

# Menominee River Area of Concern

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## Dredge Management Plan Restrictions on Dredging Activities And Beneficial Use Impairment Removal Package



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By:  
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## List of Acronyms

AOC	Area of Concern
AOOC	Administrative Order on Consent
BLRPC	Bay Lake Regional Planning Commission
BUI	Beneficial Use Impairment
BWGMP	Barrier Wall Ground Water Monitoring Plan
CAC	Citizens Advisory Committee
CH2MHill	Cornwell, Howland, Hayes, Merrifield & Hill (now called CH2M)
CBSQG	Consensus-Based Sediment Quality Guidelines
CQAPP	Construction Quality Assurance Project Plan
CY	Cubic Yards
DMU	Dredge Management Unit
DNAPL	Dense Non-Aqueous Phase Liquid
EQM	Environmental Quality Management Inc
GLLA	Great Lakes Legacy Act
GLRI	Great Lakes Restoration Initiative
GLWQA	Great Lakes Water Quality Agreement
GBPS	Green Bay Paint Sludge Site
GLNPO	Great Lakes National Program Office
LAMP	Lakewide Action Management Plan
LFII	Lloyd Flanders Industries Inc
LSF	Lower Scott Flowage
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
mg/kg	Milligrams per kilogram
MGP	Manufactured Gas Plant
MNR	Monitored Natural Recovery
NAPL	Non-aqueous Phase Liquid
NRT	Natural Resource Technology
NTCRA	Non-Time Critical Removal Action
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PEC	Probable Effect Concentration
PPM	Parts Per Million
PRP	Potential Responsible Party
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RCM	Reactive Core Mat
RCRA	Resource Conservation and Recovery Act
REL	Robert E Lee & Associates Inc
ROD	Record of Decision
RVS	Rio Vista Slough
SWAS	Surface Water Assessment Section
TAC	Technical Advisory Committee
TEC	Threshold Effect Concentration
TCDD	Tetrachlorodibenzodioxin
USACE	US Army Corps of Engineers
USCG	US Coast Guard
USEPA	US Environmental Protection Agency
USFWS	US Fish & Wildlife Service
WDNR	Wisconsin Department of Natural Resources
WPSC	Wisconsin Public Service Corporation
WWTP	Waste Water Treatment Plant

## Purpose and Limitations

The purpose of this document is to recommend removal of the Restrictions on Dredging Activities Beneficial Use Impairment (BUI) in the Lower Menominee River Area of Concern (AOC) and identify locations in a dredge management plan where there is residual contamination within post remedial dredging project areas.

The dredge management plan was developed by the communities and agencies and evaluates the following:

- Restrictions that must remain in place to protect human health and the environment
- Restrictions that must remain in place due to Resource Conservation and Recovery Act (RCRA) and Superfund Alternative Approach requirements based on federal and state law
- Priority areas for navigational use (all areas, not just the Federal Navigation Channel)
- Priority areas for utility dredging (e.g., utility crossings)
- Costs and funding options for removing dredging restrictions in priority areas

Note that several state and federal programs overlap as they relate to sediment remediation. The limitation of this document is solely for the intent of the United States Environmental Protection Agency (USEPA) AOC program as it relates to BUI Removal. The AOC program is not a regulatory. Rather, it is an effort to restore beneficial uses guided by the Great Lakes Water Quality Agreement. In no way does this document supersede any past, current, or future regulatory requirements for responsible parties or potentially responsible parties. This document is specific to in-river activities (including sediment remediation), understanding that there may be other upland activities requiring regulatory agency involvement as well.

## Background

In the late 1980s, the lower three miles of the Menominee River from the Upper Scott Dam (Park Mill Dam) to the river's mouth, approximately three miles north of the river mouth to John Henes Park and approximately three miles south of the river mouth past Seagull Bar along the Bay of Green Bay was designated as an AOC (refer to Appendix A, Figure 1). Green Island in Green Bay is also considered part of the AOC because of its strong habitat value and biological link to Seagull Bar State Natural Area. The AOC was designated under the Great Lakes Water Quality Agreement due to pollutants, including polycyclic aromatic hydrocarbons (PAHs), heavy metals (specifically arsenic), paint sludge and fecal coliform bacteria. The primary sources of pollution were municipal treatment plants, industries and urban runoff.

A 1990 Stage I Remedial Action Plan (WDNR, 1990) identified the current status of the AOC and the following six beneficial use impairments (BUIs):

- Restrictions on fish consumption (in process for removal 2016/2017)
- Degradation of fish populations
- Degradation of benthos (in process for removal 2016)
- **Restrictions on dredging activities (in process for removal 2016)**
- Restrictions on Recreational Contact –bacteria from combined sewers (removed from impaired list March 2011)
- Loss of fish and wildlife habitat

## Restrictions on Dredging and Rationale for BUI Listing

Throughout the 20<sup>th</sup> century, various municipalities and industries developed and prospered along the Lower Menominee River. River discharges of waste were considered acceptable and the increase of municipal and industrial effluent contributed to the impairment of the river's natural resources. Historical sediment sampling showed high levels of contaminants and provide the rationale for BUI listing in the 1990 RAP (WDNR and MDNR, 1990), which stated that the listing was a result of the introduction of toxic pollutants: arsenic, cadmium, lead, mercury, oil and grease, and PAHs.

The Lower Menominee River and Harbor is classified by Wisconsin Department of Transportation as a federal navigable harbor and is used as a diversified cargo port. Ports of this category handle more than one or two types of freight, but the origin and destinations of the cargo are generally limited to the immediate vicinity of the port (BLRPC, 1987). The major users of the harbor/port include Marinette Marine, KK Integrated Logistics Inc., the Menominee Paper Company, and Marinette Fuel & Dock Company. Marinette Marine began building barges in 1942. Today Marinette Marine designs and constructs ships for the US Navy, US Coast Guard, and other ocean going vessels. KK Integrated Logistics Inc. provides logistic services: trucking, warehousing, shipping and dock services (KK Integrated Logistics Inc, 2015). The Menominee Paper Company receives coal, wood and pulp. Marinette Fuel & Dock Company began port services in 1903 and receives dry bulk commodities: salt, coal, limestone and pig iron (World Port Source, 2015). There are also four marinas in the port of Marinette/Menominee: Harbor Town Marine, Menominee Marina, Nestegg Marine, and River Park (Marina Mystery Ship). There are five public launches: Boom Landing, Rail Road Dock, Seagull Bar (Red Arrow Beach), Sixth Street, Stephenson Island and soon to be six with the new boat launch planned for Menekaunee Harbor. It is important to understand the uses of the harbor and how dredging restrictions may impact these facilities.

Restrictions on dredging activities is an impaired use in the AOC due to sediment that became contaminated with arsenic, coal tar waste, paint waste and other heavy metals over the years (refer to Appendix A, Figure 2 for Sediment Remediation Sites). The presence of contaminated sediment in the Menominee River and Harbor, especially within the turning basin, has become a major problem for dredging operations (refer to Appendix A, Figure 5). The turning basin has not been dredged since 1965 by the US Army Corps of Engineers (USACE) due to arsenic contaminated sediment. Environmentally sound disposal of contaminated sediment is technically difficult and is rapidly becoming more expensive. Thus, the frequency of dredging projects were slowed or halted due to the difficulty and expense of handling the sediment (WDNR, 1990).

USACE is responsible for maintaining a navigation channel with various authorized depths from the harbor entrance to and including the turning basin and finally, 200 feet upstream of the turning basin (refer to Appendix A, Figure 3) (USACE, 2016). Dredging materials are typically disposed of in the State of Michigan waters east of the north Menominee Harbor Break Water Light. Open water placement will continue if the material is determined to be uncontaminated by Michigan Department of Environmental Quality (MDEQ). Portions of the shipping channel were last maintenance dredged in fall of 2014 (refer to Appendix A, Figure 4) with the exception of the turning basin, for reasons mentioned above.

## BUI Removal Objectives

In addition to defining the impairments and the sources of impairments in the Lower Menominee River AOC, the 1990 Stage I RAP (WDNR and MDNR, 1990) also developed long term goals for restoring beneficial uses in the AOC. The goal specifically related to contamination was to “achieve water and sediment quality that is not detrimental to human health, fish and wildlife.” The 1996 RAP update document (WDNR, 1996) then provided detailed objectives to achieve each goal. Objectives listed for this goal included eliminating all toxic effects to fish and aquatic life from industrial and municipal discharges; remediating sediment contamination to protect human health, fish, aquatic life and wildlife; pursuing all opportunities to reduce or eliminate all discharges of toxic substances into the AOC, including direct discharges to surface waters, runoff from land surfaces, and air emissions; elimination of the dredging restrictions; and promotion of public attitudes and perceptions of the water front as a valuable aesthetic resource.

## BUI Removal Criteria (2008 Final Delisting Target)

The *2015 Remedial Action Plan Update for The Menominee River Area of Concern*, WDNR & MDEQ identifies the Restoration Targets and actions necessary to be met in order to request and remove the BUI. There are **two Restoration Targets** that **must be met** in order for the Restrictions on Dredging BUI to be removed:

1. All remediation actions for known contaminated sediment sources are completed and monitored according to the approved remediation plans and the remedial action goals have been achieved; and
2. An AOC dredge management plan is developed by the communities and agencies that includes an evaluation of:
  - Restrictions that must remain in place to protect human health and the environment
  - Restrictions that must remain in place due to RCRA requirements that are based upon state and federal law
  - Priority areas for navigational use
  - Priority areas for utility dredging, e.g., utility crossings
  - Identify costs and funding option for removing dredging restrictions in priority areas

Priority areas for navigational use include: Federal Navigation Channel, commercial & industrial docks, marinas, boat launches, and private docks.

Priority areas for utility dredging and crossing include all potential future areas and in this instance specifically in the sediment remedial areas.

## Assessment of Restoration – Attainment of Sediment Goals and Targets

The following is a summary of actions taken to address the delisting targets developed in 2008 for the removal of the Restrictions on Dredging Activities BUI and the fulfillment of these goals:

**1. All remediation actions for contaminated sediment are completed and monitored according to the approved remediation plans and the remedial action goals have been achieved.**

The RCRA and GLLA project conducted by Tyco (Ansul), Superfund Alternatives project at WPSC, WDNR-lead project at Menekaunee Harbor and the MDEQ-lead project at the Green Bay Paint Sludge (Lloyd Flanders) project were all completed and post dredge sampling and assessment documented that remedial action goals were achieved to the extent practicable (see Appendix B, Table 1 Lower Menominee River AOC Sediment Remediation Sites Summary of Goals, Actions and monitoring). Additional evaluation of this work and compliance with requirements under each regulated program will continue for some time (with the exception of Menekaunee Harbor - no ongoing monitoring is required or anticipated).

Monitoring of sediment is required by USEPA, with input from WDNR, of the responsible parties to ensure the remedial objectives are continuing to be met as a requirement of the RCRA Administrative Order on Consent (AOC) for Tyco and as a requirement of the Superfund Program for WPSC. USEPA, RCRA and Superfund Alternatives, requires that 5-year reviews are conducted that include assessment of the sediment monitoring data at these sites for this purpose.

Lloyd Flanders performs ongoing maintenance and monitoring of the berm, liner, and rip/rap. In addition, monthly and storm event paint nodule collections from the shoreline are performed.

Contaminant levels have been monitored both prior to and after completion of the dredging projects to determine the degree and extent of sediment contamination. Post dredge monitoring at the Tyco and WPSC sites by the responsible parties will continue to track trends in contamination levels following sediment remediation. Particular attention will be paid to those areas with a sand cover or RCM. Post dredging sampling confirmed that remediation actions for contaminated sediment have met the goals of the approved remediation plans to the extent practicable.

More detailed descriptions of sediment remediation and characterization actions are presented in subsequent sections of this document.

**2. An AOC dredge management plan is developed by the communities and agencies that includes the evaluation of restrictions that remain in place due to human health and the environment, Superfund and RCRA requirements based on state and federal law, priority areas for navigational use, priority areas for utility dredging (utility crossings), and costs and funding options for removing dredging restrictions in priority areas.**

A separate stand-alone dredge management plan will not be developed since the sediment related remediation activities have addressed the dredging restriction BUI at three locations to the extent practicable. As a result of sediment related remediation activities, three areas were identified to place sand cover in order to meet the sediment related remedial action objectives: Tyco, WPSC and Menekaunee Harbor. Narratives presented later in this document describe each scenario and as explained in the Evaluation of Potential Remaining Dredge Restriction Areas Section of this document, utility dredging (utility crossings) and priority dredge areas are identified and discussed.

Priority areas for navigational use include: Federal Navigation Channel, commercial & industrial docks, marinas, boat launches, and private docks.

Priority areas for utility dredging and crossing include all potential future areas and in this instance specifically in the sediment remedial areas.

## Summary of Sediment Related Remedial Actions

Since the Lower Menominee River was designated as an AOC, significant progress has occurred to address pollutant sources. Upland and sediment related site investigation and remediation activities, led by USEPA Superfund Alternative and RCRA, WDNR, and MDEQ, has occurred over three decades. One Superfund Alternative Project, Wisconsin Public Service Corporation Coal Tar site; one RCRA Project, Tyco (formerly Ansul) Arsenic site; and Menekaunee Harbor, a site containing low-level heavy metals and PAHs owned by the City of Marinette with no responsible party; are located within the lower two-mile river reach and remedial activities have been directed by USEPA and/or WDNR. The Lloyd Flanders, Green Bay Paint Sludge site is located on the Bay of Green Bay three miles north of the Menominee River mouth in Menominee, Michigan. The State of Michigan, MDEQ is leading the remediation project.

Appendix B, Table 1 summarizes the sediment remediation work that has been completed in order to meet the sediment related remedial action goals, to the extent practicable, for each project. In addition, there is a timeline describing each sediment remediation site and actions taken to meet the sediment related remedial action goals to the extent practicable.

The following is a summary of events for RCRA and Superfund Alternative Projects and sediment related remediation efforts in the Lower Menominee River AOC:

- 1978 WDNR is notified of the discovery of the arsenic contamination at Ansul Fire Technology (now Tyco Safety Products)
- 1978 90,000 Tons of arsenic waste is removed from the Ansul Property
- 1980 – 1989 Sediment sampling and analysis of the Lower Menominee River
- 1981 Ansul groundwater extraction system and monitoring program
- 1982 Lloyd-Flanders Industries, Inc. (LFII) purchases Heywood-Wakefield Co and takes responsibility for the paint sludge contamination site
- 1987 Lower Menominee River is designated as an AOC
- 1987 USEPA RCRA involvement with Ansul site
- 1989 WDNR is notified of the discovery of the coal tar contamination at the Marinette Wastewater Treatment Plant (former WPSC MGP Site)
- 1989 Ansul Menominee River sediment characterization and water sampling
- 1990 Lower Menominee River Remedial Action Plan (Stage I)
- 1990 Administrative Order on Consent between USEPA RCRA and Ansul
- 1993 LFII constructs berm/rock dike to enclose submerged paint wastes to prevent further migration into the Bay of Green Bay
- 1995 (summer) – 1998 (fall) LFII perform contaminant removal of paint sludge & sediment
- 1996 Lower Menominee River Remedial Action Plan Update
- 1999 Ansul removal of sediment from the 8<sup>th</sup> Street Slip
- 2000 Tyco purchases Ansul and takes responsibility for the arsenic contamination site
- 2001 USEPA RCRA approves Tyco 8<sup>th</sup> Street Slip and former salt vault caps
- 2005 USEPA Superfund Alternative oversight of WPSC MGP site
- 2007 GLNPO Menekaunee Harbor sediment characterization
- 2008 Lower Menominee River Beneficial Use Impairment (BUI) Restoration Targets

- 2009 Administrative Order on Consent between USEPA RCRA and Tyco
- 2009 – 2010 Tyco vertical barrier wall installed
- 2010 Tyco deed restriction filed with Marinette County Register of Deeds for soil caps and no dredging, anchoring or digging in Menominee River adjacent to Tyco
- 2011 Lower Menominee River Remedial Action Plan (Stage II)
- 2011 Tyco vertical barrier wall sheet pile stabilization
- 2011 – 2012 WPSC sediment characterization
- 2012 Lower Menominee River Action Plan Update
- 2012 WPSC MGP dredging began under Superfund Alternative
- 2012 Tyco performs first year dredging under RCRA
- 2013 Tyco performs second year dredging under RCRA
- 2013 WPSC MGP dredging, RCM and sand cover completed & sediment monitoring begins
- 2013 GLNPO Lower Scott Flowage sediment characterization
- 2013 Lower Menominee River Remedial Action Plan Update
- 2014 Rio Vista sediment characterization
- 2014 Tyco Great Lakes Legacy Act dredging project completed
- 2014 Menekaunee Harbor dredging completed
- 2014 Lower Menominee River Remedial Action Plan Update
- 2015 Tyco Great Lakes Legacy Act sand cover completed
- 2015 Menekaunee Harbor sand cover completed
- 2016 Tyco pump down program begins

## Sediment Contamination Sites and Remedial Actions

This section will discuss the known areas containing contaminated sediment within the AOC that contributed to one or more impairments to designated beneficial uses. This section will also discuss additional sediment sampling completed to assess the current status of suspected areas. Primary areas identified in the 1990 Stage I RAP include the following: Ansul Arsenic Site, including the turning basin and South Channel; Wisconsin Public Service Commission Coal Tar Site; and Lloyd-Flanders Paint Sludge Site (WDNR and MDNR, 1990). A secondary area, identified by Wisconsin DNR, was Menekaunee Harbor. Suspected areas investigated by state and federal agencies to determine if those areas were contributing to beneficial use impairments include Lower Scott Flowage, between the Menominee and Park Mill Dams, and Rio Vista Slough, in the City of Menominee.

Contaminated sediment management actions have been implemented at all known contamination sites to the extent practicable, as specified in the USEPA negotiated Administrative Order on Consent (AOOC) for each site. See Appendix B, Table 1 for a concise picture of the current status of the contamination sites in the AOC. In addition, Table 1 provides a summary of the remediation goals for each site, along with the actions taken to achieve those goals, current status, along with the monitoring and maintenance requirements and whether the remedial action goals have been met. A detailed narrative for each sediment remediation site is provided below.

### **(Ansul) Tyco - Arsenic Site**

#### **Contamination Background**

The arsenic contamination resulted from arsenic salts produced by the Ansul Fire Protection Company (now known as Tyco Fire Products LP) at their manufacturing site in Marinette adjacent

to the turning basin in the river. Arsenic salts were produced as a byproduct of herbicide manufacturing between 1957 and 1977. The waste salts were stored on-site in uncovered piles and in a bunker area, and were discharged directly to the river via storm water runoff and wind erosion or leached into surficial and ground waters, which then flowed to the Menominee River along the turning basin. These discharges impaired water quality and contaminated river sediment (WDNR, 1996).

Tyco purchased Ansul in 2000, making them responsible for the arsenic contamination site. Tyco did not contribute to the contamination, which was already present on the site long before they purchased the facility.

### **Site Remediation/Source Control**

Tyco International, owners of Ansul Incorporated, signed an AOC with the USEPA to remediate the site (USEPA, 2009). The AOC requires Tyco to implement the remedy selected in the USEPA's 2008 Statement of Basis and Final Decision Document for Ansul Inc. (USEPA, 2008). Tyco completed implementation of the USEPA approved work plan to remediate arsenic contaminated sediment in 2013.

In addition, Tyco worked with the USEPA to implement a Great Lakes Restoration Initiative - Great Lakes Legacy Act (GLLA) Betterment Action at the contaminated sediment site beginning in 2014 and with completion in 2015 (EQM, 2015).

Many remedial activities were conducted before the AOC was signed. See the USEPA web page <http://www.epa.gov/region5/cleanup/rcra/ansul/index.html> for additional information.

Components of the selected remedy are summarized and listed below (USEPA, 2008), and include an informal status.

#### **Terrestrial**

- Construct and maintain an impermeable below-ground barrier wall to control the flow of groundwater to the maximum extent practicable (Appendix A, Figure 5).
  - Status: Complete with ongoing maintenance and monitoring as needed.
- Cap surface soils on-site with arsenic concentrations equal to or above 32 ppm (Appendix A, Figure 6).
  - Status: Complete with ongoing maintenance and monitoring as needed.
- Remove surface soils near the railroad tracks with arsenic concentrations equal to or above 16 ppm (Appendix A, Figure 6).
  - Status: Complete.

#### **Groundwater**

- Contain contaminated groundwater on-site through the use of a barrier wall system. Utilize an on-site groundwater extraction system and phyto-pumping as a means to keep the site from flooding. Conduct a technical review of the latest science for treating groundwater containing large quantities of arsenic every five years.
  - Status: Complete with ongoing activities as prescribed. The first five year review was completed in December 2013 (CH2MHill, 2013a). As a result of the five year review an updated barrier wall groundwater monitoring plan was prepared and approved by USEPA RCRA in September 2015. The updated plan is being implemented and includes the installation of additional monitoring wells, dye testing after the completion of the outfall investigation and the pump down program. Additional monitoring wells were installed in

2015. The pump down program to control hydraulic head within the former Salt Vault and the former 8th Street Slip began in June 2016.

- The next five year review will be completed in 2018.

## **Sediment**

### Sediment with Arsenic Levels Above 50 ppm

- Remove and properly dispose of all Menominee River soft sediment with arsenic concentrations equal to or greater than 50 ppm.
- Status: Completed in 2013. See additional details below.
- Remove and properly dispose of all Menominee River semi-consolidated silts and clays with arsenic concentrations equal to or greater than 50 ppm or, if removal is technically or economically impractical, provide an alternative to removal that protects human health and the environment, is legally implementable, and achieves arsenic concentrations of 20 ppm or less by November 1, 2023.
  - Status: Complete.
  - Removal began in July, 2012. Soft and semi-consolidated sediment containing total arsenic concentrations greater than or equal to 50 ppm were mechanically dredged using an environmental clamshell bucket and stabilized on-site (CH2MHILL, 2012). Stabilization was accomplished through the addition of a drying agent and chemical reagent (ferric sulfate and Portland cement). The stabilized soft and semi-consolidated sediment was then transported for disposal at an off-site nonhazardous landfill. Wastewater produced as part of this process was treated by a series of filters and reverse osmosis to reduce arsenic concentrations, and then discharged to the river in accordance with the limits set forth in the WDNR wastewater discharge permit. If arsenic concentrations in wastewater could not be reduced to acceptable levels, reject wastewater was properly disposed of at an offsite hazardous waste facility. Tyco hoped to remove approximately 100,000 cubic yards (CY) of contaminated sediment in 2012, but when dredging ceased for the season, only 26,913 cubic yards of material had been removed from the River (CH2MHill & Severson, 2014). Greater than expected amounts of large woody debris were encountered during dredging, which slowed progress and required additional screening/grinding steps during sediment processing. Dredging was halted for approximately 30 days while sediment stabilization protocols were modified to comply with the leachable arsenic (less than 5 ppm), free water, and shear strength requirements (CH2MHILL, 2012). The turning basin is also used by local shipping and ship building industries. Anytime it needed to be used, dredging had to cease while turbidity control measures were moved.
  - Mechanical dredging resumed in May, 2013. The quantity and size of equipment used increased significantly from 2012. Larger pug mills were utilized to increase sediment treatment capacity and processing rates. An on-site shredder mitigated problems with wood debris. Dry ferric sulfate was substituted as the stabilizing reagent when treating soft sediment, reducing the amount of sediment that needed to be retreated in order to meet the leachable arsenic requirement. A mobile lab was brought in to increase sediment stabilization efficiency and reduce wait times for treatment results. Dredging and treatment was completed December 7, 2013. A total of 232,133 cubic yards of contaminated sediment was removed from the river in 2013 (CH2MHill & Severson, 2014). Confirmation sampling determined that the remedial action goals for 2013 were reached (CH2MHill & Severson, 2014). In summary, over the two years of dredging 259,046 total cubic yards was dredged, processed and hauled off-site to the Menominee Waste Management Landfill in Menominee, Michigan. Due to the vast amount of sediment data collected for this project, please refer to Section 4.6, Table N-1 and Appendices N and R in the March 2014 *Construction Completion Report, Menominee River Sediment Removal Project Adjacent to the Tyco Fire Projects LP*

*Facility Marinette, Wisconsin* (CH2MHill & Severson, 2014) for confirmation sediment sampling results. Refer to Appendix A, Figures 7, 8, and 9 for DMUs and post-dredge confirmation sediment sampling locations and results. Add web link in the Reference list or place here.

