPHIC SCALE

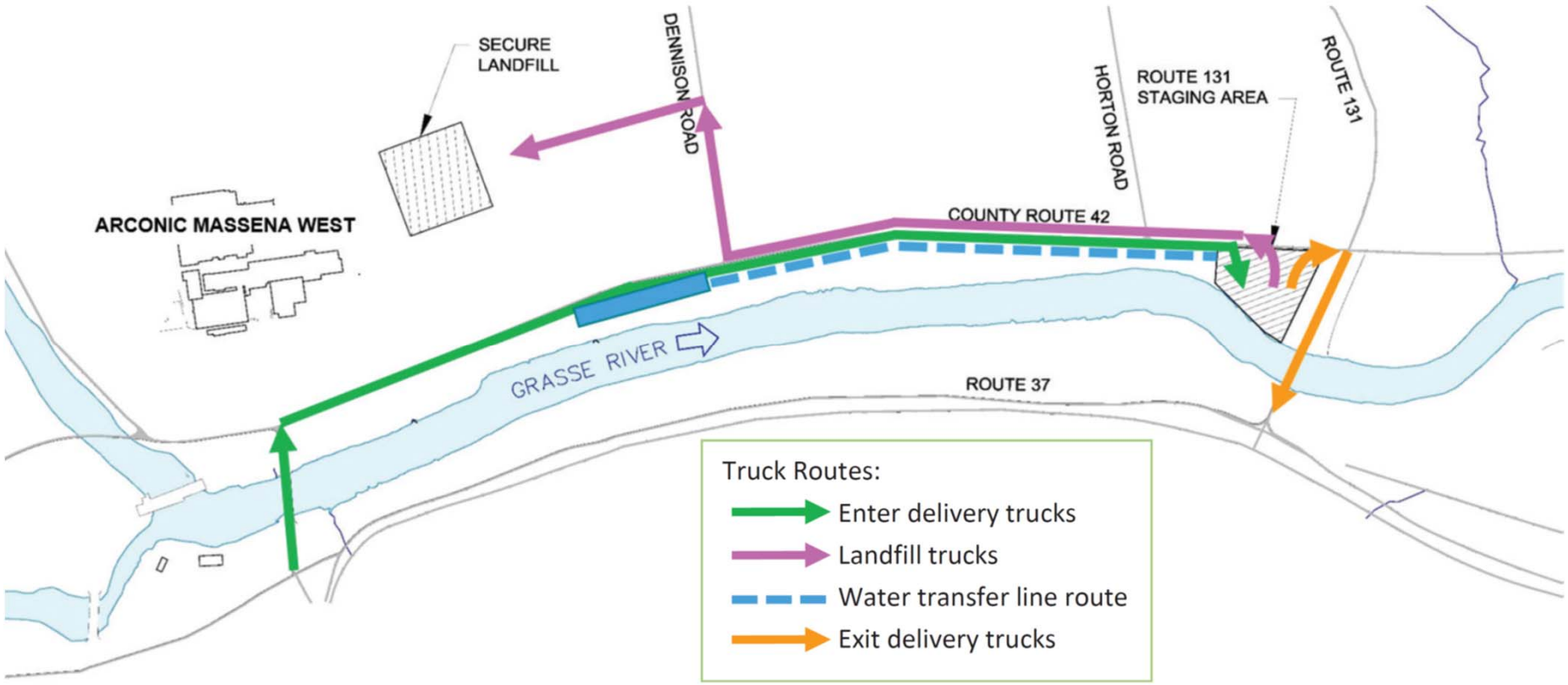
GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**COMMUNITY HEALTH AND SAFETY PLAN**

# WATER INTAKE MONITORING LOCATIONS

ARCONIC

FIGURE
**K2-3**

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: L. FORAKER T. RITSCHEL L. FORAKER LD: PIC: H. VANDEWALKER PM: H. VANDEWALKER TM: S. HILL LYR: ON=*;OFF=*REF*
C:\BIMOneDrive - ARCADIS\BIM 360 Docs\ARCONIC INC\GRASSE RIVER FDR & RFP SUPPORT\2019\B0010686.0036\01-DWG\FIG-K2-3-MON-LOCS.DWG LAYOUT: K2-3 SAVED: 3/25/2019 11:17 AM ACADVER: 23.0S (LMS TECH) PAGESETUP: C-LD2B-PDF-GMS PLOTSTYLETABLE: PLTFULL.CTB
PLOTTED: 3/28/2019 2:49 PM BY: STOWELL, GARY
XREFS: IMAGES: PROJECTNAME: ----
X-CHSP-DL Aerial2000x.jpg
Aerial4000x.jpg
Arconic.jpg




GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
**COMMUNITY HEALTH AND SAFETY PLAN**

**TRUCK TRAFFIC ROUTE IN THE VICINITY OF THE ROUTE 131 STAGING AREA**

ARCONIC

FIGURE
**K2-4**

# ATTACHMENT A
# WEST FACILITY SPDES PERMIT AND DISCHARGE LIMITS

# State Pollutant Discharge Elimination System (SPDES) DISCHARGE PERMIT

| | | | |
|---|---|---|---|
| Industrial Code: | **3334** | SPDES Number: | **NY0001732** |
| Discharge Class (CL): | **03** | DEC Number: | **6-4058-00003/00001** |
| Toxic Class (TX): | **T** | Effective Date (EDP): | **06/01/2018** |
| Major Drainage Basin: | **09** | Expiration Date (ExDP): | **05/31/2023** |
| Sub Drainage Basin: | **04** | Modification Dates: (EDPM) | |
| Water Index Number: | **SL-2, SL-3, SL-5a** | | |
| Compact Area: | | | |

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act, as amended, (33 U.S.C. §1251 et.seq)(hereinafter referred to as "the Act").

| PERMITTEE NAME AND ADDRESS | | | | | |
|---|---|---|---|---|---|
| Name: | **Arconic, Inc.** | Attention: | **Environmental Manager** | | |
| Street: | **Park Avenue East** | | | | |
| City: | **Massena** | State: | **NY** | Zip Code: | **13662** |

is authorized to discharge from the facility described below:

| FACILITY NAME AND ADDRESS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name: | **Arconic, Inc. – Massena Operations** | | | | | | | | | | | | | | | | |
| Location (C,T,V): | **Massena (V)** | | | | | | | | | | County: | **St. Lawrence** | | | | | |
| Facility Address: | **P.O. Box 150** | | | | | | | | | | | | | | | | |
| City: | **Massena** | | | | | | State: | | | | **NY** | | Zip Code: | **13662** | | | |
| From Outfall No.: | **001** | | at Latitude: | **44** | º | **56** | ´ | **35** | ´´ | & Longitude: | **74** | º | **52** | ´ | **06** | ´´ | |
| into receiving waters known as: | | **Grasse River** | | | | | | | | | | | Class: | **B** | | | |
| And | **003** | **Power Canal (SL-5a)** | | | | **Class B** | | | | | | | | | | | |
| | **004** | **Grasse River (SL-2)** | | | | **Class B** | | | | | | | | | | | |
| | **008** | **Robinson Creek (SL-3)** | | | | **Class A** | | | | | | | | | | | |

in accordance with: effluent limitations; monitoring and reporting requirements; other provisions and conditions set forth in this permit; and 6 NYCRR Part 750-1and 750-2.

| DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS | | | | | |
|---|---|---|---|---|---|
| Mailing Name: | Arconic, Inc. | | | | |
| Street: | P.O. Box 150 | | | | |
| City: | Massena | State: | NY | Zip Code: | 13662 |
| Responsible Official or Agent: | Environmental Manager | | Phone: | (315) 764-4642 | |

This permit and the authorization to discharge shall expire on midnight of the expiration date shown above and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for permit renewal not less than 180 days prior to the expiration date shown above.

DISTRIBUTION:

CO BWP - Permit Coordinator
RWE
RPA
USEPA Region 2
NYSDOH District Office

| | |
|---|---|
| Deputy Chief Permit Administrator: Kent P. Sanders | |
| Address: Division of Environmental Permits<br>625 Broadway, 4th Floor<br>Albany, NY 12233-1750 | |
| Signature: Kent P. Sanders | Date: 05/18/2018 |

| TABLE OF CONTENTS | PAGE |
|---|---|
| OUTFALL SUMMARY | 3 |
| OUTFALL 001 | 5-6 |
| OUTFALL 01A | 7 |
| OUTFALL 01D | 8 |
| OUTFALL 01E | 9 |
| OUTFALL 01G | 10 |
| OUTFALL 01H | 11 |
| OUTFALL 003 | 12 |
| OUTFALL 004 | 13-14 |
| OUTFALL 008 | 15 |
| OUTFALL 009 | 15 |
| FOOTNOTES | 16-17 |
| SPECIAL CONDITIONS AND DEFINITIONS | 18 |
| INDUSTRY BEST MANAGEMENT PRACTICES PLAN | 19-21 |
| PCB MINIMIZATION PROGRAM – Industrial Facilities | 22-23 |
| POLLUTANT MINIMIZATION PROGRAM – BENZO(A)PYRENE | 24 |
| BIOLOGICAL MONITORING REQUIREMENTS (BTA) | 25-27 |
| DISCHARGE NOTIFICATION REQUIREMENTS | 28-29 |
| SCHEDULE OF COMPLIANCE | 30 |
| SCHEDULE OF SUBMITTALS | 31 |
| SCHEDULE OF SUBMITTALS – BTA REQUIREMENTS | 32 |
| MONITORING LOCATIONS & TREATMENT SYSTEM FLOW CHART | 33 |
| GENERAL REQUIREMENTS | 34 |
| RECORDING, REPORT AND ADDITIONAL MONITORING REQUIREMENTS | 35 |

# OUTFALL SUMMARY

| OUTFALL | DESCRIPTION | RECEIVING WATER / CLASS | LATITUDE LONGITUDE |
|---|---|---|---|
| 001 | Flows from Outfalls 01A, 01D, & 01E, Area III Impoundment (occasional diversion), Stormwater runoff from Remediated 60ac, Waste Lubricating Oil, & Soluble Oil Lagoons | Grasse River Class B | 44° 56' 35" 74° 52' 06" |
| 01A | Central Impoundment Effluent (incl. 01G & 01H Effluent, Potlining Pile A Groundwater, Area III Impoundment Effluent, Non-contact cooling water, Boiler Blowdown, Stormwater) | Internal (to Outfall 001) | 44° 57' 50" 74° 52' 50" |
| 01D | Sanitary sewage, Non-contact cooling water, General Refuse Landfill (GRL) and Landfill Annex leachate, 01B Treatment System Effluent, Secure Landfill Cell 3 Leachate (SLF) | Internal (to Outfall 001) | 44° 56' 40" 77° 52' 29" |
| 01E | Direct Chill and Rod Casting contact cooling water | Internal (to Outfall 001) | 44° 57' 01" 74° 53' 42" |
| 01G | Heat Treat contact cooling water and Non-contact cooling water | Internal (to Outfalls 01A & 001) | 44° 56' 45" 74° 52' 43" |
| 01H | Extrusion Core wastewater and Solution Heat Treat wastewater | Internal (to Outfalls 01A & 001) | 44° 57' 08" 74° 53' 35" |
| 003 | Bldg. 401 Underdrain Groundwater and Area III Stormwater runoff | Massena Power Canal Class B | 44° 57' 13" 74° 54' 33" |
| 004 | Outfall 01G Effluent, Stormwater runoff from Areas I & II & Secure Landfill, and Central Impoundment Effluent (occasional diversion) | Grasse River Class B | 44° 56' 28" 74° 52' 27" |
| 008 | Stormwater runoff | Robinson Creek Class A | 44° 57' 50" 74° 52' 40" |
| 009 | Water Intake | St. Lawrence River | 44° 57' 23" 74° 55' 22" |

# PERMIT LIMITS, LEVELS AND MONITORING DEFINITIONS

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| | This cell describes the type of wastewater authorized for discharge. Examples include process or sanitary wastewater, storm water, non-contact cooling water. | This cell lists classified waters of the state to which the listed outfall discharges. | The date this page starts in effect. (e.g. EDP or EDPM) | The date this page is no longer in effect. (e.g. ExDP) |

| PARAMETER | MINIMUM | MAXIMUM | UNITS | SAMPLE FREQ. | SAMPLE TYPE |
|---|---|---|---|---|---|
| e.g. pH, TRC, Temperature, D.O. | The minimum level that must be maintained at all instants in time. | The maximum level that may not be exceeded at any instant in time. | SU, °F, mg/l, etc. | See below | See below |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | COMPLIANCE LEVEL / MINIMUM LEVEL (ML) | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE |
|---|---|---|---|---|---|---|
| | Limit types are defined below in Note 1. The effluent limit is developed based on the more stringent of technology-based limits, required under the Clean Water Act, or New York State water quality standards. The limit has been derived based on existing assumptions and rules. These assumptions include receiving water hardness, pH and temperature; rates of this and other discharges to the receiving stream; etc. If assumptions or rules change the limit may, after due process and modification of this permit, change. | For the purposes of compliance assessment, the permittee shall use the approved EPA analytical method with the lowest possible detection limit as promulgated under 40CFR Part 136 for the determination of the concentrations of parameters present in the sample unless otherwise specified. If a sample result is below the detection limit of the most sensitive method, compliance with the permit limit for that parameter was achieved. Monitoring results that are lower than this level must be reported, but shall not be used to determine compliance with the calculated limit. This Minimum Level (ML) can be neither lowered nor raised without a modification of this permit. | Action Levels are monitoring requirements, as defined below in Note 2, which trigger additional monitoring and permit review when exceeded. | This can include units of flow, pH, mass, temperature, or concentration. Examples include µg/l, lbs/d, etc. | Examples include Daily, 3/week, weekly, 2/month, monthly, quarterly, 2/yr and yearly. All monitoring periods (quarterly, semiannual, annual, etc.) are based upon the calendar year unless otherwise specified in this Permit. | Examples include grab, 24 hour composite and 3 grab samples collected over a 6 hour period. |

Notes:

1. EFFLUENT LIMIT TYPES:
   a. DAILY DISCHARGE: The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for the purposes of sampling. For pollutants expressed in units of mass, the 'daily discharge' is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the 'daily discharge' is calculated as the average measurement of the pollutant over the day.
   b. DAILY MAX: The highest allowable daily discharge.
   c. DAILY MIN: The lowest allowable daily discharge.
   d. MONTHLY AVG: The highest allowable average of daily discharges over a calendar month, calculated as the sum of each of the daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
   e. 7 DAY ARITHMETIC MEAN (7-day average): The highest allowable average of daily discharges over a calendar week.
   f. 30 DAY GEOMETRIC MEAN: The highest allowable geometric mean of daily discharges over a calendar month, calculated as the antilog of: the sum of the log of each of the daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
   g. 7 DAY GEOMETRIC MEAN: The highest allowable geometric mean of daily discharges over a calendar week.
   h. 12 MONTH ROLLING AVERAGE: The current monthly value of a parameter, plus the sum of the monthly values over the previous 11 months for that parameter, divided by 12.
   i. RANGE: The minimum and maximum instantaneous measurements for the reporting period must remain between the two values shown.

2. ACTION LEVELS: Routine Action Level monitoring results, if not provided for on the Discharge Monitoring Report (DMR) form, shall be appended to the DMR for the period during which the sampling was conducted. If the additional monitoring requirement is triggered as noted below, the permittee shall undertake a short-term, high-intensity monitoring program for the parameter(s). Samples identical to those required for routine monitoring purposes shall be taken on each of at least three consecutive operating and discharging days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the additional monitoring requirement was triggered. Results may be appended to the DMR or transmitted under separate cover to the same address. If levels higher than the Action Levels are confirmed, the permit may be reopened by the Department for consideration of revised Action Levels or effluent limits. The permittee is not authorized to discharge any of the listed parameters at levels which may cause or contribute to a violation of water quality standards.

# PERMIT LIMITS, LEVELS AND MONITORING

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 001 | Flows from Outfalls 01A, 01D, & 01E, Area III Impoundment (occasional diversion), Stormwater runoff from Remediated 60ac, Waste Lubricating Oil, & Soluble Oil Lagoons | Grasse River | 06/01/2018 | 05/31/2023 |

| PARAMETER | MINIMUM | MAXIMUM | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FOOTNOTES (FN) |
|---|---|---|---|---|---|---|
| pH | 6.5 | 9.0 | SU | Weekly | Grab | |
| Temperature | Monitor | 90 | °F | Weekly | Grab | |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | Monthly Avg | Daily Max | | | | | |
| Flow | Monitor | Monitor | | | | GPD | Continuous | Recorder | |
| Solids, Total Suspended | 20 | 40 | | | | mg/L | Weekly | 4-hr Composite | |
| Solids, Total Dissolved | Monitor | Monitor | | | | mg/L | Weekly | 4-hr Composite | |
| Solids, Settleable | Monitor | 0.1 | | | | mL/L | Weekly | Grab | |
| Oil & Grease | - | 10 | | | | mg/L | Monthly | Grab | |
| Foam (visible) | - | None | | | | Visible | Monthly | Grab | 8 |
| Aluminum, Total | 28 | 43 | | | | lbs/d | Weekly | 4-hr Composite | |
| Boron, Total | - | - | | | 130 | µg/L | Quarterly | 4-hr Composite | |
| Copper, Total | - | 3.0 | | | | lbs/d | Quarterly | 4-hr Composite | |
| Cyanide, Total | Monitor | 60 | | 60 | | µg/L | Weekly | Grab | |
| Fluoride, Total | 180 | 240 | | | | lbs/d | Weekly | 4-hr Composite | |
| Iron, Total | - | 17 | | | | lbs/d | Monthly | 4-hr Composite | |
| Nickel, Total | Monitor | Monitor | | | | lbs/d | Monthly | 4-hr Composite | |
| Zinc, Total | - | 1.7 | | | | lbs/d | Monthly | 4-hr Composite | |
| Benzo(a)pyrene | 1.2 | - | Monitor | 90 | | ng/L | 2x/month | 4-hr Composite | |
| Individual PAHs | - | - | | 10 | | µg/L | Monthly | 4-hr Composite | 2 |
| Chloroform | - | - | | 20 | | µg/L | Monthly | Grab | |
| 2-Chloroethylvinyl ether | - | - | | Monitor | | µg/L | Monthly | Grab | |
| Dichlorobromomethane | - | - | | Monitor | | µg/L | Monthly | Grab | |

FOOTNOTES: See pages 16 & 17 of this Permit.

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 001 | Flows from Outfalls 01A, 01D, & 01E, Area III Impoundment (occasional diversion), Stormwater runoff from Remediated 60ac, Waste Lubricating Oil, & Soluble Oil Lagoons | Grasse River | 06/01/2018 | 05/31/2023 |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | Monthly Avg | Daily Max | | | | | |
| PCBs, Total | - | 0.00010 | | | | ng/L | | | |
| Aroclor 1242 | | | Monitor | 200 | | ng/L | Weekly | Grab | |
| Aroclor 1248 | | | Monitor | 200 | | ng/L | Weekly | Grab | |
| Aroclor 1254 | | | Monitor | 200 | | ng/L | Weekly | Grab | |
| Aroclor 1260 | | | Monitor | 200 | | ng/L | Weekly | Grab | |
| Whole Effluent Toxicity (WET) Testing: | | | | | | | | | |
| WET - Acute Invertebrate | | | | | 2.9 | TUa | Quarterly | See footnote | 1 |
| WET - Acute Vertebrate | | | | | 2.9 | TUa | Quarterly | See footnote | 1 |
| WET -Chronic Invertebrate | | | | | 18 | TUc | Quarterly | See footnote | 1 |
| WET - Chronic Vertebrate | | | | | 18 | TUc | Quarterly | See footnote | 1 |

FOOTNOTES: See pages 16 & 17 of this Permit.

# PERMIT LIMITS, LEVELS AND MONITORING

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 01A | Central Impoundment Effluent (incl. 01G & 01H Effluent, Potlining Pile A Groundwater, Area III Impoundment Effluent, Non-contact cooling water, Boiler Blowdown, Stormwater) | Internal (to Outfall 001) | 06/01/2018 | 05/31/2023 |

| PARAMETER | MINIMUM | MAXIMUM | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FOOTNOTES (FN) |
|---|---|---|---|---|---|---|
| pH | 6.0 | 9.0 | SU | | Monthly | |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | Monthly Avg | Daily Max | | | | | |
| Flow | Monitor | Monitor | | | | GPD | Continuous | Recorder | |
| PPA to CI Flow | Monitor | Monitor | | | | GPD | Continuous | Totalizer | 11 |
| Solids, Total Suspended | - | 20 | | | | mg/L | Monthly | 4-hr Composite | |
| Solids, Total Dissolved | - | Monitor | | | | mg/L | Monthly | 4-hr Composite | |
| Oil & Grease | - | 10 | | | | mg/L | Monthly | Grab | |
| Fluoride, Total | - | 9300 | | | | µg/L | Monthly | 4-hr Composite | |
| Cyanide, Total | - | 60 | | 60 | | µg/L | Monthly | Grab | |
| Benzo(a)pyrene | 1.2 | - | | 90 | | ng/L | Monthly | 4-hr Composite | |
| Individual PAHs | - | - | | 10 | | µg/L | Monthly | 4-hr Composite | 2 |
| Endothall | Monitor | Monitor | | | | µg/L | 2x/week | Grab | 9 |
| PCBs, Total | - | 0.00010 | | | | ng/L | | | |
| Aroclor 1242 | | | Monitor | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1248 | | | Monitor | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1254 | | | Monitor | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1260 | | | Monitor | 200 | | ng/L | Monthly | Grab | |

FOOTNOTES: See pages 16 & 17 of this Permit.

# PERMIT LIMITS, LEVELS AND MONITORING

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 01D | Sanitary sewage, Non-contact cooling water, General Refuse Landfill (GRL) and Landfill Annex leachate, 01B Treatment System Effluent. Secure Landfill Cell 3 Leachate (SLF) | Internal (to Outfall 001) | 06/01/2018 | 05/31/2023 |

| PARAMETER | MINIMUM | MAXIMUM | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FOOTNOTES (FN) |
|---|---|---|---|---|---|---|
| pH | 6.0 | 9.0 | SU | Weekly | Grab | |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | Monthly Avg | Daily Max | | | | | |
| Flow | Monitor | 520,000 | | | | GPD | Continuous | Recorder | |
| $CBOD_5$ | 25 | 40 | | | | mg/L | Monthly | 24hr.comp. | |
| TKN | - | 20 | | | | mg/L | Quarterly | 24hr.comp. | |
| Solids, Total Suspended | Monitor | 20 | | | | mg/L | 2x/month | 24hr.comp. | |
| Solids, Total Dissolved | Monitor | Monitor | | | | mg/L | 2x/month | 24hr.comp. | |
| Oil & Grease | - | 10 | | | | mg/L | Quarterly | Grab | |
| Foam (visible) | - | None | | | | Visible | Monthly | Grab | 8 |
| Fecal Coliform | 200 (30d GM)<br>400 (7d GM) | | | | | #/100mL | Monthly | Grab | 3 |
| Aluminum, Total | 1300 | 3000 | | | | µg/L | Monthly | 24hr.comp. | |
| Boron, Total | - | - | | | 170 | µg/L | Quarterly | 24hr.comp. | |
| Cyanide, Total | 80 | 200 | | | | µg/L | Weekly | 24hr.comp. | 16 |
| Fluoride, Total | 3000 | 4200 | | | | µg/L | 2x/month | 24hr.comp. | |
| Zinc, Total | - | 100 | | | | µg/L | Monthly | 24hr.comp. | |
| Phenol | - | - | | 10 | | µg/L | Monthly | 24hr.comp. | |
| Individual VOCs (except Methylene Chloride) | - | - | | 10 | | µg/L | 2x/month | Grab | 2 |
| Chloroform | - | - | | 20 | | µg/L | 2x/month | Grab | |
| PCBs, Total | - | 0.00010 | | | | ng/L | | | |
| Aroclor 1242 | | | - | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1248 | | | - | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1254 | | | - | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1260 | | | - | 200 | | ng/L | Monthly | Grab | |

FOOTNOTES: See pages 16 & 17 of this Permit.

# PERMIT LIMITS, LEVELS AND MONITORING

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 01E | Direct Chill and Rod Casting contact cooling water | Internal (to Outfall 001) | 06/01/2018 | 05/31/2023 |

| PARAMETER | MINIMUM | MAXIMUM | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FOOTNOTES (FN) |
|---|---|---|---|---|---|---|
| pH | 6.0 | 9.0 | SU | Weekly | Grab | |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | Monthly Avg | Daily Max | | | | | |
| Flow | Monitor | Monitor | | | | GPD | Continuous | Recorder | |
| Flow | Monitor | 7200 | | | | GPM | Continuous | Recorder | 4 |
| Solids, Total Suspended | 12 | 15 | | | | mg/L | 2x/month | 24-hr Composite | |
| Solids, Total Suspended | Monitor | 180 | | | | lbs/d | 2x/month | 24-hr Composite | |
| Oil & Grease | - | 10 | | | | mg/L | Monthly | Grab | |
| Oil & Grease | - | 120 | | | | lbs/d | Monthly | Grab | |
| Aluminum, Total | 1.9 | 4.3 | | | | lbs/d | Monthly | 24-hr Composite | 14 |
| Aluminum, Total | 2.4 | 5.5 | | | | lbs/d | Monthly | 24-hr Composite | 15 |
| Antimony, Total | 0.6 | 1.4 | | | | lbs/d | Quarterly | 24-hr Composite | 14 |
| Antimony, Total | 0.77 | 1.7 | | | | lbs/d | Quarterly | 24-hr Composite | 15 |
| Chromium, Total | - | Monitor | | | | lbs/d | Quarterly | 24-hr Composite | |
| Fluoride, Total | 19 | 42 | | | | lbs/d | Quarterly | 24-hr Composite | 14 |
| Fluoride, Total | 24 | 53 | | | | lbs/d | Quarterly | 24-hr Composite | 15 |
| Lead, Total | - | Monitor | | | | lbs/d | Quarterly | 24-hr Composite | |
| Nickel, Total | 0.26 | 0.39 | | | | lbs/d | Monthly | 24-hr Composite | 14 |
| Nickel, Total | 0.33 | 0.49 | | | | lbs/d | Monthly | 24-hr Composite | 15 |
| Benzo(a)pyrene | 1.2 | - | | 90 | | ng/L | Monthly | 24-hr Composite | 12 |
| Direct Chill Casting (DC) Production Rate | Monitor | - | | | | tons/mo | Monthly | Calculated | |
| DC Discharge Days | Monitor | - | | | | days/mo | Monthly | Calculated | |
| Rod Casting (RC) Production Rate | Monitor | - | | | | tons/mo | Monthly | Calculated | |
| RC Discharge Days | Monitor | - | | | | days/mo | Monthly | Calculated | |

FOOTNOTES: See pages 16 & 17 of this Permit.

# PERMIT LIMITS, LEVELS AND MONITORING

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 01G | Heat Treat contact cooling water and Non-contact cooling water | Internal (to Outfalls 01A & 001) | 06/01/2018 | 05/31/2023 |

| PARAMETER | MINIMUM | MAXIMUM | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FOOTNOTES (FN) |
|---|---|---|---|---|---|---|
| pH | 7.0 | 10.0 | SU | 2x/month | Grab | |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | | | | | | |
| Flow | Monitor | Monitor | | | GPD | Weekly | Totalizer | |
| Solids, Total Suspended | 11 | 23 | | | lbs/d | Monthly | 24hr.comp. | 14 |
| Solids, Total Suspended | 13 | 27 | | | lbs/d | Monthly | 24hr.comp. | 15 |
| Oil & Grease | 6.8 | 11 | | | lbs/d | Monthly | Grab | 14 |
| Oil & Grease | 7.9 | 13 | | | lbs/d | Monthly | Grab | 15 |
| Aluminum, Total | 0.48 | 0.96 | | | lbs/d | Quarterly | 24hr.comp. | 14 |
| Aluminum, Total | 0.56 | 1.1 | | | lbs/d | Quarterly | 24hr.comp. | 15 |
| Chromium, Total | 0.027 | 0.066 | | | lbs/d | Quarterly | 24hr.comp. | 14 |
| Chromium, Total | 0.032 | 0.077 | | | lbs/d | Quarterly | 24hr.comp. | 15 |
| Cyanide, Total | 0.018 | 0.043 | | | lbs/d | Quarterly | 24hr.comp. | 10, 14, 16 |
| Cyanide, Total | 0.021 | 0.050 | | | lbs/d | Quarterly | 24hr.comp. | 10, 15, 16 |
| Zinc, Total | 0.092 | 0.22 | | | lbs/d | Quarterly | 24hr.comp. | 14 |
| Zinc, Total | 0.11 | 0.25 | | | lbs/d | Quarterly | 24hr.comp. | 15 |
| Production Rate | Monitor | - | | | tons/mo | Monthly | Calculated | |
| Discharge Days | Monitor | - | | | days/mo | Monthly | Calculated | |

FOOTNOTES: See pages 16 & 17 of this Permit.

# PERMIT LIMITS, LEVELS AND MONITORING

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 01H | Extrusion Core wastewater and Solution Heat Treat wastewater | Internal (to Outfalls 01A & 001) | 06/01/2018 | 05/31/2023 |

| PARAMETER | MINIMUM | MAXIMUM | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FOOTNOTES (FN) |
|---|---|---|---|---|---|---|
| pH | 7.0 | 10.0 | SU | 2x/month | Grab | |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | | | | | | |
| Flow | Monitor | Monitor | | | GPD | Weekly | Totalizer | |
| Solids, Total Suspended | 5.3 | 11 | | | lbs/d | Monthly | 24hr.comp. | 14 |
| Solids, Total Suspended | 6.4 | 13 | | | lbs/d | Monthly | 24hr.comp. | 15 |
| Oil & Grease | 3.3 | 5.5 | | | lbs/d | Monthly | Grab | 14 |
| Oil & Grease | 3.9 | 6.6 | | | lbs/d | Monthly | Grab | 15 |
| Aluminum, Total | 0.31 | 0.62 | | | lbs/d | Quarterly | 24hr.comp. | 14 |
| Aluminum, Total | 0.37 | 0.75 | | | lbs/d | Quarterly | 24hr.comp. | 15 |
| Chromium, Total | 0.018 | 0.043 | | | lbs/d | Quarterly | 24hr.comp. | 14 |
| Chromium, Total | 0.021 | 0.051 | | | lbs/d | Quarterly | 24hr.comp. | 15 |
| Cyanide, Total | 0.012 | 0.028 | | | lbs/d | Quarterly | 24hr.comp. | 10, 14, 16 |
| Cyanide, Total | 0.014 | 0.034 | | | lbs/d | Quarterly | 24hr.comp. | 10, 15, 16 |
| Zinc, Total | 0.060 | 0.14 | | | lbs/d | Quarterly | 24hr.comp. | 14 |
| Zinc, Total | 0.072 | 0.17 | | | lbs/d | Quarterly | 24hr.comp. | 15 |
| Production Rate | Monitor | - | | | tons/mo | Monthly | Calculated | |
| Discharge Days | Monitor | - | | | days/mo | Monthly | Calculated | |

FOOTNOTES: See pages 16 & 17 of this Permit.

## PERMIT LIMITS, LEVELS AND MONITORING

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 003 | Bldg. 401 Underdrain Groundwater and Area III Stormwater runoff | Massena Power Canal | 06/01/2018 | 05/31/2023 |

| PARAMETER | MINIMUM | MAXIMUM | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FOOTNOTES (FN) |
|---|---|---|---|---|---|---|
| pH | 6.0 | 9.0 | SU | 2x/week | Grab | |
| Temperature | Monitor | 90 | °F | Weekly | Grab | |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | | | | | | | |
| Flow | Monitor | Monitor | | | | GPD | Continuous | Recorder | 5 |
| Solids, Total Suspended | - | 20 | | | | mg/L | Monthly | 4-hr Composite | |
| Solids, Total Dissolved | - | Monitor | | | | mg/L | Monthly | 4-hr Composite | |
| Solids, Settleable | - | 0.1 | | | | mL/L | Monthly | Grab | |
| Oil & Grease | - | 10 | | | | mg/L | Monthly | Grab | |
| Foam (visible) | - | None | | | | Visible | Monthly | Grab | 8 |
| Aluminum, Total | 550 | 2000 | | | | µg/L | 2x/month | 4-hr Composite | |
| Boron, Total | - | - | | | 420 | µg/L | Quarterly | 4-hr Composite | |
| Chlorine, Total Residual | - | - | | | 30 | µg/L | Monthly | Grab | |
| Fluoride, Total | Monitor | Monitor | | | | mg/L | Weekly | 4-hr Composite | |
| Fluoride, Total | Monitor | 100 | | | | lbs/d | Weekly | 4-hr Composite | |
| Iron, Total | - | 1600 | | | | µg/L | Monthly | 4-hr Composite | |
| Zinc, Total | - | 4.0 | | | | lbs/d | Monthly | 4-hr Composite | |
| PCBs, Total | - | 0.00010 | | | | ng/L | | | |
| Aroclor 1242 | | | - | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1248 | | | - | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1254 | | | - | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1260 | | | - | 200 | | ng/L | Monthly | Grab | |
| Whole Effluent Toxicity (WET) Testing: | | | | | | | | | |
| WET - Acute Invertebrate | | | | | 0.3 | TUa | Quarterly | See footnote | 1 |
| WET - Acute Vertebrate | | | | | 0.3 | TUa | Quarterly | See footnote | 1 |
| WET - Chronic Invertebrate | | | | | 4.3 | TUc | Quarterly | See footnote | 1 |
| WET - Chronic Vertebrate | | | | | 4.3 | TUc | Quarterly | See footnote | 1 |

FOOTNOTES: See pages 16 & 17 of this Permit.

# PERMIT LIMITS, LEVELS AND MONITORING

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 004 | Outfall 01G Effluent, Stormwater runoff from Areas I & II & Secure Landfill, and Central Impoundment Effluent (occasional diversion) | Grasse River | 06/01/2018 | 05/31/2023 |

| PARAMETER | MINIMUM | MAXIMUM | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FOOTNOTES (FN) |
|---|---|---|---|---|---|---|
| pH | 6.0 | 9.0 | SU | 2x/week | Grab | |
| Temperature | Monitor | 90 | °F | Weekly | Grab | |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | | | | | | | |
| Flow | Monitor | Monitor | | | | GPD | Continuous | Recorder | |
| Solids, Total Suspended | - | 20 | | | | mg/L | Monthly | 4-hr Composite | |
| Solids, Total Dissolved | - | Monitor | | | | mg/L | Monthly | 4-hr Composite | |
| Oil & Grease | - | 10 | | | | mg/L | Monthly | Grab | |
| Foam (visible) | - | None | | | | Visible | Monthly | Grab | 8 |
| Aluminum, Total | 2000 | 4000 | | | | µg/L | Monthly | 4-hr Composite | |
| Boron, Total | - | - | | | 140 | µg/L | Quarterly | 4-hr Composite | |
| Cyanide, Total | 80 | 200 | | | | µg/L | Weekly | Grab | |
| Fluoride, Total | 250 | 440 | | | | lbs/d | 2x/month | 4-hr Composite | |
| Iron, Total | - | 15 | | | | lbs/d | Monthly | 4-hr Composite | |
| Zinc, Total | - | 5.0 | | | | lbs/d | Monthly | 4-hr Composite | |
| Chloroform | - | 20 | | | | µg/L | Monthly | Grab | |
| Trichloroethene | - | 10 | | | | µg/L | Monthly | Grab | |
| PCBs, Total | - | 0.00010 | | | | ng/L | | | |
| Aroclor 1242 | | | - | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1248 | | | - | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1254 | | | - | 200 | | ng/L | Monthly | Grab | |
| Aroclor 1260 | | | - | 200 | | ng/L | Monthly | Grab | |

FOOTNOTES: See pages 16 & 17 of this Permit.

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 004 | Outfall 01G Effluent, Stormwater runoff from Areas I & II & Secure Landfill, and Central Impoundment Effluent (occasional diversion) | Grasse River | 06/01/2018 | 05/31/2023 |

| Whole Effluent Toxicity (WET) Testing: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| WET - Acute Invertebrate | | | | 6.1 | TUa | Quarterly | See footnote | 1 |
| WET - Acute Vertebrate | | | | 6.1 | TUa | Quarterly | See footnote | 1 |
| WET - Chronic Invertebrate | | | | 40 | TUc | Quarterly | See footnote | 1 |
| WET - Chronic Vertebrate | | | | 40 | TUc | Quarterly | See footnote | 1 |

FOOTNOTES: See pages 16 & 17 of this Permit.

# PERMIT LIMITS, LEVELS AND MONITORING

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 008 | Stormwater | Robinson Creek | 06/01/2018 | 05/31/2023 |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | | | | | | |
| Flow | Monitor | Monitor | | | GPD | Continuous | Recorder | 5 |
| Fluoride, Total | - | 4300 | | | µg/L | Monthly | 4-hr Composite | |
| Whole Effluent Toxicity (WET) Testing: | | | | | | | | |
| WET - Acute Invertebrate | | | | 0.3 | TUa | Quarterly | See footnote | 1 |
| WET - Acute Vertebrate | | | | 0.3 | TUa | Quarterly | See footnote | 1 |
| WET - Chronic Invertebrate | | | | 1.0 | TUc | Quarterly | See footnote | 1 |
| WET - Chronic Vertebrate | | | | 1.0 | TUc | Quarterly | See footnote | 1 |

| OUTFALL | WASTEWATER TYPE | RECEIVING WATER | EFFECTIVE | EXPIRING |
|---|---|---|---|---|
| 009 | Water Intake | N/A | 06/01/2018 | 05/31/2023 |

| PARAMETER | EFFLUENT LIMIT or CALCULATED LEVEL | | COMPLIANCE LEVEL/ ML | ACTION LEVEL | UNITS | SAMPLE FREQUENCY | SAMPLE TYPE | FN |
|---|---|---|---|---|---|---|---|---|
| | Monthly Avg | Daily Max | | | | | | |
| Flow | 6.0 | Monitor | | | MGD | Weekly | Calculated | 6 |
| Temperature | Monitor | Monitor | | | °F | Weekly | Grab | |
| Precipitation (as rain) | Monitor | Monitor | | | Inches | Daily | 24hr. Comp. | 7 |

FOOTNOTES: See pages 16 & 17 of this Permit.

# FOOTNOTES

1. **Whole Effluent Toxicity (WET) Testing:**

   Testing Requirements - WET testing shall consist of **Chronic only**. WET testing shall be performed in accordance with 40 CFR Part 136 and TOGS 1.3.2 unless prior written approval has been obtained from the Department. The test species shall be *Ceriodaphnia dubia* (water flea - invertebrate) and *Pimephales promelas* (fathead minnow - vertebrate). Receiving water collected upstream from the discharge should be used for dilution. All tests conducted should be static-renewal (two 24 hr composite samples with one renewal for Acute tests and three 24-hr composite samples with two renewals for Chronic tests). The appropriate dilution series bracketing the IWC and including one exposure group of 100% effluent should be used to generate a definitive test endpoint, otherwise an immediate rerun of the test is required. WET testing shall be coordinated with the monitoring of chemical and physical parameters limited by this permit so that the resulting analyses are also representative of the sample used for WET testing. The ratios of critical receiving water flow to discharge flow (i.e. dilution ratio) are:

   Outfall 001: 9.6:1 for acute, and 18:1 for chronic
   Outfall 003: 2.6:1 for acute, and 4.3:1 for chronic
   Outfall 004: 20:1 for acute, and 40:1 for chronic
   Outfall 008: 1:1 for acute, and 1:1 for chronic

   Discharges which are disinfected using chlorine should be dechlorinated prior to WET testing or samples shall be taken immediately prior to the chlorination system.

   Monitoring Period - WET testing shall be performed at the specified sample frequency during calendar years ending in 0 and 5 .

   Reporting - Toxicity Units shall be calculated and reported on the DMR as follows: TUa = (100)/(48 hr LC50) or (100)/(48 hr EC50) (note that Acute data is generated by both Acute and Chronic testing) and TUc = (100)/(NOEC) when Chronic testing has been performed or TUc = (TUa) x (10) when only Acute testing has been performed and is used to predict Chronic test results, where the 48 hr LC50 or 48 hr EC50 and NOEC are expressed in % effluent. This must be done for both species and using the Most Sensitive Endpoint (MSE) or the lowest NOEC and corresponding highest TUc. Report a TUa of 0.3 if there is no statistically significant toxicity in 100% effluent as compared to control.

   The complete test report including all corresponding results, statistical analyses, reference toxicity data, daily average flow at the time of sampling and other appropriate supporting documentation, shall be submitted within 60 days following the end of each test period to the Toxicity Testing Unit, Bureau of Watershed Assessment and Management, 625 Broadway, Fourth Floor, Albany, NY 12233-3502. A summary page of the test results for the invertebrate and vertebrate species indicating TUa, 48 hr LC50 or 48 hr EC50 for Acute tests and/or TUc, NOEC, IC25, and most sensitive endpoints for Chronic tests, should also be included at the beginning of the test report.

   WET Testing Action Level Exceedances - If an action level is exceeded then the Department may require the permittee to conduct additional WET testing including Acute and/or Chronic tests. Additionally, the permittee may be required to perform a Toxicity Reduction Evaluation (TRE) in accordance with Department guidance. If such additional testing or performance of a TRE is necessary, the permittee shall be notified in writing by the Regional Water Engineer. The written notification shall include the reason(s) why such testing or a TRE is required.

2. For compliance purposes, if one or more individual constituents exceeds the permitted level for a sampling event, it will constitute one permit limit exceedance.

3. Disinfection and fecal coliform requirements only apply during the period May 1 to October 31 each year.

4. The Outfall 01E flow shall not exceed 7200 GPM for a period of more than 15 consecutive minutes.

5. Effluent monitoring is not required at Outfalls 003 and 008 when the flow rate is less than 5 GPM or 1000 GPD discharged.

6. It is intended that this limit apply to all water intake flows except cogeneration facility use. Compliance monitoring shall be performed at the Arconic water intake. During periods when the intake water temperature exceeds 20°C the permittee may exceed the 6.0 MGD limit to the extent necessary to provide essential cooling of product.

7. As an alternative to installing and maintaining a precipitation monitoring gauge, the permittee may utilize data collected by the National Weather Service station at the Massena International Airport.

8. If foam is observed in accordance with Special Condition F, then the permit limit has been exceeded.
9. The permittee shall sample Outfall 01A at a frequency of twice per week, following application of Hydrothol 191 (endothall), until two consecutive results are below 0.05 mg/l. Sampling for endothall must occur at the time of maximum anticipated

discharge of endothall at the affected outfall. The analytical method for endothall must comply with the manufacturer's recommended protocol. Pesticide (Hydrothol 191) shall not be used later than November 15.

10. Per 40 CFR 467.03(a), quarterly analyses for Total Cyanide, required under 40 CFR Part 122 or 403, are not required when both of the following conditions are met:

    a. The first wastewater sample of each calendar year has been analyzed and found to contain less than 0.07 mg/L Total Cyanide; AND
    b. The owner or operator of the aluminum forming plant certifies, in writing to the permit issuing authority, that Cyanide is not and will not be used in the aluminum forming process.

    Written certification of Cyanide disuse, under Condition (2) shall be submitted to both the Regional Water Engineer and the Bureau of Water Permits.

11. Diversion of PPA Groundwater to the CI is not be allowed under winter conditions (ice formed on the surface of the CI). Diversion of PPA Groundwater to the Central Impoundment (CI) shall be in accordance with the NYSDEC, Division of Environmental Remediation approved pumping schedule. Prior to commencement of a change in pumping schedule, notification shall be made to the Regional Water Engineer.

12. Discharge of this pollutant is not allowed. When performing analysis, any "non-detected" measurements shall be considered zeroes (0) for the purposes of compliance with 40 CFR 421.23.

13. Quarters shall be: March 1 – May 31, June 1 – August 31, September 1 – November 31, December 1 – February 28/29.

14. This pollutant has a Tiered effluent limit, based upon process production rate. This is Tier 1, which shall apply under the following conditions:

    a. Outfall 01E: Tier 1 limits shall be effective for months when Direct Chill Casting (DC) Production Rate is reported as 7,700 tons/mo, or less.
    b. Outfall 01G: Tier 1 limits shall be effective for months when Production Rate is reported as 1,100 tons/mo, or less.
    c. Outfall 01H: Tier 1 limits shall be effective for months when Production Rate is reported as 1,500 tons/mo, or less.

15. This pollutant has a Tiered effluent limit, based on process production rate. This is Tier 2, which shall apply under the following conditions:
    a. Outfall 01E: Tier 2 limits shall be effective for months when Direct Chill Casting (DC) Production Rate is reported as more than 7,700 tons/mo.
    b. Outfall 01G: Tier 2 limits shall be effective for months when Production Rate is reported as more than 1,100 tons/mo.
    c. Outfall 01H: Tier 2 limits shall be effective for months when Production Rate is reported as more than 1,500 tons/mo.

16. The composite sample shall be a laboratory composite, comprised of individual grab-type aliquots taken in accordance with Special Condition C of this permit.

# SPECIAL CONDITIONS AND DEFINITIONS

The following special conditions and definitions apply to all activities regulated by this permit.

A. The permittee must report both concentration (in mg/l, ug/l, ng/l, or pg/l) and mass loading (in lbs/day) on the periodic Discharge Monitoring Reports for all parameters except flow, pH, temperature, settleable solids and fecal coliform.

B. All requirements of the approved miscellaneous wastewater plan must be complied with, including the requirement to attach monthly summaries of treated wastewaters to the corresponding DMR.

C. All 24-hour composite samples must be flow proportional. All 4-hour composite samples must be time proportional.

D. Flow Monitoring:
   a. Continuous recorder - A flow measurement system that continuously measures and displays the instantaneous flow rate, and records the cumulative discharge volume versus time on paper and/or electronically.
   b. Totalizer - A flow measurement system that records the cumulative discharge volume on a mechanical meter and may or may not continuously measure and display the instantaneous flow rate. An example of a totalizer is typical household water meter.

E. Approvable is defined as that which can be approved by the Department with only minimal revision. Minimal revision shall mean revised and resubmitted to the Department within thirty days of notification by the Department of revisions that are necessary. All approvable engineering submissions must include the seal and signature of an engineer licensed to practice in New York State.

F. Visible Foam Analytical Method Procedure:
   1) Fill one (1) 500 mL narrow mouth bottle (glass or plastic) with effluent water to be tested.
   2) Upon return to the lab, fill a 1000 mL Wheaton narrow mouth glass sample bottle to the 200mL mark with effluent from the 500mL bottle.
   3) Place the bottle with 200 mL of sample in a constant-temperature bath for a minimum of 1 hour and a maximum of 2 hours at 25 ± 1°C (77 ± 1.8°F).
   4) Measure the temperature of the sample and adjust to 25 ± 1°C (77 ± 1.8°F) if necessary.
   5) Remove the sample from the constant-temperature bath.
   6) Vigorously shake the sample bottle using a minimum of an 8-inch stroke and 40 shakes in less than 10 seconds.
   7) After completing 40 shakes, start a timer and allow the bottle to stand undisturbed.
   8) If any foam remains after 60 seconds, the sample will be noted as containing visible foam. If no foam remains after 60 seconds the sample will be noted as not containing visible foam.

# SPECIAL CONDITIONS – INDUSTRY BEST MANAGEMENT PRACTICES

1. **General** - The permittee shall develop, maintain, and implement a Best Management Practices (BMP) plan to prevent releases of significant amounts of pollutants to the waters of the State through plant site runoff; spillage and leaks; sludge or waste disposal; and stormwater discharges including, but not limited to, drainage from raw material storage. The BMP plan shall be documented in narrative form and shall include the 13 minimum BMPs and any necessary plot plans, drawings, or maps. Other documents already prepared for the facility such as a Safety Manual or a Spill Prevention, Control and Countermeasure (SPCC) plan may be used as part of the plan and may be incorporated by reference. A copy of the current BMP plan shall be submitted to the Department as required in item (2.) below and a copy must be maintained at the facility and shall be available to authorized Department representatives upon request.

2. **Compliance Deadlines** – An updated BMP plan shall be submitted **BY 12/01/2018** to the Regional Water Engineer. The BMP plan shall be implemented within 6 months of submission, unless a different time frame is approved by the Department. The BMP plan **shall be reviewed annually** and shall be modified whenever (a) changes at the facility materially increase the potential for releases of pollutants; (b) actual releases indicate the plan is inadequate, or (c) a letter from the Department identifies inadequacies in the plan. The permittee shall certify in writing, as an attachment to the December Discharge Monitoring Report (DMR), that the annual review has been completed. All BMP plan revisions (with the exception of SWPPPs - see item (5.) below) must be submitted to the Regional Water Engineer within 30 days. Note that the permittee is not required to obtain Department approval of the BMP plan (or of any SWPPPs) unless notified otherwise. Subsequent modifications to or renewal of this permit does not reset or revise these deadlines unless a new deadline is set explicitly by such permit modification or renewal.

