



PIANC

The World Association for
Waterborne Transport Infrastructure

EnviCom WG 214

Beneficial Sediment Use

Terms of Reference

1. Background and Need

Annually, billions of cubic meters of material are dredged globally in an effort to maintain ship movement for commerce and recreation. Thus, navigational channel maintenance is integral to the world economy, without which the transport of cargo, large cruise ships, and pleasure craft could not function. With dredging comes a need to manage dredged material. Historically, dredged sediment could be disposed using a range of alternatives that included off-shore disposal in oceans or lakes, confined disposal facilities (CDFs) or confined aquatic disposal (CAD), and for filling nearshore land. Today, site owners/managers and dredgers face increasing opposition to these conventional disposal methods; stakeholders, including government entities, the public, and non-governmental organizations, are increasingly hostile toward sediment disposal methods that could impact natural waters, displace aquatic habitat, or release contaminants into the environment. These growing constraints on conventional dredged material disposal methods are motivating movement toward more sustainable alternatives, including finding beneficial uses for sediment. Beneficial use refers to the transformation of dredged sediment material into a cost-effective and useful product that can serve a positive environmental or human function.

Beneficial use of dredged sediment has multiple inherent challenges. These include transportation and handling costs to move dredged sediment to its beneficial use destination; processing costs to make dredge material suitable for its intended use; competition against low-cost alternatives, such as the use of clean quarry material that can be graded to meet the specific demands of the targeted end use; and the presence of contaminants and in some cases the need for treatment. There also are legislative obstacles to sediment beneficial use, such as when sediment is categorized as a “waste” material, strict chemical requirements that limit the use of virtually all but the cleanest sediment condition, and limits on fill and other nearshore applications.

Despite these obstacles, sediment also has some very attractive properties, including the presence of sands and clays for a variety of uses, the presence of organic matter, a lack of contamination in many cases and especially from navigational channels that are

routinely dredged, and proximity to the end use location at those sites where dredging is close to the targeted use.

Today, while there is increased interest in using dredged sediment beneficially, the industry lacks universal guidance. There is a need for economical, low-tech management solutions and guidance on how to implement those solutions. Such techniques may already exist, and include solids separation technologies, low thermal desorption, composting, and solids stabilization using pozzolanic materials. Additional economic, low-energy alternatives are available including beach restoration, shoreline protection, agricultural topsoil, wetland restoration and environmental enhancement, and soil fill for capping, land development, and other uses. Guidance is needed to understand how to characterize baseline sediment conditions, how to evaluate reuse options, and how to negotiate those options through the regulatory environment. Additional guidance is needed to modernize regulations governing sediment beneficial use, so that sediment can be used increasingly as a resource.

While beneficial use approaches must adhere to the London Convention and Protocol (LC/LP) and the Oslo Paris agreement (OSPAR), both may need to be updated to meet contemporary standards and environmental needs. The LC/LP established protocols in 1975 to protect the marine environment from human activities, and the OSPAR Convention regulates international cooperation on environmental protection in the North-East Atlantic. The OSPAR Convention was concluded in 1992.

Studies worldwide have shown that much of the material dredged for navigation is relatively clean and suitable for beneficial uses. Such dredged material can be a valuable resource and should not be thought of as a waste for disposal.

2. Objective of the Working Group

The objective of the proposed WG is to provide technical information and guidance regarding the state of the practice for use of sediment as a beneficial use product by drawing from existing approaches and best practices worldwide. The report will link to other relevant reports published by PIANC, CEDA, and IADC, among others. The report will give orientation to sediment beneficial use practices, technologies, regulations, and limitations.

The WG will work closely with other proposed PIANC WGs related to Ecosystem Goods and Services and others to ensure consistency among the WGs. The WG will give consideration to the role, influences, and implications for Working with Nature.

Specific WG objectives are as follows:

- Review and discuss historical and current trends driving beneficial use
- Discuss impediments to beneficial use and potential solutions to overcome those impediments
- Review technologies and their effectiveness, limitations, and cost

- Discuss the impact of sediment contaminants
- Evaluate beneficial use economics, making sure that approaches are economical and affordable
- Develop guidance for beneficial use

3. Earlier PIANC and other reports to be reviewed

In 1992, PIANC published *Beneficial Use of Dredged Material: A Practical Guide*. This document, now 25 years old, was prepared to advance and promote an understanding of beneficial use opportunities for dredged sediment. The report will build on this guidance.