#### Sediment With Arsenic Levels Between 20 ppm and 50 ppm

- A GLLA Betterment Action Agreement between TYCO, the USEPA, and the WDNR was signed in May 2014. The agreement called for additional dredging of all soft and semi-consolidated sediment having arsenic concentrations greater than 20 ppm remaining after the 2013 completion of the Resource Conservation and Recovery Act (RCRA) component of the project. This agreement speeds recovery of the aquatic ecosystem and delisting of the Menominee River AOC by an estimated 10 years, because the required time for natural recovery/Monitored Natural Recovery (MNR) of the sediment surface from 50 ppm to 20 ppm arsenic will no longer be required due to the active removal of contaminated material.
  - Dredging for the Betterment Action began in late August 2014, with sediment processing, treatment, and disposal methods remaining the same as those used for the RCRA activities. Dredging was completed in mid-November 2014, with 42,000 additional cubic yards of arsenic contaminated sediment removed from the river. When processed, the material resulted in 73,000 tons of non-hazardous waste, which was hauled to Michigan for conventional landfilling. Of this waste, 556 tons was scrap debris, including lumber wood waste and old construction concrete (EQM, 2015).
  - Water treatment was a critical component of the project. All the water from sediment dewatering and from spray-cleaning of equipment and trucks was sent through the modified reverse-osmosis treatment system. All totaled, 2,173,000 gallons of water was treated. Of this amount, 397,000 gallons did not pass the required effluent limits for arsenic, and so could not be returned to the Menominee River but instead was shipped via tanker truck for out-of-state hazardous waste disposal. Site decontamination and demobilization began at the end of 2014, continued through early summer 2015, and was completed by October 2015 (EQM, 2015).
  - Post-dredge confirmation sampling and bathymetry were performed to ensure the project goal of 20 ppm or less of arsenic in remaining surface sediment was met. Due to the vast amount of data collected, please refer to the *Sampling Summary Report Great Lakes Legacy Act Lower Menominee River Tyco Site Adjacent to the Tyco Fire Products LP Facility, Marinette, Wisconsin* (CH2MHill, 2015b). Refer to the Appendix A, Figures 10, 11 and 12 for DMUs and post-dredge confirmation sediment sampling locations and results. Also refer to Appendix G, Table A1-1 for the Confirmation Sampling Analytical Review. Refer to Appendix E, of the *Remedial Action Completion Report, Great Lakes Legacy Act Lower Menominee River Tyco Site*, (EQM, 2015) for bathymetric Survey Data. Refer to web link in the Reference list or place link here, CCR Report, EQM & CH2MHill reports referenced above.
    - In those deep-water areas where dredging activities exposed glacial till, a covering of carbon-enhanced sand was layered on top of any till areas having >20 ppm arsenic. This cover is approximately 12 inches thick and is intended to physically and chemically attenuate any remaining arsenic that might migrate vertically through the till to the water column. The design cover required a minimum placement of 10 inches of sand and activated carbon. Because the majority of exposed till is found within the bounds of the federal navigation channel, the action must be approved through U.S. Code Title 33, sec. 408 permitting by the Army Corps of Engineers. That permit was approved on March 2, 2015, with cover placement occurring during the summer construction season. Sand cover placement was completed on June 24, 2015 (Appendix A, Figure 12). Pan

tests, pre and post bathymetry and diver-assisted core sampling were performed to verify sediment placement and thickness (EQM, 2015). See CH2MHill, 2014 Appendix H of the *Sampling Summary Report, Great Lakes Legacy Act Lower Menominee River Tyco Site Adjacent to the Tyco Fire Products LP Facility, Marinette, WI* for Confirmation Sampling Analytical Review and Sand Cover Coring Results Summary. Add the USEPA RCRA web-link to the report.

### **Site Monitoring/Maintenance**

The Ansul/TYCO Site is following the Operations and Maintenance Plan (*Revised Barrier Wall Groundwater Monitoring Plan Update (BWGMP)*) (CH2MHill, 2015a) agreed to with the WDNR and USEPA RCRA Program. The objective of the BWGMP is to provide the approach to long-term monitoring of the effectiveness of the barrier at containing on-site groundwater. The plan is required by the AOC between Tyco and USEPA RCRA Program.

Tyco agreed to implement the following activities:

- Barrier wall inspections, installation of additional ground water monitoring wells, groundwater elevation monitoring, and water quality monitoring to demonstrate barrier wall effectiveness
- A pump-down program to lower water levels in the former Salt Vault and the former 8<sup>th</sup> Street Slip and ultimately maintain a constant groundwater elevation within these areas
- Enhanced monitoring of the Main Plant Area by calculating the potential amount of groundwater migration from the upland area that would impact the ability of the Menominee River sediment to remain less than the remedial action objective (RAO) of 20 ppm total arsenic and conducting groundwater dye testing, upon completion of an outfall investigation, to determine if any portion of the barrier wall is leaking
- Sample collection of post-dredging accumulated soft sediment in the main river channel outside the Main Plant Area, in the turning basin, and the Transition Area (CH2MHill, 2015a). The post-dredging sediment sampling will coincide with the five year review and will be completed in 2018.

### **Sediment Related Remedial Action Goals**

The sediment related remedial action goals of this remediation project were to prevent arsenic-contaminated groundwater from migrating into the Menominee River and to achieve sediment contaminant levels in the river of less than or equal to 20 ppm of arsenic. The sediment related remedial actions have been implemented to the extent practicable. Future planned monitoring activities will determine the long-term effectiveness of the remedial actions (see Sediment Related Remediation/Source Control Section above).



Photo 1. Tyco Dredging Turning Basin, Menominee River (WDNR, Bougie)

## Green Bay Paint Sludge Site (Lloyd-Flanders, Menominee Michigan)

### Contamination Background

Since the early 1900s, a manufacturing plant in Menominee, Michigan has produced high end woven wicker furniture and metal seating. The furniture plant operations included the crafting, assembling, and finishing of seating components. Operations involved plating of metal parts or spray painting of metal and wicker components. Until the late 1980s, furniture production processes used water shields (curtains) to capture paint mists and overspray which generated large volumes of paint sludge. The painting and plating processes contained heavy metals, including high levels of lead, and other metals used as colorants. The overspray containing bulk paint wastes (paint sludge) collected at the bottom of the painting booths and these paint wastes along with other manufacturing wastes were dumped behind the plant on shore, along the shore, or flushed out to Green Bay off shore of the property (WDNR and MDNR, 1990; WDNR, 1996). The majority of these wastes remained behind the plant or along the adjacent shoreline (Appendix A, Figures 14 and 13).

The Lloyd-Flanders Industries, Incorporated purchased the furniture manufacturing plant from the Heywood-Wakefield Company in 1982, making them responsible for the furniture production contamination source control at the Green Bay Paint Sludge Site. Lloyd Flanders did not contribute to the contamination, which was already present on the site long before they purchased the facility.

Michigan Department of Environmental Quality (MDEQ) and Michigan Department of Natural Resources (MDNR site inspections from the early 1980s through the early 1990s documented the presence of the paint sludge contamination in upland areas behind the manufacturing plant, in waters and in sediment along approximately one half mile of the Menominee, Michigan portion of Green Bay, including shoreline properties adjacent to and including the area behind the Lloyd-Flanders Plant.

Site delineation by consultants for the company or MDNR found that immediately behind the plant, these bulk paint wastes formed continuous multicolored layers. In some places, the waste was three feet thick on the sediment of the bay, covering approximately 0.5 acre. Bits of these layers eroded into fragments due to wave and ice actions, and these fragments—through natural water movements, including waves, ice flows, and off-shore currents—spread throughout an approximate half mile radius of the plant. These colorful, putty-like fragments of paint sludge are hydrophobic (fail to dissolve/mix in water), and will sometimes form balls (a.k.a. paint balls). Fragments can be found imbedded in the beaches or sediment and occasionally can be found floating just below the surface of the water.

### **Site Remediation/Source Control**

In 1992 Lloyd-Flanders was ordered by the State of Michigan to investigate and remediate the paint sludge contamination and other manufacturing wastes connected to plant operations and processes. The Administrative Order required development of a Remedial Action Plan (RAP) for the *Green Bay Paint Sludge Site (GBPS), Menominee Michigan*. The RAP and the Administrative Order describe the remediation requirements for the site and also provide paint sludge contamination background, history, and required source control actions.

### **Shoreline Collections**

The Lloyd-Flanders shore patrol began collection, removal, storage, and disposal of paint balls (nodules) and fragments in 1992. This collection continues as part of their ongoing responsibilities related to the bulk paint contamination. The purpose of collection is to minimize exposure to wastes washing up to shore. The company is required to collect and remove paint sludge pieces/paint balls after ice-out in the spring and after storm events because water or ice actions can loosen the wastes imbedded in the bottom of Green Bay or along the Bay's shoreline and bring them back to the surface and deposit them along the shore. Under the Administrative Order, these paint wastes were to be stored and disposed of appropriately.

At the end of 1995 the company had reported removal of 7,500 gallons of hardened paint sludge waste nodules/fragments. In personal communications to TAC and CAC by Mark Erickson, Lloyd-Flanders Plant Engineer/Manager and CAC Co-Chair, paintballs/nodules and fragment collections have decreased in volume since collections began. The shoreline collection data provided in 2010 to the Michigan DNRE-Upper Peninsula District Office showed a reduction of 40% of material collected during the 2006-2010 time period. The time period 2010-2015 also showed a 41% overall reduction in material collected in regular shoreline cleanup activities. Collection activities in 2015 resulted in a total measured volume of 33 gallons. (Mark Erickson, personal communication).

### **Shoreline/Terrestrial Source Control**

A berm/rock dike was constructed in 1993 to enclose the submerged paint wastes to prevent further migration of the manufacturing wastes into Green Bay from the main disposal area. The core of this berm structure contains a series of membrane liners designed to hydraulically isolate the wastes from the bay. The original RAP required dewatering within the berm to facilitate waste removal and disposal, but testing indicated that dewatering was not feasible due to the conductivity of the sediment underlying the berm. Waste removal plans were modified to allow removal by mechanical and hydraulic suction dredging.

Contaminant removal work was conducted during the summer and fall of 1995, and October 1998. Approximately 5,300 tons of bulk paint wastes were sent to a hazardous waste treatment and disposal facility and 10,500 tons of excavated contaminated sediment and soils were sent to the local landfill. Berm dismantling and shoreline restoration was completed in October and November

1998. Shoreline restoration included the installation of a 12-ounce non-woven polypropylene fabric liner, anchored and covered by rock-rip-rap, on a portion of the shoreline bordering the plant site. This shoreline barrier was intended to prevent further erosion of waste remnants and contaminated soil.

Additional actions were taken as described in the *Outstanding Issues Regarding the RAP, GBPS Site Menominee, Michigan* report to address issues described in the RAP Supplement response letter. Exposure barriers comprised of gravel and crushed limestone were placed on upland soil areas from October 30 to November 3, 2000 to prevent surface soil lead exposures on portions of the Lloyd Flanders plant site. To address elevated lead levels detected along the southern end of the shoreline bordering the plant site after shoreline restoration was completed, an additional 180 feet of liner and rock rip-rap barrier was installed November 6-9, 2000.

### **Site Monitoring/Maintenance**

There were no reporting requirements negotiated under the Administrative Order-RAP for any parameters—such as the amount of paint wastes collected per year, water quality, groundwater quality, sediment contaminants, viability of the liner placed over the waste area after bulk paint wastes were removed, or stability of the rock berm—to insure site remediation was working as designed.

The GBPS Site exposure barriers are regularly inspected and maintained, as needed, and shoreline paint wastes are being collected for proper disposal, as required in the Operations and Maintenance Plan agreed to with the State of Michigan. A letter of credit is being maintained to ensure availability of funding for these activities for a period of 30 years. In the last fifteen years the upland barrier and shoreline rip rap have required no repair of any kind.

### **Remedial Action Goals**

The goals of this remediation project were to remove paint waste and impacted sediment and soil from the site and collect and remove paint nodules that wash up along the shoreline. These goals were achieved through the removal of bulk paint waste, sediment, and soil, and ongoing shoreline paint nodule collection (see Sediment Remediation/Source Control Section above).

(Add photo here)

Photo 2. Green Bay Paint Sludge Site.

## **Menekaunee Harbor – Heavy Metals and PAHs Site**

### **Contamination Background**

Menekaunee Harbor is a 13-acre natural embayment of the Menominee River located south of the confluence of the main channel and the South Channel. The City of Marinette owns the property around Menekaunee Harbor with the exception of a small parcel off the south break wall. Sediment quality in the Harbor was degraded and sediment deposition in the Harbor had a negative impact on the health and functionality of the aquatic ecosystem. Contamination was not as high as other segments of the AOC, but elevated concentrations of metals, PAHs, and nutrients had been reported (Weston Solutions, 2008). Since the harbor is located at the most downstream area of the watershed, it received contaminants from many historical industrial operations and, therefore, responsible parties could not be identified. Much of the Harbor's shoreline protection consisted of dilapidated vertical wooden seawalls, which were constructed in the early 1930s.

### **Site Remediation/Source Control**

For many years, the City of Marinette planned to restore the harbor for recreation; however, due to the expense of handling contaminated sediment, the City was unable move forward with the project. In 2010, the WDNR began partnering with the City and USEPA to move the harbor restoration project forward in an effort to meet the goals and objectives to remove beneficial use impairments with the ultimate goal of delisting the AOC. After several years of planning and engineering, and with financial support through WDNR and the GLRI, the project moved into the implementation phase in 2014. See Appendix A, Figure 16 for the final Menekaunee Harbor plan and contours.

Dredging commenced August 21, 2014, with the goal of removing contaminants at or above Threshold Effect Concentrations identified in the Consensus Based Sediment Quality Guidelines (CBSQG) (WDNR, 2003) for heavy metals: total arsenic, copper, lead, mercury and zinc (Ayres, 2014a and 2014b). A total of 57,809 CY of material was removed from the harbor. Environmental material (27,129 CY) was placed at the Waste Management Landfill in Menominee, Michigan, and navigational dredge material (30,680 CY) was placed at the City-owned Lot 24. Lot 24 is located in the Sand Hill Industrial Park, west end of Murray Street, Tax Parcel # 251.08049.000, City of Marinette. Additional clean dredge material (termed beneficial-use fill) removed from the west side of the harbor was used to bring the southeast quadrant of the harbor to the desired restoration depths. 7,700 CY of this clean material from within the harbor was hydraulically pumped to the restoration area. The beneficial use material was far less than the 22,500 CY planned, as the contractor encountered large amounts of woody debris co-mingled in the sediment within the harbor, requiring disposal at the landfill or Lot 24. Confirmation sampling indicated exceedances of heavy metals in the area near Harbor Town Marine Dock. To account for the material shortfall, clean, sand fill was placed to address low level metal contaminants and bring the habitat area to design elevation. Pan Testing and bathymetric surveys were conducted to ensure the 6-inch sand cover thickness was achieved over 12,500 square foot area (REL, 2016). Refer to Appendix A, Figures 17 and 18 for confirmation sediment sampling locations and the sand cover area, respectively. Dredging was complete in November 2014 and sand cover was finished in June, 2015. Confirmation sediment sampling results are located in Section 3.4.3.1 and Appendix H in the *Sediment Sample Results of the Construction Completion Report, Lower Menominee River Area of Concern Menekaunee Harbor Restoration Project, Marinette Wisconsin* (REL, 2016).  
<https://drive.google.com/file/d/0B2gzvflVdaq1RGQ3aXRlRlJ2cDg/view?pref=2&pli=1>

### **Site Monitoring/Maintenance**

Additional monitoring and maintenance of this site are not required.

### **Remedial Action Goals**

The goals of this remediation project were to improve navigation in the harbor and achieve sediment contaminant levels of heavy metals and PAHs below Threshold Effect Concentration (TEC) values of the CBSQGs. These goals were achieved through sediment removal and placement of sand cover over a limited area in the southeast section near the Harbortown Marine Dock (see Sediment Remediation/Source Control Section above).



Photo 3. Menekaunee Harbor Dredging (WDNR, Bougie)

## Wisconsin Public Service Corporation Marinette – Coal Tar and PAHs Site

### Contamination Background

The Wisconsin Public Service Corporation (WPSC) site is located in Marinette, Wisconsin. The 4-acre former manufactured gas plant (MGP) is about 750 feet south of the Menominee River and about 1.5 miles upstream from the river mouth at Green Bay. The WPSC MGP was formerly located on the property currently known as the Marinette Wastewater Treatment Plant (WWTP). Boom Landing Park is between the river and the site. It's currently used as a boat launch facility operated by the city (USEPA, 2016).

Former WPSC MGP operations have caused impacts to soil, groundwater and sediment. Residual coal tars generated by the former MGP operations washed into the Menominee River via a former slough and contaminating sediment along the Wisconsin shoreline of the Menominee River near Boom Landing.

The WPSC Marinette MGP operated from 1910 to 1960 using two coal gasification methods: retort and carbureted. The retort gasification process operated from 1910 to 1928. Retort gasification involved heating and volatilizing coal in an airtight chamber (retort) at temperatures reaching 2,200°F so the coal decomposed into gas and tar and generated impurities, including sulfur, carbon dioxide, cyanide, and ammonia. During the carbureted coal gasification method, used from 1910 until operations ceased in 1960, air and steam were passed over incandescent coal in a brick-filled vessel to form a combustible gas, which was then enriched by injecting a fine oil mist over the bricks, purified, and stored in holders prior to distribution. Coal tars are a byproduct from coal gasification (manufactured gas) and form NAPL (non-aqueous phase liquid) and DNAPL (dense non-aqueous phase liquid). Coal tars contain polycyclic aromatic hydrocarbons (PAHs) and other site-specific processing contaminants including sulfur, heavy metals, and metalloids such as mercury and arsenic. PAHs can cause risks to human and environmental health.

Coal tar-affected soil and groundwater were identified on the property and reported to the WDNR

during the 1989 WWTP expansion on the former MGP site. The City of Marinette excavated, removed a large amount of the impacted MGP residuals in the soil and backfilled the excavations with clean material. Refer to Appendix A, Figure 19 WPSC Previous Remedial Actions – Upland (NRT, 2016a). The groundwater contaminant plume appears to be limited to the WWTP property, Boom Landing, and portions of Mann Street. The groundwater plume does not appear to extend to the Menominee River and is not impacting surface water.

PAHs pose a risk to human health when there is a pathway to exposure to the chemicals contained in the soil, sediment and groundwater. Exposure to these chemicals can possibly cause adverse health effects, depending on the degree of exposure. Chronic exposure to coal tars, by dermal contact or inhalation, produces lesions to skin and mucous membranes. Some PAH structures are carcinogenic with chronic exposure (US Department Health and Human Services, 2005). A State of Wisconsin Committee on Water Pollution in 1960, in *An Investigational Report on Floating Tars on the Menominee River in Marinette, Wisconsin*, showed that there were tar droplets in the water of a former slough and two discharge pipes draining from the coal gasification plant area into the river. The tar and tar droplets were found in the former slough area and the Menominee River sediment adhered to anchored boats and equipment located downstream of the gasification plant area, and floating as far as 500 feet downstream.

### **Sediment Related Site Remediation/Source Control**

The USEPA's Docket Number V-W-13 • C-001 *Administrative Settlement Agreement and Order On Consent For Removal Action* negotiations between USEPA-Superfund Alternative Approach and WPSC resulted in a decision to remove the coal tar contaminated sediment (USEPA, 2012). <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0509952>

A total of 15,221 CY of PAH impacted sediment was removed from the Menominee River from November 2012 through March 2013 as part of the Non-Time Critical Removal Action (NTCRA). As discussed in the Final Report - Focused NAPL and Sediment Removal Action Final Report - Revision 1, dated October 3, 2013, Natural Resource Technology (NRT, 2013a), due to an uneven bedrock surface the mechanical dredge equipment was unable to completely remove dredge residuals on the bedrock surface. Soft sediment was removed to the extent practicable (less than 6 inches) and NAPL was not observed. Post dredge soft sediment cores collected in the dredged areas identified exceedances of the 22.8 milligrams per kilogram remedial action objective (RAO). Sediments exceeding the RAO ranged in thickness from 4 to 7 inches and analytical results from these cores ranged from 46.1 mg/kg to 683.8 mg/kg total (13) PAHs . (See Appendix B, Table 2 – Residual Sand Cover Analytical Summary Table from the July 2, 2015 NRT Technical Memorandum to USEPA Superfund Alternative Program and Appendix A, Figure 21 WPSC 2015 Bathymetric Survey Sand Cover vs. 2013 Post Dredging Surface (NRT, 2015b).

As a result, per the approved Construction Quality Assurance Project Plan (CQAPP) a minimum of 6 inches of a residual sand cover was required. As discussed in Section 2.9.4 of the Final Report, a minimum thickness of 10 inches of sand was placed over approximately 12,250 square feet in areas of the river where post-dredge confirmation samples indicated residual total (13) PAH concentrations exceeded RAO, for the NTCRA, of 22.8 mg/kg.

A post sand cover monitoring plan was developed. Two sediment/sand sampling events were completed on May 21, 2014 and October 27, 2014. All of the surface sand cover sample results were below 22.8 mg/kg total PAH (13) and are all below 1 mg/kg total PAH (13). Additional sand cover monitoring will be conducted at the time of the five year review in 2018 (NRT, 2015b).

A reactive core mat (RCM) was installed around the outfall structure and former slough to the river (See Appendix A, Figure 20) over an area of 19,500 square-feet (including mainly side slopes or bank areas) as a conservative contingency measure to prevent any potential small “stringers” of NAPL that may be sorbed to the upland soil and debris from migrating into the river (NRT, 2016b). The RCM construction included 3” minus backfill and 6” of general fill-cushion layer under the RCM. The RCM was then covered by a protective geotextile fabric and 1.5’ diameter riprap on the river bank, held in place by larger toe stones. The small portion that lies on the river bottom is covered with 6-9” of 3” minus stone.

Refer to NRT, 2016b *Feasibility Study*, Appendix B for Sediment Removal Action Information: Sand Cover Monitoring Plan, sediment results, sampling map, Construction Completion Report and Feasibility Report.

<https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.scs&id=0509952&doc=Y&colid=30497&requestTimeout=480> Provide live EPA Superfund web-link to this section once it active again.

The “(13)” above stands for the thirteen priority PAHs that were sampled versus the entire list of PAHs. Following is the list of PAHs sampled:

- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Chrysene
- Fluoranthene
- Fluorene
- Naphthalene
- Phenanthrene
- Pyrene

### **Sediment Related Site Monitoring/Maintenance**

The WPSC MGP Site is following the Residual Sand Cover Monitoring Plan agreed to with WDNR and USEPA Superfund Alternative Program (NRT, 2013b). The residual sand cover was monitored using a combination of bathymetric surveys and residual sand cover core sample results. Two sediment sampling events were completed on May 21, 2014 and October 27, 2014. All of the surface sand cover sample results were below 22.8 mg/kg total PAH (13) and are all below 1 mg/kg total PAH (13). Sand thickness was also measured during the sampling events. During each sampling event, a push core was advanced to refusal. Sand cover thickness was greater than 10 inches in all events with the exception of site A1B35 which was 9.6 inches. Overall, sand cover thickness measurements ranged from 9.6 to 18 inches (NRT, 2015b).

<https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.scs&id=0509952&doc=Y&colid=30497&requestTimeout=480> Need to obtain live web-link from USEPA—new website—current docs not uploaded yet. NRT, 2016a and 2016b—*Feasibility Report*.

In addition, bathymetric surveys were performed in 2013 post dredge prior to sand cover placement and again in 2015 post sand cover. Ninety-seven percent of the area contains a sand cover thickness of 10 inches or greater, indicating natural deposition on the sand cover (See Appendix A, Figure 21).