3. **Facility Review** - The permittee shall review all facility components or systems (including but not limited to material storage areas; in-plant transfer, process, and material handling areas; loading and unloading operations; storm water, erosion, and sediment control measures; process emergency control systems; and sludge and waste disposal areas) where materials or pollutants are used, manufactured, stored or handled to evaluate the potential for the release of pollutants to the waters of the State. In performing such an evaluation, the permittee shall consider such factors as the probability of equipment failure or improper operation, cross-contamination of storm water by process materials, settlement of facility air emissions, the effects of natural phenomena such as freezing temperatures and precipitation, fires, and the facility's history of spills and leaks. The relative toxicity of the pollutant shall be considered in determining the significance of potential releases. The review shall address all substances present at the facility that are identified in Tables 6-10 of SPDES application Form NY-2C (available at http://www.dec.ny.gov/docs/permits_ej_operations_pdf/form2c.pdf ) or that are required to be monitored for by the SPDES permit. **Particular attention shall be given to the following substance(s): PCBs, PAHs, VOCs, Cyanide, Fluoride, and Metals.**

4. **13 Minimum BMPs:** Whenever the potential for a release of pollutants to State waters is determined to be present, the permittee shall identify BMPs that have been established to prevent or minimize such potential releases. Where BMPs are inadequate or absent, appropriate BMPs shall be established. In selecting appropriate BMPs, the permittee shall consider good industry practices and, where appropriate, structural measures such as secondary containment and erosion/sediment control devices and practices. USEPA guidance for development of stormwater elements of the BMP is available in *Developing Your Stormwater Pollution Prevention Plan A Guide for Industrial Operators*, February 2009, EPA 833-B-09-002. As a minimum, the plan shall include the following BMPs:

   1. BMP Pollution Prevention Team
   2. Reporting of BMP Incidents
   3. Risk Identification & Assessment
   4. Employee Training
   5. Inspections and Records
   6. Security
   7. Preventive Maintenance
   8. Good Housekeeping
   9. Materials/Waste Handling, Storage, & Compatibility
   10. Spill Prevention & Response
   11. Erosion & Sediment Control
   12. Management of Runoff
   13. Street Sweeping

   Note that for some facilities, especially those with few employees, some of the above BMPs may not be applicable. It is acceptable in these cases to indicate “Not Applicable” for the portion(s) of the BMP Plan that do not apply to your facility, along with an explanation.

## SPECIAL CONDITIONS – INDUSTRY BEST MANAGEMENT PRACTICES (continued)

5. **Stormwater Pollution Prevention Plans (SWPPPs) Required for Discharges of Stormwater From Construction Activity to Surface Waters** - As part of BMP #11, a SWPPP shall be developed prior to the initiation of any site disturbance of one acre or more of uncontaminated area. Uncontaminated area means soils or groundwater which are free of contamination by any toxic or non-conventional pollutants identified in Tables 6-10 of SPDES application Form NY-2C. Disturbance of any size contaminated area(s) and the resulting discharge of contaminated stormwater is not authorized by this permit unless the discharge is under State or Federal oversight as part of a remedial program or after review by the Regional Water Engineer; nor is such discharge authorized by any SPDES general permit for stormwater discharges. SWPPPs are not required for discharges of stormwater from construction activity to groundwater. The SWPPP shall conform to the *New York Standards and Specifications for Erosion and Sediment Control* and *New York State Stormwater Management Design Manual,* unless a variance has been obtained from the Regional Water Engineer, and to any local requirements. The permittee shall submit a copy of the SWPPP and any amendments thereto to the local governing body and any other authorized agency having jurisdiction or regulatory control over the construction activity **at least 30 days prior to soil disturbance**. The SWPPP shall also be submitted to the Regional Water Engineer if contamination, as defined above, is involved and the permittee must obtain a determination of any SPDES permit modifications and/or additional treatment which may be required prior to soil disturbance. Otherwise, the SWPPP shall be submitted to the Department only upon request. When a SWPPP is required, a properly completed *Notice of Intent* (NOI) form shall be submitted (available at www.dec.ny.gov/chemical/43133.html) prior to soil disturbance. Note that submission of a NOI is required for informational purposes; the permittee is not eligible for and will not obtain coverage under any SPDES general permit for stormwater discharges, nor are any additional permit fees incurred. SWPPPs must be developed and submitted for subsequent site disturbances in accordance with the above requirements. The permittee is responsible for ensuring that the provisions of each SWPPP are properly implemented.

6. **Required Sampling For "Hot Spot" Identification** - Development of the BMP plan shall include sampling of waste stream segments for the purpose of pollutant "hot spot" identification. The economic achievability of effluent limits will not be considered until plant site "hot spot" sources have been identified, contained, removed or minimized through the imposition of site specific BMPs or application of internal facility treatment technology. For the purposes of this permit condition a "hot spot" is a segment of an industrial facility (including but not limited to soil, equipment, material storage areas, sewer lines etc.) which contributes elevated levels of problem pollutants to the wastewater and/or stormwater collection system of that facility. For the purposes of this definition, problem pollutants are substances for which treatment to meet a water quality or technology requirement may, considering the results of waste stream segment sampling, be deemed unreasonable. For the purposes of this definition, an elevated level is a concentration or mass loading of the pollutant in question which is sufficiently higher than the concentration of that same pollutant at the compliance monitoring location so as to allow for an economically justifiable removal and/or isolation of the segment and/or B.A.T. treatment of wastewaters emanating from the segment.

7. **Facilities with Petroleum and/or Chemical Bulk Storage (PBS and CBS) Areas** - Compliance must be maintained with all applicable regulations including those involving releases, registration, handling and storage (6NYCRR 595-599 and 612-614). Stormwater discharges from handling and storage areas should be eliminated where practical.

   A. Spill Cleanup - All spilled or leaked substances must be removed from secondary containment systems as soon as practical and for CBS storage areas within 24 hours, unless written authorization is received from the Department. The containment system must be thoroughly cleaned to remove any residual contamination which could cause contamination of stormwater and the resulting discharge of pollutants to waters of the State. Following spill cleanup the affected area must be completely flushed with clean water three times and the water removed after each flushing for proper disposal in an on-site or off-site wastewater treatment plant designed to treat such water and permitted to discharge such wastewater. Alternately, the permittee may test the first batch of stormwater following the spill cleanup to determine discharge acceptability. If the water contains no pollutants it may be discharged. Otherwise it must be disposed of as noted above. See *Discharge Monitoring* below for the list of parameters to be sampled for.

   B. Discharge Operation - Stormwater must be removed before it compromises the required containment system capacity. Each discharge may only proceed with the prior approval of the permittee staff person responsible for ensuring SPDES permit compliance. Bulk storage secondary containment drainage systems must be locked in a closed position except when the operator is in the process of draining accumulated stormwater. Transfer area secondary containment drainage systems must be locked in a closed position during all transfers and must not be reopened unless the transfer area is clean of contaminants. Stormwater discharges from secondary containment systems should be avoided during periods of precipitation. A logbook shall be maintained on site noting the date, time and personnel supervising each discharge.

   C. Discharge Screening - Prior to each discharge from a secondary containment system the stormwater must be screened for contamination*. All stormwater must be inspected for visible evidence of contamination. Additional screening methods shall be developed by the permittee as part of the overall BMP Plan, e.g. the use of volatile gas meters to detect the presence of gross levels of gasoline or volatile organic compounds. If the screening indicates contamination, the permittee must collect

and analyze a representative sample** of the stormwater. If the water contains no pollutants it may be discharged. Otherwise it must either be disposed of in an onsite or off site wastewater treatment plant designed to treat and permitted to discharge such wastewater or the Regional Water Engineer can be contacted to determine if it may be discharged without treatment.

D. Discharge Monitoring - Unless the discharge from any bulk storage containment system outlet is identified in the SPDES permit as an outfall with explicit effluent and monitoring requirements, the permittee shall monitor the outlet as follows:

(i) *Bulk Storage Secondary Containment Systems:*

(a) The volume of each discharge from each outlet must be monitored. Discharge volume may be calculated by measuring the depth of water within the containment area times the wetted area converted to gallons or by other suitable methods. A representative sample shall be collected of the first discharge* following any cleaned up spill or leak. The sample must be analyzed for pH, the substance(s) stored within the containment area and any other pollutants the permittee knows or has reason to believe are present**.

(b) Every fourth discharge* from each outlet must be sampled for pH, the substance(s) stored within the containment area and any other pollutants the permittee knows or has reason to believe are present**.

(ii) *Transfer Area Secondary Containment Systems:*

The first discharge* following any spill or leak must be sampled for flow, pH, the substance(s) transferred in that area and any other pollutants the permittee knows or has reason to believe are present**.

E. Discharge Reporting - Any results of monitoring required above, excluding screening data, must be submitted to the Department by appending them to the corresponding DMR. Failure to perform the required discharge monitoring and reporting shall constitute a violation of the terms of the SPDES permit.

F. Prohibited Discharges - **In all cases, any discharge which contains a visible sheen, foam, or odor, or may cause or contribute to a violation of water quality is prohibited.** The following discharges are prohibited unless specifically authorized elsewhere in this SPDES permit: spills or leaks, tank bottoms, maintenance wastewaters, wash waters where detergents or other chemicals have been used, tank hydrotest and ballast waters, contained firefighting runoff, fire training water contaminated by contact with pollutants or containing foam or fire-retardant additives, and unnecessary discharges of water or wastewater into secondary containment systems.

* Discharge includes stormwater discharges and snow and ice removal. If applicable, a representative sample of snow and/or ice should be collected and allowed to melt prior to assessment.

** If the stored substance is gasoline or aviation fuel then sample for oil & grease, benzene, ethylbenzene, naphthalene, toluene and total xylenes (EPA method 602). If the stored substance is kerosene, diesel fuel, fuel oil, or lubricating oil then sample for oil & grease and polynuclear aromatic hydrocarbons (PAHs, EPA method 610). If the substance(s) are listed in Tables 6-8 of SPDES application form NY-2C then sampling is required. If the substance(s) are listed in NY-2C Tables 9-10 sampling for appropriate indicator parameters may be required, e.g. BOD5 or toxicity testing. Contact the facility inspector for further guidance. In all cases flow and pH monitoring is required.

# PCB MINIMIZATION PROGRAM – Industrial Facilities

1. **General** - The permittee shall develop, implement, and maintain a Polychlorinated Biphenyl Minimization Program (PCBMP) for those outfalls which have effluent limits for PCBs (including Aroclors). The PCBMP is required because the 200 nanograms/liter (ng/L) permit limit per PCB Aroclor exceeds the water quality based effluent limit (WQBEL) of 0.001 ng/L for Total PCBs. The goal of the PCBMP is to reduce PCB effluent levels in pursuit of the WQBEL. The basis for the 200 ng/L per Aroclor limit is the EPA Method 608 analytical Minimum Level for Aroclors.

2. **PCBMP Elements** - The PCBMP shall be documented in narrative form and shall include any necessary drawings or maps. Other related documents already prepared for the facility may be used as part of the PCBMP and may be incorporated by reference. As a minimum, the PCBMP shall include an on-going program consisting of: periodic monitoring; an acceptable control strategy which will become enforceable under this permit; and, submission of periodic status reports.

A. Monitoring - The permittee shall conduct periodic monitoring designed to quantify and, over time, track the reduction of PCBs. Wastewater treatment plant influents and effluents, and other outfalls shall be monitored using a congener specific analysis method* at a minimum frequency of quarterly. Key locations in the wastewater and/or stormwater collection systems, and known or potential PCB sources, including raw materials as appropriate, shall be monitored using a congener specific analysis method* at a minimum frequency of semi-annually. EPA Method 608 may be used in place of a congener specific analysis method* for the above monitoring when Method 608 sample results are greater than 200 ng/l. If PCB samples are analyzed using EPA Method 608, at least two (2) volumes of sample must be collected from that location to allow for congener specific analysis* if the Method 608 sample results are less than 200 ng/l.

SPDES permit limit compliance monitoring shall be performed at the frequency specified on the permit limits page(s) using Method 608. Results from congener specific analysis required under this PCBMP shall not be used for determining compliance with the 200 ng/L Aroclor permit limits. Additional monitoring must be completed as may be required elsewhere in this permit or upon Department request. Monitoring shall be coordinated so that the results can be effectively: compared between locations; compared between analytical methods; used to identify PCB sources; and, used to gauge the effectiveness of PCB reduction and control efforts.

* The permittee shall use a congener specific analysis method to measure and quantify Total PCBs. The congener specific analysis method must achieve a median PCB analytical Minimum Level of less than or equal to 1.0 ng/L for all congeners and/or congener peaks assessed. "Total PCBs" shall be calculated as the sum of all detections at or above the Minimum Level. A separate sum of "Estimated PCBs" detected at or above the Method Detection Limit and below the Minimum Level shall also be determined. Current methodologies approved by the Department for congener specific PCB analyses are as follows:

1. **Method 1668C** - Method 1668, Revision C: Chlorinated Biphenyl Congeners in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS. EPA-820-R-10-005, Office of Water, U.S. Environmental Protection Agency, Washington, D.C. (2010).

2. **mGBM** - "The Modified Green Bay Mass Balance Method" as detailed in the following publication: Palmer P.M., Wilson L.R., Casey A.C. and Wagner R.E. (2011) - Occurrence of PCBs in raw and finished drinking water at seven public water systems along the Hudson River. Environ. Monit. Assess. 175 (1-4), pp. 487-499.

3. **Modified SW-846 8082A** – Modified versions of Method 8082A may be used provided they meet the 1.0 ng/L sensitivity requirement above, use all 209 congeners for calibration, and can quantify at least 126 individual congeners. SW-846, Method 8082A, Revision 1: Polychlorinated Biphenyls (PCBs) by Gas Chromatography (U.S. Environmental Protection Agency, Washington, DC, 2007).

4. **Method 8270sim/680/NOAA** - Polychlorinated Biphenyls by GC-ECD, low resolution mass spectrometry. Method can accurately identify and quantify all 209 congeners with reporting limit of 0.5 ng/L (1.0 ng/L for co-eluters). 187 individual congeners can be reported. SW-846, Method 8270, EPA Method 680 and NOAA (National Oceanic and Atmospheric Association) Technical Memorandum NMFS-NWFSC-59, March 2004.

The permittee may request, and the Department may optionally approve, alternate methods for congener specific PCB analyses provided the alternate method is demonstrated to be equivalent or superior to one of the above methods.

B. Control Strategy - An acceptable control strategy is required for reducing PCB discharges via cost-effective measures, which may include, but are not limited to, source identification, best management practices, more stringent control of tributary waste streams, remediation, and/or installation of new or improved treatment facilities. Required monitoring shall also be used, and supplemented as appropriate, to determine the most effective way to operate the wastewater treatment system(s) to ensure

effective removal of PCBs while maintaining compliance with other permit requirements.

C. Annual Status Report - An annual status report shall be submitted to the Regional Water Engineer and to the Bureau of Water Permits, 625 Broadway, Albany, N.Y. 12233-3505, summarizing: (a) all PCBMP monitoring results for the previous year; (b) a list of known and potential PCB sources; (c) all action undertaken pursuant to the strategy during the previous year; (d) actions planned for the upcoming year; and, (e) progress toward the goal. The first annual status report is due one year after the permit is modified to include the PCBMP requirement and follow-up status reports are due annually thereafter. A file shall be maintained containing all PCBMP documentation which shall be available for review by NYSDEC representatives. Copies shall be provided upon request.

3. **PCBMP Modification** - The PCBMP shall be reviewed, and if necessary modified, whenever: (a) changes at the facility or within the collection system(s) increase the potential for PCB discharges; (b) new information is discovered concerning the source, nature, or extent of any PCB source(s) and/or discharges from the facility; (c) actual discharges contain detectable Aroclors as measured with EPA Method 608. The PCBMP shall be modified whenever a letter from the Department identifies inadequacies in the PCBMP or pursuant to a permit modification.

# POLLUTANT MINIMIZATION PROGRAM – BENZO(A)PYRENE

1. General – The permittee shall develop, maintain, and implement a Pollutant Minimization Program (PMP). The PMP is required because the calculated water quality based effluent limit (WQBEL) of **1.2 ng/L** for **Benzo(a)pyrene** is below the permit limit (quantification level) of **90 ng/L** using EPA Method **610**. The goal of this PMP will be to meet the calculated WQBEL. **By 06/01/2019**, the completed, approvable PMP plan shall be submitted to the Regional Water Engineer and to the Bureau of Water Permits for approval. Subsequent modifications or renewal of this permit does not reset or revise this deadline unless a new deadline is set explicitly by such a permit modification or renewal.

2. PMP Elements – The PMP plan shall be documented in narrative form and shall include any necessary plot plans, drawings, or maps. Other documents already prepared for the facility, such as a Best Management Practices Plan, may be used as part of the plan and may be incorporated by reference. At a minimum, the PMP plan shall include:

A. An on-going potential source identification, evaluation, and prioritization program.

B. Periodic monitoring designed to quantify and, over time, track the reduction of discharges of the substance(s) noted above. Minimum required monitoring is as follows: quarterly monitoring of wastewater treatment system influent(s), sludge(s), effluent(s), and outfall(s) which are known or suspected of containing the pollutant; and, semi-annual monitoring of potential sources except during the first year which shall be quarterly. This monitoring shall be performed using EPA Method 610 and shall be coordinated with routine compliance monitoring, if applicable, so that the results can be compared. Additional monitoring must be completed as may be required elsewhere in this permit.

C. An approvable schedule for submission of an approvable control strategy for reducing pollutant discharges via cost-effective control measures, including but not limited to site treatment or remediation. The schedule for submission of a control strategy will become enforceable under this permit. The control strategy and the schedule for implementation of the control strategy will also become enforceable under this permit.

D. Treatment System Operation – The periodic monitoring required in item (2B) and elsewhere in this permit shall also be used, and supplemented if appropriate, to determine the most effective way to operate the wastewater treatment system(s) to ensure the greatest removal of the pollutant. For example, monitoring data may indicate that greater pollutant removals are achieved when the system(s) are operated below certain hydraulic loading thresholds.

E. An approvable annual report shall be prepared and submitted to the Regional Water Engineer and to the Bureau of Water Permits, 625 Broadway, Albany, N.Y. 12233-3505, by February 1 of each year. This report shall summarize all pollutant monitoring data; for treatment systems include a mass balance comparison of influent, effluent, and sludge levels; a list of known or potential pollutant sources; all control measures implemented during the previous calendar year; monitoring, investigations, and control measures to be completed during the current calendar year; and document progress toward the goal of achieving the calculated WQBEL.

3. PMP Modification – The PMP plan shall be modified whenever: (a) changes at the facility increase the potential for discharge of the pollutant, (b) actual discharges indicate the plan is inadequate, or (c) a letter from the Department identifies inadequacies in the PMP plan.

4. The PMP plan shall achieve a minimum of two (2) years of consecutive non-detect analyses of the pollutant **WITHIN 5 YEARS OF 06/01/2018**. Failure to achieve this reduction shall constitute a permit violation. Reductions shall continue, beyond the minimum requirement, in pursuit of the calculated WQBEL.

# BIOLOGICAL MONITORING REQUIREMENTS

All submissions under this section should provide:
Two (2) paper and one (1) electronic copy to the Energy Unit Leader[1];
One (1) paper and one (1) electronic copy to DEC Regional Water Engineer; and
One (1) copy of the cover letter to the DEC Division of Water Bureau of Water Compliance[2]

## Impingement Mortality and Entrainment Characterization Study

1. Within three (3) months of the Effective Date of the Permit (09/01/2018), the permittee must submit an approvable plan for an *Impingement Mortality and Entrainment Study* at the Arconic water intake. The study plan must include: (1) standard operating procedures and methods for all data collection and analyses; (2) a schedule for implementation; and (3) a schedule for the submittals of an interim progress report and final report. At a minimum, the final report must include:

    a. A taxonomic identification of all fish documented to frequent the St. Lawrence River in the vicinity of the Arconic intake structure and natural life history information on each of these species.

    b. An overall estimate of the number of fish impinged and entrained at current operating conditions, and at calculation baseline conditions. For each flow scenario, estimates shall be presented in total numbers of organisms, identified to species, or lowest practical taxon. Estimates for each taxonomic group shall also be subdivided by life stage.

In addition, the *Impingement Mortality and Entrainment Characterization Study* must be generally consistent with the following guidelines:

a. Impingement Abundance Monitoring
    i. Duration - two years.
    ii. Intensity - At a minimum, one continuous 24-hour collection will be made in every, seven-day calendar period for a continuous 24- month period. The collections will be scheduled to take place within the first two days of each period so that the remainder of the period is available for an alternate collection, should intake operation or equipment malfunction and prevent impingement collection on the day initially scheduled. If for any reasons, a collection cannot be made within a given seven-day period, the subsequent collection shall proceed as scheduled. If more than 1,000 fish are collected in 24-hours of sampling, an additional 24-hour collection will be initiated within 72 hours.
    iii. Traveling screens shall be washed until they are clean prior to the start of the 24-hour collection period.
    iv. Total water withdrawal shall be recorded on a daily basis, tabulated and included as an appendix in the final report.
    v. Collection efficiency, that is, the ability of sampling to recover marked fish released in front of the traveling screens and downstream of the trash racks, shall be determined quarterly for each major species. Major species are defined as those occurring at greater than 10% abundance, and species of important recreational or commercial fishing interest.
    vi. The final report shall include a chapter on the facility and site description. In the description of the facility's operation, there will be a completed description of the intake system including the number of traveling screens, dimensions, type, mesh size, standard operating procedures, screen wash water sluice configuration and disposition of the screen washings, and the nature and estimated quantities of debris collected at this facility.
    vii. Water quality measurements will be taken in conjunction with the impingement sampling program. Measurements will include salinity, pH, and dissolved oxygen.
    viii. Every 6 months the permittee shall submit a status report describing the sampling activities that took place during the prior 6 months, and any events that affected sampling efforts.
    viiii. The final report shall include a summary table that includes estimates of the total numbers of fish impinged, by species and lifestage (*e.g.*, juvenile or adult), for the study period based upon (1) continuous operation of all pumps at full rated flow and (2) actual operational and flow data for the study period. The information must be submitted in tabular, graphic, and electronic (Excel or similar) formats.

b. Entrainment Abundance Monitoring
    i. Duration - two years.

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[1] Energy Unit Leader, NYSDEC, Bureau of Habitat, 625 Broadway 5th Floor, Albany, NY 12233-4756

[2] Department of Environmental Conservation Division of Water, Bureau of Water Compliance
625 Broadway, Albany, New York 12233-3506

ii. Intensity - At a minimum, one continuous 24-hour collection will be made in every seven-day calendar period during the dates of likely entrainment. The collections will be scheduled to take place within the first two days of each period so that the remainder of the period is available for an alternate collection, should intake operation or equipment malfunction and prevent entrainment collection on the day initially scheduled. If for any reasons, a collection cannot be made within a given seven-day period, the subsequent collection shall proceed as scheduled.

iii. All samples will be analyzed for all ichthyoplankton and juvenile fish species.

iv. Proposed methods for data analysis, sample processing, quality control, quality assurance, and splitting will be described in the scope of work submitted for DEC approval.

v. Every 6 months the permittee shall submit a status report describing the sampling activities that took place during the prior 6 months, and any events that affected sampling efforts.

vi. The report shall include a summary table that includes estimates of the total numbers of fish and selected invertebrates entrained, by species and life stage, for the study period based upon (1) continuous operation of all pumps at full rated flow and (2) actual operational and flow data for the study period. The information must be submitted in tabular, graphic, and electronic (Excel or similar) formats.

Once approved by the Department, the permittee must conduct the *Impingement Mortality and Entrainment Characterization Study* according to the approved schedule.

## Design and Construction Technology Review

2. Within six (6) months after the Department's approval of the *Impingement Mortality and Entrainment Study* final report, the permittee must submit an approvable *Design and Construction Technology Review* that includes:

a. An analysis of all feasible technologies and/or operational measures capable of being installed and implemented at the Arconic intake. For each feasible alternative include:

i. A detailed description of the alternative (including preliminary drawings and site maps, if appropriate);

ii. A discussion of the engineering feasibility of the alternative;

iii. An assessment of the mitigative benefits in reducing impingement mortality and entrainment abundance for all life stages of fish shellfish, through utilization of the alternative;

iv. A breakdown of all applicable costs including costs associated with capital improvements, operation and maintenance, and construction downtime;

v. An estimate of the time required to implement the alternative; and

vi. An evaluation of any adverse environmental impacts to aquatic biota, habitat, or water quality that may result from construction, installation, and use of the alternative.

3. Within 1 month of the Department's approval of the *Design and Construction Technology Review*, the permittee must submit, for Department review and consideration, a proposed suite of technologies or operational measures that meets the requirements of 6 NYCRR Part 704.5, and Section 316(b) of the Clean Water Act:

a. Alone, or in combination, these technologies or operational measures meet the standard of § 704.5 to *minimize* impingement mortality and entrainment of fish at the Arconic intake structure.

b. The reductions in impingement mortality and entrainment resulting from the proposed technologies and/or operational measures must meet the performance goals of Commissioner Policy #52.

NOTE: Based on this and other relevant information, the Department will select technologies and/or operational measures that meet the requirements of 6 NYCRR Part 704.5, Section 316(b) CWA, and the performance goals of Department Policy #CP-52 and will modify this SPDES permit to require the use of these selected technologies and/or operational measures.

## Technology Installation and Operation Plan

4. Within 3 months of the effective date of the permit modification requiring technologies and/or operational measures to meet requirements of 6 NYCRR Part 704.5 and Section 316(b) of the Clean Water Act, the permittee must submit an approvable *Technology Installation and Operation Plan*. This plan must include:

   a. A schedule for installing and implementing the technologies and/or operational measures selected to meet requirements of 6 NYCRR Part 704.5 and Section 316(b) of the Clean Water Act; and

   b. The methodology for assessing the efficacy of these technologies and operational measures.

## Verification Monitoring Plan

5. Within 3 months of Department approval of the *Technology Installation and Operation Plan*, the permittee must submit an approvable *Verification Monitoring Plan*. This plan must include details of procedures to confirm that the necessary reductions in impingement and entrainment required by this permit are being achieved, and must include the following:

   a. At a minimum, two years of in-plant impingement and entrainment monitoring to verify the full-scale performance of BTA measures.

   b. A description of the frequency and duration of monitoring, the parameters to be monitored, and the basis for determining the parameters and the frequency and duration for monitoring.

   c. A schedule of implementation.

   d. A draft proposed Standard Operation Procedure (SOP) that describes the sampling protocols for these monitoring studies.

   The plan and SOP must be updated as required by the Department. Upon receipt of Department approval, the permittee must complete the *Verification Monitoring Plan* in accordance with the approved schedule. The *Verification Monitoring Plan* and approved schedule will become an enforceable condition of this SPDES permit.

6. Within 6 months of the completion of the *Verification Monitoring Plan* the permittee must submit an approvable report to the Energy Unit Leader that demonstrates compliance with 6 NYCRR Part 704.5 and Section 316(b) of the Clean Water Act.

## Additional Reporting Requirements

7. The permittee must maintain records of all data, reports and analysis pertaining to compliance with 6 NYCRR Part 704.5 and Section 316(b) of the Clean Water Act for a period no less than 10 years from the Effective Date of the Permit.

8. Six (6) months prior to the expiration date of this permit, the permittee must submit a report that includes a description and detailed analysis of the cumulative reductions in impingement and entrainment achieved during the first four years of this permit modification.

## General Requirement

9. Modification of the facility cooling water intake must not occur without prior Department approval. The permittee must submit written notification, including detailed descriptions and plans, to the NYS DEC Energy Unit; the Director of the Bureau of Water Compliance Program; and both the Regional Permit Administrator and the Regional Water Engineer, Region 6, at least 60 days prior to any proposed change which would result in the alteration of the permitted operation, location, design, construction or capacity of the cooling water intake structure. The permittee must submit with the written notification a demonstration that the change reflects the best technology available for minimizing adverse environmental impacts pursuant to 6 NYCRR Part 704.5 and Section 316(b) of the Clean Water Act. As determined by NYS DEC, a permit modification application in accordance with 6 NYCRR Part 621 may be required.

# DISCHARGE NOTIFICATION REQUIREMENTS

(a) Except as provided in (c) and (g) of these Discharge Notification Act requirements, the permittee shall install and maintain identification signs at all outfalls to surface waters listed in this permit. Such signs shall be installed before initiation of any discharge.

(b) Subsequent modifications to or renewal of this permit does not reset or revise the deadline set forth in (a) above, unless a new deadline is set explicitly by such permit modification or renewal.

(c) The Discharge Notification Requirements described herein do not apply to outfalls from which the discharge is composed exclusively of storm water, or discharges to ground water.

(d) The sign(s) shall be conspicuous, legible and in as close proximity to the point of discharge as is reasonably possible while ensuring the maximum visibility from the surface water and shore. The signs shall be installed in such a manner to pose minimal hazard to navigation, bathing or other water related activities. If the public has access to the water from the land in the vicinity of the outfall, an identical sign shall be posted to be visible from the direction approaching the surface water.

The signs shall have **minimum** dimensions of eighteen inches by twenty-four inches (18" x 24") and shall have white letters on a green background and contain the following information:

**N.Y.S. PERMITTED DISCHARGE POINT**

**SPDES PERMIT No.: NY_____**

**OUTFALL No. :____**

For information about this permitted discharge contact:

Permittee Name: _____

Permittee Contact: _____

Permittee Phone: ( ) - ### - ####

OR:

NYSDEC Division of Water Regional Office Address:

NYSDEC Division of Water Regional Phone: ( ) - ### -####

(e) For each discharge required to have a sign in accordance with a), the permittee shall, concurrent with the installation of the sign, provide a repository of copies of the Discharge Monitoring Reports (DMRs), as required by the **RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS** page of this permit. This repository shall be open to the public, at a minimum, during normal daytime business hours. The repository may be at the business office repository of the permittee or at an off-premises location of its choice (such location shall be the village, town, city or county clerk's office, the local library or other location as approved by the Department). In accordance with the **RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS** page of your permit, each DMR shall be maintained on record for a period of five years

(f) The permittee shall periodically inspect the outfall identification sign(s) in order to ensure they are maintained, are still visible, and contain information that is current and factually correct. Signs that are damaged or incorrect shall be replaced within 3 months of inspection.

# DISCHARGE NOTIFICATION REQUIREMENTS (continued)

(g) All requirements of the Discharge Notification Act, including public repository requirements, are waived for any outfall meeting any of the following circumstances, provided Department notification is made in accordance with (h) below:

(i) such sign would be inconsistent with any other state or federal statute;

(ii) the Discharge Notification Requirements contained herein would require that such sign could only be located in an area that is damaged by ice or flooding due to a one-year storm or storms of less severity;

(iii) instances in which the outfall to the receiving water is located on private or government property which is restricted to the public through fencing, patrolling, or other control mechanisms. Property which is posted only, without additional control mechanisms, does not qualify for this provision;

(iv) instances where the outfall pipe or channel discharges to another outfall pipe or channel, before discharge to a receiving water; or

(v) instances in which the discharge from the outfall is located in the receiving water, two-hundred or more feet from the shoreline of the receiving water.

(h) If the permittee believes that any outfall which discharges wastewater from the permitted facility meets any of the waiver criteria listed in (g) above, notification (form enclosed) must be made to the Department's Bureau of Water Permits, 625 Broadway, Albany, N.Y. 12233-3505, of such fact, and, provided there is no objection by the Department, a sign and DMR repository for the involved outfall(s) are not required. This notification must include the facility's name, address, telephone number, contact, permit number, outfall number(s), and reason why such outfall(s) is waived from the requirements of discharge notification. The Department may evaluate the applicability of a waiver at any time, and take appropriate measures to assure that the ECL and associated regulations are complied with.

# SCHEDULE OF COMPLIANCE

a) The permittee shall comply with the following schedule:

| Outfall(s) | Parameter(s) Affected | Interim Effluent Limit(s) | Compliance Action | Due Date |
|---|---|---|---|---|
| 001 | Benzo(a)pyrene | N/A | In accordance with the B(a)P Minimization Program requirements, the permittee shall demonstrate a minimum of two (2) years of consecutive, non-detect analyses for B(a)P. | 06/01/2023 |
| **The above compliance actions are one-time requirements. The permittee shall comply with the above compliance actions to the Department's satisfaction once. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT," the permittee is not required to repeat the submission(s) noted above. The above due dates are independent from the effective date of the permit stated in the "SPDES NOTICE/RENEWAL APPLICATION/PERMIT" letter.** | | | | |

b) For any action where the compliance date is greater than 9 months past the previous compliance due date, the permittee shall submit interim progress reports to the Department every nine (9) months until the due date for these compliance items are met.

c) The permittee shall submit a written notice of compliance or non-compliance with each of the above schedule dates no later than 14 days following each elapsed date, unless conditions require more immediate notice as prescribed in 6 NYCRR Part 750-1.2(a) and 750-2. All such compliance or non-compliance notification shall be sent to the locations listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS. Each notice of non-compliance shall include the following information:

1. A short description of the non-compliance;
2. A description of any actions taken or proposed by the permittee to comply with the elapsed schedule requirements without further delay and to limit environmental impact associated with the non-compliance;
3. A description or any factors which tend to explain or mitigate the non-compliance; and
4. An estimate of the date the permittee will comply with the elapsed schedule requirement and an assessment of the probability that the permittee will meet the next scheduled requirement on time.

d) The permittee shall submit copies of any document required by the above schedule of compliance to the NYSDEC Regional Water Engineer at the location listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS and to the Bureau of Water Permits, 625 Broadway, Albany, N.Y. 12233-3505, unless otherwise specified in this permit or in writing by the Department.

# SCHEDULE OF SUBMITTALS

a) The permittee shall submit the following information to the Regional Water Engineer at the address listed on the Recording, Reporting and Monitoring page of this Permit, and to the Bureau of Water Permits, 625 Broadway, Albany NY 12233-3505:

| Outfall(s) | Parameter(s) Affected | Required Action | Due Date |
|---|---|---|---|
| N/A | N/A | The permittee shall submit to the Department an updated BMP Plan. | 12/01/2018 |
| N/A | N/A | The permittee shall submit to the Department, a PCB Minimization Program Annual Status Report, in accordance with the PCBMP. | 06/01/2019, Annually thereafter |
| N/A | N/A | The permittee shall submit to the Department, an approvable Minimization Program Plan for Benzo(a)pyrene [B(a)P]. | 06/01/2019 |
| N/A | N/A | The permittee shall submit to the Department, an approvable annual report for the B(a)P MP. | February 1, 2020, Annually thereafter |
| 01A | Flow, pH, Total Cyanide, Free Cyanide, Total Iron | Following diversion of the PPA Groundwater to the CI, the permittee shall conduct an Intensive Verification Monitoring Plan, in accordance with the *PPA Groundwater to Central Impoundment Pilot Study Report, 2017*. Monitoring shall be required for a minimum of the first three months following diversion. Results shall be tabulated and submitted to the Department within 30 days of conclusion of the monitoring plan. | Conclusion of Monitoring + 30 Days |
| 01F, 03A, & 007 | All | The permittee shall submit to the Department, a written outfall and treatment system closure plan for each outfall and subsequent treatment systems. | 12/01/2018 |
| 01F, 03A, & 007 | All | Within fourteen (14) calendar days following closure of the outfalls and/or treatment systems, the permittee shall notify the Department in writing, indicating the outfall has been closed in accordance with 6 NYCRR Part 750. A site inspection from NYSDEC may be required to confirm closure. | Date of Closure + 14 Days |

b) Unless noted otherwise, the above actions are one-time requirements. The permittee shall submit the results of the above actions to the satisfaction of the Department. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT", the permittee is not required to repeat the above submittal(s), unless noted otherwise. The above due dates are independent from the effective date of the permit stated in the letter of "SPDES NOTICE/RENEWAL APPLICATION/PERMIT."

# SCHEDULE OF SUBMITTALS – BTA REQUIREMENTS

All submissions under this section should be provided to (see Page 24 for addresses):
Two (2) paper and one (1) electronic copy to the Energy Unit Leader;
One (1) paper and one (1) electronic copy to DEC Regional Water Engineer; and
One (1) copy of the cover letter to the DEC Division of Water Bureau of Water Compliance

| Outfall(s) | Parameter(s) Affected | Required Action | Due Date |
|---|---|---|---|
| Intake | N/A | Submit an approvable Impingement and Entrainment Study (I&E) Plan | 09/01/2018 |
| Intake | N/A | Submit an approvable Design and Construction Technology Review (DCTR) | Submittal of I&E Report + 6 Months |
| Intake | N/A | Submit a proposed suite of technologies or operational measures for Department review and consideration | DCTR Approval + 1 Month |
| Intake | N/A | Submit an approvable Technology Installation and Operation Plan (TIOP) | 09/01/2018 |
| Intake | N/A | Submit an approvable Verification Monitoring Plan (VMP) | TIOP Approval + 3 Months |
| Intake | N/A | Submit an approvable report to the Energy Unit Leader that demonstrates compliance with 6 NYCRR Part 704.5 and 316(b) of the Clean Water Act | VMP Approval + 6 Months |
| Intake | N/A | Submit report on cumulative reductions in impingement and entrainment. | 12/01/2022 |

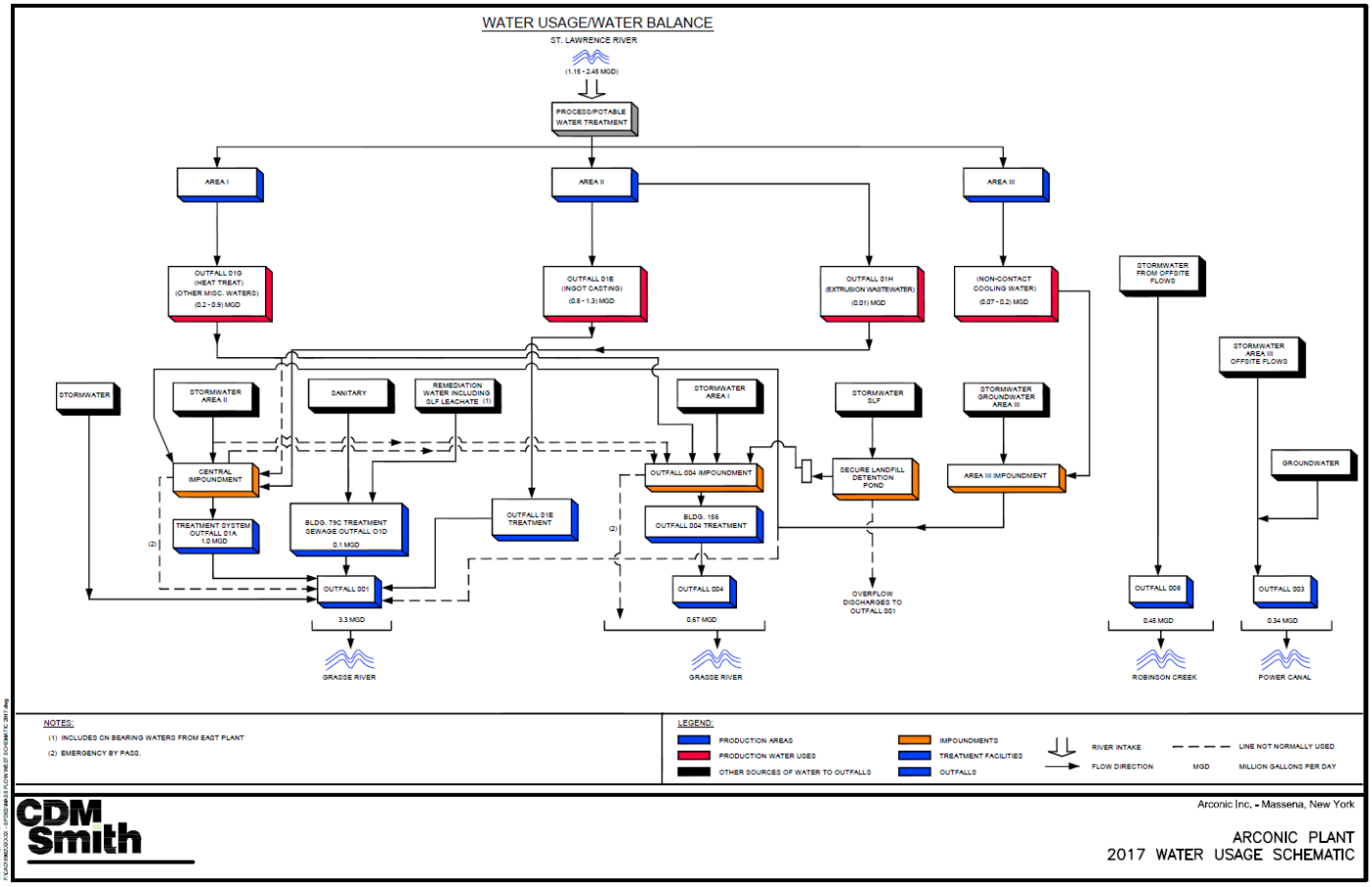
*From the suite of technologies and/or operational measures submitted for review, the Department will select technologies and/or operational measures that meet the requirements of 6NYCRR Part 704 Part 704.5 and Section 316(b) of the Clean Water Act. Subsequent to these selections the Department will modify this permit.

a) Unless noted otherwise, the above actions are one-time requirements. The permittee shall submit the results of the above actions to the satisfaction of the Department. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT", the permittee is not required to repeat the above submittal(s), unless noted otherwise. The above due dates are independent from the effective date of the permit stated in the letter of "SPDES NOTICE/RENEWAL APPLICATION/PERMIT."

# MONITORING LOCATIONS

The permittee shall take samples and measurements, to comply with the monitoring requirements specified in this permit, at the locations(s) specified below:

Outfall 001 - immediately prior to its confluence with the Grasse River.
Outfall 01A - the effluent from the final carbon unit.
Outfall 01D - carbon treated effluent, sampled at the weir box.
Outfall 01E - prior to combination with other 001 wastewaters.
Outfall 01G - prior to combination with other 001 wastewaters.
Outfall 01H - prior to combination with other 001 wastewaters.
Outfall 003 – sampling hut in place at 44.954813º N, 74.906293º W, before entering the culvert under Pontoon Bridge Rd.
Outfall 004 - at the discharge weir.
Outfall 008 - Robinson Creek, prior to leaving the site.
Outfall 009 – at the intake pump station.



# GENERAL REQUIREMENTS

A. The regulations in 6 NYCRR Part 750 are hereby incorporated by reference and the conditions are enforceable requirements under this permit. The permittee shall comply with all requirements set forth in this permit and with all the applicable requirements of 6 NYCRR Part 750 incorporated into this permit by reference, including but not limited to the regulations in paragraphs B through H as follows:

B. General Conditions

| | | |
|---|---|---|
| 1. | Duty to comply | 6 NYCRR 750-2.1(e) & 2.4 |
| 2. | Duty to reapply | 6 NYCRR 750-1.16(a) |
| 3. | Need to halt or reduce activity not a defense | 6 NYCRR 750-2.1(g) |
| 4. | Duty to mitigate | 6 NYCRR 750-2.7(f) |
| 5. | Permit actions | 6 NYCRR 750-1.1(c), 1.18, 1.20 & 2.1(h) |
| 6. | Property rights | 6 NYCRR 750-2.2(b) |
| 7. | Duty to provide information | 6 NYCRR 750-2.1(i) |
| 8. | Inspection and entry | 6 NYCRR 750-2.1(a) & 2.3 |

C. Operation and Maintenance

| | | |
|---|---|---|
| 1. | Proper Operation & Maintenance | 6 NYCRR 750-2.8 |
| 2. | Bypass | 6 NYCRR 750-1.2(a)(17), 2.8(b) & 2.7 |
| 3. | Upset | 6 NYCRR 750-1.2(a)(94) & 2.8(c) |

D. Monitoring and Records

| | | |
|---|---|---|
| 1. | Monitoring and records | 6 NYCRR 750-2.5(a)(2), 2.5(a)(6), 2.5(c)(1), 2.5(c)(2), & 2.5(d) |
| 2. | Signatory requirements | 6 NYCRR 750-1.8 & 2.5(b) |

E. Reporting Requirements

| | | |
|---|---|---|
| 1. | Reporting requirements for non-POTWs | 6 NYCRR 750-2.5, 2.6, 2.7, &1.17 |
| 2. | Anticipated noncompliance | 6 NYCRR 750-2.7(a) |
| 3. | Transfers | 6 NYCRR 750-1.17 |
| 4. | Monitoring reports | 6 NYCRR 750-2.5(e) |
| 5. | Compliance schedules | 6 NYCRR 750-1.14(d) |
| 6. | 24-hour reporting | 6 NYCRR 750-2.7(c) & (d) |
| 7. | Other noncompliance | 6 NYCRR 750-2.7(e) |
| 8. | Other information | 6 NYCRR 750-2.1(f) |

F. Sludge Management
The permittee shall comply with all applicable requirements of 6 NYCRR Part 360.

G. SPDES Permit Program Fee
The permittee shall pay to the Department an annual SPDES permit program fee within 30 days of the date of the first invoice, unless otherwise directed by the Department, and shall comply with all applicable requirements of ECL 72-0602 and 6 NYCRR Parts 480, 481 and 485. Note that if there is inconsistency between the fees specified in ECL 72-0602 and 6 NYCRR Part 485, the ECL 72-0602 fees govern.

H. Water Treatment Chemicals (WTCs)
New or increased use and discharge of a WTC requires prior Department review and authorization. At a minimum, the permittee must notify the Department in writing of its intent to change WTC use by submitting a completed *WTC Notification Form* for each proposed WTC. The Department will review that submittal and determine if a SPDES permit modification is necessary or whether WTC review and authorization may proceed outside of the formal permit administrative process. The majority of WTC authorizations do not require SPDES permit modification. In any event, use and discharge of a WTC shall not proceed without prior authorization from the Department. Examples of WTCs include biocides, coagulants, conditioners, corrosion inhibitors, defoamers, deposit control agents, flocculants, scale inhibitors, sequestrants, and settling aids.

1. WTC use shall not exceed the rate explicitly authorized by this permit or otherwise authorized in writing by the Department.
2. The permittee shall maintain a logbook of all WTC use, noting for each WTC the date, time, exact location, and amount of each dosage, and, the name of the individual applying or measuring the chemical. The logbook must also document that adequate process controls are in place to ensure that excessive levels of WTCs are not used.
3. The permittee shall submit a completed WTC Annual Report Form each year that they use and discharge WTCs. This form shall be attached to either the December DMR or the annual monitoring report required below.

The *WTC Notification Form and WTC Annual Report Form* are available from the Department's website at:
http://www.dec.ny.gov/permits/93245.html

# RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

A. The monitoring information required by this permit shall be retained for a period of at least five years from the date of the sampling for subsequent inspection by the Department or its designated agent.

B. The monitoring information required by this permit shall be summarized and reported by submitting:

Discharge Monitoring Reports (DMRs): Completed DMR forms shall be submitted for each 1 month reporting period in accordance with the DMR Manual available on Department's website.

DMRs must be submitted electronically using the electronic reporting tool (NetDMR) specified by NYSDEC. Instructions on the use of NetDMR are available in the DMR Manual. Attach the monthly "Wastewater Facility Operation Report" (form 92-15-7) and any required DMR attachments electronically to the DMR.

To submit via hard copy: Hard copy paper DMRs will only be accepted by the Department if a waiver from the electronic submittal requirements has been granted by DEC to the facility. DMRs shall be sent to:

Department of Environmental Conservation
Division of Water, Bureau of Water Compliance
625 Broadway, Albany, New York 12233-3506
Phone: (518) 402-8177

With a copy sent to:

Department of Environmental Conservation
Regional Water Engineer, Region 6
State Office Building
Watertown, New York 13601-3787
Phone: (315) 785-2513

The first monitoring period begins on the effective date of this permit, and, unless otherwise required, the reports are due no later than the 28th day of the month following the end of each monitoring period.

C. Bypass and Sewage Pollutant Right to Know Reporting: In accordance with the Sewage Pollutant Right to Know Act (ECL § 17-0826-a), Publicly Owned Treatment Works (POTWs) are required to notify DEC and Department of Health within two hours of discovery of an untreated or partially treated sewage discharge and to notify the public and adjoining municipalities within four hours of discovery. Information regarding reporting and other requirements of this program may be found on the Department's website. In addition, POTWs are required to provide a five-day incident report and supplemental information to the DEC in accordance with Part 750-2.7(d) by utilizing the Department's Non-Compliance Report Form unless waived by DEC on a case-by-case basis.

D. Monitoring and analysis shall be conducted using sufficiently sensitive test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

E. More frequent monitoring of the discharge(s), monitoring point(s), or waters of the State than required by the permit, where analysis is performed by a certified laboratory or where such analysis is not required to be performed by a certified laboratory, shall be included in the calculations and recording of the data on the corresponding DMRs.

