UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

Jon W. Allan, Director
Office of the Great Lakes
Michigan Department of Environmental Quality
525 West Allegan Street
P.O. Box 30473
Lansing, Michigan 48909-7973

Dear Mr. Allan:

Thank you for your November 9, 2016, request to remove the "Restrictions on Dredging Activities" Beneficial Use Impairment (BUI) at the Lower Menominee River Area of Concern (AOC) located within the cities of Marinette, WI and Menominee, MI. As you know, we share your desire to restore all of the Great Lakes AOCs and to formally delist them.

Based upon a review of your submittal and the supporting data, the U.S. Environmental Protection Agency (EPA) hereby approves your request to remove this BUI from the Lower Menominee River AOC. EPA will notify the International Joint Commission (IJC) of this significant positive environmental change at this AOC.

We congratulate you and your staff as well as the many federal, state and local partners who have worked so hard and been instrumental in achieving this important environmental improvement. Removal of this BUI will benefit not only the people who live and work in the Lower Menominee River AOC, but all residents of Wisconsin, Michigan and the Great Lakes Basin as well.

We look forward to the continuation of this important and productive relationship with your agency and the local coordinating committee as we work together to delist this AOC in the years to come. If you have any further questions, please contact me at (312) 886-9296, or your staff can contact John Perrecone at (312) 353-1149.

Sincerely,

Tinka G. Hyde

Tinka G. Hyde, Director
Great Lakes National Program Office

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cc: Kendra Axness, WDNR
Laurel Last, WDNR
Rick Hobrla, MDEQ
Stephanie Swart, MDEQ
Raj Bejankiwar, IJC
John Perrecone, EPA, GLNPO
Wendy Carney, EPA, GLNPO
Keith West, LMR Citizens Advisory Committee, WI
Mark Erickson, LMR Citizens Advisory Committee, MI

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

Stephen Galarneau, Director
Office of the Great Lakes and Sediment Management Unit
Wisconsin Department of Natural Resources
101 S. Webster Street
P.O. Box 7921
Madison, WI 53707-7921

Dear Mr. Galarneau:

Thank you for your November 18, 2016, request to remove the "Restrictions on Dredging Activities" Beneficial Use Impairment (BUI) at the Lower Menominee River Area of Concern (AOC) located within the cities of Marinette, WI and Menominee, MI. As you know, we share your desire to restore all of the Great Lakes AOCs and to formally delist them.

Based upon a review of your submittal and the supporting data, the U.S. Environmental Protection Agency (EPA) hereby approves your request to remove this BUI from the Lower Menominee River AOC. EPA will notify the International Joint Commission (IJC) of this significant positive environmental change at this AOC.

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We look forward to the continuation of this important and productive relationship with your agency and the local coordinating committee as we work together to delist this AOC in the years to come. If you have any further questions, please contact me at (312) 886-9296, or your staff can contact John Perrecone at (312) 353-1149.

Sincerely,

Tinka G. Hyde, Director
Great Lakes National Program Office

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cc: Kendra Axness, WDNR
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Rick Hobrla, MDEQ
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Raj Bejankiwar, IJC
John Perrecone, EPA, GLNPO
Wendy Carney, EPA, GLNPO
Keith West, LMR Citizens Advisory Committee, WI
Mark Erickson, LMR Citizens Advisory Committee, MI

RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
OFFICE OF THE GREAT LAKES
LANSING

JON W. ALLAN
DIRECTOR

November 9, 2016

Ms. Tinka Hyde, Director
Great Lakes National Program Office
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard (G-17J)
Chicago, Illinois 60604-3507

Dear Ms. Hyde:

I am writing to request the United States Environmental Protection Agency (USEPA), Great Lakes National Program Office's (GLNPO) concurrence with the removal of the Restrictions on Dredging Beneficial Use Impairment (BUI) from the Lower Menominee River Area of Concern (AOC). The Michigan Department of Environmental Quality (MDEQ), Office of the Great Lakes (OGL) along with the Wisconsin Department of Natural Resources (WDNR) has assessed the status of this BUI in accordance with the delisting target established in 2008. We recommend that the BUI be removed from the list of impairments in the Lower Menominee River AOC.

Enclosed please find documentation to support this recommendation, including the BUI Removal Recommendation and Dredge Management Plan prepared by OGL and WDNR staff. The Lower Menominee River Citizens Advisory Committee provided a letter of support for this action, dated October 20, 2016. A copy is included. Please note that a public comment period was held from September 8, to September 22, 2016. Comments received during the 30-day comment period were addressed and incorporated into the document.

We value our continuing partnership in the AOC Program and look forward to continuing to work with the GLNPO in the removal of other BUIs and the delisting of AOCs. If you need further information concerning this request, please contact Mr. Rick Hobrla at 517-284-5043, or you may contact me.

Sincerely,

Jon W. Allan, Director
Office of the Great Lakes
517-284-5035

Enclosure

cc/enc: Mr. Marc Tuchman, USEPA
Mr. John Perrecone, USEPA
Mr. Ted Smith, USEPA
Mr. Steve Galarneau, WDNR
Ms. Kendra Axness, WDNR
Mr. Victor Pappas, WDNR
Ms. Laurel Last, WDNR
Ms. Cheryl Bougie, WDNR
Mr. Rick Hobrla, MDEQ
Ms. Sharon Baker, MDEQ

Menominee River Area of Concern

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

Submitted to:
U.S. EPA Region 5
Great Lakes National Program Office
77 W. Jackson Boulevard
Chicago, IL 60604-3511

By:
Wisconsin Department of Natural Resources and
Michigan Department of Environmental Quality
November 9, 2016

Acknowledgements

Prepared by:

Office of the Great Lakes – Wisconsin Department of Natural Resources
Kendra Axness – LAMP and AOC Coordinator
Cheryl Bougie – Sediment & Water Quality Monitoring Coordinator, Primary Author
Stephen Galarneau – Director, Office of the Great Lakes
Scott Inman – Water Resources Engineer
James Killian – Water Resources Management Sediment Specialist
Laurel Last – Lower Menominee River AOC Coordinator
Victor Pappas – Lake Michigan Field Supervisor

Office of the Great Lakes – Michigan Department of Environmental Quality
Sharon Baker – Lower Menominee River AOC Coordinator
Stephanie Swart – Lake Superior Lake Coordinator

The Wisconsin Department of Natural Resources (WDNR) and the Michigan Department of Environmental Quality (MDEQ), would like to acknowledge the many contributions and support by the members of the Lower Menominee River Area of Concern (AOC) Citizens Advisory Committee (CAC) and Technical Advisory Committee (TAC) in the development of this 2016 Lower Menominee River AOC Dredge Management Plan – Restrictions on Dredging Activities and Beneficial Use Impairment (BUI) Removal Package. The CAC and TAC collaboration with state and federal agencies has resulted in materials and activities which reflect local issues and concerns.

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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
CWA	Clean Water Act
CY	Cubic Yards
DMU	Dredge Management Unit
DNAPL	Dense Non-Aqueous Phase Liquid
EQM	Environmental Quality Management Inc
FY14	Fiscal Year 2014 Federal USACE Dredging
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 and 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
NPDES	National Pollutant Discharge Elimination System
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
US	United States
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
WPDES	Wisconsin Pollutant Discharge Elimination System
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 WDNR and MDEQ with input from the communities (cities of Marinette, Menominee, TAC and CAC) and agencies (United States Environmental Protection Agency (USEPA), Great Lakes National Program Office (GLNPO), United States Army Corps Engineers (USACE) and United States Fish & Wildlife Service (USFWS)) 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 USEPA AOC program as it relates to BUI Removal. The AOC program is not a regulatory program. Rather, it is an effort to restore beneficial uses guided by the Great Lakes Water Quality Agreement (GLWQA). 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 (aka 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 GLWQA 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 and MDEQ, 1990) identified the current status of the AOC and the following six BUIs:

- Restrictions on fish consumption (estimated removal 2016/2017)
- Degradation of fish populations (estimated removal 2018)
- Degradation of benthos (estimated removal 2016)
- **Restrictions on dredging activities**

- Restrictions on Recreational Contact –bacteria from combined sewers (removed March 2011)
- Loss of fish and wildlife habitat (estimated removal 2018)

This document pertains only to the Restrictions on Dredging Activities BUI.

Rationale for Restrictions on Dredging Activities BUI Listing

Throughout the 20th 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). The impairment was a result of the introduction of the pollutants arsenic, cadmium, lead, mercury, oil and grease, and PAHs.

Restrictions on dredging activities is an impaired use in the AOC due to sediment that was contaminated with arsenic, coal tar waste, paint waste and other heavy metals (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, is a major problem for dredging operations (Appendix A, Figure 5). The USACE has not dredged the turning basin since 1965 due to the difficulty and expense surrounding environmentally sound disposal of arsenic-contaminated sediment (WDNR and MDNR, 1990).

USACE is responsible for maintaining a navigation channel from the harbor entrance to and including the turning basin and 200 feet upstream of the turning basin (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 in the bay of Green Bay will continue if the dredge material is determined to be uncontaminated by Michigan Department of Environmental Quality (MDEQ) per Section 404 of the CWA. Portions of the shipping channel were last dredged in fall of 2014 (Appendix A, Figure 4) with the exception of the turning basin.

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 six public launches: Boom Landing, Eleventh Avenue Launch, Rail Road Dock, Seagull Bar (Red Arrow Beach), Sixth Street, Stephenson Island and soon to be seventh with the new boat launch planned for Menekaunee Harbor. Since the harbor is used by many different facilities, it is important to note that restrictions on dredging may significantly impact their function.

BUI Removal Criteria (2008 Final Delisting Target)

In the *2014 RAP Update for The Menominee River Area of Concern,* WDNR and MDEQ identify the restoration targets and actions necessary in order to remove the BUI. There are **two restoration targets** that **must be met** in order for the Restrictions on Dredging Activities 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 the Federal Navigation Channel, commercial and industrial docks, marinas, boat launches, and private docks.

Priority areas for utility dredging and crossing include all potential future areas, and specifically those 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 BUI removal criteria for the removal of the Restrictions on Dredging Activities BUI:

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 Great Lakes Legacy Act (GLLA) project conducted by Tyco (Ansul), the Superfund Alternatives project at Wisconsin Public Service Corporation (WPSC), the WDNR-lead project at Menekaunee Harbor and the MDEQ-lead project at the Green Bay Paint Sludge [Lloyd-Flanders Industries, Inc. (LFFI)] site are complete and post dredge sampling confirms that remedial action goals were achieved to the extent practicable (Appendix B, Table 1 Lower Menominee River AOC Sediment Remediation Sites with Summary of Goals, Actions and Monitoring). Additional evaluation of this work and compliance with requirements under each regulated program will continue into the future as part of the required review periods, with the exception of Menekaunee Harbor, where no ongoing monitoring is required or anticipated.

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

The RCRA Administrative Order on Consent (AOOC) for Tyco and the Superfund Program for WPSC require the parties to monitor the sediment to ensure the remedial objectives are met. USEPA RCRA and USEPA Superfund Alternatives also require 5-year reviews that include assessment of the sediment monitoring data at these sites.

LFII 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 each 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 Tyco, WPSC and Menekaunee Harbor to the maximum extent practicable. As a result of sediment-related remediation activities, three areas were identified for sand cover placement in order to meet the sediment-related remedial action objectives. Narratives presented later in this document describe each scenario and in the Evaluation of Potential Remaining Dredge Restriction Areas section of this document, utility dredging (utility crossings) and priority dredge areas are identified.

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

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

Timeline of Events for RCRA and Superfund Alternative Projects and Sediment-Related Remedial Actions

Since the Lower Menominee River was designated as an AOC, significant progress has been made to address pollutant sources. Upland and sediment related site investigation and remediation activities led by USEPA Superfund Alternative, USEPA RCRA, WDNR, and MDEQ, have occurred over three decades. The Superfund Alternative Project - WPSC Coal Tar site; the RCRA Project - Tyco (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. The LFII, Green Bay paint sludge site is located on the bay of Green Bay three miles north of the Menominee River mouth in Menominee, Michigan.

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 timeline 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 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 begins involvement with Ansul site
- 1989 WDNR is notified of the discovery of the coal tar contamination at the Marinette WWTP [former WPSC Manufactured Gas Plant (MGP)] site
- 1989 Ansul Menominee River sediment characterization and water sampling
- 1990 Lower Menominee River RAP (Stage I)
- 1990 AOOC between USEPA RCRA and Ansul
- 1993 LFII constructs berm/rock dike to enclose submerged paint wastes and prevent further migration into the bay of Green Bay
- 1995 (summer) – 1998 (fall) LFII perform contaminant removal of paint sludge and sediment
- 1996 Lower Menominee River RAP Update
- 1999 Ansul removal of sediment from the 8th Street slip
- 2000 Tyco purchases Ansul and takes responsibility for the arsenic contamination site
- 2001 USEPA RCRA approves Tyco 8th 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 BUI Restoration Targets
- 2009 AOOC 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 RAP (Stage II)
- 2011 Tyco vertical barrier wall sheet pile stabilization
- 2011 – 2012 WPSC sediment characterization
- 2012 Lower Menominee River RAP 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 and sediment monitoring begins
- 2013 GLNPO Lower Scott Flowage sediment characterization
- 2013 Lower Menominee River RAP Update
- 2014 Rio Vista sediment characterization
- 2014 Tyco GLLA dredging project completed
- 2014 Menekaunee Harbor dredging completed
- 2014 Lower Menominee River RAP Update
- 2015 Tyco RCRA/GLLA 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; WPSC coal tar site; and LFII paint sludge site (WDNR and MDNR, 1990). A secondary area, Menekaunee Harbor, was identified by WDNR. A couple sites, Lower Scott Flowage and Rio Vista Slough, were investigated by state and federal agencies to determine if they were contributing to BUIs.

Contaminated sediment management actions have been implemented at all known contamination sites to the extent practicable, as specified in the USEPA negotiated AOOC for each site. See Appendix B, Table 1 for the current status of the contaminated 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 Limited Partnership) 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 surface water and ground water, 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 AOOC with the USEPA to remediate the site (USEPA, 2009). The AOOC 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 GLRI- GLLA Betterment Action at the contaminated sediment site beginning in 2014 with completion in 2015 (EQM, 2015).

Many remedial activities were conducted before the AOOC was signed. See the USEPA web page *(The link provided was broken and has been removed)* 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 CY of material had been removed from the River (CH2MHill and Sevenson, 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. Any time the basin is needed to be used dredging had to cease while turbidity control measures were relocated.

- 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 and Sevenson, 2014). Confirmation sampling determined that the remedial action goals for 2013 were reached (CH2MHill and Sevenson, 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 and Sevenson, 2014) for confirmation sediment sampling results. Appendix A, Figures 7, 8, and 9 has DMUs and post-dredge confirmation sediment sampling locations and results.

Sediment With Arsenic Levels Between 20 ppm and 50 ppm

- A GLLA Betterment Action Agreement between Tyco, USEPA, and 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 RCRA component of the project. The USEPA RCRA AOOC 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. 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. A total if 2,173,000 gallons of water was treated. Of this amount, 397,000 gallons did not pass the required effluent limits for arsenic and 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). Appendix A, Figures 10, 11 and 12 has DMUs and post-dredge confirmation sediment sampling locations and results. Appendix G, Table A1-1 contains Confirmation Sampling Analytical Review. Appendix E of the *Remedial Action Completion Report, Great Lakes Legacy Act Lower Menominee River Tyco Site* contains the bathymetric Survey Data (EQM, 2015).
- 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 USACE. 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). CH2MHill, 2015b 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, Wisconsin* has Confirmation Sampling Analytical Review and Sand Cover Coring Results.

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 AOOC between Tyco and USEPA RCRA.

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 8th 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 the Site 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 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 LFII 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. LFII did not contribute to the contamination, which was already present on the site long before they purchased the facility.

MDEQ and 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 LFII 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 LFII 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 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 LFII 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. 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 imbedded wastes. Under the Administrative Order, these paint wastes are 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, and fragments. In personal communications with Technical Advisory Committee (TAC) and Citizens Advisory Committee (CAC) by Mark Erickson, LFII Plant Engineer/Manager and CAC Co-Chair, paintballs and fragment collections have decreased in volume since collection began. The shoreline collection data provided in 2010 to the MDEQ Upper Peninsula District Office showed a reduction of 40% of material collected from 2006 to 2010. An additional 41% reduction was documented between 2010 and 2015. 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 and prevent further migration into Green Bay. The core of this berm structure contains a series of membrane liners designed to hydraulically isolate the wastes from the bay. The original GBPS 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 riprap barrier was installed November 6-9, 2000.

Site Monitoring/Maintenance
There were no reporting requirements negotiated under the Administrative Order 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 15 years the upland barrier and shoreline rip rap have required no repairs.

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 the Site Remediation/Source Control Section above).

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.

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 to move forward with the project. In 2010, the WDNR partnered with the city and USEPA to move the harbor restoration project forward in an effort to meet the goals and objectives and to remove BUIs. 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. Appendix A, Figure 16 has the final Menekaunee Harbor plan and contours.

Dredging commenced August 21, 2014, with the goal of removing contaminants at or above

Threshold Effect Concentrations (TEC) 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 dredged 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, city of Marinette. Additional clean dredged 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. Seventy-seven thousand CY of the clean material from within the harbor was hydraulically pumped to the restoration area. Confirmation sampling indicated exceedances of heavy metals in the area near Harbor Town Marine Dock. 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). Appendix A, Figures 17 and 18 have 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).

Site Monitoring/Maintenance

Additional monitoring and maintenance of this site is 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 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 Site Remediation/Source Control Section above).