As a result of the sediment quality data and bathymetry results, sand cover sampling is completed until the 5-year review in 2018, consistent with the decision tree presented in the USEPA-approved 2013 Residual Sand Cover Monitoring Plan (NRT, 2013b). All sediment and sand cover data is located at:

<https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.scs&id=0509952&doc=Y&colid=30497&requestTimeout=480> Need to obtain live web-link from USEPA—new website – current docs not uploaded yet. NRT, 2016a,b—*Feasibility Report*.

Discussions are ongoing between WPSC, USEPA Superfund Alternative Program and WDNR with regard to future long-term monitoring of the sand cover and the RCM. In addition, the upland and river areas of the WPSC MGP site are being evaluated for the purpose of developing a Record of Decision (ROD). The ROD is not scheduled for completion until June 2017 and could likely impose continuing obligations associated with the soil, ground water, RCM and other engineered controls, if necessary. This however, does not change the BUI removal status as the remedial goals for sediment removal action have been met to the extent practicable.

The ROD documents the cleanup remedy for a site or a contaminated part of a site called an operable unit. After the [remedial investigation/feasibility study](#) is completed at a National Priorities List (NPL) site, a remedy is chosen (USEPA, 2016). The ROD certifies that the remedy selection process has followed the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act ([CERCLA](#)) and the National Contingency Plan ([NCP](#)) for hazardous releases and oil spills. It also discusses the technical components of the remedy. In addition, the ROD provides a consolidated source of information about the site to the public.

### **Sediment Related Remedial Action Goals**

The goal of this sediment related remediation project was to achieve surface sediment contaminant levels of less than or equal to 22.8 mg/kg (ppm) of 13 priority PAHs. These goals were achieved to the extent practicable through sediment removal, sand cover placement, and a RCM (see Sediment Related Remediation/Source Control Section above).



Photo 4. WPSC MGP Dredging Menominee River (WDNR, Bougie)

# Sediment Assessments

## Lower Scott Flowage Sediment Investigation

The Lower Scott Flowage (LSF) is located between the Park Mill and Menominee Dams. Little historical information was available for the flowage. The 1996 RAP update (WDNR, 1996) indicated that the Scott Paper Company (located on the flowage between the dams) historically discharged its plant effluent, coal ash and other debris into the flowage. Currently, there is a fish consumption advisory for PCBs and mercury specifically for the LSF, indicating a potential issue with sediment quality within the impoundment. In March 2012, the WDNR contacted GLNPO and requested a sediment characterization to determine if there are any impairments due to sediment quality in the LSF. As a result, a sediment investigation was conducted in November 2013 for GLNPO under Task Order No. 0014, Contract No. EP-RS-11-09. (CH2MHill, 2013b).

The investigation included the following:

- Visual survey of shoreline to document outfalls and other shoreline features of interest
- Collection of water depth and sediment thickness measurements
- Collection of sediment samples for analysis of polychlorinated biphenyl (PCB) Aroclors and congeners, polycyclic aromatic hydrocarbons (PAHs), pesticides, dioxins, oil and grease, total metals, and acid volatile sulfide/simultaneously extracted metals to provide information regarding the nature and extent of contaminant concentrations within site sediment.
- Collection of sediment samples for analysis of total organic carbon, particle size, specific gravity, and percent moisture to characterize the physical properties of the sediment.

Sediment thickness and water depth vary throughout the LSF. Water depth is shallow in the western portion of the flowage and the riverbed consists primarily of rock with thin sediment deposits less than 1- foot in isolated areas. Very little sediment was identified within the main river channel. The only sediment deposits identified along the south side of the river were located near the culverts located east of the hydroelectric plant property and near the downstream Menominee Dam. Sediment thicknesses up to 4 feet were identified in the northeastern portion of the flowage.

Analytical results were screened against Wisconsin Threshold Effect Concentrations (TECs) and Probable Effect Concentrations (PECs) (WDNR, 2003) and USEPA Region 5 (USEPA, 2003) Resource Conservation and Recovery Act (RCRA) Ecological Screening Levels which include screening values from MacDonald, et al. (2000a and 2000b).

PAHs, metals, PCBs, and dioxin compounds were detected at concentrations exceeding TEC concentrations at 11 of the 36 sample locations within the LSF. TEC exceedances of PAHs, PCBs, and dioxins were also detected at two of the three sample locations upstream of the Park Mill Dam. TEC exceedances are located in isolated pockets throughout the flowage and are not indicative of a large contaminated sediment mass. No distinguishable trends in TEC exceedances were observed with depth.

PECs exceedances were present at only 2 of the 36 sample locations within the flowage. There were no PEC exceedances upstream of the Park Mill Dam. PAHs and copper were the only compounds detected at concentrations exceeding PECs within the flowage. The two samples with PEC exceedances are located in close proximity to one another within an isolated sediment pocket immediately downstream of the culverts discharging from the vicinity of the former Scott Paper Mill (now called Kimberly Clark). The estimated volume of sediment exceeding PECs is

approximately 200 cubic yards and covers a limited area (CH2MHill, 2014). The WDNR Storm Water Permit Program staff have followed up with the owners and operators of the storm sewer system and requested that they (Kimberly Clark and the City of Marinette) evaluate their outfalls at the next required monitoring period to determine if they are an ongoing source of contaminants to the LSF. No further recommendations were made for remediation of this minor deposit nor the flowage overall. Therefore, the results of the sediment characterization show that the sediment in the LSF is not a source of PAHs, metals, and PCBs and Dioxin in the AOC (Appendix A Figures 22, 23, and 24, respectively ( CH2MHill, 2014).

## Rio Vista Slough Sediment Investigation

MDEQ-Surface Water Assessment Section (SWAS) staff used a petite Ponar dredge to capture sediment samples at eight locations in Rio Vista Slough (RVS) in 2014 (Appendix A, Figure 25; Appendix B, Table 3 ). The primary purpose of the study was to help answer this question: Is RVS acting as a partial source for PCBs found in fish tissues driving the fish consumption advisory in the AOC? PCBs were not found in any of these samples (Appendix B, Table 4). As part of this analysis the samples were also analyzed for heavy metals and PAHs. Heavy metals were detectable at all locations, but varied greatly by location and were not above probable effects concentrations (Appendix B, Table 5). The locations nearest the storm drain had the highest concentrations of metals. PAHs were detected at above probable effects concentrations at three locations adjacent to storm drains that flowed into the slough (Appendix B, Table 6). Sheen was observed at all locations during sample collections.

MDEQ SWAS staff indicated that the PAHs and metals levels found in RVS were similar to other areas across the state associated with asphalt or tar topped parking lot areas, were not high enough to drive a removal action, and would be reviewed by appropriate state programs. The small size of RVS and its isolation from the main channel mean that the potential for sedimentation downstream is minimal and not likely to impact benthos. Therefore, the results of the sediment characterization show that the sediment in RVS is not a significant source of PCBs, heavy metals, or PAHs in the AOC.

## Evaluation of Potential Remaining Dredge Restriction Areas

### **(Ansul) Tyco:**

The USEPA RCRA AOC indicates that Tyco was **not** required to dredge contaminated material in the glacial till due to difficulty of removing the material and the cost feasibility. A sand cover was instead allowed for approximately 3 acres of area that contained exposed arsenic above the 20 ppm RAO in the turning basin and several areas in the transition zone. Refer to Appendix A, Figure 13 for a map of the sand cover area that was completed June 24, 2014. Because the majority of the sand cover area is located in the Federal Navigation Channel, a Federal Section 408 Permit was granted for this activity. In addition, a State of Wisconsin Chapter 30 (WI State Statues) Waterway Permit was required for sand placement in waters of the State. Permitting allowed the sand cover to be placed at -23 -feet minimum water depth. This is 2-feet below the Federal Authorized Depth of 21 feet, and includes one foot over-dredge allowance to prevent interference with USACE authority dredging activities in the turning basin. This remediation project restored the Federal Navigation authorized depths in the turning basin for the first time in 47 years.

The turning basin is a natural depositional zone due to depth and proximately to the main river channel. Transported sediment will deposit and mix with the sand cover, providing additional dilution of the arsenic. A combination of post dredge confirmation sampling, bathymetry surveys

and pan-tests of the sand cover indicate the RAO of 20 ppm total arsenic has been achieved to the extent practicable. Future planned monitoring activities will determine the long-term effectiveness of the remedial actions. Based on available information there do not appear to be any further risks or impacts to biological or human health from sediment in the turning basin, transition area, and the South Channel of the Tyco project area where the 20 ppm RAO has been met Refer to the Appendix A, Figures 10, 11 and 12 for DMUs and post-dredge confirmation sediment sampling locations and results. Also refer to Appendix G, Table A1-1 for the Confirmation Sampling Analytical Review. Refer to Appendix E, of the *Remedial Action Completion Report, Great Lakes Legacy Act Lower Menominee River Tyco Site*, (EQM, 2015) for bathymetric Survey Data. Refer to web link in the Reference list or place link here, CCR Report, EQM & CH2MHill reports referenced above.

Currently, there are no utilities that cross the turning basin or transition area due to the hard glacial till, bedrock and the sheet-pile barrier wall between the Tyco property and the river. Due to these physical constraints and USACE navigational depth restrictions, future placement of utilities in the sand cover area is unlikely. Alternate locations for future utility crossings will need to be sought in more suitable or practical areas.

Currently, the City of Marinette's public water supply lines are the only utility crossing the South Channel of the Menominee River. This part of the river is not a high priority area for navigation dredging due to limited water depths and stationary railroad bridge. Tyco's remedial dredging in the South Channel has met the 20 ppm total arsenic RAO, and no further action or monitoring is required for this area (under the current monitoring plan); therefore, dredging restrictions for the South Channel are no longer required.

#### **Green Bay Paint Sludge (Lloyd Flanders - Menominee, Michigan):**

The MDEQ Remediation and Redevelopment Division staff and files state there is no indication of any dredging restrictions associated with the remedial actions at the Green Bay Paint Sludge facility. A majority of the waste has been removed, with only small pieces of hardened paint nodules that continue to accumulate on the shoreline (Lori Maki E-mail MDEQ, 2016). The volume of paint nodules has decreased from year to year as indicated in annual reporting.

#### **Menekaunee Harbor:**

Two city-owned and operated utility crossings run parallel with the Ogden Street Bridge at Menekaunee Harbor and the South Channel: a sanitary sewer main on the west side of the bridge and a water main on the east side of the bridge. As part of the harbor restoration, dredging occurred near the water main and confirmation sampling indicated the sediment removal met the project goal of removing sediments with metal concentrations at or above TECs. Dredging was not performed near the sanitary sewer main because sediment quality did not exceed 20 ppm for total arsenic.

Post-dredge confirmation sampling indicated exceedances of heavy metals (arsenic and lead) in the area adjacent to the Harbor Town Marine Dock boat slips. Given the difficulties of dredging within the existing marina structures, the Project Team deemed a 6-inch sand cover over a 12,500 square-foot area would aid benthic recovery and residual management. Clean, tested sand fill was placed to address low level metal contaminants and bring the habitat area to design elevation (REL, 2016; Refer to Appendix A, Figure 18 for the Sand Cover Area). The dilution layer sand cover will allow for benthos recovery and prevent a direct contact exposure pathway, protecting human and ecological health. Through confirmation sediment sampling, the remainder of the harbor was determined to meet the TEC goals set within the Project Manual for Menekaunee Harbor Improvements, City of

Marinette, Marinette, Wisconsin (Ayres Associates, 2014). Impacted sediments within the harbor have been addressed environmental dredging to the extent practicable and through placement of a dilution sand cover. Concerns with material management/disposal or negative impacts on water quality, benthos, or human health have been addressed. For these reasons, dredging restrictions in the Menekaunee Harbor Area no longer apply.

**Wisconsin Public Service Corporation:**

Due to uneven bedrock surfaces, approximately 220 CY of MGP residual impacted sediment remains at depth. A 10-inch sand cover was placed over a 12,250 square-foot area along with an RCM that was installed over an adjacent 19,500 square foot area (including mainly side slopes or bank area and a small area of river bottom). The RCM serves as a conservative contingency measure to prevent any potential small “stringers” of NAPL that may be sorbed to upland soil and debris from migrating into the Menominee River near Boom Landing (NRT, 2016b; Appendix A, Figure 20).

The sand cover serves as residuals management, and WPSC developed and is implementing a Sand Cover Monitoring Work Plan to assess the effectiveness of the cover to integrate as well as separate the post-dredged sediment surface and meet the RAO of less than 22.8 mg/kg total (13) PAH in the upper 6 inches of material. As a result of the NTCRA, sediment has been remediated to the extent practicable. The sand cover is not anticipated to impact or impede any priority navigation dredging since it is located outside the Federal Navigation Channel and away from the municipal boat launch (Boom Landing). The City of Marinette and Nestegg Marine are the riparian owners of the WPSC remediation area. WPSC performed dredging at Nestegg Marina between the slips along the break wall to create sufficient draft for sail boats and other large recreational vessels. It is anticipated that with the current Lake Michigan water level and the sediment removal at Nestegg Marine, dredging will not be necessary in the immediate future. Future planned monitoring activities will determine the long-term effectiveness of the sediment related remedial actions.

Currently, there are no utilities located within the dredged portion of the river. It is unlikely that utilities will be placed in this area due to the physical constraints of the bedrock river bottom. The RCM is another limiting factor for locating utilities at this location as it may not be disturbed in order to function properly. Alternate locations for future utility crossings will need to be sought in more suitable or practical areas. If a utility crossing was planned in the sand cover area, the NR 347 application process would consider the available monitoring data and likely additional characterization based on the specific location. However, a utility crossing in the sand cover area is unlikely due to the shallow bedrock that limited dredging.

**Other Regulatory Processes for all Dredging Activities in Waters of the State:**

In addition, any activities associated with dredging, placement of utilities, piers or other streambed modifications requires a State of Wisconsin Chapter 30 (WI State Statutes) Waterway Permit along with following procedures outlined in the Wisconsin Administrative Code NR 347: Sediment Sampling and Analysis (Appendix C) for dredging permit application and approval process. This process allows the WDNR to review and evaluate if the project minimizes impacts to the environment and meets the permit and regulatory requirements. Future dredge projects located within the Lower Menominee River-way should follow the NR 347 Sediment Sampling and Analysis procedures and provide the WDNR with sediment quality results to determine any potential media (sediment, surface water, groundwater, air quality) impacts as a result of the proposed dredging project. Projects will be evaluated and permitted under the State Statutes Chapter 30 permit

process. WDNR staff will coordinate to ensure that any proposed actions will be in compliance with laws and regulations. To ensure compliance with the requirements of the Wisconsin Administrative Code NR 700 Series (November 2013) and WI State Statutes 292 (August 19, 2016), the WDNR's Remediation and Redevelopment Program should be consulted prior to disturbing any RCM and/or area(s) exceeding a site-specific RAO. As appropriate, USEPA (RCRA or Superfund Alternative Program) should also be consulted prior to disturbing any RCM, deed restricted area(s), and/or area(s) exceeding a site-specific RAO.

MDEQ also regulates dredging projects under a similar permit authority Part 301, Inland Lakes and Streams Part 325, Great lakes Submerged lands; and Part 115 Solid Waste Management of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and proposed placement of dredge spoils upland. Refer to (Appendix D) for dredging permit application and approval process from (MDEQ, 2013).

## Outcome of Evaluation for Potential Dredge Restrictions

In Summary, as outlined above, the target for BUI removal has been met. Of the sites we evaluated, three sediment remediation sites (Ansul-Tyco, Menekaunee Harbor and WPSC) relied on a combination of dredging, sand cover and/or RCM to meet the specific objectives for each site.

## Stakeholder/Public Engagement

The Technical Advisory Committee (TAC) was formed in 1988 to bring together technical experts familiar with the AOC for the development and implementation of the Remedial Action Plan (WDNR, 1990). In addition, TAC members review and provide input on project plans, monitoring data, RAP updates, and BUI removal documents. They also provide support for monitoring programs to assess impaired uses, removal of the BUI, and ultimately removing/delisting the AOC status.

The Citizens Advisory Committee (CAC) was formed in 1988 as a means of incorporating stakeholder feedback into the RAP documents and to serve as ambassadors on AOC issues to the Marinette and Menominee communities (WDNR, 1990). CAC members help the agencies by identifying local issues, developing local targets and goals, serving as a resource for historical information, and assisting in project implementation when possible. The CAC developed governing bylaws in June of 2011 to ensure the committee's long term viability and balanced representation of the community. As of July 2016, there are thirteen membership positions filled of a possible twenty-six. Dozens more individuals have attended monthly meetings and currently receive meeting minutes and AOC updates through e-mail. The WDNR and the MDEQ strongly prefer that requests to remove the impaired designation of a BUI be agreed to by the TAC and CAC. The TAC meeting minutes and CAC have included a letter of support for this document in Appendix E.

The CAC holds nine or ten regular meetings per year on the UW-Marinette campus open to all interested parties. Meetings are advertised through the WDNR Public Meetings Calendar (<http://dnr.wi.gov/Calendar/Meetings/>), CAC email distribution list, and other means. Participation in meetings is the primary way members of the CAC stay informed and provide input on AOC activities. In addition to attending CAC meetings, the CAC members have been active in the AOC in the following ways: participated in on-site tours for the sturgeon passage project, the

Ansul/Tyco arsenic site, the Menekaunee Harbor restoration site, and the WPSC coal tar site; hosted volunteer waterfront cleanup events; reviewed documents and provided letters of support for AOC related projects; provided local representation or feedback at various state and federal AOC meetings; hosted and participated in AOC Open House events in June 2014 and September 2016; and participated in state and federal AOC related conference calls.

## Recommendation Removal Statement

Based upon the completion of the necessary contaminated remediation projects, continued monitoring under the Superfund Alternative and Resource Conservation Recovery Act Programs, and review of the data for all remediation projects by WDNR, MDEQ, MDNR, USACE, USCG, USFWS, TAC and CAC, the WDNR along with MDEQ recommends the removal of the Restrictions on Dredging Activities BUI for the Lower Menominee River Area of Concern. All management actions established to meet the BUI delisting targets have been completed. The following required actions have been completed:

- Remediation of Green Bay paint sludge/sediment completed and meeting targets
- Remediation of WPSC coal tar sediment completed and meeting targets
- Remediation of Ansul/Tyco arsenic sediment completed and meeting targets
- Remediation of Menekaunee Harbor sediment completed and meeting targets
- Lower Scott Flowage sediment characterization showed no remediation needed
- Rio Vista Slough sediment characterization showed no remediation needed

This removal recommendation was discussed with the Lower Menominee River TAC and CAC at their regular meetings on August 24, 2016. The Lower Menominee River TAC and CAC submitted formal letters of support for removal of the BUI, dated ..., 2016, (Appendix E). The proposed action was public noticed via listing in the Eagle-Herald ([www.ehextra.com](http://www.ehextra.com)), and also publicized via AOC e-mail distribution lists and the GovDelivery listserve for the AOC. Supporting documents were posted on the WDNR Menominee River AOC Website ([dnr.wi.gov/topic/greatlakes/menominee.html](http://dnr.wi.gov/topic/greatlakes/menominee.html)) for public review and comment from September 8, 2016, through September 22, 2016. X #Written or verbal comments were received during this period.

A Lower Menominee River Area of Concern Open House was held on September 15, 2016, at UW-Marquette Campus as an additional opportunity for the public to review and comment on the dredge management plan and BUI removal package.

Based on the review of all pertinent data, and input from the USEPA project staff, the TAC, the CAC, and the public, all sediment remediation projects have been completed to the extent practicable, and no further sediment characterization or sediment remediation in the Lower Menominee River AOC is required.

MDEQ and WDNR AOC Program staff request concurrence with the recommendation to remove the Dredging Restrictions BUI from the Lower Menominee River AOC.

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**Note to author: All USEPA web-links to WPSC site are broken (due to reconstruction of the website) and need replacement once the USEPA website is live again. USEPA RCRA Ansl/Tyco website is live, however, more recent documents need to be updated on the website. Both USEPA Project Managers have been contacted by Bougie for request for updated links to current documents referenced here.**

## Definitions

Area of Concern (AOC) – Defined by Annex 2 of the 1987 Protocol to the U.S.-Canada Great Lakes Water Quality Agreement (GLWQA, 1987) as “geographic areas that fail to meet the general or specific objectives of the Agreement where such failure has caused or is likely to cause impairment of beneficial use or of the area’s ability to support aquatic life.” These areas are, or were, the “most contaminated” areas of the Great Lakes, and the purpose of the AOC program is to bring these areas to a point at which they are not environmentally degraded more than other comparable areas of the Great Lakes. When that point has been reached, the AOC can be removed from the list of AOCs in the Annex, or “delisted.” The GLWQA can be found at: <http://www.ijc.org/rel/agree/quality.html>

Beneficial Use Impairment (BUI) – Defined by the GLWQA as a reduction in the chemical, physical, or biological integrity of the waters of the Great Lakes sufficient to cause impairment to a designated use (GLWQA, 2013). The Lower Menominee River AOC has five BUIs remaining: restrictions on fish and wildlife consumption; restrictions on dredging activities; degradation of benthos; degradation of fish and wildlife populations; and loss of fish and wildlife habitat.

Beneficial use(s) are ways that a water body can improve the quality of life for people or for fish and wildlife. For example, providing habitat for fish and wildlife is a beneficial use of a water body. If a beneficial use is suppressed or unavailable due to environmental problems, like loss of habitat, then that beneficial use is considered impaired. The International Joint Commission provided a list of 14 possible beneficial use impairments in the 1987 amendments to the GLWQA.

Benthos/Benthic Organisms – the flora, fauna found on the bottom, or in bottom sediments of a lake, river or other body of water.

Consensus-Based Sediment Quality Guidelines – Federal and state sediment quality guidelines were developed for commonly found, in place contaminants to serve as benchmark values for making comparisons to the concentrations of contaminant levels in sediment at sites under evaluation for various reasons (NR 347 dredging projects, degree and extent studies, screening level ecological risk assessments). The consensus-based threshold values have been evaluated for their reliability in predicting sediment toxicity to benthic organisms by using matching sediment chemistry and toxicity data from field studies.

Great Lakes Restoration Initiative (GLRI) – A federal program that provides unprecedented funding for protection and restoration efforts on the five Great Lakes. State and local

governments and non-profit organizations are eligible to receive grants from the U.S. Environmental Protection Agency (USEPA) for projects addressing toxic substances, invasive species, non-point source pollution, habitat protection and restoration or accountability, monitoring, evaluation, communication, and partnership building.

Heavy Metals – The heavy metals refers to a group of toxic metals including: arsenic, chromium, copper, lead, mercury, silver and zinc. Heavy metals are often present at industrial sites and/former historical industrial operations. Heavy metals are sometimes transported off-site to ground water, surface water, and sediment via wind erosion and storm water runoff.

Lakewide Action and Management Plan (LAMP) - A LAMP is plans of action to assess, restore, protect, and monitor the ecosystem health of a Great Lake. It is used to coordinate the work of all the government, tribal, and non-government partners working to improve the Lake's ecosystem. A public consultation process is used to ensure that the LAMP is addressing the public's concerns.

Polychlorinated Biphenyls (PCBs) - A group of more than 200 compounds, PCBs have been manufactured since 1929 for uses including electrical insulation, hydraulics, fluorescent lights, and carbonless paper to name a few. In 1979, PCBs were banned because of their persistence in the environment and tendency to magnify up the food chain. They have been linked to reproductive problems in wildlife and are suspected of causing developmental problems in human infants.

Polycyclic Aromatic Hydrocarbons (PAHs) - Chemicals commonly associated with oils, greases, and other components derived from petroleum. Some PAH compounds have been identified as cancer or mutation causing.

Priority Areas Navigation Use – Include Federal Navigation Channel, commercial & industrial docks, marinas, boat launches, and private docks.

Priority Areas Utility Dredging and Crossing – Include all potential future areas and in this instance specifically in the sediment remediation areas.

Remedial Action Plan (RAP) - A RAP is developed for each AOC to identify the status of BUIs and their sources, document restoration targets, and list actions needed to reach those targets. RAPs are updated periodically to report progress toward achieving the restoration targets.