F. Calculations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

G. Unless otherwise specified, all information recorded on the DMRs shall be based upon measurements and sampling carried out during the most recently completed reporting period.

H. Any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section 502 of the Public Health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquiries regarding laboratory certification should be directed to the New York State Department of Health, Environmental Laboratory Accreditation Program.

# ATTACHMENT B
# DREDGE CORRIDOR AIR MONITORING STATION GUIDELINES AND TARGET LOCATIONS

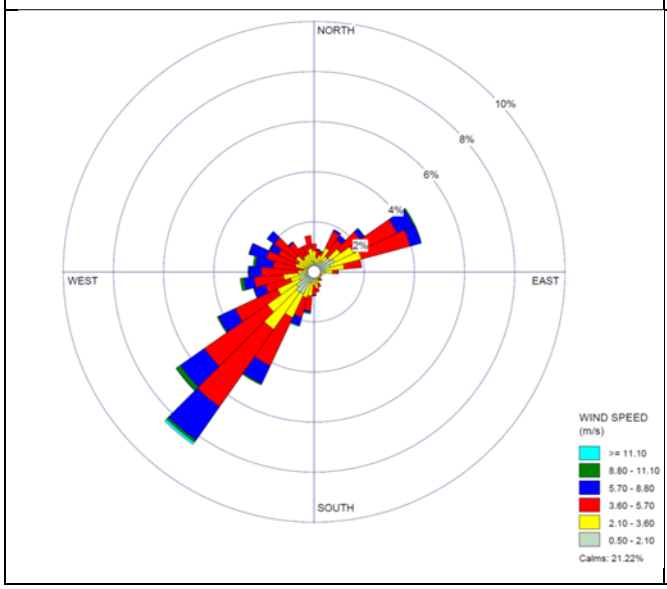
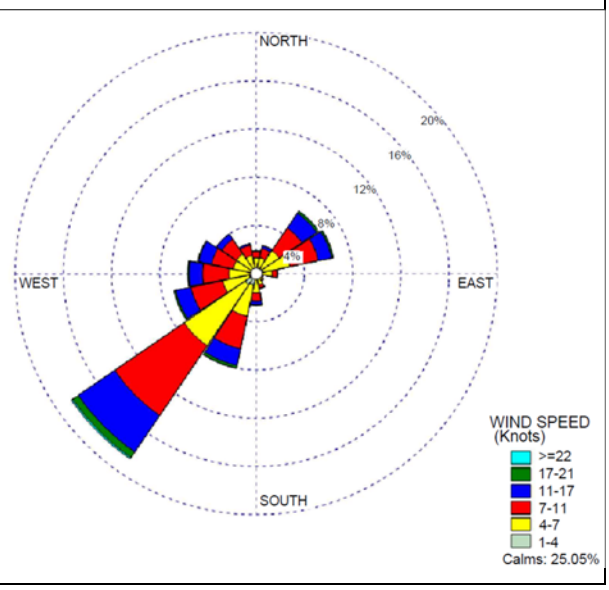
**Grasse River Remediation: Dredge Corridor Air Monitoring Station Guidelines and Target Locations**

As described in the Grasse River Final Design Report (FDR), mobile air monitoring stations will be established surrounding the near shore dredge and floodplain removal areas along the river shoreline (i.e., "dredge corridor"). This memorandum describes the guidelines used to determine where these stations will be located in the dredge corridor in consideration of each of the dredge management units (DMUs) and/or floodplain removal areas. Up to three monitoring stations will be set up along the shoreline between the nearest receptors and dredging/removal activities for each DMU or group of adjacent DMUs. These mobile monitoring stations will be moved as dredging/removal proceeds downstream. Additional details on the dredge corridor air monitoring program are provided in the FDR (see specifically the Community Health and Safety Plan [CHASP] and Environmental Monitoring Plan [EMP]). An evaluation will be performed on the data received throughout implementation, and based on the results, Arconic may work with the Agencies to modify the program (e.g., frequency, locations, etc.).

The following provides the guidelines used to select the air monitoring station locations, in order of priority. These guidelines were developed in consideration of site-specific monitoring requirements as well as the selection criteria used for the Hudson River remediation project (Anchor QEA, May 2012). These guidelines will be used by field personnel to cite actual monitoring locations as shown on the attached figures; however, adjustments may be needed at the time of equipment deployment based on forecasted weather conditions, actual site conditions, property access, etc. as noted below.

- <u>Predominant historic wind direction and receptor locations</u>: The primary guideline considers the predominant historic wind direction and receptor locations (i.e., off-site receptors such as locations where residences, businesses, and off-site workers not directly involved with remedial activities may be present for a reasonable period of time).

  Historic wind data as well as data from last year's construction activities (2018) were evaluated to develop wind roses to determine the predominant wind direction. The wind roses were developed using data from the Massena, Federal Aviation Administration Airport Meteorological Station No. 94725 (station located less than 1.5 mile south of the staging area). The wind roses using 2018 and historical (2010 to 2014) data are provided below.

| May to December 2018 Data | April to October 2010 to 2014 |
|---|---|
|   |   |

Based on this information, as well as site observations, the predominant historic wind direction is from the southwest. The secondary wind directions include from the northeast and northwest. Calm conditions accounted for 20-25% of the data, and wind coming from the southeast was rare. The likely receptor locations were identified using aerial imagery and site-specific knowledge. The target air monitoring station locations were then selected based by evaluating the receptor locations in combination with the predominant historic wind directions. Placement of these portable stations in the field at the time of deployment will also consider forecasted wind directions as possible.

- Surrounding field conditions and environment: The secondary guideline is the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE) criteria regarding ambient particulate sampling systems (Anchor QEA, May 2012). These criteria include the following for positioning the sampler: height of sampler inlet above ground (2 to 15 meters); distance of sampler from trees (greater than 20 meters); distance from sampler to obstacle at least twice the height of the obstacle above the sampler; unrestricted airflow to sampler; roof placement greater than 2 meters from any wall and no nearby flues that may impact sampling; sufficient separation of the sample inlet from roads; and avoidance of locating particulate samplers in unpaved areas unless vegetative cover is present to mitigate impacts of locally dispersed dust. Each of these criteria was considered in selecting the target air monitoring station locations. It may not be possible to comply with all criteria in some areas given topography and land use (e.g., completely wooded area adjacent to a DMU).
- Location of other air monitoring equipment: The third guideline includes consideration of the overall site air monitoring equipment locations and the proximity of the receptors to be protected in the dredge corridor. A number of air monitoring stations will be established for the Route 131 Staging Area (4 stations), Arconic's Secure Landfill (6 stations), and remedial efforts at T1 north (4 additional stations). These stations were reviewed to assess their use to protect adjacent receptors from any potential impacts from the dredge corridor operations.
- Logistical considerations: The fourth guideline is logistical considerations. These considerations include site or area accessibility, safety, security of the equipment, and property ownership and access agreements. All of these considerations will be evaluated in locating the air monitoring stations. Arconic will work to obtain access from private property owners as needed; if access is not granted, the station will either re-located or not established if a suitable alternate area cannot be identified.

These four guidelines were considered in locating the mobile air stations for each of the removal areas and transects. The attached figures illustrate the proposed target locations for the air monitoring stations based on removal areas and/or by river transect (T1 through T72). The station location clusters shown for each DMU or group of adjacent DMUs are independent of shoreline and would be established in each area whether work is being performed on the north shore and/or south shore as applicable. The air monitoring crew will closely coordinate with the contractor/engineering oversight during operations to establish the stations at the necessary locations as work progresses downstream.

Reference:

Anchor QEA, LLC, May 2012. Hudson River PCBs Superfund Site – Phase 2 Remedial Action Monitoring Quality Assurance Project Plan, prepared for General Electric in conjunction with Environmental Standards, Inc.

Grasse River Arconic Portal

FIGURE 1

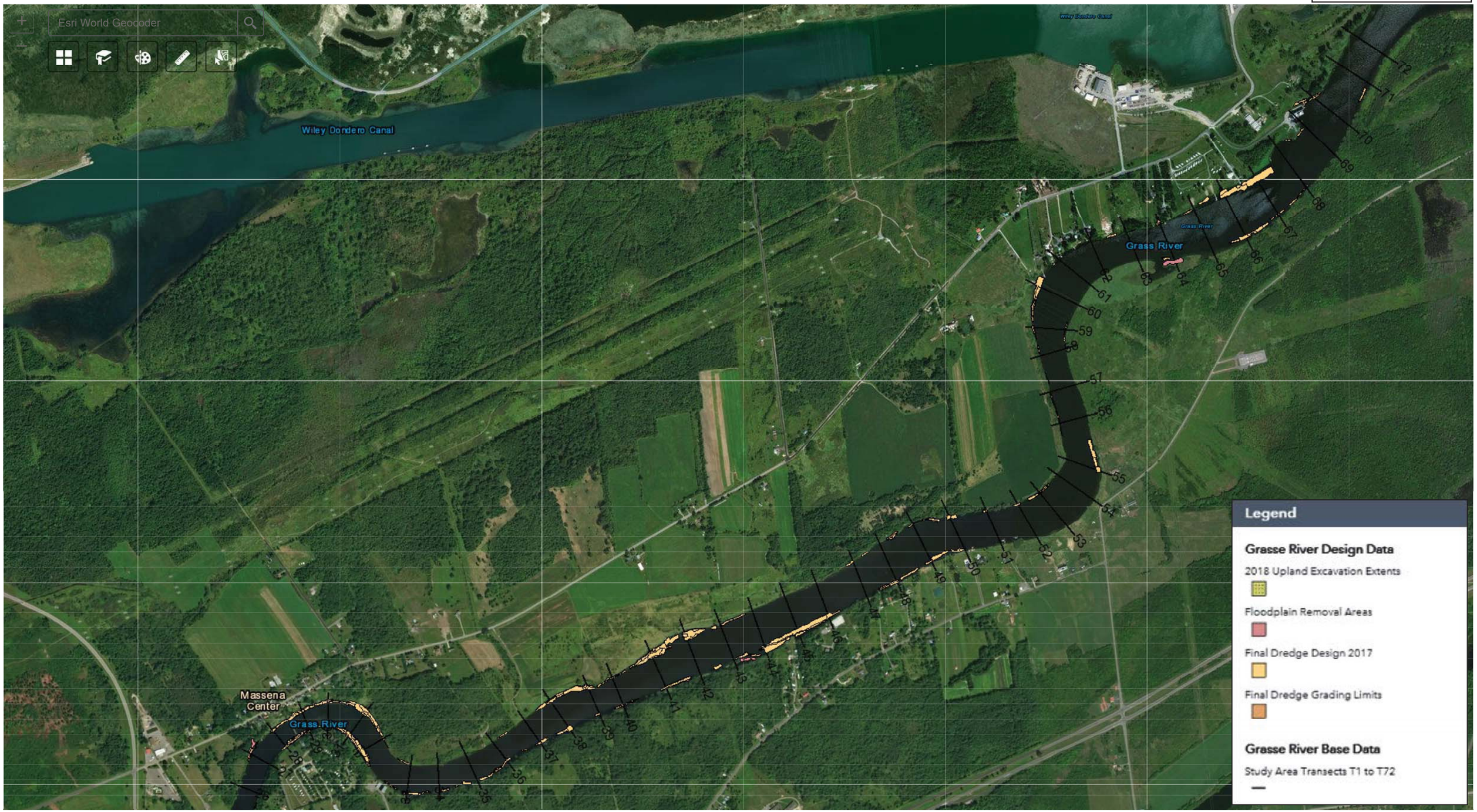
GENERAL VIEW SHOWING DMUs, FP REMOVAL AREAS, AND RECEPTORS

0.2mi
-74.780 44.964 Degrees

N

# FIGURE 2

Grasse River Arconic Portal



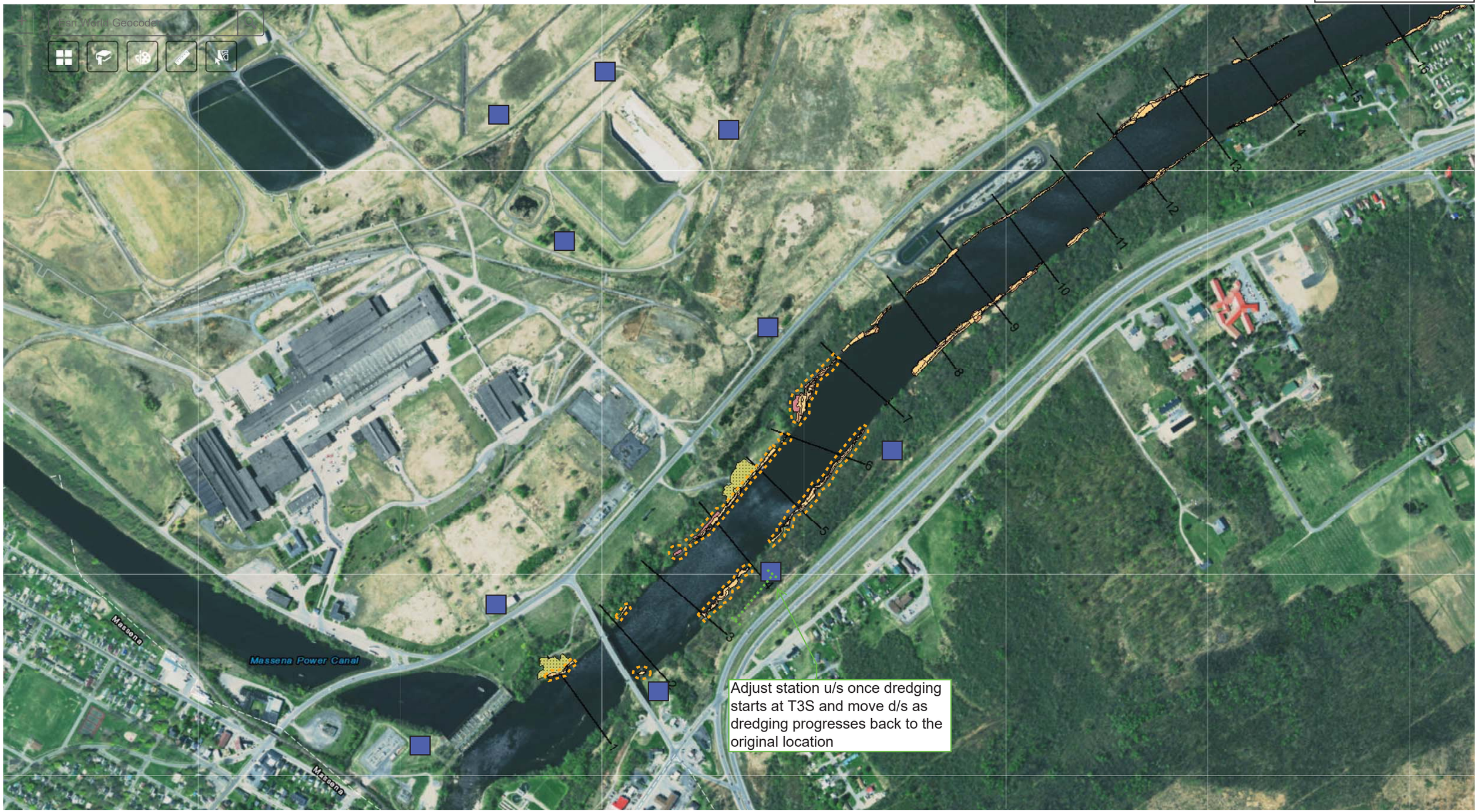

GENERAL VIEW SHOWING DMUs, FP REMOVAL AREAS, AND RECEPTORS

0.2mi
-74.838 44.987 Degrees

N

# FIGURE 3

Grasse River Arconic Portal




600ft

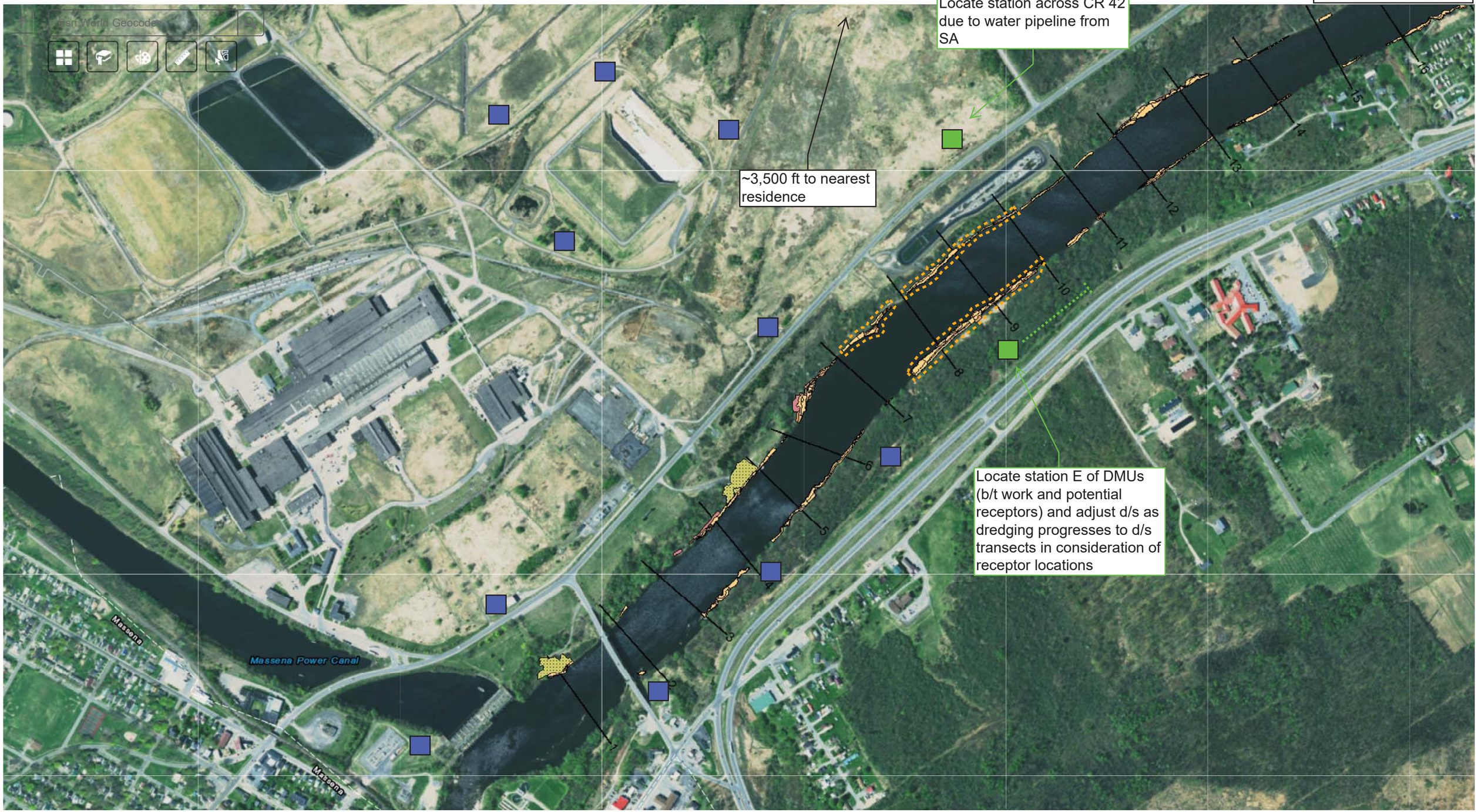
Click the map to get coordinates

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# FIGURE 4

Grasse River Arconic Portal




600ft

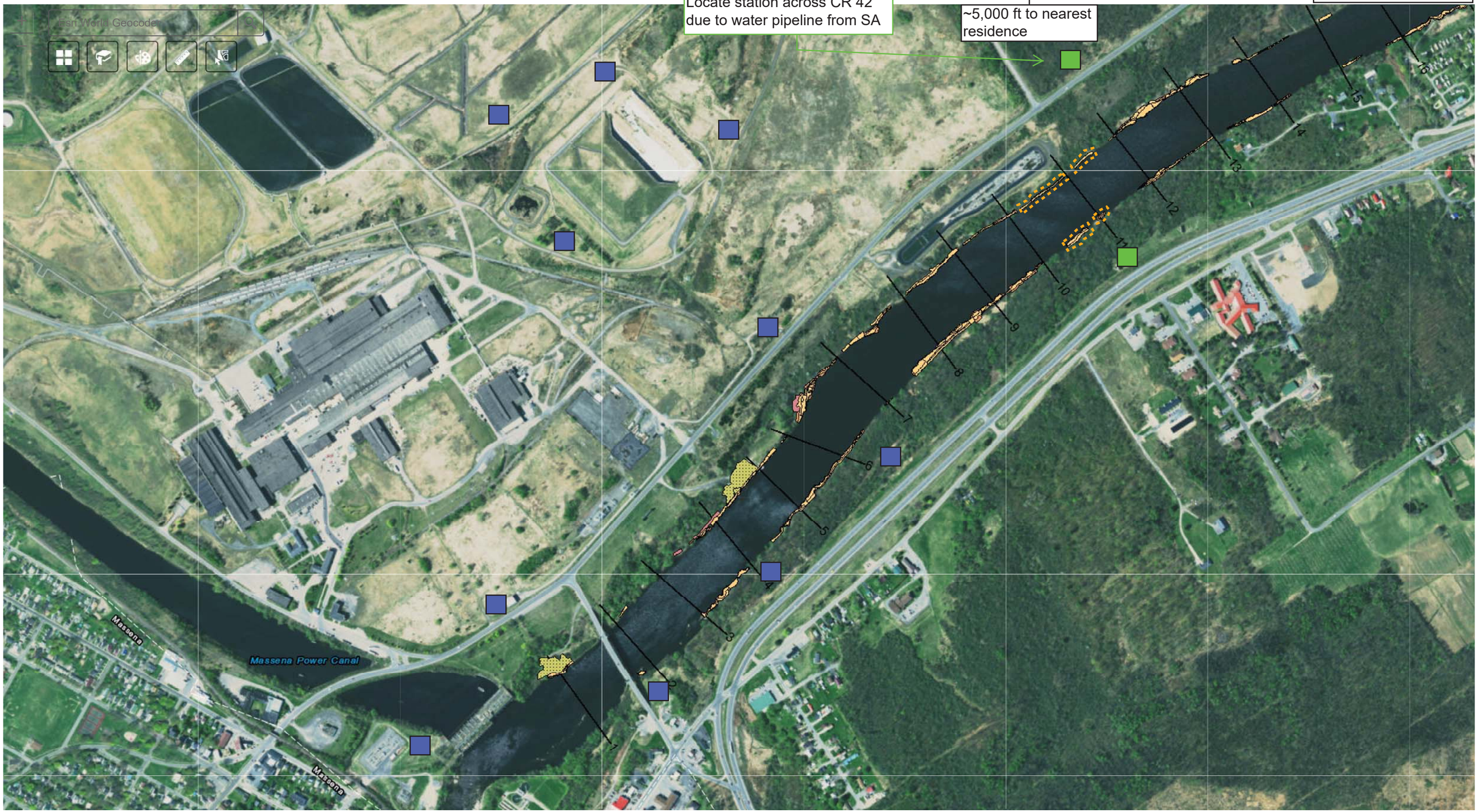
Click the map to get coordinates

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# FIGURE 5

Grasse River Arconic Portal




600ft

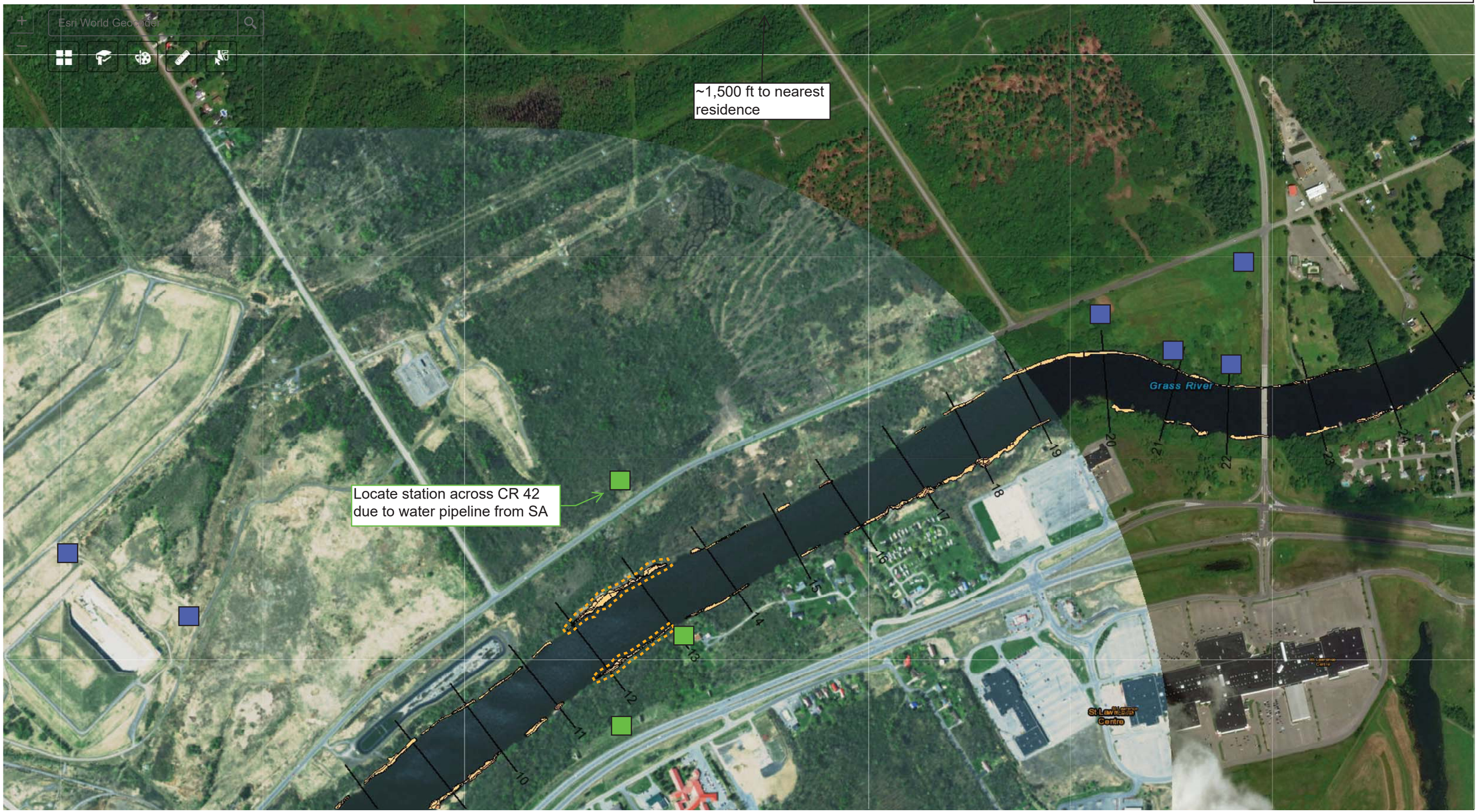
Click the map to get coordinates

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# Grasse River Arconic Portal

FIGURE 6




600ft
-74.871 44.962 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# Grasse River Arconic Portal

FIGURE 7

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

600ft
-74.871 44.962 Degrees

N

# FIGURE 8

Grasse River Arconic Portal

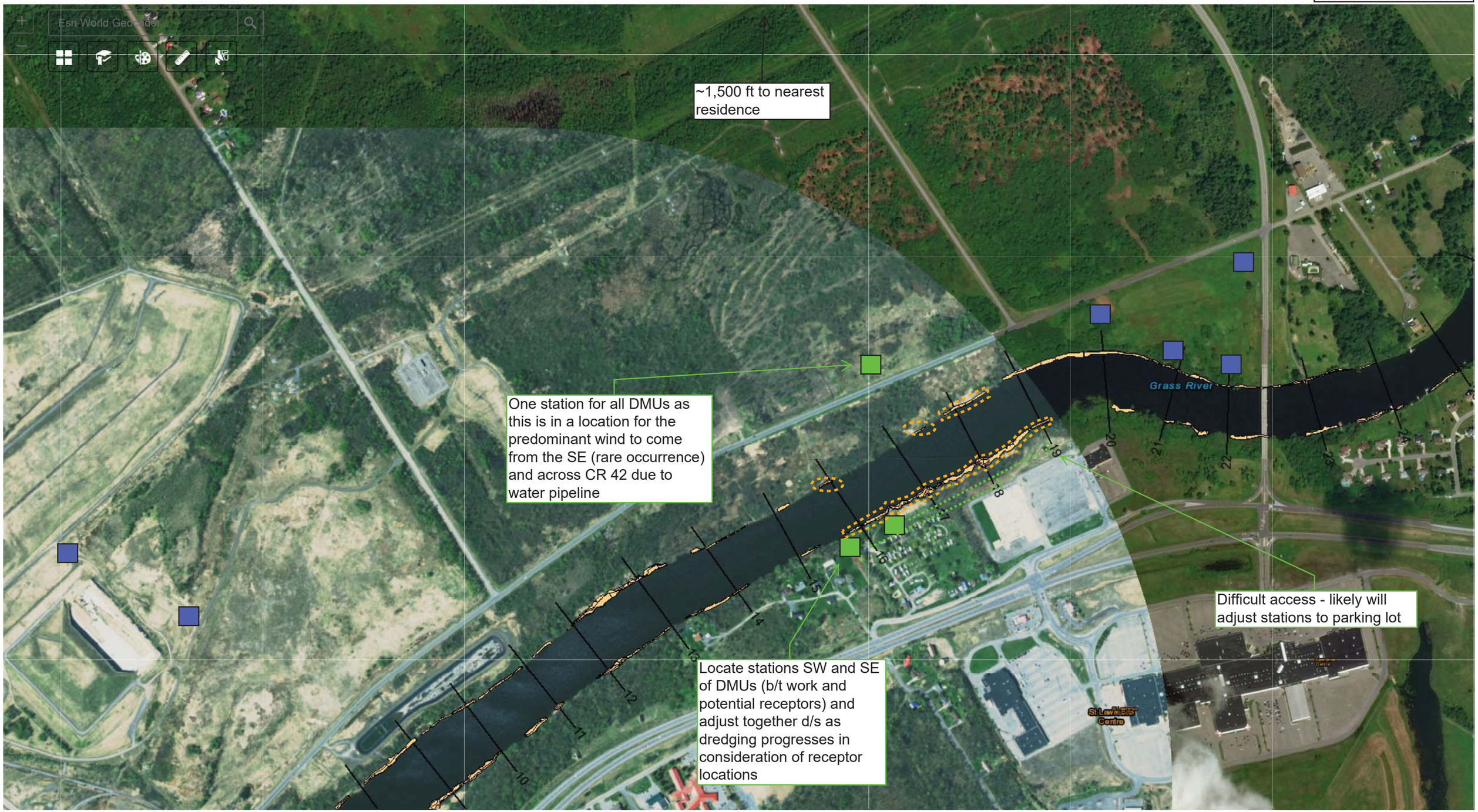
PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

600ft
-74.871 44.962 Degrees

N

# FIGURE 9

Grasse River Arconic Portal




600ft
-74.871 44.962 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# FIGURE 10

## Grasse River Arconic Portal

600ft
-74.871 44.962 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# FIGURE 11

Grasse River Arconic Portal

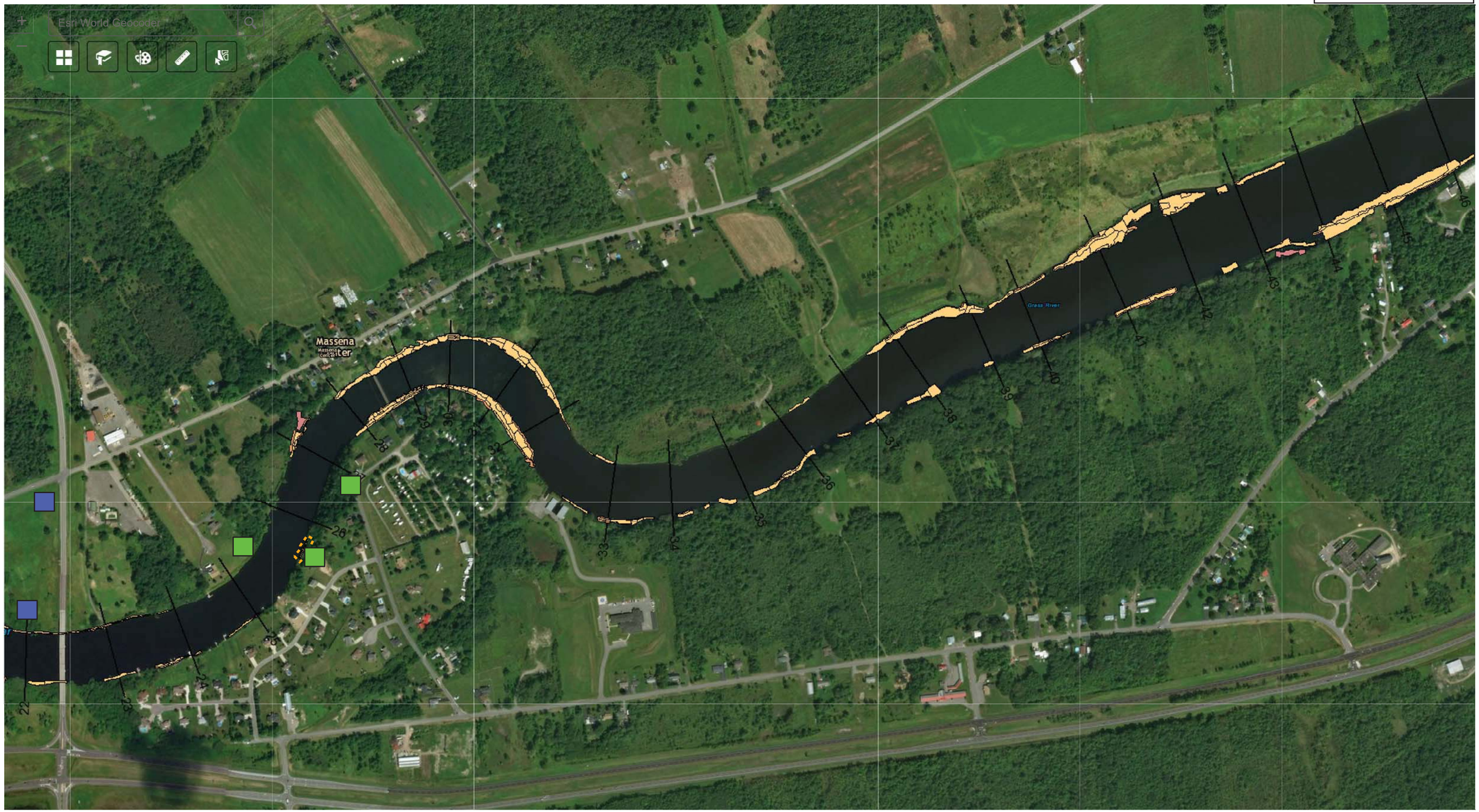
600ft
-74.871 44.962 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

Grasse River Arconic Portal

FIGURE 12



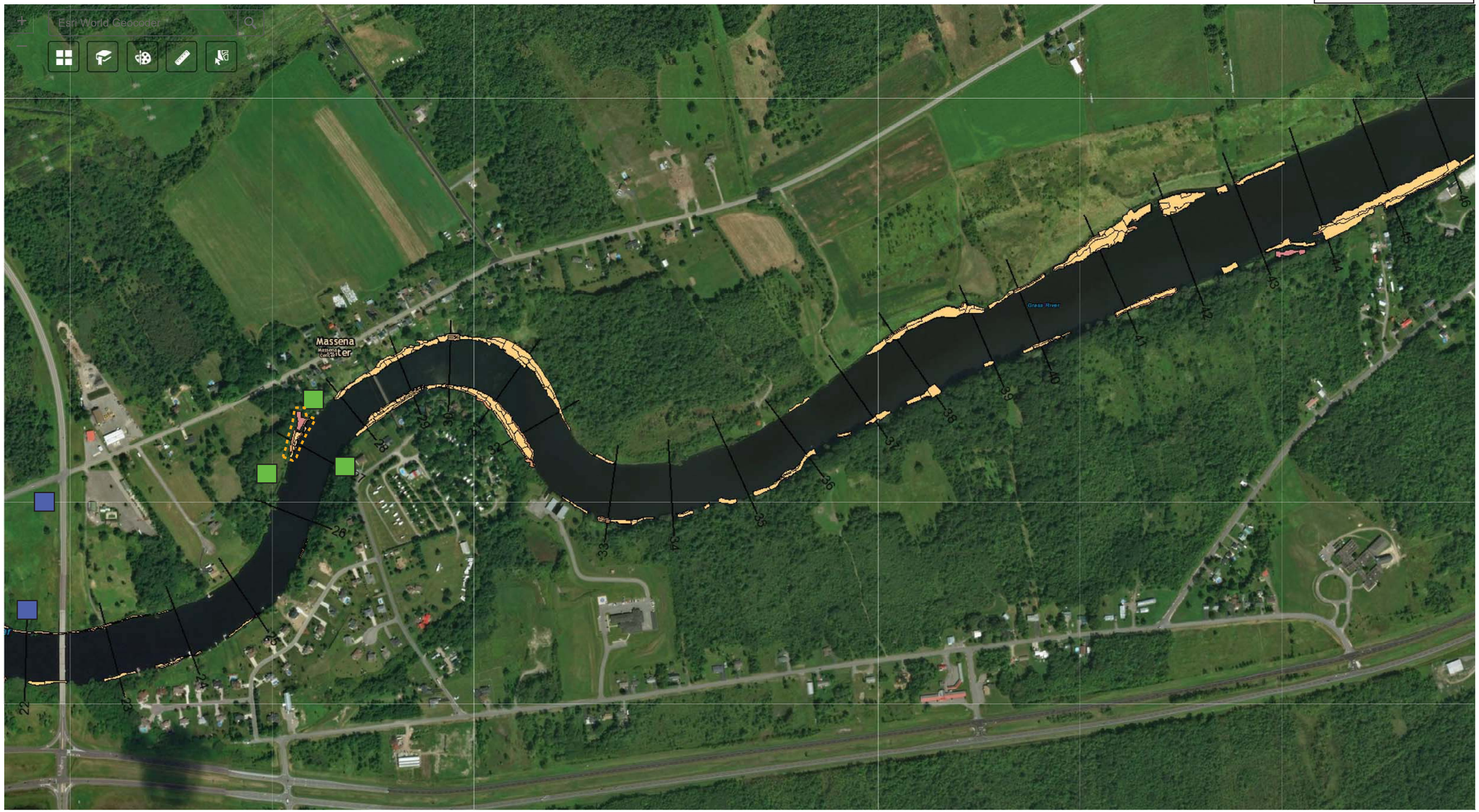

600ft
-74.828 44.966 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

Grasse River Arconic Portal

FIGURE 13



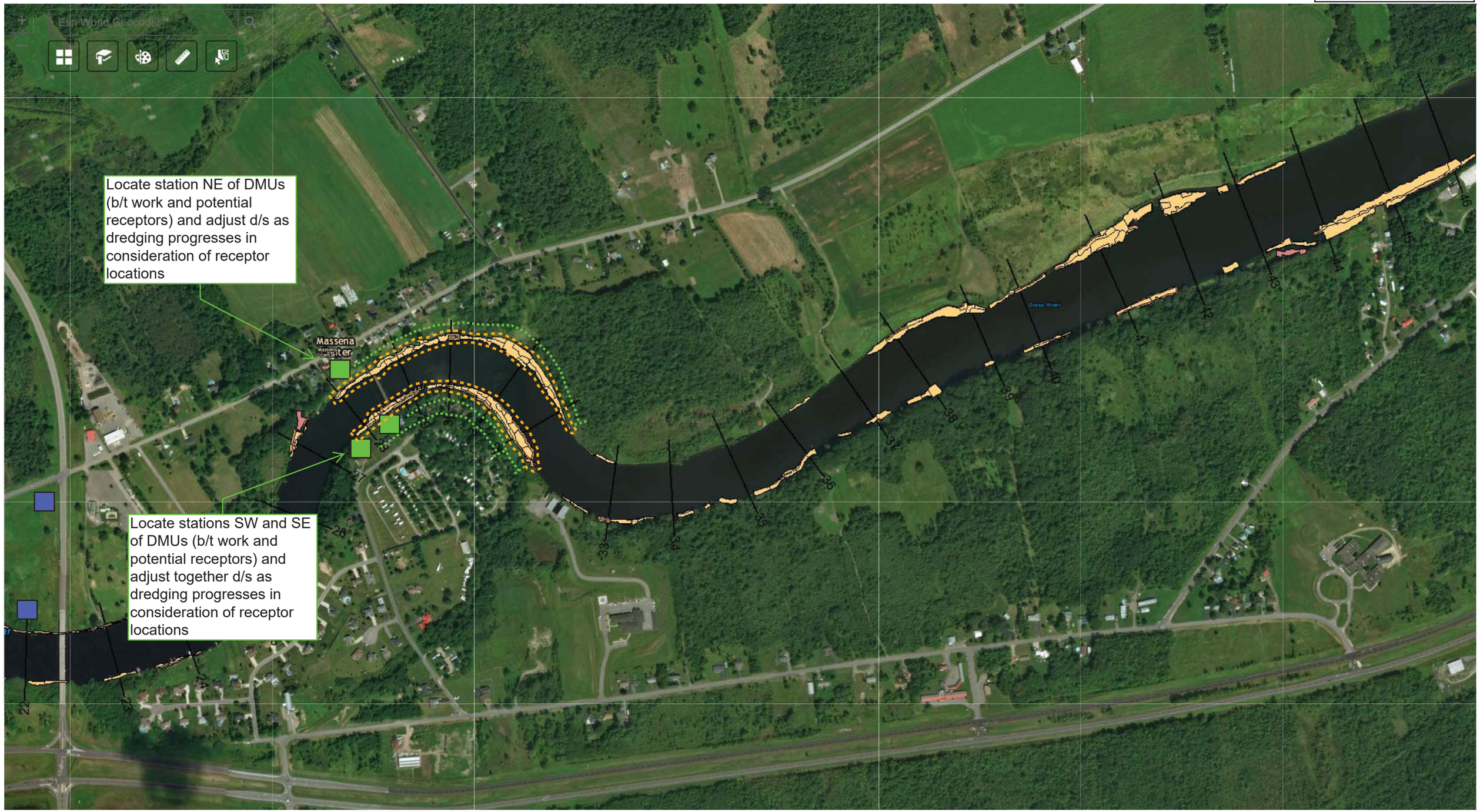

600ft
-74.828 44.966 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# FIGURE 14

