Dredging and Dredged Material Disposal

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1 Introduction to Dredging and Dredged Material Disposal

Learning Objectives

By the end of this section, you will be able to:

- **Explain** the role of dredging in developing and maintaining navigable waterways, harbors, and ports.
- **Identify** the main engineering decisions involved in dredging and dredged material disposal.
- **Recognize** the difference between new work dredging and maintenance dredging.
- **Describe** the importance of equipment selection, sediment characterization, disposal planning, and environmental controls.
- **Understand** why long-term planning is essential for dredging projects that require repeated maintenance.

Executive Summary: Dredging projects require coordinated engineering decisions involving excavation equipment, sediment characteristics, contaminant conditions, disposal or placement alternatives, environmental controls, and long-term maintenance needs. The success of a dredging project depends not only on removing material from a channel, harbor, or basin, but also on selecting suitable dredging equipment, identifying appropriate disposal facilities, evaluating sediment quality, controlling suspended solids, and managing confined disposal or placement areas over time.

1.1 Purpose and Scope

Dredging is the excavation, removal, transportation, and placement or disposal of sediment from waterways, harbors, ports, navigation channels, basins, and related aquatic environments. Dredging may be performed to create a new channel, deepen or widen an existing waterway, restore authorized project dimensions, remove shoaling, or manage sediment that interferes with navigation, flood control, environmental restoration, construction, or other project objectives.

This course section introduces the major issues that must be considered in dredging and dredged material disposal projects. These issues include:

- Types of dredging equipment.
- Selection of suitable dredging methods.
- Evaluation of disposal or placement alternatives.

- Sediment characterization.
- Potential contamination of dredged material.
- Design of confined disposal facilities.
- Control of suspended solids and turbidity.
- Environmental protection during dredging and disposal.
- Long-term planning for maintenance dredging.
- Management of containment areas to maximize storage capacity.

Dredging projects are commonly grouped into two broad categories: **new work dredging** and **maintenance dredging**.

New work dredging involves excavation required to create, deepen, widen, or otherwise improve a navigation project or other water-related facility. It is typically associated with project authorization, preliminary engineering, design, and construction.

Maintenance dredging involves the periodic removal of accumulated sediment from an existing authorized channel, harbor, basin, berth, or other facility. Maintenance dredging is necessary because many waterways naturally accumulate sediment over time through riverine transport, coastal processes, storm events, vessel traffic, and local sediment sources.

Although new work and maintenance dredging have different project drivers, they share many engineering requirements. Both require careful evaluation of site conditions, sediment characteristics, dredging equipment, disposal alternatives, environmental constraints, and construction logistics.

💡 Design Tip: The dredging method should not be selected in isolation. Equipment selection must be coordinated with sediment type, production requirements, water depth, access constraints, disposal distance, contaminant conditions, environmental windows, and the selected disposal or placement method.

1.2 Applicability

The source material was originally prepared for field operating activities involved in administering the Corps of Engineers dredging program. For continuing education purposes, the technical concepts are also relevant to Professional Engineers working on navigation, marine construction, harbor maintenance, sediment management, environmental remediation, waterfront development, and dredged material disposal projects.

Engineers involved in dredging work may participate in:

- Preliminary engineering studies.
- Project authorization support.
- Design of new navigation or marine facilities.

- Maintenance dredging planning.
- Sediment sampling and testing programs.
- Dredged material management plans.
- Confined disposal facility design.
- Environmental permitting support.
- Construction-phase oversight.
- Contractor submittal review.
- Disposal area operation and management.
- Long-term maintenance planning.

The engineer's role is to evaluate the physical, environmental, operational, and regulatory factors that affect dredging and disposal decisions. In many projects, the dredging operation and the disposal method must be designed together because the characteristics of the dredged material, the excavation method, the transport method, and the disposal site all influence each other.

1.3 Technical Reference Framework

Dredging and dredged material disposal projects rely on several technical disciplines, including geotechnical engineering, hydraulic engineering, coastal engineering, environmental engineering, construction engineering, and operations planning. The source material identifies a group of references used by Corps personnel for dredging and disposal guidance.

Key Technical References Identified in the Source Material

Reference	Subject Area
ER 1110-2-1300	Government estimates and hired labor estimates for dredging
ER 1110-2-1404	Deep draft navigation project design
EM 1110-2-1906	Laboratory soils testing
EM 1110-2-1907	Soil sampling
EM 1125-2-312	Hopper dredge operations and standard reporting procedures

WES TR D-77-9	Design and construction of retaining dikes for containment of dredged material
WES TR DS-78-1	Aquatic dredged material disposal impacts
WES TR DS-78-4	Water quality impacts of aquatic dredged material disposal, laboratory investigations
WES TR DS-78-6	Evaluation of dredged material pollution potential
WES TR DS-78-10	Designing, operating, and managing dredged material containment areas
WES TR DS-78-11	Dewatering and densifying confined dredged material
WES TR DS-78-12	Dredged material disposal area reuse management
WES TR DS-78-13	Prediction and control of dredged material dispersion around dredging and open-water pipeline disposal operations
WES TR DS-78-16	Wetland habitat development with dredged material
WES TR DS-78-17	Upland habitat development with dredged material
WES TR DS-78-18	Development and management of avian habitat on dredged material islands
WES TR DS-78-21	Land improvement using dredged material

These references show the breadth of engineering issues associated with dredging. Dredging is not simply an excavation problem. It also involves soil behavior, sediment sampling, water quality,

contaminated material evaluation, containment design, dewatering, habitat development, open-water placement, upland placement, and disposal area reuse.

⚠️ Design Constraint: The reference list is historically important, but current projects should verify whether referenced documents have been updated, superseded, or supplemented by newer federal, state, local, or project-specific requirements.

1.4 Bibliographic Support

The source material used numbered bibliography items that corresponded to an appendix. In a dredging project, bibliography items and technical references serve several practical functions.

They help engineers:

- Identify accepted design methods.
- Support equipment selection decisions.
- Document assumptions used in preliminary design.
- Compare disposal alternatives.
- Establish sediment sampling and laboratory testing procedures.
- Evaluate environmental impacts.
- Support permitting and agency coordination.
- Develop project specifications and cost estimates.
- Defend engineering judgments during review.

For continuing education purposes, the key lesson is that dredging design requires traceable engineering support. Assumptions about dredge productivity, sediment behavior, disposal site performance, suspended solids, contaminant mobility, and containment area capacity should be based on appropriate technical references, project data, and professional judgment.

1.5 Background: Role of Dredging in Navigation and Commerce

The Corps of Engineers has been involved in the development and maintenance of navigable waterways in the United States since Congressional authorization was received in **1824** to remove sandbars and snags from major navigable rivers. That early work reflects a fundamental purpose of dredging: maintaining safe and reliable navigation.

Navigation dredging supports:

- Commercial ports.
- Harbors.
- Rivers.
- Channels.

Purchase this course to see the remainder of the technical materials.