Resource Conservation Recovery Act (RCRA)- The Resource Conservation and Recovery Act protects communities and resource conservation. To achieve this, EPA develops regulations, guidance and policies that ensure the safe management and cleanup of solid and hazardous waste, and programs that encourage source reduction and beneficial reuse.

Restoration Target - Specific goals and objectives established to track restoration progress of beneficial use impairments. Once targets have been met, the beneficial use is no longer

considered impaired. Targets should be locally derived. Working with the Lower Menominee AOC Citizens Advisory Committee, delisting targets were developed in partnership with the Wisconsin Department of Natural Resources (WDNR) and the Michigan Department of Environmental Quality (MDEQ). Wisconsin and Michigan use different criteria when assessing BUIs. The agencies and CAC agreed to implement the most restrictive criteria from either state when developing the Menominee AOC specific delisting targets.

Superfund Alternative Approach- The Superfund remedial process begins once sites are brought to the attention of the Superfund site assessment program. As EPA uses all available tools to ensure the protection of human health and the environment, various avenues for site cleanup are evaluated during site assessment to determine which is the most appropriate to meet site cleanup needs. Superfund Alternative Approach - When a liable Potential Responsible Party (PRP) demonstrates it is viable and cooperative, EPA regional offices, at their discretion, may enter into a Superfund Alternative Approach agreement with the PRP to facilitate the cleanup of a site.

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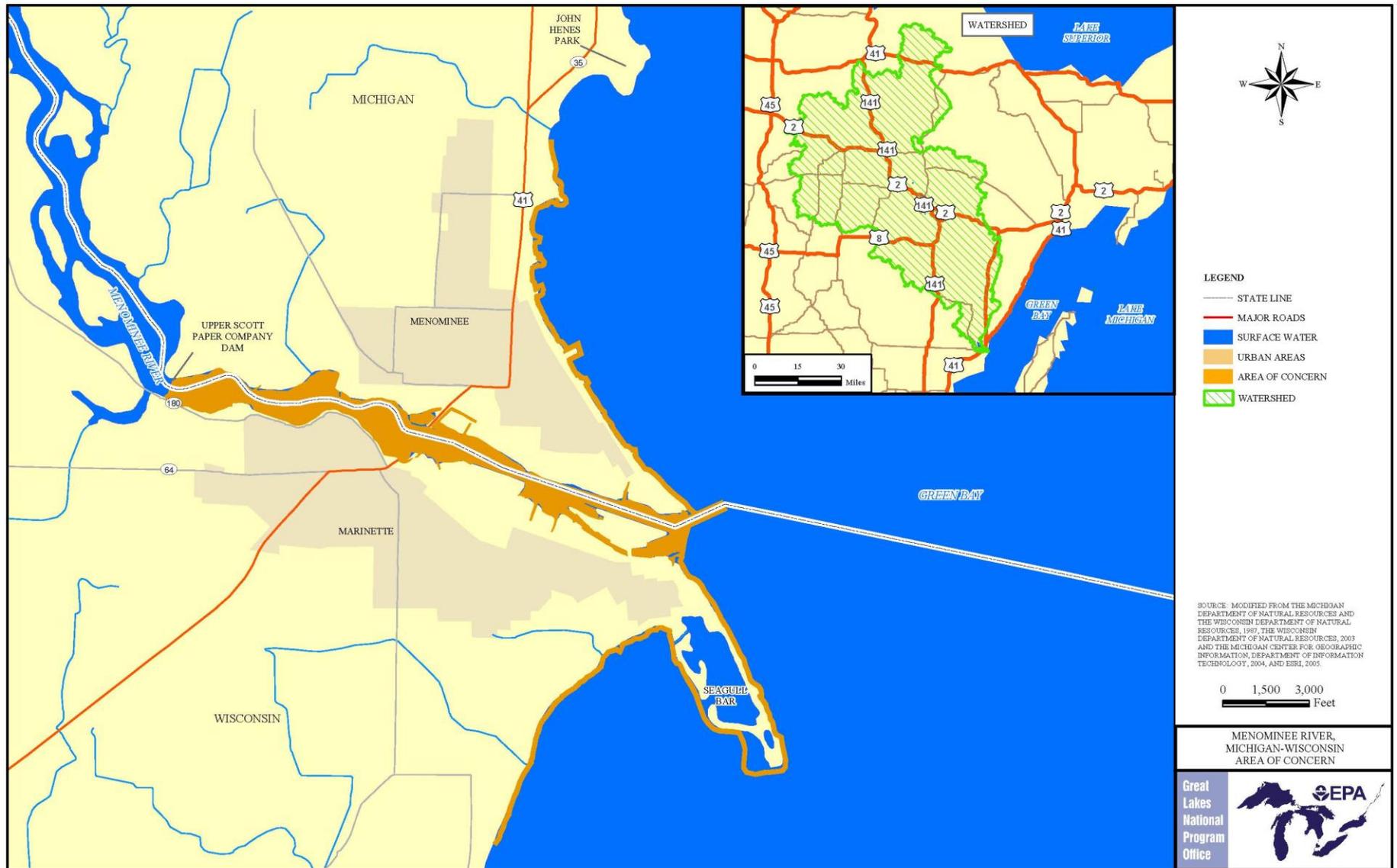
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**Appendix A - Figures**

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**Figure 1. Lower Menominee River Area of Concern (EPA, 2005).**



# Menominee Harbor, Michigan & Wisconsin



\* Outer Approach Channel currently maintained to maximum 300' width.

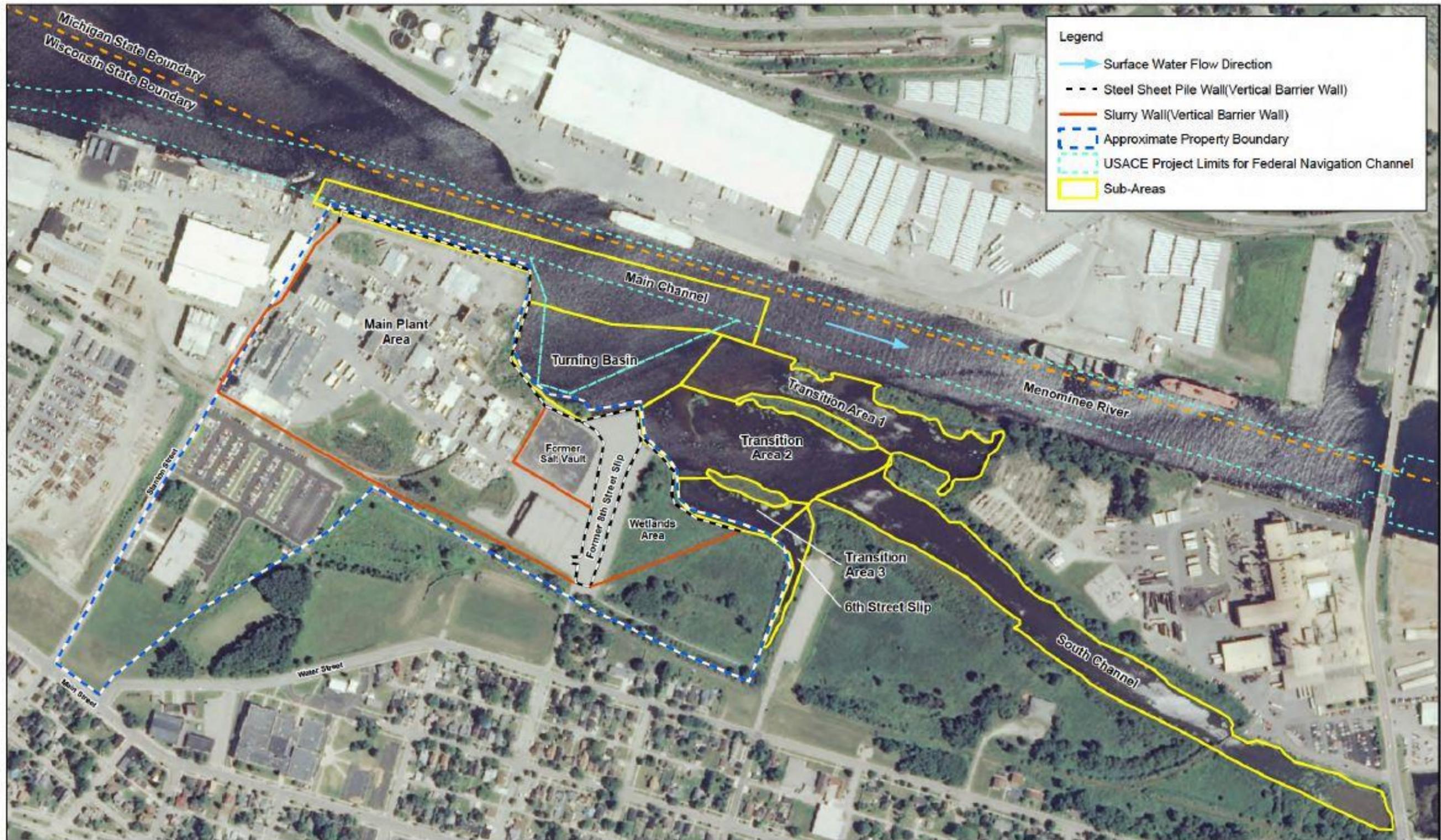
**Figure 3. USACE Menominee Harbor Federal Navigation Channel (USACE, 2016)**

# FY14 Menominee Harbor Dredging Areas



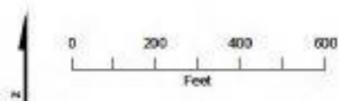
**BUILDING STRONG®**

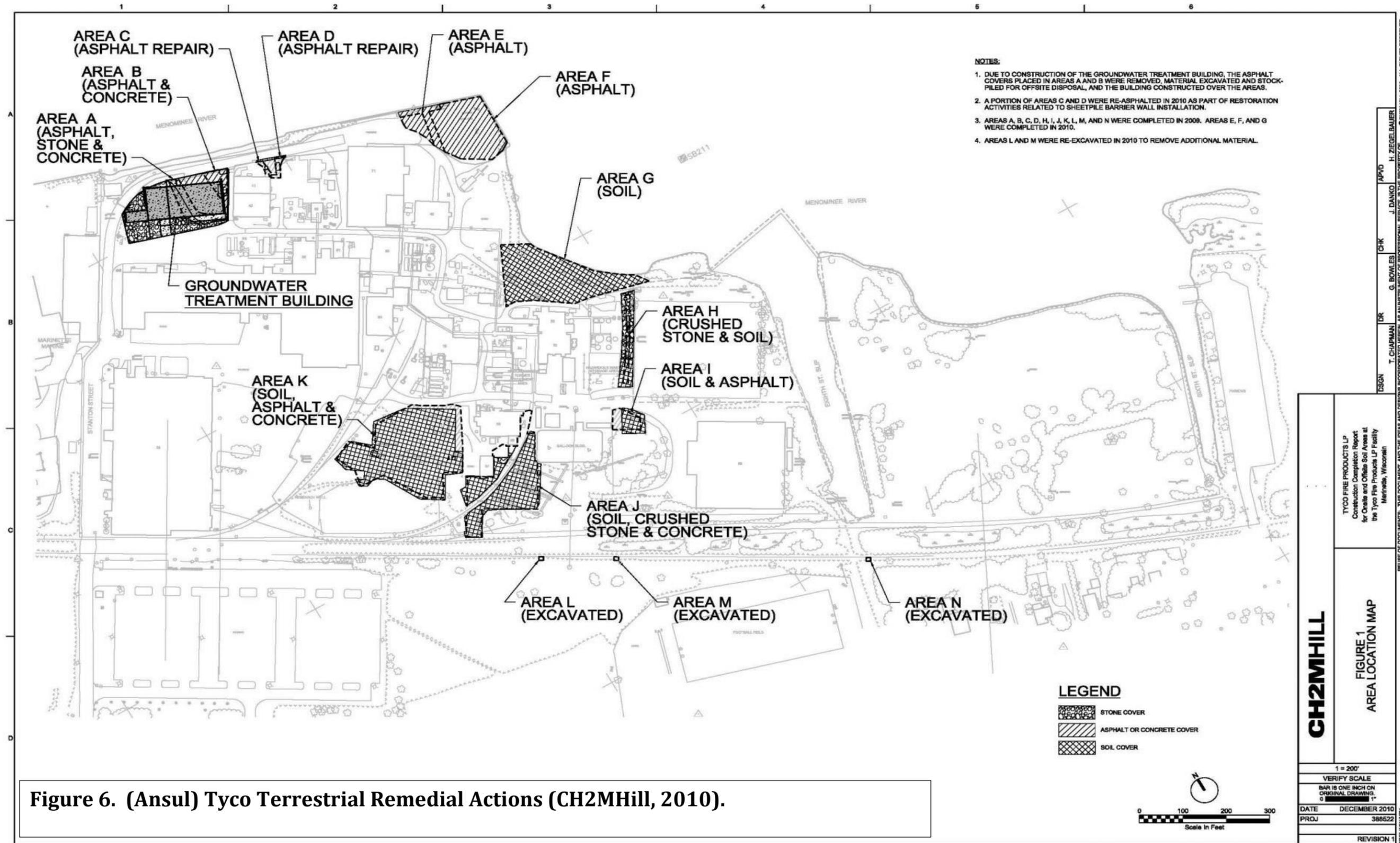
**Figure 4. USACE 2014 Federal Navigation Dredging & Disposal Site (USACE, 2014)**



**Figure 5. (Ansul) Tyco Facility Site Map (CH2MHill, 2010).**

Figure 1  
Site Map  
Tyco Fire Products LP Facility  
Marinette, WI





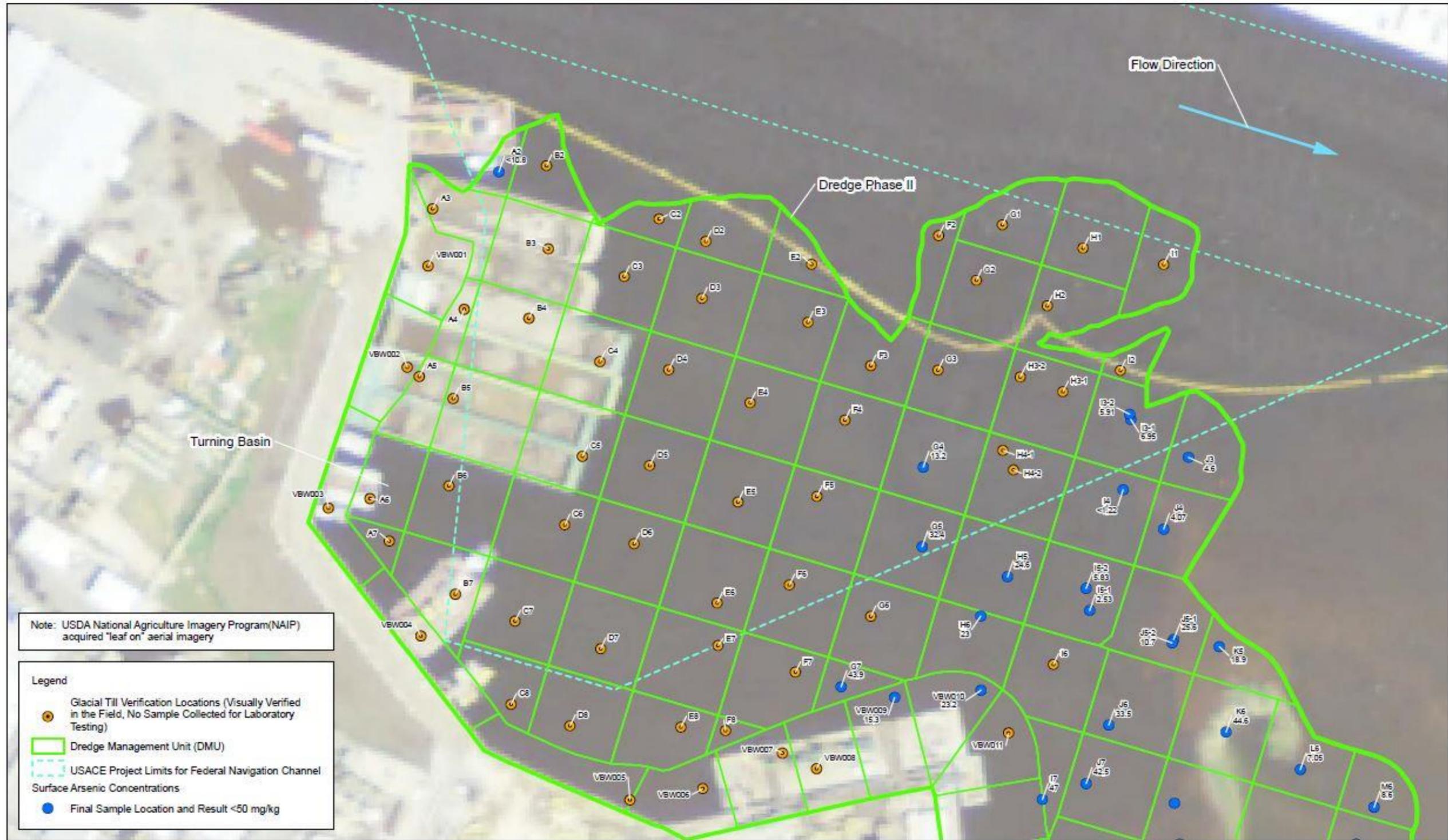
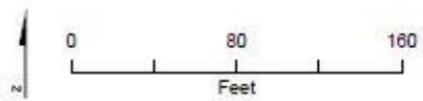


Figure 6  
Final Post-Dredge Confirmation Sampling Locations and Results  
Tyco Fire Products LP Facility  
Marinette, WI



E:\TYCO\MAPFILES\2014\OCRI\FIGURE 06 - FINAL POST-DREDGE CONFIRMATION SAMPLING LOCATIONS AND RESULTS.MXD JHANSEN1 2/28/2014 4:15:58 PM

Figure 7. (Ansul) Tyco Confirmation Sampling Results, Turning Basin, 50 ppm 2013 (CH2MHill, 2014).



Figure 3  
Confirmation Sampling and DMU Locations  
Tyco Fire Products LP Facility  
Marinette, WI

Figure 8. (Ansul) Tyco Confirmation Sampling Results - Transition Area, 50 ppm 2013 (CH2MHill, 2014).



Figure 8  
Final Post-Dredge Confirmation Sampling Locations and Results  
Tyco Fire Products LP Facility  
Marinette, WI

Figure 9. (Ansul) Tyco Confirmation Sampling Results - South Channel, 50 ppm 2013 (CH2MHill, 2014).

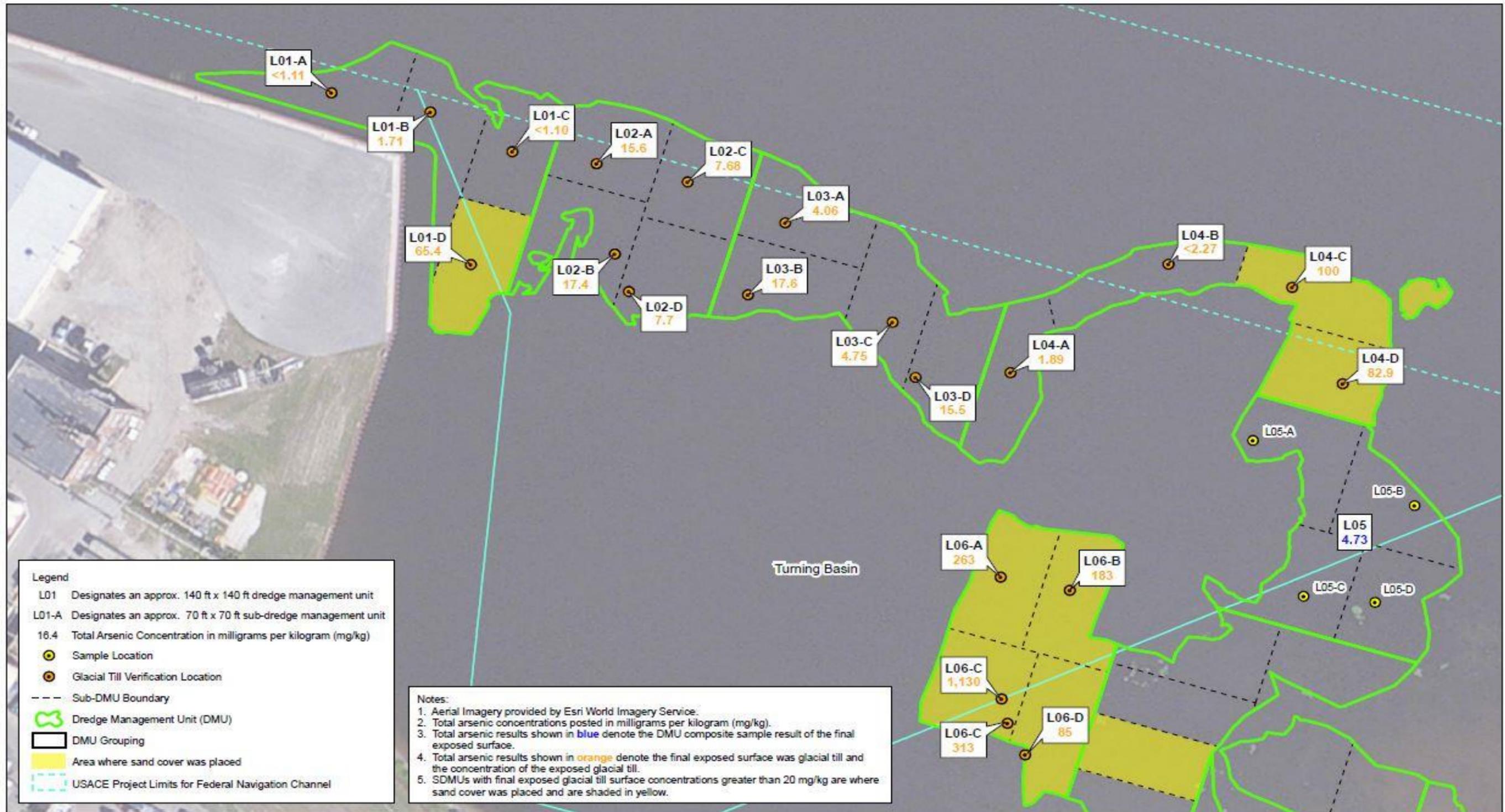


Figure 6  
Final Dredge Surface Confirmation Sampling Locations and Results - Turning Basin  
Tyco Fire Products LP Facility  
Marinette, WI

Figure 10. (Ansul) Tyco Confirmation Sampling Results - Turning Basin 20 ppm 2014 (CH2MHill, 2015b).