Grasse River Arconic Portal



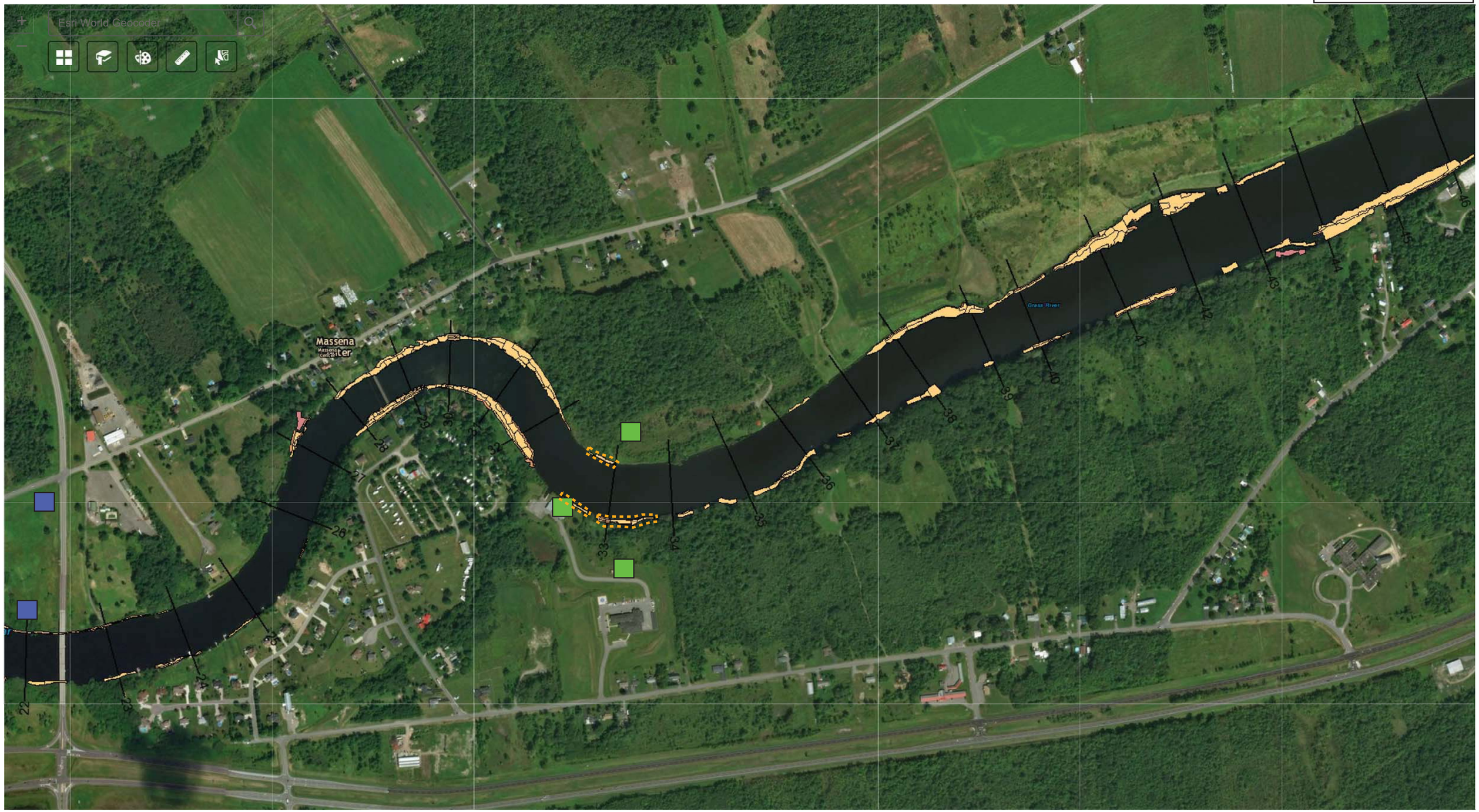

600ft
-74.828 44.966 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

Grasse River Arconic Portal

FIGURE 15



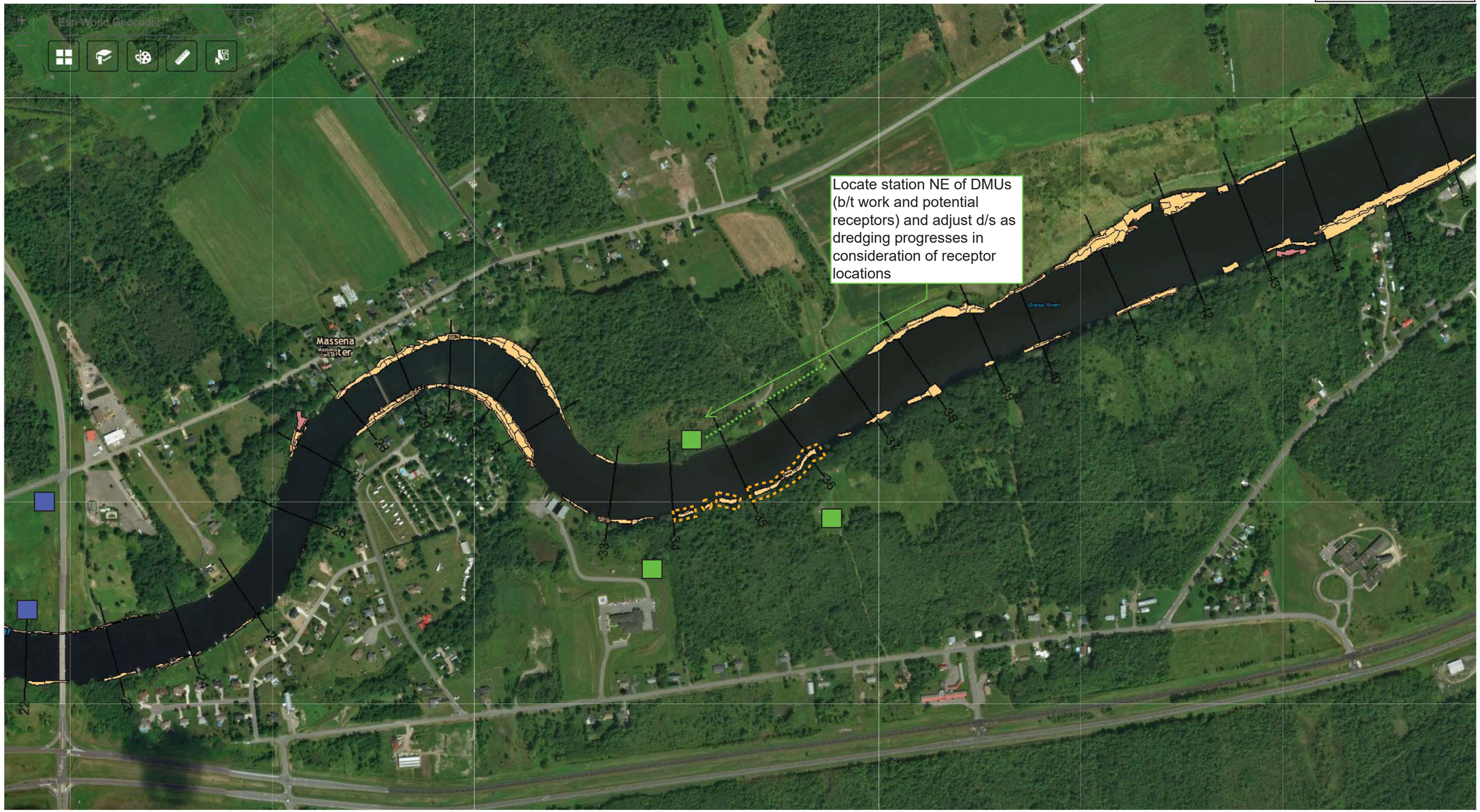

600ft
-74.828 44.966 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

Grasse River Arconic Portal

FIGURE 16



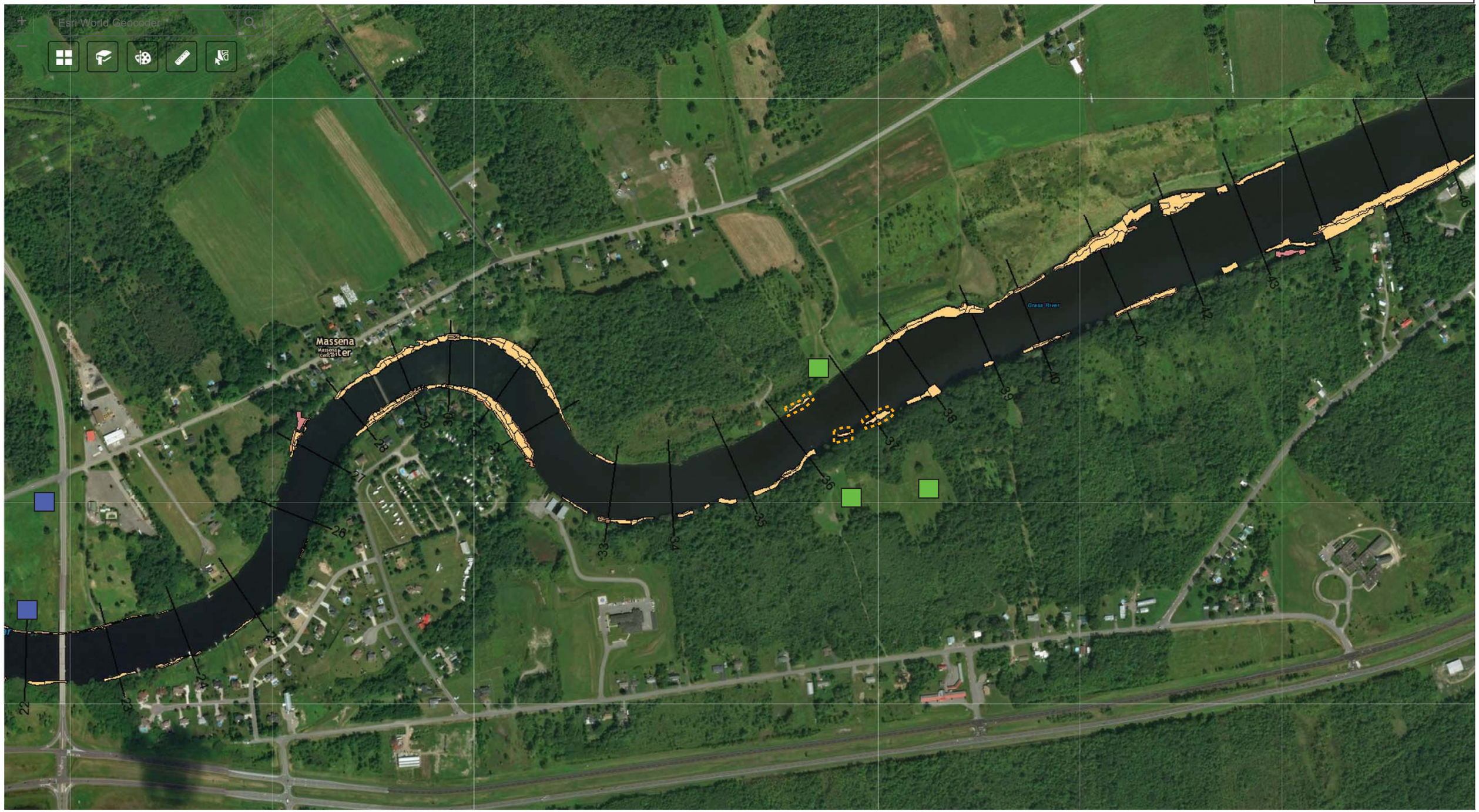

600ft
-74.828 44.966 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

Grasse River Arconic Portal

FIGURE 17



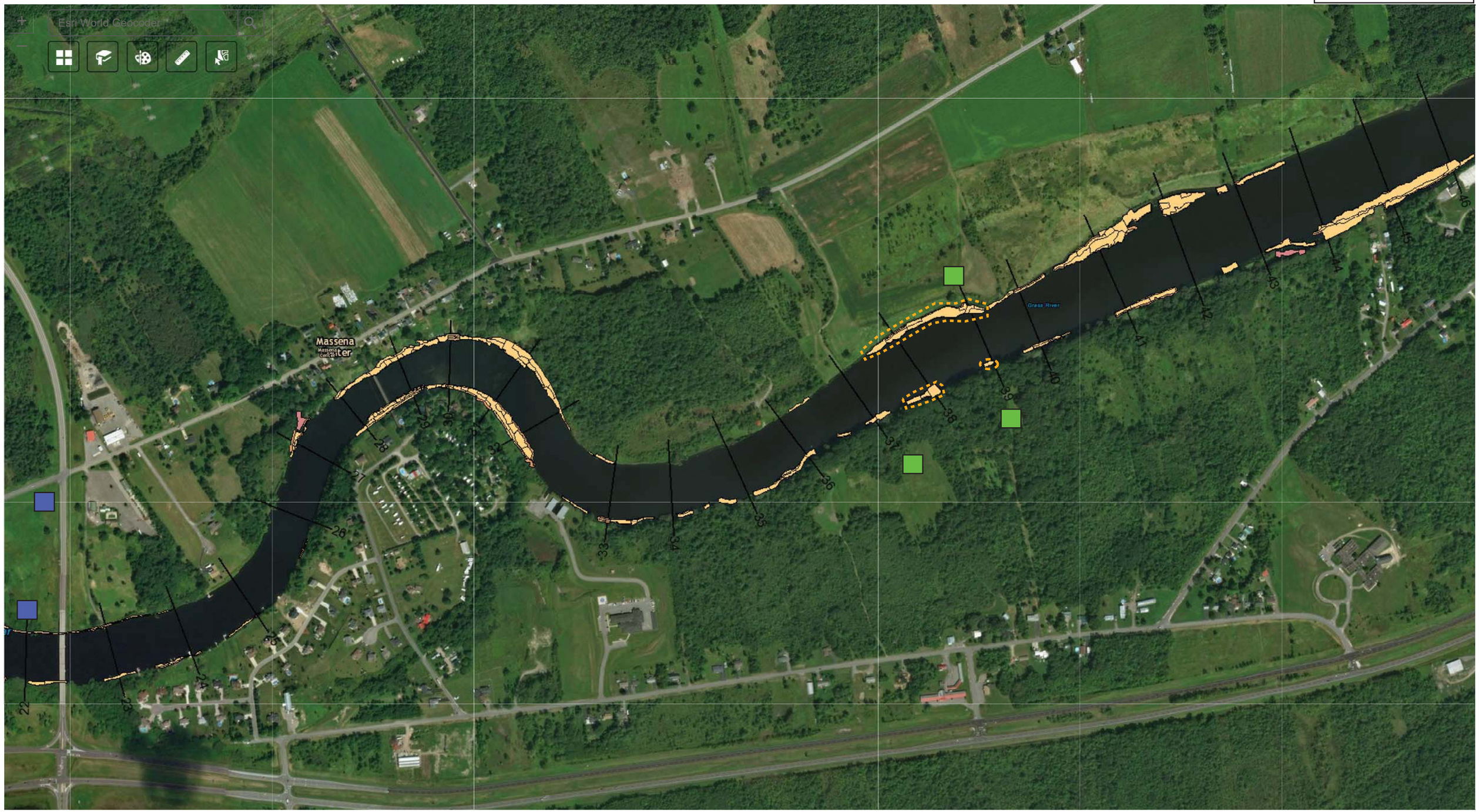

600ft
-74.828 44.966 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# FIGURE 18

Grasse River Arconic Portal




600ft
-74.828 44.966 Degrees

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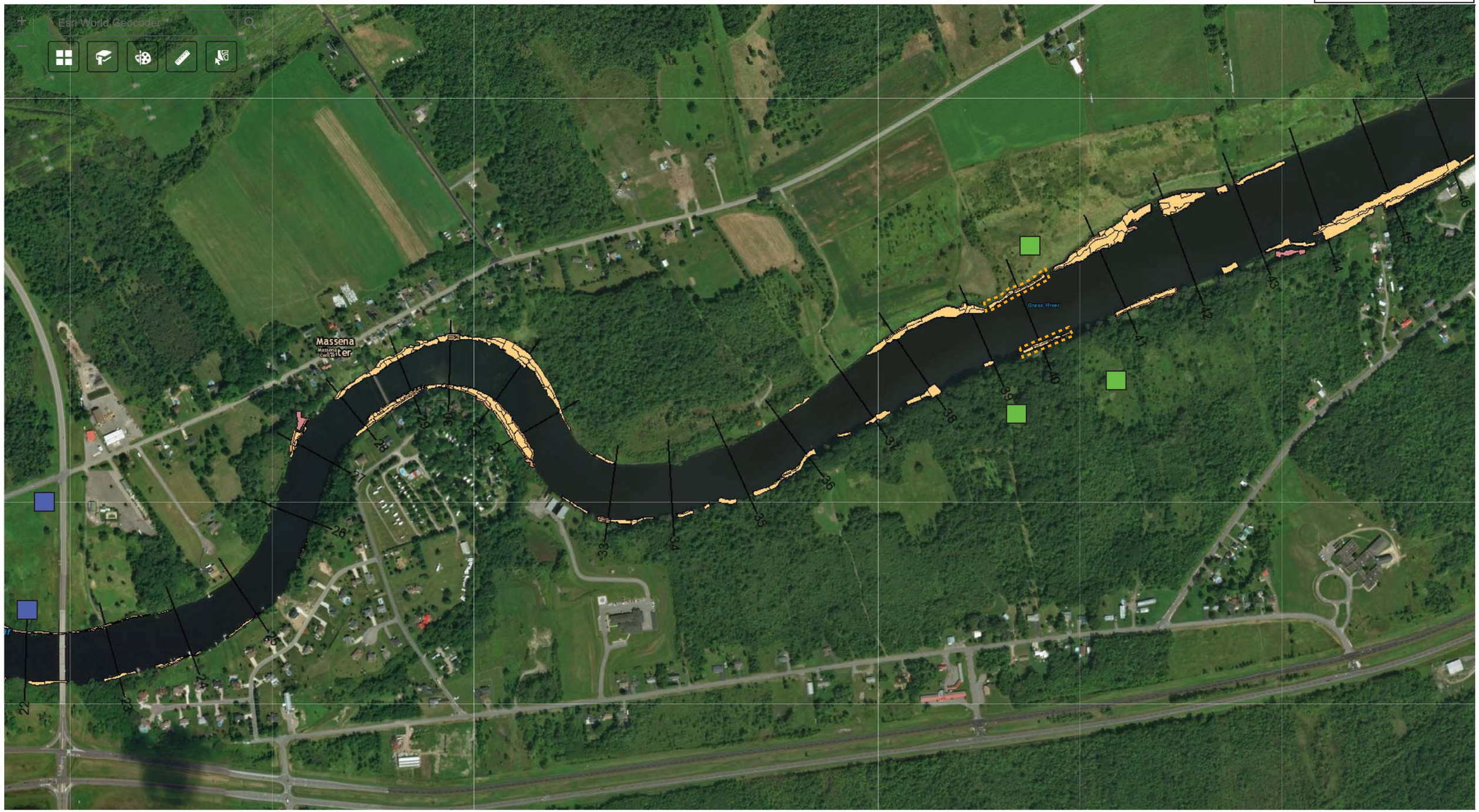
PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

Grasse River Arconic Portal

FIGURE 19




600ft
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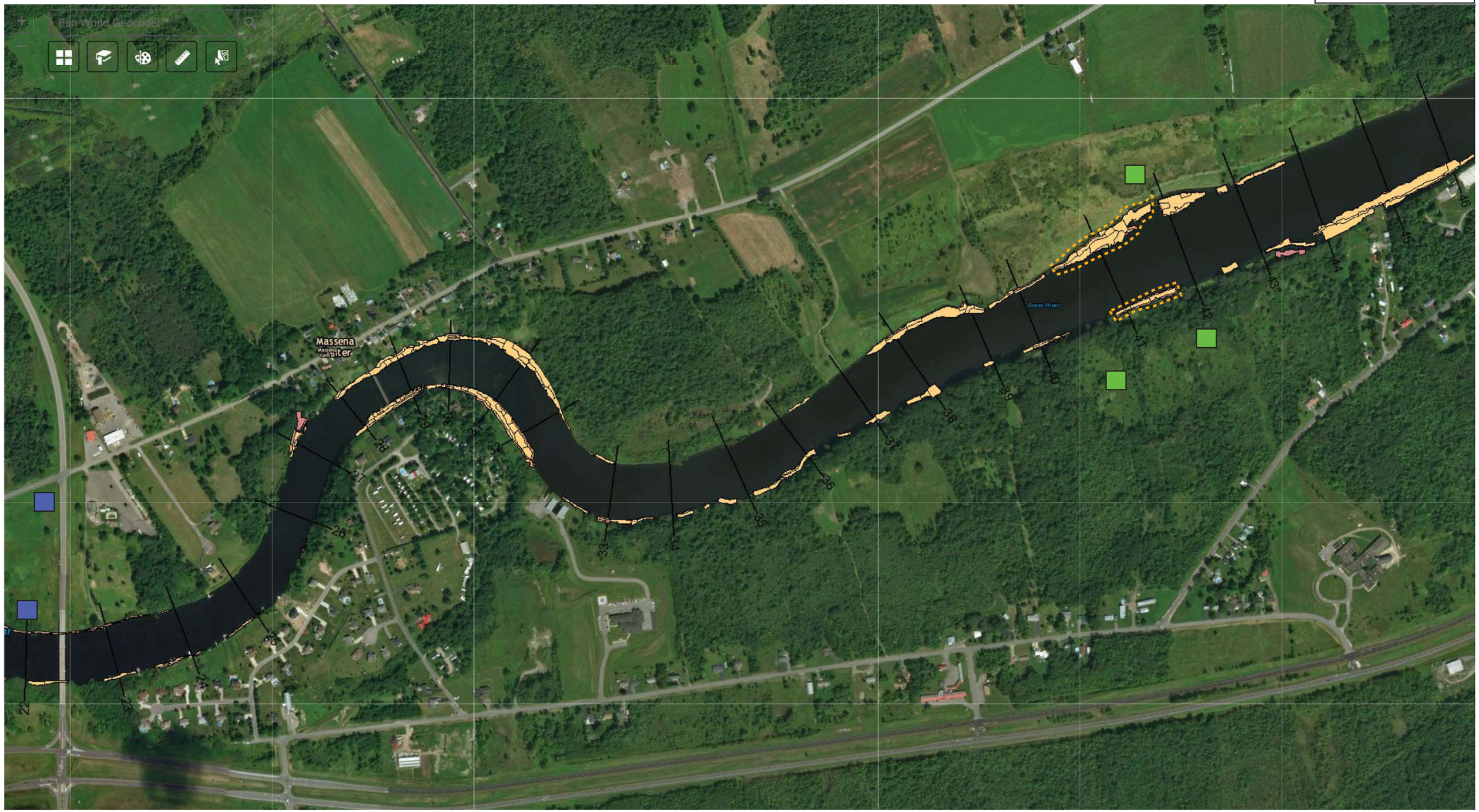
PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

Grasse River Arconic Portal

FIGURE 20



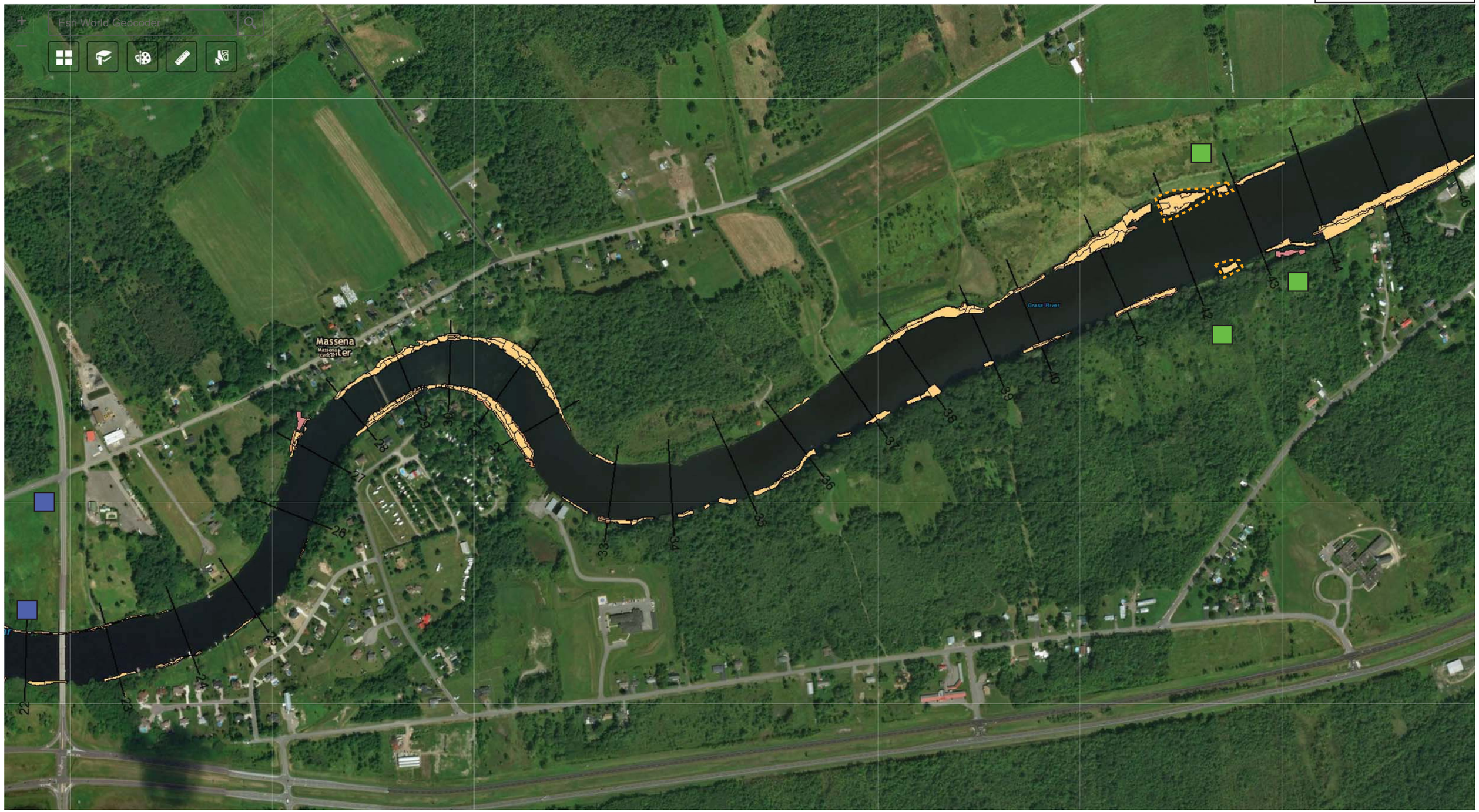

600ft
-74.828 44.966 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

Grasse River Arconic Portal

FIGURE 21



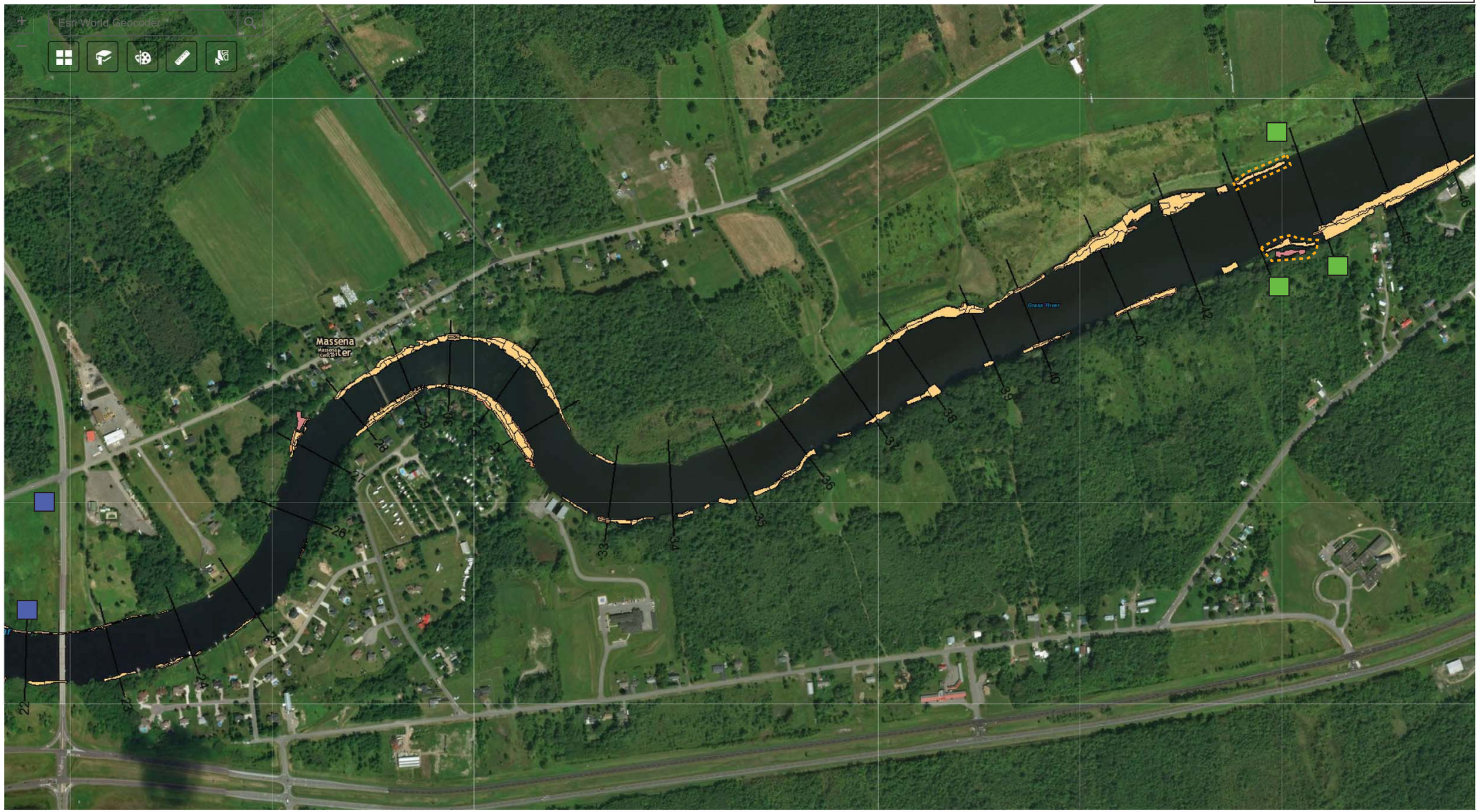

600ft
-74.828 44.966 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

Grasse River Arconic Portal

FIGURE 22




600ft
-74.828 44.966 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# Grasse River Arconic Portal

FIGURE 23

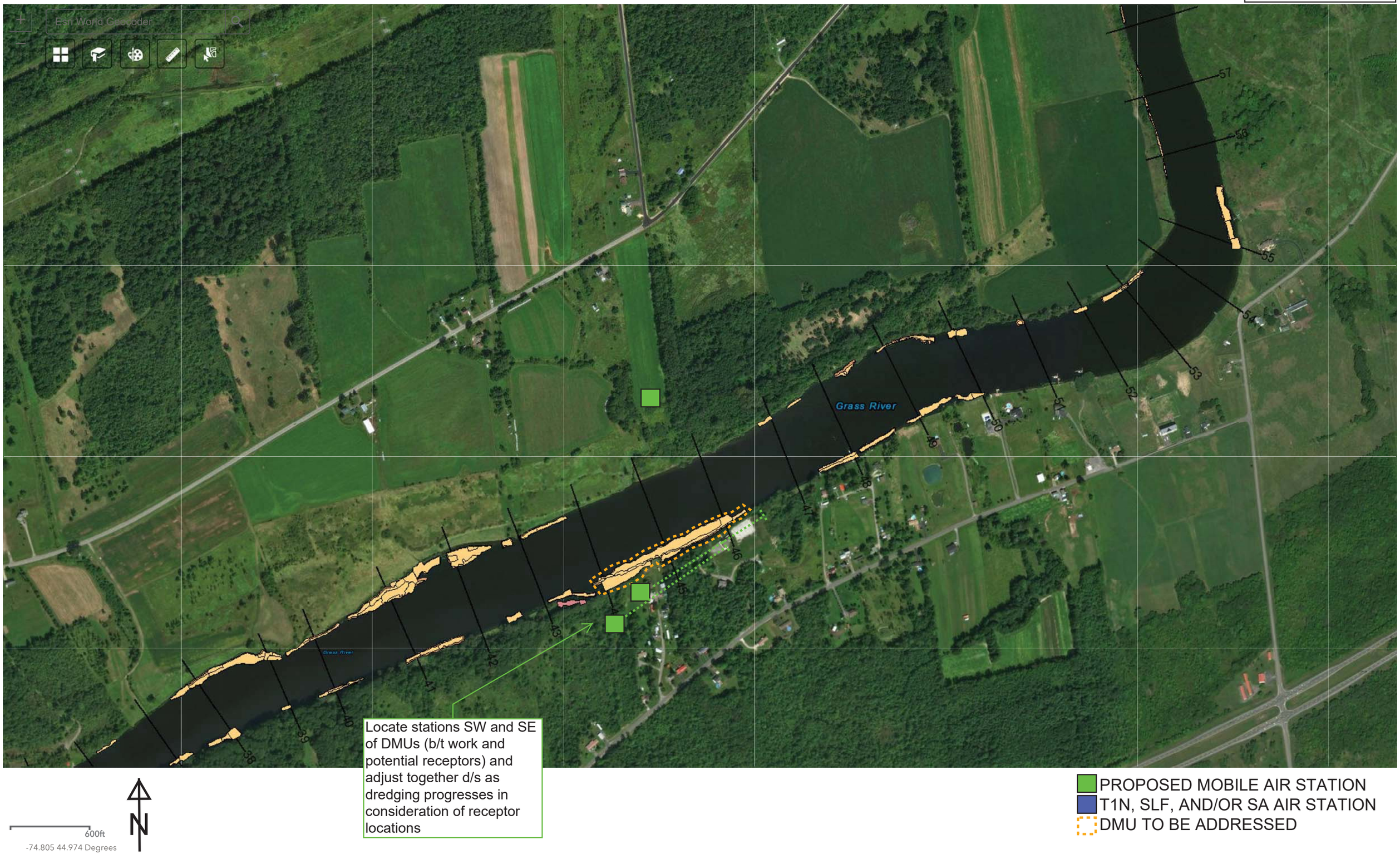


FIGURE 24

Grasse River Arconic Portal

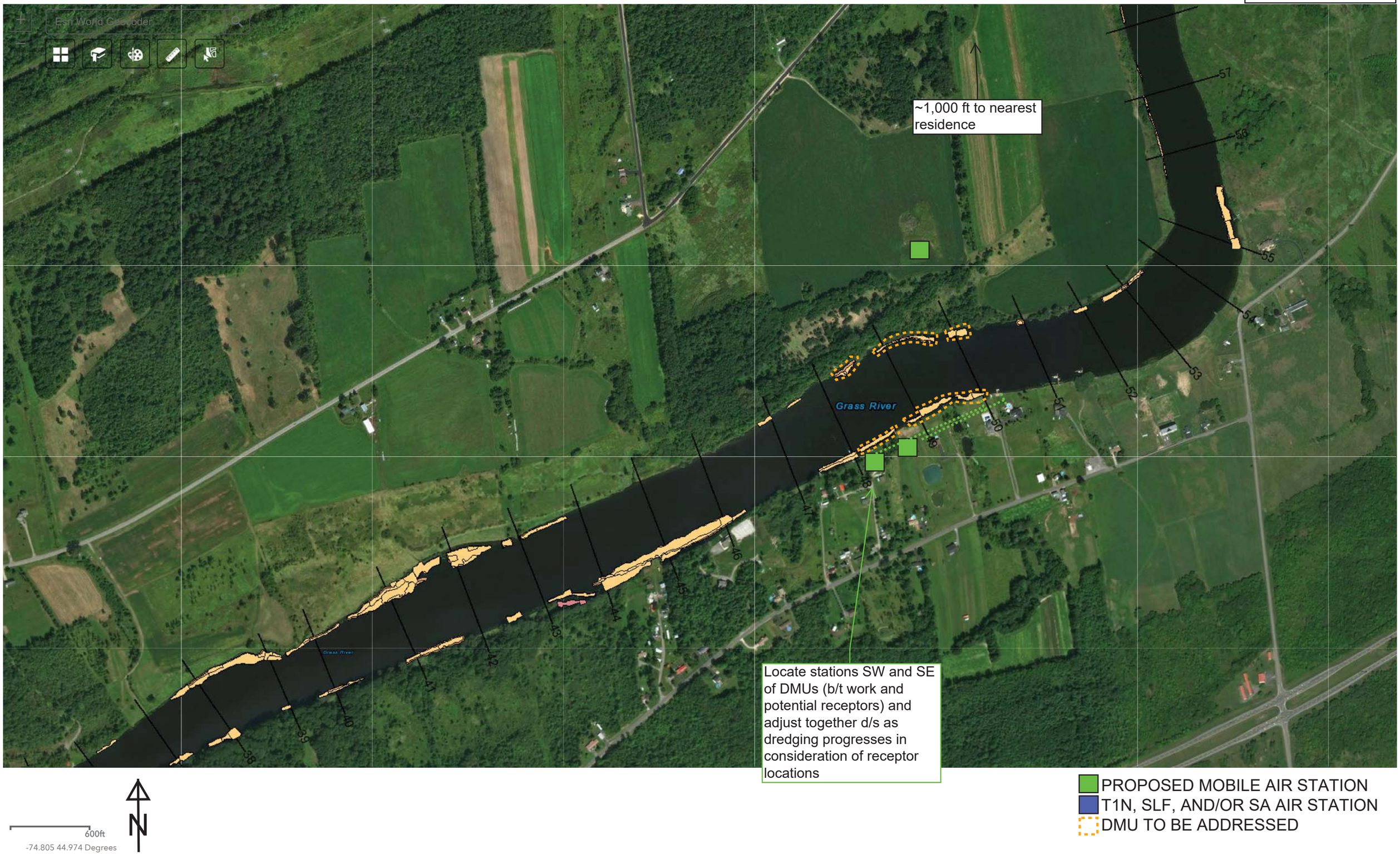
PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

600ft
-74.805 44.974 Degrees

N

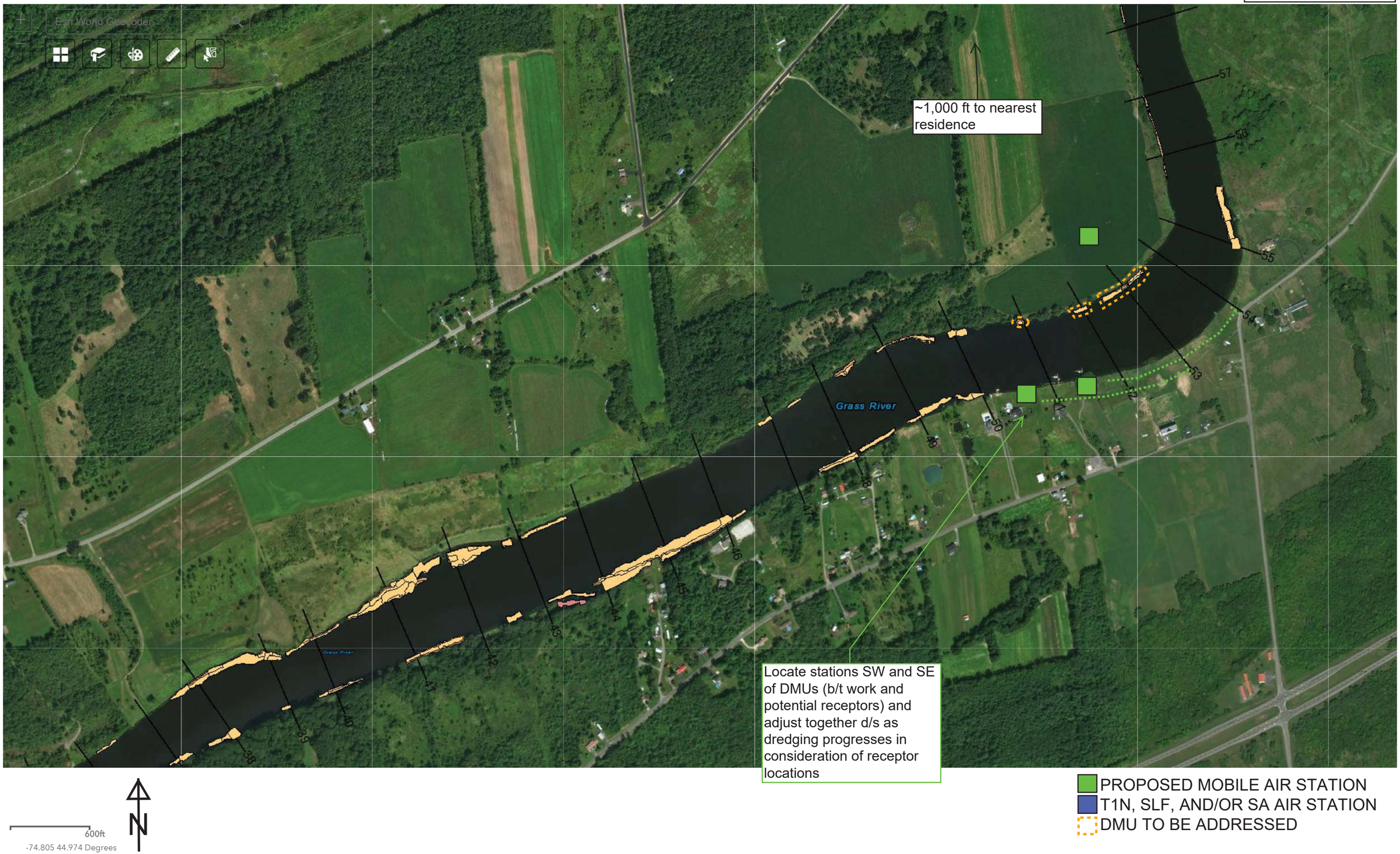
# FIGURE 25

Grasse River Arconic Portal



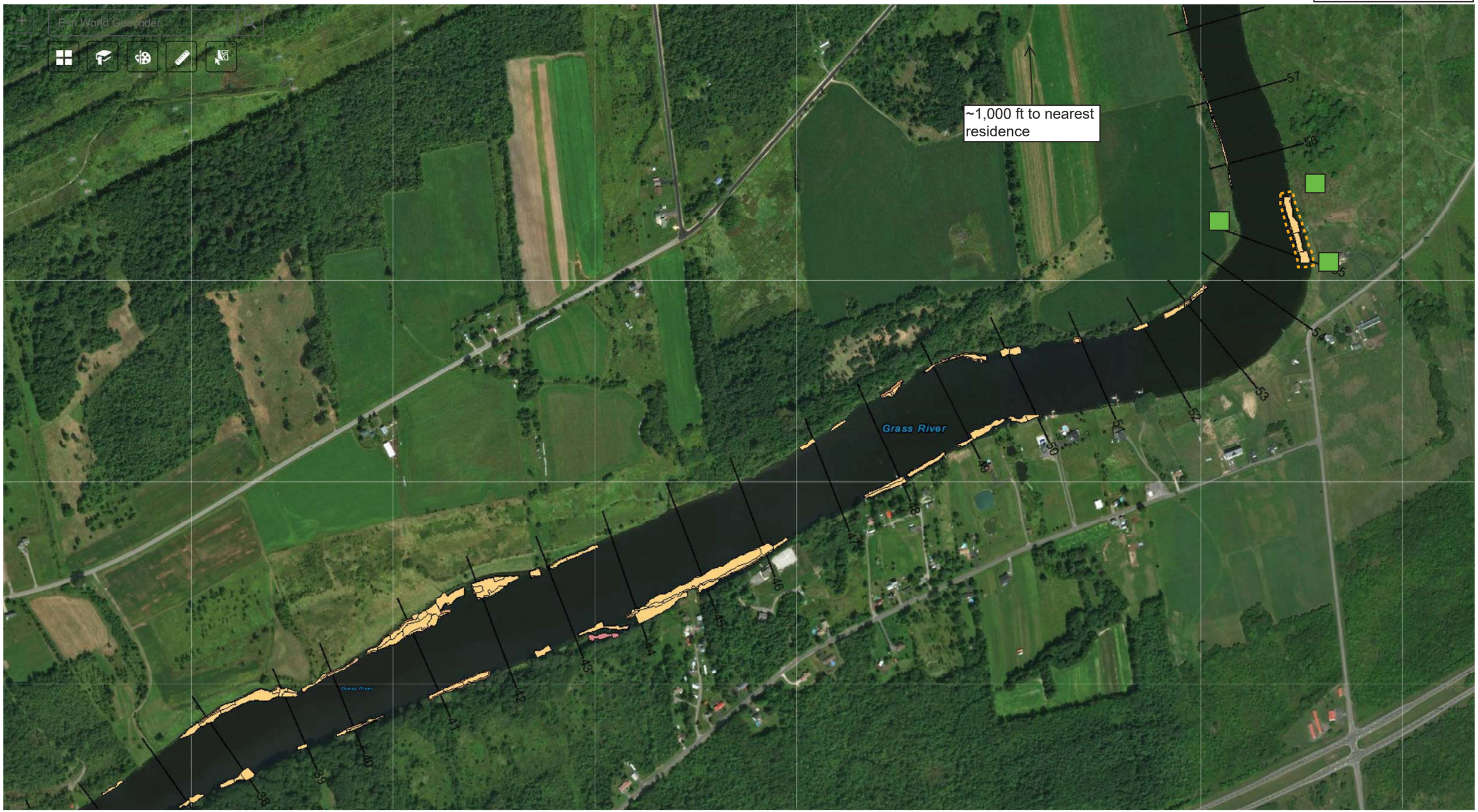
# FIGURE 26

Grasse River Arconic Portal



# FIGURE 27

Grasse River Arconic Portal



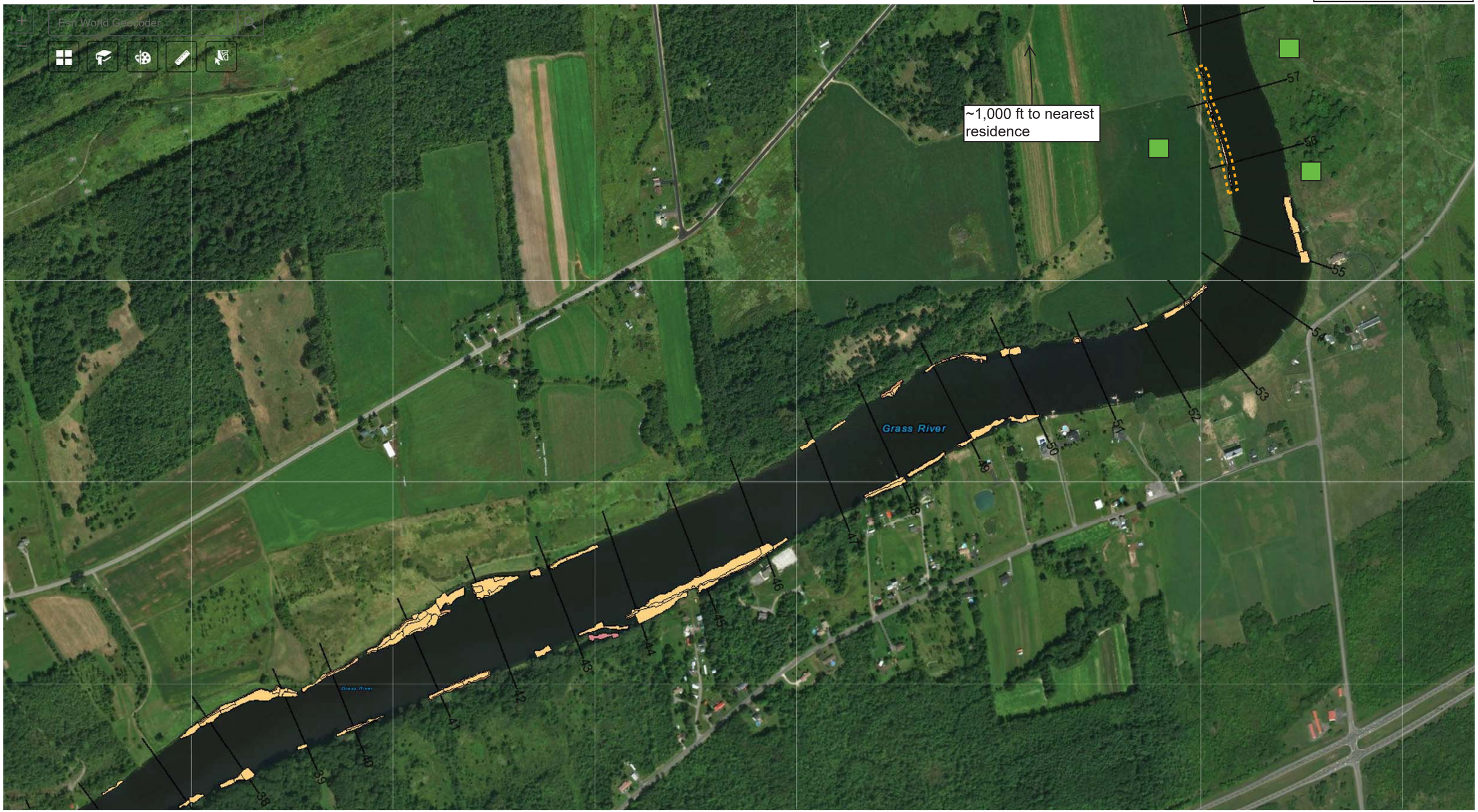

600ft
-74.805 44.974 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# FIGURE 28

Grasse River Arconic Portal



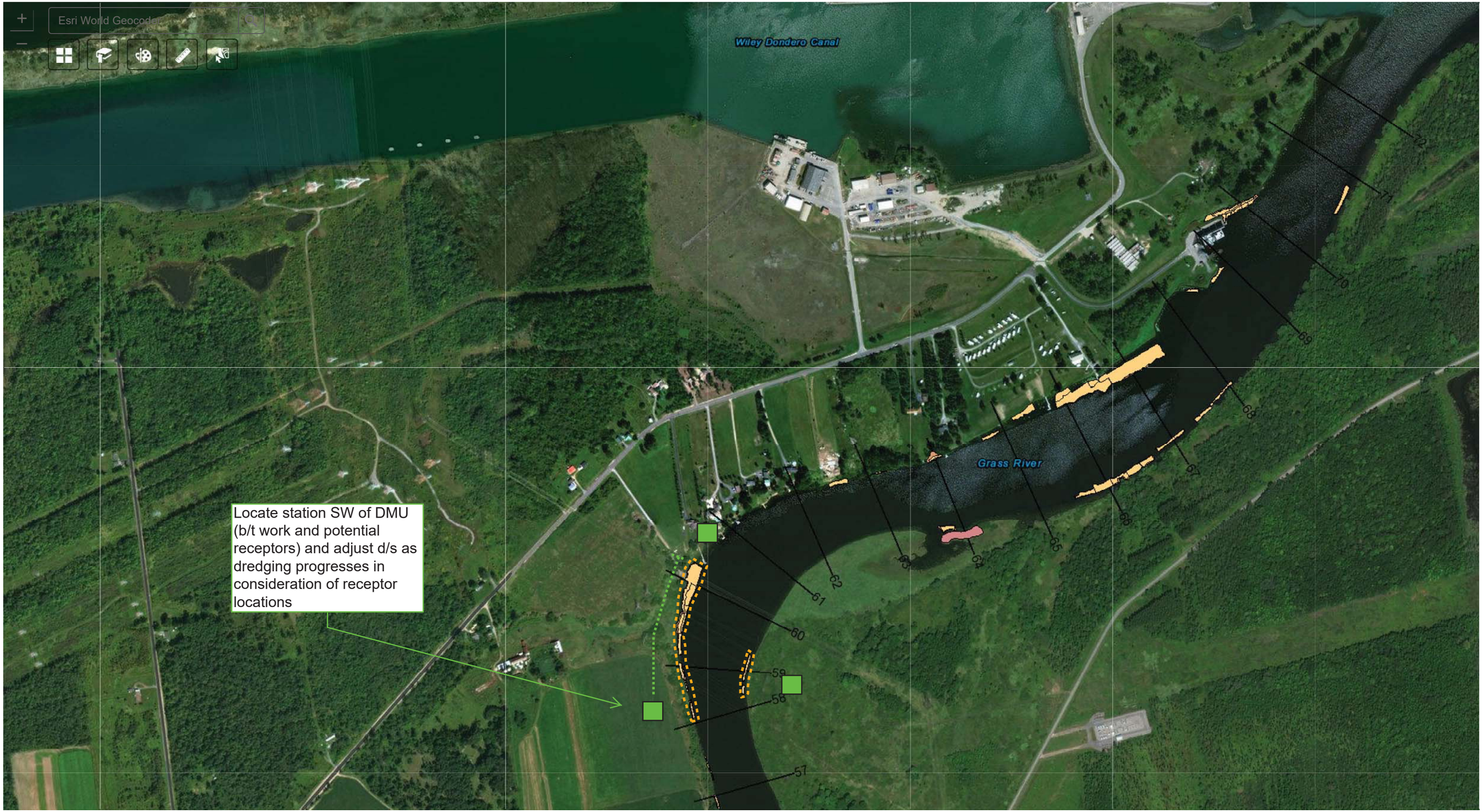

600ft
-74.805 44.974 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

FIGURE 29

Grasse River Arconic Portal




600ft
-74.804 44.986 Degrees

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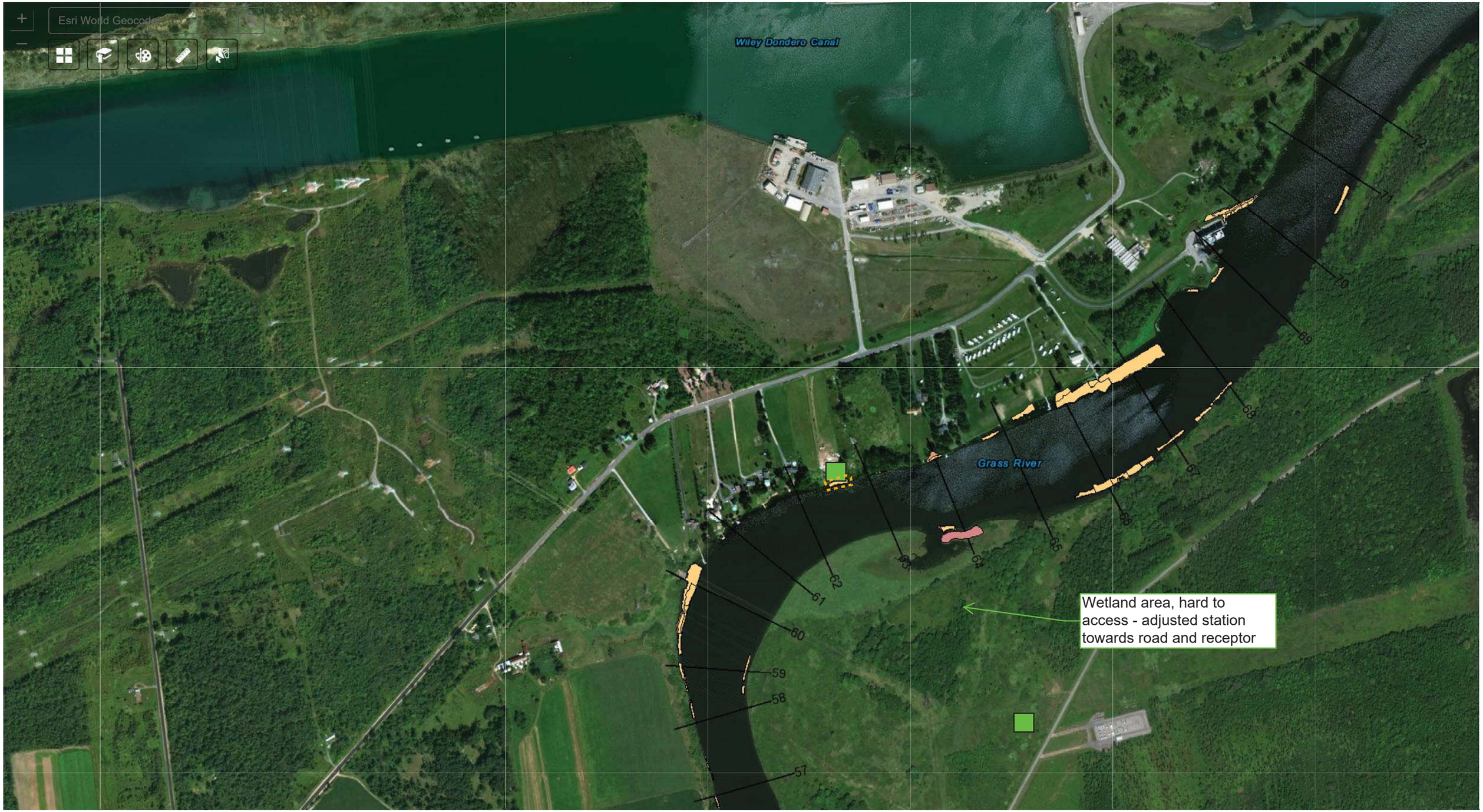
PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