Photo 2. Menekaunee Harbor Dredging (WDNR, Bougie)

Wisconsin Public Service Corporation Marinette – Coal Tar and PAHs Site

Contamination Background

The WPSC site is located in Marinette, Wisconsin. The 4-acre former MGP is about 750 feet south of the Menominee River and about 1.5 miles upstream from the river mouth at the bay of Green Bay. The WPSC MGP was formerly located on the property currently known as the Marinette WWTP. Boom Landing Park is between the river and the site and is 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 MGP operations washed into the Menominee River via a former slough and contaminated sediment along the Wisconsin shoreline of the Menominee River near Boom Landing.

The WPSC 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 involves heating and volatilizing coal in an airtight chamber (retort) at temperatures reaching 2,200°F so the coal will decompose into gas, 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 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 (Appendix A, Figure 19 WPSC Previous Remedial Actions – Upland; NRT, 2016a). The groundwater contaminant plume appears to be limited (based on ongoing ground water monitoring) 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.

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 adhered to anchored boats and equipment located downstream of the gasification plant area, and were seen floating 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).
(The link provided was broken and has been removed.)

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). Due to an uneven bedrock surface the mechanical dredge equipment was unable to completely remove dredge residuals on the bedrock surface (NRT, 2013a). 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 (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 (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.

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:

- Acenapthene
- 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 to18 inches (NRT, 2015b).

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 (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). Sediment and sand cover data is located here:
https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.scs&id=0509952&doc=Y&colid=30497&requestTimeout=480

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 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 and the National Contingency Plan 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 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 (Sediment Site Related Remediation/Source Control Section above).

Photo 3. WPSC MGP Dredging in the 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. The 1996 RAP update 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 (WDNR, 1996). There is a fish consumption advisory for PCBs and mercury for the LSF, indicating a potential issue with sediment quality within the impoundment. A sediment investigation was conducted in November 2013 to determine if there were any impairments to sediment quality in the LSF (CH2MHill, 2013b).

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 one-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 four feet were identified in the northeastern portion of the flowage.

Analytical results were screened against Wisconsin TECs and Probable Effect Concentrations (PECs) (WDNR, 2003) and USEPA Region 5 (USEPA, 2003) 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 (CH2MHill, 2014). No distinguishable trends in TEC exceedances were observed with depth.

PEC exceedances were present at only two 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 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 water 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 or 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)].

The site does contain PAH levels that could impact disposal requirements for any material dredged. Future dredging requests will be evaluated under their respective agencies and programs (refer to Other Regulatory Processes for all Dredging Activities in Waters of the State).

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 the 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 collection.

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.

As stated earlier the site does not contain PAH levels that merit remediation; however, it does contain levels that could impact disposal requirements for any material dredged. Future dredging requests will be evaluated under their respective agencies and programs (refer to Other Regulatory Processes for all Dredging Activities in Waters of the State).

Evaluation of Potential Remaining Dredge Restriction Areas

(Ansul) Tyco:
The USEPA RCRA AOOC 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. An approximately 3-acre sand cover was placed to contain exposed arsenic above the 20 ppm RAO in the turning basin and several areas in the transition zone. Appendix A, Figure 13 is 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. Appendix A, Figures 10, 11 and 12 have DMUs and post-dredge confirmation sediment sampling locations and results. Also, Appendix G, Table A1-1 has the Confirmation Sampling Analytical Review. Appendix E of the *Remedial Action Completion Report, Great Lakes Legacy Act Lower Menominee River Tyco Site*, has the bathymetric survey data (EQM, 2015).

Currently, there are no utilities that cross the turning basin or transition area due to the hard glacial till, bedrock, and 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 crossings and are in various sections of the Menominee River South Channel. This part of the river is not a high priority area for navigation dredging due to limited water depths and a 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 show there is no indication of any dredging restrictions associated with the remedial actions at the GBPS facility. A majority of the waste has been removed, with only small pieces of hardened paint nodules accumulating 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; Appendix A, Figure 18 shows 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 through environmental dredging to the extent practicable and 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 a 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 six 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.

Appendix A, Figure 26 *Lower Menominee River AOC Priority Areas for Navigational Use and Utility Dredging (Crossings)* is a map depicting the priority navigation areas (Federal Navigation Channel, commercial & industrial docks, marinas, boat launches, and private dock), priority areas for utility dredging (crossings - including all potential future areas and in this instance specifically in the sediment remedial areas), PAH impacted areas in Lower Scott Flowage, Rio Vista Slough, WPSC and Tyco Arsenic impacted area in the turning basin that if dredged, contain levels that could impact disposal requirements for any material dredged in the future (addressed under Other Regulatory Processes for all Dredging Activities in Waters of the State Section below) and, finally, remaining dredge restriction at WPSC RCM area (WDNR, 2016).

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 Statues) 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 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 Statues 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) MDEQ dredging permit policy and approval process (MDEQ, 2013).

Other Regulatory Processes for Protecting Water and Sediment Quality:

Such discharges to waters of the United States (US) are no longer allowed. The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the US and regulating quality standards for surface waters.

The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained. USEPA's National Pollutant Discharge Elimination System (NPDES) permit program controls discharges along with Wisconsin's equivalent permit program Wisconsin and Michigan's permit programs.

The 1987 CWA amendment later (1990) added storm water discharges from construction, industrial and municipal facilities and is administered locally through the states and local storm water permitting programs. Wisconsin promulgated Wisconsin Administrative Code NR 216 Storm Water Discharge Permits in 1994.

Michigan has a similar storm water permitting program under Michigan Permit by Rule – R323.2190 of Part 21, Wastewater Discharge Permits Administrative Rules, promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act 1994 PA 451 as amended, MCL 324.3101 *et seq*.

The 1978 Wisconsin Spill Law, Chapter 292.11, Wisconsin Stats., requires that a person who possesses or controls a hazardous substance or who causes discharge of hazardous substance shall notify the Department *immediately* of any discharge not exempted by Statute.

Similarly, Michigan has a spills law under the Superfund Amendments and Reauthorization Act Title III Section 304, 40 Code of Federal Regulations (CFR) 355.40 Extremely Hazardous Substances, and Comprehensive Environmental Response Compensation and Liability Act, Section 103, 40 CFR 302 Hazardous Substances.

Outcome of Evaluation for Potential Dredge Restrictions

In summary, as outlined above, the target for the Restrictions on Dredging Activities BUI removal has been met. Of the sites that were 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. Future dredging requests will be evaluated under their respective agencies and programs.

Stakeholder/Public Engagement

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 showed support via meeting minutes and the CAC submitted a formal letter of support for removal of the BUI, dated October 20, 2016, (Appendix E). The proposed action was public noticed via listing in the Eagle-Herald on September 10, 2016: http://ehextra.com/Content/RECORDS/Records-Articles/Article/DNR-seeking-public-comment/16/797/34979 (refer to Appendix F), 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) for public review and comment from September 8, 2016, through September 22, 2016. The Departments received written and verbal comments from Federal and State agencies during this period and have addressed the comments by incorporating

them into this document. The Departments received no public comments during the review and comment period.

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

The 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 the BUI removal documents. The TAC members also provided support for the monitoring programs to assess impaired use, 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 and MDNR, 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 September 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 letter of support document support for the removal of the restrictions on dredging BUI and are located 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 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 sediment remediation projects, continued monitoring under the Superfund Alternative and RCRA Programs, and review of the data for all remediation projects by WDNR, MDEQ, MDNR, USACE, USCG, USFWS, TAC and CAC; the WDNR and the MDEQ recommend 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.

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.

Photo 4. Lower Menominee River AOC Open House – speaker Steve Galarneau, WDNR, Director - Office of the Great Lakes (Ecology & Environment, Inc., Erickson)

Photo 5. Lower Menominee River AOC Open House Attendees (EEI, Erickson)

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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 the Federal Navigation Channel, commercial and industrial docks, marinas, boat launches, and private docks.

Priority Areas Utility Dredging and Crossing – Include all potential future areas, specifically those 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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   8. (Ansul) Tyco Confirmation Sampling Results - Transition Area, 50 ppm 2013 (CH2MHill, 2014)
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   11. (Ansul) Tyco Confirmation Sampling Results - Transition Area, 20 ppm 2014 (CH2MHill, 2015b)
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   13. (Ansul) Tyco Glacial Till Sand Cover Area (CH2MHill, 2015b and EQM, 2015)
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   15. Green Bay Paint Sludge Site - Lloyd Flanders Site Map (WDNR and MDNR, 1990)
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   20. Wisconsin Public Service Corporation - Sand Cover & RCM Area (NRT, 2015b)
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    2. Table 2. WPSC MGP Residual Sand Cover Analytical Summary Table (NRT, 2015)
    3. Table 3. Site Locations and Sample Descriptions for Rio Vista Slough Sampling 6/24/2014 (MDEQ, 2015)
    4. Table 4. Aroclor Results for Rio Vista Slough Sediment Samples Collected on 6/24/2014 (MDEQ, 2015)
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    6. Table 6. PAH Results for Surficial Sediment Samples Taken in Rio Vista Slough 6/24/15 (MDEQ, 2015)

C. State of Wisconsin Administrative Code for Dredging Activities - NR 347 (WDNR, 2013)

D. MDEQ Dredge Sediment Review Guidance Number 09-018. (MDEQ, 2013)

E. TAC Meeting Minutes and CAC for the Lower Menominee River AOC Letter of Support

F. Open House News Release, Eagle-Herald 9/10/16

Appendix A - Figures

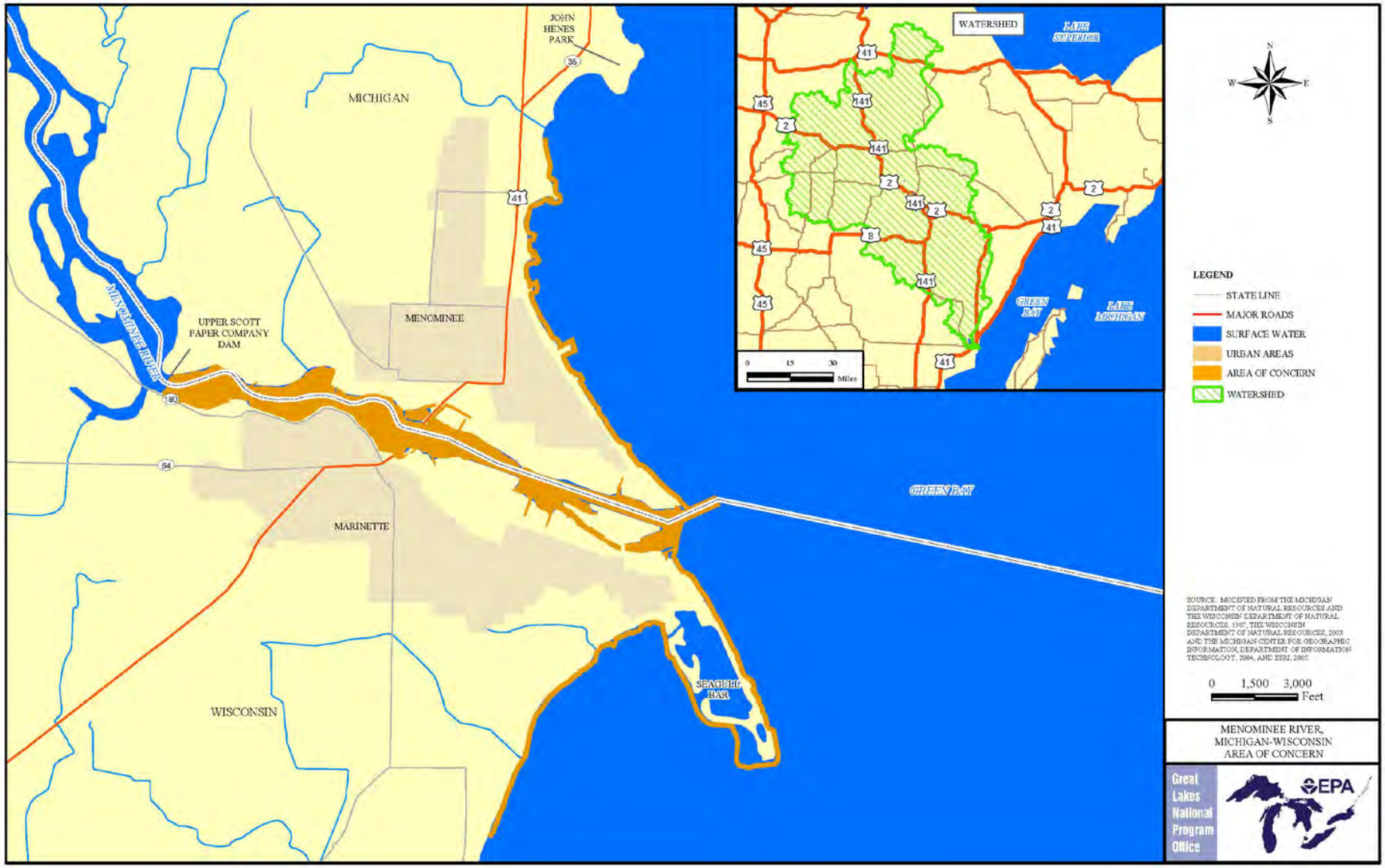


Figure 1. Lower Menominee River AOC (EPA, 2005)

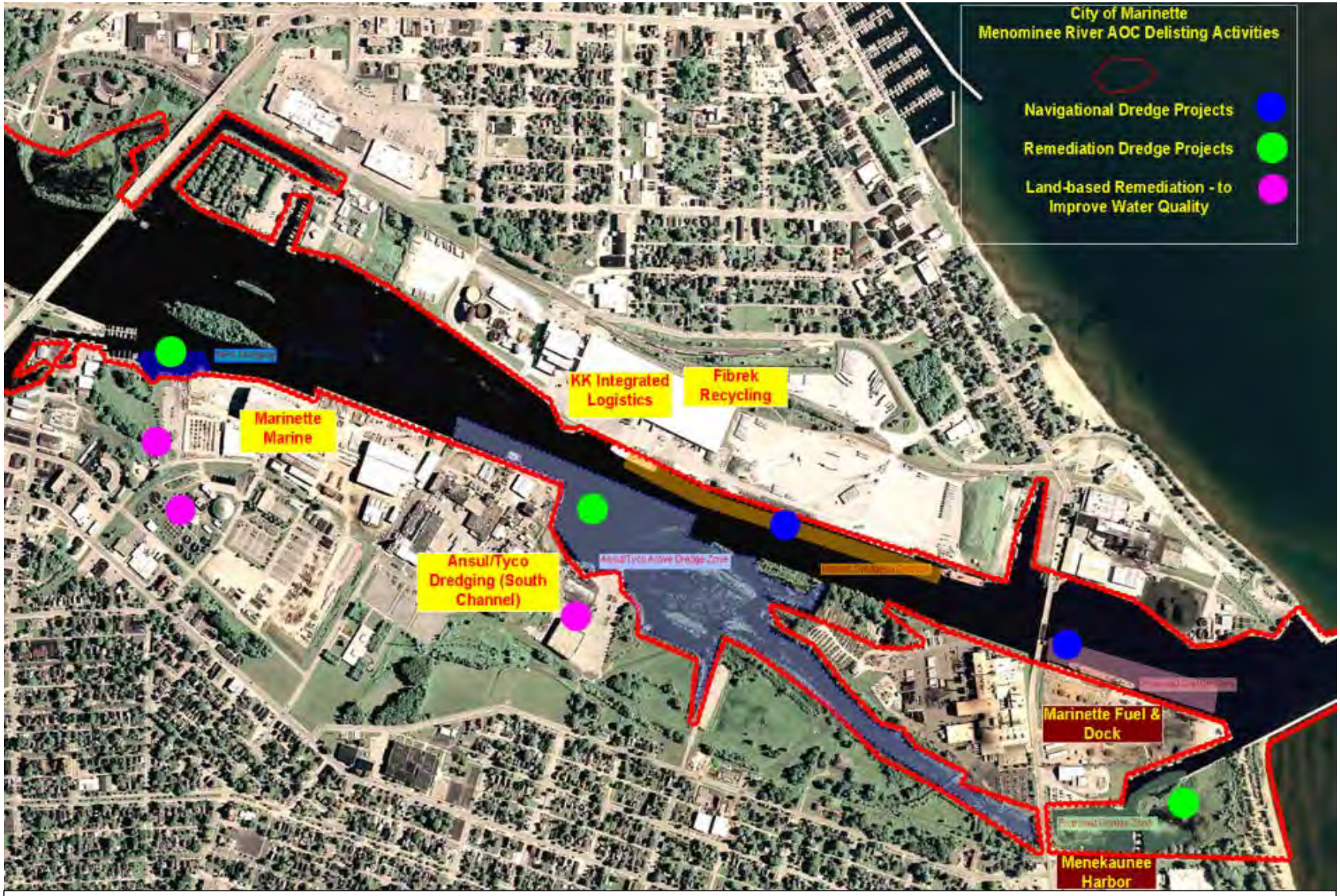
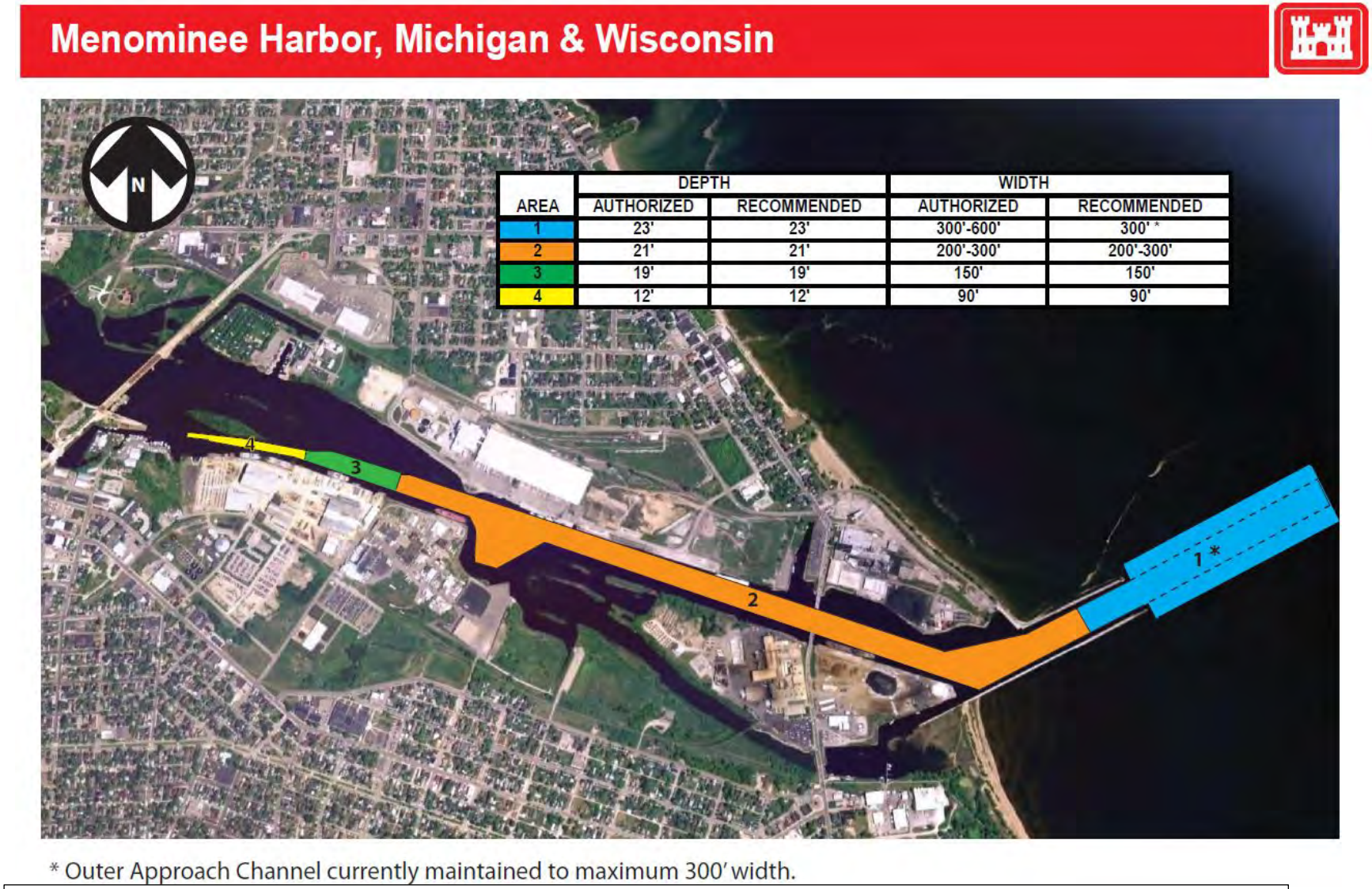


