



US Army Corps
of Engineers®

Proactive Strategy for “Dredge-Ready” Operation and Maintenance at Low-Use Navigation Projects

by Hiram T. Arden and Nicholas C. Kraus

PURPOSE: This Coastal and Hydraulics Engineering Technical Note describes a collaborative strategy with a Federal navigation project sponsor for conducting operation and maintenance (O&M) dredging and disposal activities. A collaborative strategy increases opportunities for securing funding to conduct maintenance dredging and promotes responsiveness to local sponsor needs and capabilities. Dredge-ready or shovel-ready maintenance dredging plans compete well and may possibly be more competitive for future Federal funding presently unavailable through U.S. Army Corps of Engineers (USACE) for low-use navigation projects.

INTRODUCTION: The governing criteria for obtaining Federal O&M funding to conduct routine dredging is based on commerce statistics. Typically, low-use navigation projects fall below a budgeted funding cutoff line, resulting in deferred maintenance that severely impacts local users and the associated economy.

The USACE, Seattle District, (hereafter, Seattle District) is responsible for 23 active navigation projects with 15 of them ranked as low-use projects (Figure 1). Willapa Harbor, WA, navigation project features are representative of low-use projects located in a highly dynamic coastal inlet on the southwest coast of Washington state (Figure 2). Included is a small, low-use deep-draft navigation channel at Toke Point Marina (Figure 3) sponsored by the Port of Willapa Harbor (hereafter, Port). In 2006, the Port expected to abandon the project unless they could use hydraulic pipeline maintenance dredging with “flowlane” disposal at a site located in a nearby deep natural channel with strong tidal flow.

Flowlane disposal is placement of dredged sediment in a natural inlet thalweg such that it is transported out of the area without harm elsewhere. Flowlane disposal is beneficial in returning sediment that was trapped in a harbor or navigation channel to the littoral system and, therefore, can be part of a regional sediment management plan. At Willapa Harbor, the flowlane dispersive disposal is an alternative to more costly and traditional clamshell dredging with bottom-dump barge transport 4 miles south to an open-water dispersive disposal site. In the river setting, flowlane disposal has been called thalweg disposal, “the placement of dredged material in a deep-water portion of the channel thalweg where it will become a natural element of the sediment transport system and will be assimilated into the system with minimal impacts to either the sediment transport system or the environment” (Nanda and Barker 1984; Olin 1993a; Olin 1993b).

