
The attached guidance “*Sediment Sampling and Analysis for Dredging Permit Application and Approval*” is being made available for public review at this time. This guidance was developed to provide Department staff and external applicants detailed information necessary for the permitting of both small and large scale dredging projects occurring within waters of the state. Topics covered include requirements for sediment sampling for contaminants, wastewater requirements for dredging operations and dredge material dewatering, and evaluations for dredge material disposal.

This guidance was developed by the Department’s Integrated Sediment Team, which is comprised of staff from the Water Division and Air and Waste Division. The WDNR is now soliciting comments from the public on this guidance. Once the 21 day notice period is complete, all comments will be considered and revisions made to the document as needed. Final guidance will be made available to internal staff and external stakeholders.

Comments related to this draft guidance should be sent to Jim Killian at the following email: james.killian@wi.gov



Sediment Sampling and Analyses for Dredging Permit Application and Approval

Guidance Developed by the Integrated Sediment Team

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Notice

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Sediment Sampling and Analysis for Dredging Permit Application and Approval

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List of Acronyms

ACOE	U.S. Army Corps of Engineers
CDF	Confined disposal facility
DMT	Dredging Management Team
DNR	Department of Natural Resources
EET	Effluent elutriate test
MPBC	Maximum probable background concentration
NMMO	Non-Metallic Mining Operation
PAH	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
SPLP	Synthetic precipitation leaching procedure
SWIMS	Surface Water Integrated Monitoring System
TCLP	Toxicity characteristic leaching procedure
USEPA	U.S. Environmental Protection Agency
WMS	Water Management Specialist
WPDES	Wisconsin Pollutant Discharge Elimination System

1. Purpose

Dredging projects primarily consist of three steps. The first is to remove sediment from a waterbody using either mechanical or hydraulic methods. The second step is to process the dredged material, including dewatering and transportation from the removal site to a location for use or disposal. The third step is placement of the dredged material. Permits or regulatory approvals from the Wisconsin Department of Natural Resources (DNR) may be required at each of these three steps. In order to conduct a successful dredging project, while minimizing the impact of dredging on the environment, the quality and quantity of sediment to be removed needs to be assessed to ensure that all dredging activities meet permit or regulatory requirements.

Dredging in the waters of Wisconsin is an activity that touches a wide range of DNR regulatory programs, which are charged with protecting our waters, fish and wildlife, and citizens. This document was developed as guidance for DNR staff and the public to help explain the requirements for collection and analysis of sediment samples for dredging projects in Wisconsin waterways. The information provided in this document is particularly pertinent to the requirements in Wisconsin Administrative Code NR 347 (“Sediment Sampling and Analysis, Monitoring Protocol and Disposal Criteria for Dredging Projects”). In addition, this guidance includes discussion of the removal, processing, beneficial use, and disposal of sediment removed from waterways.

This guidance document is designed to assist DNR staff and permit applicants in interpreting the statutory and regulatory requirements for dredging projects, and the submission of information to the Department for review or approval. In particular, this document provides guidance and additional resources for determining the appropriate number of *in situ* samples, the physical and chemical parameters to be tested, and sampling procedures and analyses to be used to characterize sediment quality.

This document **is not** meant to provide comprehensive guidance for complex cases, such as those where large volumes of sediment with elevated levels of contaminants are present. Complex cases require more extensive review and input from staff with specialized expertise in wastewater, storm water management, waste management, and sediment management. Site data and the degree of risk posed by dredging actions is used to guide the determination of the scope of the information required from a project applicant. Results of the sampling and analyses may lead to project modifications and will guide the inclusion of specific conditions in the final dredging permit to address the dredging, handling, and disposal of the excavated sediment.

2. Introduction

Collection of sampling and analytical information under Wisconsin Administrative Code NR 347 is premised on the need to obtain adequate information to characterize the quality of sediments within the proposed project area. These data are used to identify if there are any potential environmental concerns that may arise during the dredging, processing, and disposal of those sediments. Assessing sediment quality as it relates to identifying surface water issues can be based on a tiered framework using numerical sediment quality guidelines found in the

Department's Consensus Based Sediment Quality Guidelines (CBSQGs), DNR Publication WT-732 2002. More comprehensive risk-based assessments may be needed for sites that are more complex. The complexity of dredging projects and objectives calls for the need for a flexible and progressive framework for assessing sediment quality. More extensive assessment is obtained in successively higher tiers.

Contamination is caused by a chemical substance or substances, either organic or inorganic, which are present in sediments or surface waters above levels that naturally occur in the environment. To evaluate contamination, it is necessary to understand the normal or background levels in sediment for the project area. Background for inorganics (metals) is the concentration of metals which originate from the natural soil types and the geochemical components of the watershed. Background for natural organic compounds would generally be those compounds that originate from vegetative or animal matter that are deposited on the bottoms of lakes, streams, and wetlands. Organic chemicals manufactured by humans and released to the environment generally do not have counterparts found in nature and therefore any levels found in environmental media would be considered potential contamination. Many manufactured organic compounds may be found ubiquitously at low levels in sediments, especially in urban areas.

Contaminants at elevated levels in sediment have the potential to cause adverse environmental impacts during and after a dredging operation. These concerns include:

- 1) Release of contaminants through
 - a. bottom disturbances and releases to the water column from dredging operations;
 - b. spills or leaks from barges, scows, discharge pipelines and other sediment transport methods at the dredging site or near shore;
 - c. infiltration of sediment pore water into groundwater at an upland dewatering facility; and/or,
 - d. discharge of contaminants back into waterways via dredge carriage water.
- 2) Exposure of contaminants at the proposed project depth and along the sidewalls at the project boundaries after dredging.
- 3) Suitability of sediments planned for reuse and disposal for shoreline beach nourishment projects under Wisconsin Administrative Code NR 347.07 (4).
- 4) Suitability of sediments for on-land disposal or re-use.

An example of a potential risk from a dredging project is the release of sediment into the water column from excavation activities. At some sites, particularly in more industrial waterways, contaminants from spills or industrial discharges have settled to the bed and accumulated in sediment. In some conditions the excavation of sediments with high levels of contamination can release the contaminants to the water column and pose a risk to the ecosystem in the immediate and downstream areas of the site. Contaminants in sediment at high concentrations can also pose a potential risk during disposal or beneficial use through pathways such as bioaccumulation or toxicity to aquatic or terrestrial organisms. In general, the expected degree of risk from a project will dictate the effort required in sediment sampling and analysis. Wisconsin Administrative

Code NR 347 provides the Department with the latitude to increase, decrease or waive sampling requirements as appropriate to the project conditions.

Environmental concerns arise when the concentration of contaminants in surface water and sediment lead to observed and measurable effects to biological receptors. The contaminant in these circumstances becomes a toxicant. Some examples of these effects are:

- 1) chronic and/or acute toxicity to aquatic receptors such as bottom inhabiting macroinvertebrates or water column organisms; and/or
- 2) chronic and/or acute health concerns to wildlife or humans who may become exposed to the harmful levels of contaminants.

There are many ways that sediment-derived risk can be safely and cost effectively managed in the performance of a dredging project. The selection of risk management options can be simple steps such as following construction standards and best management practices in order to minimize dredged material spillage, or more complex solutions using engineered environmental controls such as isolation barriers, specialized dredging and dewatering equipment, and extensive monitoring systems. The process for selection of appropriate and cost effective controls to manage potential risk or the execution of a formal risk assessment is beyond the scope of this guidance.

3. Dredging Permit Application Process and Reviews

The proceeding figures illustrate when sediment sampling and analyses are needed in the permit application and approval processes for sediment dredging projects. Figure 1 illustrates a stepwise framework that the Department uses, which is further described below. Figure 2 illustrates the coordination of review by staff. The following will briefly discuss the stepwise framework and highlight the decision points of the review process.

Step 1: Pre-Application Information

The preliminary application process provides an opportunity for the Department to identify project concerns and notify the applicant early in the process. The applicant can then respond or make changes to the project to address regulatory concerns. The Preliminary Application and review steps can save the applicant time and expense by consulting with DNR staff prior to the collection and analysis of sediment samples from the proposed project area.

As shown in Figure 1, prior to submitting an application for a dredging permit, applicants will contact DNR's regional Water Management Specialist. Upon notification, the Specialist shares the preliminary information with programs potentially affected by dredging including Fisheries Management, Wildlife Management, Water Resources, Wastewater, Waste & Materials Management, and others as needed.

Wisconsin Administrative Code NR 347.05(1) requires that the dredging applicant submit to the Department preliminary information about the potential dredging project before a formal dredging permit application is submitted. A checklist has been developed for use by the applicant to assist in pre-application submittal (Pre-Application Summary Sheet, Appendix A).

The Department must review and respond to the applicant within 30 business days pursuant to Wisconsin Administrative Code NR 347.05(2). Department review will determine waiver applicability or will identify the necessary sampling and analytical requirements for characterizing the sediment quality. The review will also include an analysis of other available information and resources relevant to the project site.

The responsibilities of the Department in conducting an initial evaluation are stated in Wisconsin Administrative Code NR 347.05(2). Department review will include an inquiry as to whether past data has been collected at or near the site. Data sources may include:

- DNR Water Division Sediment Database - Surface Water Integrated Monitoring System (SWIMS): <http://dnr.wi.gov/topic/surfacewater/swims/> (including DNR's SWIMS Sediment Database)
- DNR's Bureau for Remediation and Redevelopment Tracking System (BRRTS) Database: <http://dnrmaps.wi.gov/sl/?Viewer=RR%20Sites>
- U.S. Environmental Protection Agency's (USEPA's) STORET Database: <http://www.epa.gov/storet/dbtop.html>
- Safe Eating Guidelines – Fish Consumption Advisory: <http://dnr.wi.gov/topic/fishing/consumption/index.html>
- Regional files of Water Division programs or Remediation and Redevelopment Program staff
- Fish Contaminant Database, maintained by the Central Office Bureau of Fisheries Management
- Federal Spills databases, such as United States Coast Guard National Response Center
- USEPA's Toxic Release Inventory: <http://www2.epa.gov/toxics-release-inventory-tri-program>
- Various project documentation generated by Water Division programs and Remediation and Redevelopment Program

Depending on the project site and scope, DNR staff will use additional data sources for preliminary application review (summarized in Reviewer Checklist, Appendix A). Applications will be reviewed for any concerns that may trigger further review related to potential risk to human health or the environment. Examples might include dredging projects proposed in environmentally sensitive areas, located in exceptional or outstanding waterways, or projects where contaminants are known to be present at high levels. Even after evaluating the project eligibility for codified exemptions, additional information may be used to evaluate the need for a permit. DNR staff may conduct field investigations of the proposed dredging site and disposal location during preliminary review to help further evaluate the decision criteria outlined in the Appendix A checklists.

Caution: If an applicant collects and analyzes sediments prior to submitting the preliminary permit application and does not consult with the Department, they risk using inappropriate sample collection techniques, collecting too few or too many samples, sampling in the wrong places, analyzing for the wrong or incomplete list of parameters, or using unacceptable

laboratory methods with inadequate detection limits. If any of these issues are discovered during the Department's review, the Department may require the applicant to resample and reanalyze in order to provide the specific data and information needed to adequately review the proposed dredging project for possible environmental impacts.

Step 2: Determination of Sampling Requirements

The Department will provide a written response to the applicant at the completion of the preliminary application review. The response will include the requirements of any necessary sediment sampling and analyses. In the event that sampling is waived by the Department, applicants will be instructed to submit permit applications to various programs as described in Step 5 of Figure 1. **If sampling is not waived, sampling will be required in order to complete the application.** (More detail is provided in Section 4.)

Step 3: Sampling and Analysis Plan

If preliminary application review determines the need for sediment sampling, applicants will submit a sediment sampling and analysis plan to the Department at this time.

The applicant is encouraged to use existing information and site history and work closely with the Department to plan for sampling and analyses. Doing so will help ensure that the number of samples and the contaminants of concern are tailored for the site, and the resulting information will meet the needs for permit approval required by different programs. The sampling plan will be finalized before field work starts, and the applicant should follow the plan closely. If specific field conditions trigger changes to the plan, the Department should be contacted to help resolve the issue. (More detail is provided in Sections 4, 5 and 6.)

Step 4: Applicant Submits Sampling Results

Sampling results are submitted by the applicant or their representative to the Water Management Specialist, who then routes to the Sediment Specialist assigned to the regional Dredging Management Team.

