



July 23, 2013

Old Lyme Harbor Management Commission  
c/o Steven Ross, Harbor Management Commissioner  
14 Sandlewood Lane  
Old Lyme, CT 06371

**RE: Old Lyme Navigable Waterways Study – Task 1.6  
Four Mile & Black Hall Rivers, Old Lyme, CT**

Dear Mr. Ross:

In accordance with Task 1.6 of the above-referenced study, we are providing herein an assessment of the possible methodology and associated costs with dredging that is under consideration. As a component of our feasibility and pricing evaluation, we had discussions with several mechanical and hydraulic dredge contractors who work in this area, including: Connecticut Dredge Corp., Patriot Marine, LLC, Select Transportation, Inc., and Inner Space Services. Through these discussions, we identified two potentially feasible methods. Below is a discussion of each method and the likely associated costs. However, please understand that these costs are preliminary, as this phase of the study did not include grain size testing or sediment suitability analyses by the regulatory agencies (Phase II). These Phase II tasks will determine the approved disposal locations, and ultimately allow for the preparation of final cost estimates.

**Hydraulic Dredging – *Beach Renourishment, Upland Disposal, & Landfill Disposal***

Hydraulic dredging consists of a mechanical cutterhead along the marine/river bottom, a pump, and a temporary discharge line to another location, either on the beach/nearshore or upland depending upon the nature of the material. The typical operational range for hydraulic dredging is approximately 1 mile from the dredge site and a maximum distance of 2-3 miles with the use of several booster pumps.

*Beach Renourishment*

Hydraulic dredging is optimal if the material is predominantly sand and can be disposed of at a nearby beach as a form of beach renourishment. Some potential nearby beaches include White Sands Beach, Rocky Neck State Park, and various other local beach areas in-between.

As the proposed dredge footprints in the Four Mile River and Black Hall River are approximately 4,000 feet long and 6,000 feet long respectively, larger hydraulic dredging equipment and booster pumps will be needed to complete the dredging. This results in an estimated mobilization fee of approximately \$150,000 - \$200,000 for the total project. If the material can be disposed of on a nearby beach, one can anticipate a dredge/disposal fee of \$12 - \$20 per cubic yard. For your reference, this process was recently employed in the dredging of the federal channel in Clinton Harbor and disposal at the nearby

Hammonasset Beach during the 2012/2013 winter for a rate of approximately \$22 per cubic yard, inclusive of the mobilization cost.

The estimated dredging/disposal costs for each river have been tallied in the tables below:

*Hydraulic Dredging with Nearby Beach Renourishment*  
Four Mile River - 9,787 Cubic Yards

Mobilization	\$150,000 – \$200,000
Cubic Yard Rate	\$117,444 – \$195,740
<b>Total</b>	<b>\$267,444 - \$395,740</b>

*Hydraulic Dredging with Nearby Beach Renourishment*  
Black Hall River - 13,176 Cubic Yards

Mobilization	\$150,000 – \$200,000
Cubic Yard Rate	\$158,112 – \$263,520
<b>Total</b>	<b>\$308,112 - \$463,520</b>

*Local Upland Disposal*

If the material is predominantly silt (as opposed to sand), and deemed unsuitable for beach renourishment, it will be necessary to dewater the material as a component of the upland disposal process. To accomplish this, the sediment would be pumped into upland berms or geotubes and be allowed to drain water until dry. An upland berm typically consists of mounded soil and/or a silt fence and hay bale system installed around the dewatering area to contain the dredge spoils and allow the water to leach out. A geotube is a fabric container into which the dredge spoils are pumped and allowed to dewater through the permeable membrane. Either of these dewatering methods will require a large area of open space (roughly the size of a baseball field). Ideally, the town can secure a nearby location where the material can both be dewatered and permanently allowed to remain – this is the more cost effective approach. Once dry, the sediment within the berms or geotubes typically remains on-site and graded as necessary. With dewatering, the estimated cost of hydraulic dredging is approximately \$30 - \$35 per cubic yard.

The estimated dredging/disposal costs for each river have been tallied in the tables below:

*Hydraulic Dredging with Local Upland Disposal*  
Four Mile River - 9,787 Cubic Yards

Mobilization	\$150,000 – \$200,000
Cubic Yard Rate	\$293,610 – \$342,545
<b>Total</b>	<b>\$443,610 - \$542,545</b>

*Hydraulic Dredging with Local Upland Disposal*  
 Black Hall River - 13,176 Cubic Yards

Mobilization	\$150,000 – \$200,000
Cubic Yard Rate	\$395,280 – \$461,160
<b>Total</b>	<b>\$545,280 - \$661,160</b>

*Landfill Disposal*

If a local parcel of land is not available for permanent filling, then the material will have to be dewatered at a temporary site and trucked to and disposed of at an appropriate upland landfill facility.