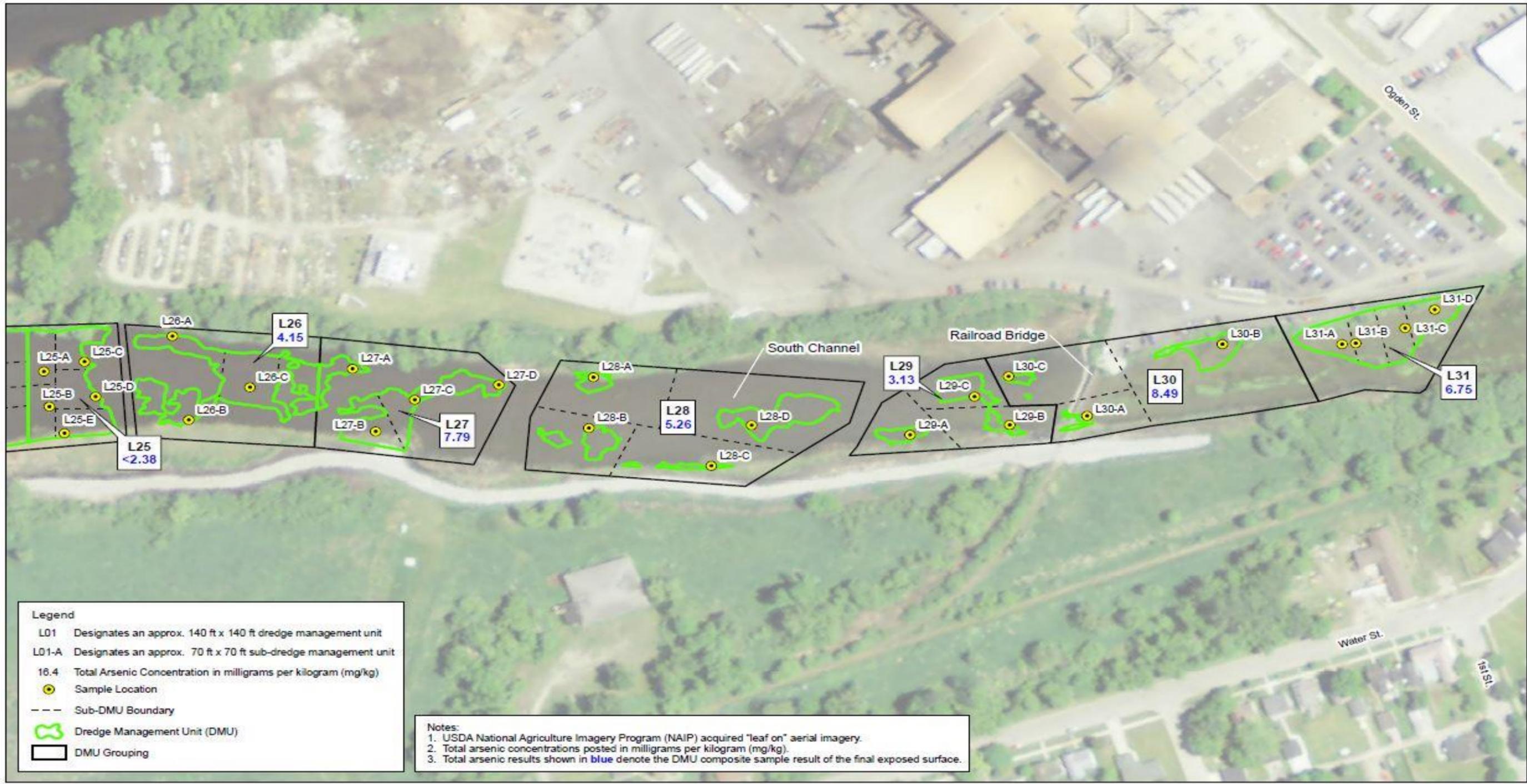


Figure 8  
Final Dredge Surface Confirmation Sampling Locations and Results - South Channel  
Tyco Fire Products LP Facility  
Manitowish, WI



Figure 12. (Ansul)Tyco Confirmation Sampling Results – South Channel, 20 ppm 2014 (CH2MHill, 2015b).

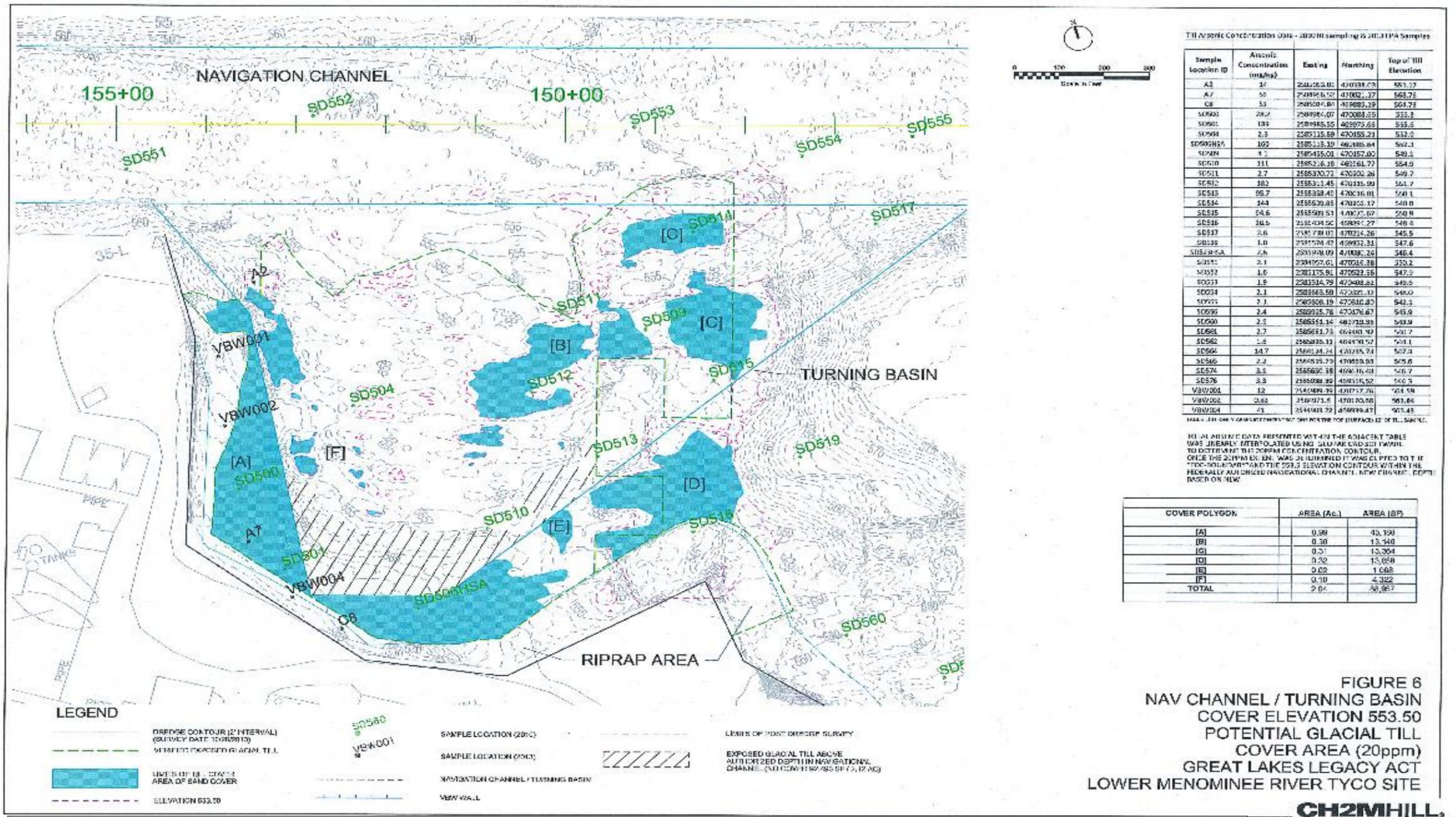
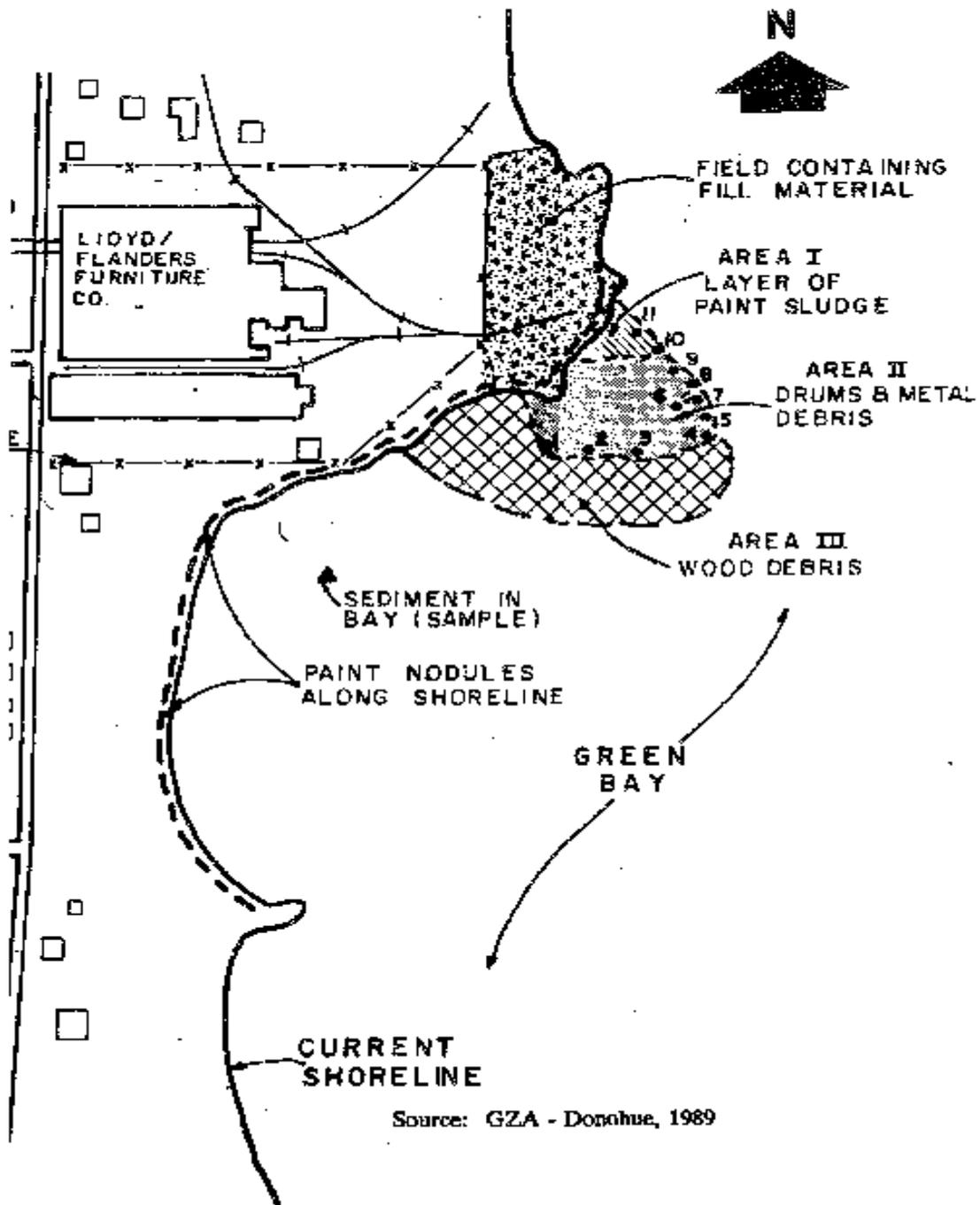


Figure 13. (Ansul)Tyco - Glacial Till Sand Cover Areas (CH2MHill, 2015b).



- 135 -

Figure 14. Green Bay Paint Sludge Site - Lloyd Flanders Facility Site Map.

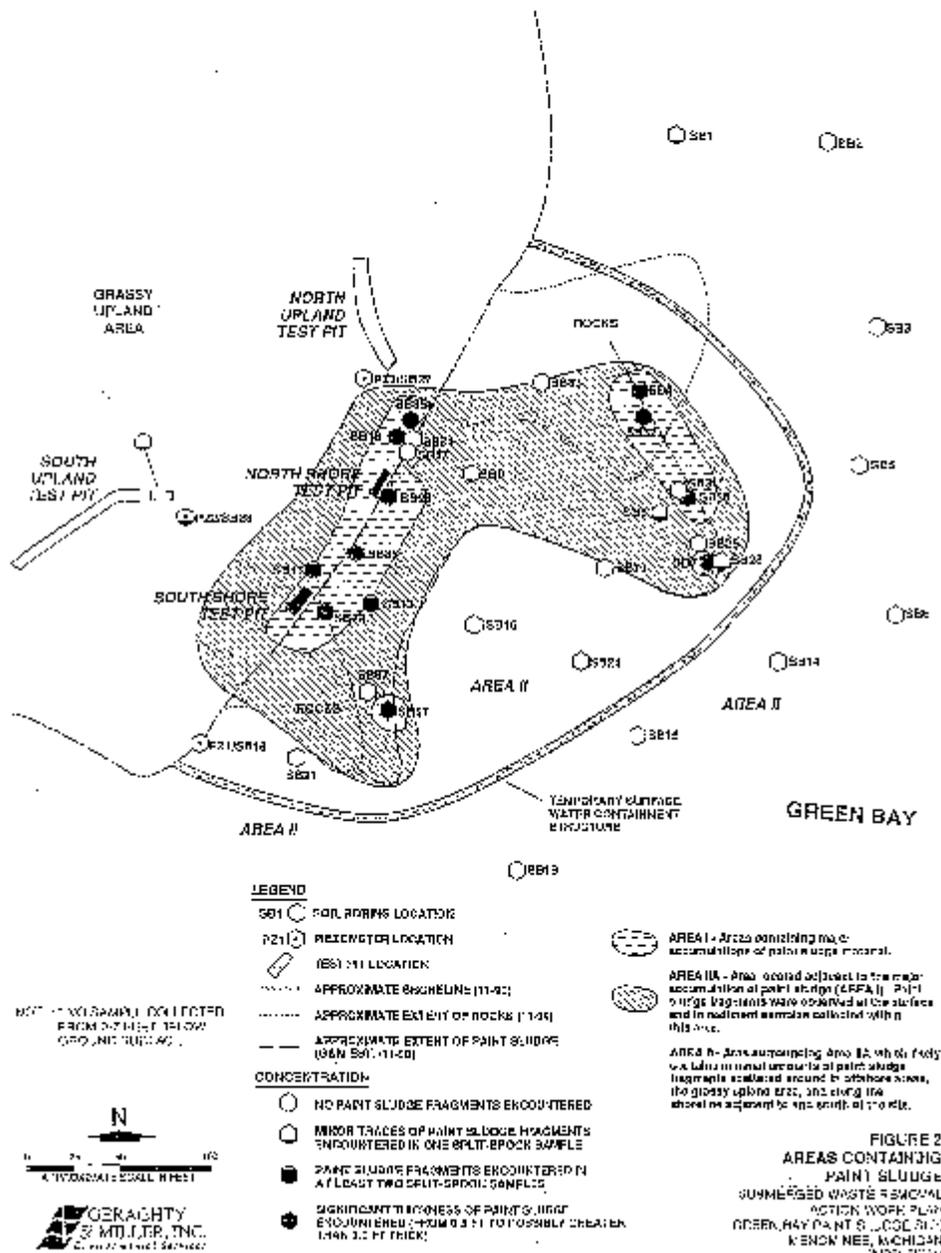


Figure 15. Green Bay Paint Sludge Site - Lloyd Flanders Facility Site Map.

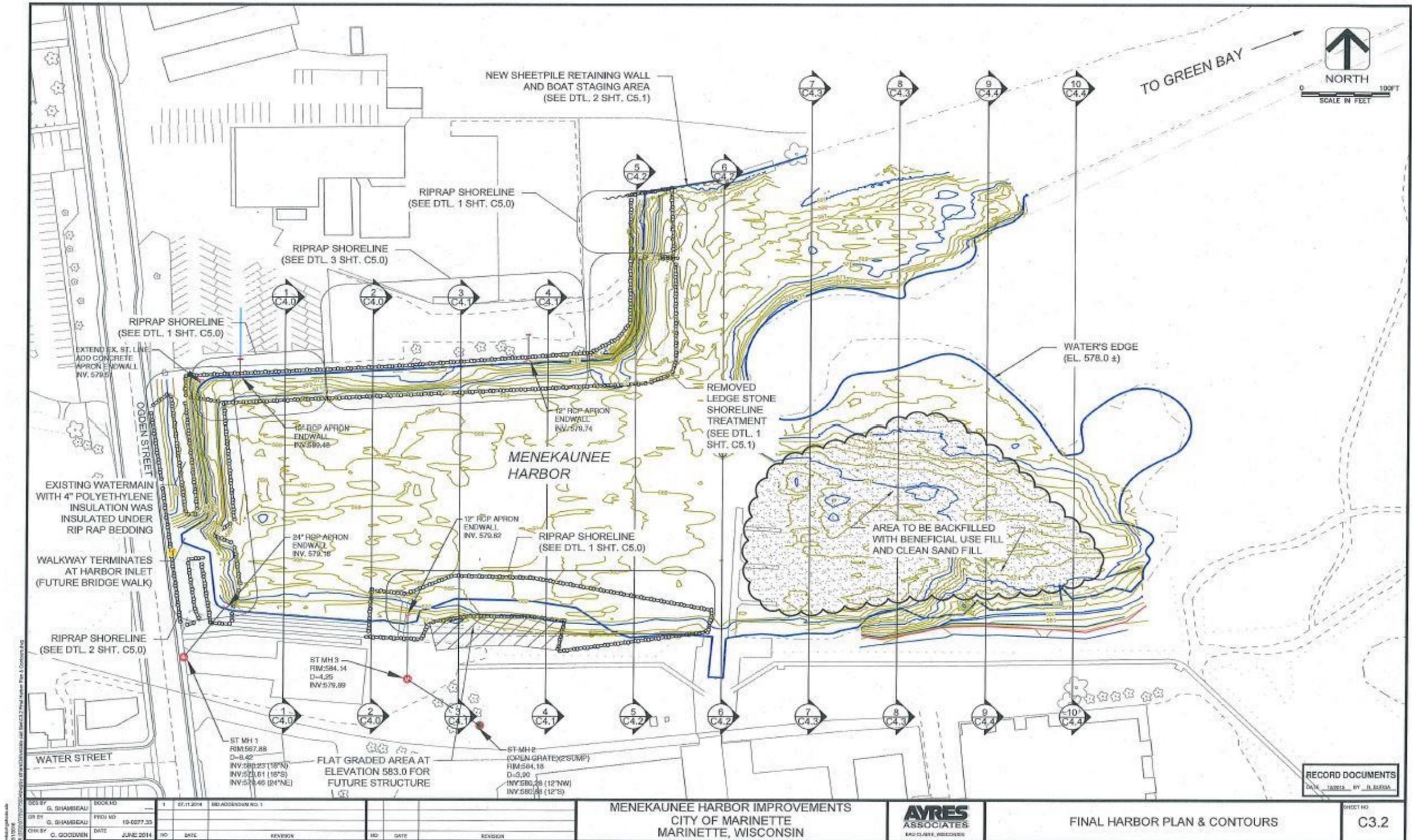


Figure 16. Menekaunee Harbor Final Plan & Contours (AYRES, 2014a and REL, 2016).



COVER AREA 12,500 SQ. FT.

DREDGE TASK 3B SAMPLES				DREDGE TASK 4B SAMPLES				BENEFICIAL REUSE SAMPLES				BENEFICIAL REUSE SAMPLES			
SEDIMENT SAMPLE	NORTHING	EASTING		SEDIMENT SAMPLE	NORTHING	EASTING		SEDIMENT SAMPLE	NORTHING	EASTING		SEDIMENT SAMPLE	NORTHING	EASTING	
LCR-28-1	14514.521	145267.714		LCR-28-1	14514.521	145267.714		BCS-2-1	14514.521	145267.714		BCS-2-1	14514.521	145267.714	

COORDINATE VALUES ARE BASED UPON THE MARINETTE COUNTY COORDINATE SYSTEM

NO.	DATE	APPROV.	REVISION
1	10/20/14	JSE	ADD TASK 4B SAMPLES FROM 10/20/14

NO.	DATE	APPROV.	REVISION
1	10/20/14	JSE	ADD TASK 4B SAMPLES FROM 10/20/14

DRAWN BY: [ ]

CHECKED BY: [ ]

DESIGNED BY: [ ]

**MENKAUNEE HARBOR DREDGE**  
CITY OF MARINETTE  
MARINETTE COUNTY, WISCONSIN

SEDIMENT SAMPLE LOCATION MAP

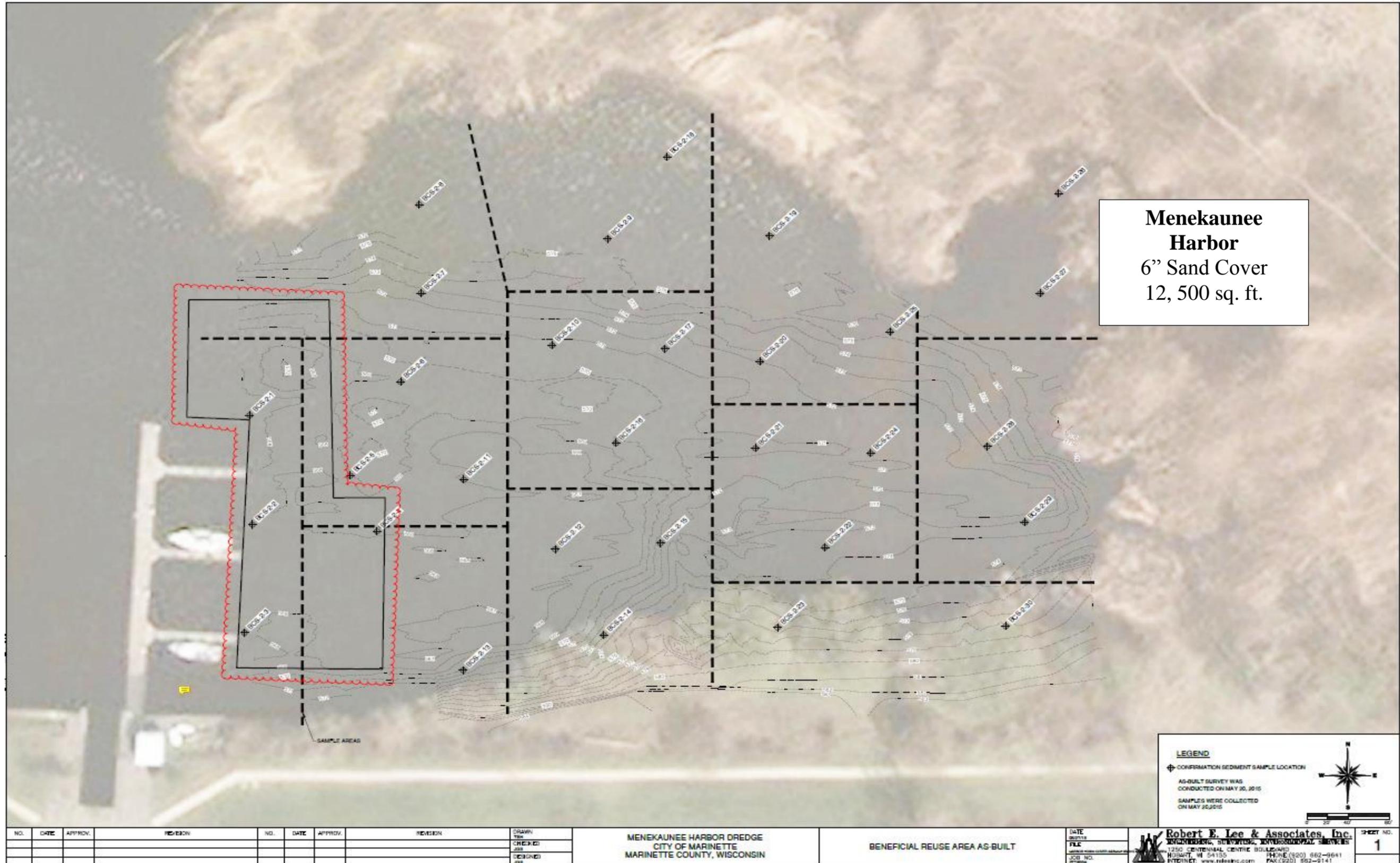
DATE: 10/20/14  
FILE: [ ]  
JOB NO.: [ ]

**Robert E. Lee & Associates, Inc.**  
1250 CENTRAL CENTRE BOULEVARD  
ROBART, WI 54155  
PHONE (920) 662-9641  
INTERNET: www.relee.com FAX (920) 662-9141

RECORD DOCUMENTS  
DATE: 10/20/14 BY: JSE

SHEET NO.: **T1.0**

Figure 17. Menekaunee Harbor Confirmation Sediment Sampling Locations (REL, 2014).