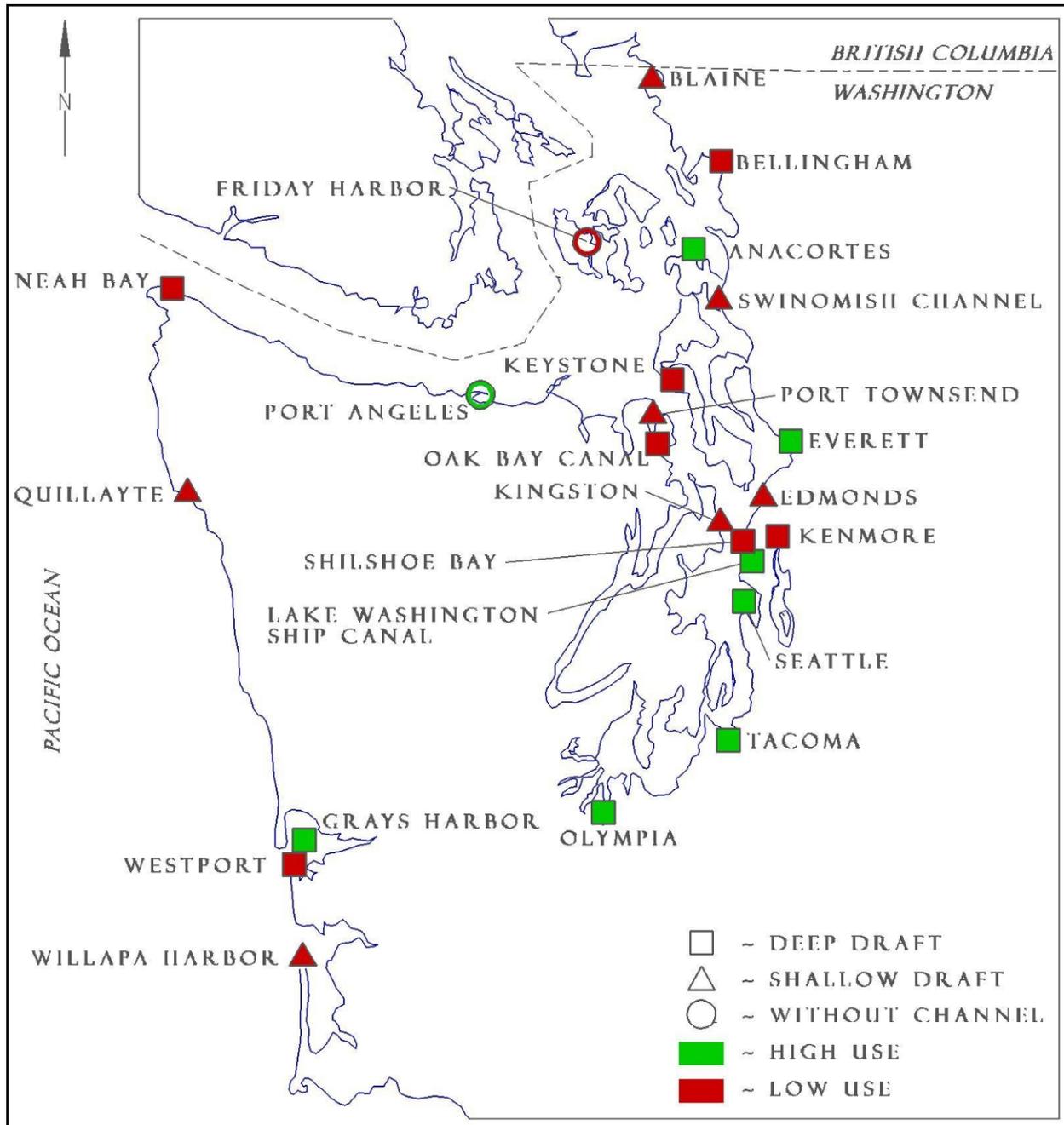


Figure 1. Map of Seattle District navigation projects, including 15 low-use harbors.

