



Summit on the Beneficial Use of Dredged Materials: Turning a Surplus Material into a Commodity of Value

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Steering Committee

- Dr. Teresa Adams, UW-Madison
- Dr. Ernie Perry, UW-Madison
- Gene Clark, UW-Madison Sea Grant Institute
- Dave Knight, Great Lakes Commission
- Steven Krebs, Wisconsin DOT
- Sherrie Walz, Wisconsin DOT
- Tony Friona, USACE
- Craig Forgette, USACE
- Greta Smith, AASHTO
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- Marc Tuchman, US EPA
- Steve Galarneau, Wisconsin DNR
- Joe Cappel, Port of Toledo
- Dr. Richard Stewart, UW-Superior
- Dr. Habib Tabatabai, UW-Milwaukee
- Dr. William Likos, UW-Madison
- Jim Weakley, Lake Carriers Association

SUMMIT ON THE BENEFICIAL USE OF DREDGED MATERIALS: TURNING A SURPLUS MATERIAL INTO A COMMODITY OF VALUE

EXECUTIVE SUMMARY

Dredged material management options for commercial ports, particularly those involving confined disposal facilities or other long term or permanent placement, are diminishing. Many existing Great Lakes disposal facilities serving these ports are at or near capacity and high costs plus limited new site availability make prospects for new or expanded capacity increasingly unlikely. According to a February, 2012 analysis by the U.S. Army Corps of Engineers, at least six of the Great Lakes largest cargo-handling ports – Duluth/Superior, Calumet Harbor, Saginaw, Toledo, Lorain and Cleveland – are in “critical” status, meaning that dredged material management issues could “severely restrict channel availability within 5 years.” Another six ports – Green Bay, Sheboygan, Port Washington, Milwaukee, Rouge River and Ashtabula – have “pressing” needs that could restrict channel availability in ten years.

Implications of these restrictions to freight movement in the North American mid-continent are serious. Some 175 million to 200 million tons of primarily bulk commodities – including iron ore, coal, stone, petroleum products, chemicals and grain – are moved annually on the Great Lakes St. Lawrence Seaway system. Great Lakes marine transportation supports some of North America’s most important core industries including steel manufacturing, automotive, construction and agriculture. For many Great Lakes bulk cargo movements, sheer volume precludes shifts to other surface transportation modes.

Given the declining placement capacity, “disposal” of non-toxic dredged material into existing disposal facilities is no longer feasible as an ongoing management practice. Reuse or recycling of material suitable for beneficial use has emerged as the most practical approach to sustainable dredged material management in the region. One factor favoring increased beneficial use is the improving physical quality of the material; however this message needs to be shared with potential users who historically have not utilized this material in the past. Major partners in the freight coalition are state departments of transportation.

Goals:

The goals of this project were to conduct a forum which would provide the introduction and discussion of the following beneficial use of dredged material information and potential uses in state transportation projects:

- Describe the current crisis (especially in the Great Lakes) of dredged material placement and disposal options

- Describe currently available, forward looking technology to assess and enhance suitability of dredged material for beneficial reuse
- Provide examples of successful beneficial reuse of dredged materials most relevant for state transportation project applications
- Discuss the applicable state and federal policy issues affecting both regulatory issues surrounding, and social acceptance of, beneficial reuse of dredged material
- Resources available to promote and implement beneficial reuse
- Provide the opportunity for state transportation department feedback on how dredged material could be used in state DOT projects and what types of testing would be required for approval
- Initiate efforts for draft memorandums of understanding to facilitate the beneficial use of dredged material by the appropriate departments

The forum for this project was a two-day (March 14 PM – March 15th AM, 2013) meeting held in Louisville, KY following the Mid America Freight Coalition meeting being held at the same location earlier that week. Specific attendees invited included members from:

- Major port authorities and harbor commissions
- Leading dredged material management experts from the Corps of Engineers' Engineering Research and Development Center
- CFIRE program leaders and research affiliates
- State Department of Transportation Materials and Environmental section members
- Federal, state and local regulatory agencies (EPA, state departments of natural resources, etc.)
- Private sector marine transportation agencies (MARAD, Lake Carriers Association, barge operators, etc.).

Project Outcomes:

The underlying rationale for the *Beneficial Use of Dredged Material Summit* was that disposal is no longer a practical approach to dealing with uncontaminated dredged material from navigation dredging projects in many locations, and that beneficial reuse has emerged the best pathway to an affordable, sustainable management strategy. The summit was designed to further define and promote the practice of beneficial use of dredged material, particularly by state departments of transportation (DOTs), by 1) providing updated information on current research and development, 2) discussing relevant state and federal policy, 3) presenting case studies of successful beneficial use involving DOT involvement in a variety of regional settings, and 4) exploring strategies for expanding DOT consideration of dredged material for beneficial use.

To characterize the criticality of dredging to commercial navigation, Marie Strum, assistant chief, engineering and technical Services, U.S. Army Corps of Engineers (USACE) Detroit District, presented an overview of the USACE dredging program in the Great Lakes. Of the 140 federally maintained harbors in the system (60 commercial, 80 recreational) 82 are currently in need of maintenance dredging, including at least four major commercial ports and scores of

recreational harbors in critical condition. Adding to the urgency were water levels at historic lows at the time of the summit due to drought and evaporation from increased water and air temperatures.

Economic analysis of USACE dredging in the Great Lakes has documented a \$335 million return from an investment of \$41 million, for a benefit/cost ratio of 8:1. Confined disposal facilities (CDFs) in the Great Lakes – 80 percent of which are full – cannot be relied upon much longer due to USACE budget constraints, and local inability to provide cost share. Additionally, GL dredged material is increasingly cleaner as pollution sources are mediated, thus lessening the need for confined disposal and creating more opportunity for beneficial use.

From the vessel operators' perspective, James Weakley, president of the Lake Carriers' Association, provided slides demonstrating a "perfect storm" facing cargo carriers in the Great Lakes, including decreased USACE operation and maintenance budgets, disallowance of congressional adds (earmarks) and the worsening low water conditions. He noted the loss of carrying capacity, and thus operating efficiency, resulting from each inch of lost draft. Also noted was the continued importance of Great Lakes marine trade to the North American economy, the fact that 50 percent of U.S. steel manufacturing is in the Great Lakes region and relies on Great Lakes maritime transportation, and that the marine mode is still greatly superior to rail and truck in the areas of fuel efficiency and toxic emissions.

Dennis Wilmsmeyer, executive director of America's Central Port near St. Louis provided perspective from the inland river system, noting that his facility has operated for 55 years and is currently building an additional brand new harbor facility using much of the material from the construction site to build new levies and provide coverage for an ash placement site.

A significant portion of the summit focused on current research on the science and technology of beneficial use of dredged material, and featured national experts in the field. Richard Price, research agronomist for the USACE Engineer Research and Development Center, discussed the physical and chemical characteristics of dredged material that relate to its suitability for beneficial use. He noted that all dredged material is ultimately a product of how the source watershed is used and managed, thus differences between agricultural and industrial uses will be reflected in the chemistry of the material.

While all dredged material can be used for something (though treatment may be more costly in some settings than others) the goal should be to determine the level of suitability through testing. Most dredged material, he noted, is good for growing, with appropriate additives usually readily available to DOTs such as cellulose and bio-solids. And while there is much uncertainty among DOTs and other state agencies regarding the use of dredged material, they should acknowledge the existence of some 40 years of R&D supporting the science behind risk-based management of this practice.

William Likos, Ph.D., associate professor at the University of Wisconsin-Madison College of Engineering presented research underway on development of a framework for use of dredged material for DOT projects. The objective is to match the material properties of available material

with specific project needs. The framework will include 1) applications for beneficial use in transportation projects, 2) required geotechnical properties, 3) geotechnical laboratory and field methods, 4) quantitative specifications for transportation applications and 5) Great Lakes locations where sourced. Challenges in acceptance of beneficial use were highlighted by a survey of DOT personnel in which 62 percent responded that they would not consider dredged material as a substitute for traditional material sources. Also noted was the fact that the greatest energy use and greenhouse gas emissions in DOT projects are generated by the production of materials.