With dewatering, the estimated cost of hydraulic dredging is approximately \$30 - \$35 per cubic yard. The costs associated with landfill disposal include disposal/tipping fees (approximately \$85/ton; 1 cubic yard weighs approx.. 1 ton) and trucking costs (\$7-\$15/ton). Landfills also have a stringent on-going testing requirement, which generally involves testing at 300 cubic yard intervals throughout the duration of the disposal activity. Upland testing of this nature is approximately \$500 per sample.

The estimated dredging/disposal costs for each river have been tallied in the tables below:

*Hydraulic Dredging with Landfill Disposal*  
 Four Mile River - 9,787 Cubic Yards

Mobilization	\$150,000 – \$200,000
Cubic Yard Rate	\$293,610 – \$342,545
Trucking Cost	\$68,509 - \$146,805
Landfill Tipping Fees	\$831,895
Sediment Testing	\$16,500
<b>Total</b>	<b>\$1,360,514 - \$1,537,745</b>

*Hydraulic Dredging with Landfill Disposal*  
 Black Hall River - 13,176 Cubic Yards

Mobilization	\$150,000 – \$200,000
Cubic Yard Rate	\$395,280 – \$461,160
Trucking Cost	\$92,232 - \$197,640
Landfill Tipping Fees	\$1,119,960
Sediment Testing	\$22,000
<b>Total</b>	<b>\$1,779,472 - \$2,000,760</b>

**Traditional Clamshell Method – *Ocean or Nearshore Disposal***

Traditional clamshell dredging consists of using a barge mounted crane or excavator affixed with a clamshell bucket to dredge the material and deposit it into a floating dump scow. Once the scow is full, the material is typically transported to a nearshore or offshore/ocean disposal site. For the purpose of pricing, we have assumed that the nearby Cornfield Shoals disposal site would be authorized for this project.

Mobilization fees for many mid-large mechanical clamshell dredges typically range from \$100,000 - \$180,000. However, due to the proposed channel widths and depths, this job would likely be limited to smaller dredgers with both narrow and shallow drafted scows. The mobilization fee for dredgers of this size typically ranges from \$20,000 - \$40,000.

It is fair to say that even the smaller mechanical clamshell dredgers would not be able to dredge the full scope of either the Black Hall or Four Mile Rivers. In addition to the physical impediment created by the railroad bridge at the mouth of the Four Mile River, the proposed maximum dredge depth of -4.0' in conjunction with a tide range of approximately +3.0', leaves only a select few contractors that have a shallow enough draft to dredge this project. Most of these shallow drafted barges accomplish the minimized displacement with the use of a wider vessel (i.e.: 40' – 80' wide). Therefore, it is possible that only a portion of these projects could be dredged via mechanical clamshell means. The terminating limit is likely the point where the proposed channels narrow beyond a width of 60'.

Within the footprint areas that could be dredged, the dredge operator will only be able to fill the dump scow to half capacity due to draft limitations. Filling the scows to half capacity will result in twice as many trips to the ocean disposal site than that which is typically necessary for the calculated dredge volume. Because of the increased frequency of disposal runs, the estimated cost for traditional dredging and ocean disposal is approximately \$30 - \$40 per cubic yard.

Although at this time it appears likely that only a portion of one or both of the projects can be dredged via mechanical clamshell method, for preliminary cost estimating purposes, we have assumed that the entire project can be dredged with the method. The estimated dredging/disposal costs for each river have been tallied in the tables below:

*Traditional Dredging with Ocean Disposal*

*Four Mile River - 9,787 Cubic Yards*

Mobilization	\$20,000 – \$40,000
Cubic Yard Rate	\$293,610 – \$391,480
<b>Total</b>	<b>\$313,610 - \$431,480</b>

*Traditional Dredging with Ocean Disposal*

*Black Hall River - 13,176 Cubic Yards*

Mobilization	\$20,000 – \$40,000
Cubic Yard Rate	\$395,280 – \$527,040
<b>Total</b>	<b>\$415,280 - \$567,040</b>

### **Task 1.6 Summary**

The methods and costs detailed above reflect the input of experienced dredging contractors following a review of all relevant material provided to them by Coastline Consulting & Development, LLC. As noted above, the costs are approximate and cannot be considered final, as the disposal location(s) has not yet been determined/approved. In addition, a competitive bid process following permit approval may result in lower total project costs.

Regarding the appropriate dredge methodology for each site, it appears that a portion (outer channel) of each is feasible by mechanical/clamshell dredging and the remainder is feasible by hydraulic dredging with potential beach renourishment/disposal and/or upland disposal. Due to the physical site challenges of this job and depending on the final costs of each method, a combination of mechanical dredging, hydraulic dredging with beach renourishment, and hydraulic dredging with upland disposal may be the best overall approach. These approaches need to be further evaluated through the grain size testing, chemical testing, and agency review covered as part of Phase II of the study.

If you have any questions or comments regarding the information provided herein, please do not hesitate to contact me at 203/245-8138 or [david@coastlineconsulting-ct.com](mailto:david@coastlineconsulting-ct.com).

Sincerely,

David R. Provencher  
Project Manager  
Coastline Consulting & Development, LLC