In 2011, US Army Corps of Engineers (USACE) published *Mass Balance, Beneficial Use Products, and Cost Comparisons of Four Sediment Treatment Technologies Near Commercialization and Economical Treatment of Dredged Material to Facilitate Beneficial Use*, both under the Dredging Operations and Environmental Research (DOER) program. These documents critically evaluated treatment technology performances and mass balances and technology costs for the beneficial use of sediment, focusing primarily on contaminated sediment.

In recent years, various regulatory agencies have created guidance for sediment and soil beneficial use, and guidance documents also may be available from different countries. Those guidance documents will be gleaned for relevant information, and incorporated as appropriate. Regulations also may need to be modernized, locally and globally, to allow sediment to be used more effectively as a resource while also protecting the environment.

4. Scope

Beneficial sediment use involves adequately characterizing baseline sediment conditions, identifying potential uses for the sediment, and developing appropriate processing / treatment methods to exploit the dredged sediment for a positive end use. The WG will develop a report that demonstrates how to evaluate sediment for non-disposal uses, the regulatory frameworks controlling sediment use, and the sediment use alternatives. The final report will provide guidance to practitioners that will serve to identify, define and ultimately realize sediment management alternatives for waterborne navigation projects. The WG will:

- Define the concepts of sediment use and existing scientific knowledge related to different uses
- Present an integrated approach to managing dredged sediment
- Understand how sediment contamination has the potential to limit sediment uses
- Perform a cost analysis to understand the relative costs of different reuse options
- Address such topics as sustainability, resilience, and collaborative processes

- Present sediment use as a process of shifting toward more sustainable practices for achieving multiple project benefits (i.e., environmental, social, and economic)
- Understand the context of beneficial use in the context of LC/LP and OSPAR legislations.
- Discuss the role of sustainability and life-cycle analysis

5. Final Product

The working group will draft guidance on sediment beneficial use. The report will comprise:

- An introduction to sediment use, and how the concept fits into the existing knowledge base from PIANC, WG participants, and available information.
- Discussion of progress and approaches developed over the past two decades and promoted globally.
- A connection with the Working with Nature and Ecosystem Goods and Services for identifying, characterizing, and substantiating the environmental and other benefits of Working with Nature projects.
- A description of the sediment beneficial use approach, to address the steps and timing needed to meet project objectives in an ecosystem context.
- The inclusion of stakeholders in the process.
- Beneficial use economics and costs.
- Address sustainability and energy use, comparing conventional approaches with beneficial use alternatives.
- Potential impediments to sediment beneficial use and ways in which impediments can be overcome.
- Port and navigation beneficial use case studies, including an understanding of the project-specific regulatory framework.
- A summary of existing publications to ensure the process integrates current knowledge.

6. Working Group Membership

WG members should include representatives from the target audience; e.g., consultants, contractors, academics, regulators, and Port Authorities who are tasked with managing dredge sediment. The development of guidance should be prepared by an international group of experts who have knowledge and experience with sediment management (dewatering, solids separation, disposal and sediment reuse) alternatives from each of their respective countries. We also recommend including at least one member from a country in transition.

7. Relevance for Countries in Transition

The primary audience in both developed and developing countries would be project designers, contractors, ecologists, civil engineers, planners, politicians and environmental stakeholders who have an influence on the decision-making responsibility pertaining to navigation infrastructure projects. The report will be written in a manner easily understood in both developed countries and countries in transition.

Ports all around the world form the significant economic backbone of global and local economy. The ports are almost all located in dense populated areas and surrounded by nature. Corporate social responsibility is becoming more and more a basis for port policy and development as is shown in an increasing number of sustainability reports produced by ports in Europe, USA, South-America, Asia, Africa and Oceania. Sustainable approaches for dredged sediment management, including the beneficial use of dredged sediment, is equally relevant to countries in transition as it is to developed countries.

8. Climate change Sustainability

The report will consider the role, influences, and implications of climate change on beneficial sediment use practices. By using sediment more cost effectively and sustainably, beneficial sediment use has the potential to be more energy efficient. Cost and energy uses associated with conventional sediment management approaches will be compared with beneficial use alternatives to better understand the global impact, and potential benefits, regarding climate change. International agreements, such as the Paris Accord, also will be considered.