



December 18, 2013

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

**RE: Old Lyme Navigable Waterways Study – Task 2.2
Four Mile & Black Hall Rivers, Old Lyme, CT**

Dear Mr. Ross:

In accordance with Task 2.2 of the above-referenced study, we are providing herein an assessment of the likely dredge disposal locations and associated costs of dredging/disposal of the projects that are under consideration. The primary component of our analysis was to characterize the physical quality of the sediments within the proposed dredge footprints, as it is the grain size that largely determines where the dredged sediment can be disposed. To make this characterization, Coastline Consulting & Development, LLC (Coastline) collected multiple preliminary sediment samples from within the proposed channels in both the Black Hall and Four Mile Rivers. These samples were then tested for grain size at a certified laboratory. The results of the grain size testing, along with our continued discussions with the dredge contractor community and the regulatory agencies, have provided us with a solid understanding of how channels can be dredged and where the sediment can be disposed.

To appreciate what the results of the grain size testing means, it is important to know that the regulatory policy for determining suitable disposal locations has recently evolved and become more restrictive. Although the Department of Energy & Environmental Protection (DEEP) and the Army Corps (USACE) have not provided definitive guidelines for how they make their suitability determination, our experience with several projects over the past 6-12 months has provided us a basic outline of their decision making process. In short, sediment that has a relatively high percentage of silt (>30% silt) is generally suitable for ocean disposal, which in the case of the Old Lyme projects, includes the New London and Central Long Island Sound disposal sites. Sediment that is mostly sand with lesser amounts of silt (5-30% silt) is generally suitable for the Cornfield Shoals Disposal Site off Old Saybrook. Chemically clean sediment that has even lower silt content (5-15% silt) is generally suitable for nearshore disposal off Hammonasset Beach in Madison. Sediment that is predominantly sand (<5% silt) is generally suitable for direct placement on a beach as sand nourishment.

Below is a discussion of each river, the likely disposal sites, the probable dredging methodology, and approximate/associated costs. However, please understand that this information is still preliminary, as the final sediment suitability analyses can only be made by the regulatory agencies following coring/testing of the approved sample locations.

Black Hall River – *Mechanical Dredging with Ocean & Nearshore Disposal*

As the sediment grain size largely dictates the disposal options, it was necessary to analyze this component of the project first. Once disposal options were determined, feasible dredge methodologies could then be evaluated.

Grain Size Evaluation & Disposal Options

The results of the preliminary grain size testing (attached) for the Black Hall River is summarized as follows:

Total Sediment Volume to be Dredged = 13,176 cy

- North of the former Griswold Point Peninsula: 63-73% silt (approx. 8,602 cy)
- South of the former Griswold Point Peninsula: 15% silt (approx. 4,574 cy)

With the Harbor Management Commission's (Commission) approval, the grain size results were forwarded to DEEP for their evaluation. DEEP commented that the proposed channel north of the former Griswold Point Peninsula will only be suitable for either upland disposal or ocean disposal at the Central or New London disposal sites. With the low probability of finding an acceptable upland/commercial property on which to dispose the material, it appears that ocean disposal is the most feasible option.

Regarding the section of the proposed channel extending south from the former Griswold Point Peninsula, DEEP indicated that this sandier material should be acceptable (assuming the material is clean from a chemical perspective) for either nearshore disposal off Hammonasset Beach or ocean disposal at the nearby Cornfield Shoals Disposal Site. DEEP believes that this material's higher silt content makes it unsuitable for direct placement on a beach for sand nourishment.

Dredging Methodology & Cost Estimates

Due to the lack of physical impediments, e.g., a bridge, and lack of nearby upland property on which to hydraulically pump the sediment, it is likely that the Black Hall River can be dredged using the traditional clamshell (mechanical) method. This method would consist of a barge mounted crane or excavator affixed with a clamshell bucket to dredge the material and deposit it directly into a floating dump scow or relayed with smaller containers and then transferred to a larger dump scow anchored offshore. Once the scow is full, the material would then be transported to the nearshore and offshore/ocean disposal sites. For the purpose of pricing, we have assumed that the nearby New London and Cornfield Shoals ocean disposal sites and the Hammonasset nearshore disposal site would be proposed/authorized for this project.