Figure 2. Sediment Remediation Sites in the Lower Menominee River (WDNR, 2012)



AREA	DEPTH		WIDTH	
	AUTHORIZED	RECOMMENDED	AUTHORIZED	RECOMMENDED
1	23'	23'	300'-600'	300' *
2	21'	21'	200'-300'	200'-300'
3	19'	19'	150'	150'
4	12'	12'	90'	90'

* Outer Approach Channel currently maintained to maximum 300′ width.

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

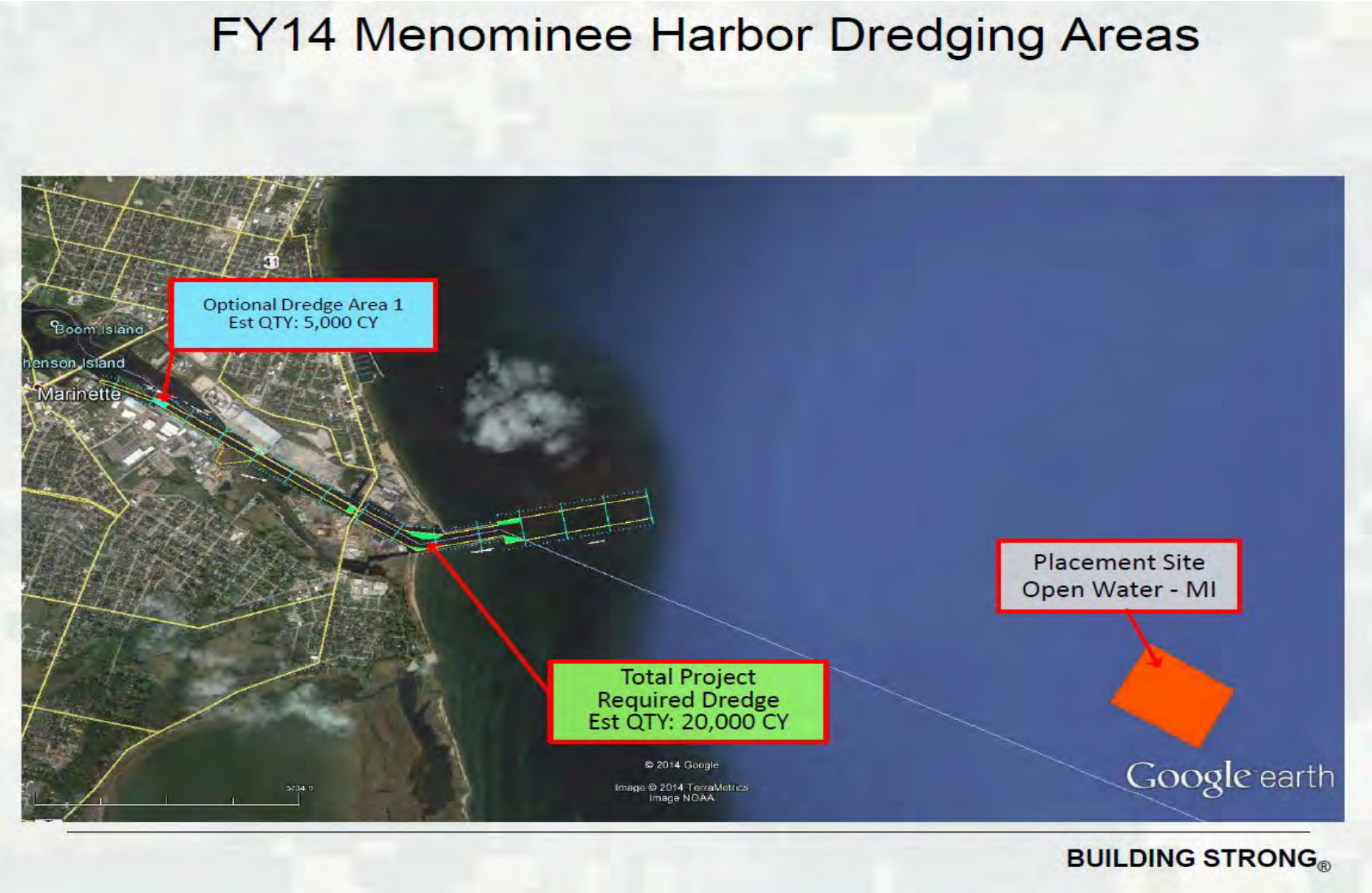


Figure 4. USACE Federal Navigation Dredging & Disposal Site (USACE, 2014)

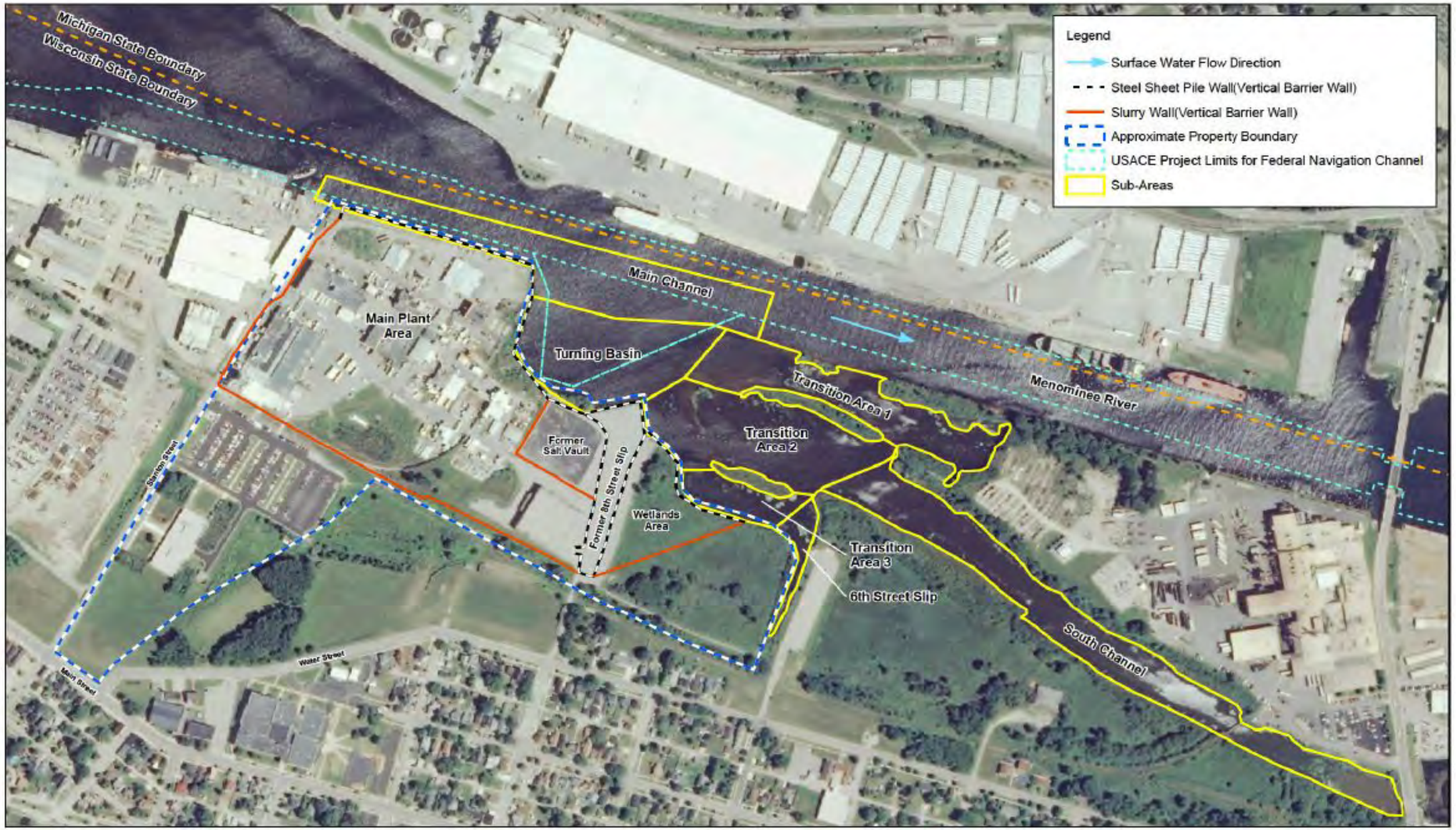


Figure 5. (Ansul) Tyco Facility Site Map (CH2MHill, 2012)

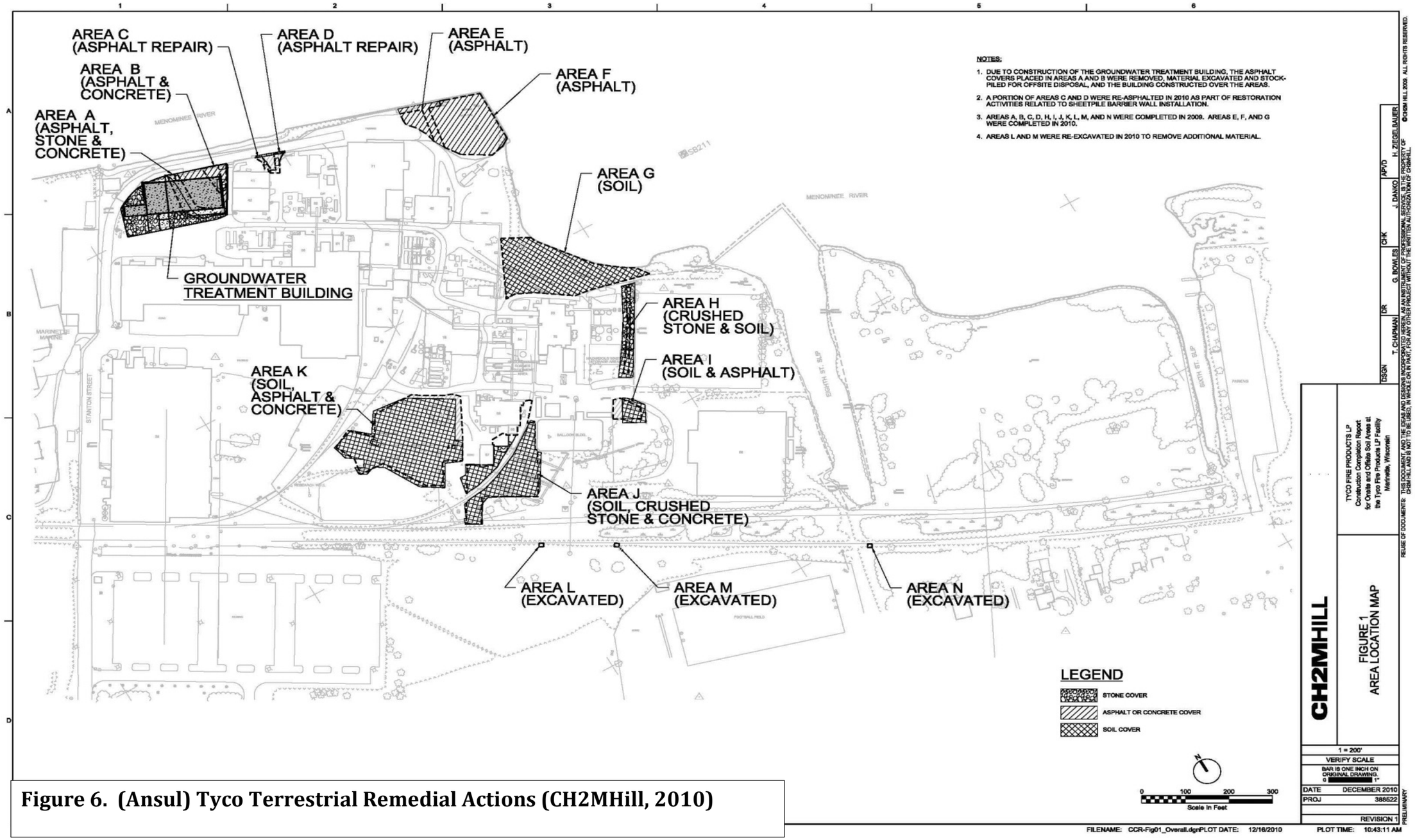


Figure 6. (Ansul) Tyco Terrestrial Remedial Actions (CH2MHill, 2010)

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

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

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

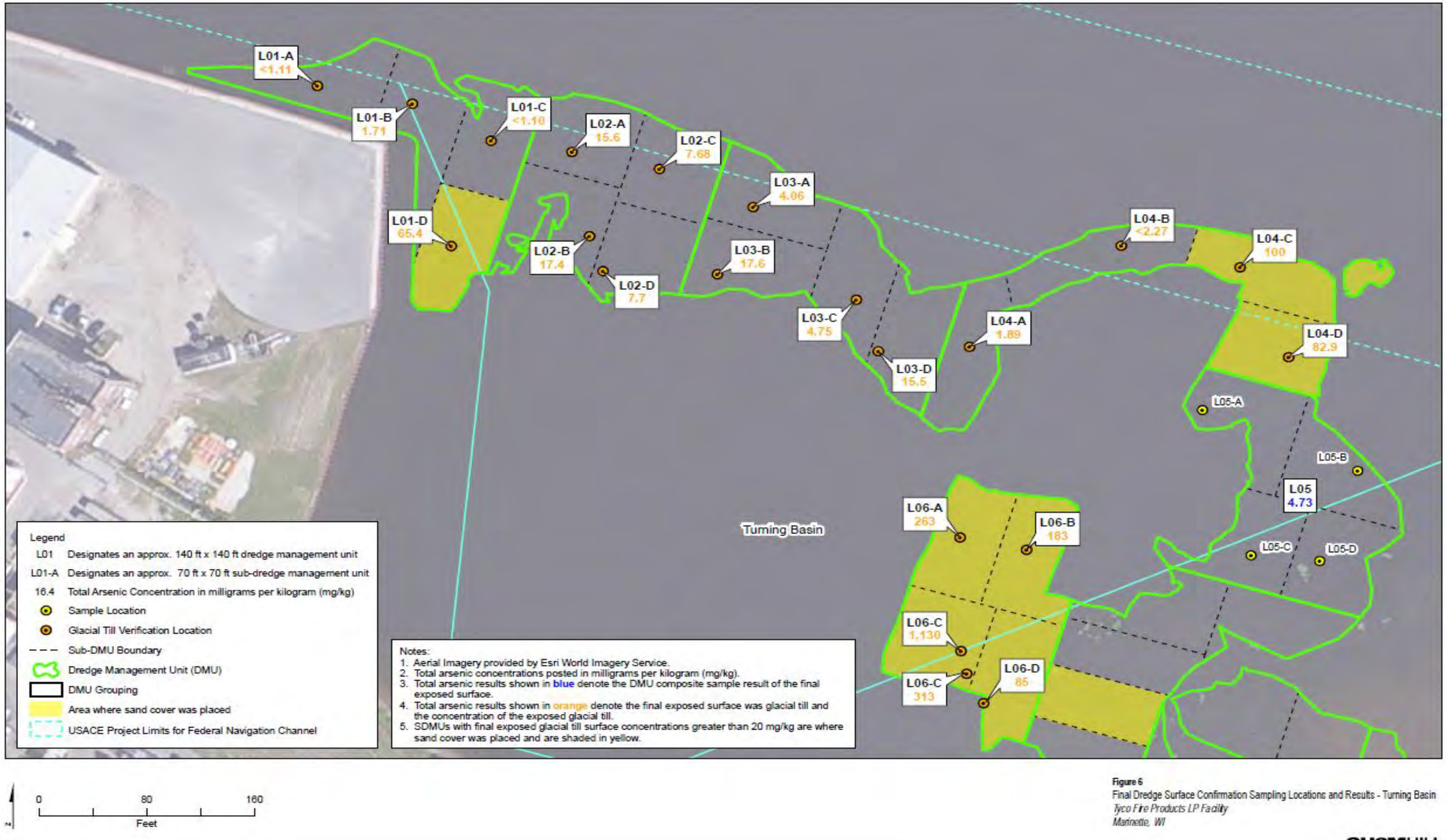


Figure 10. (Ansul) Tyco Confirmation Sampling Results - Turning Basin 20 ppm 2014 (CH2MHill, 2015b)