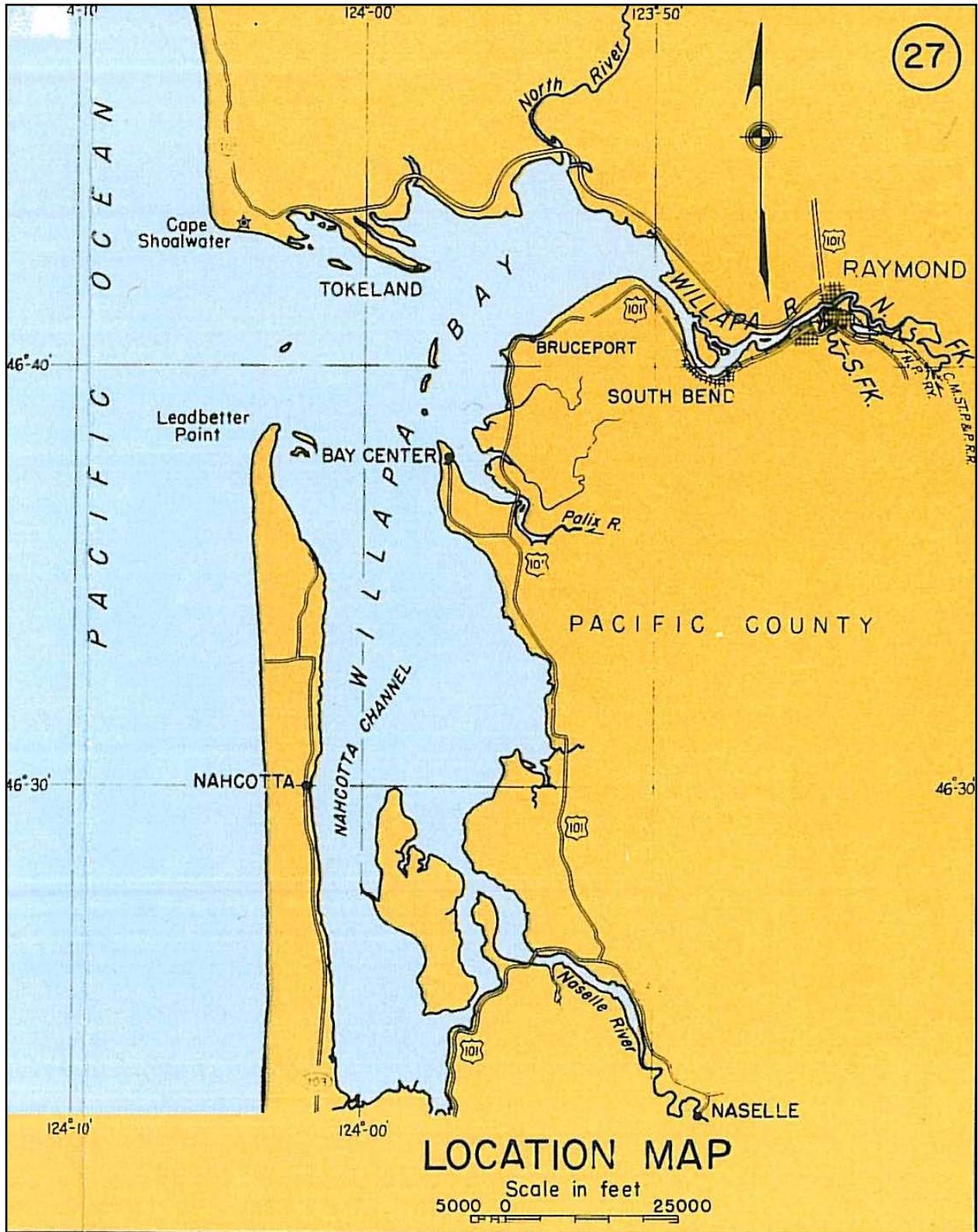


Figure 2. Willapa Harbor, low-use navigation project features.



Figure 3. Toke Point at Willapa Bay, WA (photograph courtesy of Washington State Department of Ecology).

BACKGROUND OF LOCAL SPONSORSHIP: Since initial pipeline dredge construction of the Toke Point Marina navigation project in 1958, it has been challenging to fund periodic maintenance dredging of the Federal entrance channel and Port berthing area. Periodic maintenance dredging was performed by hydraulic pipeline dredge with confined disposal at local sponsor-furnished upland disposal sites located close to the Toke Point Marina. By the 1970s, there was increased difficulty in locating and permitting upland sites of sufficient capacity for continued pipeline maintenance dredging. In the 1980s, the Seattle District, in cooperation with resource agencies, designated dispersive open-water disposal sites near Goose Point and Cape Shoalwater in Willapa Bay. Availability of these sites allowed continued clamshell maintenance dredging and bottom dump barge disposal use. The open-water sites were preferable because they were readily available and avoided disposal-impact issues and possible delays. However, there was increased local concern about the high costs for ocean-going equipment mobilization and unit costs of clamshell dredging and bottom dump barge disposal. Efforts to minimize the Federal entrance channel and Port berthing area footprint helped, but were not sufficient. By 2006, six small, Southwest Washington ports including the Port of Willapa Harbor were desperate for responsive, less-costly maintenance dredging as Federal funding for small, low-use navigation projects continued to decline.