Step 5: DNR determines needed permits and approvals

Sediment analytical results are reviewed as part of the application package, and the applicant is informed of any additional permit requirements necessary to complete the dredging permit application.

Step 6: Application(s) Submitted

The applicant completes the required application(s) and submits to the Department with relevant data and documentation, including detailed plans for removal, processing, transport, and disposal of the dredged material. Based on review, applicant is informed of any additional Chapter 30 permit requirements.

Step 7: DNR Issues Permit & Approval Decisions

The Department reviews all submitted information and makes a decision on approval of permit applications (Chapter 30 permit, wastewater discharge permit, storm water management permit, and solid waste permit). Applicable permits are then issued. It should be remembered that the permit and approval process for one or more permits/approvals can be delayed due to incomplete

applications or program workloads. Note: Permits may be amended in the event of unforeseen circumstances that arise during the dredging project.

Step 8: Applicant Notifies the Department

The applicant informs the Department (Water Management Specialist) when dredging starts.

Step 9: Oversight and Inspection

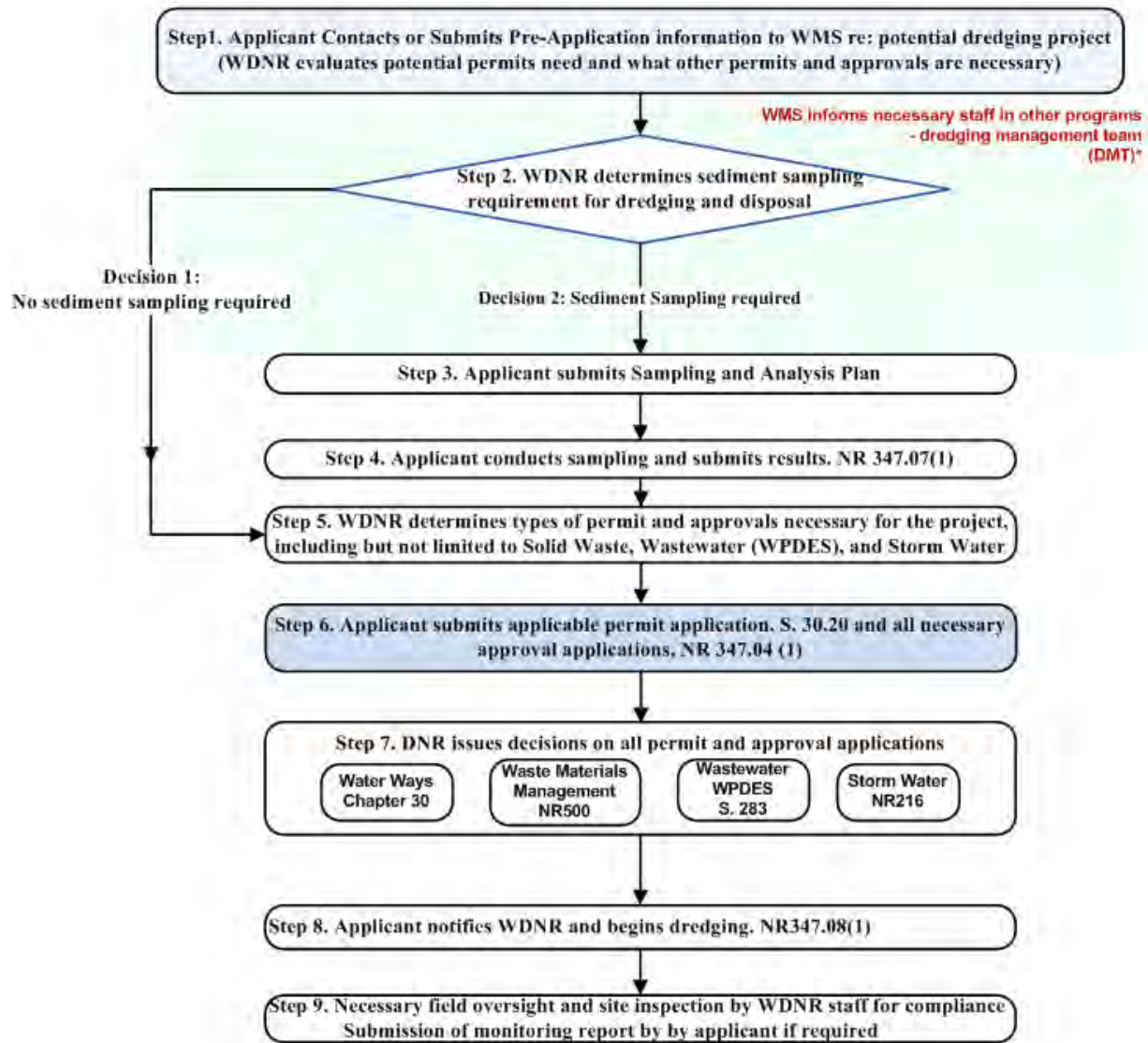
DNR staff provide field oversight and review of applicant-supplied monitoring data for compliance with the permits. Corrections will be required in the event of changing conditions or permit violations.

Figure 2 illustrates the comprehensive routing and review process carried out internally within the Department, and reflects the coordination necessary among the various programs to ensure appropriate staff are involved at all junctions of the permitting process.

Note that if the volume of sediment to be dredged is expected to be less than 50 cubic yards, and no known or anticipated elevated levels of contaminants exist, the project will require far less review. In these cases, the Water Management Specialist may process the application without extensive routing to others for review. For large projects that may involve a number of complicated issues such as high levels of contaminants, a Dredging Management Team with designated members from the appropriate regional programs will ensure that all issues are addressed and coordinated into the permitting process.

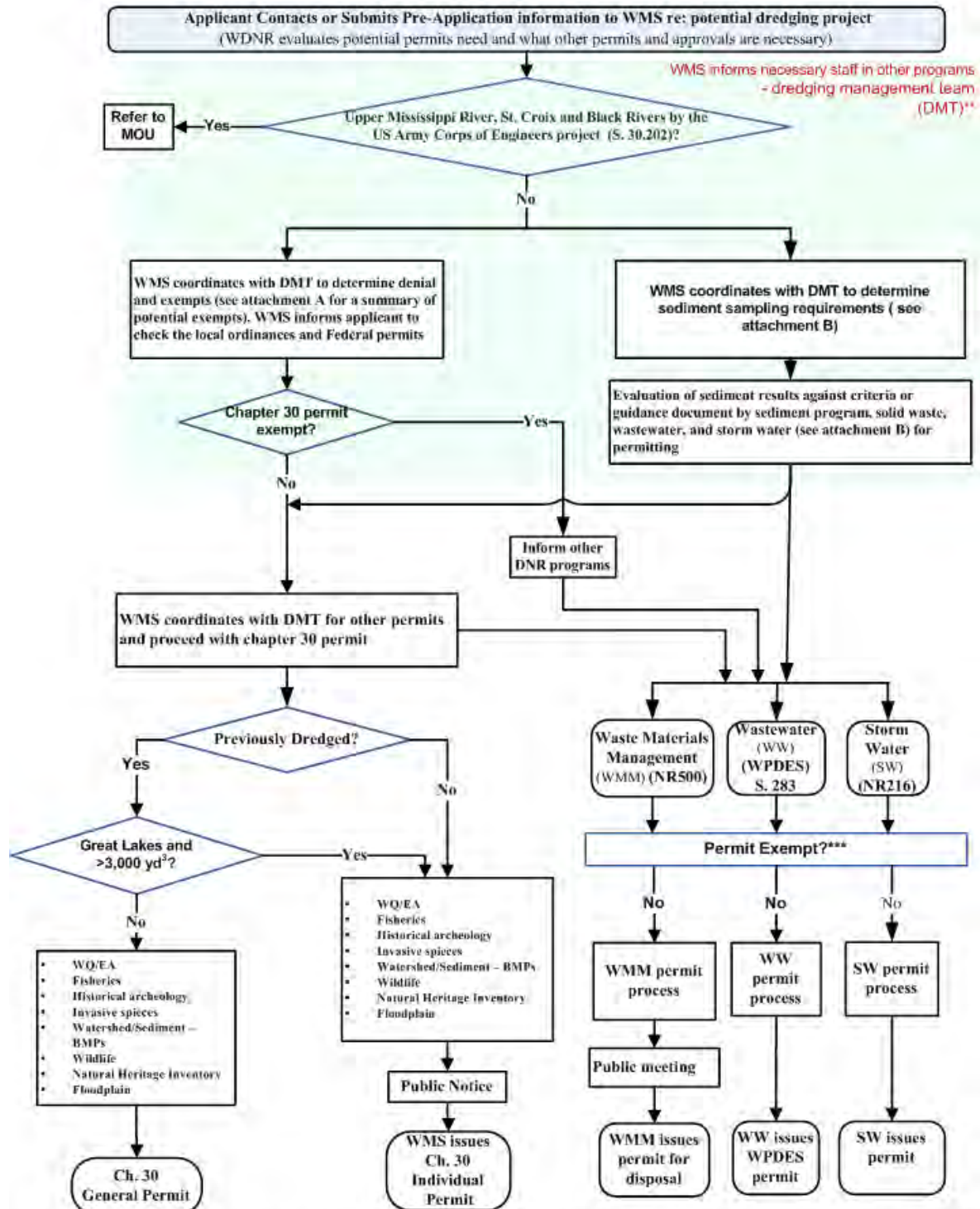
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Figure 1. The State of Wisconsin Dredging Application Review Processes



Notes: * Coordination between programs is initiated during pre-application phase. A regional dredging management team (DMT) will coordinate the evaluation. The regional DMT primarily includes Waterways, Sediment Management, Waste Materials Management, and Fisheries. Other programs include but are not limited to Water Quality, Wastewater, Storm Water, Dam Safety, Remediation and Redevelopment, Invasive Species, Archaeology; Flood Plain, Natural Heritage Inventory, and Historic Building Cultural Resources.

Figure 2. Internal Review and Routing for Dredging Projects*



Notes: * This flowchart is developed assuming EA is no longer needed under revised NR150 rule. WMS: Water resources management specialist (WMS)

** Coordination between programs are initiated during pre-application phase. A regional dredging management team (DMT) will coordinate the evaluation. The regional DMT primarily includes Waterways, Sediment Management, Waste Materials Management, and Fisheries. Other programs include but are not limited to Water Quality, Wastewater, Storm Water, Dam Safety, Remediation and Redevelopment, Invasive species, Archaeology, Flood Plain, Natural Heritage Inventory, and Historic Building Cultural Resources.

*** If the response to the question is yes, each program will follow the appropriate process to exempt the permit requirement.

4. Sediment Sampling and Analyses

This section discusses Step 2, Determination of Sampling Requirements. It includes information about sampling and analytical requirements as well as information necessary to decide if sediment sampling may be waived.

4.1 Submittals

If the Department determines that sampling is required, the dredging applicant will generally make three submittals to the Department regarding the sampling and analytical requirements. These three submittals are:

- **Scoping of Sediment Sampling and Analyses as Part of Preliminary Application** under Wisconsin Administrative Code NR 347.05. This contains the applicant's initial proposal as discussed in Section 3. The Department is required to respond within 30 business days to identify sampling requirements.
- **Sampling and Analysis Plan** is prepared by the applicant based on the Department's determination of sampling requirements, and submitted for Department approval prior to collecting samples.
- **Sampling Report and Analytical Results** is submitted by the applicant under Wisconsin Administrative Code NR 347.07(1). The Department is required to respond within 30 business days to evaluate completeness and characteristics of the sediment and identify all necessary permits and approvals.

Depending on the results, the Department may require additional sampling and reporting to adequately evaluate potential risks to environment and human health. Applicants or their representatives are encouraged to submit the Sampling and Analysis Report and Analytical Results prior to submitting the Chapter 30 dredging permit applications. Applications for other permits and approvals are generally submitted after the Department notifies the applicant of all permit and approval requirements.

4.2 Exemption and Site Specific Sampling Requirements

Based on the preliminary information provided by the permit applicant and the DNR initial investigation and evaluation under Wisconsin Administrative Code NR 347.05 (2), staff will specify the number and locations of samples to be collected and the parameters to be analyzed. Wisconsin Administrative Code NR 347 provides flexibility in sampling requirements, whereby the type and amount of sampling required can be increased, decreased, or waived altogether depending on the information available. Note that if there will be any wastewater generated for surface or groundwater disposal, or any solid waste exemption sought, sediment sampling will be necessary.