Figure 11. (Ansul) Tyco Confirmation Sampling Results – Transition Area, 20 ppm 2014 (CH2MHill, 2015b)

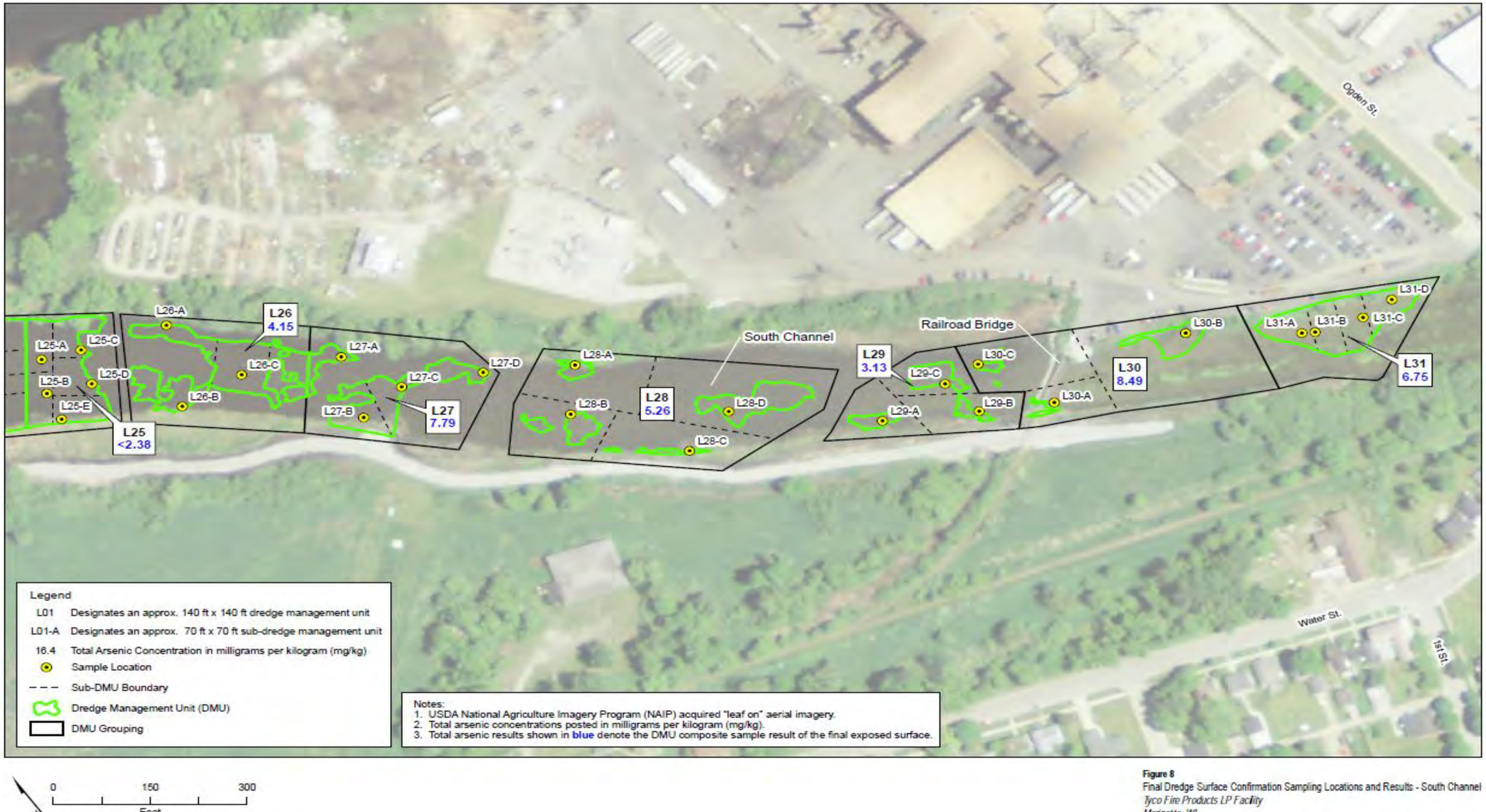
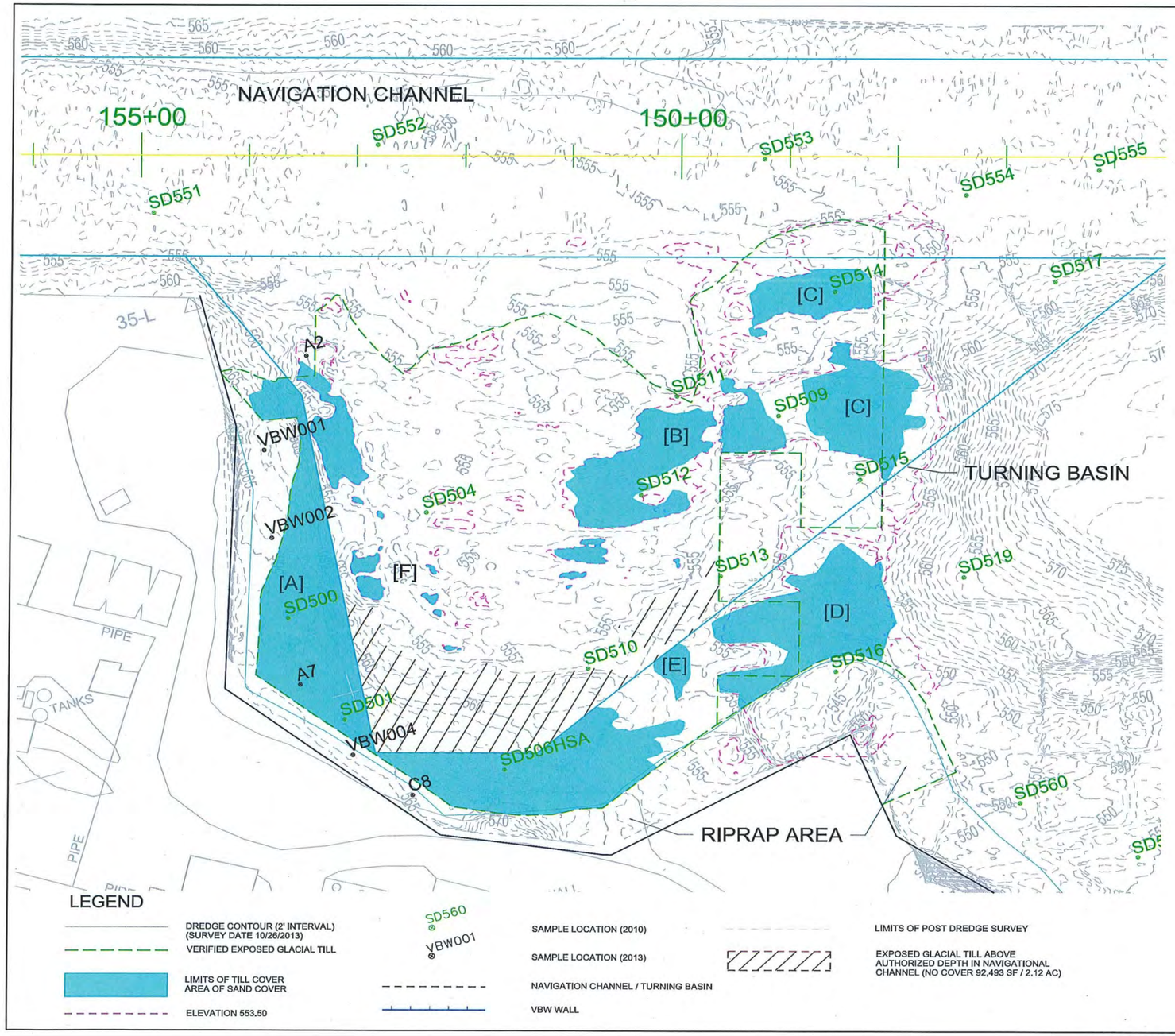
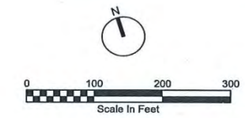


Figure 12. (Ansul)Tyco Confirmation Sampling Results – South Channel, 20 ppm 2014 (CH2MHill, 2015b)





Till Arsenic Concentration Data - 2010 RI Sampling & 2013 EPA Samples

Sample Location ID	Arsenic Concentration (mg/kg)	Easting	Northing	Top of Till Elevation
A2	14	2585053.81	470338.03	551.17
A7	53	2584956.52	470021.17	568.76
C8	52	2585024.84	469885.19	564.73
SD500	28.2	2584964.07	470088.66	565.3
SD501	139	2584985.55	469975.68	565.6
SD504	2.6	2585115.89	470155.21	552.9
SD506HSA	160	2585113.19	469885.64	562.3
SD509	4.1	2585455.01	470157.00	549.1
SD510	111	2585216.18	469961.77	554.9
SD511	2.7	2585370.72	470202.26	549.7
SD512	182	2585311.45	470115.99	551.7
SD513	95.7	2585358.49	470016.81	550.1
SD514	144	2585539.85	470262.17	548.8
SD515	94.6	2585509.51	470073.67	550.9
SD516	28.6	2585434.50	469894.27	548.4
SD517	2.6	2585738.01	470214.26	545.5
SD519	1.8	2585574.42	469952.31	547.6
SD523HSA	2.6	2585978.09	470080.24	546.4
SD551	2.1	2584957.61	470516.38	550.2
SD552	1.6	2585175.91	470523.56	547.9
SD553	1.9	2585514.79	470408.82	549.6
SD554	2.1	2585683.59	470321.32	548.0
SD555	2.1	2585808.19	470310.80	542.1
SD556	2.4	2585925.78	470176.67	545.9
SD560	2.9	2585561.14	469719.36	543.9
SD561	2.7	2585681.73	469481.92	540.7
SD562	1.6	2585826.11	469408.57	544.1
SD564	14.7	2584124.74	470735.78	547.3
SD565	2.2	2584515.79	470659.98	545.6
SD574	3.1	2585650.58	469636.48	546.7
SD576	3.3	2585938.39	469558.52	544.3
VBW001	12	2584989.49	470257.76	564.59
VBW002	0.82	2584971.8	470170.68	563.64
VBW004	41	2584983.22	469939.47	566.43

TABLE LIST ONLY ARSENIC CONCENTRATIONS FOR THE TOP (SURFACE) 12"OF TILL SAMPLE.

TOTAL ARSENIC DATA PRESENTED WITHIN THE ADJACENT TABLE WAS LINEARLY INTERPOLATED USING GEOPAK CAD SOFTWARE TO DETERMINE THE 20PPM CONCENTRATION CONTOUR. ONCE THE 20PPM EXTENT WAS DETERMINED IT WAS CLIPPED TO THE "TOE-BOUNDARY"AND THE 553.5 ELEVATION CONTOUR WITHIN THE FEDERALLY AUTORIZED NAVIGATIONAL CHANNEL. NEW CHANNEL DEPTH BASED ON NLW.

COVER POLYGON	AREA (Ac.)	AREA (SF)
[A]	0.99	43,180
[B]	0.30	13,146
[C]	0.31	13,364
[D]	0.32	13,858
[E]	0.02	1,088
[F]	0.10	4,322
TOTAL	2.04	88,957

FIGURE 6
NAV CHANNEL / TURNING BASIN
COVER ELEVATION 553.50
POTENTIAL GLACIAL TILL
COVER AREA (20ppm)
GREAT LAKES LEGACY ACT
LOWER MENOMINEE RIVER TYCO SITE

CH2MHILL.

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

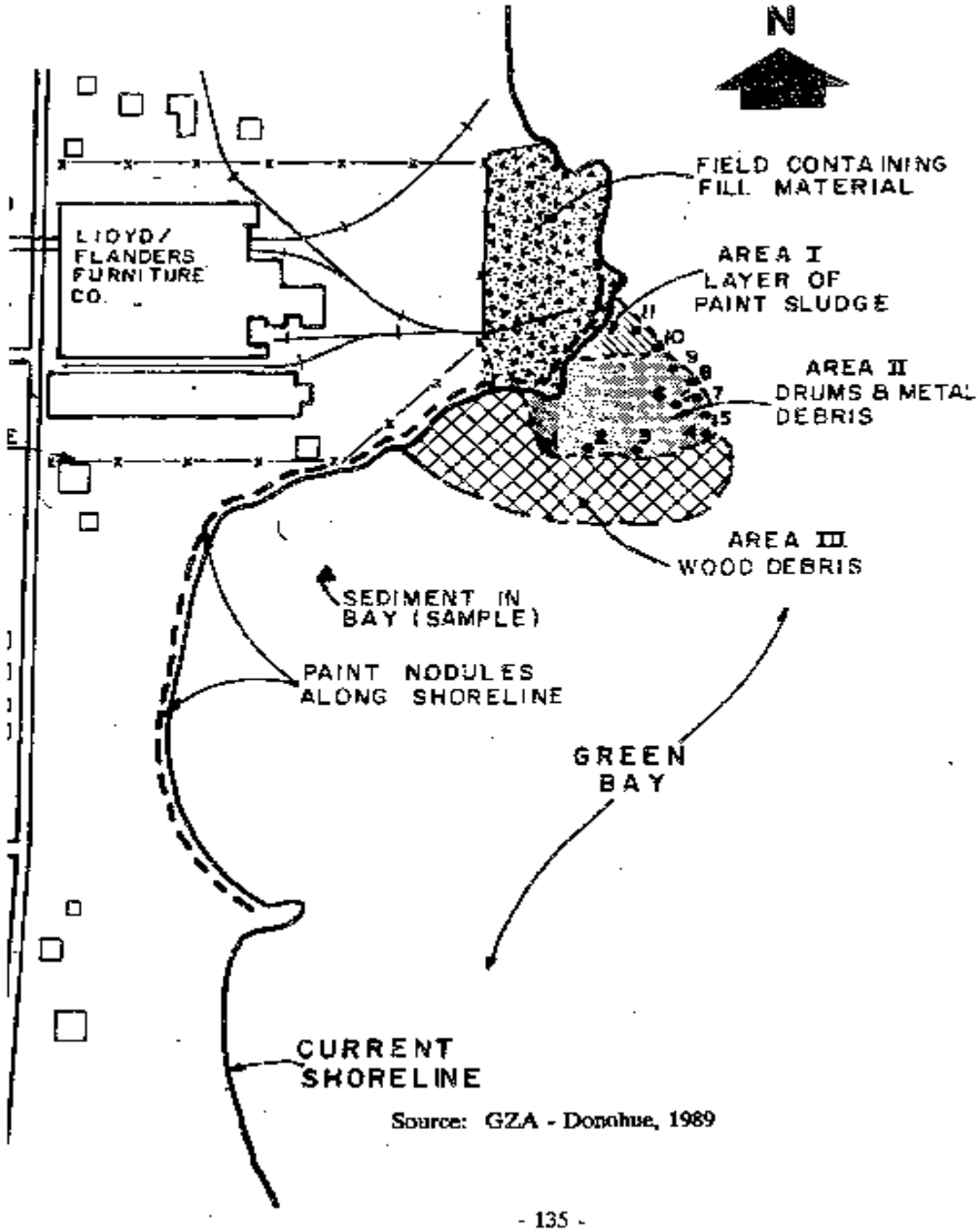


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Figure 14. Green Bay Paint Sludge Site - Lloyd Flanders Facility Site Map (WDNR and MDNR, 1990)