REVISITING COLLABORATION ON STRATEGY FORWARD: In 2007, a Port cooperative agreement (Pacific/Wahkiakum Southwest Washington Port Cooperative 2006) funded examination of dredging and disposal alternatives. It explored innovative funding sources for the low-use ports of the Port of Willapa Harbor, Port of Chinook, Port of Peninsula, Port of Ilwaco, and Ports of Wahkiakum No. 1 & No. 2. The Ports preferred alternative was return to hydraulic pipeline dredging at Toke Point with unconfined flowlane and beneficial use disposal on Port property southwest of the marina. A product of Seattle District and Port collaboration was a “Dredge Ready” concept in analogy to the recent “shovel-ready” Federal initiative for stimulating the economy. An August 2008 Joint Public Notice Application facilitated two options for dredging of the Federal entrance channel, either by the Port of Willapa Harbor or by the Seattle District (Figure 4). The Dredge Ready procedure is as follows:

- Seattle District and Port conduct joint sediment sampling and analysis that confirms sediments are suitable for unconfined disposal or beneficial use.
- Seattle District and Port both coordinate required permit approvals to conduct O&M dredging for whoever obtains funds first.
- Stakeholder and agency collaboration results in proposal to return to pipeline dredging with flowlane and beneficial-use disposal (Figure 5).
- Seattle District and Port inaugurate the ten-year campaign “Dredge Ready.” (All permits, agreements, equipment, and so on ready except funding to proceed with execution).