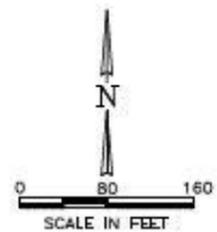


**Figure 18. Menekaunee Harbor Sand Cover Area (REL, 2015).**



	HISTORIC MGP STRUCTURES
	WASTEWATER TREATMENT STRUCTURES
	EXISTING BUILDING
	APPROXIMATE EXTENT OF UPLAND SITE
	FORMER SLOUGH/ LOG RUN
	FORMER LUMBER STORAGE AREA
	FORMER MGP PROPERTY BOUNDARY
	RAILROAD
	AREAS EXCAVATED BY CITY OF MARINETTE EXHIBITING NO EVIDENCE OF MGP RESIDUALS IN SOIL
	AREAS EXHIBITING EVIDENCE OF MGP RESIDUALS IN SOIL EXCAVATED AND BACKFILLED WITH CLEAN MATERIAL, BY CITY OF MARINETTE
	REACTIVE CORE MAT
	SURFACE SOIL REMOVAL AREA
	AREAS OF AFFECTED SOIL WERE NUMBERED FOR DISCUSSION IN THE TEXT

NOTE: ALL OF THE ABOVE GROUND AND MOST OF THE BELOW GROUND STRUCTURES ASSOCIATED WITH THE MGP WERE REMOVED AND/OR DEMOLISHED BY THE CITY OF MARINETTE IN THE 1990s IN PREPARATION FOR THE WWTP EXPANSION.



NOTES:  
 1, FORMER MGP AND WWTP STRUCTURES FROM 1993,  
 2, MANN ST., LUDINGTON ST., ELY ST., AND BOOM LANDING PARK ARE SHOWN AS THEY EXISTED IN 1994.

DRAWN BY:	DMD	DATE:	02/02/16
CHECKED BY:	MDB	DATE:	05/18/16
APPROVED BY:	JMH	DATE:	05/18/16
DRAWING NO. Fig 5_Prev Remed Actions			
REFERENCE:			

**PREVIOUS REMEDIAL ACTIONS - UPLAND**

FEASIBILITY STUDY REPORT  
 FORMER MARINETTE MGP SITE  
 WISCONSIN PUBLIC SERVICE CORPORATION  
 MARINETTE, WISCONSIN



PROJECT NO.	1549/20.2
FIGURE NO.	5

Figure 19. Wisconsin Public Service Corporation - Previous Remediation Actions - Upland (NRT, 2016a).

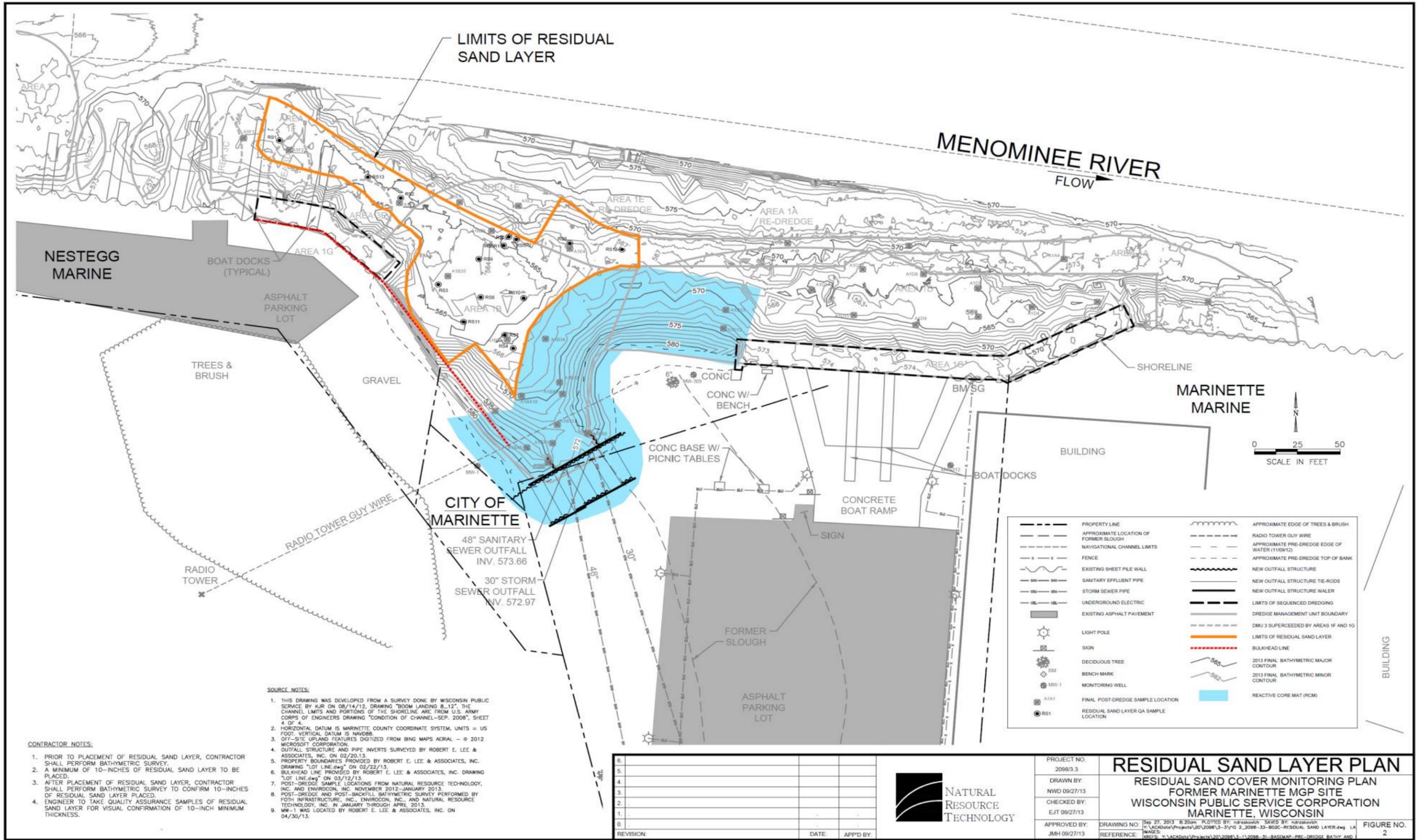


Figure 20. Wisconsin Public Service Corporation Dredge, Sand Cover & RCM (NRT, 2015b).

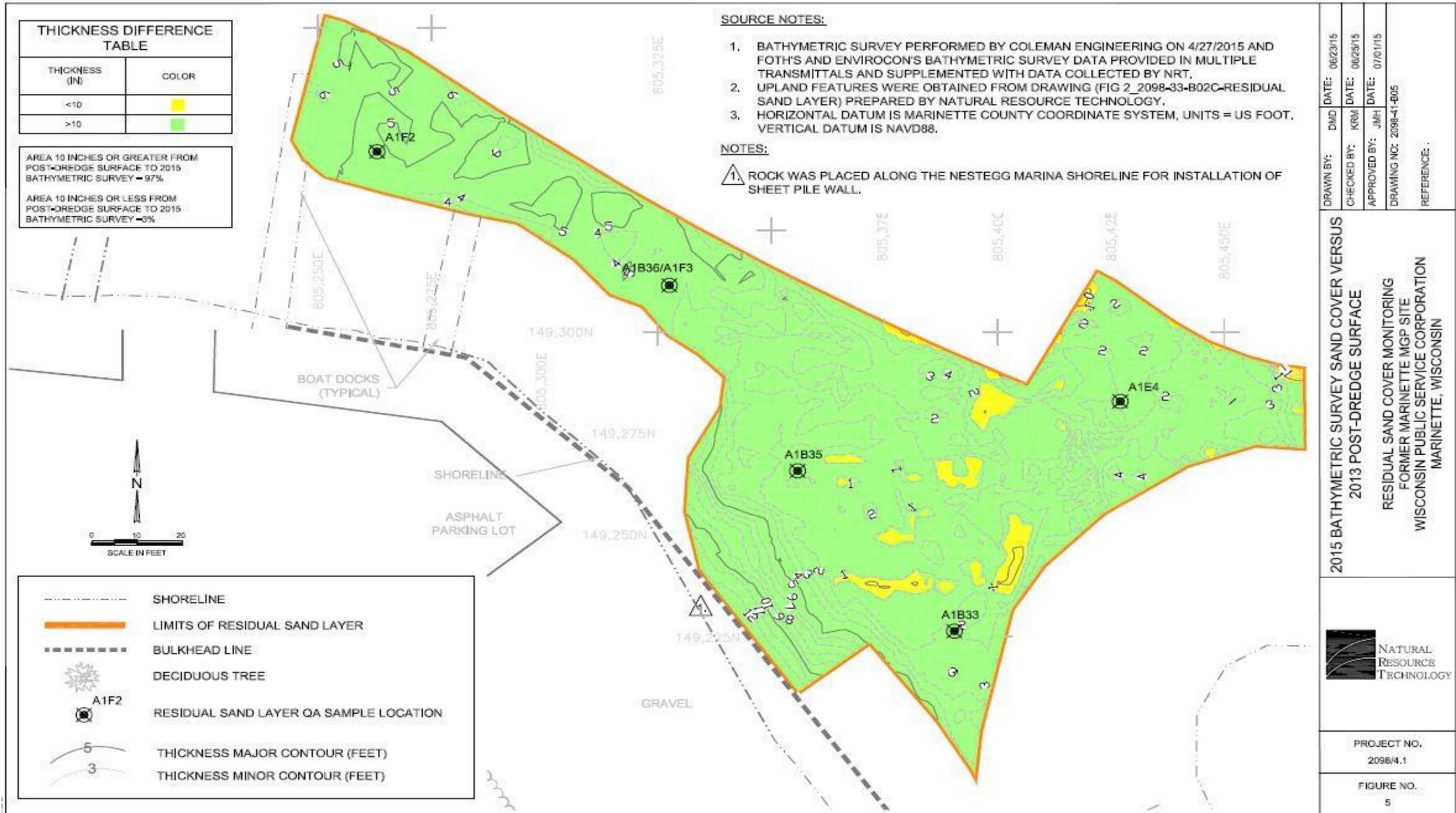
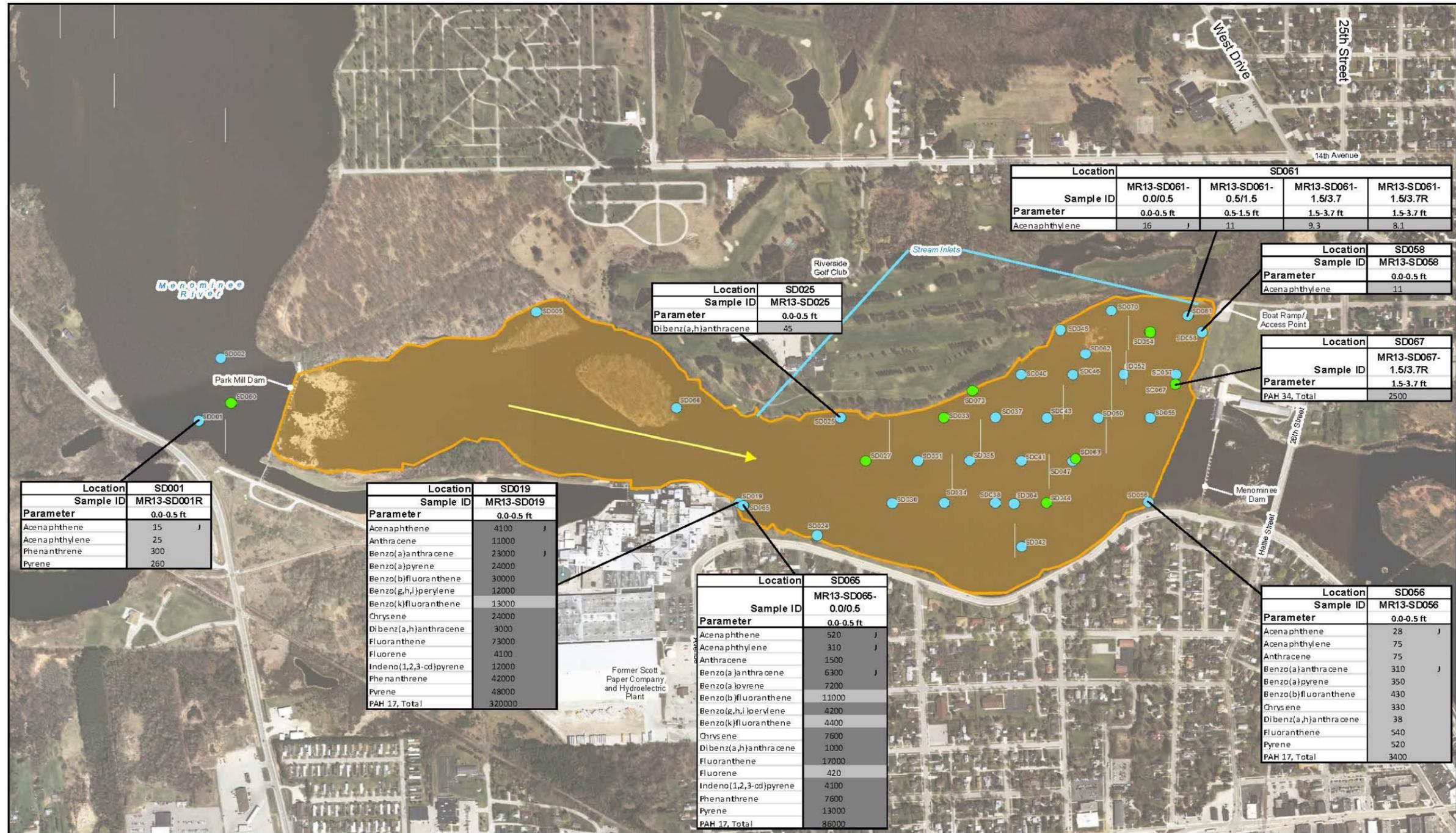


Figure 21. WPSC 2015 Bathymetric Survey Sand Cover vs. 2013 Post Dredging Surface (NRT, 2015b).



**Figure 6. Summary of Detected PAH Results, Lower Scott Flowage, Menominee River AOC (CH2MHill, 2014).**

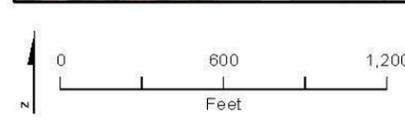
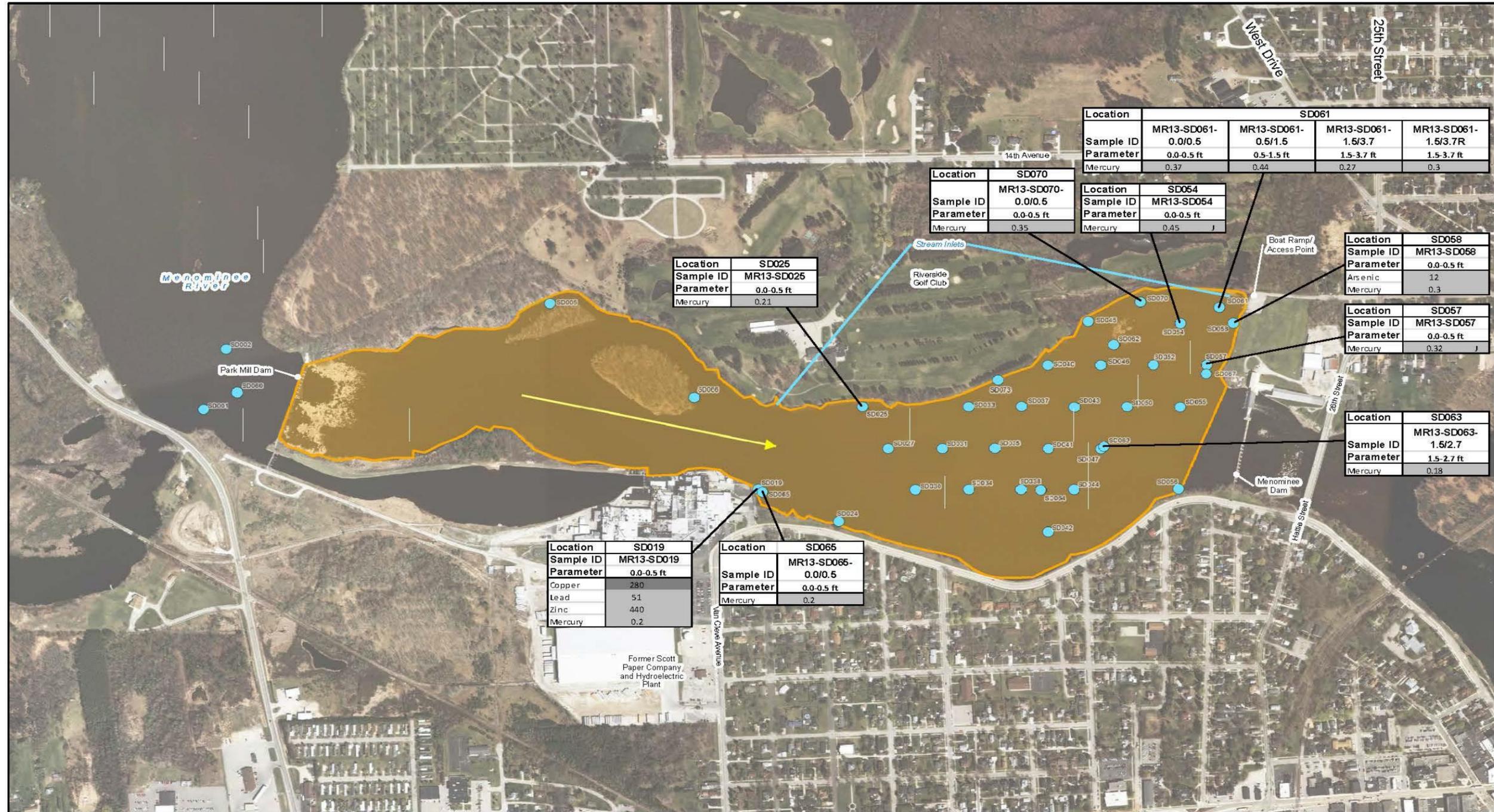
**Legend:**  
 ● Analyzed for alkylated PAHs  
 ● Analyzed for PAH-17  
 → Flow Direction  
 Investigation Area

**Notes:**  
 1. Shading indicates the analyte was detected above Wisconsin Department of Natural Resources (WDNR) sediment quality guidelines threshold effect concentration (TEC).  
 2. Shading indicates the analyte was detected above WDNR sediment quality guidelines probable effect concentration (PEC).  
 3. Only compounds with detected concentrations exceeding the TEC or PEC are included on this figure.  
 4. All detected concentrations are reported in µg/kg.  
 5. J = Analyte is present at an estimated concentration between the method detection limit and reporting limit.  
 6. -- = Sample was not analyzed for this constituent.  
 7. 2010 Aerial Photography  
 8. WDNR sediment quality guidelines TEC and PEC screening levels are summarized in Table 5.

Scale: 0, 600, 1,200 Feet

Map File Path: I:\USEN\ENVIRONMENTAL\PROTE\MENOMINEERIVER\LOWERSCOTTFLOWAGE\MAPFILES\SIREPORT\FIGURE 06 - SUMMARY OF DETECTED PAH RESULTS- FINAL.MXD JHANSEN1 8/4/2014 1:40:59 PM

**Figure 22. Summary of Detected PAH Results, Lower Scott Flowage, Menominee River AOC (CH2MHill, 2014).**



**Legend**  
 ● Sediment Sample Location  
 → Flow Direction  
 Investigation Area

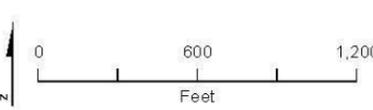
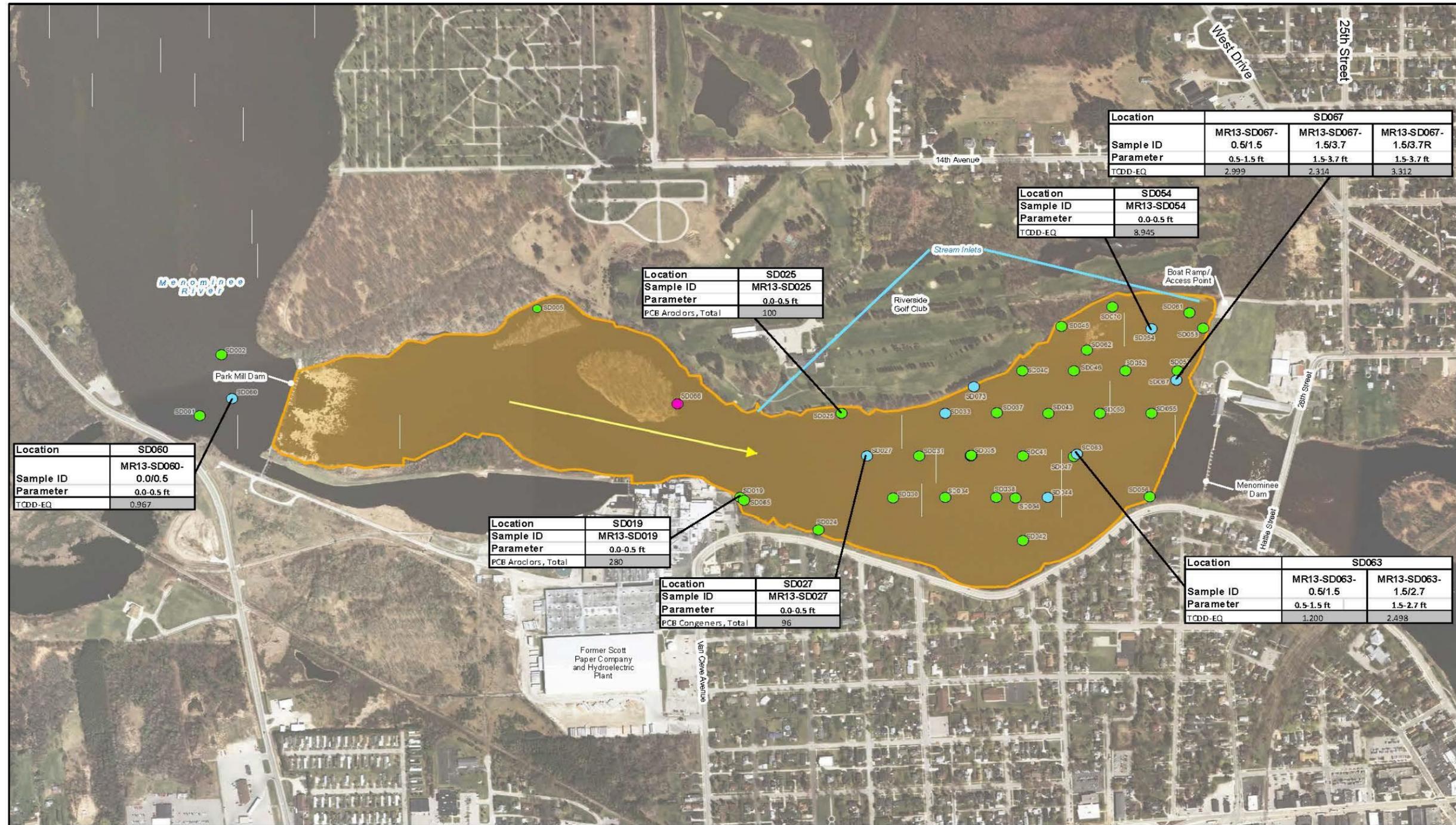
**Notes:**  
 1. Shading indicates the analyte was detected above Wisconsin Department of Natural Resources (WDNR) sediment quality guidelines threshold effect concentration (TEC).  
 2. Shading indicates the analyte was detected above WDNR sediment quality guidelines probable effect concentration (PEC).  
 3. Only compounds with detected concentrations exceeding the TEC or PEC are included on this figure.  
 4. All detected concentrations are reported in mg/kg.  
 5. J = Analyte is present at an estimated concentration between the method detection limit and reporting limit.  
 6. 2010 Aerial Photography  
 7. WDNR sediment quality guidelines TEC and PEC screening levels are summarized in Table 5

**Figure 7**  
 Summary of Detected Metals Results  
 Lower Scott Flowage  
 Menominee River AOC

I:\USENVIROMENTAL\PROTE\MENOMINEERIVER\LOWERSCOTTFLOWAGE\MAPFILES\SIREPORT\FIGURE 07 - SUMMARY OF DETECTED METALS RESULTS - FINAL.MXD JHANSEN1 8/4/2014 2:01:36 PM

**CH2MHILL**

**Figure 23. Summary of Detected Metals Results, Lower Scott Flowage, Lower Menominee River AOC (Ch2MHill, 2014).**



**Legend**  
 ● Analyzed for PCB Aroclors, PCB Congeners, and Dioxins  
 ● Analyzed for PCB Aroclors  
 ● Analyzed for PCB Aroclors and Dioxins  
 → Flow Direction  
 Investigation Area

**Notes:**  
 1. Shading indicates the analyte was detected above Wisconsin Department of Natural Resources (WDNR) sediment quality guidelines threshold effect concentration (TEC).  
 2. PCB Aroclors, PCB congeners, and dioxins, were not detected at concentrations above WDNR sediment quality guidelines probable effect concentrations (PECs).  
 3. Only compounds with detected concentrations exceeding the TEC or PEC are included on this figure.  
 5. All Dioxin concentrations are reported in ngTEQ/kg.