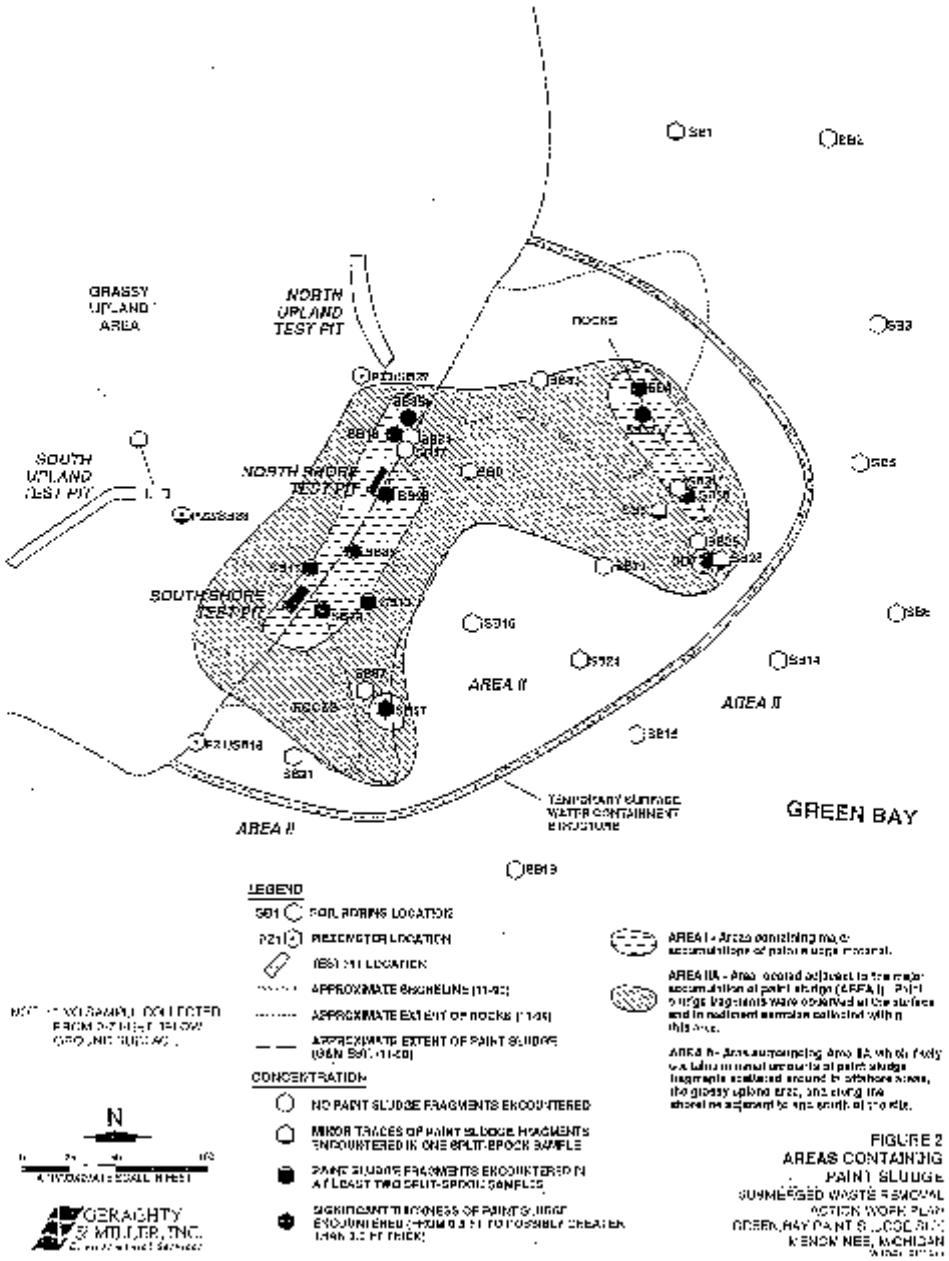


Figure 15. Green Bay Paint Sludge Site - Lloyd Flanders Facility Site Map (WDNR and MDNR, 1990)

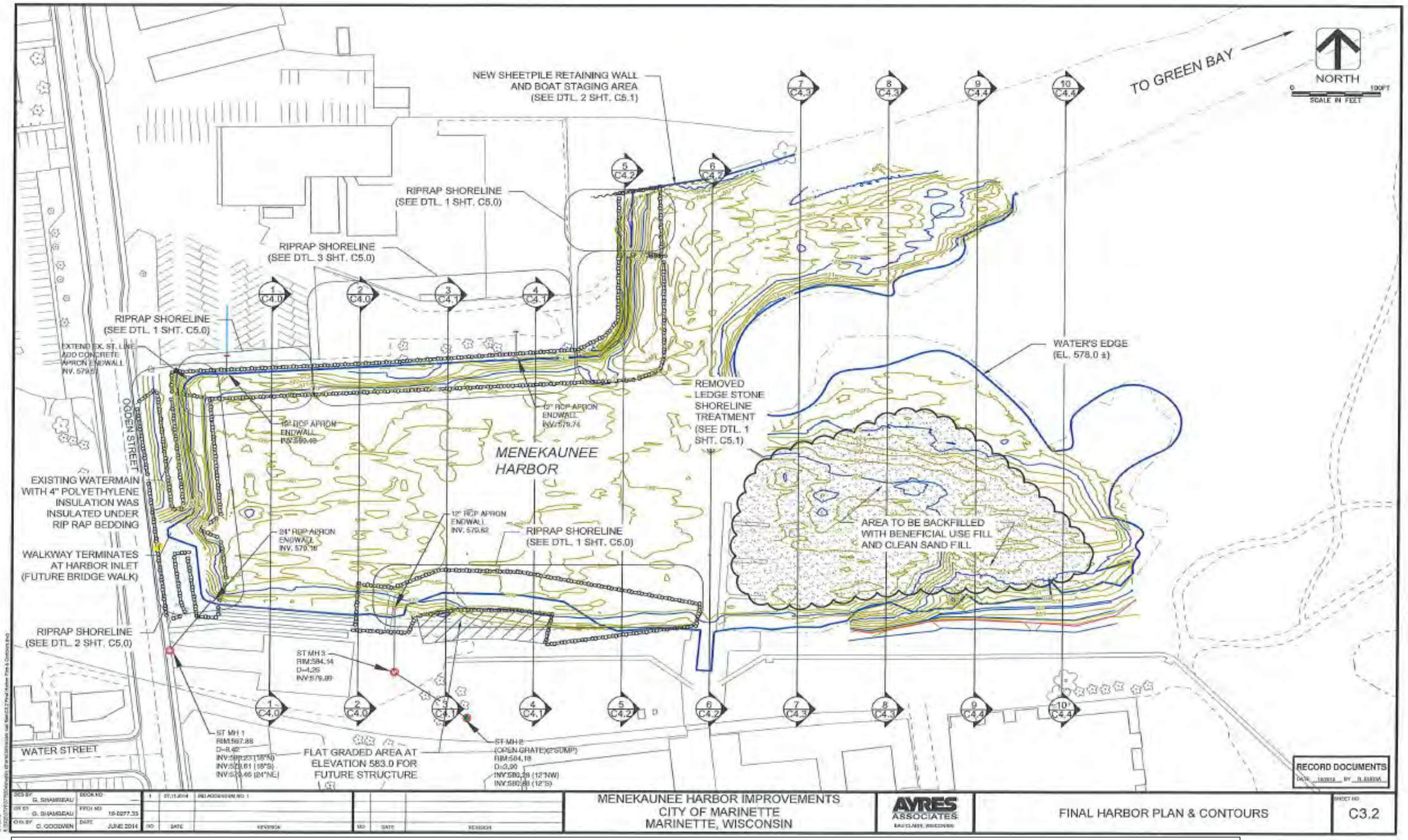


Figure 16. Menekaunee Harbor Final Plan & Contours (AYRES, 2014a and REL, 2016)

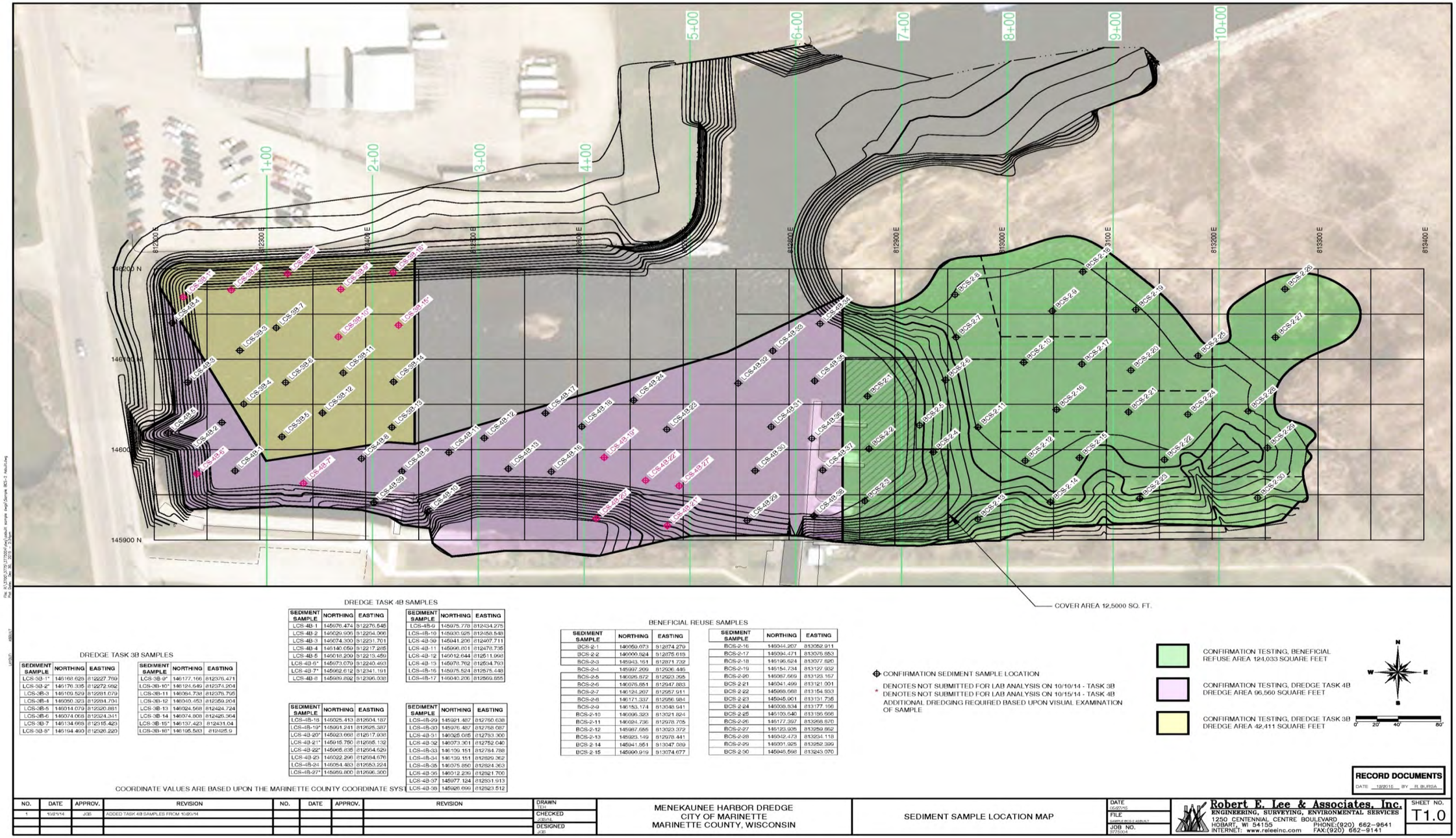


Figure 17. Menekaunee Harbor Confirmation Sediment Sampling Locations (REL, 2016)

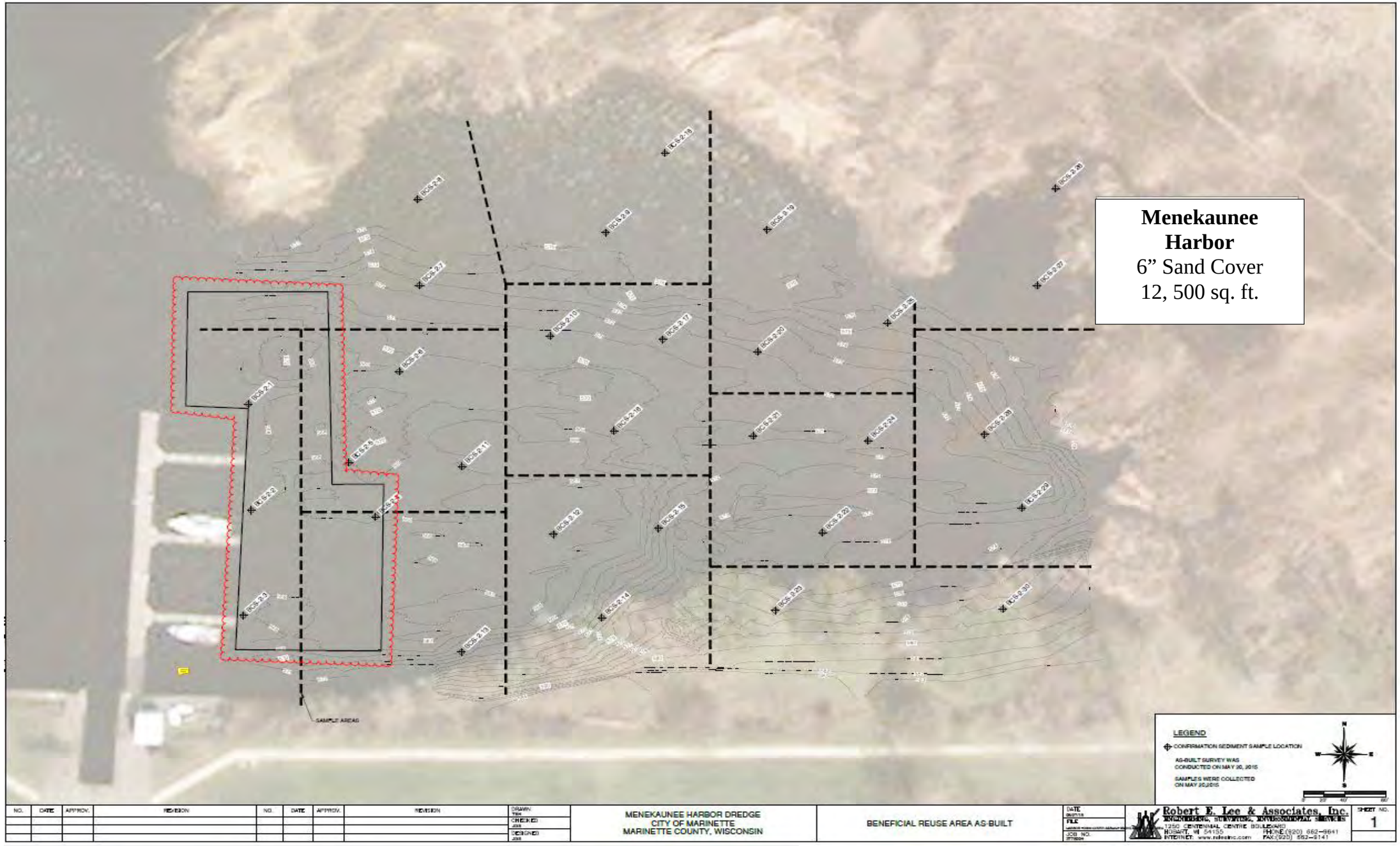


Figure 18. Menekaunee Harbor Sand Cover Area (REL, 2016)

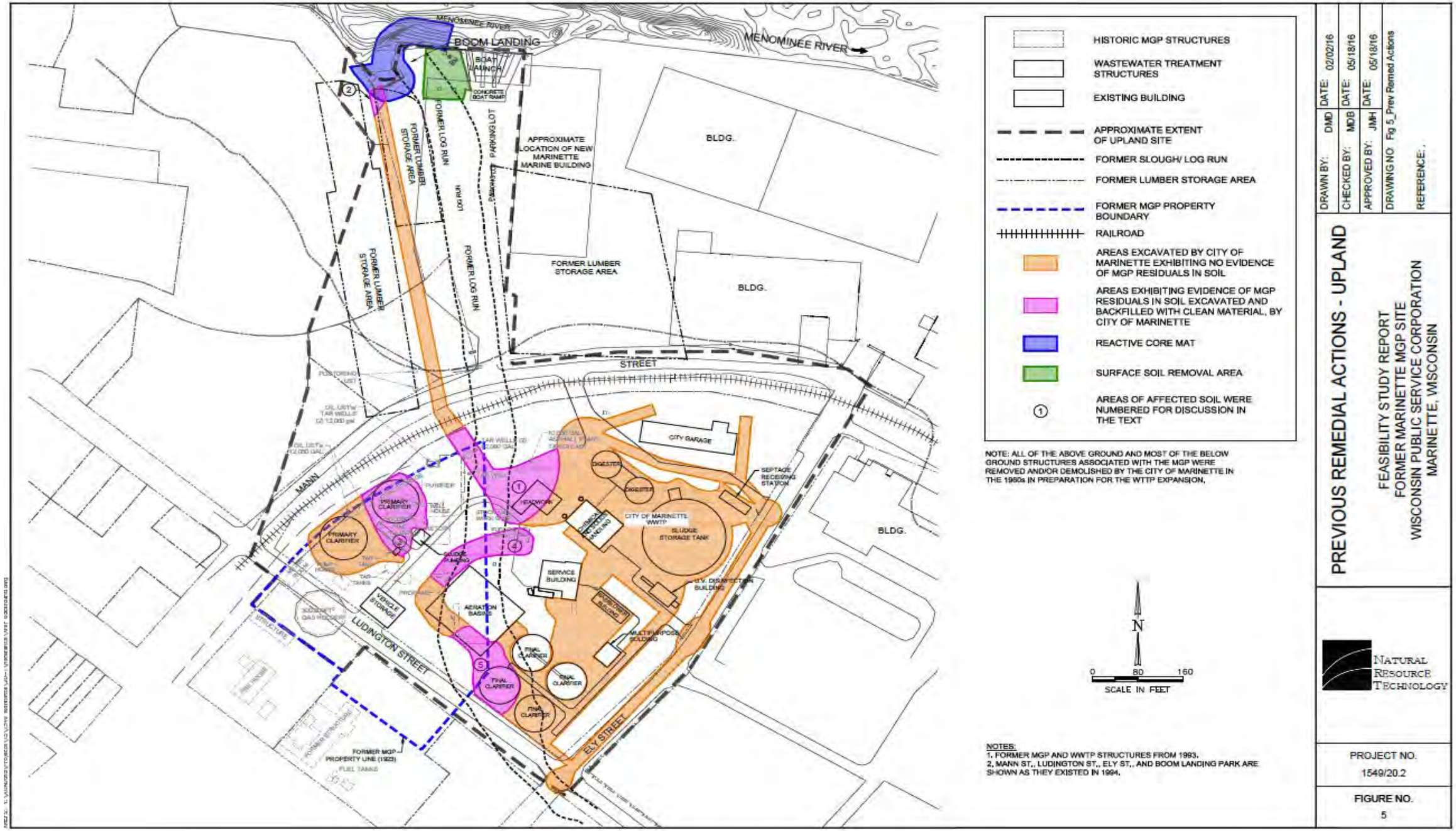


Figure 19. Wisconsin Public Service Corporation – Previous Remediation Actions - Upland (NRT, 2016a)