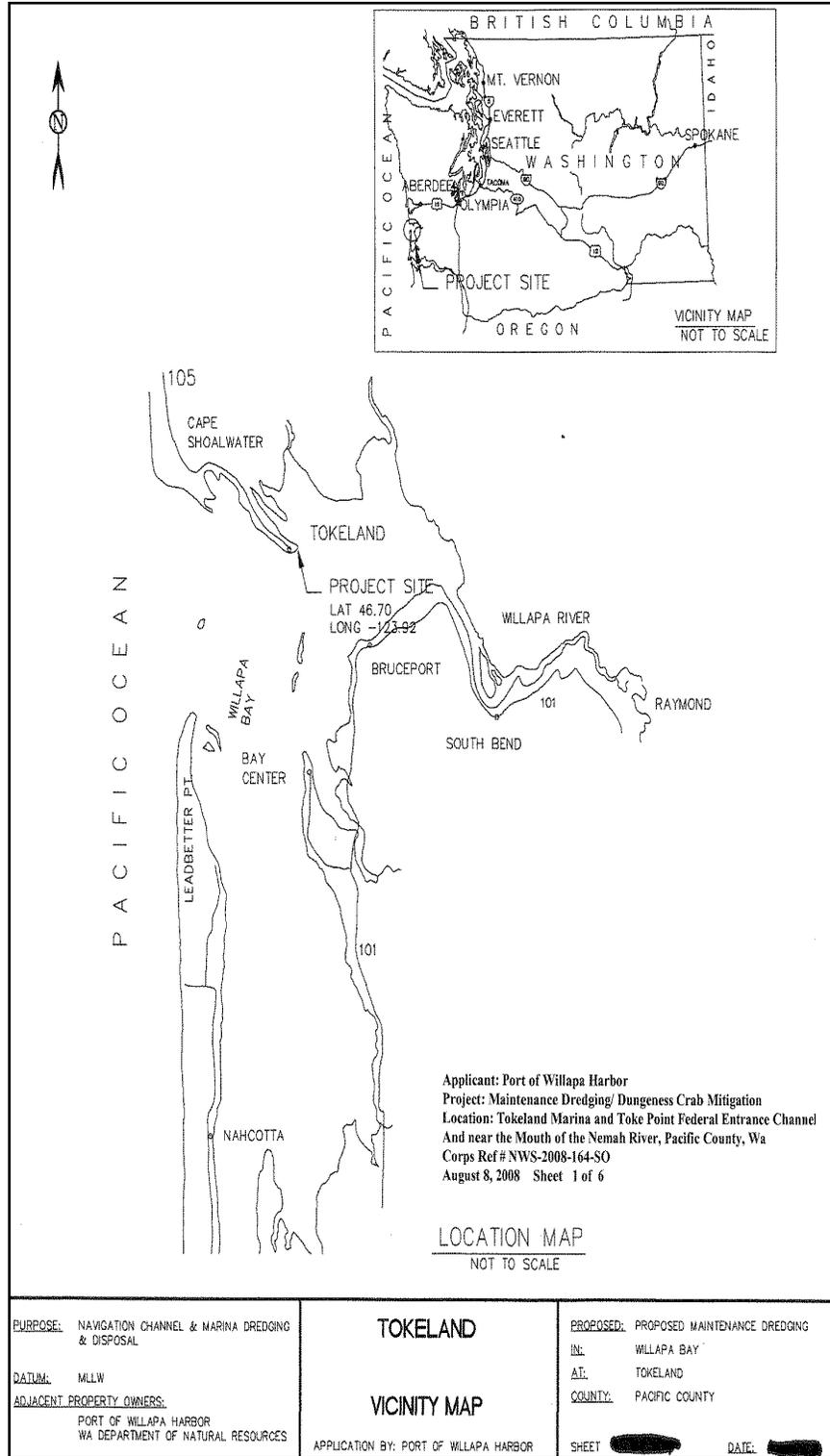


Figure 4. Joint Seattle District (Federal Entrance Public Notice #CENWS-OD-TS-NS)-and Port of Willapa Harbor Public Notices (Individual Permit Application Public Notice No. NWS-2008-164-SO) public notices.