The summit featured a number of case studies demonstrating successful application of beneficial use practices:

Robert Stanley, soils engineer for the Iowa DOT, reported how dredged material was used in an emergency response to successfully fill a scour hole caused by damage to the IA 175 bridge during the Missouri River flood of 2011.

Julie Bishop, environmental program supervisor in the Palm Beach County (FA) office of environmental resources management, presented numerous dredging projects involving use of dredged “muck” as a commodity with value, including Lake Worth Lagoon, Peanut Island and Snook Island. Particularly noteworthy was use of dredged material to restore and/or create wetland habitat, enhance fisheries and restore benthos to generate mitigation credits in support of other FA DOT project work.

Dean Haen, director of the Brown County (WI) Port and Resource Recovery Department, gave a presentation on the use of dredged material from navigation channels serving the Lake Michigan port of Green Bay to restore an offshore chain of islands, thereby not only creating some 270 acres of wildlife habitat, but also providing 30 years of dredged material placement capacity for the port.

Matthew Dalon, project engineer for Ocean & Coastal Consultants, presented examples of beneficial use in the New York-New Jersey are, including NY/NJ harbor where one to two million cubic yards of material are dredged annually and all is used beneficially, primarily for site remediation after processing. Distinction was made that dredged material is not a type of material, but a source of material.

The summit also included discussion on federal and state policy and regulatory perspectives, including an informational presentation by Jan Miller of the USACE Great Lakes Ohio River Division on meeting the non-federal cost share for beneficial use projects. Dr. Richard Stewart, co-director of the Great Lakes Maritime Research Institute at the University of Wisconsin-Superior outlined comparative state policies toward the practice of beneficial use.

Completing the summit was a roundtable discussion on how beneficial use can best be promoted and used by state DOT's, and how best to use such vehicles as memorandums of understanding (MOUs) to encourage state DOT's to adopt beneficial use as a sustainable approach to dredged material management.

Agenda (Updated 1-28-13)

National Center for Freight and Infrastructure Research and Education (CFIRE)

Beneficial Use of Dredge Materials Summit Louisville, KY March 14-15, 2013		
Thursday March 14		
1:00 p.m.	Welcome and introductions	Gene Clark, UW Sea Grant Institute
1:15 p.m.	<p>Scope of Dredging Material Disposal Problem & Benefits of the Material Use From a DOT Perspective</p> <p>Criticality of a <u>sustainable</u> dredged material management strategy to commercial navigation in North America: Why now? What are the benefits to State DOT's?</p> <ul style="list-style-type: none"> • Current status of dredging backlogs caused by diminished dredged material management disposal options, low water, material is cleaner • Impact of inadequate dredging on commercial marine transportation 	<p>Marie Strum, USACE</p> <p>James Weakley, LCA Dennis Wilmsmeyer, America's Central Port</p>
2:15 p.m.	<p>The Current "State of the Art" of Dredged Material Beneficial Use</p> <ul style="list-style-type: none"> • Current research data on suitability of dredged material for beneficial use • Framework for Desirable DOT Material Properties 	<p>Richard Price, ERDC</p> <p>Dr. William Likos, UW</p>
3:15 p.m.	Break	
3:30 p.m.	<p>Beneficial Use in Practice (20 min each): (Emphasize DOT Uses & Opportunities)</p> <ul style="list-style-type: none"> • Construction Uses • Iowa DOT BU Examples • Florida BU Examples • New Jersey DOT BU Examples • Green Bay (WI) BU Examples 	<p>Dick Lee, President and CEO of RSMT</p> <p>Robert Stanley, Iowa DOT</p> <p>Julie Bishop, Palm Beach Co.</p> <p>Scott Douglas, New Jersey DOT Office of Maritime Resources</p> <p>Dean Haen, Green Bay Port Director</p>
5:15 p.m.	Adjourn for the day	

Friday, March 15

8:00 a.m.	Summary of Day One proceedings	D. Knight
8:15 a.m.	<p>Federal & State Policy and Regulatory Perspectives</p> <ul style="list-style-type: none"> • Meeting the non-federal cost share, and other financial/administrative issues • State Permit Process Map (With Examples) 	<p style="text-align: center;">Jan Miller, USACE</p> <p style="text-align: center;">Dr. Richard Stewart, UW-S</p>
9:15 a.m.	<p>Available Tools For Finding Appropriate Dredged Material For Beneficial Use</p> <ul style="list-style-type: none"> • GLC online product for identifying sources of suitable dredged material in Great Lakes CDF's & Ports; and promotional resources currently available • Updated Beneficial Use Technical Testing Manual 	<p style="text-align: center;">Dave Knight, GLC</p> <p style="text-align: center;">Richard Price ERDC</p>
10 a.m.	Break	
10:15 a.m.	<p>Exploring the way ahead</p> <ul style="list-style-type: none"> • Roundtable discussion on how beneficial use can best be promoted and used by State DOT's. How best to encourage State DOT's to adopt Use as a sustainable approach to dredged material management (Draft MOU'S?) 	All Participants (Led by Dave Knight & Gene Clark)
11:30 a.m.	Summary and follow up	Gene Clark & Dave Knight
12:00 p.m.	Adjourn	



Summit on the Beneficial Use of Dredged Material

March 14-15, 2013 – Louisville, KY

Objectives

Over three hundred million cubic yards of sediment need to be dredged from U.S. commercial harbors and connecting waterways annually to allow unimpeded marine freight transportation. As simple disposal is no longer a practical approach to dealing with uncontaminated dredged material in many locations, beneficial reuse has emerged the best pathway to an affordable, sustainable management strategy. This summit



conference, supported by the National Center for Freight & Infrastructure Research & Education, was designed to further define and promote the practice of beneficial use of dredged material, particularly by state departments of transportation (DOTs). Specific goals were to 1) provide updated information on current research and development relating to beneficial use of dredged material; 2) discuss relevant state

and federal policy; 3) present examples of successful beneficial use involving DOT involvement in a variety of regional settings; and 4) explore strategies for expanding DOT consideration of dredged material for beneficial use.

Day One

The criticality of dredging to commercial navigation

Marie Strum, assistant chief, engineering and technical Services, U.S. Army Corps of Engineers (USACE) Detroit District, presented **Great Lakes Dredged Material Management** (http://www.wistrans.org/cfire/documents/Strum_GreatLakesMaterialMgmt.pdf), an overview of the USACE dredging program in the Great Lakes. Of the 140 federally maintained harbors in the system (60 commercial, 80 recreational) 82 are currently in need of maintenance dredging, including at least four major commercial ports and scores of recreational harbors in critical condition. Adding to the urgency are water levels at historic lows due to drought and evaporation from increased water and air temperatures. Economic analysis of USACE dredging in the Great Lakes has documented a \$335 million return from an investment of \$41 million, for a benefit/cost ratio of 8:1. Confined disposal facilities (CDFs) in the Great Lakes – 80 percent of which are full – cannot be relied upon much longer due to USACE budget constraints, and local inability to provide cost share. Additionally, GL dredged material is increasingly cleaner as pollution sources are remediated, thus lessening the need for confined disposal and creating more opportunity for beneficial use.

James Weakley, president of the Lake Carriers' Association, provided the presentation **Great Lakes Maritime Task Force – Promoting Shipping On America's Fourth Sea Coast Since 1992** (http://www.wistrans.org/cfire/documents/Weakley_TaskForce.pdf) which was presented by **Gene Clark** (University of Wisconsin Sea Grant Institute). The presentation demonstrated the “perfect storm” facing cargo carriers in the Great Lakes, including decreased USACE operation and maintenance budgets, disallowance of congressional adds (earmarks) and the worsening low water conditions. He noted the loss of carrying capacity, and thus operating efficiency, resulting from each inch of lost draft. Also noted was the continued importance of Great Lakes marine trade to the North American economy, the fact that 50 percent of U.S. steel manufacturing is in the Great Lakes region and relies on Great Lakes maritime transportation, and that the marine mode is still greatly superior to rail and truck in the areas of fuel efficiency and toxic emissions.