The proposed maximum dredge depth of -5.0' (including 1' overdredge) in conjunction with a tide range of approximately +3.0', will most likely require a contractor that has a shallow enough barge/scow 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', which is wider than the upriver portion of the channel (60'). Within this narrower section, the dredge operator may only be able to fill the dump scow to half capacity due to draft and width limitations during higher periods of the tide cycle. Filling the scows to

half capacity will result in twice as many trips to the disposal sites than that which is typically necessary for the calculated dredge volume. Because of the increased frequency of disposal runs and possible use of a barge relay system, the estimated cost for traditional dredging and ocean/nearshore disposal is approximately \$55 per cubic yard. The total estimated costs of this methodology are tallied below:

Mechanical Dredging with Ocean/Nearshore Disposal
Black Hall River - 13,176 Cubic Yards

Mobilization	\$50,000
Cubic Yard Rate	\$724,680
Total Estimate	\$774,680

Four Mile River – Mechanical Dredging with Ocean & Nearshore Disposal

As the sediment grain size largely dictates the disposal options, it was necessary to analyze this component of the project first. Once disposal options were determined, feasible dredge methodologies could then be evaluated.

Grain Size Evaluation & Disposal Options

The results of the preliminary grain size testing (attached) for the Four Mile River is summarized as follows:

Total Sediment Volume to be Dredged = 9,787 cy

- North of the bridge: 50-84% silt (approx. 6,710 cy)
- South of the bridge: 16-18% silt (approx. 3,077 cy)

With the Commission's approval, the grain size results were forwarded to DEEP for their evaluation. DEEP commented that the section of the proposed channel north of the bridge will only be suitable for either upland disposal or ocean disposal at the Central or New London disposal sites. As it appears at this time that a possible upland disposal location cannot be secured, Coastline has included an evaluation of only the ocean and nearshore disposal option.

Regarding the section of the proposed channel extending south from the bridge, DEEP indicated that this sandier material should be acceptable (assuming the material is clean from a chemical perspective) for either nearshore disposal off Hammonasset Beach or ocean disposal at the nearby Cornfield Shoals Disposal Site. As with the upper reaches of the Black Hall River, DEEP also offered that the high silt content will prevent the material from this portion of the project from being used as beach nourishment by either direct placement or nearshore disposal.

Dredging Methodologies & Cost Estimates

Mechanical Dredging with Ocean & Nearshore Disposal

The physical restrictions, e.g., bridge and width/depth of river, within the section of the proposed channel north of the railroad bridge will require a degree of creativity to dredge this area mechanically. As has been accomplished with recent dredge projects in

Connecticut and Massachusetts, the contractor will need to use sectional barges that can be configured to conform to the site width, depth and overhead bridge clearance requirements. As referenced above for the Black Hall River project, dredging the Four Mile River north of the bridge will almost certainly require a barge relay system involving smaller containers loaded north of the bridge to a large dump scow anchored south of the bridge. This method would consist of a barge mounted crane or excavator affixed with a clamshell bucket to dredge the material and deposit it directly into small barge mounted containers. These relay containers would then be pushed under the bridge by a small work boat, with the material then transferred to a large dump scow (anchored offshore) by a second barge mounted excavator. Once the scow is full, the material would then be transported to the nearshore and/or offshore/ocean disposal sites. For the purpose of pricing, we have assumed that the nearby New London ocean disposal site and Hammonasset nearshore disposal site or Cornfield Shoals Disposal Site would be proposed/authorized for this project.

The proposed maximum dredge depth of -4.0' (including 1' overdredge), in conjunction with a tide range of approximately +3.0' and an overhead bridge clearance of 10.9' at low tide, will require the selected contractor to configure his equipment appropriately in order to employ the barge relay system. Within the narrower section of the river north of the bridge, the dredge operator may only be able to fill the relay containers to half capacity due to draft and width limitations and/or use smaller/shorter relay containers in order to pass under the bridge during higher periods of the tide cycle. The barge relay system will require the use of multiple pieces of equipment and result in handling the material twice. Because of the need to use this system, the estimated cost for traditional dredging and ocean/nearshore disposal is approximately \$55 per cubic yard. The total estimated costs of this methodology are tallied below:

Mechanical Dredging with Ocean/Nearshore Disposal
Four Mile River - 9,787 Cubic Yards

Mobilization	\$50,000
Cubic Yard Rate	\$538,285
Total	\$588,285

Task 2.2 Summary

The methods and costs detailed above reflect the results of preliminary grain size analysis, input from experienced dredging contractors, recent/similar dredge projects, and DEEP. The noted cost estimates are approximate based on the current dredging climate/fees and cannot be considered final, as the disposal locations have not yet been determined/approved.