FIGURE 30

Grasse River Arconic Portal



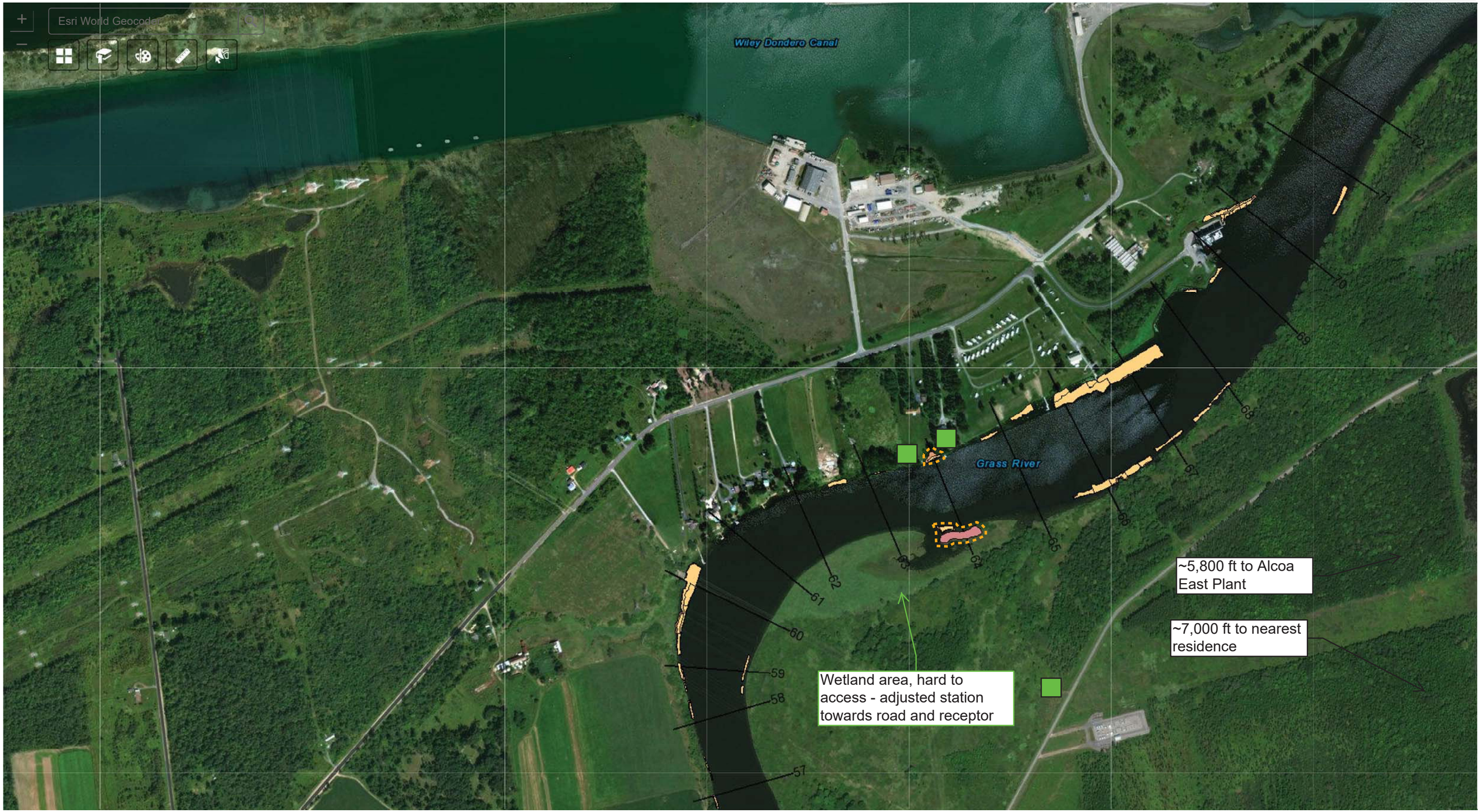

600ft
-74.804 44.986 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

FIGURE 31

Grasse River Arconic Portal



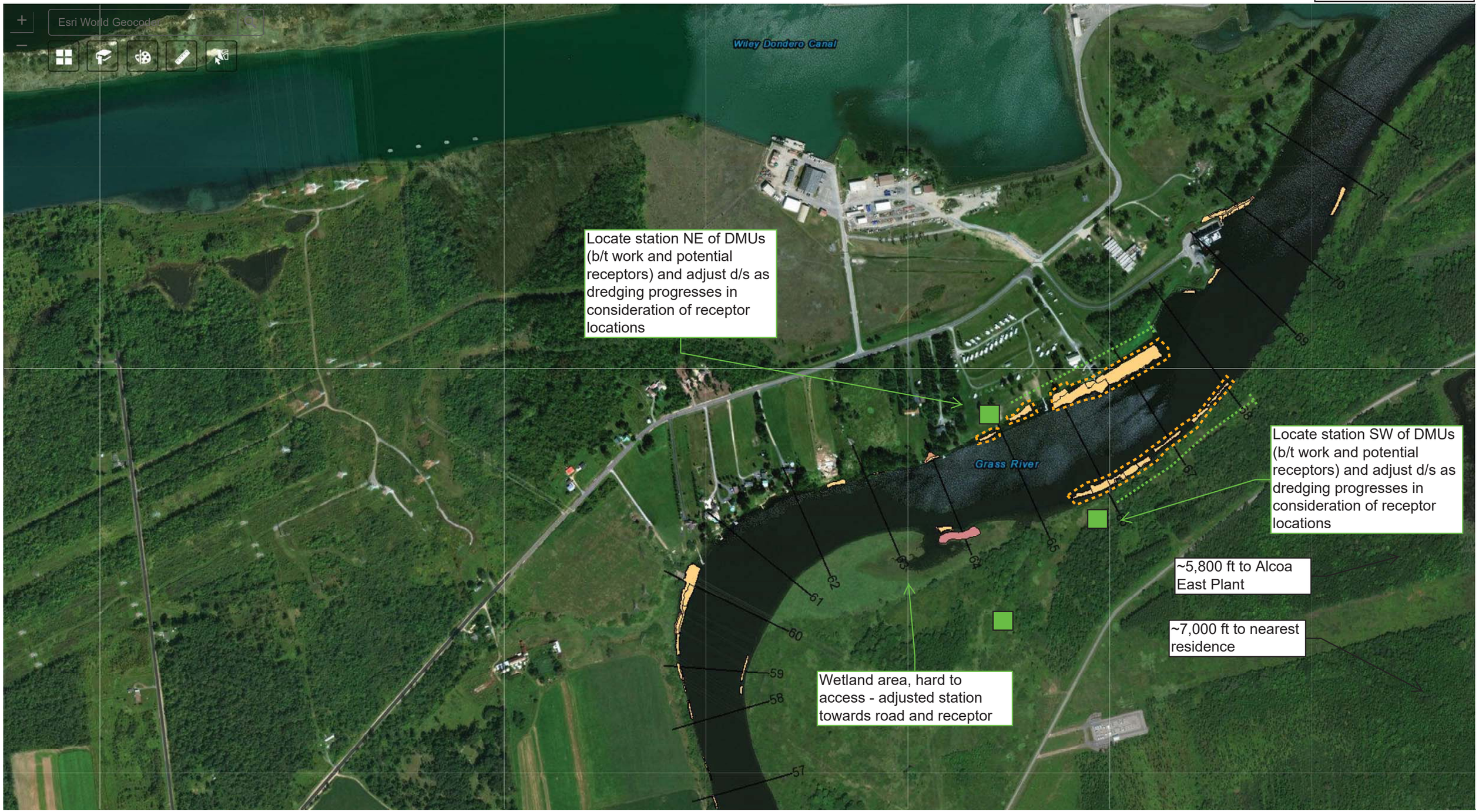

600ft
-74.804 44.986 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# FIGURE 32

Grasse River Arconic Portal



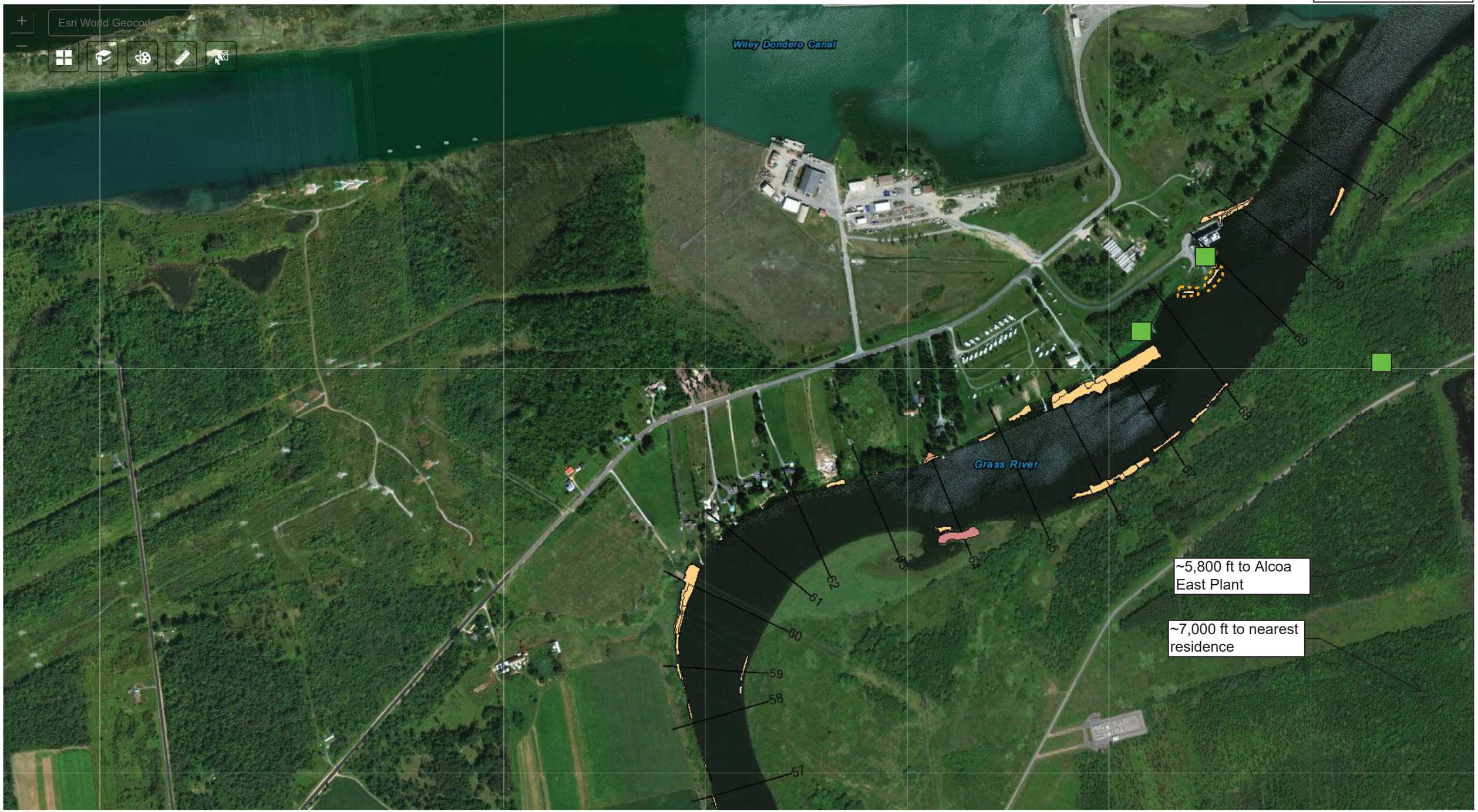

600ft
-74.804 44.986 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# FIGURE 33

Grasse River Arconic Portal



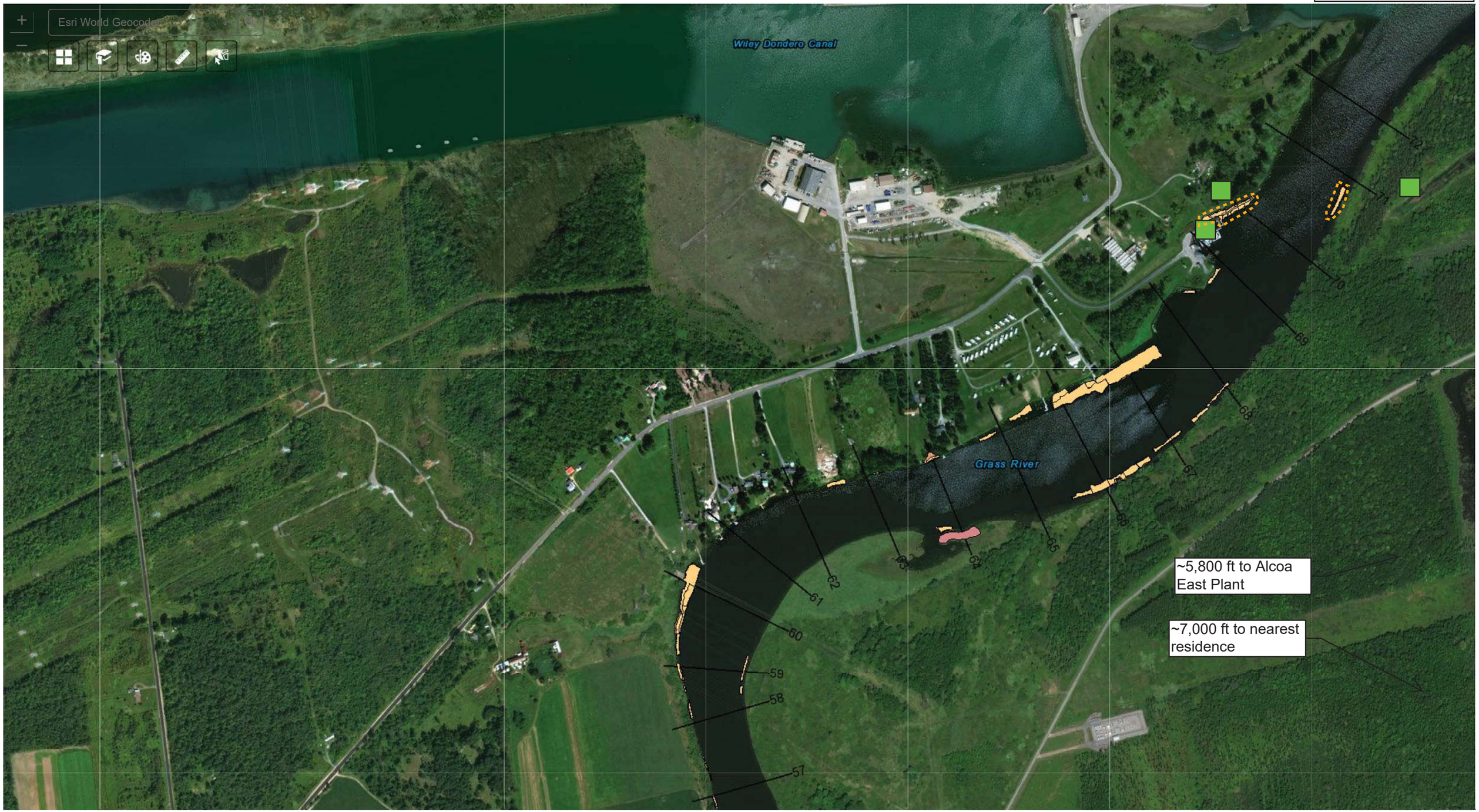

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

600ft
-74.804 44.986 Degrees

N

FIGURE 34

Grasse River Arconic Portal




600ft
-74.804 44.986 Degrees

N

PROPOSED MOBILE AIR STATION
T1N, SLF, AND/OR SA AIR STATION
DMU TO BE ADDRESSED

# CONTINGENCY PLAN
# GRASSE RIVER

**Prepared for**

Arconic, Inc.

**June 2019**

# TABLE OF CONTENTS

1 INTRODUCTION ..... 1

2 CONTINGENCIES FOR EMERGENCIES ..... 2

2.1 Pre-Emergency Planning and Preparation ..... 2

2.2 Responsibilities ..... 3

2.3 Identifying Hazards and Assess the Risk ..... 5

2.4 Emergency Contingency Procedures ..... 5

2.4.1 Fire or Explosion ..... 6

2.4.2 Spills or Material Releases ..... 7

2.4.3 Severe Weather ..... 9

2.4.4 Medical Emergencies ..... 9

2.4.5 On Water Emergencies ..... 10

2.5 Emergency Evacuation Procedures ..... 11

3 CONTINGENCIES FOR CORRECTIVE ACTION EXCEEDANCES ..... 14

3.1 Noise ..... 14

3.2 Water ..... 15

3.3 Air ..... 18

4 REFERENCE ..... 20

## List of Tables

Table 2-1 Contact Information for Key Emergency Site Personnel and Local Responders (in text)

## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| CQAP | Construction Quality Assurance Plan |
| EMP | Environmental Monitoring Plan |
| ERT | Emergency Response Technician |
| HASP | Health and Safety Plan |
| FDR | Final Design Report |
| NYSDEC | New York State Department of Environmental Conservation |
| OSHA | Occupational Safety and Health Administration |
| PEL | Permissible Exposure Limit |
| PCB | polychlorinated biphenyl |
| ROD | Record of Decision |
| SDS | Safety Data Sheets |
| SHSO | Site Health and Safety Officer |
| SRMT | Saint Regis Mohawk Tribe |
| TAT | turn-around-time |
| USEPA | U.S. Environmental Protection Agency |
| VOC | volatile organic compound |

# 1 INTRODUCTION

This Contingency Plan defines responses to potential emergencies or exceedances that may arise during the remedial construction work to be performed in the lower Grasse River. As described in the Final Design Report (FDR), remedial activities will include near shore dredging and backfilling, floodplain removal and backfilling, armored cap placement in the main channel, cap placement in the main channel, restoration, and associated support such as material processing and landfilling to meet the requirements of the Grasse River Superfund Site *Record of Decision* (ROD; USEPA, April 2013). This Contingency Plan has been specifically developed to aid site personnel in responding quickly and effectively should conditions change from those outlined in the FDR to protect workers and the local community in the instance of an accident, emergency, or corrective action exceedance caused by remedial activities.

The primary goal of this Contingency Plan is to limit the impact from any emergencies or releases, while maintaining the safety of all personnel who may be affected. This Contingency Plan is an appendix to the FDR; therefore, background information on the site and associated characteristics, details on the remedial activities, and other similar information are not repeated herein but can be found in the main body of the FDR. Section 2 of this plan establishes a framework for responding to emergencies, and Section 3 provides the contingencies for exceedances of corrective action standards. The corrective action levels are defined in the Construction Quality Assurance Plan (CQAP) and Environmental Monitoring Plan (EMP; Attachment D to the CQAP). Section 4 provides a list of references used throughout the plan.

# 2 CONTINGENCIES FOR EMERGENCIES

The following sections outline the pre-emergency planning efforts, primary project personnel roles in emergency response, and potential emergency conditions and scenarios, along with the associated contingency measures to be implemented. Note that the remedial contractor will also prepare a health and safety plan (HASP) specific to worker safety during the remedial activities, and the remedial contractor's HASP will be used in combination with this document to support response to emergency situations as referenced throughout this section.

## 2.1 Pre-Emergency Planning and Preparation

Planning for possible emergency situations will be completed by the remedial contractor prior to mobilization and initiation of remedial activities. These measures will include compiling adequate supplies and manpower for responding to an emergency and completing emergency training for site personnel in proper response procedures. The remedial contractor will have adequate equipment and materials onsite and dedicated for emergencies only. Examples of this emergency equipment include ABC-type fire extinguishers, first-aid kits, eyewash stations, spill containment/booms/absorbents, and emergency floatation/life line ropes. This inventory will be reviewed and replenished after each use as needed. In addition, air monitoring equipment will be used in accordance with the remedial contractor's HASP for worker safety and for the environment per the EMP. Data from the air monitoring equipment will also be used to support emergency responses.

On-site emergency responders will be current with regard to training and medical surveillance programs. All site personnel (e.g., remedial contractor, subcontractors, and construction management) will comply with the Occupational Safety and Health Administration (OSHA) standard 29 Code of Federal Regulations 1910.120.

The remedial contractor will provide a listing of all chemicals to be brought on site along with the safety data sheets (SDS). These chemicals will be formally reviewed by Arconic to assess compatibility concerns considering other on-site chemicals.

The remedial contractor will also focus on good housekeeping practices from initiation to completion of the project to reduce the potential for accidental spills and safety hazards (e.g., regular maintenance of walking areas, regular removal of refuse, and staging of similar materials together). Site security will be maintained starting at mobilization by the remedial contractor, and unauthorized personnel will not be permitted to enter the site. A sign-in log will be maintained so an accurate count is available for all personnel on site in the event of an emergency.

The remedial contractor, Arconic construction management, and Arconic-specific emergency response technicians (ERTs) will meet with emergency local emergency response personnel (e.g., ambulance service, fire department, and police department) as part of the pre-construction measures to review the project and emergency procedures.

Prior to project initiation, the remedial contractor, Arconic construction management, and other key project personnel (e.g., environmental monitoring crews) will conduct a project environmental safety and health review to document potential hazards specific to the work and measures to address those hazards.

## 2.2 Responsibilities

The remedial contractor will identify a Site Health and Safety Officer (SHSO) to serve as the lead for any emergency response situations. The SHSO will be notified of any emergencies and coordinate any needed response activities to be carried out at the site. The SHSO will take command of the situation and will have the ultimate authority in specifying and facilitating any contingency action. The SHSO will defer command to others, (e.g., ERTs) as required, when local emergency personnel arrive on site and will then serve in a support role as necessary. If the SHSO is not able to perform the duties, the SHSO will specify another senior individual (working for remedial contractor) to serve as the SHSO.

The communication procedure will be established prior to on-site construction activities in coordination with the remedial contractor. The SHSO will be responsible for initiating communication using the identified procedure. An initial listing of key emergency personnel and primary local responders is provided in Table 2-1.

**Table 2-1**

**Contact Information for Key Emergency Site Personnel and Local Responders**

| Personnel (Organization/Title and Specific Individual) | | Phone Number and/or Email |
|---|---|---|
| Construction Project Manager | Mike Elsner (Arconic) | (315) 764-4150<br>michael.elsner@arconic.com |
| Construction Manager | Dan Casey (Arcadis) | (315) 391-0445<br>dan.casey@arcadis.com |
| Community Relations Liaison | Sue Flynn (Arconic) | (315) 764-4400<br>susan.flynn@arconic.com |
| Site Safety Representative and Responsible Person | Toby Topa (CDM-S) | TopaTJ@cdmsmith.com |
| Remedial Contractor Project Manager | Tyler Lee | tlee@jfbrennan.com |
| Remedial Contractor SHSO | Mike Cerda | mcerda@jfbrennan.com |
| USEPA Project Manager | Young Chang | (212) 637-4253<br>chang.young@epa.gov |
| USEPA Field Oversight | Mark Riordan | mriordan@mjels.com |
| SRMT Project Manager | Jay Wilkins | (518) 358-5937, ext. 123<br>jay.wilkins@srmt-nsn.gov |
| NYSDEC Project Manager | David Tromp | (518) 402-9786<br>david.tromp@dec.ny.gov |
| Fire Department | Arconic ERTs Gate 1 | (315) 764-4500 |
| | Massena Fire Department | 911 |
| Police | Arconic ERTs Gate 1 | (315) 764-4500 |
| | Massena Police Department | 911 |
| Ambulance | Arconic ERTs Gate 1 | (315) 764-4500 |
| | Massena Ambulance Corp | 911 |
| Massena Memorial Hospital | Not Applicable | (315) 769-4208 |
| United States Coast Guard | Not Applicable | (216) 902-6117<br>(maritime emergency use) |
| United States Border Patrol | Not Applicable | (315) 769-3091 |
| NYSDEC's 24-hour Spill Notification | Not Applicable | (800) 457-7362 |
| National Response Center | Not Applicable | (800) 424-8802 |
| SRMT Water Intake Supervisor | Shawn Martin | (518) 358-4205 |

## 2.3 Identifying Hazards and Assess the Risk

The objectives during any emergency will be to protect human health and safety first and then the environment. The SHSO will assess possible risks to human health or the environment that may result from the emergency (e.g., release, fire, explosion, or severe weather conditions), including direct and indirect effects. The following actions shall be part of this assessment:

- Identifying the materials involved in the incident.
- Consulting the appropriate occupational health guideline or SDS to determine the potential effects of exposure/release and appropriate safety precautions.
- Identifying the exposure and/or release pathways and the quantities of materials involved.

Based on this information, the best course of action for dealing with the emergency will be determined by the SHSO, along with possible follow-up requirements (e.g., equipment repair and material disposal).

If the remedial contractor's personnel cannot control the incident without incurring undue risk, the SHSO will implement the Site Evacuation Procedures described in Section 2.5. The SHSO will also request immediate assistance of Arconic's ERTs and local emergency response personnel (e.g., ambulance service, fire department, and police department) if emergency assistance in treating injuries or carrying out the evacuation is needed.

## 2.4 Emergency Contingency Procedures

Potential emergency conditions and scenarios that require implementation of this Contingency Plan include fire or explosion, occurrence of a spill or material release, severe weather conditions, physical or chemical injury to a worker, and on-water emergencies. These emergency conditions are discussed further in Sections 2.4.1 through 2.4.5, along with the specific contingency procedures to be performed.

### 2.4.1 Fire or Explosion

Flammable and combustible materials will be present on site; therefore, fire is an ongoing hazard. The following list is an example of procedures to be put in place to mitigate the possibility of fires:

- Keep separation between sources of ignition and flammable material storage or handling areas.
- Store gas, diesel, or other flammable materials in flammable cabinets.
- Complete Arconic's required hot work permit and review procedures with Arconic personnel.
- Conduct air monitoring for explosivity before and during hot work and periodically where flammable materials are present.
- Clearly identify designated smoking areas for site workers, and post "No Smoking" signs in areas where flammable materials are present.
- Place fire extinguishers where a fire hazard may exist and train workers in proper use of extinguishers.
- Train workers on emergency and evacuation procedures, with signs posted for egress routes and exit points.

Contingency procedures will be immediately implemented upon notification of any of the fire or explosion scenarios listed below:

- A fire that causes, or could cause, the release of toxic fumes.
- A fire that could ignite nearby flammable materials or could cause heat-induced explosions.
- A fire that could spread to off-site areas.
- A danger exists that an explosion could occur, causing a safety or health hazard.
- An explosion has occurred.

When these scenarios appear imminent or have occurred, all normal site activity will stop. The SHSO will assess the potential risk and severity of the situation to decide whether the emergency event can be readily controlled with existing portable fire extinguishers or site equipment and materials at hand. Firefighting will not be done at the risk to site workers.

Emergency responders will be contacted in all situations in which fires and/or explosions have occurred. The following steps will be taken for localized fire.

- Contact Arconic Gate 1 ERTs for immediate deployment of the on-site emergency responders and local fire departments if necessary (see Table 2-1).
- Move all personnel to an upwind location at an appropriately safe distance away.
- Determine if on-site personnel have the capabilities to attempt initial firefighting.
- Determine if smoke and/or fumes from fire are potentially impacting off-site areas.
- If the fire is not impacting off-site areas and is within on-site personnel capabilities, use most appropriate means of extinguishing fire (e.g., fire extinguishers, water, and covering with soil).
- Once fire is extinguished, containerize and properly dispose of any spilled material, runoff, or soil.

If the situation appears uncontrollable and/or poses a direct threat to human life, the local fire department will be contacted and the evacuation procedures described in Section 2.5 will be implemented. The SHSO will work with the lead emergency responder(s) to determine when the situation has been controlled and danger has passed, and will then notify site personnel.

### *2.4.2 Spills or Material Releases*

The potential for land and water spills or material releases exists for the project. The following spill or material release scenarios, whether imminent or having already occurred, will cause implementation of contingency procedures:

- A spill or material release that could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard.
- A spill or material release that could cause the release of toxic vapors or fumes into the atmosphere in concentrations higher than the OSHA Permissible Exposure Limits (PELs).
- A spill or material release that cannot be contained on site, resulting in a potential for off-site soil contamination, sediment contamination, and/or groundwater or surface water pollution. Examples include release of hydraulic oil or motor oil from

mechanical equipment, oils from sediment disturbed during dredging to the surrounding environment, pump failures, truck accidents, and resulting spills.

All spills or material releases will be reported immediately to the SHSO. In addition, per Arconic's requirements, the SHSO will then immediately notify Arconic Gate 1 ERTs regardless of size or quantity. The SHSO will obtain the following information on the spill or release to assess the severity:

- Material spilled or released (SHSO will then obtain appropriate SDS)
- Source and location of release
- Estimated quantity released or ongoing rate of release
- Direction release is moving
- Cleanup assistance needs
- Personnel in potential contact with release and associated injuries or sickness
- Potential for fire and/or explosion resulting from release

If the spill or release is determined to be within the on-site emergency response capabilities, the SHSO will ensure implementation of the necessary remedial action (i.e., contain, treat as needed, and dispose per applicable requirements). If the accident is beyond the capabilities of the remedial contractor's crew, all personnel not involved with emergency response activities will be evacuated from the immediate area and the appropriate emergency response group(s) will be contacted. Arconic has spill responders under contract to support and respond to such situations. The decision to bring in a spill contractor will be made by Arconic and the Construction Manager in coordination with U.S. Environmental Protection Agency (USEPA), New York State Department of Environmental Conservation (NYSDEC), and Saint Regis Mohawk Tribe (SRMT). The remedial contractor will report the release to the Construction Manager. All petroleum spills will be reported Arconic and/or the Construction Manager to NYSDEC within 2 hours of the release in accordance with New York State law. In addition, spills requiring reporting to New York State will also be at reported orally a minimum to USEPA within 24 hours, and a report will be provided to USEPA within 20 days in accordance with the Administrative Order. Notifications would also be made in the event of a spill or release with the potential to impact downstream water supplies to these receptors (e.g., SRMT).

### 2.4.3 Severe Weather

Site operations will not be performed during hazardous weather conditions. The following severe weather conditions, whether imminent or having occurred, may cause implementation of contingency procedures:

- A tornado has been sighted in the area or a tornado warning is in effect for the area.
- Lightning has been sighted or a lightning storm is underway in the area (storm center is less than 5 miles away).
- Other severe weather or weather induced conditions (e.g., hurricane or flood, heavy rains or snow, or high winds).

Any information on severe weather will be immediately relayed to the SHSO. In the case of a tornado sighting, the SHSO will initiate emergency evacuation procedures and all personnel will be directed to proceed indoors after completing appropriate shutdown procedures. In the case of a tornado warning or lightning storm, the SHSO will stop operations and direct all personnel to stand by for emergency evacuation procedures. In the case of lightning, the SHSO will direct all personnel to proceed indoors or take shelter after completing appropriate shutdown procedures. Work will remain halted until 30 minutes have elapsed since the last visible lighting.

If, based on the results of weather and flow monitoring, flooding is anticipated, the remedial contractor will implement the following contingency measures:

- Shutdown and secure all water-based vessels from flooding conditions.
- Shutdown and secure all upland heavy equipment to the highest on-site elevation.
- If upland flooding is possible, secure (or removed from the site if possible) all chemicals and materials, including impacted material within staging areas. If it is not possible to remove, all dredged/dewatering sediment stockpiles should be covered with a plastic liner.

### 2.4.4 Medical Emergencies

The potential exists for an injury to a worker, including physical injuries, chemical injuries, and/or symptoms of chemical overexposure. The SHSO will be notified of all injuries, including those requiring first-aid treatment of any kind. Upon notification that a worker has

been injured, the SHSO will immediately determine the severity of the accident and whether the victim can be safely moved from the incident site. Local medical assistance will be requested immediately by contacting the Arconic Gate 1 ERTs if needed.

Minor injuries sustained by workers will be treated on-site using materials from the first-aid kits. Whenever possible, such treatment will be administered by trained personnel in a "clean" support zone. Minor injuries would not be expected to trigger implementation of the contingency procedures.

A major injury sustained by a worker will require professional medical attention. The SHSO will immediately contact the Arconic Gate 1 ERTs to request an ambulance and contact the hospital to which the injured worker will be transported. The SHSO will relay the following information to emergency responders:

- Nature of the injury
- Whether the injured worker will be decontaminated prior to transport
- A list of the chemicals the worker has been exposed to during on-site work
- When and where the injury was sustained
- The present condition of the injured worker (e.g., conscious, breathing)

Additional details on medical emergencies will be provided in the remedial contractor's HASP. Also, details on the nature of the contaminant and methods for treating exposure or injury can also be obtained from the appropriate SDSs.

### *2.4.5 On Water Emergencies*

A significant portion of work activities will be performed on the Grasse River; therefore, procedures will be put in place for on-water emergencies. The nature of the on-water emergencies could be similar to those listed in Sections 2.4.1 through 2.4.4, but the process of accessing on-water equipment or personnel is more challenging than if the events were to occur on land. Examples of these emergency situations could include man-over board, fires, spills, medical issues, lightning, high river flows, and disabled vessels. Additional water vessels dedicated to responding to on-water emergencies will also be provided by the remedial contractor.

All personnel working on a water vessel will be trained on shipboard safety and operation of emergency equipment. Watercraft and personnel will be equipped with safety equipment and emergency supplies to manage foreseeable problems, including the following:

- U.S. Coast Guard-approved personal floatation device (PFD)
- Throwable floatation devices capable of supporting an alert person in the water
- Mooring lines, signaling equipment, repair equipment, and boat hooks for floating barges
- Other equipment, including paddles or push probes, fire extinguishers, air horns, and emergency first-aid kits
- Basket-type stretcher with brindle and rope on docks or at least one piece of water equipment in active areas

The SHSO will be notified of all on-water emergencies. When any of these scenarios appear imminent or have occurred, all normal site activity will stop until the SHSO assesses the situation to determine if emergency responders should be contacted. Drills will be run for emergency water situations. These drills will be conducted with all personnel and in combination with the Massena Fire and Rescue staff, especially including man over-board, fire, and medical emergency drills.

## 2.5 Emergency Evacuation Procedures

Severe and uncontrolled emergency situations could result in emergency conditions that require site evacuation. All visitors to the site will require a site orientation, and this orientation will review site hazards and emergency procedures. If an emergency occurs that requires the evacuation of an on-site area to ensure personnel safety (e.g., fire, explosion, severe weather or hazardous waste/material spills, or a significant release of vapors into the atmosphere), an air horn or equivalent will be sounded on the site as directed by the SHSO. The SHSO will take charge of all emergency response activities and dictate the procedures to be followed until emergency personnel arrive. The horn will sound continuously for approximately 15 seconds, signaling that immediate evacuation of all personnel from the area is necessary. In areas where only two or three people are working side by side, and the need to evacuate can be communicated verbally by the nearest person aware of the event.

All heavy equipment in the area will be shut down, and in-water vessels will be immediately moved to land and secured. Visitors or observers and all non-essential personnel present in the area of an emergency will be instructed to evacuate the area immediately. The only personnel allowed to enter any area where an emergency is occurring will be emergency responders. Personnel are to avoid encountering smoke/gas plumes as practicable during evacuation and assembling. The evacuated workers will assemble at the area determined by the remedial contractor, where the SHSO will give directions for implementing necessary actions.

After initiating emergency response procedures, the SHSO will assign appropriate personnel to check and attempt to ensure access roads are not obstructed. If traffic control is necessary (e.g., in the event of a fire or explosion), personnel who have been trained in traffic control procedures will assume these duties until emergency responders arrive.

The SHSO will remain at the site to provide any assistance requested by emergency response personnel when arriving to deal with the situation. The SHSO has the authority to shut down any part or the entire project after an emergency, until the SHSO deems it safe to continue operations. The SHSO will dictate any changes in project safety practices that are made necessary by the emergency that has occurred or are required for preventing further emergencies.

If the SHSO determines human health beyond the site limits is at risk, the SHSO will notify the appropriate agencies and departments (e.g., Arconic and Gate 1 ERTs, USEPA, NYSDEC, SRMT police, and fire department) of the need, or potential need, to institute off-site evacuation procedures. Arconic will also work to develop a method to communicate with local river residents and SRMT community members in the event of an emergency that can have off-site impacts (potential methods could include voice or text messaging to a target group).

The SHSO will provide, at a minimum, the following information:

- Contact information
- Name and address of facility

- Time and type of incident (e.g., release, fire)
- Name and quantity of materials or materials involved, to the extent this information is known
- Extent of injuries, if any
- Possible hazards to human health or environment and cleanup procedures

After evacuation, all personnel will be accounted for at the designated assembly areas determined by the remedial contractor for a roll call. All personnel will be accounted for by name. All site personnel and visitors will be required to sign in upon entering the site.

# 3 CONTINGENCIES FOR CORRECTIVE ACTION EXCEEDANCES

This section outlines the contingency actions to be performed in the event of exceedances of the corrective action triggers established for noise, water, and air. The monitoring program to be conducted to obtain data necessary to evaluate the need corrective actions, along with the corrective action levels, are provided in the CQAP and EMP (Attachment D to the CQAP). If there is an exceedance of any of the corrective action levels, Arconic will implement the contingency actions outlined in Sections 3.1 through 3.3. In general, these actions may include increased monitoring efforts, operational changes, equipment or process modifications, and/or additional engineering controls.

## 3.1 Noise

As outlined in the CQAP, noise monitoring will be performed at the start of new construction activities or changes in mode of operation to assess levels. Changes in mode of operations during construction will be determined in coordination between the remedial contractor and Construction Manager. This decision will be made considering equipment to be used, any modifications, activities to be performed, and proximity to receptors. Any change in construction methods that will result in an increase in noise will require noise monitoring. The remedial contractor and Construction Manager will discuss the overall process and potential impacts to noise levels to assess the need for additional noise monitoring; this decision will be reviewed with USEPA, NYSDEC, and SRMT.

The program will include the use of a hand-held sound-level meter to measure levels between the construction activities and the nearest receptor. If levels are acceptable, routine noise monitoring would be performed monthly to assess overall project levels, and no other specific additional monitoring would be performed until a new activity begins or when the mode of operation changes significantly. However, if the monitoring shows sound levels above the noise criteria, the contingency measures outlined below will be implemented:

1. Evaluate the noise source(s) to confirm it is associated with project-related activities.
2. If confirmed to be project-related, conduct additional monitoring at a location closer to the nearest receptor to confirm results and re-assess the criteria. If the levels are again above the criteria, this will be considered an exceedance and further contingency measures will be required.

3. Review construction activities and conduct monitoring as needed to identify the noise source(s).
4. Once identified, the remedial contractor will then work to reduce the noise source(s) using various mitigation measures. The following mitigation measures could be employed:
   - Install noise-dampening devices on equipment, such as mufflers
   - Place noise barriers at or around the noise source(s) to block sound
   - Repair, replace, or retrofit equipment operating outside of the noise criteria
   - Relocate equipment or operations away from receptors
   - Install noise-deadening materials within material scows or material-handling portions of the staging area
   - Modify or reduce the speed of operations
5. Continue noise monitoring and mitigation measures until noise levels are within the specified criteria.

USEPA will be notified within 24 hours of a noise exceedance, and then kept informed throughout implementation of the mitigation measures and ongoing monitoring until receipt of final compliant monitoring results. Any additional changes to the construction activities will be documented for approval as described in the CQAP.

In the event of a community noise complaint, an investigation will be performed as soon as practical. The community liaison and contact information are included in Table 2-1. The investigation will include communication with the individual(s) making the complaint, review of the complaint to determine if the noise is attributable to the project, and implementation of additional noise monitoring, mitigation efforts, or modifications to construction as needed. All findings will be documented and discussed with USEPA, NYSDEC, and SRMT.

## 3.2 Water

As outlined in the CQAP and EMP, monitoring will be conducted daily in the water column and at downstream water intakes (Alcoa East intake and SRMT intake) during near shore debris removal and excavation, floodplain removal, backfilling, and capping. The program

will include turbidity monitoring via real-time meters at the intakes and sampling for total suspended solids (TSS) and polychlorinated biphenyl (PCB) analysis during dredging/associated activities and a portion of the capping activities. Advisory levels have been established to inform construction operations and adjustments, and corrective action levels were developed to determine potential community exposure and the need for corrective actions. The advisory levels will be assess based on results from the fixed upstream, near-field, and mouth (T71) stations. The corrective action levels will be assessed based on results from the fixed upstream (background)/downstream (far-field in the St. Lawrence River) or intake locations. TSS and PCB analytical results will be requested on an accelerated turn-around-time (TAT; target is 24 to 48 hours, but it may take 48 to 72 hours after collection). If turbidity, TSS, and PCB levels are acceptable, no mitigation measures will be required for construction activities. However, monitoring results above the advisory levels will trigger work review/evaluation and response actions, as appropriate. An evaluation will be conducted to assess the cause of the exceedance and the need for operational changes or other response actions. Such an evaluation may result in one or more of the following actions:

- Additional monitoring as necessary to investigate the cause of the exceedance such as collecting and analyzing individual grab samples from 0.2 and 0.8 times the total water column depth
- A review of work operations and best management practices (BMPs), including investigation of the cause of the exceedance
- Identification of possible operational adjustments or BMPs (to the extent practicable) to reduce the concentrations in the water column

Following such evaluation, Arconic will discuss with USEPA, NYSDEC, and SRMT whether operational changes or other response actions are warranted to address the exceedance of the advisory level. This may include active field refinements in operations or equipment while continuing operations. However, exceedance of the advisory levels at the near-field station will not result in a slowdown or shutdown of operations.

If the monitoring shows results above the corrective active levels, a construction work stoppage may be triggered along with examining the BMPs employed and making appropriate modifications. The contingency measures outlined below will be implemented:

1. Investigate the cause of the exceedance to confirm if it is associated with project-related activities.
2. If confirmed to be project-related, review the following day's monitoring data to assess if there is still an exceedance. If the levels are again above the criteria, this will be considered an exceedance and further contingency measures will be required.
3. If there is a continuing exceedance, the remedial contractor will then work to reduce the potential water source(s) using various potential mitigation measures. The following mitigation measures could be implemented:
   - Conduct general review of all in-water construction activities to determine if the cause of the water exceedance can be readily identified and corrected
   - Review debris removal, dredging, and backfilling operations, including tug and barge movements, and make adjustments as needed
   - Conduct additional monitoring and/or sampling (e.g., collecting and analyzing individual grab samples from 0.2 and 0.8 times the total water column depth)
   - Modify or reduce the speed of debris removal, dredging, and/or backfill placement
   - Install engineering control measures such as silt curtains (near shore areas only)
4. Continue water monitoring and mitigation measures until levels are within the specified criteria.

USEPA, NYSDEC, and SRMT will be notified by the next business day of a water exceedance, and then kept informed throughout implementation of the mitigation measures and ongoing monitoring until receipt of final compliant monitoring results. The notification email will be sent to the following Agencies and personnel:

- USEPA: Young Chang (chang.young@epa.gov)
- NYSDEC: David Tromp (david.tromp@dec.ny.gov), Randi Walker (randi.walker@dec.ny.gov), and Karen Woodfield (karen.woodfield@dec.ny.gov)
- NYSDOH: Scarlett McLaughlin (scarlett.mclaughlin@health.ny.gov)
- SRMT: Jay Wilkins (jay.wilkins@srmt-nsn.gov)

Any additional changes to the construction activities will be documented for approval as described in the CQAP.

## 3.3 Air

As outlined in the CQAP and EMP, air monitoring will be conducted during near shore debris removal and dredging, floodplain removal, contaminated sediment dewatering and processing, and landfill operations and material handling activities associated backfill or capping activities. The program will include daily particulate and volatile organic compound (VOC) monitoring via real-time meters during all activities and continuous air sampling for PCB analysis between the construction activities and the nearest receptor during dredging/associated activities. PCB analytical results will be requested on an accelerated TAT (target 48 hours, but may take 72 to 96 hours after collection). If levels are acceptable, no mitigation measures will be required for construction activities. However, if the monitoring shows particulate, VOC, or PCB levels above their respective criteria, contingency measures will be implemented. The contingency measures are bulleted below:

1. Investigate the cause of the exceedance to confirm if it is associated with project-related activities. This will include reviewing weather and site conditions to assess potential impacts to the meters and sampling equipment due to humidity or rain, or activities in the vicinity of the meter such as lawn mowing or weed trimming, and reviewing data from the upwind location. If the cause is confirmed to be project-related, this will be considered an exceedance and contingency measures will be required.
2. The remedial contractor will work to reduce the potential air source(s) using various potential mitigation measures. The following mitigation measures could be employed:
   - Increase dust-suppression efforts (e.g., water spray on roads)
   - Cover sediment within barges during transport from dredge area to staging area
   - Use sprung structures, wind screens, or other protective structures in staging area or around the barge
   - Modify or reduce the speed of operations
   - Modify dredging sequencing to place sediment with higher PCB concentrations at the bottom of the transport barge and then cover with sediment with lower PCB concentrations
   - Cover stockpiles or spray product (i.e., spray-on cover or biodegradable foam) on stockpiles at the staging area
   - Minimize time materials are stockpiled in the staging area

- Evaluate covers for trucks transporting materials to the secure landfill

3. Continue monitoring and mitigation measures until levels are within the specified criteria.

USEPA, NYSDEC, and SRMT will be notified by the next business day of an air exceedance, and then kept informed throughout implementation of the mitigation measures and ongoing monitoring until receipt of final compliant monitoring results. Any additional changes to the construction activities will be documented for approval as described in the CQAP.

# 4 REFERENCE

USEPA (U.S. Environmental Protection Agency), 2013. *Record of Decision.* Grasse River Superfund Site, Massena, St. Lawrence County, New York. April 2013.

# APPENDIX N
# ARMORED CAP BASIS OF DESIGN MEMORANDUM

## 1.0 OBJECTIVES

One component of the Remedial Options Pilot Study (ROPS) for the Grasse River includes the placement of an armored cap in a 1-acre area of the river (Alcoa Inc. [Alcoa], June 2004). The armored cap is designed to provide a high degree of protection against estimated bottom forces caused by velocities and associated turbulence anticipated to occur under the toe of a severe ice jam such as the one that occurred at T16 in spring 2003. The primary purpose of the armored cap component of the ROPS is to evaluate the implementability issues associated with the placement of such a cap in the lower Grasse River.

The armored cap consists of base, filter and armor layers, the respective functions of which are summarized in the following list:

- Base Layer – Acts as a "chemical barrier" to isolate the polychlorinated biphenyls (PCBs) in the in situ sediments from the overlying water column and the river biota
- Filter Layer – Provides hydraulic stability to the base and armor layers and minimizes upward migration of the base layer
- Armor Layer – Provides a physical barrier that protects the base layer (and hence, the in situ sediments) from estimated forces associated with certain river flow and ice jam-induced turbulence events

This memorandum summarizes the basis of design and specifications for the armored cap.