Dennis Wilmsmeyer, executive director of America's Central Port near St. Louis presented **America's Central Port** (http://www.wistrans.org/cfire/documents/Wilmsmeyer_AmericasCentralPort.pdf) which provided the perspective from the inland river system, noting that his facility has operated for 55 years and is currently building an additional brand new harbor facility using much of the material from the construction site to build new levies and provide coverage for an ash placement site.

Current research on the science and technology of beneficial use of dredged material

Richard Price, research agronomist for the USACE Engineer Research and Development Center (ERDC) presented **Research on the Beneficial Use of Dredged Material** (http://www.wistrans.org/cfire/documents/Price_ResearchDredgedMaterials.pdf) which discussed the physical and chemical characteristics of dredged material that relate to its eligibility for beneficial use. He noted that all dredged material is ultimately a product of how the source watershed is used and managed, thus differences between agricultural and industrial uses will be reflected in the chemistry of the material. While all dredged material can be used for something (though treatment may be more costly in some settings than others) the goal should be to determine the level of suitability through testing. Most dredged material, he noted, is good for growing, with appropriate additives usually readily available to DOTs such as cellulose and bio-solids. While there is much uncertainty among DOTs and other state agencies regarding the use of dredged material, they should acknowledge the existence of some 40 years of R&D supporting the science behind risk-based management of this practice.

William Likos, Ph.D., associate professor at the University of Wisconsin-Madison College of Engineering presented **Beneficial Use of Dredged Materials in Great Lakes Commercial Ports for Transportation Projects** (http://www.wistrans.org/cfire/documents/Likos-Yu_GreatLakesCommericalPorts.pdf). This CFIRE funded research is underway on the development of a framework for use of dredged material for DOT projects. The objective is to match the material properties of available material with specific project needs. The framework will include 1) applications for beneficial use in transportation projects, 2) required geotechnical properties, 3) geotechnical laboratory and field methods, 4) quantitative specifications for transportation applications and 5) Great Lakes locations where sourced. Challenges in acceptance of beneficial use were highlighted by a survey of DOT personnel in which 62 percent responded that they would not consider dredged material as a substitute for traditional material sources. Also noted was the fact that the greatest energy use and greenhouse gas emissions in DOT projects are generated by the production of materials.

Beneficial use in practice

Dick Lee, RSMT and ERDC (ret.), presented **Beneficial Uses of Dredged Material** (http://www.wistrans.org/cfire/documents/Lee_BeneficialUses.pdf) which introduced a wide variety of potential uses for dredged material.

Robert Stanley, soils engineer for the Iowa DOT, presented **Iowa Experiences** (http://www.wistrans.org/cfire/documents/Stanley_IowaExperiences.pdf) which focused on how dredged material was used successfully to fill a scour hole in mitigation of damage at the IA 175

bridge from the Missouri River flood of 2011 as well as repair of a damaged road berm along the same road. He also discussed where dredged material was used in large quantities for the reconstruction of two additional US highways in Iowa.

Julie Bishop, environmental program supervisor in the Palm Beach County (FA) office of environmental resources management, presented **Beneficial Reuse Of Materials To Restore An Urban Estuary** (http://www.wistrans.org/cfire/documents/Bishop_UrbanEstuary.pdf) which discussed numerous dredging projects involving use of dredged “muck” as a commodity with value, including Lake Worth Lagoon, Peanut Island and Snook Island. Noted was use of dredged material to restore and/or create wetland habitat, enhance fisheries and restore benthos to generate mitigation credits in support of other FA DOT project work.

Matthew Dalon, project engineer for Ocean & Coastal Consultants, presented **A Decade of Experience with Beneficial Use in New Jersey** (http://www.wistrans.org/cfire/documents/Douglas-Dalon_NewJersey.pdf) for W. Scott Douglas, New Jersey Department of Transportation dredging program manager. Examples were given of beneficial use in the New York-New Jersey region, including NY/NJ harbor where one to two million cubic yards of material are dredged annually and all is used beneficially, primarily for site remediation after processing. Distinction was made that dredged material is not a *type* of material, but a *source* of material.

Dean Haen, Green Bay port director for the Brown County (WI) Port and Solid Waste Department, presented **Beneficial Use Overview: Green Bay, WI** (http://www.wistrans.org/cfire/documents/Haen_GreenBay.pdf) which discussed how some 150,000 to 250,000 cubic yards of material dredged annually from the port of Green Bay must be put to upland use, as CDFs and open water placement are not viable options. The result has been beneficial use of dewatered dredged material mined from the existing Bayport CDF, the capping of Renard Island with dredged material, a current project to create near shore habitat through the restoration of the Cat Island chain with clean dredged material, , and a potential use of dredged material for a state highway project. Noted was the fact that use of dredged material is particularly beneficial when it can save taxpayers’ money.

Day 2

Federal and state policy and regulatory perspectives

Jan Miller, USACE environmental engineer, presented **Meeting the non- federal cost share and other financial/administrative issues**

(http://www.wistrans.org/cfire/documents/Miller_FinancialIssues.pdf), covering such topics as the challenges facing beneficial use including costs comparative to other available materials, proximity

to project sites, and public acceptance. The federal standard/base plan was explained as the least costly dredged material management alternative that is both feasible from an engineering standpoint and environmentally acceptable. The base plan is important, as any costs above that for beneficial use typically involve a non-federal cost share.

Richard Stewart, director of the Transportation and Logistics Research Center at the University of Wisconsin-Superior, presented a **State permit process map** (http://www.wistrans.org/cfire/documents/Stewart-Mokashi_WIMNPermitting.pdf) comparing the processes in the states of Wisconsin and Minnesota to get all the proper permits and authorizations for a project using dredged material beneficially. The research included identification of all the agencies to be contacted, the testing and permits required, the time typically involved, what the two states' regulatory policies allowed for beneficial use, and how the process in the two states differed.

Available tools for finding appropriate dredged material for beneficial use

David Knight, contract ports and navigation specialist for the Great Lakes Commission, presented the online tool **Recycling Dredged Material in the Great Lakes** (<http://www.glc.org/rsm/>), which uses USACE data to identify on an interactive map all the federally authorized harbors in the Great Lakes, and all the confined disposal facilities (CDFs) for dredged material in the Great Lakes states, including vital data to promote beneficial use of the material such as the CDF owner/operator, physical characteristics of the material, and transportation access to the material. The website also has a feature that automatically identifies all the CDFs in a given distance when a potential DOT user enters a specific location.

Richard Price, research agronomist for the USACE Engineer Research and Development Center, presented the **Updated beneficial use technical testing manual** (http://www.wistrans.org/cfire/documents/Price_GuidanceDredgedMaterial.pdf) and provided guidance on how the federal government establishes the standards determining suitability of dredged material for beneficial use. Referenced was a four-part formula typically required for success in any beneficial reuse project: 1) technical feasibility, 2) legal and regulatory clearance, 3) public acceptance, and 4) economic benefit.

Exploring the way ahead

Gene Clark and **David Knight** led an open discussion on strategies to encourage and promote use of dredged material by state departments of transportation. Topics included:

- Further investigation of the use of dredged material to generate “mitigation credits” by creating or restoring habitat to offset loss of habitat in other DOT projects.

- Further investigation of monitoring and tracking material placed in CDFs to better identify specific geotechnical characteristics of material at different locations and strata of each CDF.
- Using as a model the best practices involved with management of fly ash and as an ingredient in the mixing of concrete.
- The challenge of establishing a “track record” of dredged material use for transportation projects, for DOT personnel wary of exploring new, untested approaches to project management even when regulatory guidelines are met.
- Characterize the physical properties of dredged material in terms of commonly used DOT material specifications such as AASHTO specifications.
- Investigate ways that dredged material can be “blended” or “processed” with other material in order to meet standard DOT specifications.

Appendix I: Green Bay Beneficial Use Newsletter

in this issue >>>

Issue
ONE



- Purpose of Dredging*
- Current Projects*
- Regulations*
- Qualities of Dredge Material*
- Beneficial Use*

An Insight Into the Beneficial Reuse of Dredge Material

in Depth



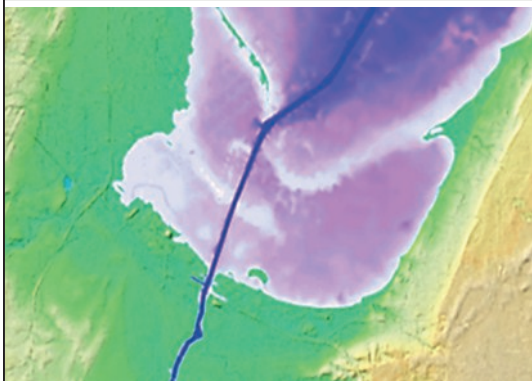
current topics >>>

Using Dredge Material for Your Project...