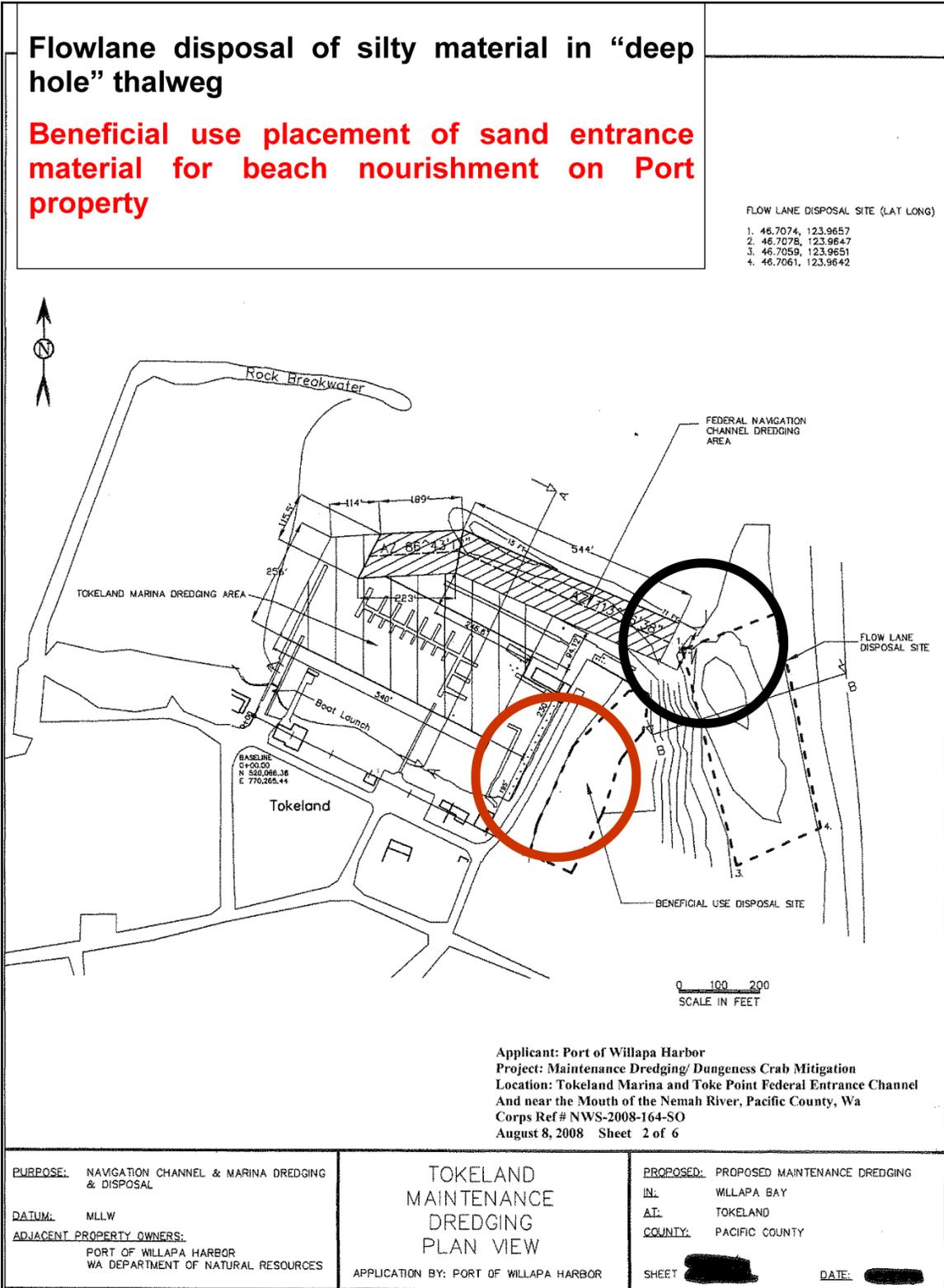


Figure 5. Federal entrance and Port moorage area.

LOW-COST DREDGING AND FLOWLANE BENEFICIAL USE DISPOSAL: Stakeholder consensus is that low-cost dredging is essential for viability of marina and continued maintenance dredging. The capability to adequately address some of the coordination issues about flowlane disposal stems from comprehensive USACE studies (Kraus 2000, Kraus et al. 2002), observations, and numerical modeling of Willapa Bay (Shepsis 2008). Flowlane disposal may be feasible at other sites, although placement at sites with complicated wave, tide, longshore, and cross-shore currents such as open coast inlets must be carefully evaluated to ensure that rehandling of dredged sediment is minimized. For Willapa Bay, previous studies provided a foundation for improved understanding of the sediment and current dynamics, and the studies demonstrated knowledge to obtain required agency approvals for future O&M dredging that is essential to the small fishing based economy and navigation at the Toke Point Marina.

COORDINATION HURDLES CLEARED: The joint permit application process facilitated options intended to avoid permit delays regardless of which entity (Seattle District or Port) obtained the required O&M funding first. The Port and its consultant were successful in satisfying initial fisheries objections to flowlane disposal with receipt of State Hydraulic Project Approval (HPA) and State Ecology 401 Water Quality Certification Order #6297 dated January 7, 2009. A condition of the HPA was mitigation for potential crab entrainment mortality associated with pipeline dredging in the Federal entrance. The Seattle District may not have agreed to such mitigation for Federal maintenance dredging; however, the Port negotiated a mitigation plan that paid \$4,000 to place 237 cy of oyster shell on Washington State Oyster Reserves at Willapa Bay.

TEN YEAR CORPS PERMIT ISSUED AND PORT BUYS NEW DREDGE: Seattle District permit approval of 2009-2019 maintenance dredging for the Tokeland Marina and the Toke Point Federal Entrance was issued on August 7, 2009. The Port applied State grants and loans to purchase a new 10-inch Ellicott cutterhead pipeline dredge in September 2009 (Figure 6).

The first of four Port maintenance dredging events scheduled over the 10-year permit period started on October 9, 2009. Initial dredging began in October 2009 and was completed on March 5, 2010 with flowlane disposal (Figures 7-8).



Figure 6. New pipeline dredge delivered to Port of Willapa Harbor, Raymond, WA, in September 2009.



Figure 7. Port of Willapa Harbor pipeline dredge at work, October, 2009.



Figure 8. Anchored dredge discharge diffuser float for flowlane disposal 5 ft below water surface.