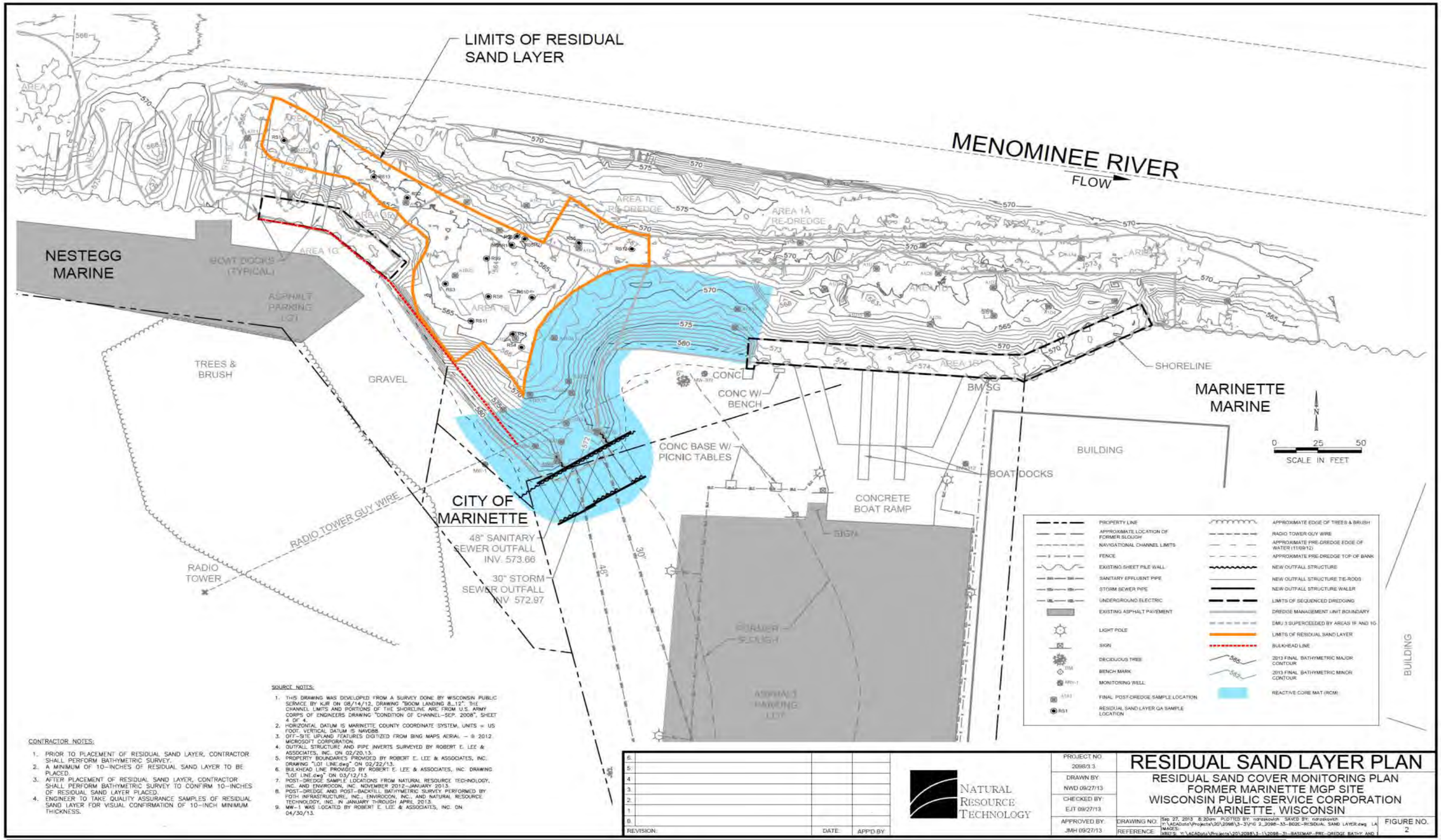


Figure 20. Wisconsin Public Service Corporation - Dredge, Sand Cover & RCM (NRT, 2015b)

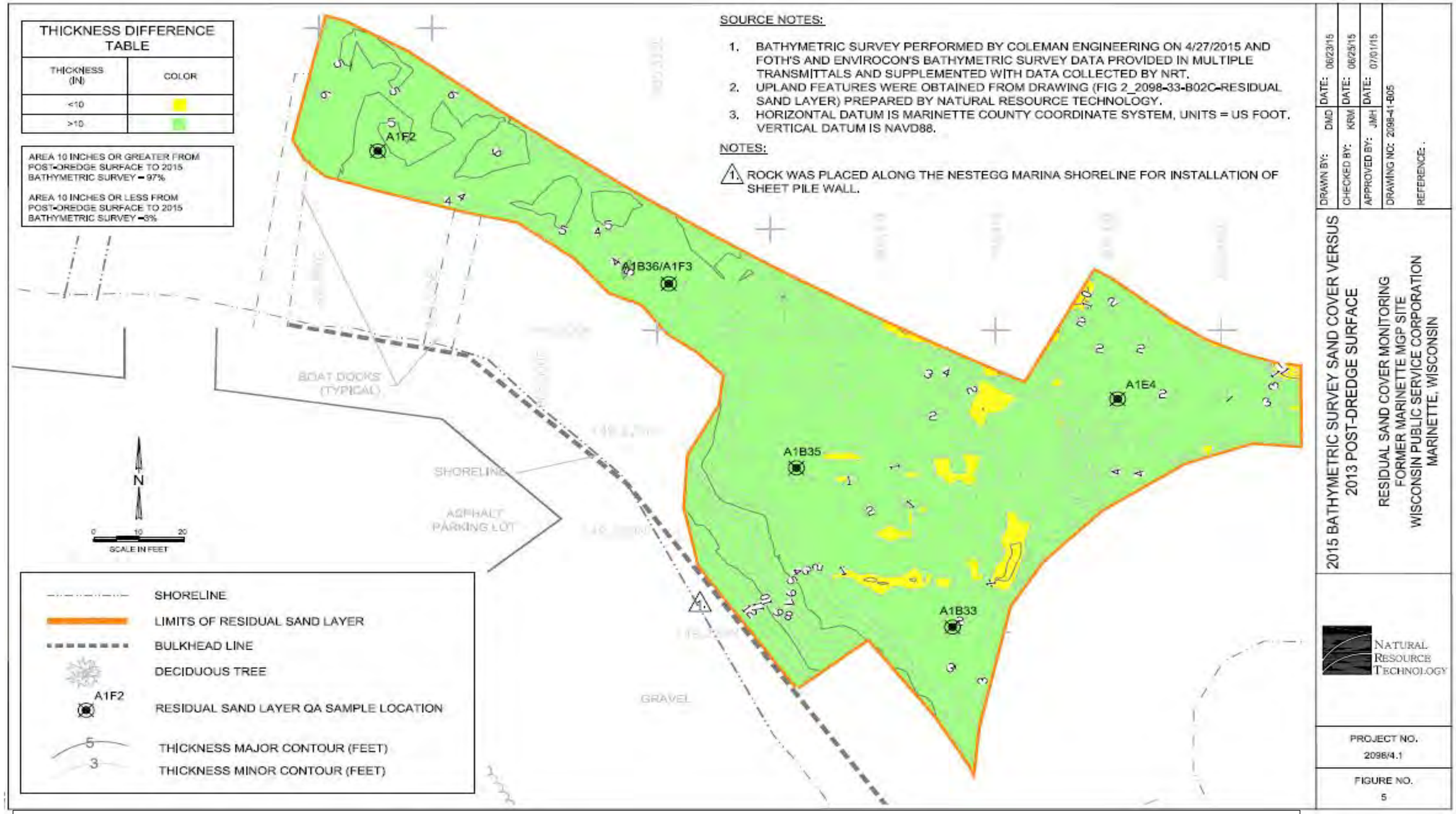
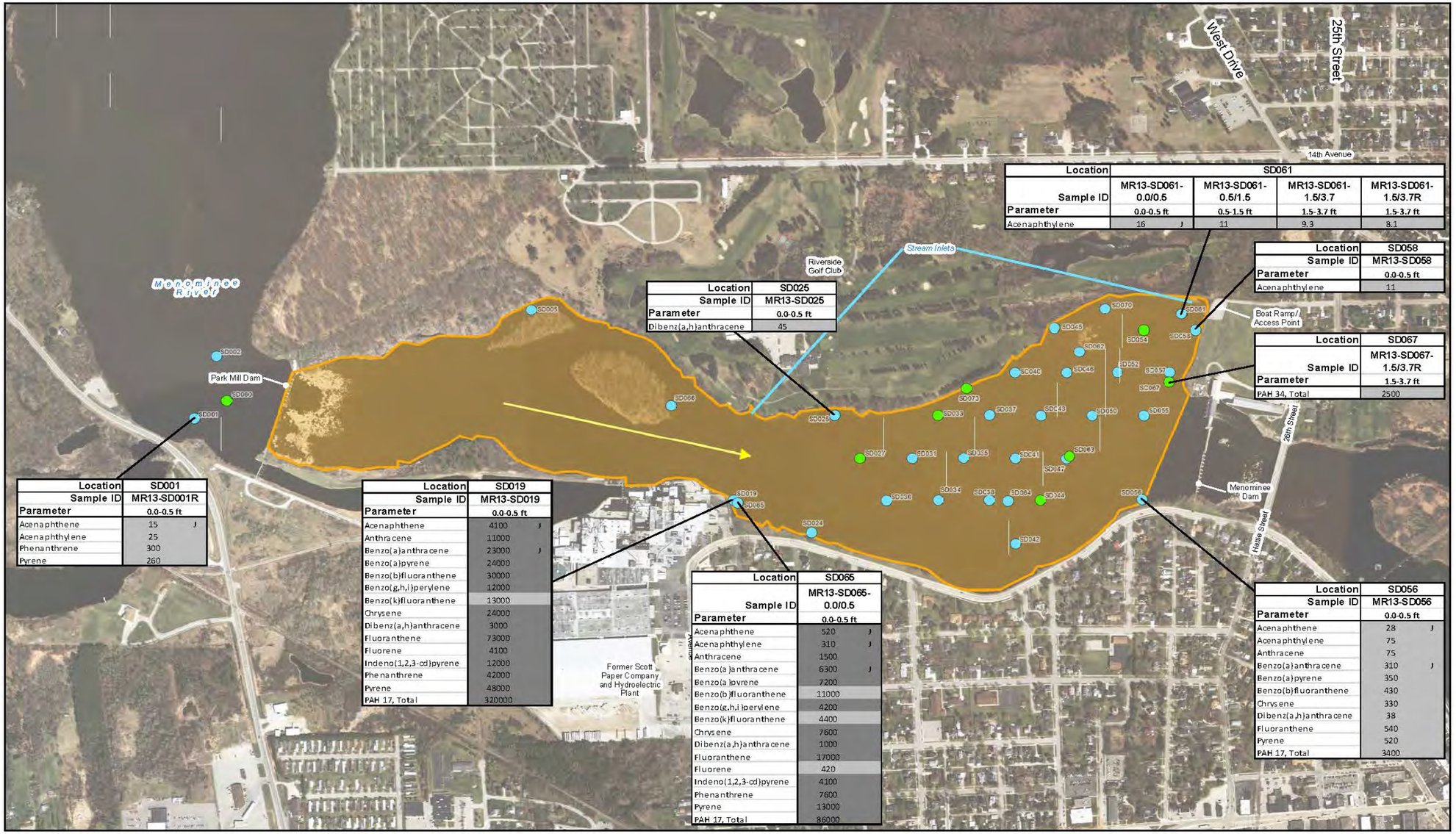


Figure 21. Wisconsin Public Service Corporation - 2015 Bathymetric Survey Sand Cover vs. 2013 Post Dredging Surface (NRT, 2015b)



Location	SD061			
Sample ID	MR13-SD061-0.0/0.5	MR13-SD061-0.5/1.5	MR13-SD061-1.5/3.7	MR13-SD061-1.5/3.7R
Parameter	0.0-0.5 ft	0.5-1.5 ft	1.5-3.7 ft	1.5-3.7 ft
Acenaphthylene	16 J	11	9.3	8.1

Location	SD058
Sample ID	MR13-SD058
Parameter	0.0-0.5 ft
Acenaphthylene	11

Location	SD067
Sample ID	MR13-SD067-1.5/3.7R
Parameter	1.5-3.7 ft
PAH 34, Total	2500

Location	SD025
Sample ID	MR13-SD025
Parameter	0.0-0.5 ft
Dibenz(a,h)anthracene	45

Location	SD001
Sample ID	MR13-SD001R
Parameter	0.0-0.5 ft
Acenaphthene	15 J
Acenaphthylene	25
Phenanthrene	300
Pyrene	260

Location	SD019
Sample ID	MR13-SD019
Parameter	0.0-0.5 ft
Acenaphthene	4100 J
Anthracene	11000
Benzo(a)anthracene	23000 J
Benzo(a)pyrene	24000
Benzo(b)fluoranthene	30000
Benzo(g,h,i)perylene	12000
Benzo(k)fluoranthene	13000
Chrysene	24000
Dibenz(a,h)anthracene	3000
Fluoranthene	73000
Fluorene	4100
Indeno(1,2,3-cd)pyrene	12000
Phenanthrene	42000
Pyrene	48000
PAH 17, Total	320000

Location	SD065
Sample ID	MR13-SD065-0.0/0.5
Parameter	0.0-0.5 ft
Acenaphthene	520 J
Acenaphthylene	310 J
Anthracene	1500
Benzo(a)anthracene	6300 J
Benzo(a)pyrene	7200
Benzo(b)fluoranthene	11000
Benzo(g,h,i)perylene	4200
Benzo(k)fluoranthene	4400
Chrysene	7600
Dibenz(a,h)anthracene	1000
Fluoranthene	17000
Fluorene	420
Indeno(1,2,3-cd)pyrene	4100
Phenanthrene	7600
Pyrene	13000
PAH 17, Total	86000

Location	SD056
Sample ID	MR13-SD056
Parameter	0.0-0.5 ft
Acenaphthene	28 J
Acenaphthylene	75
Anthracene	75
Benzo(a)anthracene	310 J
Benzo(a)pyrene	350
Benzo(b)fluoranthene	430
Chrysene	330
Dibenz(a,h)anthracene	38
Fluoranthene	540
Pyrene	520
PAH 17, Total	3400

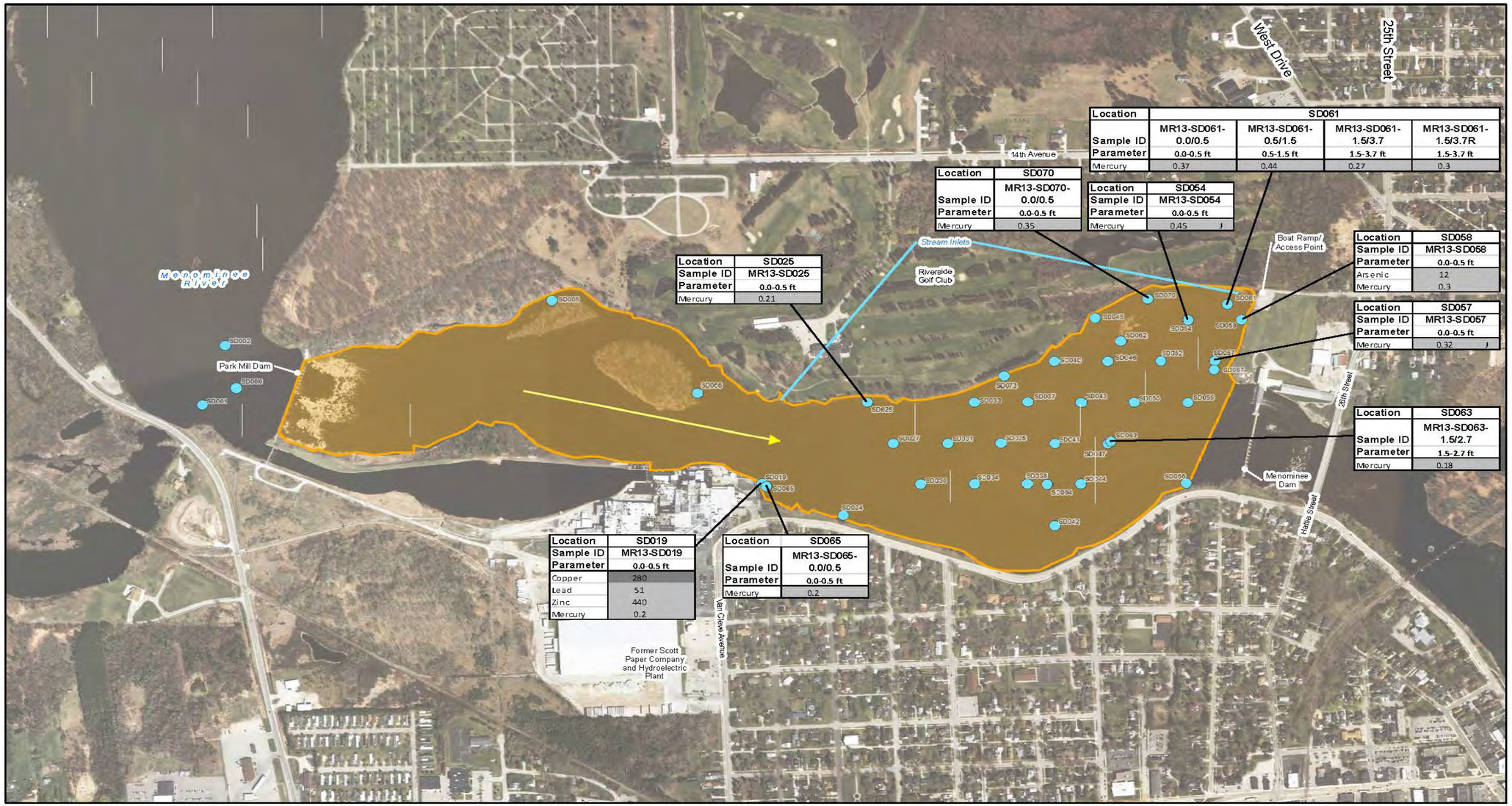
Notes:
1. Shading indicates the analyte was detected above Wisconsin Department of Natural Resources (WDNR) sediment quality guidelines threshold effect concentration (TEC).
2. Shading indicates the analyte was detected above WDNR sediment quality guidelines probable effect concentration (PEC).
3. Only 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