Dredge material can be used in many different types of projects. The Wisconsin Department of Natural Resources has granted a low hazard exemption to allow for many beneficial uses.

This material is a low cost alternative to traditional top soil products. The dredge material also contains many of the same nutrients added to traditional soil mixes. One of the limitations of this material is its inability to be used structurally. This result from the relatively loose pack characteristics of the material.

For more information call 920-492-4950



Purpose of Dredging

What is the impact of dredging on your community?

Dredge material is being generated at high rates in many port cities due to the necessity to perform navigational and/or recreational dredging. One of these ports is located in Green Bay, WI on the western most part of Lake Michigan and offers a direct route for shipments linking Midwest and international markets. The Port of Green Bay generates on average 170,000 cubic yards of dredge material each year. This material is removed from the bay in order to facilitate the movement of maritime traffic for the economic benefit of the area. In 2010, the Port of Green Bay was responsible for an economic impact of more than \$83 million and supported 823 jobs. The benefits of navigational dredging are very evident but the cost per cubic yard has steadily increased over the years,

which results in the continual pressure to store, dispose of or beneficially reuse this abundant commodity. If port cities are not able to keep up with the need for placing this material they may face the threat of closing their ports, which would be detrimental to the surrounding communities. These port cities are looking for ways to better use this material for the benefit of everyone in the community. One trend is that many local governments are now looking for opportunities to beneficially reuse this material. Brown County has invested effort in finding these opportunities while protecting the environment in the process. The material taken from Green Bay has also been evaluated for its chemical and physical properties. This allows for a use or disposal method to be chosen.

Dredge material is a valuable resource that can be used to promote a healthy environment while reducing the need for disposal.

Qualities of Dredge Material

Dredge material is defined as any non-remediation related material that is excavated or dredged at or below the ordinary high water mark of water basins, watercourses, or public waters.



Dredge material in the state of Wisconsin carries a stigma resulting from the Fox River Superfund site and the regulatory language associated with this material. By legislation labeling dredge material as a solid waste we limit the opportunities available for placement. Much of the material excavated from the bay of Green Bay originated from land and was transported due to erosion and runoff into our water bodies. This

material was once topsoil in your neighborhood or local farmland. Many of the qualities of dredge material show this connection to quality soil. Brown County has invested time and effort in determining the qualities of this material. One of the tests done was a greenhouse study that was used to determine if plant uptake the toxins within contaminated dredge material. This study showed no uptake of harmful chemicals or metals that would endanger the welfare of grazing animals. This study also revealed the nutrient content of the dredge material in relation to retail top soil. The quality of dredge material was shown to be very comparable to marketable top soils. This begs the question of why dredge material is treated as a waste stream instead of a valuable commodity. We have the ability to use this commodity without endangering the environment or human health. Many options exist but steps should be taken to relieve the burdensome stigma asso-

Beneficial Reuse

Beneficial reuse is defined as the specific utilization of a solid by-product as a resource, which constitutes reuse rather than disposal and does not adversely affect human health or the environment.



Land Creation

This option is a way to dispose of large quantities of dredge material while being contained. This option also allows for beneficial use of the land after closure of the site. In many cases this land can be used for positive community improvement. Previous projects throughout the country have used the land as amusement parks, recreational sites, or habitat improvement. This is a viable option for many areas and can also be an economic benefit to the area involved.

Landfill Topsoil

This is a popular option for communities that also have a solid waste program. The dredge material can be used for daily cover or even final cover at landfills, which serves multiple purposes. This is currently being done in Brown County at the East and West landfills for final cover and repair. This is an economical option for local government due to the reduction in top soil purchasing and placement of dredge material.

ask us >>>

Q: *Is there a danger with the use of dredge material?*

A: *There are fewer unknowns...*



In many ways dredge material may be safer to use. Currently our state regulations do not require the testing of top soil by suppliers that is used as fill at many project sites. The state does however require Brown County to test their material at fixed intervals so that decisions can be made on its use. Currently, this material is not allowed to be used in residential areas and must have a cap layer to prevent direct contact.

Cat Island Restoration Project

Historically, a 2.5-mile chain of small islands and shoals were located near the southern end of Green Bay. These islands and shoals provided protection for an extensive coastal wetland from damaging wave and storm effects. The lower Green Bay was considered one of the most diverse wetland areas in the Great Lakes ecosystem. The shallow waters and beds of aquatic vegetation provided habitat for many migrating birds, invertebrates, native fish, amphibians and mammals. Cat Island itself was documented to



have had many different colonial nesting bird species that used it for habitat, which contributed to one of the most diverse Great Lakes islands. Over the years, much of the island and wetland habitat has been degraded due to wetland filling, shoreline development, high water levels, erosion, and sedimentation. In addition, during the 1970s, catastrophic high water storm events destroyed much of the forested areas and eroded the islands. The project will create three islands that will form 272 acres of upland island refuge



for wildlife. The restoration will also help restore approximately 1,400 acres of coastal habitat. The project began construction in the spring of 2012. This will include the construction of the rock spine, which will be the basis for the rest of the project.



more progress >>>

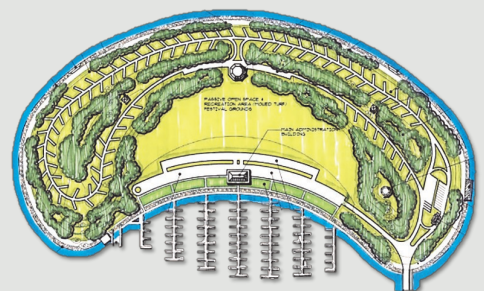
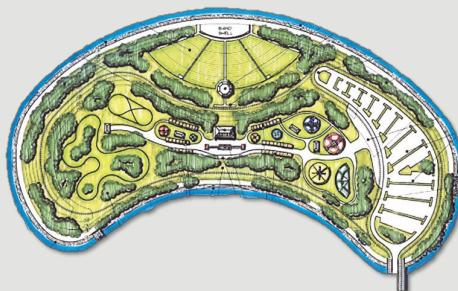
Regulations

In the state of Wisconsin, dredge material is characterized, for regulatory purposes, as a solid waste material in accordance with s. 289, Stats, which limits the options for placement and beneficial use. This characterization also carries a stigma when the public or other possible end users of this material are involved. The Wisconsin Department of Natural Resources (WDNR) governs regulations pertaining to testing and the beneficial reuse of dredge material. The three most applicable regulations are the following:

- ⊗ **NR 347: Sediment Sampling and Analysis, Monitoring Protocol and Disposal Criteria for Dredging Projects**
- ⊗ **NR 538: Beneficial Use of Industrial Byproducts**
- ⊗ **NR 500: General Solid Waste Management Requirements**

Renard Island

Recently, Brown County received a \$2 million Great Lakes Restoration Initiative (GLRI) grant to begin the closure process, which will reduce the amount of exposure at the surface to biological life and will reduce further release of PCBs to the bay. The Army Corps of Engineers provided \$2.7 million to create a temporary causeway to provide a transportation route for the trucks hauling sediment. During 2010-11, nearly 335,000 cy of dredge material was hauled to Renard Island for positive drainage and to act as a barrier between existing contaminated sediments and the clean final cover. To finish the closure process the County must secure another \$3.1 million to transport an additional 178,000 cy of clean fill. Once the final closure is complete an end use plan may be developed to beneficially use the island.



finalthoughts...

Dredge material is no longer something we simply throw away. At a time when communities are looking for innovative ways to recycle and maintain or improve the current environmental condition, we must look for new ways to beneficially reuse materials that were once seen as waste.