Dredged volumes are modest for the Toke Point Marina. This chronology of dredging through 2019 shows a return to least-cost pipeline dredging which would not have been possible without better understanding of sediment transport dynamics at Willapa Bay:

- 1958 New Construction: 184,000 cy Pipeline with upland disposal
 - 1964 O&M 12,000 cy pipeline with upland disposal
 - 1970 O&M 16,500 cy pipeline with upland disposal
 - 1974 O&M 14,000 cy pipeline with upland disposal
 - 1987 O&M 27,800 cy clamshell with open-water disposal
 - 1991 O&M 27,100 cy clamshell with open-water disposal
 - 1998 O&M 27,650 cy clamshell with open-water disposal
 - 2009 O&M pipeline with flowlane and beneficial use disposal (underway and funded by Port of Willapa Harbor)
- | | Federal Channel | Port Berthing Areas |
|------------|------------------------|----------------------------|
| | 20,000 cy | 45,000 cy |
| • 2012 O&M | 15,000 cy | 40,000 cy |
| • 2015 O&M | 15,000 cy | 40,000 cy |
| • 2019 O&M | 15,000 cy | 40,000 cy |

CONCLUSIONS AND FUTURE CHALLENGE: Collaborative strategies were complimented by access to appropriate technical studies, which allowed the Port of Willapa to overcome challenges for accomplishing maintenance-dredge-and-disposal operations at a Federal, low-use navigation project. The next challenge for the Port is to seek congressional authority and grants for future Federal funding of Port dredging of the Federal entrance channel. As a bottom line for the Toke Point low-use project at Willapa Harbor, the Seattle District initially took the lead, but now the local sponsor has to assume that role to meet its dredging needs.

ADDITIONAL INFORMATION: This Coastal Engineering Technical Note is a product of the Geomorphologic Evolution Work Unit of the Coastal Inlets Research Program (CIRP) being conducted for Headquarters, USACE, at the U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory. Questions about this technical note can be addressed to Hiram T. Arden at 206-764-3401 or by email at Hiram.T.Arden@usace.army.mil. For information about the Coastal Inlets Research Program (CIRP), please contact the CIRP Program Manager, Dr. Julie Dean Rosati at 251-694-3719 or by email at Julie.D.Rosati@usace.army.mil. This technical note benefited from reviews by Rebecca L. Chaffee, Manager Port of Willapa Harbor at portofwh@willapabay.org, and by Dr. Rosati and Ashley E. Frey of the CIRP. This document should be cited as:

Arden, H. T., and N. C. Kraus. 2010. *Proactive strategy for “dredge-ready” operation and maintenance at low-use navigation projects*. Coastal and Hydraulics Laboratory Engineering Technical Note ERDC/CHL CHETN-IV-75. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

REFERENCES

- Kraus, N. C. (Editor). 2000. *Study of Navigation Channel Feasibility, Willapa Bay, Washington*. ERDC/CHL TR-00-6. Vicksburg, MS: U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory.
- Kraus, N. C., H. T. Arden, and D. P. Simpson (Editors). 2002. *Study of Navigation Channel Feasibility, Willapa Bay, Washington, Report 2, Entrance Channel Monitoring and Study of Bay Center Entrance Channel*. ERDC/CHL TR-00-6. Vicksburg, MS: U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory.
- Nanda, S. K., and R. M. Baker. 1984. Experience in Channel Maintenance in Upper Mississippi River. *River Meandering, Proceedings of the Conference Rivers '83*, ASCE, NY, 471-482.
- Olin, T. J. 1993a. Environmental Effects Evaluation for Thalweg Disposal of Dredged Material. Technical Note EEDP-01-31. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- Olin, T. J. 1993b. Implementation Approach for Thalweg Disposal of Dredged Material. Environmental Effects of Dredging, Technical Note EEDP-01-30. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- Shepsis, V. 2008. *Willapa Harbor Flow Lane Disposal Summary of DREDGE Simulations*. Coast & Harbor Engineering, Technical Memorandum, November 10, 2008. Edmonds, WA.

NOTE: *The contents of this technical note are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such products.*