6. All Total PCB (aroclor and congeners) are reported in µg/kg.  
 7. 2010 Aerial Photography  
 8. WDNR sediment quality guidelines TEC and PEC screening levels are summarized in Table 5.

**Figure 8**  
 Summary of Detected Total PCB and TCDD-EQ Results  
 Lower Scott Flowage  
 Menominee River AOC

**Figure 24. Summary of Detected Total PCB and TCDD-EQ Results (CH2MHill, 2014).**



**Figure 25. Surficial Sediment Sampling Locations in Rio Vista Slough, June 24, 2014 (MDEQ, 2015).**

Appendix B – Tables

Draft

Table 1. Lower Menominee River AOC Sediment Remediation Sites Summary of Goals, Actions & Monitoring (WDNR, 2016).

Site Name/ Contaminant of Concern	Media Type	Remediation Goals	Remedial Action	Remedial Action Implementation Status	Remediation Goal Met?	Monitoring and Maintenance
<b>Ansul/Tyco (former Ansul Fire Protection)</b>  Arsenic	Terrestrial	Onsite Surface Soils $\leq 32$ ppm Total Arsenic  Adjacent Offsite Surface Soils 16 $\leq$ ppm Total Arsenic	<ul style="list-style-type: none"> <li>90,000 Tons of Salt Waste Removal</li> <li>Limited Soil Removal</li> <li>Capping</li> </ul>	Complete	Verified 2015 <ul style="list-style-type: none"> <li>Construction Completion Report</li> </ul>	Ongoing Maintenance & Monitoring <ul style="list-style-type: none"> <li>2018 5-Year Review</li> </ul>
	Ground Water	Containment & Flood Control	<ul style="list-style-type: none"> <li>Barrier Wall</li> <li>Ground Water Extraction &amp; Treatment System</li> <li>Phyto Pumping Tree Plots</li> </ul>	Complete	<ul style="list-style-type: none"> <li>2010</li> <li>Yes, with management plan implementation</li> </ul>	Ongoing Maintenance & Monitoring <ul style="list-style-type: none"> <li>Barrier Wall Ground Water Monitoring Plan 2015 Update</li> <li>2018 5-Year Review &amp; Research new arsenic removal technologies</li> </ul>
	Sediment	$\leq 20$ ppm Total Arsenic	<ul style="list-style-type: none"> <li>Dredge 300,058 CY</li> <li>12" Sand Cover Areas <math>\geq 20</math> ppm</li> </ul>	Complete	Verified 2015 <ul style="list-style-type: none"> <li>Core Sampling</li> <li>Pan Testing</li> <li>Bathymetry</li> </ul>	Ongoing Monitoring <ul style="list-style-type: none"> <li>Post Dredge Sand Cover Sediment Sampling 2018</li> <li>2018 5-Year Review</li> </ul>
<b>Green Bay Paint Sludge (Lloyd Flanders, former Hayward-Wakefield)</b>  Heavy Metals	Sediment/Soil	Remove Paint Waste, Impacted Sediment & Soil and Install Shoreline Barrier	<ul style="list-style-type: none"> <li>Remove 5,000 Tons Bulk Paint Waste (hazardous waste facility)</li> <li>Excavate 10,500 Tons Sediment &amp; Soil (local landfill)</li> </ul>	Complete	Reported volumes to MDNR 1995 & 1998 under Public Act 307.	Ongoing Implementation of Operations and Maintenance Plan
	Paint Nodules	Remove Paint Nodules that wash up along shoreline	<ul style="list-style-type: none"> <li>Collect &amp; Remove Paint Nodules</li> <li>Report under Admin Order</li> </ul>	Ongoing	Verified Annually	Ongoing monthly and post storm events collection along shoreline
<b>Menekaunee Harbor</b>  Heavy Metals & PAHs	Sediment	Threshold Effect Concentration (TEC) Values for Heavy Metals & Polynuclear Aromatic Hydrocarbons (PAHs)	<ul style="list-style-type: none"> <li>Dredge 27,129 CY</li> <li>6" Sand Cover Areas that exceed TEC for Metals.</li> </ul>	Complete	Verified 2015 <ul style="list-style-type: none"> <li>Core Sampling</li> <li>Pan Testing</li> <li>Bathymetry</li> </ul>	Not Required
<b>Wisconsin Public Service Corporation (former manufactured gas plant)</b>  Coal Tar – PAHs	Terrestrial	Limited Soil Removal During Construction of Wastewater Treatment Plant & Road Construction.	<ul style="list-style-type: none"> <li>None at this Time</li> <li>Developing Record of Decision (ROD)</li> </ul>	Ongoing Evaluation	Removal documented & developing ROD to determine next steps.	Ongoing Maintenance & Monitoring
	Ground Water	Contamination plume defined	<ul style="list-style-type: none"> <li>None at this Time</li> <li>Developing ROD</li> </ul>	Ongoing Evaluation	Verified Feasibility Study Report 2016 ROD to determine next steps.	Ongoing monitoring
	Sediment	$\leq 22.8$ ppm 13 Priority PAHs	<ul style="list-style-type: none"> <li>Dredge 15,221 CY</li> <li>10" Sand Cover Areas <math>\geq 22.8</math> ppm</li> <li>Reactive Core Mat (RCM)</li> </ul>	Complete (Non-Time Critical Removal Action)	Verified 2013 & 2015 <ul style="list-style-type: none"> <li>Core Sampling</li> <li>Bathymetry</li> </ul> ROD to determine continuing obligations for Sand Cover & RCM.	Ongoing Maintenance & Monitoring <ul style="list-style-type: none"> <li>Reactive Core Mat</li> <li>Sand Cover</li> <li>2018 5-Year Review</li> </ul>

Table prepared by WDNR, June 2016

Table 2. WPSC MGP Residual Sand Cover Analytical Summary Table (NRT, 2015).

**Table 2 - Residual Sand Cover Analytical Summary Table**  
 Residual Sand Cover Monitoring Results  
 Marinette Former Manufactured Gas Plant Site, Marinette, Wisconsin  
 Wisconsin Public Service Corporation  
 CERCLA Docket No. V-W-06-C-847 / Site Spill ID - B5BT / CERCLIS ID - WIN000509952

A1B33	Sample Interval <sup>1</sup>	Sample Depth <sup>2</sup> , ft	PAH
01/19/13	Pre-Sand Cover Placement Grab	0-0.3	<b>603.7</b>
03/18/13	Post-Sand Cover Placement Grab	0-1.5	0.1
10/22/13	Surface Sand Cover Push Core	0-0.5	0.08
05/21/14		0-0.5	0.18
10/27/14		0-0.5	0.43
10/22/13	Sub-Surface Sand Cover Push Core	0.5-1.1	0.01
05/21/14		0.5-1.3	0.06
10/27/14		0.5-1.5	15.2

A1B35	Sample Interval <sup>1</sup>	Sample Depth <sup>2</sup> , ft	PAH
01/19/13	Pre-Sand Cover Placement Grab	Grab	<b>683.8</b>
03/18/13	Post-Sand Cover Placement Grab	0-1.5	0.1
10/22/13	Surface Sand Cover Push Core	0-0.5	13.4
05/21/14		0-0.5	0.92
10/27/14		0-0.5	0.86
10/22/13	Sub-Surface Sand Cover Push Core	0.5-1.1	<b>346.28</b>
05/21/14		0.5-1.5	<b>74.76</b>
10/27/14		0.5-1.35	<b>31.9</b>

A1E4	Sample Interval <sup>1</sup>	Sample Depth <sup>2</sup> , ft	PAH
01/19/13	Pre-Sand Cover Placement Grab	0-0.5	<b>46.1</b>
10/22/13	Surface Sand Cover Push Core	0-0.5	0.27
05/21/14		0-0.5	0.35
10/27/14		0-0.5	0.14
10/22/13	Sub-Surface Sand Cover Push Core	0.5-1.3	0.06
05/21/14		0.5-1.4	6.1
10/27/14		0.5-1.2	9.7

A1F2	Sample Interval <sup>1</sup>	Sample Depth <sup>2</sup> , ft	PAH
01/17/13	Pre-Sand Cover Placement Grab	Ponar	<b>54.62</b>
10/22/13	Surface Sand Cover Push Core	0-0.5	0.06
05/21/14		0-0.5	0.57
10/27/14		0-0.5	0.10
10/22/13	Sub-Surface Sand Cover Push Core	0.5-1.2	0.06
05/21/14		0.5-1.3	0.77
10/27/14		0.5-1.4	0.01

A1B36/A1F3 <sup>2</sup>	Sample Interval <sup>1</sup>	Sample Depth <sup>2</sup> , ft	PAH
1/19/2013	Pre-Sand Cover Placement Grab	0-0.45	<b>567</b>
03/18/13	Post-Sand Cover Placement Grab	0-1.2	0.4
10/22/13	Surface Sand Cover Push Core	0-0.5	0.69
05/21/14		0-0.5	0.10
10/27/14		0-0.5	0.74
10/22/13	Sub-Surface Sand Cover Push Core	0.5-1.3	0.08
05/21/14		0.5-1.3	0.23
10/27/14		0.5-1.25	<b>58.4</b>

**Notes:**

Total PAH (13) consists of summation of: Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Fluoranthene, Fluorene, Naphthalene, Phenanthrene, and Pyrene.  
 (mg/kg) - milligrams per kilogram.

**Bold and magenta - detected values exceed SL.**

1. Surface sand is 0-6 inches below the river bottom surface, sub-surface samples are greater than 6 inches below the river bottom surface.
2. Total depth of core is indicated by the greatest sample depth for each sample date.
3. A1F3 Location is a reoccupied location of sediment sample location A1B36.

Table 3. Site locations and sample descriptions for Rio Vista Slough sampling 6/24/2014 (MDEQ, 2015).

SITE ID	LAT	LONG	DESCRIPTION	ODOR	COMMENTS
Men 1	45.10561	-87.6242	organic	no	no sheen
Men 2	45.10550	-87.62524	organic w/ sheen	no	large outfall, sheen
Men 3	45.10537	-87.62581	organic	no	small outfall, light sheen
Men 4	45.10524	-87.62563	organic w/ sheen	no	sheen
Men 5	45.10514	-87.62632	organic	no	no sheen
Men 6	45.10493	-87.62708	organic	no	no sheen
Men 7 (Dup)	45.10493	-87.62708	organic	no	no sheen
Men 8	45.10441	-87.6271	organic	no	no sheen
Men 9	45.10455	-87.62629	organic	no	no sheen

Table 4. Aroclor results for Rio Vista Slough sediment samples taken on 6/24/14 (MDEQ, 2015). *ND = No Detect*

SITE ID	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268
	ug/kg dry								
Men 1	ND								
Men 2	ND								
Men 3	ND								
Men 4	ND								
Men 5	ND								
Men 6	ND								
Men 7 (Dup)	ND								
Men 8	ND								
Men 9	ND								

Table 5. Heavy metal results for surficial sediment samples taken in Rio Vista Slough, 6/24/14 (MDEQ, 2015). \* PEC and TEC consensus-based values, Macdonald et. al., 2000. Bold values above PEC values. ND = not detectable

	PEC*	TEC*	Men 1	Men 2	Men 3	Men 4	Men 5	Men 6	Men 7 (Dup)	Men 8	Men 9
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic	9.79	33	6.3	1.2	2.6	2	3.7	3	3.5	2.3	5
Cadmium	0.99	4.98	2.1	0.4	0.5	0.6	0.3	0.9	0.3	ND	0.8
Chromium	43.4	111	46	32	15	26	14	11	7.8	8.8	20
Copper	31.6	149	66	23	23	36	24	26	16	7.7	28
Lead	35.8	128	110	23	42	49	37	42	14	5.7	34
Mercury	0.18	1.06	<b>1.1</b>	ND	0.1	0.5	0.1	0.3	0.2	0.1	0.5
Zinc	121	459	410	180	220	300	89	120	85	38	150

Table 6. PAH results for surficial sediment samples taken in Rio Vista Slough, 6/24/14 (MDEQ, 2015). \* PEC and TEC consensus-based values, Macdonald et. al., 2000. Bold values above PEC values. ND = not detectable

	PEC*	TEC*	Men 1	Men 2	Men 3	Men 4	Men 5	Men 6	Men 7 (Dup)	Men 8	Men 9
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Benz[a] anthracene	108	1050	ND	<b>3700</b>	ND	<b>4200</b>	ND	ND	ND	ND	ND
Benz[b] fluoranthene	na	na	ND	7200	ND	<b>10000</b>	ND	ND	ND	ND	ND
Chrysene	166	1290	ND	<b>6300</b>	ND	<b>8100</b>	ND	ND	ND	ND	ND
Fluoranthene	423	2230	ND	<b>14000</b>	<b>5600</b>	<b>17000</b>	ND	ND	ND	ND	ND
Phenanthrene	204	1170	ND	<b>6200</b>	ND	<b>6300</b>	ND	ND	ND	ND	ND
Pyrene	195	1520	ND	<b>10000</b>	<b>4100</b>	<b>12000</b>	ND	ND	ND	ND	ND
Total PAHs	1610	22800		<b>47400</b>	9700	<b>57600</b>					

Appendix C - State of Wisconsin Administrative Code for  
Dredging Activities – NR 347

Draft

## Chapter NR 347

## SEDIMENT SAMPLING AND ANALYSIS, MONITORING PROTOCOL AND DISPOSAL CRITERIA FOR DREDGING PROJECTS

NR 347.01 Purpose and policy.  
 NR 347.02 Applicability.  
 NR 347.03 Definitions.  
 NR 347.04 Permits, approvals and reviews required.

NR 347.05 Preliminary application and analytical requirements.  
 NR 347.06 Sampling and analysis.  
 NR 347.07 Review procedures and review criteria.  
 NR 347.08 Monitoring, reporting and enforcement.

Note: Chapter NR 347 as it existed on February 28, 1989 was repealed and new chapter NR 347 was created effective March 1, 1989.

**NR 347.01 Purpose and policy.** (1) The purpose of this chapter is to protect the public rights and interest in the waters of the state by specifying definitions, sediment sampling and analysis requirements, disposal criteria and monitoring requirements for dredging projects regulated under one or more of the following statutes: s. 30.20, Stats., which requires a contract or permit for the removal of material from the beds of waterways; s. 281.41, Stats., which establishes a wastewater treatment facility plan approval program; ch. 289, Stats., which establishes the solid waste management program; ch. 291, Stats., which establishes the hazardous waste program; and ch. 283, Stats., which establishes the Wisconsin pollutant discharge elimination system (WPDES) program.

(2) It is department policy to encourage reuse of dredged material and to minimize environmental harm resulting from a dredging project.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; corrections in (1) made under s. 13.93 (2m) (b) 7., Stats., Register January 2002 No. 553.

**NR 347.02 Applicability.** The provisions of this chapter apply to the removal and disposal of material from the beds of waterways except where exempted by statute.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89.

**NR 347.03 Definitions.** (1) "Analyte" means the chemical substance or physical property being tested for in a sample.

(2) "Bathymetry" means the measurement of depth of water in lakes or rivers to determine lake or river bed topography.

(3) "Beach nourishment disposal" means the disposal of dredged material on the beaches or in the water landward from the ordinary high-water mark of Lakes Michigan and Superior for the purpose of adding, replenishing or preventing erosion of beach material.

(4) "Bioassay" means a method for determining the acute or chronic toxicity of a material by studying its effects on test organisms under controlled conditions.

(5) "Bulk sediment analysis" means a test to measure the total concentration of a specific constituent in a sample being analyzed.

(6) "Carriage water" means the water portion of a slurry of water and dredged material.

(7) "Carriage water return flow" means the carriage water which is returned to a receiving water after separation of the dredged material from the carriage water in a disposal, rehandling or treatment facility.

(8) "Connecting waterways" means a portion of a navigable lake or stream which is directly joined to Lake Michigan or Lake Superior and which contains a navigation channel providing access for commercial or recreational watercraft to Lake Michigan or Lake Superior.

(9) "Contamination" means a solid, liquid or gaseous material, microorganism, noise, heat, odor, or radiation, alone or in any combination, that may harm the quality of the environment in any way.

(10) "Contract" means a binding written agreement between the department and a dredging applicant authorizing the removal of material from the bed of a natural navigable lake or outlying water.

(11) "Department" means the department of natural resources

(12) "Disposal facility" means a site or facility for the disposal of dredged material.

(13) "Dredged material" means any material removed from the bed of any waterway by dredging.

(14) "Dredging" means any part of the process of the removal of material from the beds of waterways; transport of the material to a disposal, rehandling or treatment facility; treatment of the material; discharge of carriage or interstitial water; and disposal of the material.

(15) "Grain size analysis" means a method to determine dredged material and disposal site sediment particle size distribution.

(16) "Hazardous waste", as defined in s. 291.01 (7), Stats., means any solid waste identified as a hazardous waste under ch. NR 661.

(17) "Interstitial water" means water contained in the interstices or voids of soil or rock in the dredged material.

(18) "Limit of detection" (LOD) means the lowest concentration level that can be determined to be statistically different from a blank sample for that analytical test method and sample matrix.

(19) "Limit of quantitation" (LOQ) means the concentration of an analyte at which one can state with a stated degree of confidence for that analytical test method and sample matrix that an analyte is present at a specific concentration in the sample tested.

(20) "Parent material" means the native unconsolidated material which overlies the bedrock.

(21) "PCBs" means those materials defined in s. 299.45 (1) (a), Stats.

(22) "Particle size distribution" means a cumulative frequency distribution or frequency distribution of percentages of particles of specified diameters in a sample.

(23) "Rehandling facility" means a temporary storage site or facility used during the transportation of dredged material to a treatment or disposal facility.

(24) "Treatment facility" in this chapter means a natural or artificial confinement facility used for the separation of dredged material solids from the interstitial or carriage water.

(25) "Upland disposal" means the disposal of dredged materials landward from the ordinary high-water mark of a waterway or waterbody.

History: Cr. Register, February, 1989, No. 398, eff. 3-1-89; correction in (16) made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1995, No. 478; correction in (16) made under s. 13.93 (2m) (b) 7., Stats., Register May 2013 No. 689.

**NR 347.04 Permits, approvals and reviews required.** (1) The following are the permit, approval and review requirements for dredging projects:

(a) Except where otherwise provided by law, all private and municipal dredging projects require a permit or contract under s.

30.20, Stats., and ch. NR 346. Dredging in portions of the Mississippi, St. Croix and Black rivers by the U.S. army corps of engineers is governed by s. 30.202, Stats.

(b) All dredging projects require review under ch. 289, Stats., and chs. NR 500 to 520 for disposal of dredged material under the solid waste management program.

(c) All dredging projects shall be reviewed under ss. 1.11 and 23.11 (5), Stats., and ch. NR 150 for compliance with the Wisconsin environmental policy act.

(d) All federally funded, permitted or sponsored dredging projects require water quality certification under ss. 281.11 to 281.36 (12) and 283.001, Stats., and ch. NR 299.

(e) A Wisconsin pollutant discharge elimination system (WPDES) permit under ch. 283, Stats., is required for dredging projects with carriage water return flows to surface water or groundwater.

(f) Plan approval under s. 281.41, Stats., is required for dredging projects which include a dredged material treatment facility.

(g) Sites and facilities for the disposal of hazardous waste and PCBs require review under subch. IV of ch. 291, Stats., and s. 299.45, Stats., and chs. NR 500 to 520 and 660 to 670.

(2) The project application process shall be coordinated by the department. Except as otherwise provided by law, decisions on all applicable department approvals, permits, contracts and licenses relating to a dredging project shall be made concurrently and with the decision on:

(a) Water quality certification under ch. NR 299 for all federally funded, permitted or sponsored projects, or

(b) Permit or contract under s. 30.20, Stats., and ch. NR 346 for all other projects.

**History:** Cr. Register, February, 1989, No. 398, eff. 3-1-89; corrections in (1) made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1995, No. 478; corrections in (1) (b), (d), (e), (f), and (g) made under s. 13.93 (2m) (b) 7., Stats., Register January 2002 No. 553; corrections in (1) (d), (g) made under s. 13.93 (2m) (b) 7., Stats., Register May 2013 No. 689.

**NR 347.05 Preliminary application and analytical requirements.** (1) Prior to submission of a formal application, anyone seeking to remove material from the beds of waterways shall provide the department with preliminary information including:

(a) Name of waterbody and location of project;

(b) Volume of material to be dredged;

(c) Brief description of dredging method and equipment;

(d) Brief description of proposed disposal method and location and, if a disposal facility is to be used, size of the disposal facility;

(e) Any previous sediment sampling (including field observations) and analysis data from the area to be dredged or from the proposed disposal site;

(f) Copy of a map showing the area to be dredged, the depth of cut, the specific location of the proposed sediment sampling sites and the bathymetry of the area to be dredged; and

(g) Anticipated starting and completion dates of the proposed project.

(2) An initial evaluation shall be conducted by the department within 30 business days after receipt of the information under sub. (1) to determine if there is reason to believe that the material proposed to be dredged is contaminated. This initial evaluation shall be used by the department in specifying sediment sampling and analysis requirements to the applicant under s. NR 347.06 and shall be accomplished with existing data. Factors which shall be considered by the department in its evaluation of the dredging site and, if appropriate the disposal site, include, but are not limited to, the following:

(a) Potential that contaminants may be present. Potential routes that may have introduced contaminants into the dredging site shall be identified by examining appropriate maps, aerial photographs, or other graphic materials that show surface water-

courses and groundwater flow patterns, surface relief, proximity to surface and groundwater movement, private and public roads, location of buildings, agricultural land, municipal and industrial sewage and stormwater outfalls, etc., or by making supplemental field inspections.

(b) Previous tests of the material at the dredging site or from other projects in the vicinity when there are similar sources and types of contaminants, water circulation and stratification, accumulation of sediments, general sediment characteristics, and potential for impact on the aquatic environment, as long as nothing is known to have occurred which would render the comparisons inappropriate.

(c) The probability of past introduction of contaminants from land runoff.

(d) Spills of toxic or hazardous substances.

(e) Introduction of contaminants from point sources.

(f) Source and previous use of materials used or proposed to be used as fill.

(g) Natural deposits of minerals and other natural substances.

(h) Any other relevant information available to the department.

**History:** Cr. Register, February, 1989, No. 398, eff. 3-1-89.

**NR 347.06 Sampling and analysis.** Upon completion of the initial evaluation, the department shall establish sampling and analysis requirements.

(1) EXCEPTION. Except as provided in subs. (3) (a) and (6), the applicant shall collect and analyze data on sediments to be dredged in the manner outlined in this section.

(2) CORRECT METHODS. Unless otherwise specified, sampling, sample handling and sample analysis to demonstrate compliance with this section shall be in accordance with methods from applicable sources enumerated in ch. NR 149.

(3) NUMBER OF SAMPLES. (a) Sediment sampling may be waived by the department if it determines from its review of available information under s. NR 347.05 (2) that sediment contamination is unlikely.

(b) If available information is either insufficient to determine the possibility for sediment contamination, or shows a possibility for sediment contamination, the department shall require the applicant to collect sufficient samples to describe the chemical, physical and biological properties of the sediment. The exact number and location of sediment samples required and analyses to be conducted shall be specified by the department, in consultation with the applicant, based on the initial evaluation and on other factors including, but not limited to, the potential for possibility of contamination, volume and aerial extent of material to be dredged, depth of cut and proposed method of disposal.