Figure 6
Summary of Detected PAH Results
Lower Scott Flowage
Menominee River AOC

CH2MHILL

I:\USENVIRONMENTAL\PROTE\MENOMINEERIVERLOWERSCOTTFLOWAGE\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, Lower Menominee River AOC (CH2MHill, 2014)



Location	SD061			
Sample ID	MR13-SD061-0.0/0.5	MR13-SD061-0.5/1.5	MR13-SD061-1.5/3.7	MR13-SD061-1.5/3.7R
Parameter	0.0-0.5 ft	0.5-1.5 ft	1.5-3.7 ft	1.5-3.7 ft
Mercury	0.37	0.44	0.27	0.3

Location	SD070
Sample ID	MR13-SD070-0.0/0.5
Parameter	0.0-0.5 ft
Mercury	0.35

Location	SD054
Sample ID	MR13-SD054
Parameter	0.0-0.5 ft
Mercury	0.45 J

Location	SD058
Sample ID	MR13-SD058
Parameter	0.0-0.5 ft
Arsenic	12
Mercury	0.3

Location	SD057
Sample ID	MR13-SD057
Parameter	0.0-0.5 ft
Mercury	0.32 J

Location	SD063
Sample ID	MR13-SD063-1.5/2.7
Parameter	1.5-2.7 ft
Mercury	0.18

Location	SD025
Sample ID	MR13-SD025
Parameter	0.0-0.5 ft
Mercury	0.21

Location	SD019
Sample ID	MR13-SD019
Parameter	0.0-0.5 ft
Copper	280
Lead	51
Zinc	440
Mercury	0.2

Location	SD065
Sample ID	MR13-SD065-0.0/0.5
Parameter	0.0-0.5 ft
Mercury	0.2

N

0 600 1,200
Feet

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

CH2MHILL

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

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

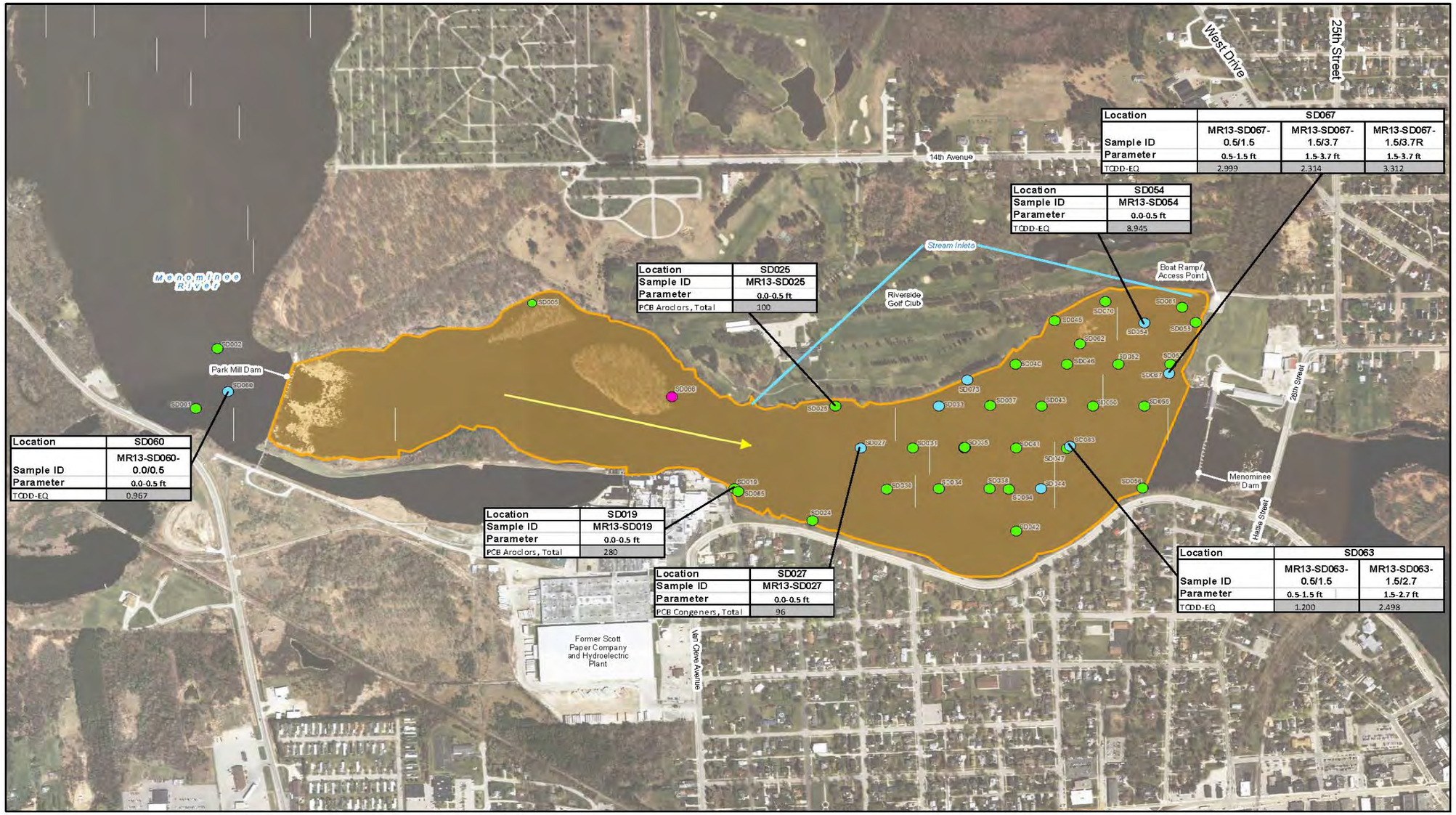


Figure 24. Summary of Detected Total PCB and TCDD-EQ Results – Lower Scott Flowage, Lower Menominee River AOC (CH2MHill, 2014)

Figure 25. Surficial Sediment Sampling Locations in Rio Vista Slough – Lower Menominee River AOC, June 24, 2014 (MDEQ, 2015)

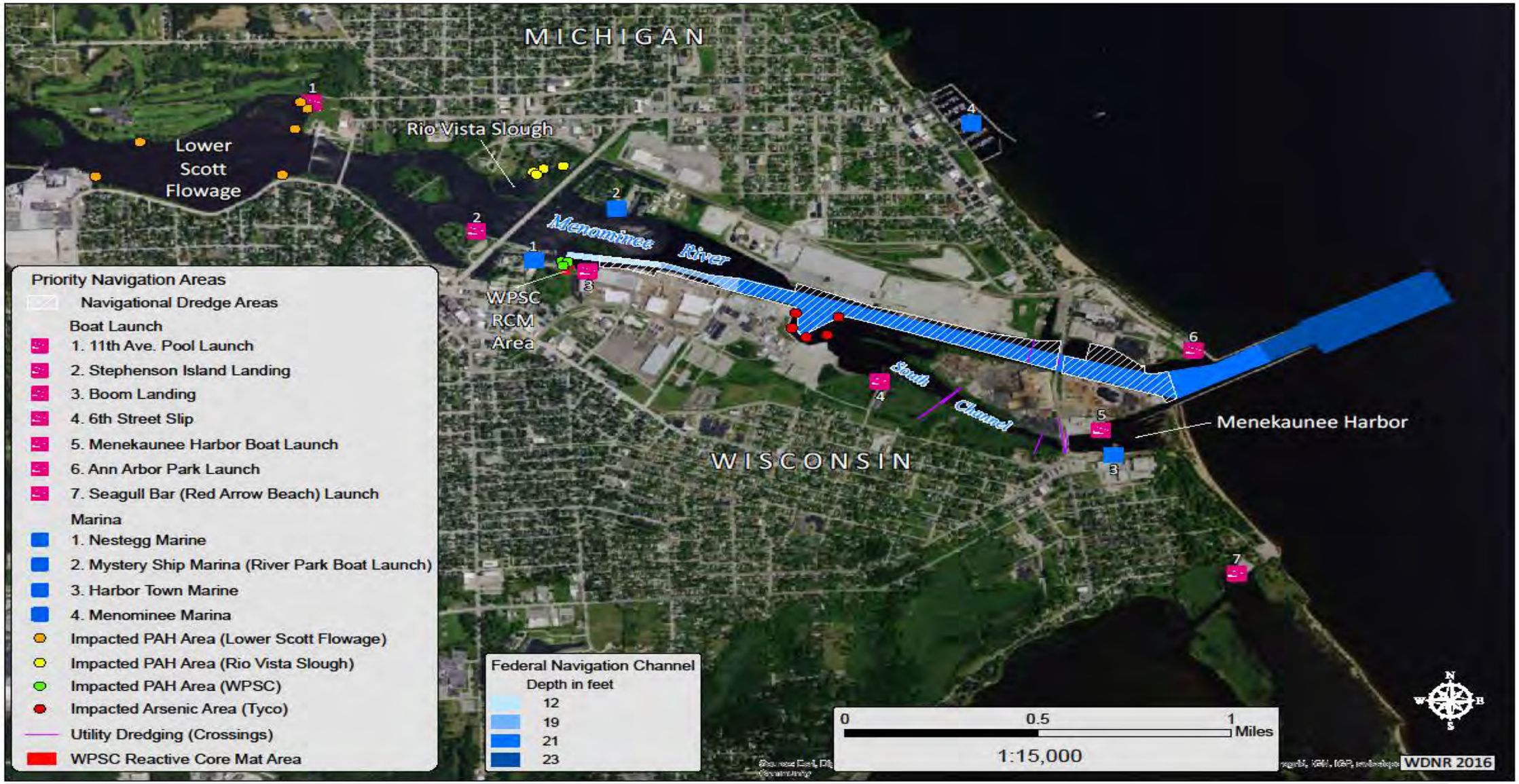


Figure 26. Lower Menominee River AOC Priority Areas for Navigation Use and Utility Dredging (Crossings)-(WDNR, 2016)

Appendix B – Tables

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

Site Name/ Contaminant of Concern	Media Type	Remediation Goals	Remedial Action	Remedial Action Implementation Status	Remediation Goal Met?	Monitoring and Maintenance
Ansul/Tyco (former Ansul Fire Protection) Arsenic	Terrestrial	Onsite Surface Soils ≤32 ppm Total Arsenic Adjacent Offsite Surface Soils 16 ≤ppm Total Arsenic	• 90,000 Tons of Salt Waste Removal • Limited Soil Removal • Capping	Complete	Verified 2015 • Construction Completion Report	Ongoing Maintenance & Monitoring • 2018 5-Year Review
	Ground Water	Containment & Flood Control	• Barrier Wall • Ground Water Extraction & Treatment System • Phyto Pumping Tree Plots	Complete	• 2010 • Yes, with management plan implementation	Ongoing Maintenance & Monitoring • Barrier Wall Ground Water Monitoring Plan 2015 Update • 2018 5-Year Review & Research new arsenic removal technologies
	Sediment	≤20 ppm Total Arsenic	• Dredge 300,056 CY • 12" Sand Cover Areas ≥ 20 ppm	Complete	Verified 2015 • Core Sampling • Pan Testing • Bathymetry	Ongoing Monitoring • Post Dredge Sand Cover Sediment Sampling 2018 • 2018 5-Year Review
Green Bay Paint Sludge (Lloyd Flanders, former Hayward-Wakefield) Heavy Metals	Sediment/Soil	Remove Paint Waste, Impacted Sediment & Soil and Install Shoreline Barrier	• Remove 5,300 Tons Bulk Paint Waste (hazardous waste facility) • Excavate 10,500 Tons Sediment & Soil (local landfill)	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	• Collect & Remove Paint Nodules • Report under Admin Order	Ongoing	Verified Annually	Ongoing monthly and post storm events collection along shoreline
Menekaunee Harbor Heavy Metals & PAHs	Sediment	Threshold Effect Concentration (TEC) Values for Heavy Metals & Polynuclear Aromatic Hydrocarbons (PAHs)	• Dredge 27,129 CY • 6" Sand Cover Areas that exceed TEC for Metals.	Complete	Verified 2015 • Core Sampling • Pan Testing • Bathymetry	Not Required
Wisconsin Public Service Corporation (former manufactured gas plant) Coal Tar – PAHs	Terrestrial	Limited Soil Removal During Construction of Wastewater Treatment Plant & Road Construction.	• None at this Time • Developing Record of Decision (ROD)	Ongoing Evaluation	Removal documented & developing ROD to determine next steps.	Ongoing Maintenance & Monitoring
	Ground Water	Contamination plume defined	• None at this Time • Developing ROD	Ongoing Evaluation	Verified Feasibility Study Report 2016 ROD to determine next steps.	Ongoing monitoring
	Sediment	≤22.8 ppm 13 Priority PAHs	• Dredge 15,221 CY • 10" Sand Cover Areas ≥22.8 ppm • Reactive Core Mat (RCM)	Complete (Non-Time Critical Removal Action)	Verified 2013 & 2015 • Core Sampling • Bathymetry ROD to determine continuing obligations for Sand Cover & RCM.	Ongoing Maintenance & Monitoring • Reactive Core Mat • Sand Cover • 2018 5-Year Review

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[1]	Sample Depth[2], ft	PAH
01/19/13	Pre-Sand Cover Placement Grab	0-0.3	**603.7**
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[1]	Sample Depth[2], ft	PAH
01/19/13	Pre-Sand Cover Placement Grab	Grab	**683.8**
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	**346.26**
05/21/14		0.5-1.5	**74.76**
10/27/14		0.5-1.35	**31.9**

A1E4	Sample Interval[1]	Sample Depth[2], ft	PAH
01/19/13	Pre-Sand Cover Placement Grab	0-0.5	**46.1**
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	8.1
10/27/14		0.5-1.2	9.7

A1F2	Sample Interval[1]	Sample Depth[2], ft	PAH
01/17/13	Pre-Sand Cover Placement Grab	Ponar	**54.62**
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[3]	Sample Interval[1]	Sample Depth[2], ft	PAH
1/19/2013	Pre-Sand Cover Placement Grab	0-0.45	**597**
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	**58.4**

Notes:

Total PAH (13) consists of summation of: Acenaphthene, Acenphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)flouranthene, Benzo(k)flouranthene, Chrysene, Flouranthene, Flourene, 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	ug/kg dry	ug/kg dry	ug/kg dry	ug/kg dry	ug/kg dry	ug/kg dry	ug/kg dry	ug/kg dry
Men 1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Men 2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Men 3	ND	ND	ND	ND	ND	ND	ND	ND	ND
Men 4	ND	ND	ND	ND	ND	ND	ND	ND	ND
Men 5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Men 6	ND	ND	ND	ND	ND	ND	ND	ND	ND
Men 7 (Dup)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Men 8	ND	ND	ND	ND	ND	ND	ND	ND	ND
Men 9	ND	ND	ND	ND	ND	ND	ND	ND	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

	TEC*	PEC*	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	**1.1**	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

	TEC*	PEC*	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	**3700**	ND	**4200**	ND	ND	ND	ND	ND
Benz[b] fluoranthene	na	na	ND	7200	ND	**10000**	ND	ND	ND	ND	ND
Chrysene	166	1290	ND	**6300**	ND	**8100**	ND	ND	ND	ND	ND
Fluoranthene	423	2230	ND	**14000**	**5600**	**17000**	ND	ND	ND	ND	ND
Phenanthrene	204	1170	ND	**6200**	ND	**6300**	ND	ND	ND	ND	ND
Pyrene	195	1520	ND	**10000**	**4100**	**12000**	ND	ND	ND	ND	ND
Total PAHs	1610	22800		**47400**	9700	**57600**					

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

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" 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 watercourses 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^2, NO^3, NH^3 –N, TKN	X	X
Total P	X	X
Grain–size	X	X

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

DEQ

DEPARTMENT OF ENVIRONMENTAL QUALITY
POLICY AND PROCEDURE

Subject: Dredge Sediment Review | Number: 09-018

Original Effective Date: March 19, 2013
Revised Date:
Reformatted Date:

Page 1 of 6

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.

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.

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

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.

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 permittable, 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.