Brown County is constantly looking for new ways to use dredge material in local projects. With the help of the community we can help resolve problems associated with dredging activities. This document will help explain our perspective on the use of dredge materials and will hopefully foster a line of communication with the community on our current projects and the possibilities of new ones. We look forward to hearing

from you with new ideas or your interest in using some material for your next endeavor. Please feel free to contact us at Brown County Port and Solid Waste with your input.

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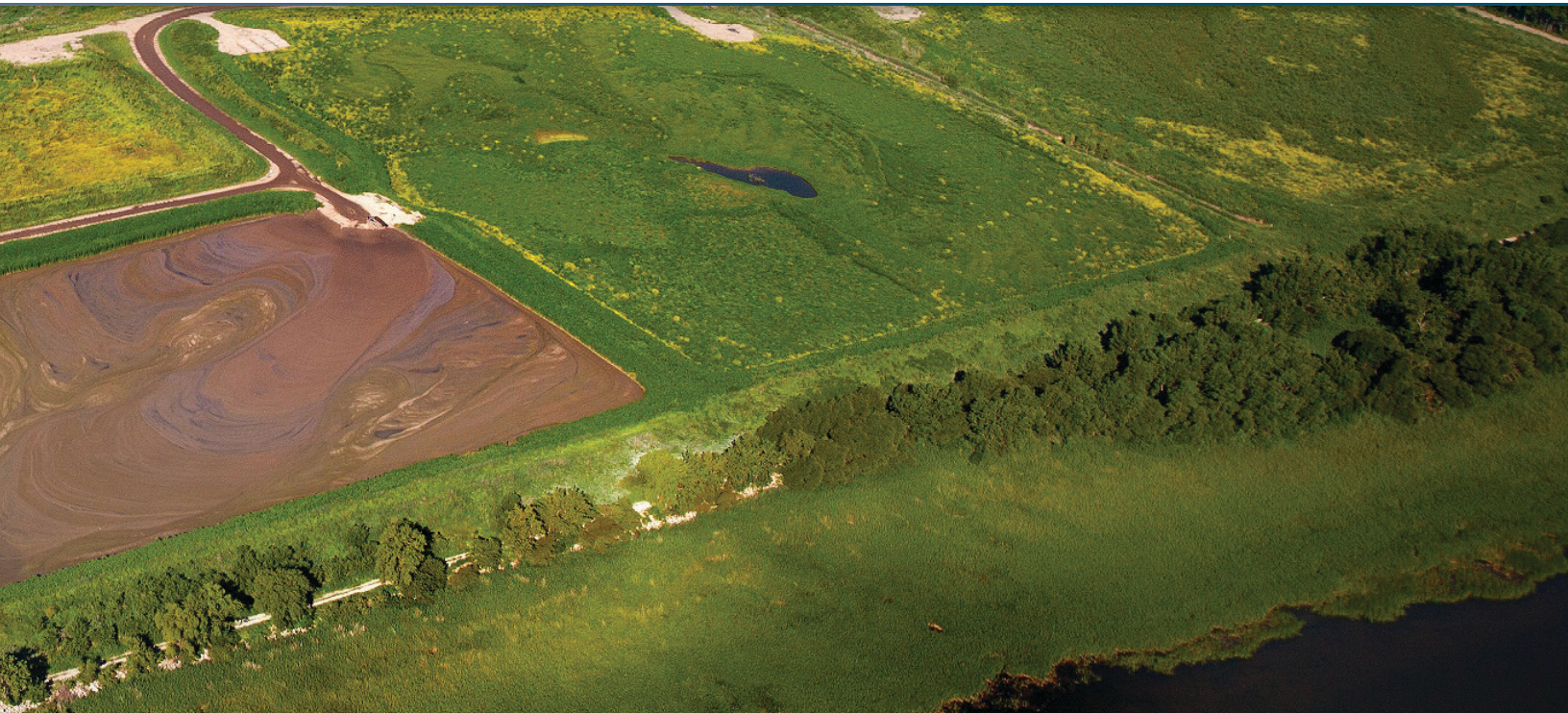


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Appendix II: Beneficial Use of Dredged Materials in the Great Lakes

Beneficial Use of Dredged Material in the Great Lakes



March 2013

Acknowledgments

This publication is a product of the Great Lakes Dredging Team. It was prepared by Gene Clark P.E. of the University of Wisconsin Sea Grant Institute and David L. Knight of the Great Lakes Commission. Thomas Crane, Christine Manninen of the Great Lakes Commission assisted in this publication's editing. Designed by Devra Polack of Spinster Design, Inc.

Appreciation is also extended to members of the Steering Committee of the Great Lakes Dredging Team for their contributions and assistance. This publication was made possible by support from the U.S. Army Corps of Engineers.

Cover photos

- » **Front/back:** Close-up aerial view of Bayport confined disposal facility at the Port of Green Bay. Photo courtesy of the Port of Green Bay.
- » **Pictured left:** Times Beach Nature Preserve bird watching area, built with remediated dredging materials. Buffalo, NY. Photo courtesy of Ken Winters, ACE-IT Buffalo.
- » **Pictured right:** Aerial photos of Port of Toledo. Photo courtesy of Ken Winters, ACE-IT Buffalo.
- » **Inside back cover:** Calumet River and Harbor, Port of Chicago.



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Introduction

Maritime transportation in the Great Lakes, both commercial and recreational, relies on the maintenance of adequate water depth in harbors and connecting channels for navigation. Maintaining that depth where there is natural accumulation of sediments requires a program of periodic dredging. Each year navigation dredging in the Great Lakes produces 2 - 3 million cubic yards of sediment from the dredging of numerous federal Great Lakes commercial ports, recreational harbors, and connecting channels maintained by the U.S. Army Corps of Engineers (Corps). In addition to this is sediment dredged from the many non-federal navigation sites including state parks and harbors, municipal and private marinas, and launch ramps. Slightly more than half of the dredged sediment bears enough contamination from past industrial discharge, agricultural runoff and other activity to require confined disposal, typically in specifically designed “confined disposal facilities,” or CDFs. Clean sandy material is often used for beach nourishment, and much uncontaminated sediment dredged from Great Lakes harbors has historically been placed in the open lakes where states allow it, although that practice can face certain challenges at both the state and local levels.

Open lake placement has historically been the most common practice for managing dredged sediment in the Great Lakes; it is often the least cost alternative when the sediment is determined to be clean enough for placement in the open waters of the lake. Currently some 30 - 50 percent of sediment dredged from Great Lakes harbors and channels is transported for placement in the open waters of one of the Great Lakes. This practice is currently allowed in waters of five of the Great Lakes states—Illinois, Indiana, Michigan, New York and Ohio—when the material meets

...Much of the material dredged in the Great Lakes for navigation is clean enough to be managed not as a burden...but as a sustainable resource: a commodity with value.

Clean Water Act requirements. Pennsylvania, Minnesota and Wisconsin have policies (based on state laws/policies outside the Clean Water Act) that attempt to prohibit open-water placement, with limited exceptions for beneficial use such as beach nourishment.

Among U.S. federal agencies, Great Lakes states and individual communities, there is an increasing awareness that much of the material dredged in the Great Lakes for navigation is clean enough to be managed not as a burden—and in some states, a solid waste—but as a sustainable resource: a commodity with value. Recognizing that value, and identifying ways to maximize it, is the concept behind “beneficial use” as an environmentally sound, practical and sustainable approach to dredged material management in the Great Lakes.

