

October 17, 2014
File No. 18.0171857.00



Mr. Brendhan Zubricki
Town Administrator
Essex Town Hall
30 Martin Street
Essex, MA. 01929

DRAFT

Re: Essex River Encroachment Survey
Essex, MA

372 Merrimac Street
Newburyport, MA
01950
781-278-4800
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Dear Mr. Zubricki:

GZA GeoEnvironmental, Inc., (GZA) is pleased to submit the following letter report outlining the results of our Essex River encroachment survey in accordance with our agreement dated November 27, 2013.

www.gza.com

Introduction

The Essex River is approximately 2 ¼ miles long from the designated mouth near Cross Island in Essex Bay to the westernmost limit near the Route 133 bridge. According to information obtained from the U.S. Army Corps of Engineers (USACE), the federal channel was originally dredged in 1901 to a width of 60 feet and to a depth of 4 feet (below Mean Lower Low Water datum). The most recent published survey by the USACE was performed in April and May of 2008. At that time, the USACE noted shoaled conditions in the river and “encroachment by numerous floats and piles along the east and west limits.” It is our understanding that the USACE will not provide funding toward future dredging projects in this area until the encroachment issue of floats and piles within the Federal Channel limits has been resolved.

In addition to the existing encroachment into the Federal Channel, the USACE also requires a setback distance from the Federal Channel where no permeant structures are allowed. This setback distance is based on three times the dredge depth of the Channel. For Essex River within the encroachment area of concern, the setback distance is 12 feet (3 times the dredge depth of 4 feet = 12 feet).

GZA was retained by the Town of Essex (the Town) to perform a bathymetric survey of a limited portion of the Essex River as well as a limited topographic survey of shoreline features and positional location of the floating docks and piles to determine the possible encroachments into the Federal Channel limits. GZA’s scope of work included the following; performing a bathymetric survey of the study area, survey of landside float, pile and shoreline structures, integrating the positioning of the Federal Channel onto the survey plan, and development of an evaluation report letter to identify the structures at each marina that are within the encroachment of the Federal Channel limit, including recommendations on alternate ways to address the encroachment issue.



Existing Conditions

GZA field engineers performed landside and waterside survey of the site within the evaluation limits. Bathymetric and limited shoreline topographic survey was performed on April 1, 2014, before the seasonal floats were installed. Survey was performed of the existing float layout on June 3, 2014, after the floats were installed for the summer boating season. The portion of the River fronting the CK Pearl Restaurant, was not surveyed as part of this evaluation. Prior GZA survey performed for the Town on March 29, 2012 was utilized within this area to create the contour map shown on the attached plans. All bathymetric survey was performed by GZA’s survey vessel utilizing an echo sounder and a Differential Global Positioning System (DGPS). Shoreline and float survey was performed by GZA personnel using a Real-Time Kinematic (RTK), DGPS unit. The attached project drawings are referenced to Mean Lower Low Water (MLLW) vertical datum and North American Datum of 1983 (NAD83) horizontal datum, similar to the USACE drawings for the Essex River.

The survey data was reduced to show existing conditions of the River, along with the location of the existing Federal Channel limits, the Federal Channel limit offset and the location of the existing floating docks. The Essex River has a 12-foot channel offset (three times the dredge depth) within which no permanent structures are allowed. Seasonal floats are acceptable, but piles and other permanent structures are not. The offset restriction provides the ability for a dredging contractor to be able to maneuver their equipment when performing dredging operations, and for allowing sufficient distance for a 3 horizontal to 1 vertical, sideslope.

Six floating dock locations were surveyed including: Pike Marine, Essex Marina, Perkins Marina, Tom Shea’s Riverside Restaurant, Essex River House Motel, and the private apartment complex floating dock. Based on the alignment of the floats at the time of the survey, it was determined that all six of the floating dock locations were encroaching into the Federal Channel. Table 1 indicates the approximate square footage of encroachment per each location.

Table 1: Federal Project Limits Channel Encroachments (Existing Conditions) - Essex River

<i>Location</i>	<i>Encroachment Area (Square Feet)/ Pile Encroachments</i>	<i>Encroachment Area Within Channel Offset (Square Feet)</i>
Pike Marine	1,458 SF / 2 Piles	810 SF / 1 Pile
Essex Marina	522 SF / 3 Piles	792 SF / 1 Pile
Perkins Marine	77 SF	350 SF
Tom Shea’s Riverside Restaurant	272 SF	54 SF
Essex River House Motel	198 SF	159 SF
Apartment Complex	237 SF	425 SF / 2 Piles

Each of the six private dock structure locations surveyed were found to be in some form of encroachment into the existing channel. In order for USACE to participate in future dredge planning and construction, changes to either the floating dock layout or the channel alignment will need to occur.