The applicable code sections related to sampling and analyses include:

1) Exemption of sampling and analytical requirements

- The Department may waive sediment sampling if it determines from the review of previous sampling data or other available information under Wisconsin Administrative Code NR 347.05(2), that sediment contamination is unlikely. (NR 347.06 (3)(a) Adm. Code)
- If previous sampling data or other adequate information demonstrates that the possibility of contamination is negligible, analysis for any chemical may be waived in writing by the Department. (NR 347.06 (6)(d) Adm. Code)
- All sediment samples and sediment elutriate samples shall be analyzed for those parameters listed in Wisconsin Administrative Code NR 347 Table 1 unless waived by the Department. (NR 347.06 (6)(b) Adm. Code)

2) Sampling and analysis related to disposal areas

- For a project involving the disposal of dredged material at an upland non-landfill disposal site, the Department may require samples to be taken from the proposed disposal site and analyzed for parameters found elevated in samples from sediments in the project area. (NR 347.06 (3)(c) Adm. Code)
- For a project involving the disposal of dredged materials on a landfill, samples will need to be collected for analyses of parameters defined by landfill operation.
- Great Lakes beach nourishment disposal sites have additional sampling and analytical requirements. (NR 347.06 (3)(d) Adm. Code)

3) Specifying additional sampling and analysis

- If previous sampling data or other available information indicates the possible presence of chemicals not listed in Table 1, the Department may require analysis for those chemicals. (NR 347.06 (6)(c) Adm. Code)
- If available information is either insufficient to evaluate sediment quality or shows a possibility of 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 and parameters to be analyzed will be determined by the information and factors related to the site. (NR 347.06 (3)(b) Adm. Code)
- Based on the testing report submitted, the Department can require additional sediment sampling and analyses when there is evidence of contamination. (NR 347.07(3) Adm. Code)

- The Department may require additional samples and analysis as specified by law or for other appropriate reasons. (NR 347.06 (6)(e) Adm. Code)

Based on a review of all the applicable, available information for the site, the Department determines the sampling and analytical requirements, and notifies the applicant in writing. The applicant or their representative will then incorporate the requirements into a sampling plan that should be submitted to the Water Management Specialist. The WMS will route the sampling plan to the regional Sediment Specialist and other members of the Dredge Management Team for a final review prior to sample collection.

4.3 Sampling and Analysis Plan

The Sampling and Analysis Plan should include the following:

- Sampling methods, such as using a surface grab sampler or coring device.
- Sample handling procedures such as composite samples or discrete samples, mixing protocols, containers, temporary storage during transport which often requires keeping the samples on ice, and delivery of samples from the site to analytical laboratories.
- Updated site location map with clear labels of sampling locations.
- Planned segmentation of cores at each sampling location if core samples will be collected.
- Parameters for which analysis will be conducted, including analytical methods and detection limits.
- Name of analytical laboratory certified under Wisconsin Administrative Code NR 149 to conduct analyses for the parameter. The link to NR 149 and Wisconsin Certified Laboratories is provided in Section 9.

Department staff should compare the sampling plan to recommended procedures detailed in the CBSQGs, Wisconsin Pollutant Discharge Elimination System (WPDES) effluent limit calculations, storm water permit evaluation guidelines, and disposal site approval to ensure that initial information needs required by different programs are met. Once approved, the applicant can implement the Sampling and Analysis Plan.

5. Parameters and Testing Methods

5.1 General Guidance for Parameter Selection

Sediment samples are collected to characterize the dredged materials for evaluation of potential risks to human health and the environment that may occur during dredging, processing, and disposal. Physical and chemical characteristics of the sediment are essential for setting appropriate permit conditions to protect the environment. Wisconsin Administrative Code NR 347.06 contains a list of physical and chemical parameters to be analyzed for sediment samples. As discussed earlier, the code also provides leeway for the Department to increase,

decrease, or waive the number of samples and the parameters. **Table 1 of this document (below)** is an enhanced version of Table 1 supplied in Wisconsin Administrative Code NR 347.06, and includes additional updated information and reflects the results of scientific research and experience with dredging projects. Those parameters listed in this enhanced version not appearing in Table 1 of NR 347.06 are considered as recommended. In addition, Table 1 includes Suggested Analytical Method, along with the detection limits for the parameter of the method. The “Suggested Base Parameter Analyses” is based on previous data from numerous sediment projects.

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Table 1. Sediment Sampling Parameters with Suggested Methods and Analyses

Parameter	Suggested Analytical Method (Suggested Detection Level) (mg/kg, dry weight unless noted)	Suggested Base Parameter Analyses ¹	
		Great Lakes or Urban/ Industrial	Inland Waters (Rural/ Forested)
Inorganic – Metals			
Arsenic	SW-846 3050B/6010B EPA 6010 or 7060 (5)	X	X
Barium	SW-846 3050B/6010B (0.2)		
Cadmium	SW-846 3050B/6010B EPA 7131 (0.6)	X	X
Chromium (total)	SW-846 3050B/6010B EPA 6010 or 7191 (0.6)	X	X
Copper	SW-846 3050B/6010B EPA 6010 or 7211 (0.5)	X	X
Cyanide	SW-846 9010B/9014 (0.4)		
Lead	SW-846 3050B/6010B EPA 6010 or 7421 (3)	X	X
Manganese	SW-846 3050B/6010B (0.1)		
Mercury	SW-846 7471A EPA 7471 (0.015)	X	X
Nickel	SW-846 3050B/6010B EPA 6010 (2)	X	X
Selenium	SW-846 3050B/6010B (8)	X	
Zinc	SW-846 3050B/6010B EPA 6010 or 7951 (2)	X	X
Inorganic – Nutrients			
Oil & Grease	SW-846 9070	X	
Total Phosphorus	EPA 365.2/365.3 or USGS I-6600-85 (9.9)	X	X
Nitrate + Nitrite	LACHAT 12-107-04-1-B (0.25)	X	X
Ammonia-Nitrogen	LACHAT 12-107-06-1-A (0.16)	X	X
Total Kjeldahl Nitrogen		X	X
Organics			
Aldrin	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		
Chlordane	SW-846 8081 EPA 8081, 354440B, 3541 (0.009)	X	
Dieldrin	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		
Endrin	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		
Heptachlor	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		
Lindane (Gamma BHC)	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		

Table 1 (cont'd)

Parameter	Suggested Analytical Method (Suggested Detection Level) (mg/kg, dry weight unless noted)	Suggested Base Parameter Analyses ¹	
		Great Lakes or Urban/ Industrial	Inland Waters (Rural/ Forested)
DDT	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)	X	
DDD & DDE	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)	X	
Toxaphene	SW-846 8081 (0.01)		
PCBs (Total)	SW-846 8081	X	X
	EPA 8081, 3540B, 3541 (0.04)	Tied to Fish Advisories	
2,3,7,8-dioxin, 2,3,7,8-furan and 15 2,3,7,8-substituted dioxin and furan congeners	EPA 8290 (1 – 10 pg/g)		
Total Organic Carbon	SW 846 8081 SW846-EPA 9060 (0.2%)	X	X
Polycyclic Aromatic Hydrocarbons (PAHs)	EPA 8310	X	
Naphthalene	(0.019)		
Phenanthrene	(0.017)		
Pyrene	(0.012)		
Fluorene	(0.058)		
2-Methylnaphthelene			
Acenaphthene	(0.017)		
Acenaphthylene	(0.021)		
Anthracene	(0.0071)		
Benzo (a) anthracene	(0.019)		
Benzo (a) pyrene	(0.023)		
Benzo (e) pyrene			
Benzo (b) fluoranthene	(0.032)		
Benzo (g,h,i) perylene	(0.022)		
Benzo (k) fluoranthene	(0.021)		
Chrysene	(0.0074)		
Dibenzo (a,h) anthracene	(0.008)		
Fluoranthene	(0.029)		
Indeno (1,2,3-cd) pyrene	(0.034)		
Physical Tests			
Particle Size Analysis – Sieve and Hydrometer Analysis	ASTM D422 (%)	X	X
Moisture Content	ASTM D2216 (%)	X	X
Atterberg Limits (Liquid Limit and Plastic Limit)	ASTM D4318 (as moisture content)		
Specific Gravity	ASTM D854 (Ratio, unitless)		

¹ Suggested base parameter list reflects additions to NR 347 Table 1, based on scientific research and experience with dredging projects.

Table 1 may not include all parameters necessary for determining disposal options. If the Waste & Materials Management Program requires additional analytical parameters or other site information, this will usually be determined during review of the preliminary application submittal material (in Step 2 or Step 5). If the sediment disposal options change at any time during the application process, the applicant should notify the Waste & Materials Management Program as soon as possible.

5.2 Site-Specific Parameters

For certain projects, knowledge of the history of the site or adjacent land use history can be used to help identify particular contaminants that may be present in the sediment. For example, in the Great Lakes basins, especially in the large tributaries and harbors, a more extensive list of parameters may be required for analysis depending on the scope of the project and existing data.

Polycyclic aromatic hydrocarbons (PAHs) are a group of organic contaminants often present in sediment in urban waterways. Sources include industrial activities, such as former coal manufactured gas plants (MGPs), wood treatment using creosote, and emission from power plants. If the dredging project is located downstream or adjacent to these industries, it is likely PAHs will need to be analyzed. Because urban runoff contributes PAHs to local waterways, PAHs should be analyzed when sampling is conducted in a highly urbanized area. If samples are not planned to be analyzed for PAHs, the sampling plan should include rationale for waiving the sampling of these organic contaminants. The number of samples for PAH analyses can be adjusted based on consideration of the site, the scale of the project and anticipated risk.

PCBs (polychlorinated biphenyls) and mercury are bioaccumulative in organisms and the concentrations increase greatly through the food chain. Game fish often bioaccumulate much higher levels of PCBs and mercury compared to lower trophic biota. Fish consumption advisories issued by DNR and the Wisconsin Department of Health Services should be reviewed to determine if the project area is in a waterbody listed in the advisory. While sampling for mercury and PCBs is recommended for any project in a waterbody that has a fish and/or wildlife consumption advisory, the number of samples can be adjusted depending on the nature of the fish consumption advisory, past knowledge of sediment contamination, and the scope and scale of the project. For example, for a small project in a waterway where the source of the fish consumption advisory is suspected to be low levels of mercury contamination from atmospheric deposition, permit decision-making with respect to the risk of dredging may be achieved with fewer samples specific to mercury. The goal of providing flexibility in selecting parameters for analyses is to have enough data for risk-based decisions on permit conditions yet avoid collecting more samples than necessary. Applicants can search Safe Eating Guidelines on line: <http://dnr.wi.gov/topic/fishing/consumption/index.html>

To assist both applicants and DNR staff, Table 2 lists frequently detected contaminants and potential sources of these contaminants based on data collected over multiple years. This table may be used to identify other parameters that will need to be analyzed on a case-by-case basis.