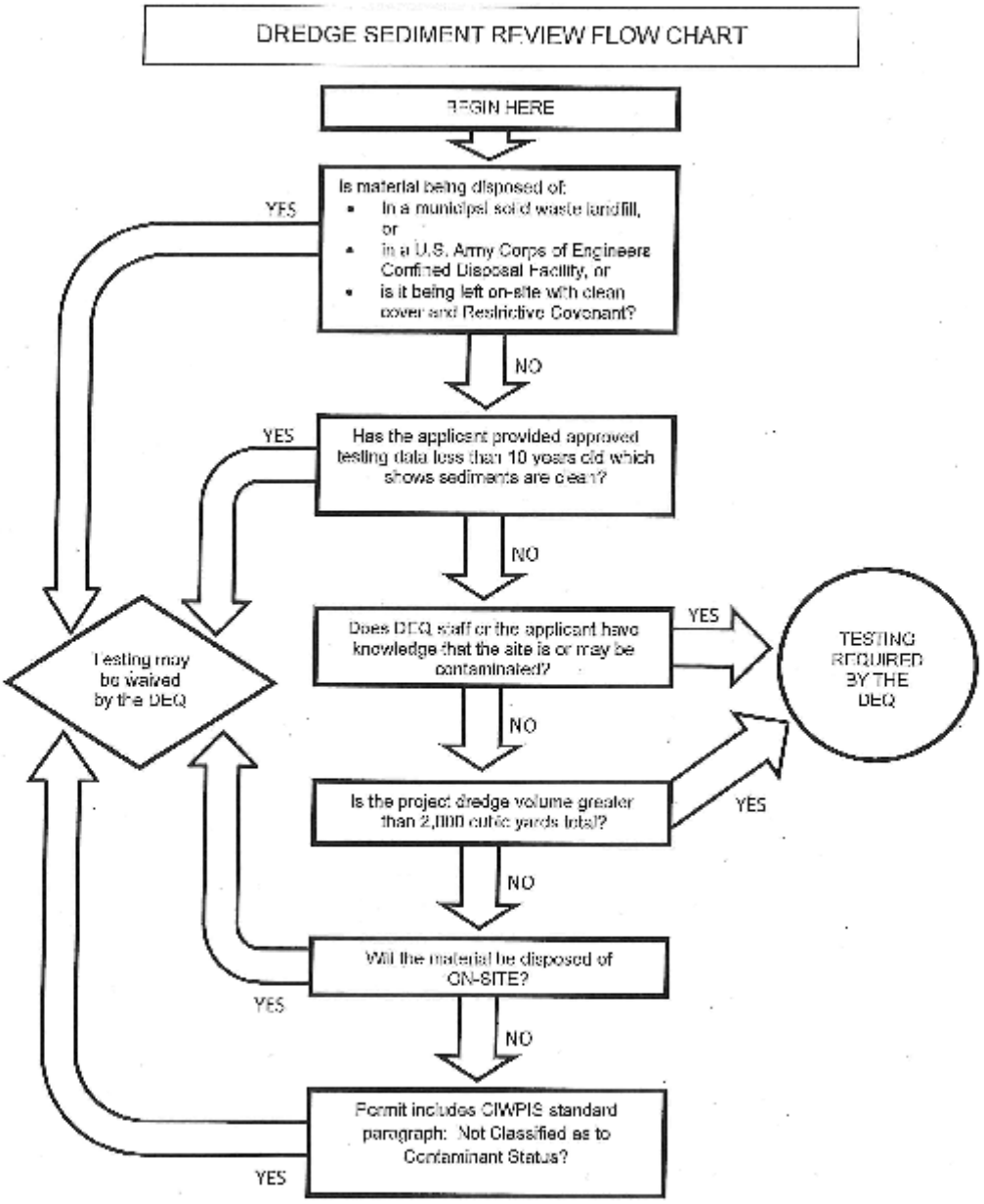
11. The applicant selects a disposal option, countersigns the draft permit, and returns to WRD field staff for issuance. If the disposal option is on-site with Restrictive Covenant, WRD field staff will withhold final execution of the permit until a recordable Declaration of Restrictive Covenant form is received. If another disposal option is selected, WRD field staff issues the permit if the proposed project is permittable. As applicable, WRD field staff forwards the recordable form to Duane Roskoskey, OWMRP, DEQ, Constitution Hall, Lansing, Michigan.

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.

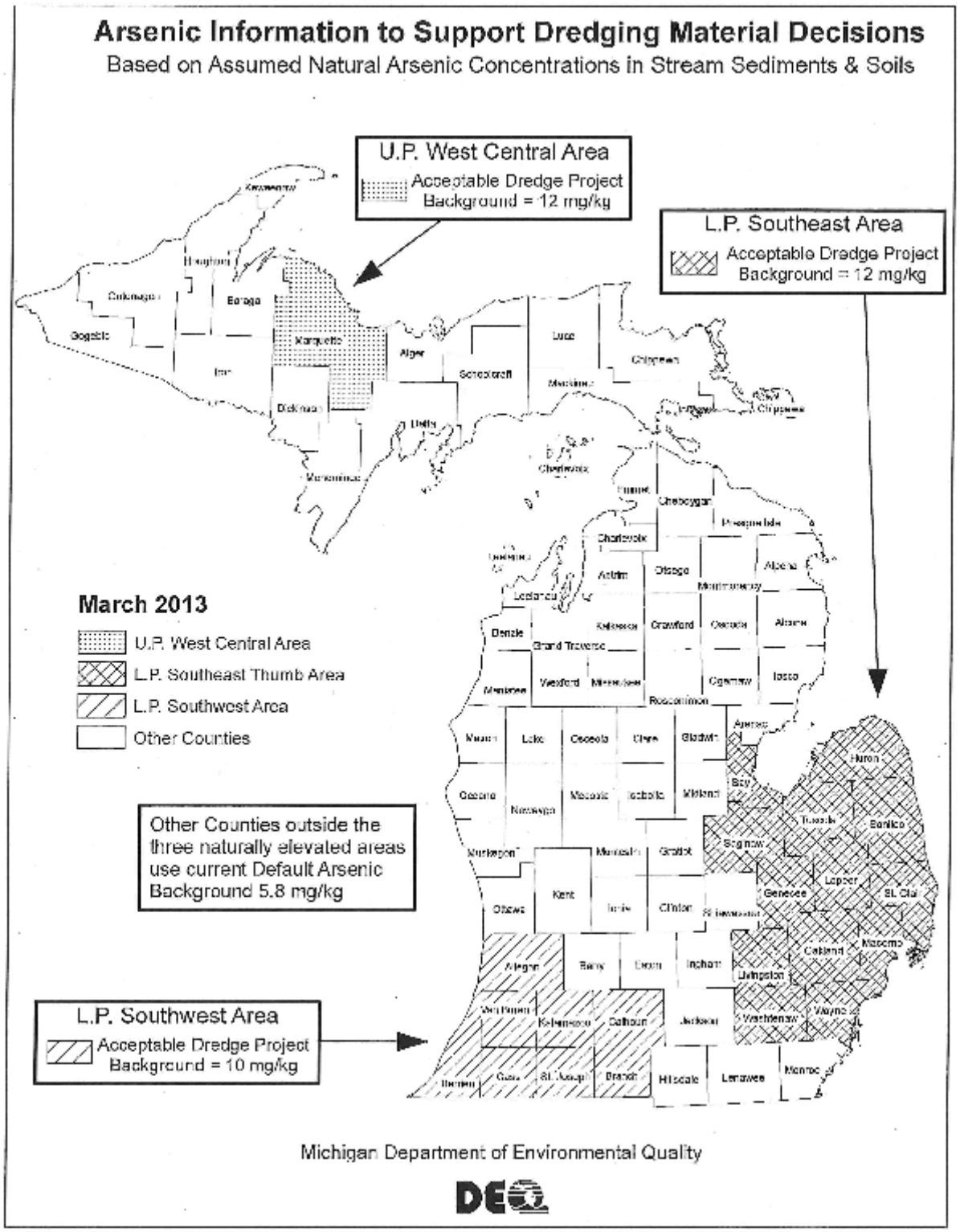
13. Where applicable, the WRD updates CIWPIS that an executed and recorded Restrictive Covenant was received, where applicable, and adds the hard copy to the file.

Approved: Dan Wyant, Director

Michigan Department of Environmental Quality



March 2013


Arsenic Information to Support Dredging Material Decisions
Based on Assumed Natural Arsenic Concentrations in Stream Sediments & Soils
U.P. West Central Area
Acceptable Dredge Project Background = 12 mg/kg
L.P. Southeast Area
Acceptable Dredge Project Background = 12 mg/kg
March 2013
U.P. West Central Area
L.P. Southeast Thumb Area
L.P. Southwest Area
Other Counties
Other Counties outside the three naturally elevated areas use current Default Arsenic Background 5.8 mg/kg
L.P. Southwest Area
Acceptable Dredge Project Background = 10 mg/kg
Michigan Department of Environmental Quality

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

Lower Menominee River Area of Concern
Technical Advisory Committee Meeting
August 24th, 2016, 1:00 – 3:00 pm CST
WDNR Service Center, 101 N Ogden Rd, Peshtigo, WI
Minutes prepared by Laurel Last

Meeting Objectives

- The TAC discusses the revised draft Degradation of Benthos BUI removal document and approves moving forward with stakeholder review process
- The TAC discusses the draft Restrictions on Dredging BUI removal document and approves moving forward with stakeholder review process
- The TAC discusses the draft 2015 RAP Status Report
- The TAC is updated on the status of the Fish Consumption BUI
- The TAC is updated on AOC habitat restoration and monitoring projects

Attendees
Sharon Baker (MDEQ), Cheryl Bougie (WDNR), Mike Bryant (USEPA-GLNPO), Steve Choy (USFWS), Mike Donofrio (WDNR), David Halfmann (WDNR), Laurel Last (WDNR), Conor Neal (USEPA), Tammie Paoli (WDNR), Vic Pappas (WDNR)

Introductions and review of the agenda

Draft Degradation of Benthos BUI removal package – Laurel Last (WDNR) and Sharon Baker (MDEQ)

- Laurel went over changes since last draft responding to TAC and EPA comments
- Added table of contents, but did not add executive summary
- TAC supported executive summary, so Laurel will add that for public review draft
- Two draft sediment remediation site summary tables discussed at last meeting have been combined into one table (in both Benthos and Dredging BUI documents)
- Sharon suggested adding Ansul arsenic salt pile cleanup to table
- Laurel shared draft TAC letter of support for BUI removal package
- **TAC supported moving forward with BUI removal, but decided not to provide letter of support (meeting minutes will suffice)**
- Proposed schedule for review and BUI removal
  - Tonight, CAC reviews and approves (letter of support)
  - Revised draft out for public comment September 8th -22nd
    - Will post on WDNR AOC website
    - WDNR will send announcements via e-mail and GovDelivery; CAC members will contact local papers and radio station
    - Sharon—MDEQ announcement will point to WDNR site
    - Send comments to Laurel
  - Public can also provide input at CAC Open House September 15th

- BUI documents will be available for review
- BUI fact sheet and feedback forms
- Plan to respond to comments and submit final package to EPA by September 30th

Restrictions on Dredging BUI removal package – Cheryl Bougie (WDNR)

- Cheryl provided overview of draft Dredge Management Plan / Restrictions on Dredging BUI removal package
- Only area in AOC with dredge restrictions is along shoreline near Boom Landing--reactive core mat barrier at WPSC site (not priority area for navigational dredging)
- TAC members asked questions and provided input on draft
- Mike D—Will USACE dredge turning basin again? Cheryl—Yes, if/when needed in future. Sand cover is 2 ft below authorized depth, will not be a problem.
- Dave H—What is thickness of Tyco sand cover? Cheryl—12 in sand cover
- Need more information on Green Bay paint sludge site—Sharon will send to Cheryl
- Sharon—Have her secretary review document before final version is routed to EPA for concurrence
- Tammie—Tyco bought out by Johnson Controls, might result in name change (later)
- **TAC supported moving forward with BUI removal, but decided not to provide letter of support (meeting minutes will suffice)**
- Proposed review schedule is same as for Benthos BUI (see above), except can take longer to finalize and send to EPA for concurrence

2015 RAP Status Report – Sharon Baker and Laurel Last

- Draft out for stakeholder review—today (24th) is deadline for comments
- Laurel brought current draft and described changes in response to comments
- TAC members discussed draft and provided one editing comment
- TAC supported document

Restrictions on Fish Consumption BUI update – Sharon Baker and Laurel Last

- MDEQ (Joe Bohr) and MDHHS (Michelle Bruneau) completed revised fish consumption report and white paper
- We will refer to these documents in the BUI removal package
- We plan to move forward with this BUI for potential removal later this year or early next year

South Channel Habitat Project Update – Laurel Last and Cheryl Bougie

- Aquatic Ecological Services (AES) began on-site work August 17th
- Conducting herbicide applications and various project startup items
- Plan to be substantially complete by October 31st, with possibly some additional plantings in spring
- Monitoring and maintenance period through 2019

Menekaunee Harbor Project Update – Cheryl Bougie and Laurel Last

- Aquatic Ecological Services (AES) is conducting maintenance of original project area
- Monitoring and maintenance period through 2018
- AES is also working on controlling invasive plants in additional restoration zone east and southeast of original project area (using available funding)

Lower Menominee River Fish Passage Update – Mike Donofrio (WDNR)

- Contractor hired for downstream passage at Menominee Dam
- Construction has started, and should to be complete by November
- Mike and Paul Radzikinas (ECRE) will host table at AOC Open House

Island Rookery Habitat Enhancement Project update – Laurel Last

- Shared 2016 project summary handout from Ecology & Environment (E&E)
- E&E will host a table at the AOC Open House (September 15th)
- Discussed potential island project tour for CAC and TAC members
    - Week of Open House convenient for out-of-town folks
    - Could use Fisheries boats
    - Laurel will coordinate with E&E, Mike D, and Cheryl

Fish populations reference site monitoring update – Laurel Last

- Ben Uvaas (WDNR) volunteered to analyze fish monitoring data from lower Menominee River, Peshtigo River, and Escanaba River to determine whether target species are meeting population/recruitment objectives
- When Ben has completed analysis, Laurel will convene fish team to discuss results and decide next steps

Other News

- AOC Open House 6-8 pm September 15th at UW-Marinette
- Menekaunee Harbor tour 5 pm before the Open House
- Waterfront Cleanup planned for September 17th will likely be postponed until next spring (CAC to discuss tonight)
- Proposed expansion of restricted area around Marinette Marine Corp. Shipyard—Laurel passed around proposal

Future **Agenda Items and Next Meeting Date**

- Next meeting date—did not discuss, but Sharon and Laurel will plan as needed
- Potential Agenda Topics for next meeting
    - Degradation of Benthos BUI removal progress/status
    - Restrictions on Dredging BUI removal progress/status
    - Restrictions on Fish Consumption BUI
    - 2015/2016 RAP Update
    - Updates on habitat and monitoring projects

Contact information

Laurel Last, Wisconsin DNR
Laurel.last@wisconsin.gov
920-662-5103

Sharon Baker, Michigan DEQ
BakerS9@michigan.gov
517-284-5044

Michael Bryant, EPA Area of Concern Task Force Leader
Bryant.Michael@epa.gov
312-886-5266

ONLINE RESOURCES

EPA – http://www.epa.gov/grtlakes/aoc/menominee/index.html

MDEQ – http://www.michigan.gov/deq/0,1607,7-135-3313_3677_15430_57388---,00.html

WDNR – http://dnr.wi.gov/topic/greatlakes/menominee.html

CAC – https://www.facebook.com/menomineeriveraoc

2014 RAP Update available

http://dnr.wi.gov/topic/greatlakes/documents/Menominee2014RAPUpdate.pdf

2013 F&W Plan available

http://dnr.wi.gov/topic/greatlakes/documents/Menominee2013FishAndWildlifePlan.pdf

Lower Menominee River Remedial Action Plan
Citizens Advisory Committee

LOWER MENOMINEE RIVER REMEDIAL ACTION PLAN

The Lower Menominee River: A Great Lakes Area of Concern

October 20, 2016

Laurel Last
Lower Menominee River AOC Coordinator
Wisconsin Department of Natural Resources
2984 Shawano Ave
Green Bay, WI 54313

Sharon Baker
Lower Menominee River AOC Coordinator
Constitution Hall 6FS
525 West Allegan
PO Box 30473
Lansing, MI 48909

Subject: Support for Lower Menominee River AOC Restrictions on Dredging BUI removal

Dear Ms. Last and Ms. Baker:

The Lower Menominee River Area of Concern (AOC) Citizens Advisory Committee (CAC) supports the efforts of the Wisconsin Department of Natural Resources (WDNR) and the Michigan Department of Environmental Quality (MDEQ) to remove the Restrictions on Dredging Beneficial Use Impairment (BUI) from the Lower Menominee River AOC.

The Lower Menominee River AOC community has partnered with local, state, and federal agencies, businesses, and volunteers over the years to clean up toxic sediments in the AOC. Sediment remediation projects have been completed at the Green Bay paint sludge site, the Wisconsin Public Service Corp. coal tar site, the Ansul/Tyco arsenic site, and Menekaunee Harbor.

The projects are being monitored according to their approved plans and are meeting their respective goals. In addition, sediment assessments in the Lower Scott Flowage and Rio Vista Slough show that no remediation is needed at those sites. A Dredge Management Plan has been developed and is currently under review. Therefore, the sediment contamination that was causing the dredging restrictions in the AOC has been addressed and restoration targets for this impairment have been met. We concur that the Restrictions on Dredging impairment has been adequately addressed and we are prepared to celebrate the removal of this BUI.

We appreciate all that the WDNR, MDEQ, EPA, and other partners have done to help achieve this goal.

Respectfully Submitted,

Keith West
CAC Wisconsin Co-Chair
keith.west@uwc.edu

Mark Erickson
CAC Michigan Co-Chair
merickson@lloydflanders.com

Appendix F – Open House News Release, Eagle-Herald 9/10/16

DNR seeking public comment

MARINETTE — The Wisconsin Department of Natural Resources is inviting the public to review and comment on the proposed removal of two beneficial use impairments listed for the Lower Menominee River Area of Concern.

Information about the proposal will be presented at a public meeting Thursday. Steve Galarneau, director of DNR's Office of the Great Lakes, will be keynote speaker at an open house hosted by the Lower Menominee River Area of Concern Citizens Advisory Committee from 6-8 p.m., at UW-Marinette in the cafeteria, 750 W. Bayshore St. The event will provide an overview of the work being done to restore the waterway and an opportunity to ask questions about the proposed removal of the two impairments. A walking tour of the Menekaunee Harbor Restoration Project will take place at 5 p.m. before the open house. To join in the tour, meet at the parking lot southwest of the harbor off Ogden Street.

Information about the impairments and an explanation of the progress that has been made as part of ongoing restoration efforts can be found on DNR's website,dnr.wi.gov, by searching "Lower Menominee River." The documents for public comment that describe the proposed removal can be found at http://dnr.wi.gov/topic/greatlakes/menominee.html.

People may submit comments to Laurel Last, 2984 Shawano Ave., Green Bay, WI 54313 or laurel.last@wisconsin.gov by 5 p.m., Sept. 22. Questions about the draft removal packages may be directed to Last via email or to 920-662-5103.