Proposed Options

The following options were considered to address the encroachment and future dredging issues based on the results of the bathymetric survey and the landside structure and shoreline survey:

1. “Do-Nothing” Option:

The “Do-Nothing” option provides for no changes to the existing conditions within the surveyed limits of the Essex River. If the floating docks, pilings and the channel remain in their current alignments, the USACE will not provide expenditures or funding for future dredging activities and the shoaling issues will remain and potentially worsen in the future. In order to maintain safe navigation, dredging activities would be required to be performed by either the State, Town, or by the individual marina owners, or a combination of the three, at their own expense.

2. Relocation of Private Structures:

Relocating or removing existing floats and piles could be an option for individual marina owners, however possible reduction in float sizes and reconfigurations may be required. For two of the three larger marinas, this could be a feasible option based on shoreline conditions, however private dredging would be required to provide sufficient water depth for use. Shoreline structures would need to be evaluated to make sure they would not be compromised if dredging occurred.

- a) Essex Marina: The existing floats at the Essex Marina could potentially be relocated and reconfigured landward to maintain approximately the same square footage of floats while eliminating float encroachments into the Federal Project Limits. With this relocation, three piles would be required to be relocated outside of the Federal Project Limits and associated channel offset.
- b) Perkins Marina: The majority of the floats at Perkins Marina are within the Federal Channel limits offset and only a small portion within the Channel. The portion of the floats within the Federal Channel limits could potentially be realigned such that encroachments could be eliminated, provided private dredging is performed.
- c) Pike Marine: Pike Marine currently has the largest amount of floats within the existing Federal Project Limits, nearly 50 percent of their total floats. Based on the existing bathymetry landward of their floats and the close proximity to retaining structures, relocating floats within this area does not appear to be feasible unless extensive shoreline adjustments and significant dredging is performed.
- d) Remainder of Private Sites: The other three private sites downriver from the three larger marinas all could potentially relocate their floats landward, or re-configure to eliminate the encroachments, provided private dredging work is performed.





3. Elimination of a Portion of the Federal Channel:

By proposing to ‘cut short’ the Federal Channel, just downriver from the first private encroachment, identified as “private apartments” as indicted above and as shown on Figure 3, this would eliminate the USACE’s concerns about encroachment onto their Channel. With this option, the remaining portion of the Essex River that does not include any channel encroachments, including possibly the mouth of the River would likely be considered by USACE for future dredge planning and funding.

Future dredging activities upriver from the proposed new channel ending would be required to be performed by the State, Town, or by the individual marina owners, or a combination of the three, at their own expense.

4. Proposed Channel Re-Alignment (60 ft):

The existing Federal Channel alignment was established over 100 years ago and it is unknown as to what the shoreline conditions were at that time or how the natural flow of the River was located in comparison to the existing Channel limits. Based on the bathymetric survey performed and the location of the existing floats, piles and shoreline structures, we have considered one option to include the re-alignment of the existing 60-foot wide Federal Channel to better fit within the current water depths and physical constraints at the site, while trying to eliminate or reduce the encroachment issues to a minimum.

On July 23, 2014, GZA personnel spoke to Ed O’Donnell, Chief of the Navigation Section at the U.S. Army Corps of Engineers, New England District. Mr. O’Donnell was asked about the ability to re-align a portion of the Federal Channel on the Essex River. He indicated that re-alignment of the Channel is possible and is typically performed internally at the USACE. He further stated the process to re-align a Channel generally does not take that long, as long as all parties agree and the alignment is acceptable to the USACE. Encroachment in the Channel offset is generally discouraged however it is allowed in certain instances where structures could be removed for contractor operations. Individual review by the USACE would be required.

Based on our conversation with the USACE, the bathymetric and structure survey and the current alignment of the Federal Channel, we have presented the option to re-align the 60-foot wide channel as shown on the attached Figures 4A and 4B. This re-alignment allows for the existing floats to remain in their current positions with no encroachment to the proposed Channel and minimal encroachment to the Channel offset limits. The turning basin at the upriver end of the Channel would also be narrowed from the existing alignment. This option will also reduce the current encroachments within the Channel offset limits of 12 feet. Table 2 indicates the approximate square footage of encroachments that would still remain after the proposed Channel re-alignment.



Table 2: 60-Ft Channel Re-Alignment Offset Encroachments, Essex River, MA

<i>Location</i>	<i>Offset Encroachment Area (Square Feet)/ Pile Encroachments</i>
Pike Marine	309 SF
Essex Marina	368 SF / 4 Piles
Perkins Marine	427 SF
Tom Shea's Riverside Restaurant	1 SF
Essex River House Motel	67 SF
Apartment Complex	18 SF

The allowance of encroachments in the 12-foot Channel offset would need to be approved by the USACE. It is hopeful the USACE will allow offset encroachments provided no fixed structures (i.e. piles) exist and the floats are seasonal and are able to be removed during dredging future operations.