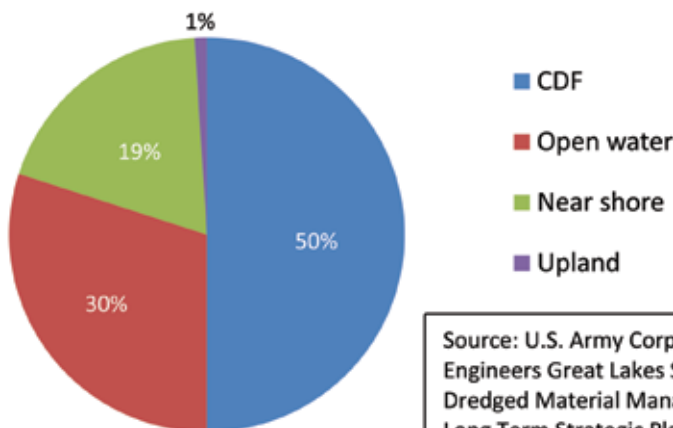
Why we dredge

Safe, reliable navigation on Great Lakes harbors and connecting channels has defined the North American mid-continent’s economic development, and remains critical to job growth and investment in those areas today. Without regular navigation access to some 60 deep-draft commercial ports that require maintenance by periodic dredging, the Great Lakes states would not be able to sustain core industries such as steel-making, mining, heavy manufacturing, agribusiness and power generation. An average

of over 300 million tons of cargo move on the Great Lakes St. Lawrence Seaway system annually. The Great Lakes navigation system provides an estimated transportation rate savings benefit of \$3.6 billion per year. According to a 2011 economic impact study, this movement generated 130,000 U.S. jobs directly and supported another 400,000 in related industries. The total economic impact of Great Lakes marine freight transportation made possible by the maintenance of harbors and connecting channels was estimated at \$34.6 billion.

In addition, the largest freshwater recreational boating industry in the world is

Dredged material placement by volume at U.S. federal Great Lakes harbors 1999-2008



Source: U.S. Army Corps of Engineers Great Lakes System Dredged Material Management Long Term Strategic Plan 2012

also made possible by some 80 federally authorized recreational harbors, and hundreds more recreational waterways maintained by state, municipal and private interests. A study released in 2008 identified spending by over 900,000 recreational boaters on the Great Lakes at \$2.36 billion per year on boating trips alone and another \$1.44 billion per year on boats, boating equipment and supplies. This activity supports over 60,000 jobs with \$1.77 billion in personal income and enhances quality of life for millions of Great Lakes residents and visitors to the region. The value of maintaining access to Great Lakes shallow-draft harbors goes beyond that associated with recreational boating. Such harbors are home to ferry operations, Coast Guard search and rescue stations, harbors of refuge, and subsistence harbors, upon which isolated island communities rely for goods and services.

The argument for beneficial use as a management strategy

In addition to the obvious wisdom of sustainably recycling a commodity with potential value, a more urgent motivation to promote beneficial use is the diminishing availability of other dredged material management alternatives. Over three decades of environmental remediation and industrial site cleanup has reduced the legacy of contamination in many of the Great Lakes harbor sediments placed in CDFs today. Consequently, dredged material only lightly contaminated is increasingly suitable for certain types of beneficial use.

Confined disposal facilities (CDFs), typically stone or earthen dikes designed to contain contaminated dredged sediment, have been used in the Great Lakes since the 1960s, but they are quickly reaching their design capacity. Since the 1970s, the Corps has built and/or operated 45 CDFs at a total cost of nearly \$900 million. The 20 CDFs currently active in the Great Lakes are 80 percent full. Prohibitive construction costs, a cost share requirement for non-federal partners of 35 percent, and reduced site availability make construction of any new CDFs increasingly difficult. Therefore the capacity of many Great Lakes CDFs is being expanded by heightening dikes, or through removing material for beneficial use.

Beneficial reuse of existing dredged material stored in CDFs is a technique being used at several Great Lakes CDFs. Material has been harvested from a Cleveland Harbor CDF for use in brownfield restoration and from a Duluth-Superior CDF for mine-land reclamation. This creates additional capacity in the CDF for contaminated sediment and can extend the CDF's life by several years. Material in the Duluth-Superior Harbor Erie Pier CDF

is also being used at construction sites. Theoretically, CDF life could be lengthened indefinitely, assuming enough beneficial reuse projects of sufficient size are found to accommodate the sediment recycling concept. In other CDFs, material is remaining in-place and the CDF itself is being used beneficially for wildlife habitat after the cessation of dredged material placement. For example, under the leadership of local sponsors and environmental agencies, Dike 14 in Cleveland and Times Beach in Buffalo are both being used as nature preserves.

Technologies and applications of beneficial use

Engineered uses of dredged material

- » **Beach nourishment** is the placement of sandy dredged material in the nearshore area or along the shore to provide a source of nourishment for natural sand movement or to restore a beach.
- » **Capping** is the placement of clean or relatively clean dredged material on top of other sediment in the aquatic environment. Usually this is done to provide a layer of cleaner material over slightly more contaminated material so that the contaminated material will not be harmful to human health or the environment.
- » **Land creation and improvement** includes the building of dikes and berms for shore protection; filling, raising and protection of submerged and low-lying areas; and applying material to areas where the quality of existing land is poor, such as mineland or brownfields reclamation. Land creation and improvement with dredged material is often associated with other benefits, such as capping or habitat creation.
- » **Replacement fill** includes use of dredged material to replace soils or other materials moved or removed for construction and landscaping projects; it essentially functions as material otherwise known as fill dirt.

Other product uses

- » **Construction materials** can use the sand component of dredged material in road construction and rip-rap. Dredged material can also be used as an ingredient in the manufacture of bricks, ceramics and concrete.
- » **Top soil enhancement** usually involves drying out finer dredged material and applying it alone or mixing it with other materials to make topsoil. Dredged material is commonly composed of silt, clay and organic matter—all important components of topsoil. This use of dredged material often also requires the addition of other components such as bio-solids (manure) or processed municipal yard waste.

Environmental restoration and enhancement

- » **Habitat creation or restoration** using dredged material can occur in aquatic, wetland or upland environments. Upland wildlife habitats can be created in pre-existing dredged material containment areas that are no longer used, as well as by placement of dredged material on degraded lands or habitats. Native vegetation is then re-established to provide food and cover for wildlife. In aquatic or wetlands environments, dredged material can be used to nourish, restore or improve habitats.
- » **Fisheries improvement** can be the result of aquatic placement of dredged material to create shoals or shallower areas for fish habitat, or to create/enhance wetlands or aquaculture ponds for fisheries.

Policy related to beneficial use

Federal oversight of beneficial use of dredged material in upland sites is covered by several authorities and primarily relates to material with some level of toxicity. There are no federal regulations specifically governing the beneficial use of clean dredged material. Section 404 of the Clean Water Act (CWA) requires permits to be obtained for discharges of any dredged material into U.S. waters, making it directly applicable to beach nourishment or placement in a wetland. Section 404 permits are also required for effluent from

upland sites. In addition, Section 401 of the CWA requires a state issued certification ensuring compliance with state water quality standards whenever a section 404 permit is required. The National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA) respectively require consideration of adverse environmental impacts and specific impacts on threatened or endangered species. These acts apply to all federal agency actions, including permit issuance. The Resource Conservation and Recovery Act (RCRA) and the Toxic Substances Control Act (TSCA) have a number of requirements regarding the handling, transport, and disposal of wastes; depending on the contaminants and level of contamination, different provisions of these acts may apply. If a dredged material qualifies under any of the criteria of these acts, some or all beneficial uses may be precluded. The Coastal Zone Management Act (CZMA) administered by the National Oceanic and Atmospheric Administration (NOAA) provides financial and technical assistance to states to develop and implement their own coastal zone management programs. The CZMA gives states broad flexibility for coastal resource management and protection, which can be used as a mechanism to promote beneficial use of dredged material.

The Great Lakes states do not have a uniform regulatory framework for beneficial use of dredged material. While dredged material is regulated as solid waste in some states, there are exceptions to this classification depending on test results and end uses. Where exceptions do not exist, the material is subject to some or all solid waste rules and regulations for processing, storage and public distribution. Solid waste regulations are based primarily on design concepts for containment of wastes and leachate, and on provisions for protection of groundwater quality such as at landfills. Depending on the state regulatory process, beneficial reuse may be subject to dredging regulations or discharge permit regulations, rather than solid waste regulations. The format and language of these regulations may differ among the various regulations. Concentrations of contaminants, location and regulatory requirements for groundwater protection heavily influence choices in design of facilities. Locational standards are often listed in regulatory codes as setback distances from homes, private or public water supply wells, roads, and public buildings or property. These standards can be set either at the state level or by local ordinances. Performance standards are often expressed as requirements for compliance with groundwater standards, surface water discharge standards, air standards and protection of wetlands and critical habitat. For some beneficial uses, dredged material is expressly exempt from many requirements depending on the contaminant levels. In other cases, exemption may be requested if it can be demonstrated that the material will not be detrimental to the environment or human health in the specified placement.