Table 2. Contaminants and Potential Sources

(Adapted from Inland Testing Manual (EPA/Corps, 1998))

Potential industrial activities	Acenanthhene	Aldrin	Ammonia	Aniline	Arsenic	Benzo(a)anthracene	Benzo(a)pyrene	Cadmium	Chlordane	Chromium	Copper	Cyanide	DDE	DDT	Dieldrin	Endrin	Ethyl Parathion	Fluoranthene	Heptachlor	Hexachlorobenzene	Hexachlorocyclopentadiene	Lead	Mercury	2-Methylnaphthalene	Nickel	Oil and Grease	Organotin / Tin	PCB	Phenanthrene	Phosphorus	Pyrene	Selenium	Tetrachlorodibenzo-dioxin	Tetrachlorodibenzofuran	Toxaphene	Zinc			
Aluminum Die-Casting							■		■															■	■	■													
Ammunitions											■																			■							■		
Anti-fouling Paints											■												■	■			■												
Automotive				■		■	■		■	■																	■	■									■		
Batteries																					■	■															■		
Boat Manufacturing / Repair						■	■	■		■	■							■									■	■	■		■	■						■	
Boat Refueling						■	■											■									■	■		■	■							■	
Chemical Manufacturing			■				■		■															■	■		■										■		
Commercial Farming	■	■	■										■	■	■																						■		
Corrosion Metallurgy										■	■	■										■			■												■		
Dairy			■																																				
Detergents / Surfactants																																						■	
Dye	■			■																																			
Electrical							■			■													■	■		■		■					■				■		
Explosives			■								■																												
Fish / Wildlife Consumption Advisory																												■											
Fruits and Vegetables			■																																				
Leather / Tanning										■																													
Manufactured Gas Plant (MGP)	■					■	■					■						■						■		■		■		■									
Meat Products			■																																				
Metal Finishing / Refining				■	■		■	■		■	■	■										■	■		■	■											■		
Metallurgical Processes					■																					■	■											■	
Nitric Acid Manufacturing			■																																			■	
Oxide Manufacturing										■	■																											■	
Pesticides / Fertilizers	■	■	■													■	■	■																				■	
Petroleum Refining			■																				■																
Phosphate Mining																																							
Photographic					■					■																													
Pigments / Inks			■	■																			■	■														■	
Plastics	■																						■																
Printing Plates																																						■	
Pulp and Paper Mills																								■	■	■	■											■	
Rubber																																						■	
Steam Power				■	■		■	■		■	■												■		■														
Steel / Iron			■	■	■	■						■											■				■		■	■	■								■
Sulfuric Acid			■	■																																			
Textiles			■				■																																
Utilities																																						■	
Valuable Mineral Mining												■																										■	
Wastewater Treatment Plants			■						■	■	■												■	■		■	■		■	■								■	

5.3 Considerations for Settleability Testing

Projects planning to discharge carriage return water from hydraulic dredging projects back to surface waters may need to perform column settling tests to gauge the retention time needed to settle out suspended or particulate matter. Information on settleability is needed to assist in reviewing settling pond plan designs. Column settling test protocols and the techniques used to evaluate the test results may be found in the U.S. Army Corps of Engineers' (ACOE's) Testing Manual on "Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities" (see Section 9.3 for reference).

5.4 Considerations for Elutriate and Leach Testing for Contaminants of Concern

Wisconsin Administrative Code NR 347.06 (6)(b) specifies that sediment elutriate testing for parameters listed in Table 1 of the code may be required. Potentially required for a WPDES permit, elutriate testing may be needed to determine whether carriage return water will meet water quality based effluent limits or surface water quality criteria in Wisconsin Administrative Code NR 105. It is also potentially required to meet the groundwater standards in Wisconsin Administrative Code NR 140. In some cases, the Waste & Materials Management Program also needs elutriate test results. The elutriate test results provide information for evaluating the mobility of contaminants of concern in sediment to the water column (surface water) or to groundwater. Waste Management and wastewater staff should be consulted as early in the project review as possible, in order to determine whether elutriate testing of any type is desirable.

Depending on the questions that need to be answered about the potential impacts to particular environmental media, the elutriate testing methodologies differ. The effluent elutriate test, the Toxicity Characteristic Leaching Procedure, and the Synthetic Precipitation Leaching Procedure are some common elutriate and leach tests. Table 3 below outlines the issues each test may be expected to address:

Table 3. Summary of Elutriate Testing Methodologies

Type of Test	Evaluation
Effluent Elutriate Test (EET)	<u>Carriage return water</u> quality from a hydraulic dredging operation, to either surface or groundwater
Synthetic Precipitation Leaching Procedure (SPLP)	<u>Leachate or runoff</u> from an upland confined disposal facility
Toxicity Characteristic Leaching Procedure (TCLP)	<u>Hazardous Waste Classification</u>
Filtration of Sediment Slurry (0.45 μm filter) as defined in WPDES General Permit	<u>Wastewater evaluation</u>
Hanging Bag method	<u>Wastewater evaluation</u>

Effluent Elutriate Test – The effluent elutriate test (EET) is a sample preparation procedure designed to simulate the quality of water discharged as effluent from a confined disposal facility (CDF) and accounts for geochemical changes occurring in the CDF during active disposal operations. It is most recently referenced in the ACOE Upland Testing Manual (EL TR-03-1), Appendix B; and may also be called the ‘modified elutriate’ test. It is appropriate for dredging that involves fine-grained sediment which requires extended settling time. The effluent elutriate test requires that a volume of site water is collected along with the sediment sample.

The EET should be done on a proportional composite sample of all sediment to be removed, which is diluted with water from the site. The methods of analysis for the contaminants should be those approved for wastewater in Wisconsin Administrative Code NR219. The results need to be sensitive enough to be compared with the water quality criteria in Wisconsin Administrative Code NR 105. In addition to contaminants, total suspended solids (TSS) in elutriate must also be reported.

If the EET is run after the dry weight data have been screened for contaminants of concern, it may not be possible to adhere to the holding times specified in Wisconsin Administrative Code NR 219 from the time of sample collection. Samples should be frozen after initial aliquots are taken for other analyses.

5.4.1 Less Common Leach Tests

The following tests were developed for sediment sites with higher levels of contaminants such as Superfund, hazardous waste or spill sites. These tests are not commonly used at most dredging sites.

Toxicity Characteristic Leaching Procedure (TCLP) SW 846, Method 1311 - The purpose of the TCLP test is to determine if a solid waste exhibits hazardous characteristics as defined by the federal Resource Conservation and Recovery Act (RCRA). This test will determine whether dredged material might be classified as a hazardous waste. The waste is leached with an acidic solution similar to conditions found in a landfill. The resulting leachate quality is used to assess the potential of toxic constituents in a waste material to contaminate groundwater and cause environmental or health concerns. Regulatory levels for 39 compounds in the leachate have been established in Wisconsin Administrative Code NR 605.08(5)(b) (Table 1). The waste-to-water ratio in the TCLP test is 1:20. To estimate the maximum leachable concentration, divide the total concentration in dry weight sediment analysis by 20. If the estimated maximum leachable concentrations exceed the regulatory levels, then the TCLP test needs to be performed on the sediment to determine if the sediment may be hazardous waste. Historically, dredged materials seldom fail the TCLP test, and the test results are not good predictors of actual leaching behavior or leachate composition for material not disposed of in a landfill. If there is a concern that the material may or could be hazardous waste, the TCLP test could be performed on the sediment samples with the highest concentration of contaminants of concern. Some landfills may require specific testing requirements, such as TCLP, prior to accepting dredge materials for disposal.

Synthetic Precipitation Leaching Procedure (SPLP) SW 846, Method 1312 - This test procedure is commonly used to predict the leaching of contaminants from waste materials from soil by rainfall. It may be a better test to predict contaminant leachability for material not disposed of in a landfill than the TCLP test. It has been used in the past to simulate carriage return water. The SPLP uses the same equipment as the TCLP test, but is run at the pH of

rainfall instead of simulating the more acidic conditions of a landfill. The SPLP can be used for both organic and inorganic contaminants. Sediment contaminated with volatile organic compounds (VOCs) can be analyzed using this method, by using the zero headspace vessel option.

The results from an SPLP test may be compared directly to Wisconsin Administrative Code NR 140 groundwater preventative action levels (PALs) and enforcement standards (ESs), or may be used to calculate a site-specific residual contaminant for a given disposal area. Consult with Waste & Materials Management Program or Remediation and Redevelopment Program staff for additional information on application of the test and interpretation of the test results.

Other Leach Tests - Other leaching test methods are also available. The ASTM D3987-85 method is a shake extraction method that is similar to the SPLP, and can be performed with distilled water, tap water, or other aqueous media. It may provide a more accurate method to simulate slurry condition due to hydraulic transport. This might be useful for assessing effects of return water flows. The ASTM D4874-95 method is a column test, which can also be performed with distilled water, tap water, or project water. It may simulate leaching of the dredged material after placement in a non-landfill disposal environment.

6. Sampling Procedures

6.1 Number of Samples

The number of samples necessary to characterize the sediments at a particular project is not specified in Wisconsin Administrative Code NR 347 (except for beach nourishment, see last paragraph below), and is left to the professional judgment of Department program specialists. **Table 4** provides general recommendations for the number of initial core samples, based on the volume of proposed dredging. The exact number of samples should be determined by factors and circumstances specific to each site. If existing information or data suggests that there are significant contaminants present in the project area or vicinity, and if there is reason to believe that these contaminants are elevated to levels that may be of concern to humans or aquatic organisms during dredging or disposal, additional samples should be required.

The project scale and site geomorphic conditions should guide the selection of the number of and types of samples. The Water Management Specialists and program specialists should be able to weigh existing knowledge from the site, site complexity and the project scale to guide decision-making for sampling needs. A very small project, e.g., 100 cubic yards on a channel in a recreational lake where past chemistry has shown little contamination may be characterized in a single core sample, if any. In contrast, a project in an urban stream site covering ½ mile will likely call for a greater number of cores than shown in Table 4. Note that for linear sites, collection of additional samples may be required to properly characterize the sediment for disposal and benthic recovery even though the volume planned for removal is less than the volume/number of core samples specified in Table 4.

For some contaminated sediment remediation projects, the sampling design may be determined by the state or federal regulatory programs under which the removal is being done. Some examples include federal Superfund law, state hazardous substances Spill Law (s. 292.111, Wis.

Stats.), state Environmental Repair law (s. 292.31, Wis. Stats.) and state Groundwater law (s.160.23 and 160.25, Wis. Stats.). In cases involving contaminated sediments, the number of samples may be greater than recommended in Table 4, in order to define the vertical and lateral extent as part of the remedial investigation, and for determining the actual volume of contamination to be removed.

Table 4. General Recommendations for Initial Number of Core Samples

VOLUME PLANNED FOR REMOVAL in CUBIC YARDS	NUMBER OF SEDIMENT CORES*
3,000-10,000	3 or less
10,000-30,000	3
30,000-100,000	5
100,000-500,000	6
500,000-1,000,000	8
>1,000,000	>8

* Recommendation of sediment segmentation is provided in Section 6.2. In addition, the project size, in terms of area, will also affect the number of sediment cores required to be collected.

The Department may request that the applicant collect reference or control samples outside the project area. This is especially true where the preliminary review of information suggests that some background sediment contamination is likely (e.g., PAHs are often elevated in urban settings). Ideally, the reference site should have similar physical, geological, and biological characteristics as the project sediments. If the applicant anticipates disposing of the dredged material at a location other than in a landfill, it may be useful for the applicant to collect a background sample and compare contaminant concentrations between the dredged material and the disposal site.

Wisconsin Administrative Code NR 347 specifies the number of samples to be collected at the proposed beach nourishment site, for use in particle size (grain-size) and color matching of the proposed dredged material and the beach substrates. Wisconsin Administrative Code NR 347.06 (3)(d) requires a sample to be collected every 250 linear feet of the beach nourishment disposal area, with a minimum of two samples. The code does not specify the number of sediment samples from the proposed dredging site. Beach nourishment disposal following NR 347.06 is allowed in the Great Lakes (Lake Michigan & Lake Superior) for the purpose of adding, replenishing or preventing erosion of beach material. Beach nourishment disposal is also allowed on select pre-approved beaches on islands within the Mississippi River to replenish sand that has been lost to wave action. Such placement is governed by the procedures and limitations within the Channel Maintenance Management Plan of the St. Paul District USACE, and must be consistent with approved Beach Plans and also requires approval by the Corps' On-Site Inspection Team. This practice may not be used in other waters of the state, because of the concern with loss or harm to aquatic life, habitat and spawning locations. In some cases,

beneficial use of clean sediment has been used for habitat restoration projects like the Cat Island Chain Restoration Project in Green Bay or the Habitat Restoration and Enhancement Projects on the Mississippi River.

6.2 Sample Collection and Handling Methods

The method of collecting sediment samples and handling samples after collection is described in Wisconsin Administrative Code NR 347.06(4) and NR 347.06(5), respectively. The samples should be taken with a core sampler or other device that takes a vertical, continuous length of sediment. The thickness of sediment cores should extend 2-feet below the proposed dredging depth to determine if any contaminants will be left exposed or potentially available at this interface upon completion of the project. If bedrock or parent hardpan materials prevent obtaining the bottom 2-foot materials, then the materials between the dredging depth and the bedrock or hardpan regardless sediment thickness will be used for analysis. Distinct sediment strata in the core profile based on field observation of physical appearances (e.g., texture or coloring) should be separated out as distinct segments for analysis based on Wisconsin Administrative Code NR 347.06(6)(a).

The applicant must provide a written description including depth from sediment core surface, odor, texture, and color of any strata visually observed in the core profile in the sampling result report submitted to the Department under Wisconsin Administrative Code NR 347.06(4)(e). If there are no distinct strata or the strata are not of any significant thickness, the core sample should be divided into 2-foot long segments for analysis of the specified chemical and physical parameters. Under Wisconsin Administrative Code NR 347.06(6)(a), the Department has flexibility to approve other sub-sampling methods if they are found to be appropriate. Photographing the core and documenting any odors are additional useful methods of recording and evaluating sediment condition.

Sediment samples can be collected with a commonly used coring device, such as push corer with Lexan tubes. Upon retrieval, sediment samples should be well mixed before being placed in sample containers. Stainless steel or aluminum pans and mixing tools should be used. The testing laboratory needs to be contacted for the type of sample containers for different parameters and methods of preservation and temporary storage. Often sediment samples are required to be stored in cool conditions at 4°C or below all the time until received by the laboratory. That means samples should be kept in cold condition during transportation. Additional information regarding sample handling method can be found in Wisconsin Administrative Code NR219.

If multiple sediment cores from the same sampling location are needed to provide sufficient sample amount, materials from the same depth segment can be combined or composited. Combining samples from different sampling stations into a composite sample should be avoided, as this will cause difficulties in evaluating spatial distribution of contaminants if present in the project area.

There are a number of guidance documents available for sediment sampling that can provide important considerations on collections techniques, sample handling and volumes necessary for analysis by parameter. USEPA has numerous useful publications, including “Methods for

Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual” [USEPA, 2001].

7. Evaluation of Analytical Results

Once an applicant submits the analytical results in a report in accordance with Wisconsin Administrative Code NR 347.07(1), DNR staff will review the data to determine if all applicable information has been provided according to NR 347.07(2). Depending on final dredging and disposal options selected by applicants the results will be evaluated against criteria, standards, and guidelines established or adopted by the Department.

During the evaluation process, in order to make a correct decision the Department may request additional site information from the applicant. There is potential that additional sediment sampling and analyses may be required when evidence of contamination is present based on the submitted sampling results (Wisconsin Administrative Code NR 347.07(3)). The additional sampling and analyses are often required when the submitted report indicates that high levels of contaminants were detected. The additional sampling will assist with better defining the degree and extent of the contamination for making management decisions.

7.1 Sediment Quality Guidelines for Evaluation

Currently there are no state or federal promulgated numeric criteria for determining contaminated versus non-contaminated sediment. Pollutants at various levels can have differing effects depending on site conditions. Sediment quality guidelines have been developed by a number of agencies and researchers in the past decade [e.g. MacDonald et al., 2000 and Long & Morgan, 1991] along with reviews of how the guidelines can be used [e.g. Peddicord et al., 1998].

The Department’s Contaminated Sediment Standing Team published guidance in 2002 entitled “Consensus-Based Sediment Quality Guidelines: Recommendations for Use & Application.” (DNR Publication WT-732 2002). The CBSQGs can assist staff in making an initial evaluation of sediment sampling results. The results for each sample parameter are compared with the effect level concentrations described in the CBSQGs document. In the event that a project’s analytical results exceed sediment quality guidelines, further evaluation of the risk may be necessary. Post-dredge confirmation sampling may also be required to ensure contaminant concentrations are at an acceptable level for aquatic organisms as outlined in the CBSQGs. If sediment monitoring is conducted and high concentrations of PCBs, mercury, dioxin/furans or other bio-accumulating chemicals are found, this information should be provided to the regional water quality biologist and fish contaminant specialist to determine if fish contaminant monitoring is warranted.

7.2 Background Levels and Reference Sites

In addition to the CBSQGs, it is often useful to review background levels of chemical concentrations at reference sites when evaluating sediment sample results. For instance in many parts of the state, sediment background levels of arsenic, copper, cadmium, chromium, lead, nickel, and mercury can exceed the threshold effects concentration. In cases where chemical concentrations are naturally influenced from watershed geology, the ubiquitous background

concentration should override the CBSQG threshold effect concentration (TEC) value in assessing the sediment quality.

It may be to the applicant's advantage to obtain enough samples from adjacent or upstream areas in order to calculate a maximum probable background concentration (MPBC) in order to evaluate the significance of the concentrations observed from within a proposed dredge project boundary. The MPBC is the 95% upper confidence limit (UCL) of the mean of a data set of background concentrations for a given chemical parameter.

Regional databases or site-specific background data may also be used to define the parameters for analyses described in this document. If a contaminant (for example PCBs), in a given watershed is rarely detected, and if the waterbody in question is not on a fish and wildlife consumption advisory list, it may be appropriate to waive PCB analysis for projects located in the watershed or region. However, as the size and potential impact of a dredging project increases, the analytical list will become more comprehensive regardless of whether background data suggests a potential problem.

7.3 Anomalous Data

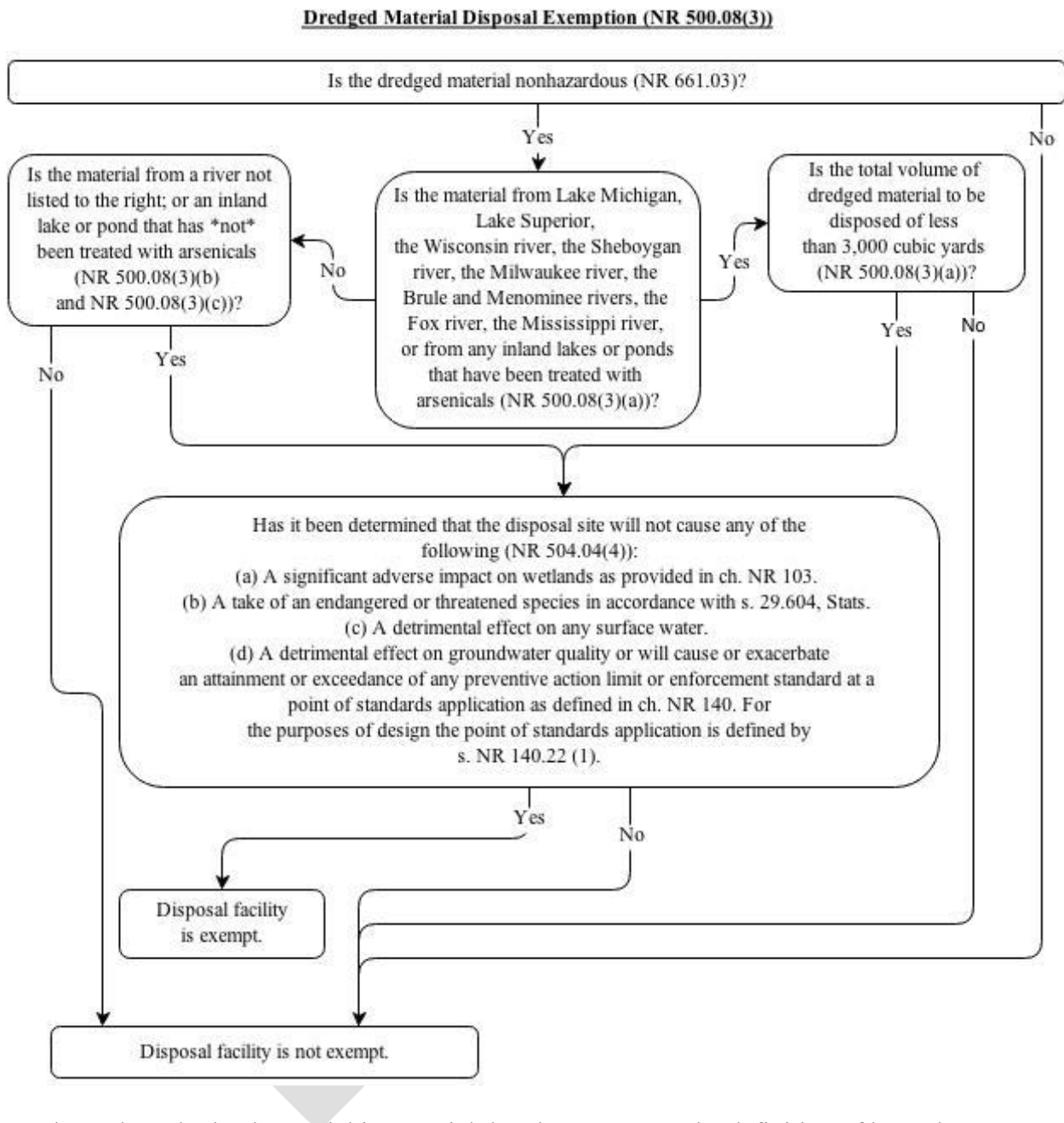
In reviewing sediment data chemistry, at times a spike in one or more parameters can occur at locations where it was not observed in other samples or expected given the knowledge of the site and other relevant data. An example is a spike in lead in a rural non-industrial lake. The lead source may have been from lead shot or fishing weight fragments. Anomalous results can also be the result of sampling and analytical quality assurance problems, sample handling, or laboratory errors. While contaminants above levels of concern are not desirable, the reviewers should weigh the risk associated with the prevalence of the contaminant (history, number of samples, concentration), and the risk from removal, handling and disposal in regulatory decision-making. The Dredging Management Team and program experts must be consulted in the interpretation of sediment data that may indicate environmental concerns.

8. Evaluation for Disposal of Dredged Material

8.1 Codified Solid Waste Exemptions Under Wisconsin Administrative Code NR 500.08(3)

Most dredge projects meet the codified exemption criteria in Wisconsin Administrative Code NR 500.08(3). In these cases, material disposal is not subject to licensing and plan review by the Waste & Materials Management Program. However, there are waterway restrictions, volume restrictions, and performance standards outlined in Wisconsin Administrative Code NR 504.04(4), which must be met. The applicant must determine compliance with the exemption criteria and provide that information to the Water Management Specialist. If exempt, the Chapter 30 permit will include a finding that the exemption criteria have been met. See the flow chart below (Figure 3).

Figure 3. Dredged Material Disposal Exemption (NR 500.08(3))



Nonhazardous dredged material is material that does not meet the definition of hazardous waste as defined by Wisconsin Administrative Code NR 661.03. The most likely way that dredged material would be a hazardous waste is if certain compounds leach out of it under specific kinds of tests (toxicity characteristic leaching procedure tests, or TCLP). Unless the dredged material comes from a site that has been subject to a spill or a release from certain industrialized activities, it will typically be classified as nonhazardous.

Note that nonhazardous dredged materials may be contaminated with pollutants. Dredged material which meets the solid waste exemption under Wisconsin Administrative Code NR

500.08(4), may contain concentrations of contaminants which exceed human health direct contact standards in Wisconsin Administrative Code NR 720. Non-landfill disposal of dredged material exceeding direct contact standards could result in future liabilities.

Reuse of the material should be considered and could be an easy way to show compliance with the exemption criteria. Dredged material has been reused in projects including:

- fill under a parking lot or road;
- fill under a building foundation; and,
- material to improve grades on a closed landfill.

In certain cases, if PCB concentrations in sediment are 50 mg/kg or greater, dredged material from the project would be subject to waste management regulations under the federal Toxic Substances Control Act (TSCA) in addition to state regulations (Wisconsin Administrative Code NR 500 and NR 157). Management of this material would require approval by USEPA Region 5 as well as the Department.

For remediation projects being conducted under Superfund authority, disposal of dredged material within the Superfund project area would be subject to Superfund preemption and thus, formally regulated under Superfund. If a chosen disposal is located outside the Superfund project area, it would be regulated either as a licensed solid waste landfill under Wisconsin Administrative Code chapters NR 500 to 520 or under a statutory exemption under s. 289.43(8), Stats.

8.2 Considerations for Formal Waste & Materials Management Program Review

If the project is not eligible for exemption under Wisconsin Administrative Code NR 500.08(3), the material must be disposed of in a Department approved disposal facility such as a landfill or dredge material disposal facility. The Waste & Materials Management Program may approve of non-landfill disposal of select dredged material through a low-hazard grant of exemption in accordance with NR 500.08(4) and S. 289.43(8) stats. A low-hazard grant of exemption requires formal review of proposed plans for the disposal site, and the approval usually contains conditions of approval. See DNR publication “Exempting Low-Hazard Wastes from Solid Waste Regulations” Publication WA-1645.

The Department’s Waste & Materials Management representative will review sediment analytical results and may ask for additional testing in order to fully characterize the waste. Decisions are based on professional judgment and information known about contaminant properties and their leachability.

Generic characteristics of disposal options expected by the Waste & Materials Management Program may include the following:

- de-watering of dredged material as much as possible;
- compliance with the performance standards outlined in Wisconsin Administrative Code NR 504.04(4);
- confined to as limited an area as practicable;
- confined to as limited a volume as practicable;

- cover with clean soil if necessary to prevent erosion and direct contact, with thicker covering (1 to 3 feet) when there is concern for human contact; and,
- post-project reporting to document location, cover, volumes, changes made, etc.