The majority of the encroachments within the Channel offset (per Table 2, above) are seasonal floats that are removed each Fall, with the exception of four piles at the Essex Marina. These piles would be required to be relocated out of the offset area.

5. Proposed Channel Re-Alignment (40 ft):

Similar to Option 4 – Proposed Channel Re-Alignment (60 ft), above, the fifth option is to re-align and reduce the width of the existing Channel to a 40-foot width, as shown in Figures 5A and 5B. This option would reduce further the encroachment into the Channel offset limits. Table 3 indicates the approximate square footage of encroachment within the re-aligned channel offset per each location.

Table 3: 40-Ft Channel Re-Alignment Offset Encroachments, Essex River, MA

<i>Location</i>	<i>Offset Encroachment Area (Square Feet)/ Pile Encroachments</i>
Pike Marine	12 SF
Essex Marina	5 SF
Perkins Marine	50 SF
Tom Shea's Riverside Restaurant	0 SF
Essex River House Motel	0 SF
Apartment Complex	0 SF

Option No. 5 is a feasible option for the Essex River Federal Channel limits. This re-alignment will create a smaller channel width while eliminating the encroachments within the Federal Channel. There will continue to be minor encroachments within the 12-foot channel offset, but these will consist of seasonal floats with no permanent structures. The allowance of encroachments in the 12-foot Channel offset and reduction in the Channel width to 40 feet wide would need to be approved by the USACE.

Summary and Recommendations



The USACE will not allocate future expenditures for survey, planning or dredging of the upper portion of the Essex River within their Federal Project Limits until the existing encroachment issues are resolved. The above options outline the various scenarios for the following: maintaining existing conditions; relocation of floats and guide piles; de-authorizing a portion of the Federal Channel and re-alignment of the existing Channel with an additional option of a width reduction. Each option, with the exception of Option No. 1, would require USACE, Navigation Section and possibly Regulatory Section review and approval.

Although beyond the scope of services, GZA performed some rough, preliminary volume calculations to determine the approximate amount of proposed dredging within the Federal Channel needed to maintain the original design depth, based on the existing surveyed conditions. Assuming a 1-foot over-dredge allowance (to -5.0 mean lower low water datum) and a ten percent contingency, the amount of material to be dredged is approximately 15,000 cubic yards. If the 60-foot Channel is re-aligned, as indicated in Option 4 above, the amount of material to be dredged is approximately 8,500 cubic yards. If the 40-foot, re-alignment Channel option is considered, the amount of material to be dredged is approximately 6,000 cubic yards.

Although Town officials, stakeholders and other interested parties should come to an agreement on the selected option, or course of action going forward with regard to the encroachment issue, GZA has provided a recommendation based on the information we obtained during our survey work. GZA recommends Option 4 which will maintain the same width of the existing Federal Channel (60-foot), but provide an improved re-alignment which better suits the existing 'traveled way' of vessels. Minor adjustments to the existing structures would be required. In addition, the re-alignment improves the physical constraints that exist within the study area, and potentially would involve less dredging of the Federal Channel, which could be more favorable for the USACE if compared to the dredging amount if Option 2 is considered.

We recommend that a meeting be arranged with representatives of the USACE to determine the feasibility of each option from a navigation and regulatory prospective prior to public discussions. Upon input from the USACE, we recommend that these options as presented above be discussed amongst the Town officials, stakeholders and other interested parties involved along the study portion of the Essex River to discuss benefits and drawbacks of each option. With this additional feedback, the Town can determine a course of action to begin discussions with the USACE regarding which option is favored and what is required to implement the selected option. GZA will be available to assist in these discussions and can provide the necessary documentation to the USACE upon the selected option.

If you have any questions on the submitted information contained in this report letter or require any additional information, please call me at 781-278-4806 or email me at david.smith@gza.com for further information.

Very truly yours,
GZA GEOENVIRONMENTAL, INC.



A handwritten signature in blue ink that reads "David A. Smith".

David A. Smith
Project Manager

A handwritten signature in blue ink that reads "Anders B. Bjarngard".

Anders B. Bjarngard, P.E.
Principal-in-Charge

A handwritten signature in blue ink that reads "David B. Vine".

David B. Vine, P.E.
Consultant/Reviewer

Attachments:

1. Appendix A – Limitations
2. Figures:
 - Figure 1 – Key Plan
 - Figure 2A – Existing Conditions
 - Figure 2B – Existing Conditions
 - Figure 3 – Partial Elimination of Federal Channel
 - Figure 4A – Proposed Plan: 60-foot Channel Realignment
 - Figure 4B – Proposed Plan: 60-foot Channel Realignment
 - Figure 5A – Proposed Plan: 40-foot Channel Realignment
 - Figure 5B – Proposed Plan: 40-foot Channel Realignment