Examples of beneficial use in the Great Lakes

Duluth, Minnesota – Superior, Wisconsin

The Port of Duluth-Superior is the largest and busiest on the Great Lakes by tonnage, handling an average of 40 million tons annually of commodities including iron ore, coal, limestone and grain, plus heavy-



*Coarse material stockpile at Erie Pier, Port of Duluth-Superior
Photo credit: Wisconsin Sea Grant Institute*

lift and project cargo. Situated at the mouth of the St. Louis River, natural sedimentation requires the dredging of some 100,000 to 125,000 cubic yards of material a year from the harbor's navigation channels. For the past three decades, most of the material has been deposited in the 89-acre Erie Pier Confined Disposal Facility built in 1979 with a 1.1 million cubic yard capacity and a life-expectancy then projected at 10 years.

Thanks to the raising of interior dikes and better than expected sediment settling, the facility's capacity has been significantly increased and it currently holds approximately 2.26 million cubic yards of dredged material. With the objective of extending Erie Pier's useful life even further, the Duluth Seaway Port Authority now operates it as a dredged material recycling facility—termed a Processing and Reuse Facility (PRF). Under a management plan created by the multi-agency Harbor Technical Advisory Committee/Duluth-Superior Metropolitan Interstate Council, dredged materials are hydraulically sorted at Erie Pier (based on size) into two grades: coarse and fine. The coarse material, basically sand, has been utilized in area road and other construction projects since the late 1980s. It meets Minnesota Pollution Control Agency (MPCA) Tier I standards, which permit its use in any upland location and a local contractor has a five-year agreement to use up to 50,000 cubic yards a year for general construction and use in making asphalt material. The Wisconsin DNR

has issued a five-year low hazard exemption permit for use of this coarse material, and one for the Erie Pier fine material, for use in public projects anywhere in Douglas County, Wis.

The fine material—best described as “reclaimed soil”—has also been tested and found to meet MPCA Tier I standards for re-use. It is being utilized in a number of projects around the Twin Ports, such as turf restoration at a local golf course and a stormwater berm at a cement plant and Minnesota's Iron Range, as well as in a pilot project in Wisconsin to restore turf at the Superior landfill. In a recent demonstration project, some 30,000 cubic yards of Erie Pier fine material was trucked to an iron ore mining operations tailing basin over 50 miles away to provide cover for the reclamation of the tailings basin. In an example of beneficial use of dredged material for habitat restoration, the Corps of Engineers is working with the Minnesota Department of Natural Resources and the MPCA in developing plans for a site in the Duluth Superior harbor known as the 21st Avenue West Pilot Project. The 21st Avenue West area is a large open bay with a channel that was formerly part of the federal navigation channel in the harbor but has since been de-authorized and is now designated as a site for potential in-water placement of suitable dredged material. Currently scheduled to begin in 2013, the objective of the pilot project, ultimately, is to create wetland habitat on the 75-acre site with small islands and shallow pools. The pilot project is set to begin by utilizing three years worth of material dredged from the harbor in three 100,000 cy/yr placements. If successful, the pilot project could lead to much more material continuing the habitat restoration of the site and could total over 800,000 cubic yards of beneficially used dredged material.



*Dredging material off Erie Pier, Port of Duluth-Superior
Photo credit: Wisconsin Sea Grant Institute*

Examples of beneficial use in the Great Lakes

Grand Haven, Michigan

Grand Haven Harbor, located on the eastern shore of Lake Michigan, receives just under 1 million tons a year of water-borne coal, stone and cement. The harbor's outer navigation channel is dredged annually, with the dredged material placed in the nearshore as beach nourishment. The harbor's inner channel has a dredging frequency of every two to four years with approximately 20,000 to 40,000 cubic yards of sediment dredged each time.

From the 1970s to the 1990s the sediment was deposited in a CDF but that facility was capped in 1992 and the subsequent search for an alternative CDF has been unsuccessful. By 2004 the harbor was in critical need of maintenance dredging. Bulk carriers calling at the port had to reduce their loads, particularly in increasingly prevalent low water conditions. With a growing urgency for alternative solutions, community leaders realized that the future of commercial shipping in Grand Haven largely depended on a sustainable strategy to deal with dredged material on an ongoing basis. The result of this collective concern was formation of a Harbor Task Force involving harbor users and several local governmental officials.

The group, headed by the Grand Haven Chamber of Commerce, worked closely with the Michigan Department of Environmental Quality and the Corps of Engineers to identify the most viable beneficial use solution, which turned out to be the manufacture of a high quality topsoil product by combining harbor sediment with composted local municipal yard waste. The city developed a temporary placement site to dry the material for mixing with the compost. The first product was introduced in August 2004 and successfully used in a number of landscaping and



Calumet River, Chicago

construction projects, including public recreational areas. It is now successfully marketed and sold by Grand Haven's Verplank Dock Company, a main harbor constituent, under the brand "Bottoms Up." Some material from this site that contained a high percentage of sand has been used for construction projects, most recently for the U.S. 31 bypass project.



Calumet River and Harbor: the major deep-draft commercial harbor and site of the Chicago CDF

Chicago, Illinois

The Peoria Lakes are essentially two wide spots in the Illinois River in central Illinois. Together the lakes are 20 miles long and have an upstream drainage area of 13,765 acres of some of Illinois' richest agricultural land. The lakes were created in 1900 when Lake Michigan water was diverted to the Illinois River, inundating some floodplains. Continuous sedimentation over the past century, however, has reduced the lakes' volume by 77 percent, greatly curtailing navigation and recreational boating activity.

Because of its composition of rich agricultural soils and the fact that it is relatively free of toxic materials, sediment dredged from Peoria Lakes backwaters was judged to be clean enough for beneficial use, most specifically as topsoil. However, given the abundance of fertile farm land in central Illinois, the benefits of local deposition as topsoil were minimal. About 165 miles to the northeast, US Steel closed its massive Chicago South Works plant in April 1992 and all structures were removed leaving a 573-acre site at the mouth of the Calumet River covered largely with slag, some concrete foundations and roads. Following completion of environmental remediation and clean-up, the Illinois Environmental Protection Agency approved the site for redevelopment by the Chicago Park District in 1997. The Illinois Department of Natural Resources saw the potential of addressing the needs of both Peoria Lakes and the Chicago Park District by barging sediment dredged from the lakes up the river to Lake Michigan and to the South Works site. In 2003 it conducted a series of studies and demonstrations to assess the concept's feasibility and the Chicago Department of Planning and Development was awarded a \$5 million grant from the State of Illinois for work at the South Works site. Of that, \$1.4 million was earmarked to transport 105,000 tons of wet Peoria Lakes sediment up the river by barge to the South Works site.

Intergovernmental agreements among the Chicago Park District, the City of Chicago and the Illinois Department of Natural Resources were signed and the project, named "Mud to Parks," began in April



*Aerial View of Cat Island Construction, Green Bay
Photo credit: Port of Green Bay*

2004. Wet sediment deposited in Chicago was consistent enough to be handled efficiently and remain where it was placed. The sediment dried well and formed soil structures similar to those observed in the demonstrations. Within a year, and with no seeding, the formerly barren brownfield on the shore of Lake Michigan was lush with vegetation.

Green Bay, Wisconsin

The Port of Green Bay handles a diverse cargo throughput of about 2.5 million tons a year of bulk materials including pig iron, coal, cement, limestone, gypsum and salt. Dredging of the Fox River navigation channel to access port facilities produces about 50,000 cubic yards of dredged material a year, while maintenance of the channel's eight-mile lower reach into Green Bay produces another 100,000 cubic yards of relatively clean sediment. The total amount of material dredged from the harbor each year is approximately 150,000 to 250,000 cubic yards.

Needing new placement capacity for the material, a major project has been initiated to reconstruct with dredged material a series of barrier islands in Green Bay. These islands originally existed as recently as the 1960s before eroding away due to hardening of the shoreline and high water levels. The Cat Island Chain Restoration Project begins with a 2.5-mile wave barrier built atop the remnant shoals to create and protect 1,200 acres of nearshore and wetland habitat, and 200 acres of island habitat. The site is known to be favored by such avian species as double-crested cormorants, American white pelicans and black crowned night herons.