## 2.0 DESIGN ASSUMPTIONS

The primary function of the armored cap is to provide a physical barrier that isolates the in situ sediments from anticipated physical forces. These potential forces of concern may be caused by the following:

- Physical mixing of sediments by biological organisms
- High river flow
- Prop wash from boat traffic
- Wakes from boat traffic
- Ice jam-induced velocities and turbulence

The sand/topsoil cap design applied during the 2001 Capping Pilot Study (CPS) considered all of these phenomena with the exception of ice jam-induced turbulence because the scour potential of ice jams in the lower Grasse River was not known prior to the 2003 ice jam event. For this reason, ice jam-induced turbulence is considered to be a significant force that can affect the stability of sediments in portions of the lower Grasse River. The 2003 ice jam is believed to be the most severe ice jam in the Grasse River over the last 40 years (Alcoa, April 2004). As part of a turbulence modeling study (Alcoa, September 2004), several variations of the 100-year return frequency event (varying ice thickness, river flow and water depth) were modeled; however, none of these created a larger shear stress when compared to that produced by the 2003 ice jam event. Therefore, the 2003 ice jam was used as the design event for the ROPS armored cap design.

The processes associated with the movement and jamming of surface ice during the 2003 ice jam event, including the coupled dynamics of ice motion and water flow, as well as flow through and under the ice rubble, were modeled using the Clarkson University DynaRICE model (Alcoa, April 2004). Results from the DynaRICE model (water depth, ice thickness, and current velocity) were used as inputs to a turbulence model (STORM/CFD2000) to estimate the degree of turbulence generated by the rough undersurface of the ice jam. This undersurface was simulated using random variations of the mean ice thickness that was computed by the DynaRICE model for the 2003 event. The STORM/CFD2000 model predicts the turbulent flow conditions under the jam and allows for the evaluation of the total shear stress and effective velocity under the toe of the ice jam. The effective velocity is

not the actual current velocity underneath the toe of the ice jam; rather, it represents the velocity under free-surface flow that would produce a total shear stress on the sediment bed (or armor layer) equal to that caused by the combination of the actual velocity and the ice-induced turbulence beneath the ice jam. Five separate STORM/CFD2000 simulations were performed, each with a unique randomization of ice thicknesses.

The total shear stress and effective velocity under the toe of the jam calculated by the turbulence model varied spatially. For example, about 20% of the area under the toe was calculated to experience a shear stress of 147 dynes per square centimeter (dynes/cm$^2$) or greater, which equates to an effective velocity of about 6.6 feet per second (ft/sec). As shown in Table 1, the affected area drops rapidly as shear stresses above 147 dynes/cm$^2$ are considered. Note that these calculations are conservative in that they assume that the ice layer stays intact and does not disintegrate in response to the added turbulence and resulting flow velocity underneath it.

**Table 1**
**Estimated Total Shear Stress and Effective Velocity from the 2003 Ice Event**

| Affected Area Under Toe (%) | Total Shear Stress | | Effective Velocity (ft/sec) |
|---|---|---|---|
| | (dynes/cm$^2$) | (lb/ft$^2$) | |
| 20 | 147 | 0.30 | 6.6 |
| 10 | 207 | 0.43 | 7.8 |
| 5 | 277 | 0.58 | 9.1 |
| 1 | 455 | 0.95 | 11.6 |

Note:
For a given flow condition and random ice profile, the turbulence model (STORM/CFD2000) was used to simulate current velocity and near-bed turbulence (represented as turbulent kinetic energy [TKE]) underneath the jam on small spatial scales (about 1 meter). These two variables, predicted by STORM/CFD2000, are used to calculate the effective bed stress along the length of the ice jam toe, which is about 300 meters (980 feet) long. The Affected Area Under Toe is based on the predicted distribution of bed shear stresses and effective velocities for the 2003 ice event. These are based on the model predictions shown in Figures 7-3 and 7-4 in Appendix V Turbulence Memo of the 2004 Draft Addendum to the Comprehensive Characterization of the Lower Grasse River.
lb/ft$^2$: pound per square foot

## 3.0 ARMOR STONE DESIGN

The armor layer serves as the primary means of protecting the filter and base layers from physical forces such as ice jam-induced turbulence/scour. The armor stone design was developed using available guidance from the following sources: Hydraulic Design of Flood Control Channels (USACE, July 1991); Loose Riprap Protection (USDA, July 1989); ARCS Guidance (USEPA, September 1998); and Maynord and Oswalt (1993); Palermo et al. (June 1998); Palermo et al. (September 1998); and Palermo (March 2000).

Two approaches were considered for determination of stone sizes for the armored cap:

- Modified Shields equation (Maynord, August 1995), which uses the total shear stress results from the STORM/CFD2000 model (due to ice turbulence and shear effects), is used as the primary method.
- Isbash equation (USACE, July 1991), which uses the effective velocity (calculated from the total shear stress results from the STORM/CFD2000 model), is employed as an alternate method for comparison of the computed stone sizes.

### *a) Modified Shields Equation*

Initiation of motion of a non-cohesive sediment bed may be determined through use of the Shields curve, which specifies the critical Shields parameter ($\theta_{cr}$) as a function of the particle Reynolds number ($Re_*$).

$$\theta_{cr} = \frac{\tau_{cr}}{(\gamma_S - \gamma_W) D_{50}} \qquad \text{(Shields equation)}$$

$$Re_* = \frac{u_* D_{50}}{\nu} \qquad \text{(Reynolds number)}$$

where:

- $D_{50}$ – median particle diameter (ft)
- $\tau_{cr}$ – critical total bed shear stress (lb/ft$^2$)
- $\gamma_S$ – specific weight of sediment (pound per cubic foot [lb/ft$^3$])
- $\gamma_W$ – specific weight of water (62.4 lb/ft$^3$)
- $u^*$ – bed friction velocity (ft/sec)

- v – kinematic viscosity of water ($ft^2/sec$)

A full discussion of the Shields curve is presented in Van Rijn (1993).

The Shields curve is an initiation-of-motion relationship between shear stress and $D_{50}$ for a sediment bed (i.e., $\theta_{cr} = f(Re_*)$) that is fully mobile, which means that this relationship, as defined in the given equations, is not directly applicable for the armored cap design. Laboratory experiments, however, have shown that a family of Shields curves exists that correspond to varying degrees of bed mobility, ranging from fully mobile to negligible mobility (van Rijn, 1993). These results make it possible to modify the fully-mobile Shields curve such that it can be used for the armored cap design.

For the armored cap design, the Modified Shields shear stress equation is used (Hoffmans and Verheij, May 1997) to determine a median particle (or stone) size that is stable (i.e., immobile) for a particular bed shear stress.

$$\theta_{cr} = \frac{4\tau}{(\gamma_S - \gamma_W)D_{50}} \qquad \text{(Modified Shields equation)}$$

where:

- $D_{50}$ - Median stone diameter (ft)
- $\theta_{cr}$ - Critical Shields parameter (set equal to 0.05 for armored cap design)
- $\tau$ - Total shear stress (sum of the velocity-induced mean shear stress [$\tau_{mean}$] and the shear associated with turbulence [$\alpha$TKE ] as computed from the STORM/CFD2000 model) ($lb/ft^2$)
- g - Acceleration due to gravity (32.2 feet per square second [$ft/sec^2$])
- $\gamma_S$ – Specific weight of stone (165 $lb/ft^3$)
- $\gamma_W$ – Specific weight of water (62.4 $lb/ft^3$)

Transforming the Shields relationship from a fully mobile bed curve to an immobile bed curve is accomplished by incorporating the factor of four into the relationship. This transformation is illustrated on Figure 1.

In recommending scour protection for bridge piers, Hoffmans and Verheij (1997) found that maximum shear stress is increased by a factor of 4 over the undisturbed turbulent value near a cylinder:

$$\tau_{max} = 4\,\tau_{undisturbed}$$

If that substitution is made in the Critical Shields Parameter, then:

$$\theta_{cr} = \frac{\tau_{max}}{(\gamma_s - \gamma_w)D_{50}} = \frac{4\tau_{undisturbed}}{(\gamma_s - \gamma_w)D_{50}}$$

For turbulent flow conditions for armor stone sizing ($Re_*$ corresponding to 200; larger particles sizes, and/or fully turbulent flow), $\theta_{cr} = 0.05$, as shown in the following equation:

$$\theta_{cr} = 0.05 = \frac{4\tau_{undisturbed}}{(\gamma_s - \gamma_w)D_{50}}$$

Transforming the Shields relationship from a fully mobile bed curve to an immobile bed curve is accomplished by incorporating the factor of four into the relationship as shown in the previous equation.

$$\theta_{cr} = 0.0125 = \frac{\tau_{undisturbed}}{(\gamma_s - \gamma_w)D_{50}}$$

Use of the factor of four in the Modified Shields equation effectively translates the relationship from the original fully mobile bed curve (point A on Figure 1) to a point on an immobile bed curve (point B on Figure 1). The y-axis of Figure 1 represents the critical Shields parameter:

$$\theta_{cr} = \tau / [(\gamma_s - \gamma_w)\, D_{50}]$$

The x-axis represents the particle Reynolds number:

$$Re_* = u^* D / \nu$$

The symbol $u^*$ represents bed friction velocity, i.e., $u^* = (\tau/\rho)^{1/2}$, where $\tau$ is bed shear stress and $\rho$ is water density.

Using the Modified Shields equation for cap design results in the following:

$$4\theta_{cr} = 0.05$$

The equation is used to locate Points A and B on Figure 1 as follows. Assume that the design criteria are applied to the Shields curve shield, which means that Point A is located on Figure 1 at the intersection of the solid line (i.e., Shields curve) and $\theta_{cr}(A) = 0.05$. This intersection occurs at $Re_*(A) = 200$. The condition at Point B is $4\theta_{cr}(B) = 0.05$. Assuming that the same bed shear stress is applied at Points A and B (i.e., $\tau = \tau(A) = \tau(B)$, which means that $u^* = u^*(A) = u^*(B)$ ), then:

$$\theta_{cr}(A) = 4\ \theta_{cr}(B) = 0.05$$

which results in:

$$\theta_{cr}(B) = 0.0125$$

and:

$$D_{50}(B) = 4\ D_{50}(A)$$

which gives:

$$Re_*(B) = 4\ Re_*(A) = 800$$

Thus, Point B is at the intersection of $\theta_{cr}^{(B)} = 0.0125$ and $Re_*^{(B)} = 800$. As can be seen, the region of the Shields diagram corresponds to an immobile bed.

### *b) Isbash Equation*

The Isbash equation was developed by empirical observation of the stability of various rock sizes dropped into flowing water for the purpose of construction of in-stream structures. In cases where design of scour countermeasures incorporates water velocity as a parameter, the methods are generally based on the original Isbash equation. The United States Army Corps

of Engineers (USACE) HEC-23 notes that either Shields or Isbash stability criteria can be used as long as turbulence is accounted for in the velocity component. Due to the conservative nature of the Isbash equation, it is the recommended procedure for sizing scour protection around bridge piers and abutments (USDOT, March 2001). In this application, due to the inherent uncertainties associated with the stress-velocity transformations from the STORM/CFD2000 model, the Modified Shields method was used as the primary method for armor stone sizing. However, due to the traditional application of the Isbash method in stream and river scour situations, it was still retained as an "order of magnitude" check on the stone sizing resulting from the Modified Shields equation.

Using the Isbash equation, a mean stone diameter ($D_{50}$) can be calculated from effective velocity, specific weights of the stone and the water, and the Isbash constant.

$$D_{50} = \frac{V^2}{C^2\left(2g\frac{\gamma_S-\gamma_W}{\gamma_W}\right)} \qquad \text{(Isbash equation)}$$

where:

- $D_{50}$ - Mean stone diameter (feet)
- C - Isbash constant for non-turbulent flow (1.2)
- g - Acceleration due to gravity (32.2 ft/sec$^2$)
- $\gamma_s$ - Specific weight of stone (165 lb/ft$^3$)
- $\gamma_w$ - Specific weight of water (62.4 lb/ft$^3$)
- V - Effective velocity (ft/sec)

The total shear stress results from the STORM/CFD2000 turbulence model were used to calculate the effective velocity needed to solve the Isbash equation. Because the results from the STORM/CFD2000 model already account for turbulent conditions, a non-turbulent flow Isbash constant of 1.2 was used to calculate the mean stone diameter ($D_{50}$).

## Armor Stone Sizing Summary

Stone sizes were determined by calculating the stone sizes for the various hydrodynamic exceedances using both the Modified Shields and Isbash equations and then applying a factor of safety to conservatively increase the stone size. Relationships between armor stone sizes

($D_{50}$) and the percent of the capped area that might experience forces great enough to move the stone, as calculated for the two approaches using two different factors of safety (to account for uncertainties in data prediction), are summarized in Table 2.

The percentages (i.e., 10% and 20%) in Table 2 do not infer degree of damage, but rather indicate the percent of the area under the jam that is predicted to experience conditions in excess of that for which a given stone size is recommended by the individual design method(s). The relatively infrequent occurrence of the design event is also not reflected in these calculations. Further, the convergence of the river discharge and magnitude of the ice jam thickness that was modeled based on the 2003 ice jam event appear to be rare (Alcoa, April 2004). However, the precise frequency of the recurrence interval of such hydrodynamic forces and the interaction of the variations (in ice thickness and river discharge) on determining those forces are uncertain.

**Table 2**
**Armor Stone Size Comparison using Modified Shields and Isbash Equations for Three Different Factors of Safety**

| Affected Area Under the Toe (%) | Modified Shields Equation-Turbulent Flow ($D_{50}$ [inches]) | | | Isbash Equation ($D_{50}$ [inches]) | | |
|---|---|---|---|---|---|---|
| | FS=1.0 | FS=1.5 | FS=2.0 | FS=1.0 | FS=1.5 | FS=2.0 |
| 20 | 2.9 | 4.3 | 5.8 | 3.4 | 5.1 | 6.9 |
| 10 | 4.1 | 6.1 | 8.1 | 4.8 | 7.2 | 9.6 |
| 5 | 5.4 | 8.1 | 10.8 | 6.5 | 9.8 | 13.0 |

Notes:
FS: factor of safety

Armor stone sizing was optimized for design purposes by selecting an effective velocity at the upper end of the effective velocity distribution generated by STORM/CFD2000 for the 2003 ice scour event (a 90% value that corresponds to 10% of the affected area under the toe).

Due to the fact that the mechanics of ice jam-related sediment scour are not completely understood, the use of a factor of safety is justified for the Grasse River application. A factor of safety increases initial capital costs of the cap construction in an effort to minimize future

operation and maintenance (O&M) costs. Considering the uncertainties associated with the ice and turbulence effects modeling (i.e., variability and reliability of ice thickness, flow, ice melting, river bed roughness and recurrence assumptions), a factor of safety of 1.5 was selected.

Incorporating a factor of safety is not required in these equations. However, the use of a factor of safety is justified for this application due to the complex mechanics of ice jam-related sediment scour and considering the uncertainties associated with the ice and turbulence effects modeling (e.g., variability and reliability of ice thickness, flow).

Regarding the use of a safety factor of 1.5, the HEC-11 design guidance "Design of Riprap Revetments" states the following:

> *"Ice can affect riprap linings in a number of ways. Moving surface ice can cause crushing and bending forces as well as large impact loadings. The tangential flow of ice along a riprap lined channel bank can also cause excessive shearing forces. Quantitative criteria for evaluating the impact ice has on channel protection schemes are unavailable. However, historic observations of ice flows in New England rivers indicate that riprap sized to resist design flow events will also resist ice forces.*
>
> *"For design, consideration of ice forces should be evaluated on a case by case bases. In most instances, ice flows are not of sufficient magnitude to warrant detailed analysis. Where ice flows have historically caused problems, a stability factor of 1.2 to 1.5 should be used to increase the design rock size. Note: the selection of an appropriate stability factor to account for ice generated erosive problems should be based on the designer's experience."*

The stability factor is analogous to the safety factor because it is used to increase the calculated stone size.

Using a safety factor of 1.5 and allowing for hydrodynamic exceedance in approximately 10% of the capped area, the stone size for the armor layer ($D_{50}$) is approximately 6 inches using the Modified Shields equation, and 10% was selected as an appropriate balance between the stone size, armor layer thickness, and maintenance requirements. Note that this is actually equivalent to a hydrodynamic exceedance of less than 5% under the factor of safety = 1.0 scenario, as illustrated in Table 2. The objective in the armor stone sizing was therefore to optimize between the stone size and hydrodynamic exceedance probability in order to arrive at the final stone size.

The following relationship is then used to compute the weight of the median stone:

$$W_{50} = \frac{\pi \gamma_s D_{50}^3}{6}$$

where:

- $\gamma_s$ - Specific weight of stone (165 lb/ft$^3$)
- $D_{50}$ - Mean stone diameter (0.5 ft)

## Armor Layer Gradation

The gradation of the armor layer in the cap will affect its overall resistance to erosion and, thus, stones should be reasonably well graded throughout. Based on United States Department of Agriculture (July 1989) and USACE (July 1991) guidance, the suggested gradation for the armor layer is provided in Table 3.

**Table 3**
**Armor Layer Gradation**

| Gradation (%) | Diameter (in) | Weight (lb) |
|---|---|---|
| 80 to 100 | 10 | 50 |
| 40 to 60 | 7 | 17 |
| 10 to 20 | 3 | 1.3 |

## Armor Layer Thickness

Armor layer thickness is related to the stability of the cap. The USACE (July 1991) guidance suggests an armor stone thickness of 1.25 times the diameter of the largest stone (i.e., D100 - see Table 3), assuming well-controlled placement in water with adequate survey and coordination controls. Thus, a minimum armor layer thickness of 13 inches is recommended for hydraulic protection of the base layer and in situ sediments.

## 4.0 FILTER LAYER DESIGN

The filter layer protects the base material from hydraulic forces and helps to evenly distribute the load induced by placement of the armor stone layer. The Terzaghi-Vicksburg criteria (January 1943) are often used as guidelines in the design of a filter layer, as described in Mohan et al. (January 2000). Three criteria must be met to provide hydraulic stability between the armor and filter layers and the filter and base layers. These criteria are as follows:

Armor layer (A) and filter layer (F):

- $D_{15(A)} < 5D_{85(F)}$
- $20D_{15(F)} > D_{15(A)} > 5D_{15(F)}$
- $D_{50(A)} < 25D_{50(F)}$

Filter layer (F) and base layer (B):

- $D_{15(F)} < 5D_{85(B)}$
- $20D_{15(B)} > D_{15(F)} > 5D_{15(B)}$
- $D_{50(F)} < 25D_{50(B)}$

Note that these diameters correspond to the 15%, 50% and 85% passing sizes for the particular layer in consideration (i.e., filter layer or base layer).

Determined through an iterative process, the approximate filter layer gradation is shown in Table 4.

**Table 4**
**Filter Layer Gradation**

| Gradation (%) | Diameter (mm) |
|---|---|
| 80 to 100 | 15 |
| 40 to 60 | 7 |
| 10 to 20 | 4 |

The minimum filter layer thickness is equal to 25% of the armor stone layer thickness (USACE, July 1991), which in this case translates to a thickness of approximately 3 inches. To be conservative, a filter layer with a target thickness of 6 inches is recommended.

## 5.0 BASE LAYER DESIGN

The base layer was originally designed as part of the CPS and was assumed to be a sorptive cap comprising 12 inches of a 50/50 mix of sand and topsoil, the basis of design of which is presented in Alcoa (June 2002). The evaluation of the long-term effectiveness of this cap design is presented in Attachment A. The CPS base layer was designed in accordance with the guidance set forth by the United States Environmental Protection Agency (USEPA; Palermo et al., September 1998) and USACE (June 1998) to mimic the physical properties of the native sediments as far as practically possible. The cap thickness was determined through an evaluation of site-specific information so that the cap would provide the following:

- Physical isolation of PCBs in the sediment from the benthic environment
- Erosion protection (i.e., mitigate the resuspension and transport of sediments to downstream areas)
- Chemical isolation (i.e., reduce the flux of dissolved PCBs to the water column)

The design thickness of the physical isolation component is 5 inches and is based on the following: 1) the diversity and abundance of organisms that predominate the benthic community of the river; 2) review of published literature; 3) results of lead-210 ($^{210}Pb$) modeling in the surface sediments of the river; 4) USACE (June 1998) guidance; 5) and consolidation testing performed as part of the pre-engineering design studies (Alcoa, March 2001).

The design thickness of the erosion component is 1 inch and is based on conservative estimates of sediment scour predicted during a 100-year flood event[1] (via hydrodynamic and sediment transport modeling under non-ice conditions) and site-specific analysis of potential resuspension due to recreational boat activity in the river (i.e., prop wash; Alcoa, June 2002). Erosion during a more extreme flood event in the river is not expected to be substantially greater because the 1-in-500 year flood flow of 17,070 cfs is only 13% greater than the 1-in-100 year flow of 15,080 cfs (Federal Emergency Management Agency [FEMA], May 1980).

[1] For design of the erosion component, USACE (1998) guidance suggests the use one of two options: 1) erosion during a 100-year flood event; or 2) the net erosion over 20 years of normal current/wave energies. The design of the erosion component presented here uses the more stringent criterion of net erosion during a 100-year flood (Alcoa, June 2002).

The design thickness for the chemical isolation component is 6 inches. Although laboratory studies have demonstrated that very thin layers (1 to 8 millimeters [mm]) of materials can effectively reduce chemical flux from sediments to the overlying water column (Talbert et al., 2001), a conservative thickness of 6 inches was selected and evaluated using a one-dimensional transport model. Results of the evaluation, which included the effects of biological mixing, indicate that a 6-inch cap is sufficient to effectively reduce the diffusive PCB flux from the PCB-containing sediments to the overlying water column (Alcoa, June 2002 and Attachment A). It is important to note that conservative assumptions were employed in the design of each of the individual cap components and, when considered together, provide an additional protective component to the overall cap (base layer) design.

In accordance with the design guidance (Palermo et al., September 1998), the total thickness of the cap is the sum of the thicknesses required to achieve each of these objectives (i.e., 12 inches). Considering the stone sizes for the armor and filter materials, the base layer sizing presented in the CPS was coarsened slightly, relative to the design used in the 2001 CPS, so that the sand fraction would remain stable under the hydraulic forces considered, and the need for another filtering layer in between would be minimized. The modified base layer gradation is shown in Table 5. Note that since there was only a minor change in the gradation of the base layer, the chemical effectiveness of the base layer is not expected to change significantly, and hence the analysis presented in Attachment A is still valid for the modified layer.

**Table 5**
**Base Layer Gradation**

| Gradation (%) | Diameter (mm) |
|---|---|
| 80 to 100 | 2 |
| 40 to 60 | 0.6 |
| 10 to 20 | 0.2 |

It should be noted, that the physical and erosion components of the base layer are not essential in the ROPS design, since the functions of these layers would be met by the armor and filter layers. As such, Alcoa proposes that the base layer thickness be reduced to 6 inches for areas where the armor and filter layers would be placed above the base layer. For the

purposes of the revised Analysis of Alternatives Report that will be submitted following the completion of the ROPS, the base layer would remain as a 12-inch-thick layer for those alternatives that include areas of unarmored capping as a component.

## 6.0 FILTER LAYER DESIGN FOR AREAS WITHOUT A PLACED BASE LAYER

As described in the draft ROPS Work Plan (Alcoa, June 2004), the sand/topsoil base layer will only be placed in the upstream half of the armored cap test area. A base layer will not be placed in the downstream half of the test area to evaluate the application of armored capping for sections of the river that have elevated PCB levels at depth, but lower concentrations in the upper portion of the sediment column that may not require placement of the sand/topsoil base layer. For such a situation, the base layer is expected to have a gradation close to that presented in Table 6 below (determined based on the results of sediment samples collected in 2003 from the proposed armored cap area).

**Table 6**
**In-River Native Sediment Gradation**

| Gradation (%) | Diameter (mm) |
|---|---|
| 80 to 100 | 1.2 |
| 40 to 60 | 0.2 |
| 10 to 20 | 0.1 |

Considering this in-river native sediment gradation, a revised filter layer gradation has been determined per the filter design criteria presented in Section 4. The new filter layers for such a scenario are presented in Table 7.

**Table 7**
**Filter Layer Gradations for Armored Cap without a Placed Base Layer**

**Filter Layer 1**

| Gradation (%) | Diameter (mm) |
|---|---|
| 80 to 100 | 102 |
| 40 to 60 | 51 |
| 10 to 20 | 5 |

**Filter Layer 2**

| Gradation (%) | Diameter (mm) |
|---|---|
| 80 to 100 | 15 |
| 40 to 60 | 4 |
| 10 to 20 | 1 |

Note that two filter layers are needed to provide the necessary protection of the native sediments; a single filter layer cannot satisfy the filtering requirements as presented in the Terzaghi-Vicksburg criteria due to the very fine nature of the in-river native sediments.

The resulting minimum filter layer thickness is 6 inches, expected to comprise approximately 3 inches for filter layer 1 and approximately 3 inches for filter layer 2.

# 7.0 GEOTECHNICAL STABILITY ANALYSIS

An analysis was undertaken to assess the geotechnical stability of the in situ sediments under the stresses induced from placement of the armored cap.

## Summary of Geotechnical Test Results

Geotechnical sampling was conducted throughout the lower Grasse River in fall 2003 in accordance with the Phase II Work Plan (Alcoa, November 2003). Sampling consisted of collection of sediment cores by manually pushing 3-inch-diameter Lexan® tubes into the sediments until refusal. Sampling was conducted along six river transects, with three collection attempts performed along each transect at equally spaced intervals (see Figure 2). It should be noted that the lack of recoverable sediment precluded collection of cores at some targeted locations. The sediment core samples were transported to Camp, Dresser & McKee's (CDM's) geotechnical laboratory in Cambridge, Massachusetts (MA), for testing. Testing was conducted for the purpose of obtaining index, consolidation, and strength parameters of the sediment. Geotechnical test results are provided in Table 8 and summarized below.

In general, sediments between T5 and T17 consist of non-plastic, poorly-graded silty sand, and sand with little silt (Unified Soil Classification System [USCS] designations of SM and SP, respectively). The average water content of the sediment was 47%, with average bulk and dry densities of 101 and 71 pounds per cubic foot (lb/ft$^3$), respectively. Consolidation test results indicate that the sediments range from "slightly compressible" to "very slightly compressible," with compression index values ranging from 0.3 to 0.01. Strength test results indicate that sediment strength varied, with internal friction angles ranging from approximately 25 to 37 degrees.

Geotechnical test results indicate a difference between sediments collected from T5 though T17 and those collected from T37 through T60. In general, sediments collected from T37 through T60 consist of sandy silt (USCS - ML) with non-plastic fines. The average water content of the sediment tested was 186%, with average bulk and dry densities of 78 and 30 lb/ft$^3$, respectively. Test results indicate that these sediments are "very slightly compressible."

## Geotechnical Analysis for the Armored Cap

Since the ROPS is intended for implementation in the lower river between T1 and T20, only geotechnical parameters resulting from sediment cores collected from this area of the river are considered in the following analyses. In general, the native sediments will respond to the added stress from cap/armor materials depending on their unique strength, compressibility and slope stability properties. Note that the analysis presented herein is based on an armored cap (assumed to consist of 6 inches of sand/topsoil, 6 inches of gravel, and 13 inches of cobbles).

The bearing capacity of the native sediment is related to the strength of the sediment, which in turn supports the additional stress induced by placement of a cap/armor layer. Due to the relatively soft nature of the sediment, local and punching shear bearing capacity failure was considered in this analysis.

Note that a range of internal friction angles was used for this analysis to account for strength variation among the samples tested. The internal friction angle value will increase slightly after each lift is placed due to dissipation of pore pressures, which occurs rather quickly (estimated to be less than 24 hours for the SM-SP sediments). The factor of safety against a bearing capacity failure of the sediment under various cap/armor placement scenarios is summarized in Table 9.

**Table 9**
**Factor of Safety Summary against Bearing Failure for Armored Cap**

| Total Friction Angle, Φ (degrees) | 6-inch lift of sand/topsoil | Placement of 19- inch gravel and armor stone |
|---|---|---|
| 20 | 4 | 2 |
| 25 | 6 | 4 |
| 30 | 10 | 10 |

Estimates of native sediment consolidation under the impacts of a 25-inch armored cap placed on a 5-foot-thick layer of native sediment between T5 and T17 is less than 2 inches. Therefore, the effects of cap induced settlements are expected to be minimal.

## Geotechnical Analysis for the Armored Cap without a Placed Base Layer

For the armored cap placement proposed for the downstream portion of the ROPS armored cap area (i.e., without a sand/topsoil base layer), the geotechnical analysis presented above was recalculated assuming that the dual filter (described in Section 6) and armor layers will be placed directly on top of native sediments. The factor of safety against bearing capacity failure of the native sediment under the assumed armored cap placement scenario is summarized in Table 10 below. The assumed placement scenario represents placement of the 19-inch armored cap in three lifts (two 3-inch gravel lifts and one 13-inch cobble lift).

**Table 9**
**Factor of Safety Summary against Bearing Failure for Armored Cap**

| Total Friction Angle Φ (degrees) | 3-inch lift of gravel | 3-inch lift of gravel | 13-inch lift of armor stone |
|---|---|---|---|
| 20 | 6 | 7 | 3 |
| 25 | 8 | 15 | 7 |
| 30 | 15 | 35 | 15 |

This armored cap design would be placed in three lifts due to the varied gradation of the two filter layers and armor layer, and to take advantage of strength gains due to pore pressure relief as illustrated by the results presented in Table 10 (see FS increase between the two 3-inch filter layers).

Estimates of native sediment consolidation under the impacts of a 19-inch alternate armored cap placed on a 5-foot-thick layer of native sediment between T5 and T17 is less than 1.5 inches. Therefore, the effects of cap induced settlements are expected to be minimal.

## Summary of Geotechnical Analysis

Bearing capacity analyses indicate that sediments between T5 and T17 will support the proposed cap configuration. Placement of each of the individual layers (base/filter/armor) will allow sufficient time for porewater dissipation and subsequent strength gains.

The compressibility of sediment between T4 and T17 is low and settlement is anticipated to be minimal. Due to the granular nature of the sediment within this area of the river, the estimated settlement should occur rapidly (estimated to be less than 24 hours).

## 8.0 VALIDATION OF REQUIRED ARMOR STONE SIZING USING IN-RIVER OBSERVATIONS

A field diver program was implemented in 2004 with the objective of validating the required armor stone sizing in the river to protect against erosive forces resulting from ice jam events similar to the 2003 ice jam event. Diving was conducted in some areas of the river that were previously videotaped as well as areas whose bathymetry had changed following the 2003 ice jam event (Alcoa, April 2004). The field diver program had three objectives: 1) attempt to measure the size of the stones, along with their placement density; 2) determine what material type underlies the stones; and 3) record any unusual features.

Two dives were completed in the river: May 26 and August 27, 2004. During the May 2004 dive, the diver examined two locations: Site 1 was located approximately 250 feet downstream of the CPS area at T17 (center channel) within an area of scour as indicated by the bathymetric survey; and Site 2 was approximately 100 feet downstream of T16 toward the center channel (in Pilot Cell No. 4). Visibility during this dive effort was reportedly less than 2 inches, and as such observations mostly relied on touch. Sandy to silty materials were reported at Site 1, with no readily apparent stones present within the area explored by the diver. The side and bottom materials at Site 2 were mostly sandy. The diver observed some stones on the order of 1 foot in size along the bottom of the scour area. The diver was able to retrieve stones in the size range of 2 to 3 inches along the sloped area of the scour area at Site 2.

The second dive was conducted in the general area of Subcell No. 1D during August 2004 at a time when visibility in the river was somewhat clearer, but still less than 1 foot. Videotaping performed in Subcell No. 1D during June 2003 (Alcoa, April 2004) indicated the presence of stones of various sizes. Observations were made along approximately the general extent of Subcell No. 1D at an initial discrete location and subsequently in a line parallel to shore (starting downstream [at the downstream edge of Subcell No. 1C2] and continuing upstream [to approximately T15] through and past the original initial discrete dive location). Starting at the initial upstream location, the diver described the bottom of the river as being covered with 3 to 4 inches of fine (easily disturbed) sediment, beneath which was smooth bedrock. During the subsequent dive, starting at the most downstream location, the diver observed flat “brick shaped” rocks (a few inches in thickness) measuring approximately 0.5 feet by

1.0 feet. There was also approximately 1 foot of sediment at the downstream end. As the diver proceeded upstream, these rocks were no longer present. The diver did report 3- to 4-inch well-rounded stones in the sediment with no smaller stones present. The diver did not report any scour holes, nor did the boat's sonar identify any.

Given these observations, stone sizes in the range of 3 to 4 inches likely withstood the erosive forces resulting from the 2003 ice jam event. While it is recognized that these 2004 dive efforts may not have examined the entire area influenced by the 2003 ice jam event, it is likely that the most severely impacted areas (based on the 2003 bathymetry; Alcoa, April 2004) were observed. Based on these field measurements, it appears that the proposed armor layer (contained herein) for the lower Grasse River is sufficiently protective, if not conservative, for a scour event such as that associated with the 2003 ice jam.

## 9.0 MATERIAL SPECIFICATION SUMMARY

Considering the analyses presented above, the following approximate material specification is proposed for the armored cap (see Table 11). Note that these specifications will be reviewed with the selected contractor to verify that the specification is readily achievable with locally available materials. In the event that minor modifications are found to be necessary to the proposed specification, these will be reviewed with USEPA.

**Table 11**
**Approximate Material Specification for the Armored Cap (with a placed base layer)**

| Cap Component | Material Type | Minimum Thickness to be Achieved (in) | Material Gradation | | |
|---|---|---|---|---|---|
| | | | % | Diameter | Weight (lb) |
| Armor | Cobbles | 13 | 80 to 100 | 10 in | 50 |
| | | | 40 to 60 | 7 in | 17 |
| | | | 10 to 20 | 3 in | 1.3 |
| Filter | Gravel | 6 | 80 to 100 | 15 mm | N/A |
| | | | 40 to 60 | 7 mm | N/A |
| | | | 10 to 20 | 4 mm | N/A |
| Base | Sand/topsoil | 6 | 80 to 100 | 2 mm | N/A |
| | | | 40 to 60 | 0.6 mm | N/A |
| | | | 10 to 20 | 0.2 mm | N/A |

For the armored cap design without a placed base layer (i.e., placement of the filter and armor materials directly on top of the in-river native sediments), the following approximate specification is provided.

**Table 12**
**Approximate Material Specification for the Armored Cap (without a placed base layer)**

| Cap Component | Material Type | Minimum Thickness to be Achieved (in) | Material Gradation | | |
|---|---|---|---|---|---|
| | | | % | Diameter | Weight (lb) |
| Armor | Cobbles | 13 | 80 to 100 | 10 in | 50 |
| | | | 40 to 60 | 7 in | 17 |
| | | | 10 to 20 | 3 in | 1.3 |
| Filter Layer 1 | Gravel | 3 | 80 to 100 | 102 mm | N/A |
| | | | 40 to 60 | 51 mm | N/A |
| | | | 10 to 20 | 5 mm | N/A |

| Cap Component | Material Type | Minimum Thickness to be Achieved (in) | Material Gradation | | |
|---|---|---|---|---|---|
| | | | % | Diameter | Weight (lb) |
| Filter Layer 2 | Sand/topsoil | 3 | 80 to 100 | 15 mm | N/A |
| | | | 40 to 60 | 4 mm | N/A |
| | | | 10 to 20 | 1 mm | N/A |

Note that the armor stone specification summarized above represents some probability of the need to perform repairs on up to approximately 10% of the capped area, should an ice jam like the one that occurred in 2003 occur in the future (and assuming a factor of safety of 1.5). Note that if a factor of safety of 1.0 is considered, the same probability drops down to less than 5%. The above material specifications will be re-evaluated in the future as part of the revised Analysis of Alternatives Report, considering additional data and other information that may be available at that time.

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**Table 8**
**Summary of Geotechnical Test Results**

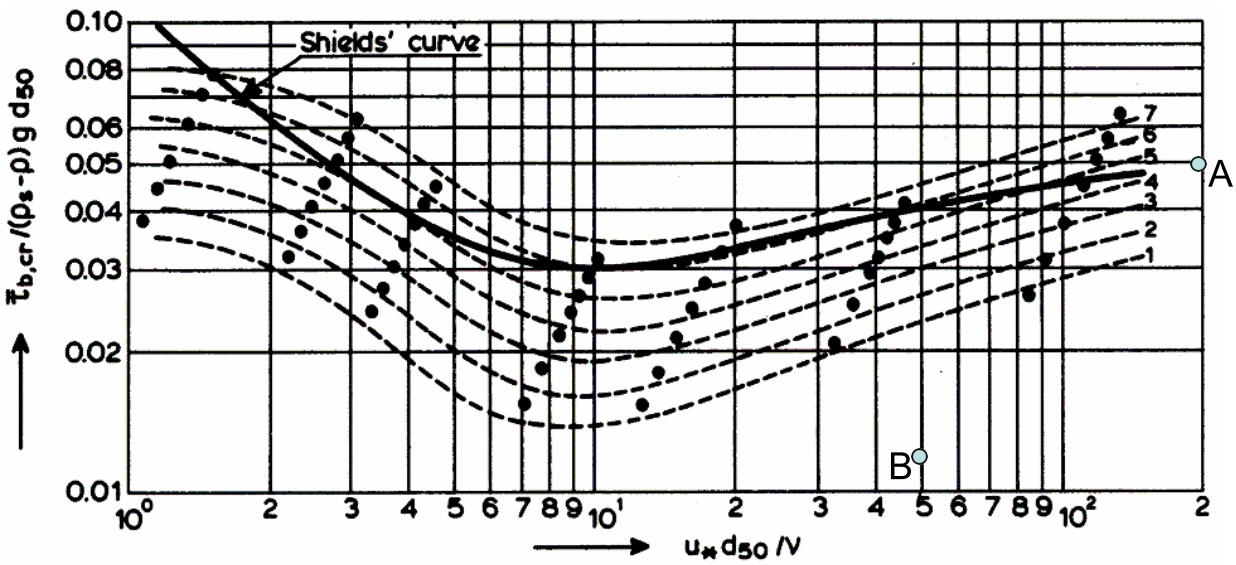
**Grasse River Study Area**
**Massena, New York**

| Sample ID | Total Core Depth (feet) | Sample Depth (feet) | Water Content (%) | Gravel (%) | Sand (%) | Silt (%) | Clay (%) | USCS | Atterberg Limits (ASTM D4318) | | Bulk Density ASTM D2937 ($lb/ft^3$) | Dry Density ($lb/ft^3$) | Sample Depth (feet) | Consolidation ASTM D2435 | | Peak Direct Shear Strength ASTM D3080 | | Residual Direct Shear Strength ASTM D3080 | | Sample Depth (feet) | CU Triaxial Test ASTM D4767 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | LL (%) | PL (%) | | | | CR | RR | Cohesion ($lb/ft^2$) | Friction Angle (degrees) | Cohesion ($lb/ft^2$) | Friction Angle (degrees) | | q at Rmax ($lb/in^2$) | Consolidation Stresses ($lb/in^2$) |
| T05 M | 2.3 | 1.2-1.8 | 29.5 | 0.6 | 96.4 | 2.1 | 0.9 | SP | | | 106.5 | 82.2 | | | | 126 | 29.5 | 84 | 28.2 | | | |
| T05 N | 3.7 | 1.3-1.8 | 22.7 | 0 | 96.5 | 3.3 | 0.2 | SP | | | 123.7 | 100.8 | | | | 64 | 36.7 | 94 | 24.1 | | | |
| T05 NA | | 3.1-3.7 | 53.9 | 0.1 | 81.2 | 17.7 | 1 | SM | | | 100.4 | 65.3 | | | | | | | | | | |
| T09 M | 3.3 | 0.6-1.0 | 26.2 | 1.7 | 89 | 7.9 | 1.4 | SP-SM | NP | NP | 96.3 | 76.3 | | | | 99 | 25.1 | 94 | 23 | | | |
| T09 N | 1.9 | 0.9-1.4 | 50.3 | 0.2 | 86.5 | 12.2 | 1.1 | SM | | | 102.4 | 68.2 | 1.5 | 0.1 | 0.007 | | | | | | | |
| T09 S | 2.5 | 0.6-1.1 | 36.1 | 2.5 | 73.5 | 23.2 | 0.8 | SM | | | 98 | 72 | | | | | | | | | | |
| T09 SA | | 2.0-2.5 | 71.7 | 0.4 | 68.4 | 30.8 | 0.4 | SM | | | 83.1 | 48.4 | | | | | | | | | | |
| T11 N | 1.2 | 0.5-1.0 | 26.6 | 0.1 | 97.2 | 2 | 0.7 | SP | NP | NP | 120.7 | 95.4 | 1.2 | 0.014 | 0.003 | | | | | | | |
| T17 M | 3.1 | 0.6-1.1 | 108.8 | 0.6 | 59.4 | 38.5 | 1.5 | SM | NP | NP | 83.7 | 40.1 | 1.2 | 0.151 | 0.012 | | | | | | | |
| T17 MA | 1.7 | 2.5-3.0 | 46.7 | 0.2 | 84.7 | 14.7 | 0.4 | SM | NP | NP | 95.9 | 65.4 | 1.7 | 0.312 | 0.024 | | | | | | | |
| T17 N | 1.5 | 0.4-0.9 | 48.6 | 1.2 | 76.1 | 21.5 | 1.2 | SM | NP | NP | 99.1 | 66.7 | 1.5 | 0.018 | 0.003 | | | | | | | |
| T17 NA | 1.9 | 1.8-2.3 | 44.5 | 0.2 | 87.8 | 11 | 1 | SP-SM | NP | NP | 103.6 | 71.7 | 1 | 0.246 | 0.018 | | | | | | | |
| T17 S | 2.3 | 0.7-1.2 | 51.6 | 0.2 | 87.8 | 11.4 | 0.6 | SP-SM | NP | NP | 102.3 | 67.4 | | | | | | | | | | |
| T37 M | 1.3 | 0.5-1.1 | 189.3 | 1.9 | 45.9 | 49.6 | 2.6 | ML | NP | NP | 73.9 | 25.6 | 0.3 | 0.289 | 0.015 | | | | | | | |
| T37 N | 1.3 | 1.8-2.3 | 64 | 1.4 | 7.5 | 90 | 1.1 | ML | NP | NP | 98.5 | 60.1 | | | | | | | | 0.4 | 2.31 | 3.8 |
| T37 S | 1.4 | 0.7-1.2 | 183.8 | 0 | 35.4 | 63.5 | 1.1 | ML | NP | NP | 75.6 | 26.6 | | | | | | | | 1.4 | 1.18 | 2 |
| T60 M | 0.8 | 0.1-0.4 | 232.3 | 0 | 24 | 74.5 | 1.5 | ML | NP | NP | 75.6 | 22.7 | | | | | | | | | | |
| T60 N | 1.7 | 0.2-0.7 | 221.3 | 0 | 36.7 | 62.5 | 0.8 | ML | NP | NP | 70.3 | 21.9 | 1.1 | 0.219 | 0.018 | | | | | | | |
| T60 S | 0.8 | 0.0-0.2 | 223.9 | 0 | 31.1 | 67.8 | 1.1 | ML | NP | NP | 75.8 | 23.4 | 0.5 | 0.217 | 0.018 | | | | | | | |

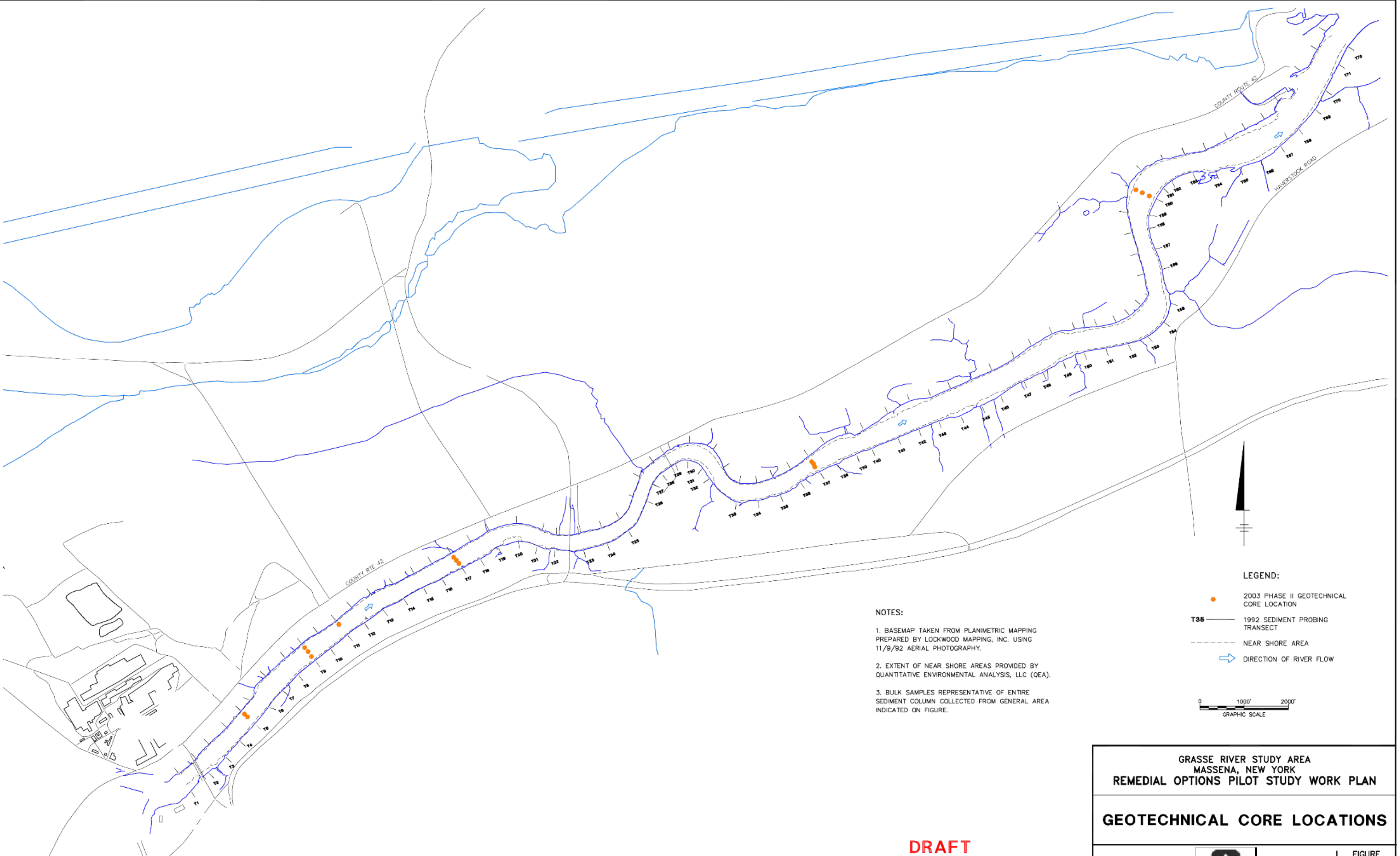
Notes:

1. Definitions: USCS - Unified Soil Classification System; LL - liquid limit; PL - plastic limit; $lb/ft^3$ - pounds per cubic foot; $lb/ft^2$ - pounds per square foot; $lb/in^2$ - pounds per square inch; SP - poorly graded sands; SM - silty sands; ML - silt with fine sand; NP - non-plastic; CR - compression ratio, RR - recompression ratio; q - maximum shear stress; R max - maximum obliquity; CU - consolidated undrained
2. Testing performed by CDM Geotechnical Laboratory located in Cambridge, MA.
3. Shear Vane (ASTM D4648) and Unconsolidated Undrained Triaxial (ASTM D2850) testing was intended, but could not be performed due to lack of undisturbed sample.
4. Sample collection locations are shown on Figure 2.
5. Sample identification as follows: N-north, S- south, M- middle, "A" (e.g., T17 NA) - split sample, lower depth.

**Figure 1**
**Shields Curve Transformation**
**(adapted from van Rijn, 1993)**




- ● measured
- 1 occasional particle movement at some locations
- 2 frequent particle movement at some locations
- 3 frequent particle movement at many locations
- 4 frequent particle movement at nearly all locations
- 5 frequent particle movement at all locations
- 6 permanent particle movement at all locations
- 7 general transport (initiation of ripples)




NOTES:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY.

2. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

3. BULK SAMPLES REPRESENTATIVE OF ENTIRE SEDIMENT COLUMN COLLECTED FROM GENERAL AREA INDICATED ON FIGURE.

DRAFT

X: 10476X00.DWG, 10476X04.DWG, 10476X01.TIF
L: ON=* OFF=*REF*
P: PAGESET/PLT-DL
6/2/04-SYR-85-NES LAF
10476004/WORKPLAN/10476G19.DWG

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
REMEDIAL OPTIONS PILOT STUDY WORK PLAN

## GEOTECHNICAL CORE LOCATIONS

ALCOA

FIGURE
C1

# APPENDIX O: ONE-DIMENSIONAL CHEMICAL ISOLATION MODELING GRASSE RIVER – FINAL DESIGN REPORT

**Prepared for**

ARCONIC

Arconic Inc.

**September 2018**

# TABLE OF CONTENTS

1 INTRODUCTION ..... 1

2 MODEL THEORY ..... 2

3 MODEL PARAMETERIZATION ..... 4

3.1 Sediment Bed Discretization ..... 6

3.1.1 Main Channel Armored Cap (T1 to T19) ..... 6

3.1.2 Main Channel Modified Armored Cap (T19 to T21) ..... 8

3.1.3 Main Channel Cap (T21 to T72) ..... 8

3.2 Sediment Bed Properties ..... 9

3.3 Mass Transport Processes ..... 9

3.4 Sorption Processes ..... 10

3.5 Initial Conditions ..... 11

3.6 Sedimentation ..... 12

3.7 Potential Cap Amendment Material for Chemical Isolation Layer ..... 13

4 CAP MODELING RESULTS ..... 15

4.1 Main Channel Armored Cap (T1 to T19) ..... 15

4.2 Main Channel Modified Armored Cap (T19 to T21) ..... 15

4.3 Main Channel Cap (T21 to T72) ..... 16

5 REFERENCES ..... 17

## List of Tables

Table O-1 Model Input Values ..... 4

Table O-2 Homolog-specific Partition Coefficients ..... 10

Table O-3 Development of PCB Profile for Initial Conditions ..... 11

## List of Figures

Figure O-1 Interpretation of Sediment Core Data for Sediment Bed Model

Figure O-2 Vertical Fraction Organic Carbon Profile (T1-T21)

Figure O-3 Vertical Fraction Organic Carbon Profile (T21-T72)
Figure O-4 Vertical PCB Profile (T1-T21)
Figure O-5 Vertical PCB Profile (T21-T72)
Figure O-6 PCB Homolog Distribution
Figure O-7 Variable Sedimentation Rate Function
Figure O-8 Adsorption of PCBs onto GAC Compared with Adsorption of PCBs onto Natural TOC
Figure O-9 Predicted Diffusive Flux of PCBs Through a 25-inch Cap to the Overlying Water Column (No Sedimentation)
Figure O-10 Predicted Diffusive Flux of PCBs Through an 18-inch Cap to the Overlying Water Column (No Sedimentation)
Figure O-11 Predicted Diffusive Flux of PCBs Through a 12-inch Cap to the Overlying Water Column (No Sedimentation)

## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| $\mu g/cm^2$ | micrograms per square centimeter |
| $\mu g/cm^2/year$ | micrograms per square centimeter per year |
| 1-D | one dimensional |
| cm | centimeter |
| cm/day | centimeter per day |
| cm/yr | centimeter per year |
| $cm^2/day$ | square centimeter per day |
| CPS | Capping Pilot Study |
| $f_{OC}$ | fraction organic carbon |
| $g/cm^3$ | grams per cubic centimeter |
| g/mL | grams per milliliter |
| GAG | granular activated carbon |
| IDR | Intermediate Design Report |
| $K_d$ | equilibrium partition coefficient |
| $K_{OC}$ | organic carbon partition coefficient |
| $K_{OW}$ | octanol/water partition coefficient |
| L/kg | liters per kilogram |
| $mg/cm^3$ | milligrams per cubic centimeter |
| mg/kg | milligram per kilogram |
| OC | organic carbon |
| PCB | polychlorinated biphenyl |
| TOC | total organic carbon |
| USACE | U.S. Army Corps of Engineers |

# 1 INTRODUCTION

A one-dimensional (1-D) model of the fate and transport of polychlorinated biphenyls (PCBs) in the sediment bed and overlying cap was developed to understand the extent to which the cap designed for the lower Grasse River would mitigate PCB flux from the underlying sediment into the water column over the long term. This evaluation of the long-term effectiveness of the caps proposed for the Grasse River was initially presented in the Grasse River Analysis of Alternatives Report (Alcoa, July 2012), and has been updated to reflect the cap design presented in the Intermediate Design Report, as well as sediment concentrations concurrent with the intermediate design.

This modeling analysis was conducted for the main channel armored cap (T1 to T19), main channel modified armor cap (T19 to T21), and main channel cap (T21 to T72). The model was run for each cap using two scenarios: 1) a scenario that considers continued sedimentation in the future; and 2) for comparative purposes, a scenario where sedimentation in the future is assumed to be zero. This modeling analysis considers the effects of the relevant processes identified in the U.S. Environmental Protection Agency and U.S. Army Corps of Engineers (USACE) cap design guidance documents (Palermo et al., September 1998; USACE, June 1998), including sorption, molecular diffusion, biological mixing, groundwater advection, mixing of cap materials and native sediments during placement, expulsion of porewater after cap placement, consolidation of the cap after placement, and sedimentation.

## 2 MODEL THEORY

The transport of PCBs within the sediment bed is described using Equation 2-1. The first term represents the dispersive flux of total PCBs (particulate + dissolved components) to simulate biological activity in surface sediments, as well as the propagation of water turbulence into the bed. The second term describes the diffusive flux of dissolved PCBs within the bed and below the region of particulate mixing. The third term represents the flux of dissolved PCBs through the sediment bed due to groundwater advection. The last term represents the net sedimentation of solids onto the sediment bed.

$$\frac{\partial C_T}{\partial t} = \frac{\partial}{\partial z}\left(E_{disp}\frac{\partial C_T}{\partial z}\right) + \frac{\partial}{\partial z}\left[D_s\frac{\partial C_d}{\partial z}\right] - \frac{\partial v_z C_d}{\partial z} - \frac{\partial u_z C_T}{\partial z} \qquad (2\text{-}1)$$

where:

| | | |
|---|---|---|
| $C_T$ | = | total PCB concentration (sediment and porewater) (milligrams per cubic centimeter [mg/cm$^3$]) |
| $t$ | = | time of simulation (days) |
| $z$ | = | segment depth (cm) |
| $E_{disp}$ | = | dispersion coefficient (square centimeters per day [cm$^2$/day]) |
| $D_s$ | = | molecular diffusion coefficient (cm$^2$/day) |
| $C_d$ | = | dissolved PCB concentration in porewater (mg/cm$^3$) |
| $v_z$ | = | groundwater seepage velocity (cm/day) |
| $u_z$ | = | sedimentation rate (cm/day) |

In solving this equation, the dissolved phase PCB concentrations were computed assuming equilibrium partitioning. They were calculated as the product of the total PCB concentration ($C_T$) and the fraction of the total that is in dissolved form ($f_d$):

$$C_d = C_T f_d \tag{2-2}$$

where:

$$f_d = \frac{1}{\theta + K_{OC} f_{OC} \rho}$$

and:

| | | |
|---|---|---|
| $f_{OC}$ | = | fraction organic carbon [OC] in the sediments (grams OC/gram sediment) |
| $K_{OC}$ | = | OC partition coefficient (cubic centimeters per gram OC) |
| $\rho$ | = | bulk density of the sediments (grams per cubic centimeter) |
| $\theta$ | = | porosity of the sediments (unitless) |

# 3 MODEL PARAMETERIZATION

Model coefficients and input parameters were defined using a combination of site-specific information, available literature, and modeling experience on other systems in an effort to provide an accurate representation of conditions in the lower Grasse River.

The following site-specific data were used:

- Homolog-specific partition coefficients determined through laboratory experiments using Grasse River sediments
- Average vertical profiles of PCB concentration, total organic carbon (TOC), and dry density based on sediment core data
- An average PCB homolog distribution derived from Grasse River sediment core data
- An average groundwater advection rate based on field-measured seepage velocities
- Post-placement cap material characteristics based on data generated during the 2001 Capping Pilot Study (CPS)

**Table O-1**
**Model Input Values**

| Model Parameter/Process | Value | Description |
|---|---|---|
| Molecular diffusion coefficient ($cm^2$/day) | 0.21 | Based on porosity estimates for Grasse River sediments |
| Homolog-specific partition coefficients (L/kg) | Table O-2 | Based on results of laboratory studies using Grasse River sediments |
| Bed dispersion (i.e., mixing) ($cm^2$/day) | Main channel cap and main channel modified armor cap: varied in top 10 cm, zero below 10 cm; Main channel armored cap: zero throughout | Based on conservative estimate of particle mixing used in PCB fate model; Presence of the armor material inhibits mixing |
| **Native Sediment** | | |
| PCB concentration profile (mg/kg) | Varies with depth | Based on average vertical PCB profile computed using sediment cores collected from 2003 to 2015 (T1 to T21) and 2000 to 2015 (T21 to T72) |

| Model Parameter/Process | Value | Description |
|---|---|---|
| PCB homolog distribution (%) | Homolog-specific | Based on average PCB homolog distribution computed from sediment cores collected from 2003 to 2015 (T1 to T21) and 2000 to 2015 (T21 to T72) |
| Organic carbon fraction | Varies with depth | Based on average depth profile computed from data from 2003 to 2015 (T1 to T21) and 2000 to 2015 (T21 to T72) |
| Dry bulk density (g/cm$^3$) | T1-T21: 0.96<br>T21-T72: 0.68 | Represents average of sediment core data from 2003 to 2015 (T1 to T21) and 2000 to 2015 (T21 to T72) |
| **Cap Material** | | |
| PCB concentration profile (mg/kg) | Within bottom 2 inches of cap, where mixing may be expected: 4.3% of surface sediment PCB concentrations. Zero in the remainder of the cap | Based on observations made during Capping Pilot Study |
| Organic carbon fraction (%) | Isolation material: 1; Habitat/erosion protection layer: 0.4; Armor/filter material: 0.01 | Isolation material and armor/filter material based on average TOC of in-place cap (pilot cells; 2001 and 2002)<br>Habitat/erosion protection layer TOC is consistent with final design target 1% organic content (0.4% TOC) |
| Dry bulk density of cap material (g/cm$^3$) | 1.84 for sand;<br>2.00 for cobble and gravel | Reflective of the values to be expected from borrow source locations. |
| **Deposition** | | |
| Future sedimentation rate (cm/year) | Zero | Conservative estimate of long-term PCB flux from cap |
| | Exponential decline from 0.15 to near zero | Developed a function to simulate sedimentation of 5 feet in river (amount of sedimentation required to achieve estimated equilibrium water depth of 8 feet) |
| **Consolidation** | | |
| Effect on cap thickness | 1 inch for 12-inch cap; 0.5 inch for 6-inch cap | Cap thickness reduced to 11 inches (for 12-inch cap simulation) to reflect one inch of consolidation, as observed during Pre-Engineering Cap Design Studies |
| Porewater expulsion | Accounted for in PCB levels in mixing layer | Considered as part of the initial PCB concentration in the bottom of the cap material as derived from cores collected |

| Model Parameter/Process | Value | Description |
|---|---|---|
| | | during the 2001 and 2002 Capping Pilot Study monitoring programs. The PCB levels measured in these post-placement cores reflect the combination of mixing of cap material and underlying sediments, and porewater expulsion. (see Mixing During Cap Placement, below) |
| **Mixing During Cap Placement** | | |
| Extent of mixing (inches) | 2 inches | Mixing depth based on results of sediment core data collected during the Capping Pilot Study (2001 and 2002) |
| PCB levels in mixing layer (% of total PCB) | 4.3 | Based on sediment core data collected during 2001 and 2002 Capping Pilot Study monitoring program (computed as average ratio of PCB concentration in the bottom 2 inches of cap to PCB concentration in the top 3 inches of the sediment being capped). |
| Groundwater Seepage (cm/day) | 0.002 | Based on average groundwater seepage rate measured in river (1998, 1999, and 2002). |

Notes:
cm = centimeter
$g/cm^3$ = grams per cubic centimeter
g/mL = grams per millimeter
L/kg = liters per kilogram
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
TOC = total organic carbon

## 3.1 Sediment Bed Discretization

### *3.1.1 Main Channel Armored Cap (T1 to T19)*

The sediment bed model for the 25-inch armored cap simulation was constructed to represent a cap consisting of 13 inches of cobble over 6 inches of gravel and 5.5 inches of sand chemical isolation material placed on top of 6 feet of native sediment (a total of 96.5 inches, or 245 cm). A chemical isolation layer thickness of 5.5 inches was selected to represent the post-consolidation thickness of a 6-inch layer placed in the river, based on results of the pre-engineering design studies (Alcoa, March 2001). Expulsion of porewater during consolidation was not explicitly modeled, but was accounted for by using post-capping cap PCB data from the CPS to establish the initial PCB concentrations in the cap

material. The PCB levels measured in these post-placement cores reflect the combination of mixing of cap material and underlying sediments, and porewater expulsion. The native sediment depth of 6 feet (i.e., 72 inches) was based on the maximum sediment depth observed in the cores collected between 1997 and 2002, and is consistent with the current design. In the model, the cap and sediment bed were represented by a total of 982 layers, each 0.25 cm (0.1 inch) thick.

Data from more than 500 sediment cores were used to characterize the native sediments represented in the 1-D model. Most of the sediment cores collected from the lower Grasse River were segmented into the following sample intervals: 0 to 3 inches or 0 to 6 inches; 3 to 12 inches or 6 to 12 inches; and every 6 inches thereafter, down to a maximum depth of 72 inches. Some cores have also been segmented in 1-cm intervals to evaluate the PCB vertical profile at a high resolution. Because the segmentation schemes employed in the sediment surveys and the 1-D model differed, the following procedure was developed so the parameterization of the sediment bed model accurately represented the sediment data:

- Cores segmented in 1-cm intervals (i.e., high resolution) were collapsed, as appropriate, into equivalent 0- to 3-inch, 3- to 12-inch, 12- to 24-inch, 24- to 36-inch, 36- to 48-inch, 48- to 60-inch, and 60- to 72-inch intervals. For example, samples from the top 7.6 cm were averaged to represent the 0- to 3-inch interval; samples collected between 7.6 and 30.5 cm were averaged to represent the 3- to 12-inch interval.
- Concentrations representative of two sample intervals were applied to both intervals (e.g., concentrations of a 0- to 6-inch layer were averaged into both the 0- to 3-inch and 3- to 6-inch sample intervals).
- The average value for each sample interval was then used to define the equivalent interval in the model. For example, the average PCB concentration in the 0- to 3-inch interval (based on data) was applied to each of the top 30 model segments (each at 0.25 cm thick, for a total of 3 inches).

This procedure was used to develop PCB and OC inputs for the native sediments in the model.

### 3.1.2 Main Channel Modified Armored Cap (T19 to T21)

The sediment bed model for the 18-inch armored cap simulation was constructed to represent a cap consisting of 12 inches of gravel and 5.5 inches of sand chemical isolation material placed on top of 6 feet of native sediment (a total of 89.5 inches, or 227 cm). A chemical isolation layer thickness of 5.5 inches was selected to represent the post-consolidation thickness of a 6-inch layer placed in the river, based on results of the pre-engineering design studies (Alcoa, March 2001). Expulsion of porewater during consolidation was not explicitly modeled, but was accounted for by using post-capping cap PCB data from the CPS to establish the initial PCB concentrations in the cap material. The PCB levels measured in these post-placement cores reflect the combination of mixing of cap material and underlying sediments, and porewater expulsion. The same sediment bed discretization scheme for the native sediments used in the armored cap simulation was used here. In the model, the cap and sediment bed were represented by a total of 911 layers, each 0.25 cm (0.1 inch) thick. PCB and OC inputs were consistent with Main Channel Armored Cap (T1 to T19).

### 3.1.3 Main Channel Cap (T21 to T72)

The sediment bed model for the 12-inch cap simulation was constructed to represent an 11-inch cap placed on top of 6 feet of native sediment (a total of 83 inches, or 211 cm). A cap thickness of 11 inches was selected to represent the post-consolidation thickness of a 12-inch cap placed in the river; 1 inch of consolidation was used based on results of the pre-engineering design studies, which indicated 0.5 inch of consolidation for a 6-inch cap (Alcoa, March 2001). Similar to the armored cap simulation, the effect of porewater expulsion was implicitly included by use of the post-capping PCB data from the CPS to establish the initial PCB concentrations in the cap material. The PCB levels measured in these post-placement cores reflect the combination of mixing of cap material and underlying sediments, and porewater expulsion. Additionally, the same sediment bed discretization scheme for the native sediments used in the armored cap simulation was used here. In the model, the cap and sediment bed were represented by a total of 845 layers, each 0.25 cm thick (0.1 inch; Figure O-1).

## 3.2 Sediment Bed Properties

Sediment properties needed to simulate PCB flux through the cap include bulk density and fraction OC. Measured dry bulk densities in the native sediments range from about 0.04 to 2.8 grams per milliliter ($g/cm^3$) and do not exhibit any clear trend with depth. The average dry bulk density from all sediment samples collected from T1 to T21 (0.963 $g/cm^3$) was assumed for native sediments upstream of T21 in the model. The average dry bulk density from all sediment samples collected from T21 to T72 (0.684 $g/cm^3$) was assumed for native sediments downstream of T21 in the model.

OC levels in the native sediments exhibit variability at depth, with average OC ranging from approximately 2% to 6%. Vertically varying OC levels were input in the model using the procedure described in Section 3.1. Vertical OC profiles are shown in Figure O-2 for T1 to T21 and Figure O-3 for T21 to T72. The OC fraction in the cap material was based on data collected during 2001 and 2002 as part of the CPS. An average OC fraction of 1% was computed from these data and applied to the isolation cap material. The OC fraction in the armor and filter material was set to a nominal percentage of 0.01%.

## 3.3 Mass Transport Processes

PCBs are transported within the sediment and through the cap by molecular diffusion within porewater, bulk mixing (i.e., dispersion), and groundwater advection. The molecular diffusion coefficient ($D_s$) was set to 0.21 $cm^2$/day based on the molecular diffusivity for total PCBs in aqueous solution, adjusted for the tortuosity of the sediment bed. This value was computed using available literature and the average sediment porosity estimated from dry bulk density and percent moisture data collected between 1997 and 2002.

The dispersion coefficient characterizing the mixing of sediment caused by bioturbation and shear stress at the sediment-water interface was based on values applied in the PCB fate model developed for the lower Grasse River (Alcoa, April 2001) and modeling experience on other river systems. A dispersion coefficient ($E_{disp}$) that approximates complete mixing ($4.32 \times 10^{-2}$ $cm^2$/day) was applied to the top 5 cm and declined to a value of $8.64 \times 10^{-4}$ $cm^2$/day at a 10-cm depth and zero thereafter. Mixing sediments to a depth of 10 cm is a conservative assumption, as $^{210}Pb$ data obtained for the 1997 high-resolution sediment cores

indicate a mixing depth of a few centimeters (Alcoa, April 2001). For the armored cap, mixing due to bioturbation was set to zero to reflect the fact that the armor and filter layers of the cap would prohibit biological activity from reaching the isolation layer.

Groundwater advection was estimated using groundwater seepage rate measurements collected in the lower Grasse River in 1998, 1999, and 2002. An average upward flowing (i.e., from the sediment bed to the water column) Darcy velocity of 0.002 cm/day was calculated from these data and used in the model. This value was held constant for the duration of the simulation.

## 3.4 Sorption Processes

The OC partition coefficient ($K_{OC}$) was based on the partition coefficients measured in laboratory batch equilibration studies conducted using Grasse River sediments (Alcoa, March 2001). The OC partition coefficients determined from these studies are similar to the octanol/water partition coefficient ($K_{OW}$) values reported by Mackay et al. (1992), except for hepta- and octa-chlorobiphenyls, which are lower relative to the published study. The use of the lower $K_{OC}$ values for hepta- and octa-chlorobiphenyls in the modeling simulations provides a conservative overestimate of the diffusive flux of these homologs through the cap.

**Table O-2**
**Homolog-specific Partition Coefficients**

| Homolog | Log $K_{OC}$ (L/kg) | Log $K_{OW}$ (L/kg)[1] |
|---|---|---|
| Mono- | 4.6 | 4.7 |
| Di- | 4.9 | 5.1 |
| Tri- | 5.7 | 5.5 |
| Tetra- | 6.1 | 5.9 |
| Penta- | 6.4 | 6.3 |
| Hexa | 6.6 | 6.7 |
| Hepta | 6.6 | 7.1 |
| Octa | 5.9 | 7.5 |

Notes:
1 Mackay et al. (1992)
$K_{OC}$ = organic carbon partition coefficient
$K_{OW}$ = octanol/water partition coefficient
L/kg = liters per kilogram

## 3.5 Initial Conditions

PCB levels in Grasse River sediments exhibit a general increase with depth (Alcoa, April 2001). Vertical PCB patterns for the T1 to T21 and T21 to T72 cap areas were characterized using the sediment core data collected within each cap area. The vertical patterns were developed based solely on cores with data at depth (i.e., greater than 12 inches), consistent with the method described in Section 3.1. PCB levels average about 15.2 mg/kg in the T1 to T21 sediments (0 to 3 inches) and 11.6 mg/kg in the T21 to T72 sediments (0 to 3 inches). At depth, PCB concentrations generally range from 100 to 200 mg/kg in the T1 to T21 cap areas and between 40 to 80 mg/kg in the T21 to T72 cap area.

These vertical profiles were then adjusted to represent the average sediment PCB concentration observed in each cap area using all 0- to 3-inch sediment data.[1] In other words, the vertical profiles were adjusted by multiplying the PCB levels in each sample interval of the profile by the ratio of the length-weighted average 0- to 3-inch concentration (using all data) divided by the average 0- to 3-inch concentration (using cores only), as shown in Table O-3. The final "adjusted" PCB profiles for T1 to T21 and T21 to T72 are shown in Figures O-4 and O-5, respectively. PCB profiles for T1 to T21 were used for the Armored Cap area (T1 to T19) and the Modified Armored Cap area (T19 to T21).

**Table O-3**
**Development of PCB Profile for Initial Conditions**

| Cap Type | Surface PCB Concentration (mg/kg) | | Ratio Applied to Full Profile |
|---|---|---|---|
| | Cores with Data at Depth (>12 inches) Only | All Data (Includes Surficial-only Samples) | |
| Armored Cap (T1-T19) | 15.2 | 12.3 | 0.81 |
| Modified Armored Cap (T19-T21) | 15.2 | 12.3 | 0.81 |

[1] The average 0- to 3-inch sediment PCB concentrations for the cap areas were based on a length-weighted analysis of all available 0- to 3-inch sediment PCB data collected within the cap footprint as presented in this IDR.

| Cap Type | Surface PCB Concentration (mg/kg) | | Ratio Applied to Full Profile |
|---|---|---|---|
| | Cores with Data at Depth (>12 inches) Only | All Data (Includes Surficial-only Samples) | |
| Main Channel Cap (T21-T72) | 11.6 | 18.4 | 1.59 |

PCB levels in the cap material were defined using sediment core data collected in 2001 and 2002 as part of the CPS monitoring program. PCB levels in cap material samples collected during the study indicate a cap material-native sediment mixing depth of 2 inches or less (Alcoa, April 2002). This mixing was simulated in the model by assigning a PCB concentration to the bottom 2 inches of the cap, which was estimated to be 4.3%[2] of the sediment PCB concentration in the top 3 inches of the native sediments being capped based on the available data from the CPS. Therefore, PCB concentrations of 0.53 mg/kg (i.e., equal to 4.3% of 12.3 mg/kg) and 0.79 mg/kg (i.e., equal to 4.3% of 18.4 mg/kg) were applied to the bottom 2 inches of the cap in the model in the T1 to T21 and T21 to T72 regions, respectively. PCB concentrations in the cap material above this 2-inch mixing layer were set to zero, because PCB levels measured above the cap-sediment interface in 2001 and 2002 were typically non-detect.

PCB concentrations in the cap and native sediments in the model were defined for each of the PCB homologs using the distribution presented in Figure O-6. This average PCB composition was computed using all of the 0- to 3-inch sediment PCB data collected between 2000 and 2015. This PCB composition was held constant during the 5,000-year simulation period.

## 3.6 Sedimentation

Two scenarios regarding future sedimentation were evaluated during the cap modeling studies: 1) a scenario that considers continued sedimentation in the future, as recommended by Dr. Palermo during the USACE review of the 2001 Draft Analysis of Alternatives Report

[2] This value was computed as follows: 1) where appropriate, PCB levels below detection were set to half the detection limit; 2) the ratio of the PCB concentration in the bottom 2 inches of the cap material to the PCB concentration in the 0- to 3-inch native surface sediment interval was computed for each sediment core collected during the 2001 and 2002 CPS monitoring programs; and 3) the ratios computed for the 2001 and 2002 cores were combined, and an average value was computed.

(Palermo, July 2002); and 2) for comparative purposes, a scenario where sedimentation in the future is assumed to be zero.

Contemporary sedimentation rates in the lower Grasse River are estimated to be about 0.15 cm/year (Alcoa, April 2001). The sedimentation rate in the river is expected to decline in the future as water column depths in the river approach steady state values (i.e., water depths that result in no net deposition or resuspension). Although these steady state water depths are not known, the absence of soft sediments at sediment probing T1 and T2 (as measured in 1992) indicates the deposition of soft sediments is not occurring at these locations. The average water depth at these transects is about 8 feet, approximately 5 feet shallower than the average water depth for the lower river (i.e., 13 feet). Therefore, a sedimentation rate function was developed to simulate the reduction in sedimentation, on average, that would result in approximately 5 feet of deposition over the river bottom during the 5,000-year simulation period. This function is presented in Figure O-7.

## 3.7 Potential Cap Amendment Material for Chemical Isolation Layer

This evaluation was performed assuming 1% fraction OC ($f_{OC}$), which was based on average TOC of the in-place cap within the CPS pilot cells (2001 and 2002). This $f_{OC}$ in the cap material can be achieved with 50:50 topsoil and sand mixture or active amendments, such as granular activated carbon (GAC), anthracite, or organoclay. It was determined that 400 acres of topsoil would be needed to achieve 50:50 topsoil and sand mixture. Because of the large volume of topsoil required, GAC was evaluated as an alternate amendment. Because a linear relationship between transport and the partition coefficient exists (i.e., for TOC, $K_d = K_{OC} \times f_{OC}$), alternate sources of OC (i.e., sorbent) can be evaluated based on the partition coefficient.

A review of available literature was conducted to understand differences in adsorption of PCBs onto GAC as compared to natural TOC (i.e., $K_{OC}$). Data from a number of sources were evaluated (Hale et al., 2010; Arp et al., 2009; McDonough et al., 2008; Zimmerman et al., 2004; Jonker and Koelmans, 2002); partition coefficients describing partitioning of PCB congeners onto GAC were compared with the $K_{OC}$ describing partitioning of congeners onto TOC, as shown in Figure O-8. A fairly wide range of sorption coefficients were reported in

the literature. For the purposes of this evaluation and to be conservative, the lower end of the range observed in the literature was used. These data indicate adsorption of PCBs onto GAC is at least 10 times stronger than adsorption of PCBs onto natural TOC; therefore, a GAC dose of approximately 0.1% (dry-weight basis) is expected to be equivalent to 1% TOC. As an additional consideration, modeling studies have indicated that a cap's chemical isolation layer performs better when the GAC is distributed throughout the cap rather than concentrated in a thin layer (Shen and Reible, 2015).

# 4 CAP MODELING RESULTS

## 4.1 Main Channel Armored Cap (T1 to T19)

If net sedimentation continues in the future, as per the analysis provided in Section 3.6, the model predicts some PCBs would reach the surface of a 25-inch-thick armored cap after 1,341 years. The PCB flux to the water column would peak at 1,800 years at a flux of 0. 002 micrograms per square centimeter per year (μg/cm$^2$/year). The peak flux is 0.1% of the current flux of 1.6 μg/cm$^2$/year.

The magnitude and composition of the predicted diffusive flux through the armored cap under the conservative assumption that no sedimentation occurs throughout the 5,000-year simulation period are presented in Figure O-9. In this instance, the model indicates that PCBs would reach the sediment surface 266 years after capping. The total PCB flux is predicted to peak after 4,952 years at about 0.0063 μg/cm$^2$/year, representing about 0.4% of the current total PCB flux.

## 4.2 Main Channel Modified Armored Cap (T19 to T21)

Assuming net sedimentation continues, as per the analysis provided in Section 3.6, model results indicate that PCBs would not break through an 18-inch-thick cap, indicating that even low rates of sedimentation augment the performance of the cap.

The magnitude and composition of the predicted diffusive flux through the modified armored cap under the conservative assumption that no sedimentation occurs throughout the 5,000-year simulation period are presented in Figure O-10. In this instance, the model indicates that PCBs would reach the sediment surface 54 years after capping. The total PCB flux is predicted to peak after 1,637 years at about 0.0068 μg/cm$^2$/year, representing about 0.4% of the current total PCB flux.

## 4.3 Main Channel Cap (T21 to T72)

Assuming net sedimentation continues, as per the analysis provided in Section 3.6, model results indicate that PCBs would not break through a 12-inch-thick cap, indicating that even low rates of sedimentation augment the performance of the cap.

The magnitude and composition of the predicted diffusive flux through a 12-inch-thick cap, under the conservative assumption no sedimentation occurs throughout the 5,000-year simulation period, are presented in Figure O-11. In this scenario, breakthrough does occur; PCBs migrating through the cap by molecular diffusion and groundwater advection eventually reach the zone of bioturbation where particle mixing makes them available at the cap surface. The top panel compares the diffusive flux of PCBs with one, two, and three or more chlorine atoms ($PCB_{3+}$) to the current flux in the river predicted by the PCB fate model. The current flux is representative of PCBs with two or more chlorine atoms due to a lack of mono-chlorinated biphenyls in lower Grasse River water (Alcoa, April 2001). The bottom panel provides the predicted composition of the total diffusive flux through the cap throughout the simulation period (in 200-year intervals). Under this conservative assumption, the model predicts mono-chlorobiphenyl would reach the sediment surface 296 years after capping, using 0.001 microgram per square centimeter per year ($\mu g/cm^2/year$) as a threshold (Figure O-11). Di-chlorobiphenyl would begin to appear after 324 years. The flux of PCBs with three or more chlorine atoms ($PCB_{3+}$) to the water column would begin beyond 5,000 years. At the end of the simulation, the total PCB flux would be about 0.005 $\mu g/cm^2/year$, or about 0.3% of the current total PCB flux of approximately 1.6 $\mu g/cm^2/year$.

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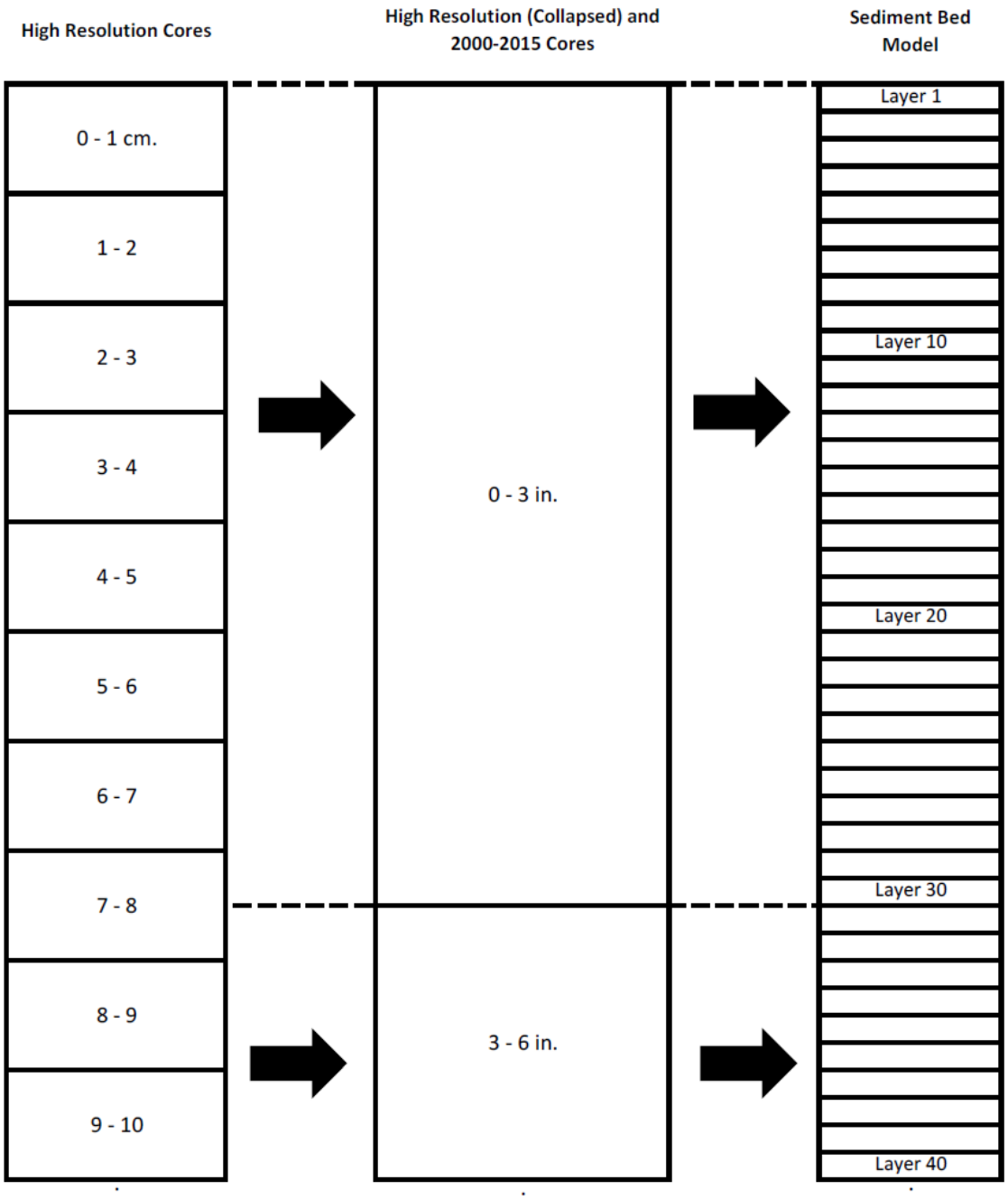
# FIGURES




Notes:
Based on cores collected 2003 to 2015 (T1-T21) and 2000 to 2015 (T21-T72). Core segmentation varies by sampling program but surface samples typically end at 3 or 6 inches, with 6 inch segmentation of deeper intervals, and accommodations for changes in strata. Model concentration segmentation is 0-3, 3-6, and 6-12 inches, and 12-inch sections thereafter.

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ARCONIC

**Figure O-1**
Interpretation of Sediment Core Data for Sediment Bed Model
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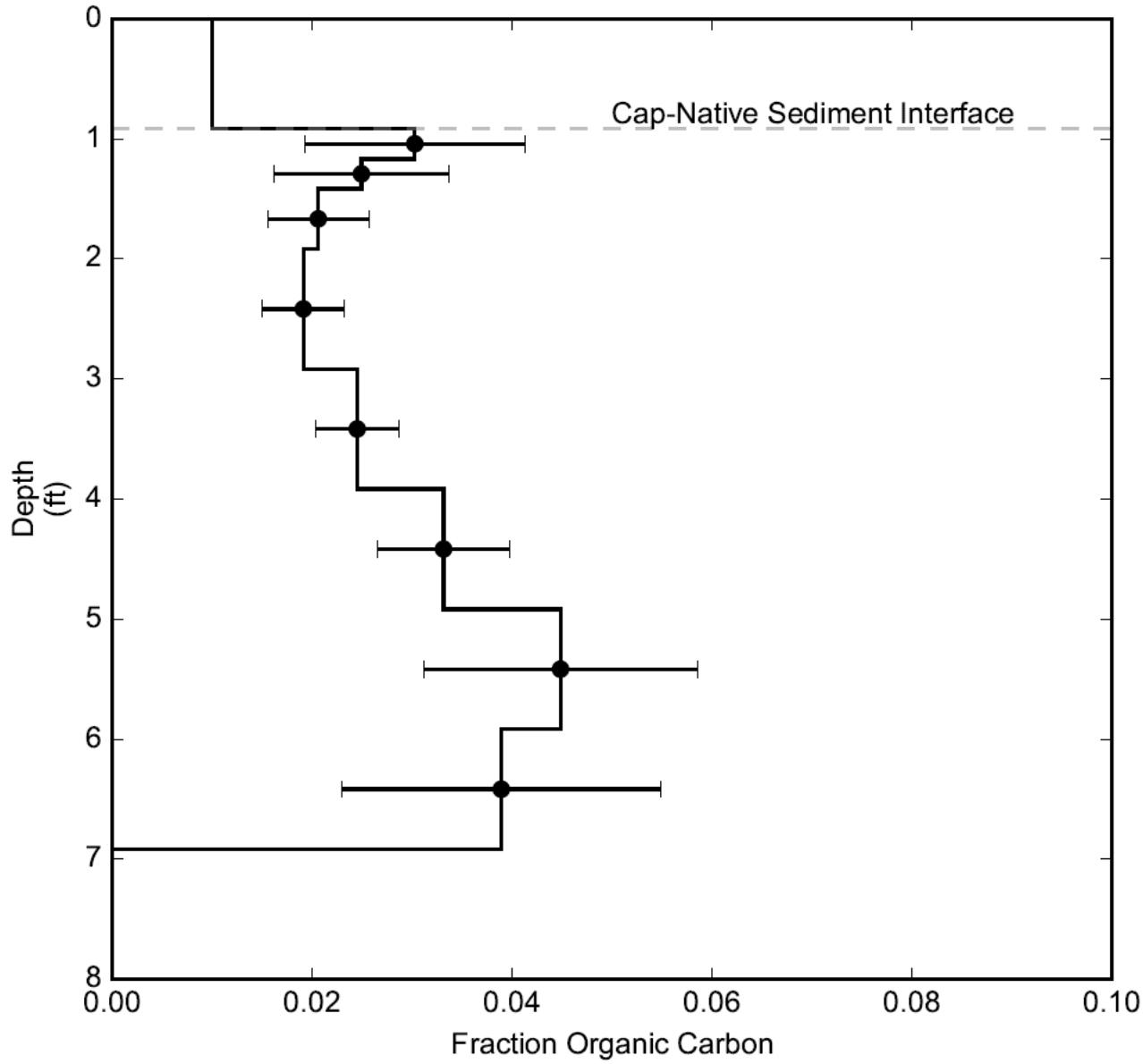
Grasse River Project/Arconic




Notes:
Data from 2003 Phase II, January 2004, 2004 Focused, 2006 Phase I, 2007 Phase II, 2010 Near Shore, and 2013-2015 PDI. Symbols are depth-weighted values plotted at mid-depth. Error bars represent +/- two standard errors of the mean.

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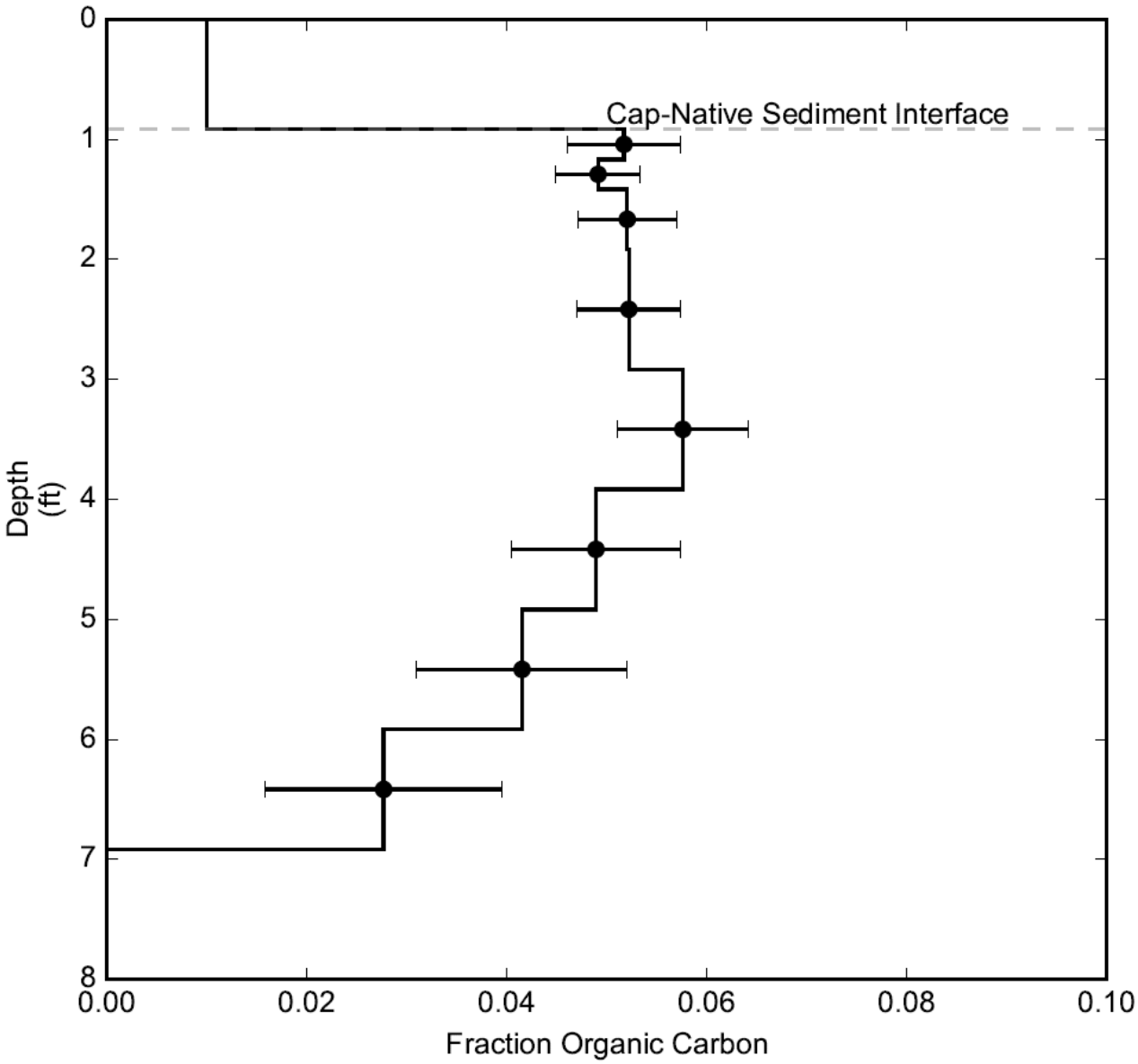
ARCONIC

**Figure O-2**
Vertical Fraction Oganic Carbon Profile (T1 to T21)
Final Design Report
Grasse River Project/Arconic




Notes:
Data from 2000 and 2001 SSS, 2003 Phase II, January 2004, 2004 Focused, 2006 Phase I, 2007 Phase II, 2010 Near Shore, and 2013-2015 PDI. Symbols are depth-weighted values plotted at mid-depth. Error bars represent +/- two standard errors of the mean.

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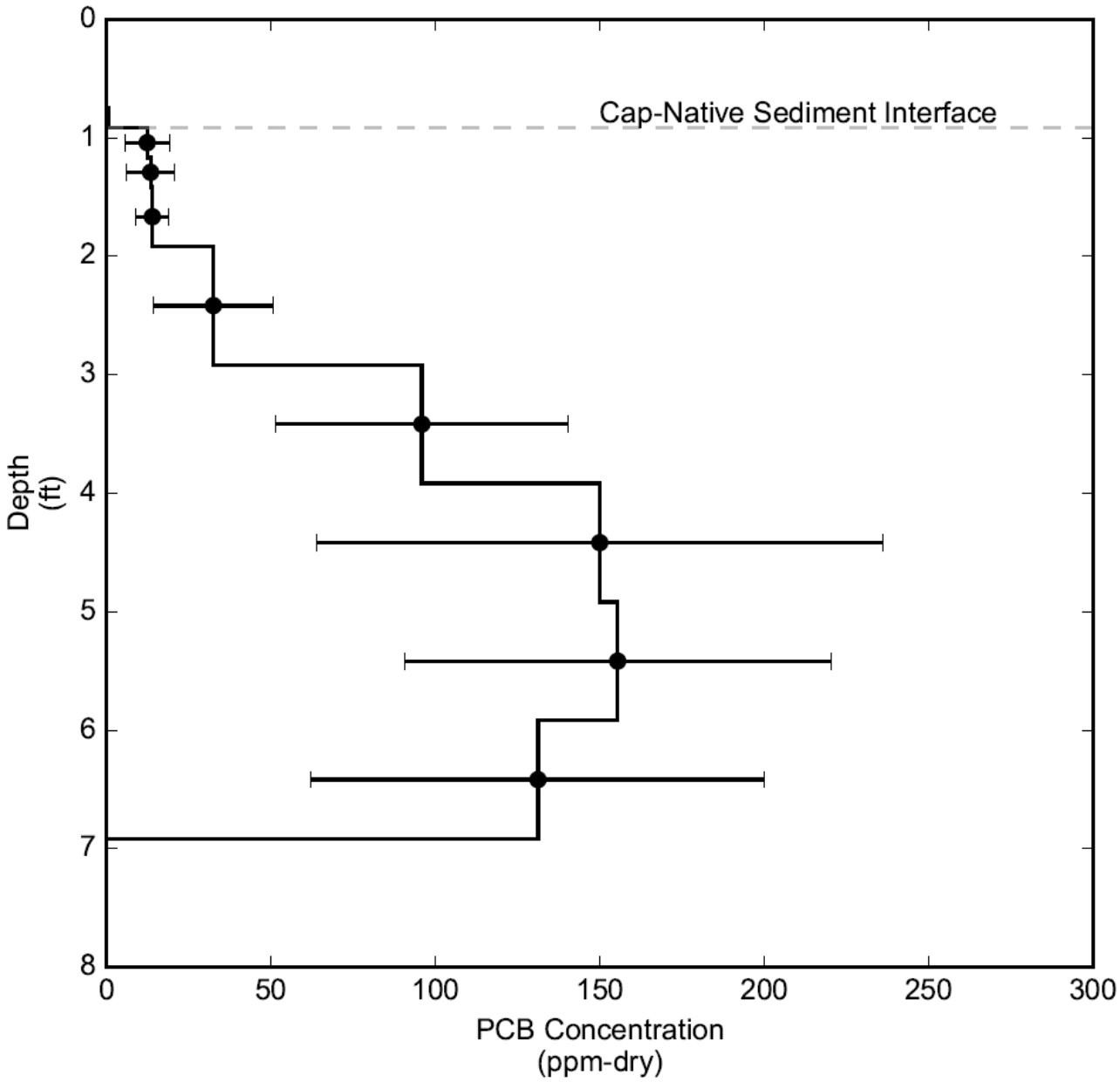
ARCONIC

**Figure O-3**
Vertical Fraction Oganic Carbon Profile (T21 to T72)
Final Design Report
Grasse River Project/Arconic




Notes:
Data from 2003 Phase II, January 2004, 2004 Focused, 2006 Phase I, 2007 Phase II, 2010 Near Shore, and 2013-2015 PDI. Symbols are depth-weighted values plotted at mid-depth. Error bars represent +/- two standard errors of the mean.