Low-hazard grant of exemptions for dredged material disposal or use have included the following:

- Fill under a parking lot or road;
- Fill under a building foundation;
- Material to improve grades on a closed landfill;
- Ingredient in construction materials like concrete or asphalt;
- Earthen fill covered by clean soil in areas that will not be developed for residential use;
- Mine/quarry reclamation.

Landspreading of dredged material is possible under Wisconsin Administrative Code NR 518, or the statutory low-hazard waste exemption in s. 289.43, Stats., if there are low levels of contamination and the material is determined to have value as a soil conditioner or fertilizer. A written approval is needed from the Department to landspread any non-exempt dredged material.

Sediment that is collected and removed from storm water management structures is regulated as accumulated sediment under Wisconsin Administrative Code NR 528, not under NR 347. (See links for Wisconsin Administrative Code NR 528 in Section 9).

8.3 Sediment Sampling and Analyses for Consideration of Formal Wastewater Program Review

Sediment samples are collected and analyzed for additional review under the Wisconsin Pollutant Discharge Elimination System for discharge of carriage or interstitial water generated from dredging projects. If evaluation of sediment sample results indicate that the sediment is contaminated, either a general or individual WPDES permit will be required. The level of contamination may affect wastewater treatment requirements. A fact sheet for the general permit has been developed and is available on-line:

(http://dnr.wi.gov/topic/wastewater/documents/46558_fs.pdf) as part of the general WPDES Permit No. WI-0046558-05-0 (<http://ua.dnr.wi.gov/topic/wastewater/GeneralPermits.html>).

If evaluation of analytical results indicates the sediment is not contaminated, exemption of WPDES permit is possible. However, even if sediment is determined not to be contaminated, best management practices should be followed in order to minimize the impact of suspended sediment generated by active dewatering within the project area. Appendix B details the conditions for a potential WPDES permit exemption and recommended best management practices during dredging operations. In addition, the dredging permit applicant is encouraged to contact the Department regional wastewater engineer for more information.

8.4 Sediment Sampling and Storm Water Discharge Permit Review

In general, regardless of chemical analyses results, in many cases site preparation of staging areas to process dredged materials and at disposal sites will create a land disturbance of one acre or greater. A Construction Site Storm Water Discharge General Permit is required for this activity. The construction site permit requires that landowners install practices to help decrease the amount of soil and sediment that may enter Wisconsin's waterways during construction projects. Land disturbance during a construction project exposes bare soil which can erode during storm events. Best Management Practices help decrease the amount of soil that runs off during a storm event.

In some cases, the disposal site may be regulated as a Non-Metallic Mining Operation (NMMO). In these cases it is important that the regional storm water engineer or specialist be contacted because many of the NMMO's currently hold an Industrial Storm Water Discharge General Permit for their mining activities. Consideration for the addition of dredged material disposed at these sites would need to be incorporated in the Storm Water Pollution Prevention Plans (if applicable), or the storm water contaminant controls operations. Please note the NMMO General Permit is administered by both the Storm Water & Wastewater Management Programs.

Note that many municipalities have erosion control and storm water management ordinances authorized under Wisconsin Administrative Code NR 216 and NR 151. Proper permits may need to be obtained from the local agency.

8.5 Sediment Sampling and Analyses for Formal Review of Invasive Species

Invasive species have the potential to directly or indirectly cause economic or environmental harm, including harm to native species, biodiversity, natural scenic beauty, and natural ecosystem structure, function or sustainability. They can harm the long-term genetic integrity of native species; the recreational, commercial, industrial, and other uses of natural resources in the state; and the safety or well-being of humans, including vulnerable or sensitive individuals. It is important as part of the dredging project to consult with the Invasive Species Coordinator to ensure invasive species are identified, classified and controlled as part of the dredging project per Wisconsin Administrative Code NR 40.

9. References

9.1 List of online links to Administrative Codes, Rules and Guidance Documents relevant to dredging projects:

This document:

<http://dnr.wi.gov/files/pdf/pubs/wt/wt0778.pdf> (a place holder)

State Statutes:

<http://docs.legis.wisconsin.gov/statutes/statutes/160.pdf>

<http://docs.legis.wisconsin.gov/statutes/statutes/283.pdf>

<http://docs.legis.wisconsin.gov/statutes/statutes/289.pdf>

<http://docs.legis.wisconsin.gov/statutes/statutes/292.pdf>

Administrative Codes:

NR 40: http://docs.legis.wisconsin.gov/code/admin_code/nr/001/40.pdf

NR 105: http://docs.legis.wisconsin.gov/code/admin_code/nr/100/105.pdf

NR 149: http://docs.legis.wisconsin.gov/code/admin_code/nr/100/149.pdf

Wisconsin Certified Laboratory List:

http://dnr.wi.gov/regulations/labCert/documents/LabLists/AllTechRpt_.pdf

NR 151: http://docs.legis.wisconsin.gov/code/admin_code/nr/100/151.pdf

NR 157: http://docs.legis.wisconsin.gov/code/admin_code/nr/100/157.pdf

NR 216: http://docs.legis.wisconsin.gov/code/admin_code/nr/200/216.pdf

NR 219: http://docs.legis.wisconsin.gov/code/admin_code/nr/200/219.pdf

NR 347: http://docs.legis.wisconsin.gov/code/admin_code/nr/300/347.pdf

NR 500: http://docs.legis.wisconsin.gov/code/admin_code/nr/500/500.pdf

Low-Hazard Waste Exemption Guidance document:

<http://dnr.wi.gov/news/input/documents/guidance/LowHazardGuidance.pdf>

NR 528: http://docs.legis.wisconsin.gov/code/admin_code/nr/500/528.pdf

Guidance document: <http://dnr.wi.gov/files/pdf/pubs/wa/wa1375.pdf>

Resources on DNR's website

Surface Water Integrated Monitoring System (SWIMS):

<http://dnr.wi.gov/topic/surfacewater/swims/>

WPDES General Permits: <http://dnr.wi.gov/topic/wastewater/GeneralPermits.htm>

Wetlands & Waterways website:

<http://dnr.wi.gov/topic/Waterways/construction/dredging.html>

Storm Water Permit Website: <http://dnr.wi.gov/topic/stormwater/>

Bureau of Remediation and Redevelopment Tracking System database:
<http://dnr.wi.gov/botw/SetUpBasicSearchForm.do>

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General Internet Links

This guidance document was written to provide sampling recommendations for relatively common and straightforward cases. In cases requiring substantial sediment dewatering and/or upland disposal in a confined disposal facility, we recommend following the guidance documents listed below, in addition to consulting with staff from waste management, wastewater, and watershed management programs. These references are in addition to those presented in the sections 1-8 above.

U.S. Environmental Protection Agency: <http://www.epa.gov/glnpo/sediments.html>

Corps Engineering Manuals: <http://el.ercd.usace.army.mil/dots/>

9.2 Sediment Sampling and Evaluation

U.S. Army Corps of Engineers, January 2003. Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities - Testing Manual. ERDC/ EL TR-03-1. Washington, D.C.
<http://el.ercd.usace.army.mil/dots/pdfs/trel03-1.pdf>

U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, 1998. Evaluation of Dredged Material Proposed For Discharge in Waters of the U.S. - Testing Manual: Inland Testing Manual. EPA-823-B-98-004. Washington, D.C.
<http://www.epa.gov/ost/itm/itmpdf.html>

U.S. Environmental Protection Agency. 2001. Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual. EPA 823-B-01-002. Washington, D.C.
<http://www.epa.gov/waterscience/cs/collection.html>

Wisconsin Department of Natural Resources, 1997. Interim Guidance on the Use of Leaching Tests for Unsaturated Contaminated Soils to Determine Groundwater Contamination. PUBL RR-523 1997. Bureau of Remediation and Redevelopment. Madison, WI.
<http://dnr.wi.gov/files/PDF/pubs/rr/RR528.pdf>

Wisconsin Department of Natural Resources, 2001. "Consensus Based Sediment Quality Guidelines" http://dnr.wi.gov/topic/brownfields/documents/cbsqg_interim_final.pdf

9.3 Risk Assessment and Sediment Quality

- Long, E.R., and L.G. Morgan. 1991. The potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52. National Oceanic and Atmospheric Administration. Seattle, Washington.
- MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. *Archives of Environmental Contamination and Toxicology*. 39:20-31.
- Moore, D.W., T.S. Bridges, and J. Cora. 1998. Use of risk assessment in dredging and dredged materials management. Technical Note DOER-RI. U.S. Army Engineer Waterways Experiment Station. Vicksburg, MS.
- Peddicord, R.K., C.R. Lee, and R.M. Engler. 1998. Use of sediment quality guidelines (SQGs) in dredged material management. Dredging Research Technical Note EEDP-04-29. Long-Term Effects of Dredging Operations (LEDO) Program. U.S. EPA, U.S. Army Corps of Engineers, Vicksburg, MS
- U.S. Environmental Protection Agency. Guidelines for ecological risk assessment. EPA/630/R95/002F. April 1998. Risk Assessment Forum.
- Wisconsin Department of Natural Resources. 1992a. Background document on assessing ecological impacts and threats from contaminated sediments. PUBL-WR-322-93.
- Wisconsin Department of Natural Resources. 1992b. Guidance for assessing ecological impacts and threats from contaminated sediments. PUBL-WR-321-93.
- Wisconsin Department of Natural Resources. 2002. Consensus-Based Sediment Quality Guidelines: Recommendations for Use & Application. Developed by the Contaminated Sediment Standing Team. December 2003. PUBL-WT-732 2002.

Appendix A

Pre-Application Summary Sheet Reviewer Checklist

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A-1. PRE-APPLICATION SUMMARY SHEET

Note: This sheet and following checklists are provided here as a means for keeping track of preliminary application requirements, as well as other information useful for the processing of dredging permits. It is intended for use by DNR staff and applicant or applicant contractors.

Refer to Applicable Statutes and Codes for Exact Requirements

General Information

Facility/project Name: _____

Name of Waterbody: _____

County: _____

Project location: _____ 1/4 section of _____ 1/4 section, T _____ N, R _____ E/W,

Latitude/Longitude (Decimal degrees) _____

Estimated volume of material to be dredged:
_____ cubic yards

Brief description of proposed dredging method and equipment to be used:

Brief description of proposed dredged material disposal method and location, if an approved disposal facility (CDF, Licensed landfill) is to be used the name, location, and size of facility:

Include any previous sediment sampling (including field observations) and analysis data from the area to be dredged, neighboring areas, or the proposed disposal site if known.

Attach a map showing the area to be dredged, the depth of cut, the location of proposed sediment sampling sites, and the bathymetry of the area to be dredged.