Regarding the likely dredge methodologies and disposal sites for each project, it appears that both rivers can be mechanically dredged with the use of a barge relay system as appropriate. Material from both sites will involve ocean/nearshore disposal. Due to the physical site challenges of these projects, the anticipated approaches may need to be revisited following submittal of the Sampling & Analysis Plan (Task 2.3), agency review, and final grain size & chemical testing.

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.

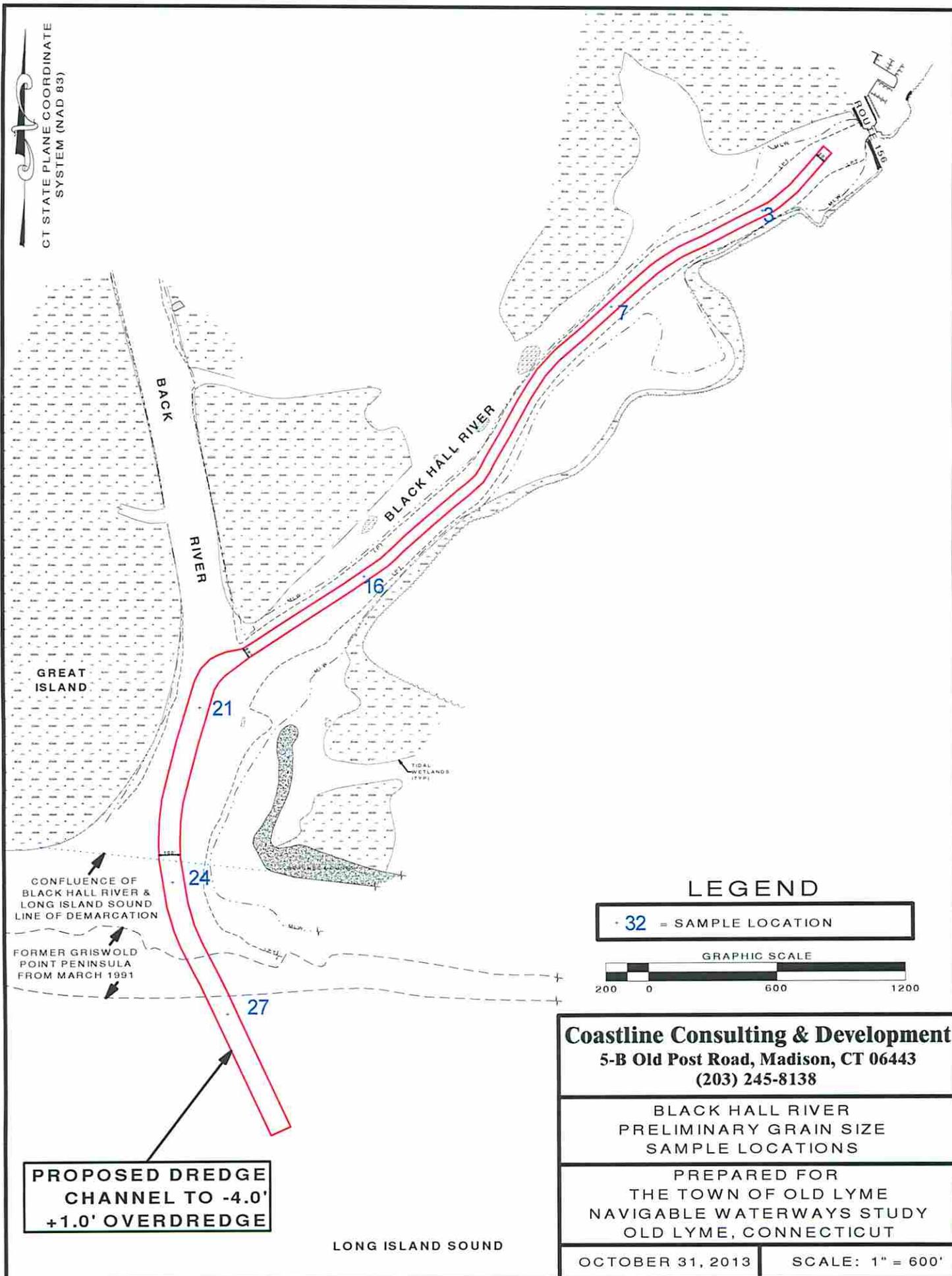
Sincerely,



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

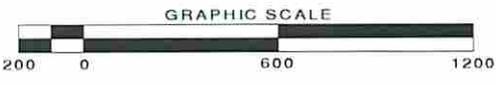
Attachments:
Sampling Maps & Preliminary Grain Size Testing Reports

CT STATE PLANE COORDINATE SYSTEM (NAD 83)



LEGEND

• 32 = SAMPLE LOCATION



PROPOSED DREDGE CHANNEL TO -4.0' +1.0' OVERDREDGE

Coastline Consulting & Development
5-B Old Post Road, Madison, CT 06443
(203) 245-8138

BLACK HALL RIVER
PRELIMINARY GRAIN SIZE
SAMPLE LOCATIONS

PREPARED FOR
THE TOWN OF OLD LYME
NAVIGABLE WATERWAYS STUDY
OLD LYME, CONNECTICUT

OCTOBER 31, 2013 SCALE: 1" = 600'

LONG ISLAND SOUND

Date Samples Received: 09/27/13

Client Name : Coastline Consulting	CTL Lab No. : 0913450
Report Date : 10/02/13	PO/ Job No. : 13-062 Black Hall River

RESULTS OF ANALYSIS

Washed Sieve Analysis

ASTM D-422/ D-1140

Date Analyzed: 09/29/13

Matrix Type :	S	S	S	S
CTL Sample No.:	14612	14613	14614	14615
Field ID :	BH #3	BH #7	BH #16	BH #21

	Sieve Size				
Percent by Wt. Passing	No. 4	99.7	98.7	95.4	99.1
	No. 10	99.2	98.5	93.6	98.2
	No. 40	92.7	94.5	79.3	90.9
	No. 200	65.0	73.0	72.1	65.1