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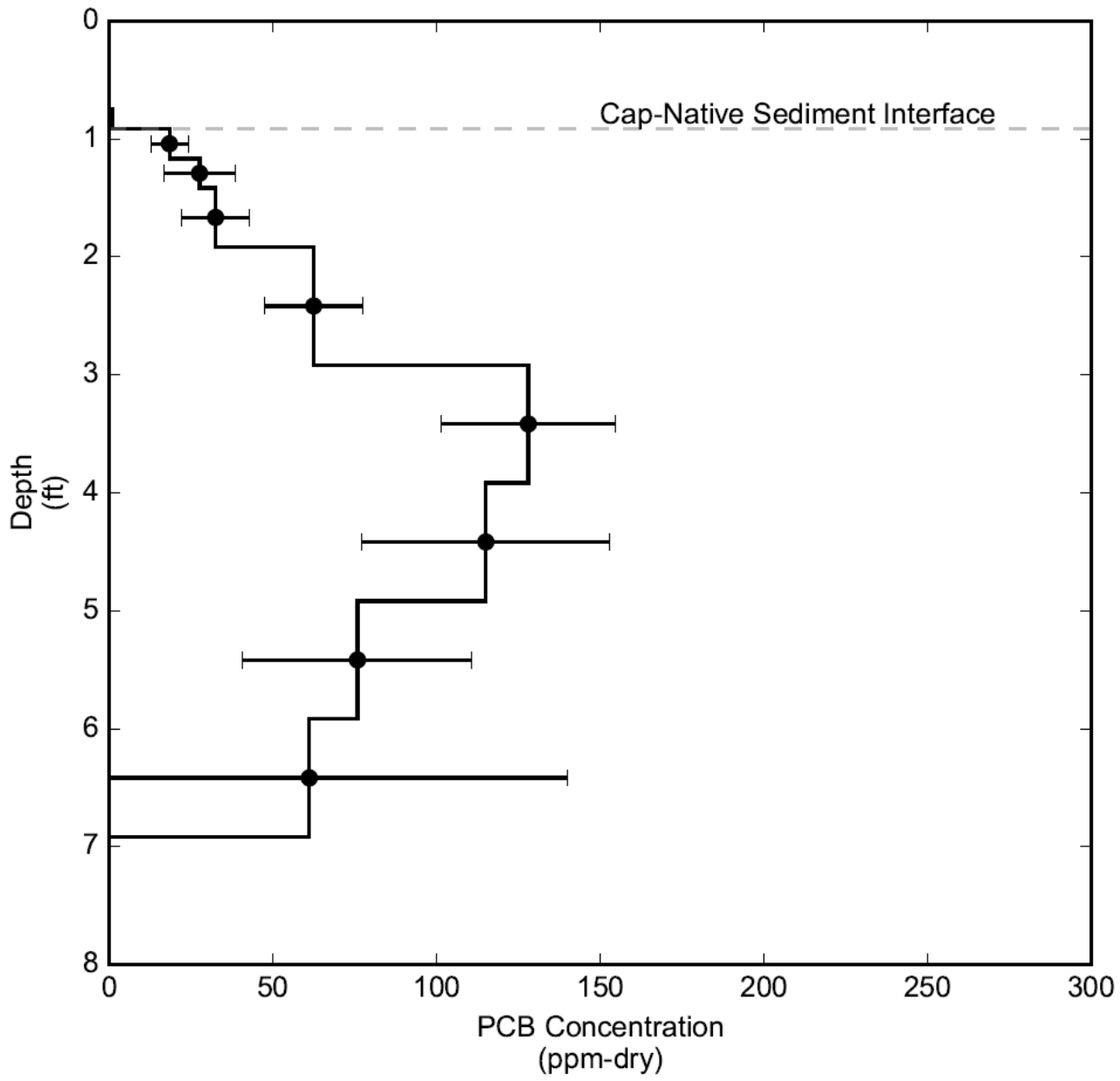
ARCONIC

**Figure O-4**
Vertical PCB Profile (T1 to T21)
Final Design Report
Grasse River Project/Arconic




Notes:
Data from 2000 and 2001 SSS, 2003 Phase II, January 2004, 2004 Focused, 2006 Phase I, 2007 Phase II, 2010 Near Shore, and 2013-2015 PDI. Symbols are depth-weighted values plotted at mid-depth. Error bars represent +/- two standard errors of the mean.

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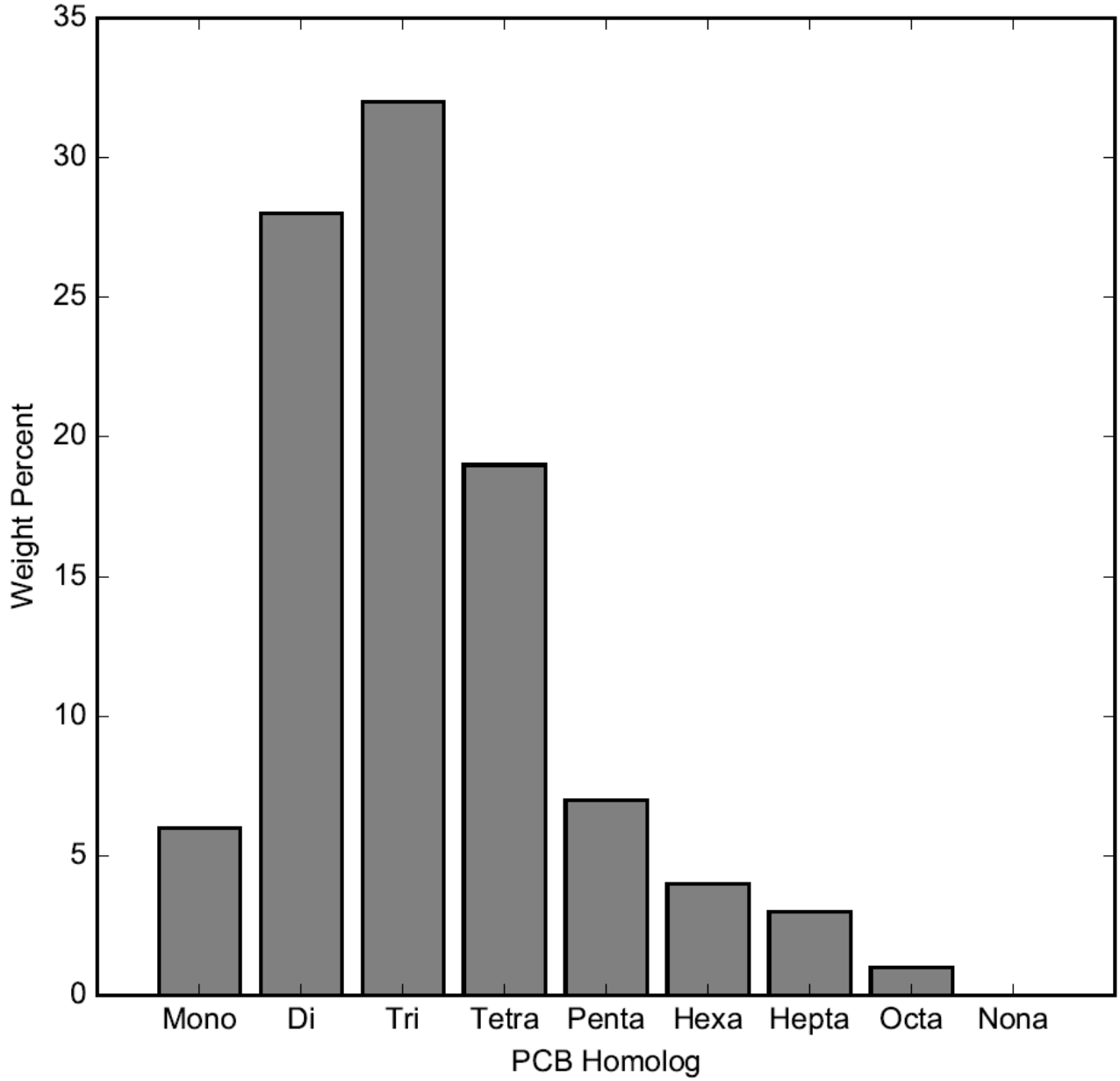
**Figure O-5**
Vertical PCB Profile (T21 to T72)
Final Design Report
Grasse River Project/Arconic




Notes:
Values computed using data from 2000 and 2001 SSS, 2003 Phase II, January 2004, 2004 Focused, 2006 Phase I, 2007 Phase II, 2010 Near Shore, and 2013-2015 PDI.

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**Figure O-6**
PCB Homolog Distribution
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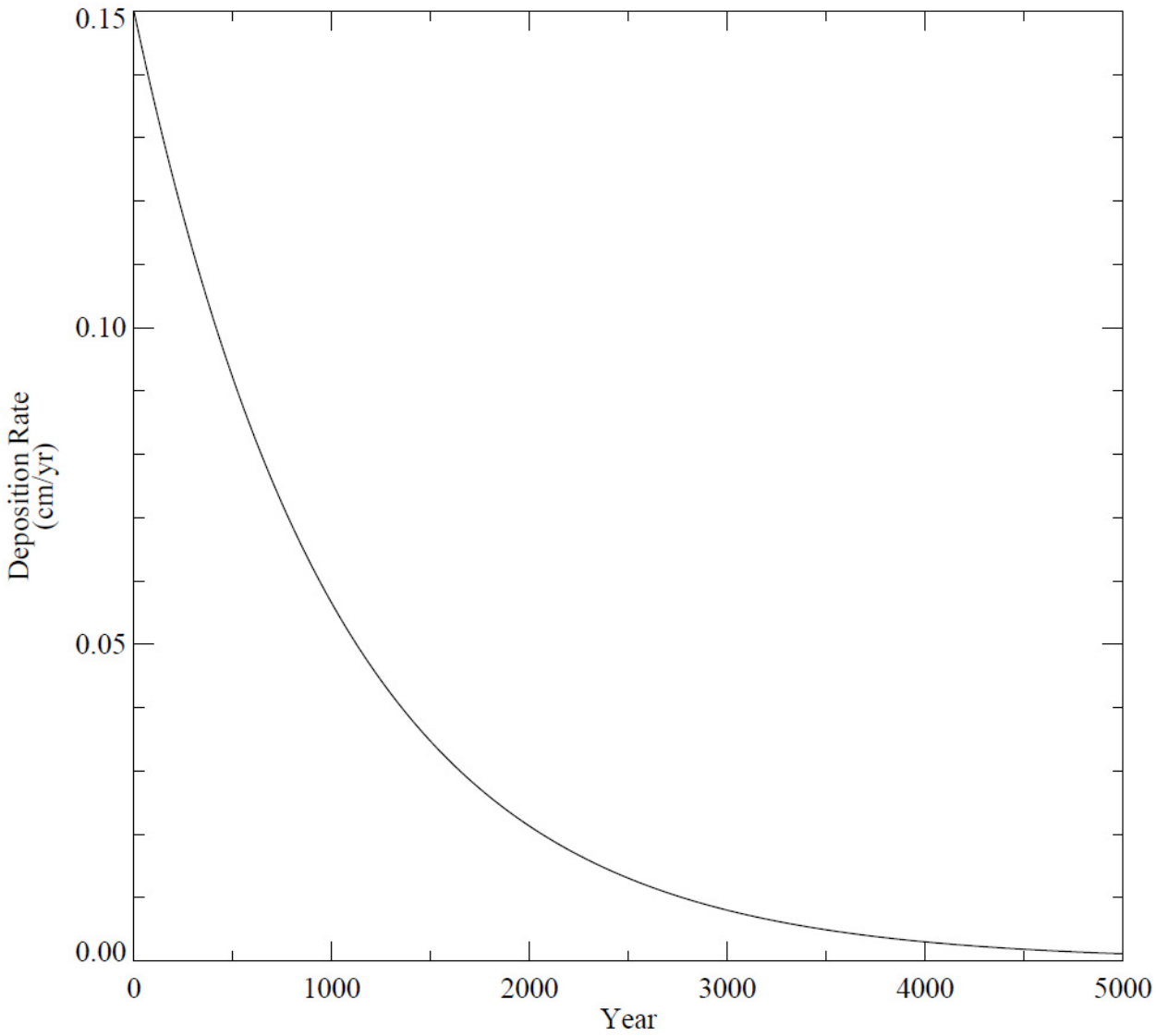


Note:
The cumulative depth of sediments deposited over 5,000 years is 5 feet

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**Figure O-7**
Variable Sedimentation Rate Function
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Grasse River Project/Arconic

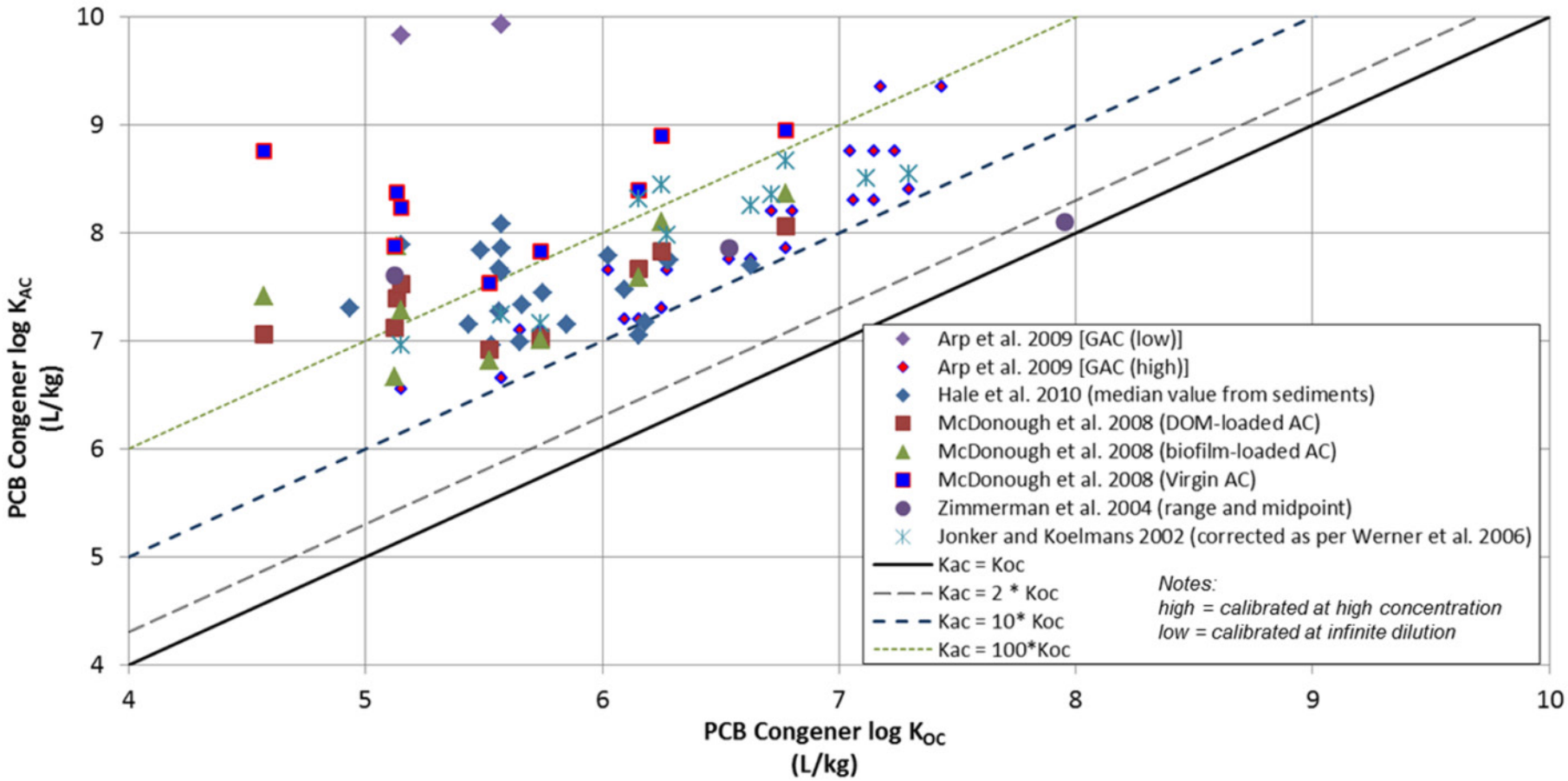


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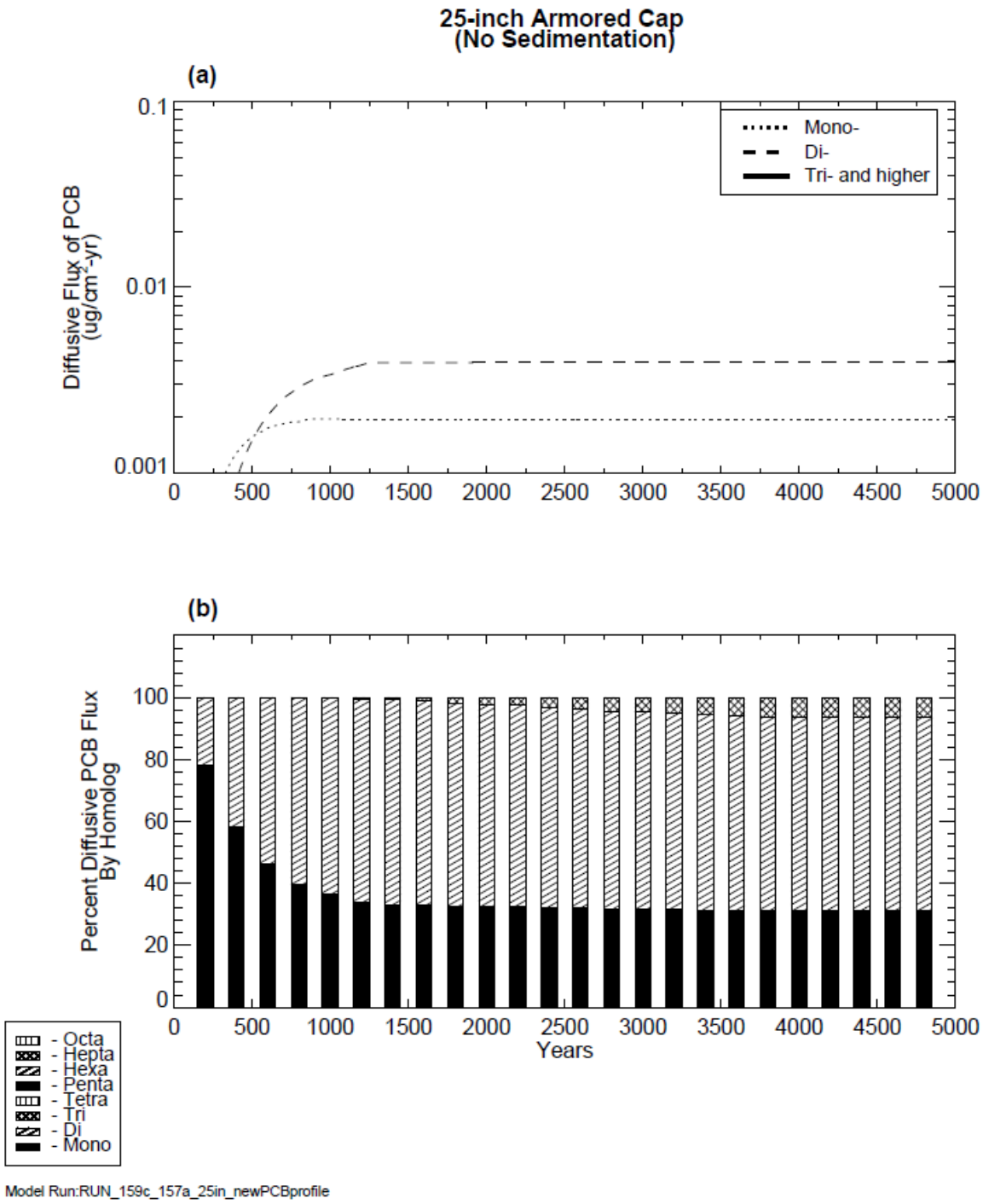
**Figure O-8**
Adsorption of PCBs onto GAC Compared with Adsorption of PCBs onto Natural TOC
Final Design Report
Grasse River Project/Arconic




Notes:

Notes: Initial native surface (0 to 3 inches) sediment PCB concentration equals 12.3 ppm-dry. Homolog distribution of 6% mono, 28% di, and 66% tri+ applied. No bioturbation or sedimentation modeled. 25-inch armored cap. Current Flux as predicted by PCB fate model calibration = 1.6 µg/cm$^2$-yr

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**Figure O-9**

Predicted Diffusive Flux of PCBs Through a 25-inch Cap to the Overlying Water Column (No Sedimentation)

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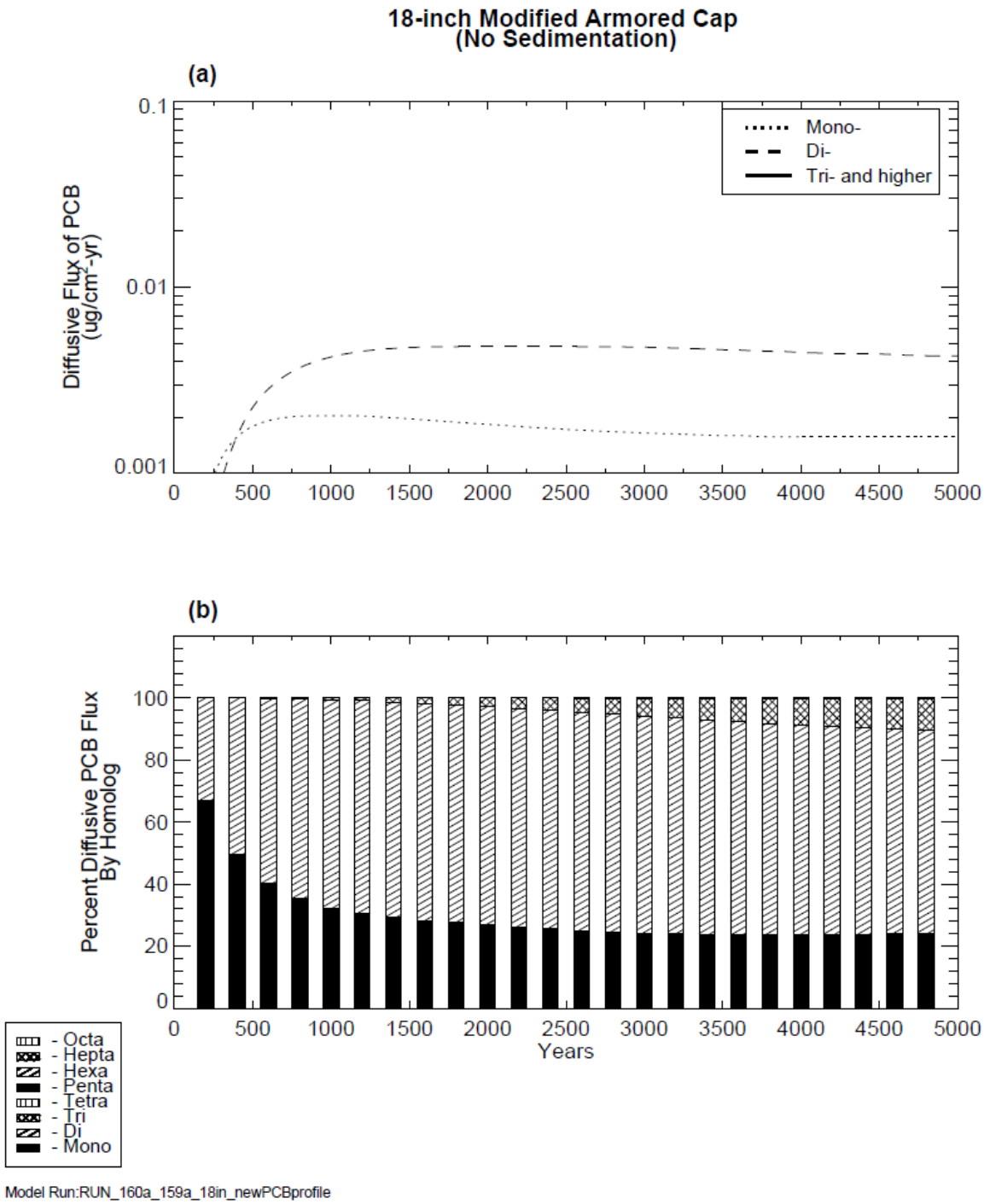


Notes:

Notes: Initial native surface (0 to 3 inches) sediment PCB concentration equals 12.3 ppm-dry. Homolog distribution of 6% mono, 28% di, and 66% tri+ applied. No bioturbation or sedimentation modeled. 18-inch modified armored cap. Current Flux as predicted by PCB fate model calibration = 1.6 µg/cm$^2$-yr

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**Figure O-10**

Predicted Diffusive Flux of PCBs Through an 18-inch Cap to the Overlying Water Column (No Sedimentation)

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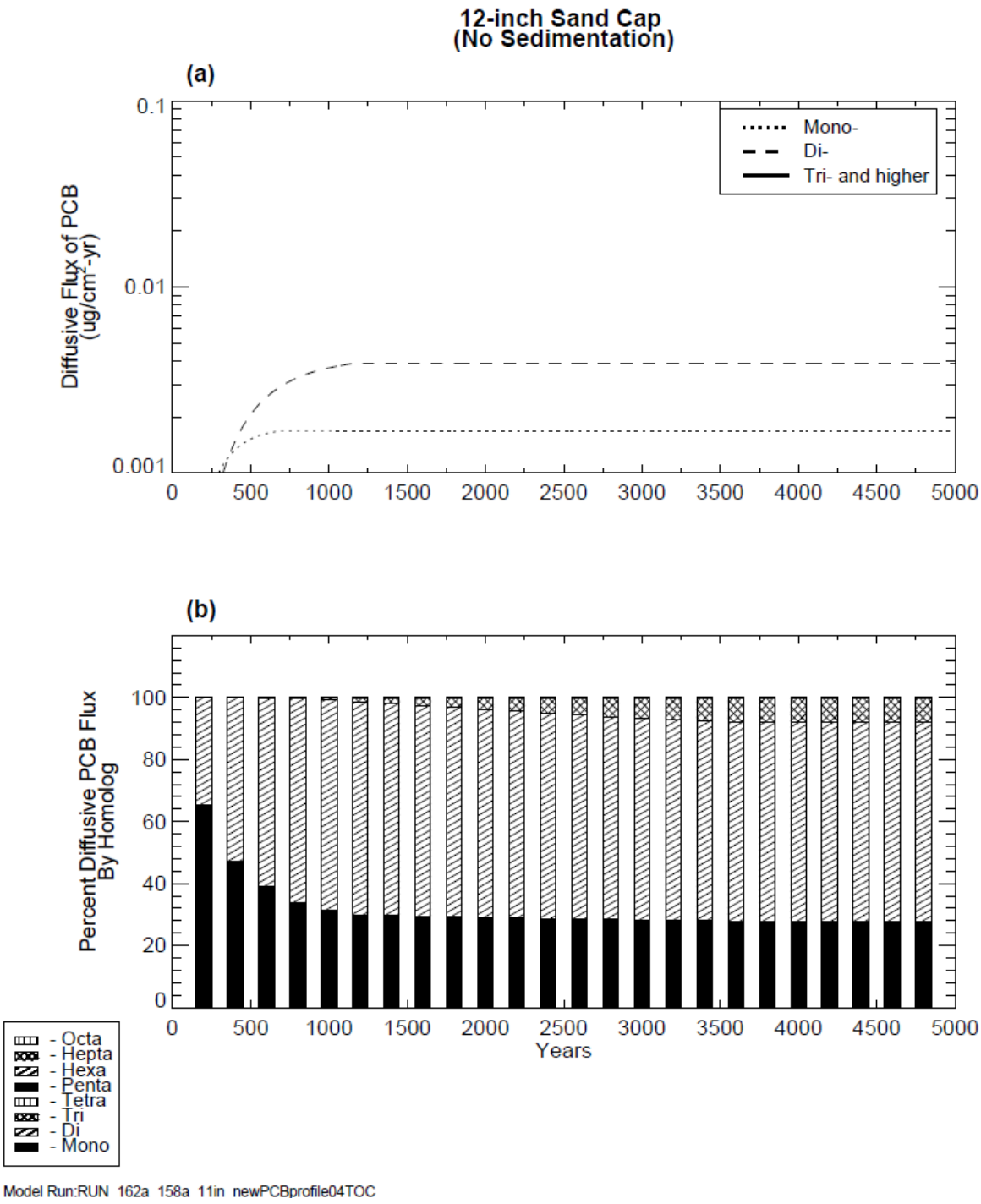


Notes:
Initial native surface (0 to 3 inches) sediment PCB concentration equals 18.4 ppm-dry. Homolog distribution of 6% mono, 28% di, and 66% tri+ applied. No bioturbation or sedimentation modeled. 12-inch sand cap. Current Flux as predicted by PCB fate model calibration = 1.6 µg/cm$^2$-yr. Modeling of 12-inch cap with sedimentation projects no breakthrough of PCBs over the 5,000-year period, and therefore no figure is presented.

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**Figure O-11**
Predicted Diffusive Flux of PCBs Through a 12-inch Cap to the Overlying Water Column (No Sedimentation)
Final Design Report
Grasse River Project/Arconic

ARCONIC

# DRAFT PRESERVATION PROTOCOL PLAN GRASSE RIVER

**Prepared for**

Arconic Inc.

**September 2018**

# TABLE OF CONTENTS

1 INTRODUCTION.....1

2 MASSENA CENTER BRIDGE – BACKGROUND INFORMATION.....3

3 PROJECT ACTIVITIES IN THE MASSENA CENTER BRIDGE LOCATION.....5

4 PRESERVATION PROTOCOLS.....6

5 REFERENCES.....8

## List of Figures

Figure P-1 Massena Center Bridge Location

Figure P-2 Photograph of the Massena Center Bridge Looking Towards the South Shore of the Grasse River

Figure P-3 Photograph of the Massena Center Bridge Looking Towards the North Shore of the Grasse River

Figure P-4 Close-up View of a North Shore Anchorage of the Massena Center Bridge

Figure P-5 Massena Center Bridge Looking Towards the South Shore of the Grasse River

Figure P-6 Massena Center Bridge and the Extent of Removal Activities

Figure P-7 Massena Center Bridge and the Extent of Capping and Backfill Activities

# 1 INTRODUCTION

The National Historic Preservation Act (NHPA) requires federal agencies to conduct appropriate activities to identify, evaluate, and protect significant Historic and Pre-Contact period properties that their actions potentially affect. To carry out these requirements at the Grasse River Superfund Site located in the Town of Massena, Saint Lawrence County, New York, and in accordance with the United States Environmental Protection Agency's (USEPA's) April 2013 Record of Decision (ROD), Arconic Inc. (Arconic) conducted a Phase IA Cultural Resources Assessment for land and river bottom areas that will be directly or indirectly impacted by the remedial project in the Grasse River Study Area (ARCADIS, July 2014). These efforts were conducted in accordance with the Phase IA Cultural Resources Assessment (CRA) Work Plan (Alcoa, January 2014) and are documented in the Phase IA Cultural Resources Assessment Report (ARCADIS, July 2014) and Phase IA Cultural Resource Assessment Report Addendum (ARCADIS, October 2014).

Among the historic resources identified by the Phase IA CRA (ARCADIS, July 2014) is the Massena Center/County Road 42 Bridge (USN A08920.000011) over the Grasse River. The bridge crosses the Grasse River at Massena Center (Figure P-1). Photographs taken of the bridge in 2015 are provided on Figures 2 through 5. Massena Center is located about two and a half miles east of the Village of Massena on the north side of the Grasse River and about five miles west of its confluence with the Saint Lawrence River. Efforts resulting from the 2014 CRA indicated that the bridge spans a portion of the river to be addressed by the Grasse River remediation. This document serves as a Preservation Protocol Plan and details protocols to be taken by the remedial contractor to ensure that the bridge is not inadvertently damaged or otherwise impacted by construction activities.

The Massena Center/County Road 42 Bridge was built in 1910. It is a one lane suspension bridge with three spans supported by wire cables. The main span is 400 feet long and the two side spans are each 100 feet long with a clearance of 51.8 feet. The bridge was designed by the renowned American engineer, Holton Duncan Robinson, who became the world's recognized expert engineer in suspension bridge cable design and bridge construction. Professionally, it was stated that during his working career, no suspension bridge project worldwide was completed without his being consulted (The Massena Observer, 1974). The

bridge has been closed to all vehicle traffic and pedestrians for safety reasons since 1989 (Massena Museum, n.d.). Among the conclusions of the Phase IA report was that the bridge may be eligible for listing on the National Register of Historic Places. Massena Town Supervisor Joseph D. Gray described the bridge as historically significant and recent social media activity indicate there is much local interest in acquiring such a designation for it (https://www.youtube.com/watch?v=51Bu4T4c5Rw).

Final remedial design plans indicate that remediation activities will not have direct or indirect adverse impacts on the Massena Center Bridge (ARCADIS, July 2014). Additionally, the Phase IA report indicated that the river bottom sediments along the Grasse River, including the section around the bridge at T28.5, were not sensitive for the presence of cultural resources due to prior (early twentieth century) dredging of the Grasse River and construction of the existing Massena Center Bridge and the prior nineteenth century bridges at the same location (ARCADIS, July 2014).

This Preservation Protocol Plan has been prepared in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (USEPA, August 1989), and the standards and requirements currently adopted by the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP; New York Archaeological Council 1994, 2000; NYSOPRHP 2005). All cultural resource related tasks for this project will be undertaken by Eugene J. Boesch, Ph.D., R.P.A., Principal Investigator and Cultural Resource Specialist for ARCADIS. The Principal Investigator has described and discussed the project with Mr. Arnold Printup (2017), Tribal Historic Preservation Officer for the Saint Regis Mohawk Tribe/Akwesasne and Nancy Herter (2017), Coordinator & Native American Liaison, New York State Office of Parks, Recreation and Historic Preservation, Waterford, New York.

## 2 MASSENA CENTER BRIDGE – BACKGROUND INFORMATION

The existing bridge is the site of the earliest bridge built in Massena Center (1832), and the second built in the Town of Massena. The 1832 overpass was swept away later that same year as a result of ice floes on the river. Thirty years later (1862) a covered bridge was built spanning the river at the same location at a cost of $4,000. This bridge also was destroyed and an iron bridge was erected in its place in 1873 at a cost of $10,000.

In 1905 the Massena Town Board authorized $40,000 to build a new suspension bridge at the same location in Massena Center due to the deterioration of the iron bridge. However, no contractor reportedly would take the project for less than $60,000. In some desperation, the town board turned to Holton Duncan Robinson for help. In 1910 Holton returned to Massena Center to design and construct the still existing Massena Center suspension cable bridge absorbing much of the cost personally (see Massena Museum, n.d.; Stewart and Badger, 1913).

Robinson's design for the Massena Center Bridge called for two major cables to extend between the bridge anchorages. The cables sweep up from the anchorages and over the two 60-foot towers and then down across the river channel. The cables were squeezed, binding them together, and finally wrapped with an outer wire covering or encasement. From saddles or steel nodules, small single cables or suspenders, hang down to carry the girders and trusses of the superstructure carrying the entire roadway (Stewart and Badger, 1913). Cost saving inventions developed by Robinson were used in the construction of the bridge including the hydraulically-operated cable-squeezing machine, electrically-operated cable-wrapping machine, flat-band seizings, and a simplified version of cable anchorage (http://amhistory.si.edu/archives/AC0963.html).

Robinson was born in Massena, New York on February 7, 1863 and died May 7, 1945. He was buried at the Massena Center Cemetery, although the actual location of the grave reportedly is lost. Robinson was a descendant of one of the first American families to settle in Massena, moving there in 1803. In 1886, Robinson graduated from Saint Lawrence University with a major in engineering. He served in the United States Army as Director of the Bureau of Yards and Docks during the First World War.

Together with David Steinmen, Robinson formed the noted engineering firm of Robinson and Steinmen in 1921. Bridge design was the firms' specialty. The firm designed such bridges as the Deer Isle Bridge in Maine, the Hercilio Luz Bridge in Florianopolis, Santa Catarina, Brazil, and the Thousand Island International Bridge at Alex Bay on the St. Lawrence River. Earlier, Robinson was a principal designer for the Williamsburg Bridge, the Catskill Aqueduct, and many Canadian railroad bridges.

In recent years there have been discussions among the Massena Town Board, Saint Lawrence County, and various citizen advocacy groups to preserve and reopen the bridge for walkers or bicyclists but funding was not available. There have also been attempts to place historical signage to mark the importance of the bridge and its designer to the local community with no success. Nevertheless, local interest in the bridge and its reuse continues to be high (Courier Observer, 2017). Social media has been used to gather support for placing the bridge on the National Register of Historic Places.

# 3 PROJECT ACTIVITIES IN THE MASSENA CENTER BRIDGE LOCATION

Figures P-2 and P-3 show the in-river dredging and capping plans at T28.5 adjacent to and under the Massena Center Bridge. Remedial work will consist of the removal of near shore sediments followed by backfilling by equipment operated from a barge in the river. No upland work will occur. Approximately 40 feet will exist between the edge of the work area and the base of the bridge anchorages on each shore. Work will be performed only from the river and will not extend beyond the edge of water which is at an elevation of 155.5 feet above mean sea level (amsl; United States Lakes Survey datum). The elevation change along the south shore from the river's elevation (155.5 feet amsl) to the base of the anchorage is 39 feet. The elevation change along the north shore from the river's elevation to the base of the anchorage is 38 feet. There will also be cap placement within the river from shore to shore in the vicinity of the bridge. The equipment to be used to place the cap materials will not be high enough to reach the decking of the bridge.

# 4 PRESERVATION PROTOCOLS

The tasks listed below will be implemented to ensure that inadvertent impacts do not occur to the Massena Center Bridge as a result of remedial activities.

1. Prior to the start of remedial activities, copies of this plan will be provided to the remedial contactor. In addition, prior to the protocol's implementation and before construction activities occur at T28.5, a brief conference call and/or meeting will be held among the ARCADIS archaeologist, construction manager, and senior on-site remedial contractor representative to review the site area and terms of the protocol. The ARCADIS archaeologist will brief the construction manager and senior on-site remedial contractor representative (and others as needed) about the sensitivity of the historic bridge and the objective of the Preservation Protocol.

2. An appropriate temporary barrier or fence will be placed 15 feet from the bridge anchorage on both shorelines prior to construction in this area to mark the boundary of the historic bridge's sensitive zone. Intrusive activities will not occur between the barrier and bridge anchorage on either shoreline. Following placement of the barrier or fence, and prior to the start of construction activities in the vicinity of the bridge, the construction manager will inspect the demarcated line to insure its proper placement.

3. The remedial contractor must confirm the clearance of the bridge (estimated at approximately 50 feet above the Grasse River) prior to any in-water work at T28.5. Once verified, the remedial contractor must maintain a minimum clearance of 15 feet from the underside of the bridge. A visible barrier such as colored 15-foot weighted cords or something similar will be hung from points on the bridge decking to make the 15-foot elevation point visible from the river if it is anticipated that construction activities will be within 25 feet of the bridge deck. The cords would be removed at the end of the project.

4. In the event of an unanticipated mishap to the bridge or any archaeological resource is identified eroding from the bank as a result of wave/water action caused by the construction barges or equipment movement on the water or river bottom, the

remedial contractor will cease work at the find/impact location to protect the resource from further damage and inform the construction manager. The construction manager will coordinate with the ARCADIS archaeologist to assess and record the revealed resource. The USEPA, New York State Department of Environmental Conservation (NYSDEC), and SRMT would be informed of the finding and an appropriate way to proceed would be determined among all parties.

5. Any in-situ human remains encountered during the remedial work at T28.5 will be left in place to the extent possible and all work at that location halted. If human remains are recovered from the removed material spoils, they will be separated and placed in an appropriate container. In all cases, any human remains encountered will be treated with the utmost respect and dignity. Locations containing human remains will be secured to protect the remains from damage and disturbance and USEPA, NYSDEC, and SRMT will be contacted regarding the finding. Further consultations among interested parties will occur and a consensus arrived at as to the appropriate way to proceed. If the remains are determined to date to the Historic period, they will be treated as a significant archaeological site. Attempts will be made to determine the period of the interment(s) and the identity of the individual(s) buried and to locate any of their living lineal descendants. Further consultations involving New York State Office of Parks, Recreation and Historic Preservation and other interested parties will take place to arrive at a consensus as to the appropriate way to proceed as needed.

6. Photos will be obtained of the established buffer zones, barrier fencing/markers, and hanging bridge cords if used to document the efforts.

7. A memo will be prepared following completion of the Preservation Protocol field tasks by the ARCADIS archaeologist and submitted to USEPA and NYSOPRHP confirming the successful implementation of the Protocol and the protection and preservation of the Massena Center Bridge during remedial activities.

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# FIGURES

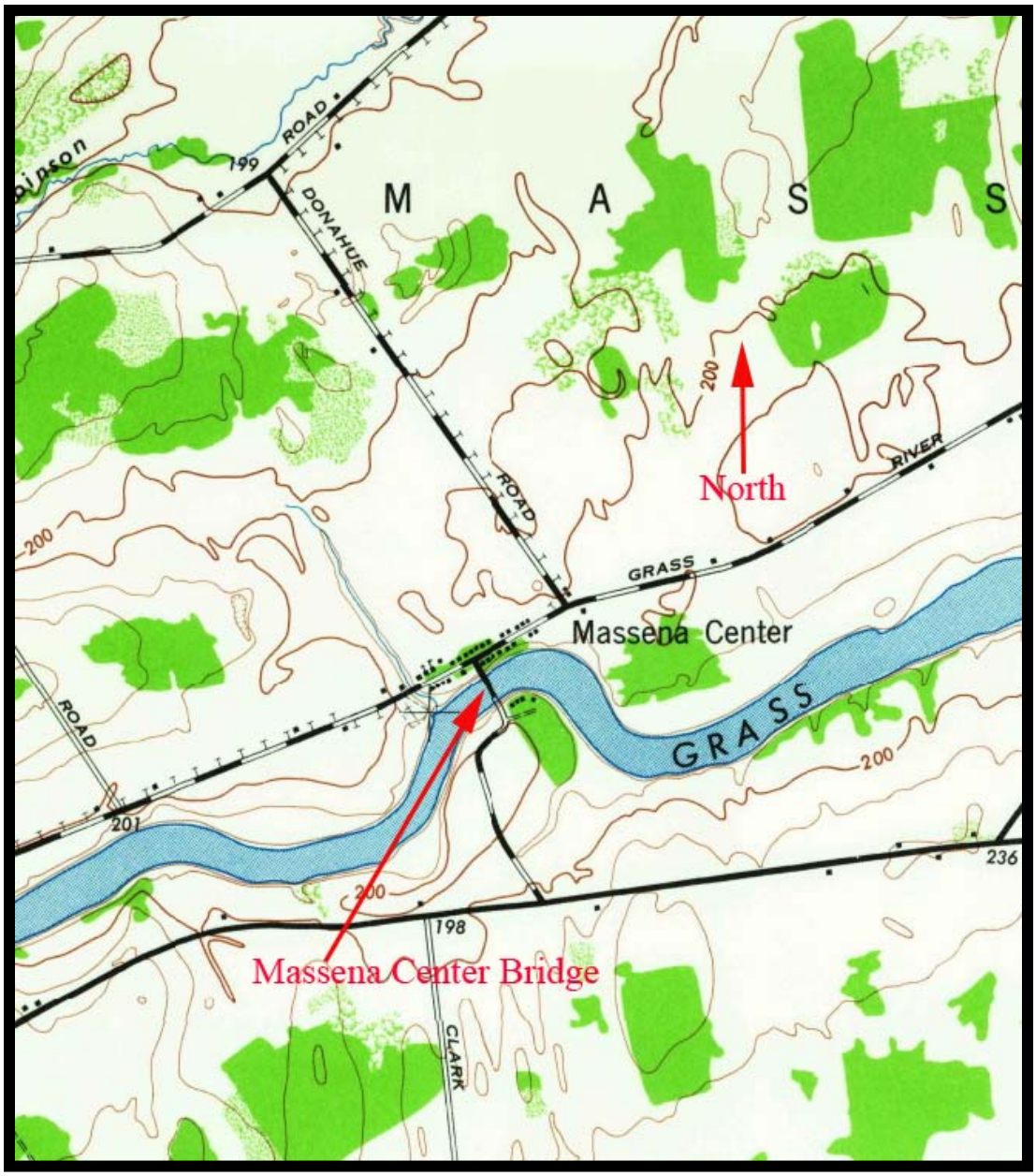


**Figure P-1**

**Massena Center Bridge Location**

**Scale of Original: 24,000**

**Base Map Source: United States Geological Survey 1964**

**Figure P-2**

**Massena Center Bridge Looking Towards the South Shore of the Grasse River**

**Figure P-3**

**Massena Center Bridge Looking Towards the North Shore of the Grasse River**

**Figure P-4**

**Close-up View of a North Shore Anchorage of the Massena Center Bridge**

**Figure P-5**

**Massena Center Bridge Looking Towards the South Shore of the Grasse River**

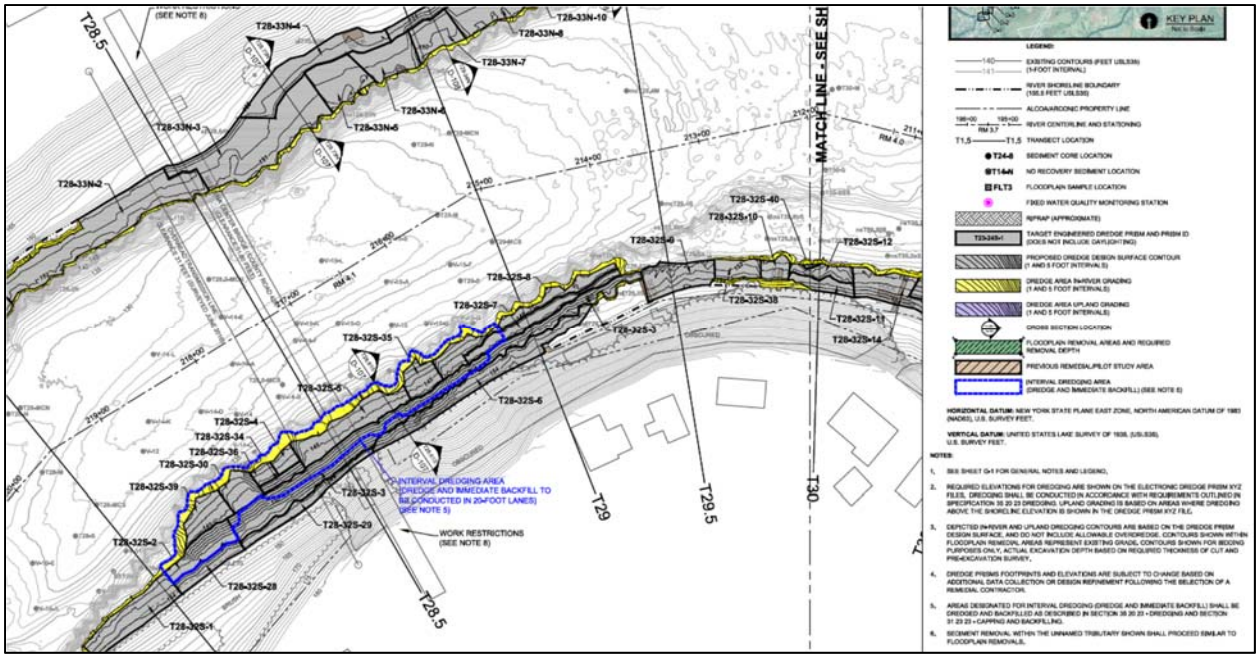


**Figure P-6**

**Massena Center Bridge and the Extent of Removal Activities**

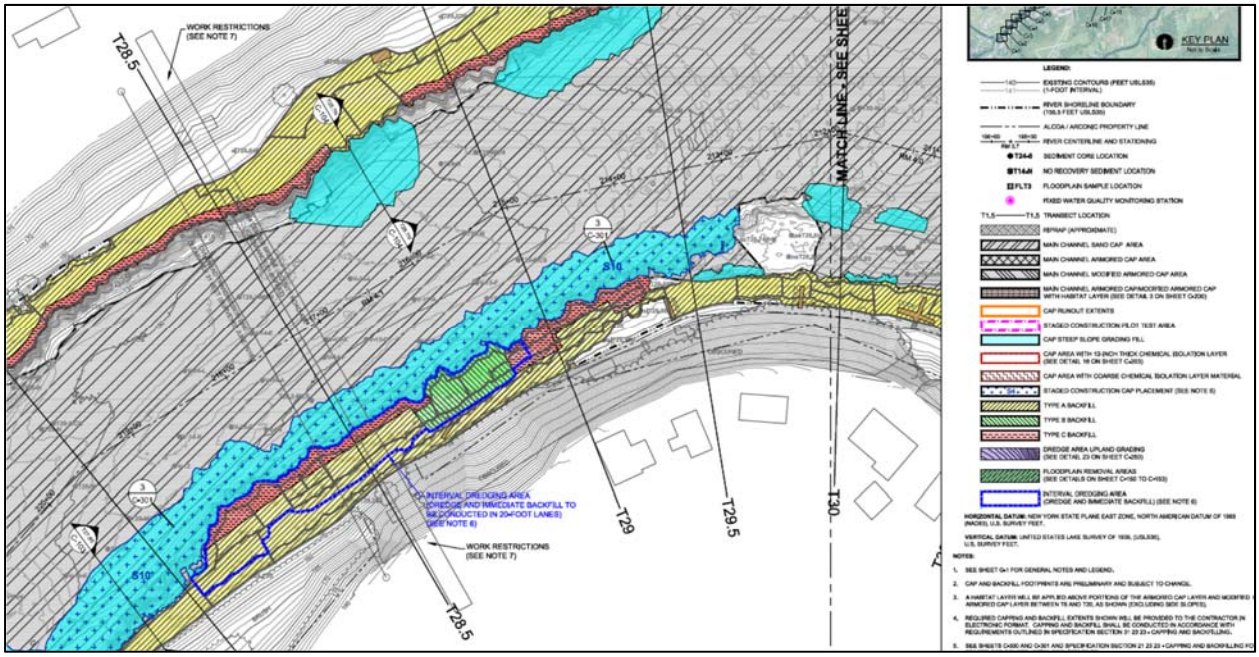


**Figure P-7**

**Massena Center Bridge and the Extent of Capping and Backfill Activities**