Anticipated starting and completion dates of the proposed project: Start: _____
Completion: _____

A-2. REVIEWER CHECKLIST for DREDGING PERMIT APPLICATION

Preliminary Application Review Questions	RESPONSE				
NR 347 required information	Yes	No	NA	Unk	COMMENTS
Is the description of the proposed dredging method and equipment to be used adequate:					
<p>Is the description of the proposed dredge material disposal method and location adequate?</p> <p>If an approved disposal facility (CDF, Licensed landfill) is to be used have they included the name, location, and size of facility?</p>					
Does the application include previous sediment sampling (including field observations) and analysis data from the area to be dredged, neighboring areas, or the proposed disposal site?					
Does the application include a map showing the area to be dredged, the depth of cut, the proposed specific sediment sampling locations, and the bathymetry of the area to be dredged?					
Does the application include anticipated starting and completion dates of the proposed project?					<p>Start: _____</p> <p>Completion: _____</p>

ITEMS	RESPONSE				
In assessing potential contaminants in sediment and the possible need for and specifics in a sediment sampling plan (sampling locations, parameters, collection method) have the following been taken into consideration:	Yes	No	NA	Unk	Comments
<p>The current and past land uses on the surrounding watershed.</p> <p>Please include a description of current and historic land use practices in the area (residential, agricultural, industrial etc.), and if possible estimated percentages of each land use.</p>					
<p>Have surface waters historically been treated with copper and arsenic-containing herbicides or herbicides that may have contained dioxins as an unwanted manufacturing byproduct?</p>					
<p>The results of sediment sampling previously conducted in the location to be dredged and nearby locations (if available). Are the data included?</p>					
<p>Records of past spills and discharges (point and nonpoint) from various sources, and nearby areas known to be contaminated, consider checking the R&R programs BRRTS database.</p>					
<p>Is the location of the dredging project within the boundaries of, or in the vicinity of, any Superfund, Resource Conservation and Recovery Act (RCRA), or Remediation and Redevelopment Program site?</p>					
<p>Are there known or suspected contaminated groundwater plumes from landfills and other sources (current and historical)?</p>					
<p>Are there current or past industrial, municipal and stormwater outfalls (consult with the local DNR wastewater engineer)? Please show locations of outfalls on your map.</p>					

ITEMS	RESPONSE				
Is there a brownfield project in vicinity of the proposed project site?					
Levels of naturally-occurring elements in soil and sediment of the watershed and common contaminants (e.g., PAHs, PCBs, and heavy metals including lead and zinc) from anthropogenic sources.					
<p>Is the proposed project in one of the five designated Great Lakes Areas of Concern (Milwaukee Estuary and Harbor, Sheboygan River, Menominee River at Marinette, Lower Fox River and Green Bay, or St. Louis River Estuary at Superior)?</p> <p>If yes, check for and if available review specific management plans such as Remedial Action Plans (RAPs) or Lakewide Area Management Plans (LAMPs):</p>					
<p>Are there any fish and wildlife public health advisories issued for the water body involved? If yes, please identify them.</p>					
<p>Might a former manufactured gas plants be located adjacent to the area and potentially discharged wastes including coal tars into the waterway?</p>					
<p>Wastewater and Waste Management regulations may require certain sampling data to characterize the dredged material for determining dewatering and disposal options:</p>					

Has the applicant included in the preliminary application the following:	Yes	No	NA	Unk	Description
Appropriate maps, aerial photographs, or other graphics that show surface watercourses and groundwater flow patterns, land use, building locations, and other features.					
Justification for not sampling or a proposed sampling plan:					
Does the proposed sampling plan contain:					
<ul style="list-style-type: none"> • Sampling locations: 					
<ul style="list-style-type: none"> • Sampling methods 					
<ul style="list-style-type: none"> • Parameters to be analyzed (physical and chemical) 					

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ITEMS	RESPONSE*				
	Yes	No	NA	Unk	Description
Might the dredged material disposal result in:					
<i>A significant adverse impact on wetlands?</i>					
Name of DNR staff contacted, date & reply/response					
<i>A significant adverse impact on fisheries?</i>					
Name of DNR staff contacted, date & reply/response					
<i>A significant adverse impact on water quality?</i>					
Name of DNR staff contacted, date & reply/response					
<i>A significant adverse impact on waste water (carriage water)?</i>					
Name of DNR staff contacted, date & reply/response					
<i>A significant adverse impact on storm water (dredge material dewatering)?</i>					
Name of DNR staff contacted, date & reply/response					
<i>A significant adverse impact to a critical habitat area (endangered or threatened species)?</i>					
Name of DNR staff contacted, date & reply/response					
<i>Spread of invasive species (ch. NR 40)?</i>					
Name of DNR staff contacted, date & reply/response					
<i>A detrimental effect on groundwater quality?</i>					
The migration and concentration of explosive gases in excess of 25% of the lower explosive limit for any gases?					
The emission of any hazardous air contaminant exceeding limitations in s. NR 455.04 or 455.05?					
Will the disposal result in a direct contact exceedance of one or more parameters in ch. NR 720?					
Will the disposal occur in an area of historical or archeological significance?					

* Unk = unknown

Appendix B

Dredging Guidance _WPDES permit

The purpose of this guidance is to identify the circumstances where coverage under the WPDES general permit for “Carriage and/or Interstitial Water Resulting from Dredging Operations” WI-0046558 is not required, and to clarify the meaning of some dredging activities and expressions. Also refer to the attached “Illustration of configuration of dredging containment BMP” for examples.

The WPDES Permit is not required when the following two factors are met:

1. The sediment is uncontaminated in accordance with the sediment characterization under sections 3.2 or 3.3 of the WPDES dredging general permit. A determination of uncontaminated sediment may be met in two ways:
 - The concentration of all the contaminants of concern required for testing under the guidance document “*Sediment Sampling and Analysis for Dredging Application and Approval*” must be less than the threshold effect concentration. The optional elutriate testing may not be used to change this determination, because the concern is with whether the sediment is contaminated and not whether the contaminant partitions into the water fraction.
 - If the sediment is believed to be uncontaminated, but no sediment characterization data is available to confirm this, other documentation must be provided to support a determination the sediment is uncontaminated. Only in special situations will the department accept a determination of uncontaminated sediment without any actual sediment analysis data (for example, sediment from a water body known to have high water quality, no history of wastewater discharges, no other activity that could contaminate the sediment, or it consists of course material). Note, even if WPDES permit program determines data isn’t necessary, data may be required for other purposes, such as for the solid waste program to determine the disposal options.
2. The carriage and/or interstitial water from dewatering is discharged within a “dredging containment area”¹. To keep material within the dredging area, the dredging operation must include best management practices (BMPs) to create a contained area, and appropriately manage and contain suspended solids within this dredging containment area to the maximum extent possible. Discharges from dredging operations, including dewatering from a barge, could be contained within a turbidity barrier, silt curtain, bubble curtain, cofferdam, caisson, or other BMP that can prevent suspended solids generated by dredging operations from moving into the water body outside the dredging containment area BMP. The requirement for using proper BMP’s to contain the sediment would be included in the Chapter 30 dredging permit.

- Barges located inside the dredging containment area: In some cases the barge (used for dredging, material storage, or a combination of dredging/material storage) may be located and operated within the dredging containment area BMP. In this situation, WPDES permit coverage is not required for dewatering discharges from barges (even if they are unsealed) because the suspended solids that are discharged remain in the dredged area. It is recommended that larger dredging areas be divided into smaller operational cells, with each cell dredged in sequence, in order to better manage suspended solids. The containment BMP would then be moved from cell to cell, once the sediment in the active cell has settled sufficiently to eliminate turbidity such that the water quality is visually equivalent inside and outside the cell's containment BMP. Alternatively, the containment BMP could surround the entire dredging area that consists of multiple cells. It should be noted that if dredge operators determine that creating and maintaining a "contained dredging area" is not feasible due to site conditions or other reasons, they also have the option of using a sealed barge.

¹ "Dredging containment area" is defined as that area of the water body bed that is disturbed by dredging operations, and is surrounded by best management practices (BMPs) within the water body to prevent the release of suspended solids and turbidity plume outside the BMP.

- Barges located outside the dredging containment area: In some cases, the barge may be located and operated outside the dredging containment area. In this situation, if the dredged material is placed on the barge, WPDES permit coverage is not required if the barge is sealed and dewatering wastewater and materials are not directly discharged outside the containment area. Only minor incidental leakage is allowed from the barge outside the containment area without WPDES permit coverage. Dewatering wastewater from the sealed barge may be collected and discharged back into the dredging containment area without WPDES permit coverage because the suspended solids from the dredged material area remain in the dredged area. The method of discharge from the barge back to the containment area cannot cause BMP failure or impact the ability of the BMP to adequately function. If dewatering wastewater is discharged into the water body outside the dredging containment area, then WPDES permit coverage is required because suspended solids are discharged outside of the dredging area (either from an unsealed barge used to store/transport dredged material, or otherwise directly discharged. Note: Under the WPDES dredging general permit, the dewatering discharge from dredged material off of the barge must comply with the suspended solid limit of 80 mg/L; therefore, monitoring is required (see section 3.3.1 of the WPDES permit).

Rationale for no permit required:

If the discharge from the barge meets the criteria for dredging uncontaminated sediment, and the barge or any discharge from it is contained within a BMP containment area, a WPDES permit is not required. The department believes under this situation any discharge from the barge does not constitute a discharge of pollutants because:

- The ch. 30 permit authorizing the dredging contains a condition for a BMP (usually a turbidity barrier) to adequately prevent environmental pollution.
- The discharge of the suspended solids is completely contained in the area disturbed by dredging.
- The discharge consists of native uncontaminated suspended solids.
- Suspended solids are settled within the area disturbed by dredging.
- The characteristics of the discharge from dewatering on the barge are similar to the suspended solids plume created from the dredging operation within the water in the containment area.
- There is no net addition of a pollutant.
- The sediment is not contaminated with other pollutants.

In the case of commercial navigation dredging on the Mississippi, Black and St. Croix Rivers conducted as part of the U.S. Army Corps of Engineers project subject to Ch. 30.202, discharge from barges is exempted from WPDES permitting. A Memorandum of Understanding (MOU) includes water quality effluent controls such as baffles, drop structures, ponding and hydraulic pipe management. Mississippi River main channel dredge cuts are predominantly sands (see Figure X) and are routinely sampled for bulk chemistry. The discharge occurs in an area impacted by routine dredging and by commercial navigation traffic, which causes benthic sediment disturbance through prop wash, shifting substrate conditions, and resuspension from boat wakes.

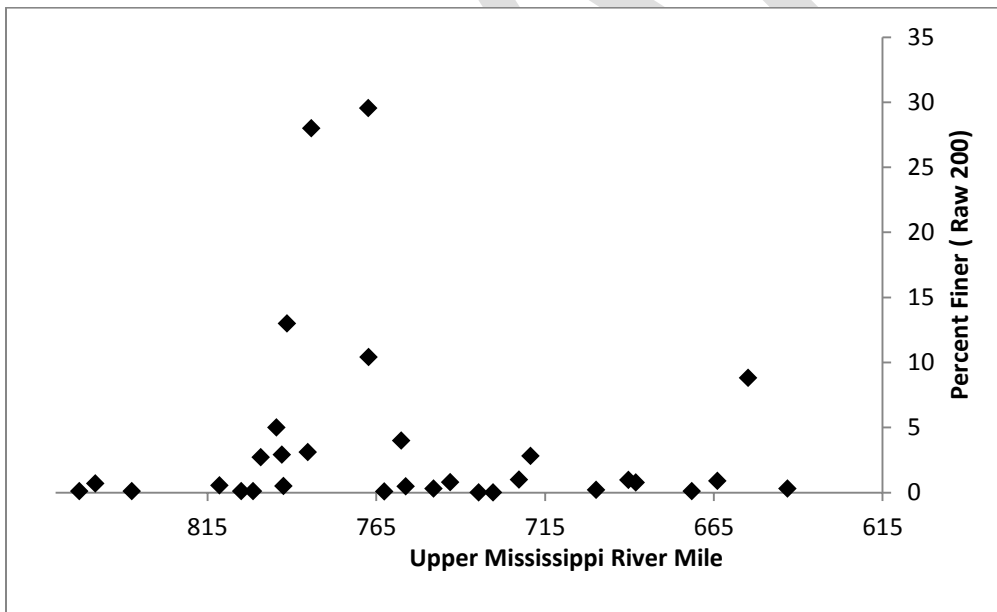


Figure X. Grain sizes percent finer than P200 sieve (~0.08mm) for main channel dredge cuts from the Mississippi River (data primarily 1989-2008). River mile 857.6 is upstream limit of ACOE 9-ft channel project. River mile 0 is confluence of Ohio River at Cairo, IL.

Clarifying notes:

Discharges from mechanical dredging that consists of incidental leakage of water from clam shell buckets, backhoes, barges, or other equipment used to remove or temporarily store dredged material are exempt from the WPDES permit. Leakage is defined as the minor amounts of water that may discharge from the movement of the clam shell bucket or backhoe while dredged material is removed from the water body and placed onto a barge or onshore. This includes the minor amounts of water that may runoff the barge during dredging or while in transit to an onshore dewatering facility. Discharges from intentional dewatering are not leakage. Barges shall be water tight to prevent the runoff of interstitial water from the dredged material, except if operated within a dredging area containment BMP.

Dredging with a clam shell bucket or backhoe should be done in a manner to minimize the amount of leakage returned to the water body due to the concern of suspended solids release that is preventable. An environmental bucket should be utilized for all contaminated sediment whenever the quality of the dredged material allows it (no interfering debris), and is recommended for uncontaminated sediment. The clam shell bucket or backhoe should be moved quickly to deposit the dredged material onto a barge or onshore receiving area to minimize leakage into the water body. The bucket should not have holes for intentional drainage to promote dewatering unless it is operated within a dredging area containment BMP.