Matrix Type :	S	S
CTL Sample No.:	14616	14617
Field ID :	BH #24	BH #27

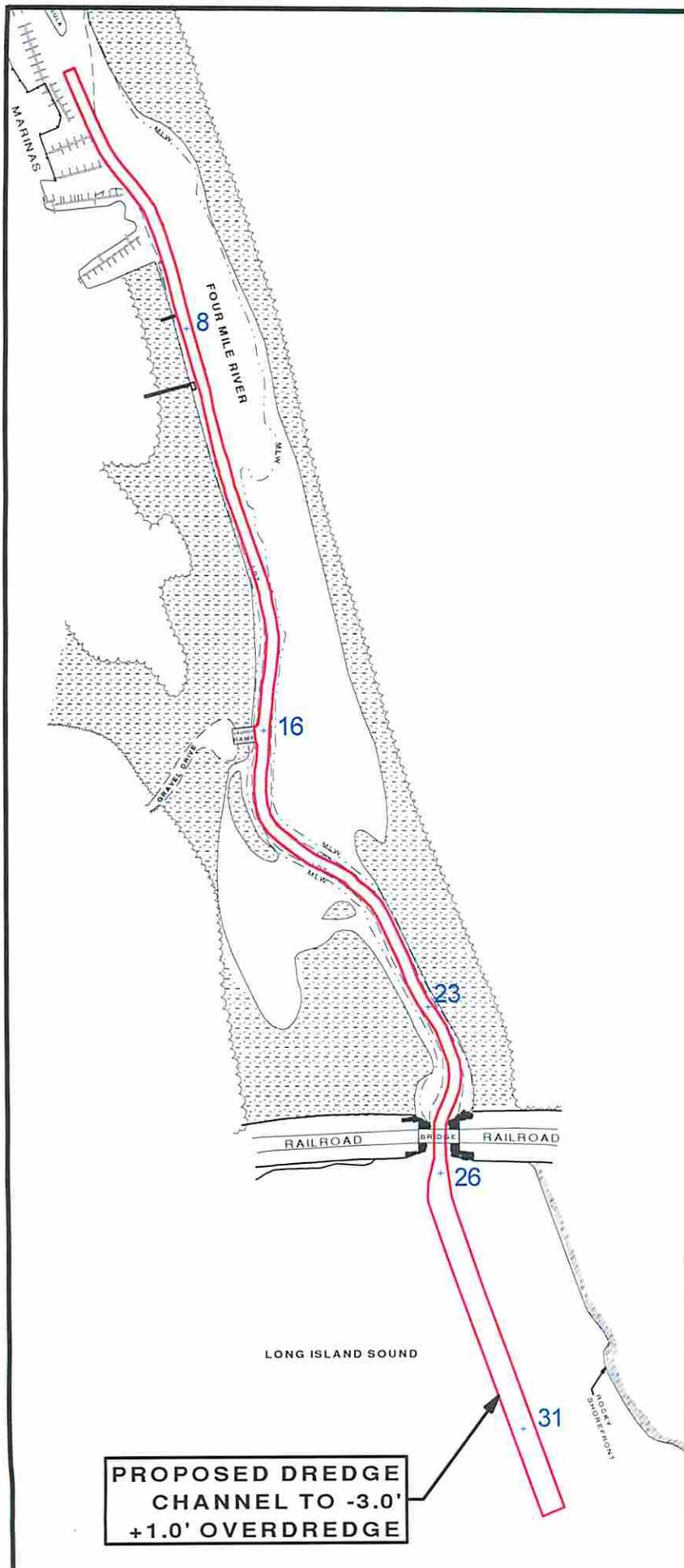
	Sieve Size				
Percent by Wt. Passing	No. 4	97.0	83.8		
	No. 10	94.4	77.6		
	No. 40	70.5	44.5		
	No. 200	63.0	14.5		

RL= Reporting Limit ND= Not Detected

Matrix Type: W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbon

Connecticut Testing Laboratories, Inc.
165 Gracey Avenue / Meriden, CT 06451
(203) 634-3731 (Fax) 630-1336
Certification CT-PH0547/ MA-CT035

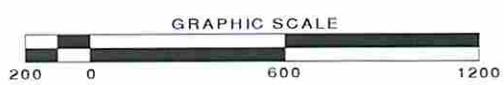
CT STATE PLANE COORDINATE
SYSTEM (NAD 83)



**PROPOSED DREDGE
CHANNEL TO -3.0'
+1.0' OVERDREDGE**

LEGEND

+32 = SAMPLE LOCATION



Coastline Consulting & Development
5-B Old Post Road, Madison, CT 06443
(203) 245-8138

FOUR MILE RIVER
PRELIMINARY GRAIN SIZE
SAMPLE LOCATIONS

PREPARED FOR
THE TOWN OF OLD LYME
NAVIGABLE WATERWAYS STUDY
OLD LYME, CONNECTICUT

OCTOBER 31, 2013

SCALE: 1" = 400'

Date Samples Received: 09/27/13

Client Name : Coastline Consulting	CTL Lab No. : 0913449
Report Date : 10/02/13	PO/ Job No. : 13-062 Four Mile River

RESULTS OF ANALYSIS

Washed Sieve Analysis

ASTM D-422/ D-1140

Date Analyzed: 09/29/13

Matrix Type : S S S S
CTL Sample No.: 14607 14608 14609 14610
Field ID : Four Mile #8 Four Mile #16 Four Mile #23 Four Mile #26

Percent by Wt. Passing	Sieve Size				
	No. 4	No. 10	No. 40	No. 200	
	100.0	96.4	97.9	90.5	
	99.9	93.9	96.6	83.1	
	99.1	72.7	63.0	40.2	
	83.6	65.0	49.4	16.0	

Matrix Type : S
CTL Sample No.: 14611
Field ID : Four Mile #31

Percent by Wt. Passing	Sieve Size				
	No. 4	No. 10	No. 40	No. 200	
	100.0				
	100.0				
	99.6				
	17.9				

RL= Reporting Limit ND= Not Detected

Matrix Type: W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbon