CHAPTER 7

Channel Dredging and Disposal

7-1. Channel Dredging.

a. Channel dredging involves initial construction to provide the navigation channel design depth with allowances for advance maintenance dredging and dredging tolerance, and for the periodic removal of sediment deposited on the channel bed, which is referred to as channel maintenance after construction. The type of material that must be excavated and the location of dredged material disposal areas are important factors that enter into the channel cost estimate. Estimates of both construction and maintenance dredging for various channel alignments and dimensions have to be included in the project optimization analysis. Deep-draft channels are usually dredged by hopper dredges in entrance channels or where the dredge may be exposed to wave action, during dredging or during the material disposal operation. This is usually the case when offshore disposal is proposed. Pipeline dredges usually are more economical than hopper dredges with greater production but are restricted to protected or semiprotected areas. The Dredged Material Research Program (DMRP) resulted in excellent evaluation of current dredging methods, disposal techniques, and environmental impacts. DMRP results, published in a series of ERDC/WES technical reports, provide useful information for dredging and disposal plans. Most of the information is available in EM 1110-2-1202 and EM 1110-2-5025.

b. An ongoing research and development program, the Dredging Research Program (DRP), is implementing new technology for dredging operations, equipment, control, and measurements. Study results are being published in a series of ERDC/WES technical reports, bulletins, DRP technical notes, newsletters, etc. The planner/designer should consult these publications for recent research results and availability of products.

7-2. Disposal Sites. Disposal sites can be ocean-continental shelf or deep-water, estuary, intertidal, streams, bay, lake, or upland. Ocean disposal remote from the channel has the advantage of assuring that the material will not reenter the channel; however, costs are usually the highest. Disposal in estuaries should be in areas where tidal currents will not move the material back into the channel being developed or adversely affect the environment. Intertidal disposal (between low-tide and high-tide levels) might be feasible where the creation of marshes for fish and wildlife habitat or beach restoration is desired. Upland disposal will usually require dikes and weirs to control the solids content of carrier water returning to the waterway, and temporary restraining structures might be required for marsh creation. The effect of disposal in streams on channel maintenance and development and the environment must be considered. Predictive models are available to estimate the location and extent of dredged material movement after disposal (Johnson 1990).

7-3. Use of Dredged Material. A study of beneficial uses of the dredged material might indicate an increase to project benefits. Some beneficial uses of dredged material would be:

a. Landfill for industrial development.

b. Construction materials.

c. Topsoil.

d. Marsh creation.

e. Beach restoration.

7-4. Environmental Effects. Studies must consider all positive and negative environmental effects of the alternative dredging and material disposal plans considered. Some of the environmental effects may be changes in water levels, erosion, water circulation, flushing rates, saltwater intrusion, shoaling pattern, or distribution of wave energy along the shoreline. Any plan recommended must have an environmental assessment. The assessment will indicate whether a Statement of Findings or an Environmental Impact Statement will be required, including a comprehensive mitigation plan with cost for any adverse effects. In the development or improvement of deep-draft navigation projects, the effects of dredging disposal on fish and wildlife resources and possible productive use of dredged material must be considered. Special consideration will be required for both dredging method and disposal when dealing with contaminated materials. Public Law 409, Section 5, requires the study and prediction of erosion and accretion for a distance of not less than 16 kilometers (10 miles) on either side of an improvement of the entrance at the mouth of a river or inlet. Project limits should be extended beyond the project features to allow future mitigation work, if needed. Mathematical and physical model studies are currently the best method to predict project-caused changes in salinity, shoaling patterns, current velocities, tidal flushing, and dispersion rates. Prototype verification data for model studies are essential and should cover a wide range of conditions. Quantitative biological assessment of project impact to the aquatic life is needed to plan mitigation measures.