(c) For a project involving the disposal of dredged material at an upland disposal site, the department may require samples to be taken from the proposed disposal site and analyzed for parameters found to be elevated in the dredged material sediment samples. The number and location of disposal site samples required shall be specified by the department based on the size and other characteristics of the site.

(d) For a project to be conducted in the Great Lakes with beach nourishment disposal, at least one sample every 250 linear feet of beach with a minimum of 2 samples shall be taken from the proposed beach nourishment disposal site and analyzed for particle size and color. Core or grab samplers may be used.

(4) METHOD OF TAKING SAMPLES. (a) All samples shall be taken with a core sampler except as provided in sub. (3) (d). The department may approve other sampling methods if it finds them to be appropriate.

(b) All sampling equipment shall be properly cleaned prior to and following each sample collection.

(c) Samples collected for PCB, pesticide and other organic analyses shall be collected and processed using metallic (stainless

steel preferred) liners, tubs, spoons and spatulas. Samples collected for other chemical analysis, including heavy metals, shall be collected and processed using non-metallic liners, tubs, spoons and spatulas.

(d) Core samples from the dredging site shall be taken to the proposed dredging depth plus 2 feet.

(e) Core samples shall be visually inspected for the existence of strata formation, and a written description including position, length, odor, texture and color of the strata shall be provided to the department.

(5) SAMPLE HANDLING AFTER COLLECTION AND PRIOR TO ANALYSIS. Sample handling and storage prior to analysis shall be in accordance with the maximum holding times and container types given in table F of ch. NR 219. Samples shall be preserved at the time of collection by cooling to 4°C.

(6) ANALYSES TO BE PERFORMED ON SEDIMENT SAMPLES. Analyses shall be done in accordance with methods from applicable sources enumerated in ch. NR 149. Analyses submitted to the department under this chapter shall be done by a laboratory certified or registered under ch. NR 149.

(a) Samples shall be analyzed from each distinct layer observed in the material to be dredged. If no strata formation exists, core samples shall be divided into 2-foot segments, and each segment shall be analyzed for the required chemicals and characteristics. For cores extending into parent material, analysis of only the top 2-foot segment of parent material is required. The department may approve other subsampling methods if it finds them to be appropriate.

(b) All samples shall be analyzed for those parameters listed in table 1 unless waived by the department as provided in par. (d). Elutriate testing may be required for all chemicals listed in Table 1 unless waived by the department as provided in par. (d).

(c) If previous sampling data or other adequate available information indicates the possibility of contamination by chemicals not listed in table 1, the department may require analysis for those chemicals.

(d) If previous sampling data or other adequate available information demonstrates that the possibility of contamination is negligible, analysis for any chemical may be waived, in writing, by the department.

(e) The department may require additional samples and analyses as specified by law or for other appropriate reasons.

TABLE 1  
ANALYSES TO BE PERFORMED ON SEDIMENT SAMPLES

	GREAT LAKES	INLAND WATERS
PCB (Total)	X	X
Total 2,3,7,8 TCDD	X	X
Total 2,3,7,8 TCDF	X	X
	GREAT LAKES	INLAND WATERS
Aldrin	X	X
Dieldrin	X	X
Chlordane	X	X
Endrin	X	X
Heptachlor	X	X
Lindane	X	X
Toxaphene	X	X
DDT	X	X
DDE	X	X
Arsenic	X	X
Barium	X	X
Cadmium	X	X
Chromium	X	
Copper	X	X
Cyanide	X	
Iron	X	
Lead	X	X
Manganese	X	
Mercury	X	X
Nickel	X	X
Selenium	X	X
Zinc	X	X
Oil and Grease	X	X
NO <sup>2</sup> , NO <sup>3</sup> , NH <sup>3</sup> -N, TKN	X	X
Total P	X	X
Grain-size	X	X

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Register May 2013 No. 689

Percent Solids	X	X
Total Organic Carbon	X	X
Moisture Content	X	X
Settleability (if return water)	X	X

**History:** Cr. Register, February, 1989, No. 398, eff. 3-1-89; am. (5) and (6) (intro.), Register, November, 1992, No. 443, eff. 12-1-92.

**NR 347.07 Review procedures and review criteria.**

(1) When sediment sampling and analyses have been completed, the applicant shall submit a copy of the testing report to the department. This report shall include raw data for all analyses, a map of the project area showing the specific locations of sediment sampling sites and the name and address of the laboratory which performed the tests. All testing and quality control procedures shall be described and analytical methods, detection limits and quantification limits shall be identified.

(2) The department shall review the information submitted under sub. (1) within 30 business days after receipt and determine the applicable statutory and administrative rule provisions and any additional information required from the applicant under this section.

(3) Based on the submitted testing report the department may after consultation with the applicant require additional sediment sampling and analyses when there is evidence of contamination.

(4) For projects in the Great Lakes involving beach nourishment disposal, grain-size analysis results of the proposed dredged material and the beach shall be compared by the department.

(a) The department may allow beach nourishment disposal if:

1. The average percentage of silt plus clay (material passing a #200 sieve or less than .074 mm dia.) in the dredged material does not exceed the average percentage of silt plus clay in the existing beach by more than 15% and the color of the dredged material does not differ significantly from the color of the beach material.

**Note:** For example, if the silt plus clay content of the existing beach is 10%, suitable dredged material must have a silt plus clay content of less than 25%.

2. The criteria of any general permit regulating wastewater discharges under the Wisconsin pollutant discharge elimination system is not exceeded.

(5) For all projects where upland disposal is required or planned, the results of sediment sampling and analysis shall be compared by the department to the solid waste disposal standards and criteria specified in chs. NR 500 to 520.

(6) If the bulk sediment analysis criteria in sub. (4) is exceeded, the applicant shall have the option of demonstrating to the department through use of bioassay, or other methods approved by the department, that the dredging and sediment disposal operations will have minimum effects on the environment.

**History:** Cr. Register, February, 1989, No. 398, eff. 3-1-89; correction in (5) made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1995, No. 478.

**NR 347.08 Monitoring, reporting and enforcement.**

(1) **SURVEILLANCE.** (a) The permittee shall contact the department 5 business days prior to the commencement of dredging to provide an opportunity for the department to review all required

environmental safeguards to ensure they are in place and operable.

(b) The department may inspect the dredging project at any time during operation to determine whether requirements of permits and approvals are being met or to conduct effluent sampling.

(2) **MONITORING.** (a) For those projects authorized in part by a WPDES permit, monitoring, analyses and reporting shall be performed as specified in the WPDES permit.

(b) For all other projects, monitoring, analyses and reporting shall be performed as specified in ss. NR 347.06 (2) and 347.07 (1).

(c) Project characteristics to be monitored may include, but are not limited to, carriage water return flow, total suspended solids, dissolved oxygen concentrations, effluent and receiving water temperatures, receiving stream flow rates, effluent ammonia-nitrogen concentrations, and pH.

(3) **SUSPENSION OF WORK.** If the department determines that project performance is not in compliance with permit or contract conditions, the permittee shall suspend work upon written notification from the department. This shall be a condition of any permit or contract issued by the department. The permittee shall be accorded an opportunity for hearing in accordance with s. 227.51 (3), Stats. The issuance of a suspension order under this subsection shall not limit other enforcement actions or penalties. The department and permittee shall analyze operational deficiencies and the department shall prescribe changes necessary to bring project operation into conformance with permit or contract conditions.

(4) **PENALTIES.** (a) Each violation of the conditions of a permit or contract issued under s. 30.20, Stats., or this chapter, may result in a forfeiture of not less than \$100 nor more than \$10,000 for the first offense and shall forfeit not less than \$500 nor more than \$10,000 upon conviction of the same offense a second or subsequent time. The permit or contract may be rescinded and appropriate restoration orders may be issued as authorized by ss. 23.79, 30.03, 30.12, 30.15, 30.20, 30.292, 30.294 and 30.298, Stats.

(b) The enforcement provisions of s. 283.91, Stats., shall apply to any violations of WPDES permits associated with dredging projects.

(c) The enforcement provisions of ss. 289.97 and 299.97, Stats., and chs. NR 500 to 520 shall apply to violations of solid waste management approvals for this chapter.

(d) The enforcement provisions of ss. 291.95 and 291.97, Stats., shall apply to violations of any hazardous waste approvals for disposal activities associated with dredging projects authorized by this chapter.

**History:** Cr. Register, February, 1989, No. 398, eff. 3-1-89; corrections in (4) made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1995, No. 478; corrections in (4) (b) to (d) made under s. 13.93 (2m) (b) 7., Stats., Register January 2002 No. 553.

Appendix D - Michigan Department of Environmental  
Quality Dredge Sediment Review - Number 09-018

Draft



DEPARTMENT OF ENVIRONMENTAL QUALITY  
POLICY AND PROCEDURE

Subject: Dredge Sediment Review

Number: 09-018

Original Effective Date: March 19, 2013

Revised Date:

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Reformatted Date:

Category:  Internal/Administrative  External/Non-Interpretive  External/Interpretive

*A Department of Environmental Quality (DEQ) Policy and Procedure cannot establish regulatory requirements for parties outside of the DEQ. This document provides direction to DEQ staff regarding the implementation of rules and laws administered by the DEQ. It is merely explanatory; does not affect the rights of, or procedures and practices available to, the public; and does not have the force and effect of law.*

This policy and procedure supersedes the former Land and Water Management Division Policy and Procedure Number 301-99-01, "Dredge Sediment Review," dated January 23, 2009.

#### ISSUE:

Identify when proposed dredging requires testing under this policy and procedure when processing applications for permit under authority of Part 301, Inland Lakes and Streams; Part 325, Great Lakes Submerged Lands; and Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and proposed placement of dredge spoils is upland.

Unless the project is located in an area of known or suspected contamination, this dredge policy and procedure shall not apply to the following:

- ponds,
- wetlands,
- new creation of: inland lakes or streams, artificial waterways, canals, ditches, lagoons, or similar waterways.

#### DEFINITIONS:

1. "CIWPIS": The Coastal and Inland Waters Permit Information System, used by Water Resources Division (WRD) staff to electronically record permit file information such as locations that are cross-referenced against spatial information stored in multiple databases.
2. "Area of known or suspected contamination": Either a facility, as defined in Part 201 (may show up as Act 307 on CIWPIS), Environmental Remediation, of the NREPA, or any site which has known or suspected contamination as determined by DEQ staff or the applicant.
3. "Designated Test Area": An area listed in CIWPIS Special Interests database as containing contaminated or polluted sediment.

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4. "Saginaw Bay Dioxins and Furans Test Area": The portion of Saginaw Bay that lies between the mouth of the Saginaw River and a line drawn between the tip of Fish Point and the tip of the unnamed point east of the lakeward end of East Pinconning Road, which shall also include dioxins and furans testing
5. "On-Site Disposal": Upland property in the same ownership as the dredge location and contiguous to the dredge location.
6. "Clean Cover": Six (6) inches of uncontaminated soil that can support vegetation.

**PROCEDURES:**

1. WRD field staff receiving the initial application marks all files with a dredging component as administratively incomplete, per Joint Permit Application (JPA) guidance. Projects involving dredging may require sediment testing and will not be considered administratively complete until the DEQ determines that either:
  - testing is not required, or
  - the required testing results have been received.
2. WRD field staff reviews the dredge project dredge volume, location, and designated test areas to determine if contamination is likely to be present. If the project volume is more than 2,000 cubic yards total, the project is in a designated test area. If the applicant indicates there is contamination on-site, or if field staff believes contamination is likely, the file is marked as requiring testing. WRD field staff coordinates with appropriate Remediation and Redevelopment Division field staff and/or Office of Waste Management and Radiological Protection (OWMRP) field staff to determine appropriate testing criteria if field staff believe it should be different than the standard criteria listed in Step 6b, below, (please see the attached Dredge Sediment Review Flow Chart for a simplified decision tree).
3. Sediment testing is required for any of the following:
  - a. Dredging more than 2,000 cubic yards as a project total;
  - b. Dredging in designated test areas; or
  - c. Dredging in areas where DEQ staff requires testing, including, but not limited to: maintenance dredging in areas where the historical dredge area has been expanded vertically and/or horizontally into areas of suspected contamination, new dredging in areas of historical known and/or suspected contamination, or any dredging in areas where designated uses are currently impaired due to contamination.

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4. Sediment testing may be waived if one of the following conditions is met:
  - a. The material is disposed of in a municipal solid waste landfill or a U.S. Army Corps of Engineers Confined Disposal Facility (USACE CDF).
  - b. The material remains in an upland area on-site (i.e., outside of waterbodies, wetland, or floodplain areas), with clean cover, and the applicant signs a Declaration of Restrictive Covenant to prevent movement of the dredge material off-site as well as any other restrictions that OWMRP Lansing staff deems necessary.
  - c. The applicant can supply approved previous test data from the site, or from a site immediately adjacent to the site within 100 feet, collected and analyzed within the last ten (10) years that demonstrates the dredge materials are below the criteria listed in the OWMRP Review Criteria and Method Detection Limits (i.e., test data that demonstrates the material is inert). This data must be representative of the dredge area, including depth. For projects on the Tittabawassee River downstream of the city of Midland, on the Saginaw River downstream of the Tittabawassee River, or in the Saginaw Bay Dioxins and Furans Test Area, dioxins and furans testing is required and previous test data must show dioxins and furans below criteria or that portion of testing will still be required.
  - d. The total dredge volume is less than 2,000 cubic yards, is not within a designated test area, DEQ staff has not required testing, disposal location is in an upland area outside of a waterbody, wetland, or floodplain area, and:
    - i. the applicant wishes to keep the material on-site, or
    - ii. the applicant wishes to dispose of the material off-site and the final permit includes CIWPIS standard paragraph Not Classified as to Contaminant Status.
5. If testing is not required, WRD field staff marks the application file in CIWPIS as administratively complete and continues processing the application file outside of this policy and procedure. If testing is required, the file remains incomplete and WRD field staff continues processing per this policy and procedure, continuing to Step 6, below.
6. WRD field staff sends the Sediment Testing for Dredging Projects letter to the applicant if the proposed sediment dredging meets any one of the criteria listed above in Steps 3a-c and provides the OWMRP District Supervisor with a copy of the application and letter, which contains the following guidance:
  - a. Applicant may opt to conduct sieve grain analysis test for sand content, or move to Step 6b if material is believed to be less than 90 percent sand. For all sieve grain analysis testing of dredging projects of less than 10,000 cubic yards, applicant shall sample sediments from six (6) discrete locations within the proposed dredge area. If more than 10,000 cubic yards of dredging are proposed, at least one additional sample shall be obtained and analyzed for each 10,000 cubic yards of additional material proposed for dredging. Typically, each sample will consist of a composited

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subset of a core taken to full project depth. DEQ field staff may mandate specific sampling criteria, locations, and/or depth intervals, based on their site specific knowledge. Applicant conducts a sieve grain size analysis on the sediments using U.S. Standard Sieve Number 200 sieve. Applicant reports the results for each of the six (or more) discrete sample locations as a mass percentage of retained sediments. If the average mass percentage retained on the Number 200 sieve is 90 percent sand or greater, no additional sediment testing is required, unless the project is located on the Tittabawassee River downstream of the city of Midland, on the Saginaw River downstream of the Tittabawassee River, or in the Saginaw Bay Dioxins and Furans Test Area, in which case dioxins and furans must also be analyzed. The sieve grain analysis test is a pass/fail test. If the average mass percentage of sand is less than 90 percent, then the material must be analyzed according to Step 6b, below, for at least six (6) discrete sampling locations.

- b. If the result of the mass percentage retained on the Number 200 screen is less than 90 percent sand, on average, or the applicant opted not to conduct sieve grain analysis, additional testing is required. For all analytical testing of dredging projects of less than 10,000 cubic yards, applicant shall sample sediments from six (6) discrete locations within the proposed dredge area. If more than 10,000 cubic yards of dredging are proposed, at least one additional sample shall be obtained and analyzed for each 10,000 cubic yards of additional material proposed for dredging. Typically, each sample will consist of a composited subset of a core taken to full project depth. DEQ field staff may mandate specific sampling criteria, locations, and/or depth intervals, based on their site specific knowledge. The default analytical parameters include seven (7) heavy metals [arsenic, cadmium, copper, lead, mercury, selenium, and zinc] and polynuclear aromatic hydrocarbons. Default analytical parameters also include polychlorinated bi-phenyls if the project is on one of the following bodies of water: Detroit River, Rouge River, Raisin River, Kalamazoo River, Saginaw River, Saginaw Bay, and Manistique Harbor, or canals that connect to any of the listed bodies of water. Additions or deletions to this list can be made on a project specific basis if field staff or the applicant has additional information related to the project. For projects on the Tittabawassee River downstream of the city of Midland or on the Saginaw River downstream of the Tittabawassee River, or in the Saginaw Bay Dioxins and Furans Test Area, dioxins and furans must also be analyzed. For the purposes of dredging and dredge spoil disposal, default background concentrations of arsenic have been developed. Those areas currently include a statewide default background and three specific areas identified as L.P. Southwest Area, L.P. Southeast Area, and U.P. West Central Area (please see attached figure "Arsenic Information to Support Dredging Material Decisions"). A site specific background analysis is also allowed for arsenic if the applicant wishes to pursue that option.
- c. Levels of detection required are reflected in the OWMRP Review Criteria and Method Detection Limits.

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- d. If sediment results show PCB and/or mercury concentrations greater than 1 PPM, or metals data and/or PNA data greater than the probable effect concentration as defined in MacDonald *et al.*, 2000 (MacDonald *et al.*, 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31), additional sediment testing will be required to evaluate the newly exposed sediment quality. This sediment testing data will be used to evaluate potential impacts to surface water designated uses from the newly exposed sediment, as defined in Part 4, Water Quality Standards, promulgated under Part 31, Water Resources Protection, of the NREPA. If this additional testing is required, WRD field staff will forward sediment data analyzed under this part to the Lakes Erie, Huron, and Superior Unit Chief, WRD, DEQ, for review, analysis, and further direction.
7. The applicant forwards the sediment analysis results to WRD field staff.
8. WRD field staff forwards the sediment analysis data for review as follows:
  - a. From Steps 6a-b, above, to Duane Roskoskey, OWMRP, DEQ, Constitution Hall, Lansing, Michigan.
  - b. From Step 6d, above, to the Lakes Erie, Huron, and Superior Unit Chief, WRD, DEQ, Constitution Hall, Lansing, Michigan. The WRD Unit Chief will instruct WRD field staff as to the next steps based on the test results.
9. OWMRP Lansing staff evaluates the data from Steps 6a-b, above, and determines disposal requirements as one or more of the following and notifies WRD field staff of the disposal requirement options:
  - a. inert and suitable for unrestricted upland disposal
  - b. on-site disposal with clean cover and Restrictive Covenant
  - c. municipal solid waste landfill or USACE CDF
10. If the proposed dredge project is permissible, WRD field staff drafts the permit with the disposal requirement options and other requirements needed to be protective of designated uses and forwards to the applicant, and updates CIWPIS.
11. The applicant selects a disposal option, countersigns the draft permit, and returns to WRD field staff for issuance. If the disposal option is on-site with Restrictive Covenant, WRD field staff will withhold final execution of the permit until a recordable Declaration of Restrictive Covenant form is received. If another disposal option is selected, WRD field staff issues the permit if the proposed project is permissible. As applicable, WRD field staff forwards the recordable form to Duane Roskoskey, OWMRP, DEQ, Constitution Hall, Lansing, Michigan.

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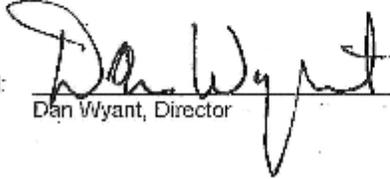
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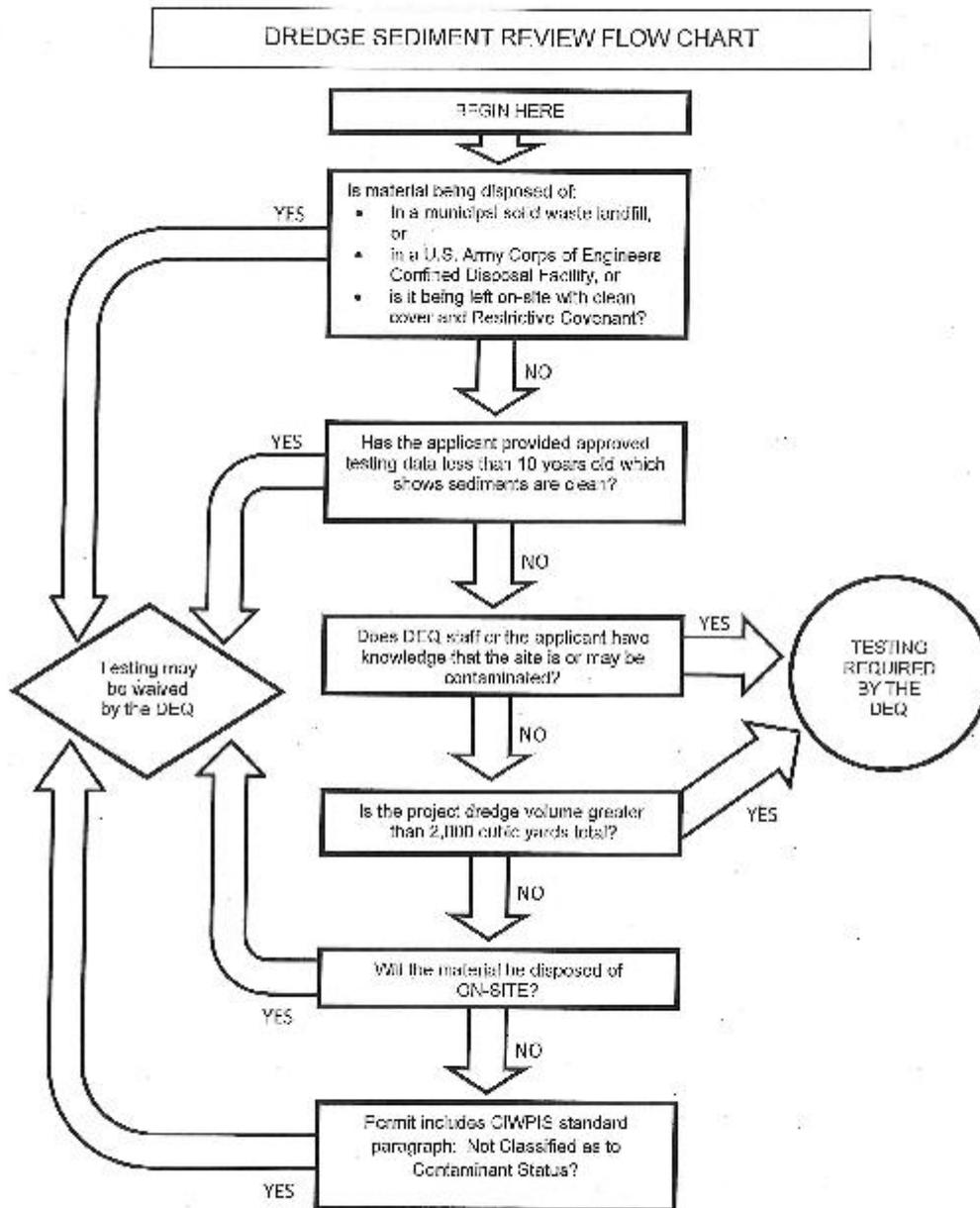
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12. Where applicable, OWMRP Lansing staff executes the recordable Declaration of Restrictive Covenant and forwards a copy to WRD field staff for CIWPIS update and to the appropriate county government office for final recording. Once the recorded form has been returned, OWMRP Lansing staff retains the original and forwards a copy of the recorded form to WRD field staff for CIWPIS update.
13. Where applicable, the WRD updates CIWPIS that an executed and recorded Restrictive Covenant was received, where applicable, and adds the hard copy to the file.

Approved:

  
Dan Wyant, Director



March 2013



Appendix E – Technical Advisory Committee Meeting  
Minutes and Citizens Advisory Committee Letter of Support

(To be added once committees approve)

Draft