A WPDES permit will always be required if the sediment is characterized as contaminated under sections 3.2 or 3.3 of the WPDES permit. The rationale used for the 'no permit required' scenario isn't applicable to contaminated sediment, because of the concern the contaminant will be reintroduced into the water column at concentrations exceeding the background. In these cases, it is likely that a wastewater treatment system will be needed which will have to be approved by the Department. The dredging area containment BMP's would not prevent the increased concentration of known pollutants from spreading and causing water quality impairment.

Illustration of configuration of dredging containment BMP

When dredging sediment, it may be advisable to limit the spread of suspended sediment by using physical barriers around dredging operations. Such barriers may be appropriate for minimizing adverse impacts. Water seeping from material placed on a barge or from active in-place dewatering needs to be controlled in compliance with WPDES requirements and best management practices. A WPDES permit may not be needed if control methods are used to prevent sediment particles from entering the drainage stream.

The following definitions and accompanying figures illustrate various dredging scenarios:

Dredging Area – Where dredging and on-site material loading and storage take place before transport for disposal. This is the area of sediment disturbance. The Dredge Area may be the same as the Project Area in some instances.

Dredging barge – Barge used for containing the dredging equipment.

Material barge – Where dredged materials will be loaded, temporarily stored, and dewatered before disposal. A truck might be used instead of a barge in certain circumstances. Sometimes, the material barge is combined with dredging barge.

Dewatering discharge – Water purposely discharged from material barge to water column.

Containment BMP – Turbidity barriers, such as silt curtain, cofferdam and etc.

Figure 1. Containment BMP installed around the entire project area - Material barge stays in the project area for dewatering (note: dredging barge can be operated outside the dredging containment BMP)

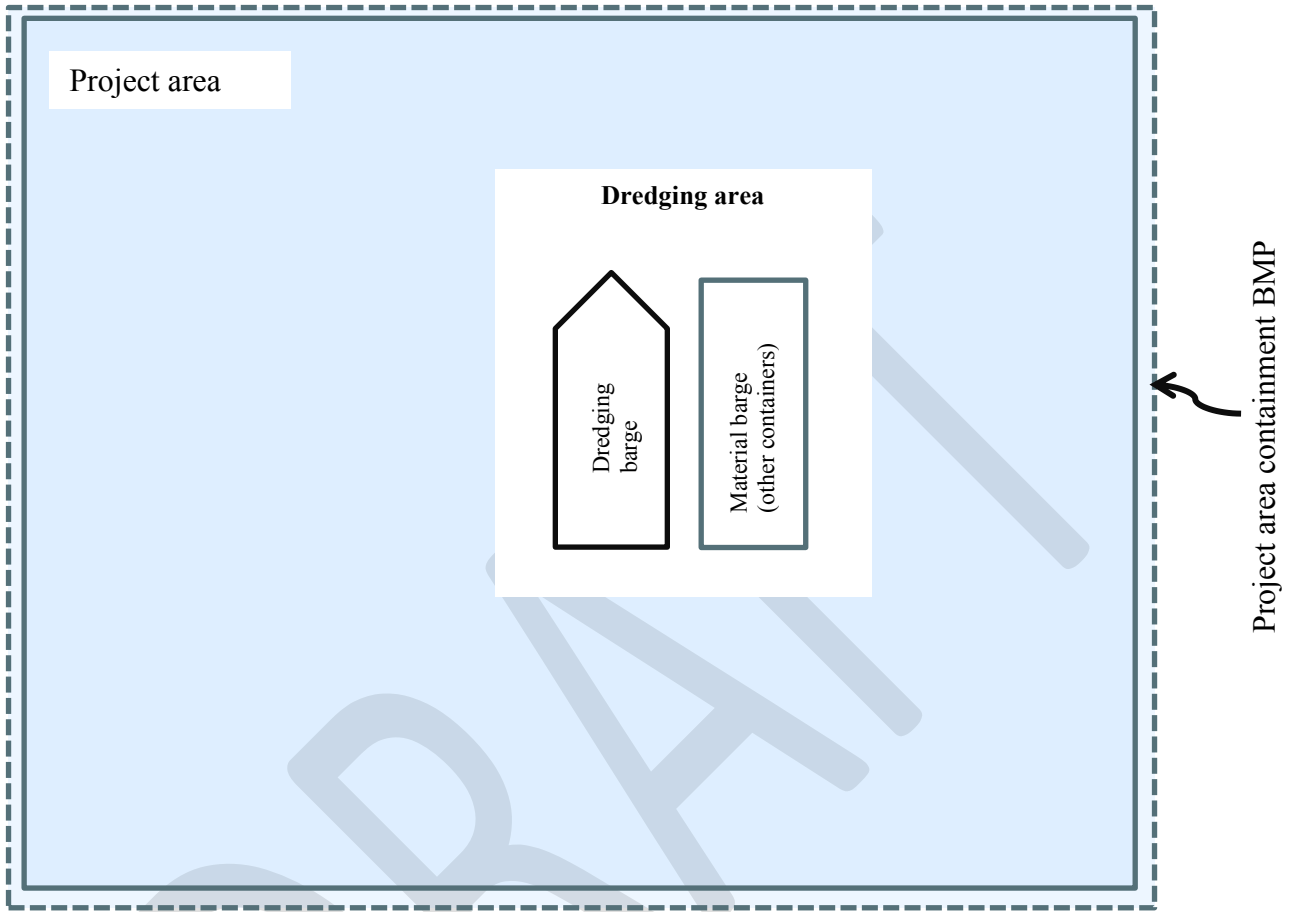


Figure 2. Containment BMP installed around dredging barge and material barge as separate units - Material barge stays in the project area for dewatering (note: dredging barge can be operated outside the dredging containment BMP)

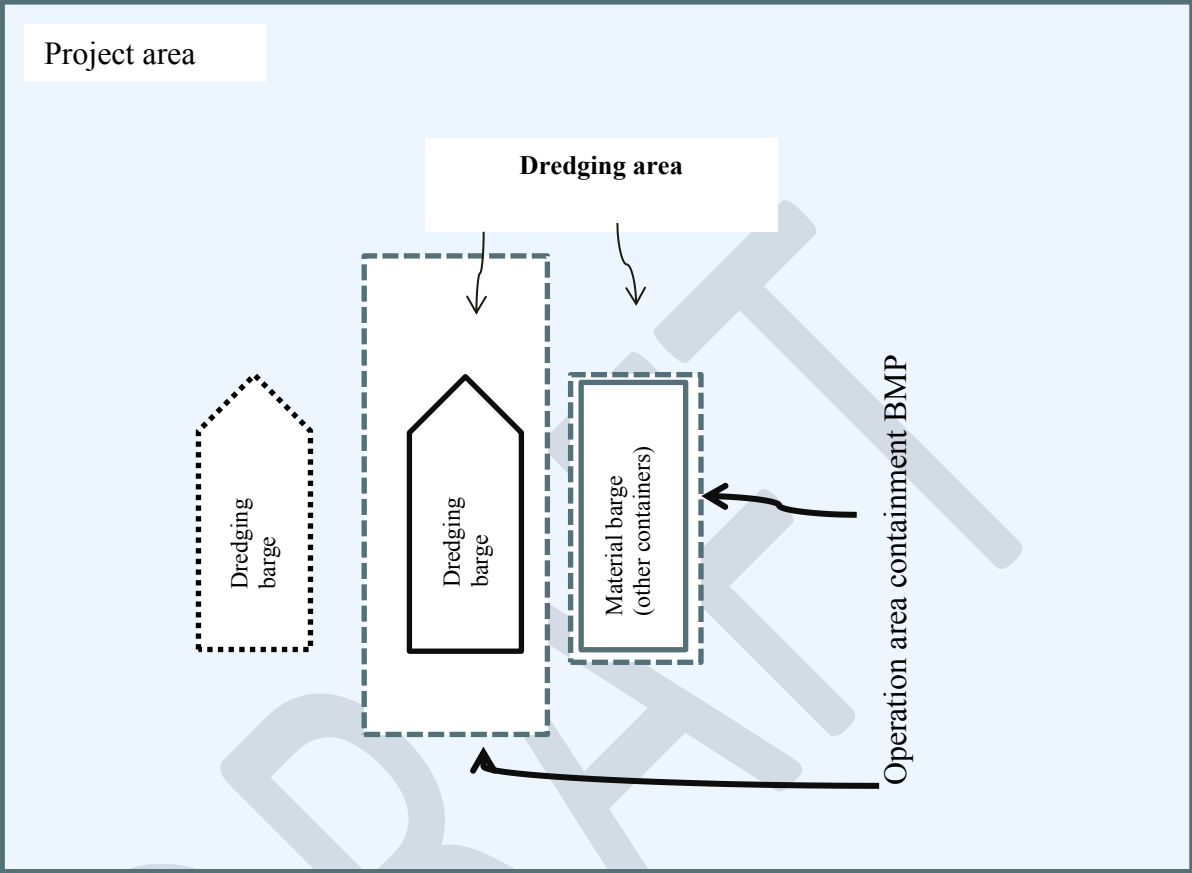


Figure 3. Containment BMP installed around dredging barge and material barge as one unit - Material barge stays in the project area for dewatering (note: dredging barge can be operated outside the dredging containment BMP)

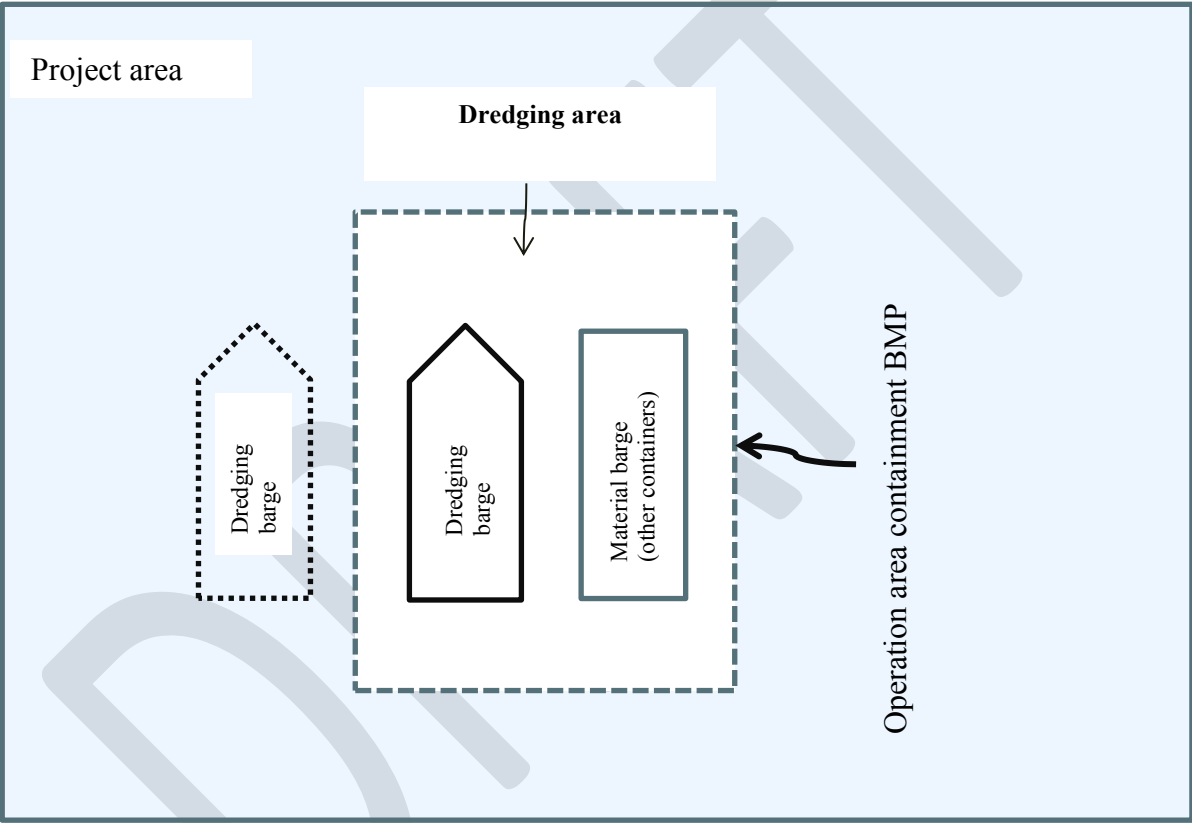


Figure 4. Containment BMP installed around dredging barge - Water from material barge is actively returned back to the contained area (note: dredging barge can be operated outside the dredging containment BMP)