The project will build three islands temporarily connected by causeways to facilitate trucking the

construction materials, with capacities to, ultimately, receive 630,000, 720,000 and 1 million cubic yards of dredged material respectively. The dredged material will be hydraulically deposited at the site. Because of its beneficial use objective tied to habitat creation, the total project cost of under \$20 million was largely supported by the federal Great Lakes Restoration Initiative with a 35 percent non-federal cost share provided by the Wisconsin Department of Transportation's Harbor Assistance Program, a Natural Resources Damages Assessment Grant, and the Brown County Port & Solid Waste Department. Construction of the wave barriers and dikes defining the three islands is planned for completion in 2014, after which they will supply the port with enough coarse dredged material placement capacity—about 2.3 million cubic yards—to last the next 30 years.

In addition, the Port has utilized approximately 30,000 cubic yards of fine dredged material from their Bayport CDF for final cover material for the county's landfill. Also, approximately 513,000 cubic yards of fine dredged material from the Bayport facility will be used as cover material to assist with the Renard Island CDF closure. Recently, the Port has secured a State of Wisconsin low hazard grant of exemption to utilize 412,000 cubic yards of fine Bayport material in construction projects, such as the local highway 41 reconstruction project by the Wisconsin Department of Transportation.

Cleveland, Ohio

With annual tonnage of over 10 million tons and an economic impact of more than \$800 million in job support alone, maritime commerce on Cleveland's Cuyahoga River is a major contributor to the northeastern Ohio regional economy. The port is also one of the most heavily dredged facilities on the Great Lakes, requiring some 250,000 cubic yards of sediment to be removed each year for placement in



*300,000 cubic yards of sediment was removed from CDF 10B in Cleveland and used to cap a 58-acre Brownfield site off Pershing Avenue. The site is slated for redevelopment as an industrial park.
Photo credit: Skip Jacobsen, Cleveland-Cuyahoga County Port Authority*

Beneficial use in Cleveland

CDFs. Cleveland's CDFs are all approaching their designed capacity. In an effort to extend CDF life, some 300,000 cubic yards of material was removed from the port's CDF 10B near the Burke Lakefront Airport to be beneficially used for brownfield redevelopment on a 58-acre site near the ArcelorMittal steel mill in Cleveland. The Cleveland Cuyahoga County Port Authority and the Corps of Engineers are continuing to look at other upland settings where dredged sediment could be used beneficially for such applications as habitat restoration, landfill cover, gravel pit fill and recreational areas.

Regional framework for testing and evaluating dredged material for upland beneficial uses

The lack of adequate regulatory guidance was one of the obstacles to beneficial use of dredged material identified by the Great Lakes Beneficial Use Task Force and described in the final task force report, published by the Great Lakes Commission in 2001. The lack of guidance is particularly acute regarding beneficial use of dredged material in upland environments. The Beneficial Use Task Force report noted that most upland beneficial uses are evaluated on a case-by-case basis using various types of guidance or regulations aimed at solid waste, hazardous waste and sewage sludge.

The task force recommended that regional guidance be developed for beneficial use of dredged material. This recommendation became one of the top five priorities for the Great Lakes Dredging Team, which served in an advisory capacity to the Beneficial Use Task Force. This *Regional Framework* brings together and builds on the body of existing case studies, policy, guidance and regulations used by the individual Great Lakes state regulatory agencies to make decisions regarding beneficial use of dredged material.

It also includes relevant rules and regulations implemented by the Corps of Engineers and the U.S. Environmental Protection Agency. The *Regional Framework* adds structure to what has been a piecemeal approach to beneficial use decision making. The Corps has updated the information in the *Regional Framework* with their 2007 publication, *Summary of Available Guidance and Best Practices for Determining Suitability of Dredged Material for Beneficial Uses*. In addition, the Corps and USEPA collaborated in producing the 2007 guidance manual, *Beneficial Use Planning Manual, Identifying, Planning, and Financing Beneficial Use Projects Using Dredged Material*.

Tips and resources to help communities become involved with beneficial use

The success of any beneficial use program requires community involvement. Communities play an important role in identifying local projects that might be able to use dredged material instead of an original source material. Road construction projects, parks or a brownfield reclamation project may all be suitable for the use of dredged material. Communities can also pool their resources to promote dredged material recycling by forming a committee, task force or subgroup within existing local government entities. An important first step for communities is to discuss project ideas and engage in dialogue with local officials, a port authority and relevant businesses. Researching planned or current beneficial use projects underway and inquiring about plans, project proposals or needed permits will be helpful in setting up partnerships and organizing public meetings for input or information sharing.

As presented in this brochure, dredged material can be beneficially used for a variety of purposes including habitat restoration, topsoil enhancement, general fill, landscaping and road bed construction. Mildly contaminated dredged materials can often be beneficially used for daily landfill cover, capping more contaminated sites, and as aggregate for construction materials that "lock in" the contaminants.

One valuable resource for communities is a web-based tool developed by the Great Lakes Commission in partnership with the U.S. Army Corps of Engineers and the Great Lakes states. This website (glc.org/rsm) is a preliminary screening tool to help communities and other customers identify potential sources of sediment for reuse. Information provided from this website is generated from data provided by the U.S. Army Corps of Engineers. The site provides valuable information including: 1) Frequently Asked Questions for general inquiries; 2) a MapFinder for getting detailed information on specific sediment locations around the Great Lakes; and 3) an Advanced Query that allows a user to find material closest to a potential project suitable for a project's specific needs.

It is clear that dredging of Great Lakes ports and harbors is essential to the economic health and environmental integrity of the region. This brochure has aimed to educate and inform resource managers, communities, elected officials, business leaders and other stakeholders about the importance of beneficial reuse as a desirable option over confined disposal of dredged material. There is no single right way to get involved but interest and involvement is necessary for success. Being determined and asking a lot of questions will likely lead to answers and results that will keep the Great Lakes "great" for many generations to come.

About the Great Lakes Dredging Team

www.glc.org/dredging

The Great Lakes Dredging Team is a partnership of federal and state agencies created to assist the Corps of Engineers and the Great Lakes states to assure that the dredging of U.S. harbors and channels throughout the Great Lakes, connecting channels and tributaries is conducted in a timely and cost effective manner while meeting environmental protection, restoration and enhancement goals. The Great Lakes Dredging Team includes representatives from federal agencies including the Department of Defense/U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Department of the Interior/U.S. Fish & Wildlife Service, Department of Transportation/Maritime Administration, Department of Agriculture/Natural Resources Conservation Service, Department of Commerce/National Oceanic and Atmospheric Administration, and the Department of Homeland Security/U.S. Coast Guard. In addition, each Great Lakes state also designates two representatives to serve on the Great Lakes Dredging Team to assure that state natural resource and commerce interests are represented. The Team may also expand its membership, upon consensus, to other agencies, organizations or groups. The Great Lakes Dredging Team is co-chaired by one federal and one state representative. These co-chairs are selected by the federal and state team members, respectively, on a biennial basis. The state co-chair also leads the State Caucus, which has as its membership the Great Lakes states and the Great Lakes Commission.

About the Great Lakes Commission

www.glc.org

The Great Lakes Commission was established in 1955 with a mandate to “promote the orderly, integrated and comprehensive development, use and conservation of the water resources of the Great Lakes basin.” Founded in state law with U.S. federal consent, with membership consisting of the eight Great Lakes states and associate member status for the provinces of Ontario and Québec, the Commission pursues four primary functions: communication and education, information integration and reporting, facilitation and consensus building, and policy coordination and advocacy.

Each member jurisdiction is represented by a delegation consisting of three to five members who are appointees of the respective governor or premier, legislators or senior agency officials. A board of directors, consisting of the chair of each delegation, is the Commission’s executive body.

In carrying out its initiatives, the Commission works in close cooperation with many partner organizations, including U.S. and Canadian federal agencies, binational institutions, tribal/First Nation governments and other regional interests. Representatives appointed by partner entities participate extensively in Commission activities through a formal Observer program. The Commission is supported by a professional staff in Ann Arbor, Michigan.







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