Multi-beam and Single-beam Bathymetric Survey
Newark Bay Study Area
Fall/Winter 2012
Field Modification Form

Based on conditions observed during setup, surveying, and reconnaissance surveying conducted in the Newark Bay Study Area during the weeks of December 10, 2012 and December 17, 2012, the following field modifications are proposed:

Field Modification Number: *20121219*

Method (source): *Water depth coverage for multi-beam and single-beam equipment (Quality Assurance Project Plan (QAPP) Section 1; QAPP Section 2 Worksheets #9, #10, #11, #14, #17, #18; Field Sampling Plan (FSP) Section 2; Standard Operating Procedures (SOPs) #4, #5*

Procedure Proposed for Modification and Rationale for Change:

The QAPP, FSP, and SOPs were originally developed to have multi-beam coverage include the area deeper than approximately -6 feet (ft) National Geodetic Vertical Datum of 1929 (NGVD29) elevation. The single-beam survey coverage would then cover from -6 ft NGVD29 to approximately -2 ft NGVD29.

Based on field conditions and reconnaissance surveying, it was determined that the targeted depths could be more efficiently surveyed by allowing the multi-beam vessel to cease surveying at approximately -8 ft NGVD29 and the single beam-beam vessel to survey shoreward of this isopleth. The project Data Use Objectives would not be impacted by this change.

Proposed Modification:

Single-beam surveys will cover areas with elevations from -8 ft NGVD29 shoreward (as shallow as the equipment and vessels can reach safely) using the following general guidelines (see Attachment A for specific locations):

1. *In mudflat areas where a significant amount of time would be spent identifying the -8 ft NGVD29 elevation line, it is acceptable to develop a smooth separation line between the multi-beam and single-beam coverage The smooth contour line will generally be established based on single-beam coverage. The -8 ft NGVD29 contour will be captured (generally) but this approach will result in some elevations between -8 ft and -6 ft not being ensonified with the multi-beam echosounder (see for example Area #s 1, 2, and 5 in Attachment A).*
2. *Areas where the -8 ft NGVD29 elevation extends towards the navigation channel may create large gaps in multi-beam coverage. This situation will be handled similar to guideline #1, i.e., develop a smooth separation line between the multi-beam and single-beam coverage in an effort to minimize large voids in the multi-beam surface (specifically noted along the eastern edge of the navigation channel in the NBSA) (see for example Area #4 in Attachment A).*
3. *It is not necessary to utilize multi-beam survey technology in areas within the mudflats, within the -8 ft NGVD29 elevation, where the elevation decreases again (see for example Area #3 in Attachment A).*
4. *In areas of the NBSA that the elevations have not been determined with reconnaissance surveying, the rules above can be followed to obtain a smooth transition between the multi-beam and single-beam coverage areas while still capturing the -8 ft NGVD29 elevation (and as shallow as possible beyond this elevation).*

The objective of the guidelines provided with this modification (above) is to survey from -8 ft NGVD29 and deeper with the multi-beam system, allowing for flexibility whether multi-beam or single-beam will be used around -8 ft NGVD29, depending on field conditions. Single-beam will be used shoreward of the area ensonified by the multi-beam system.

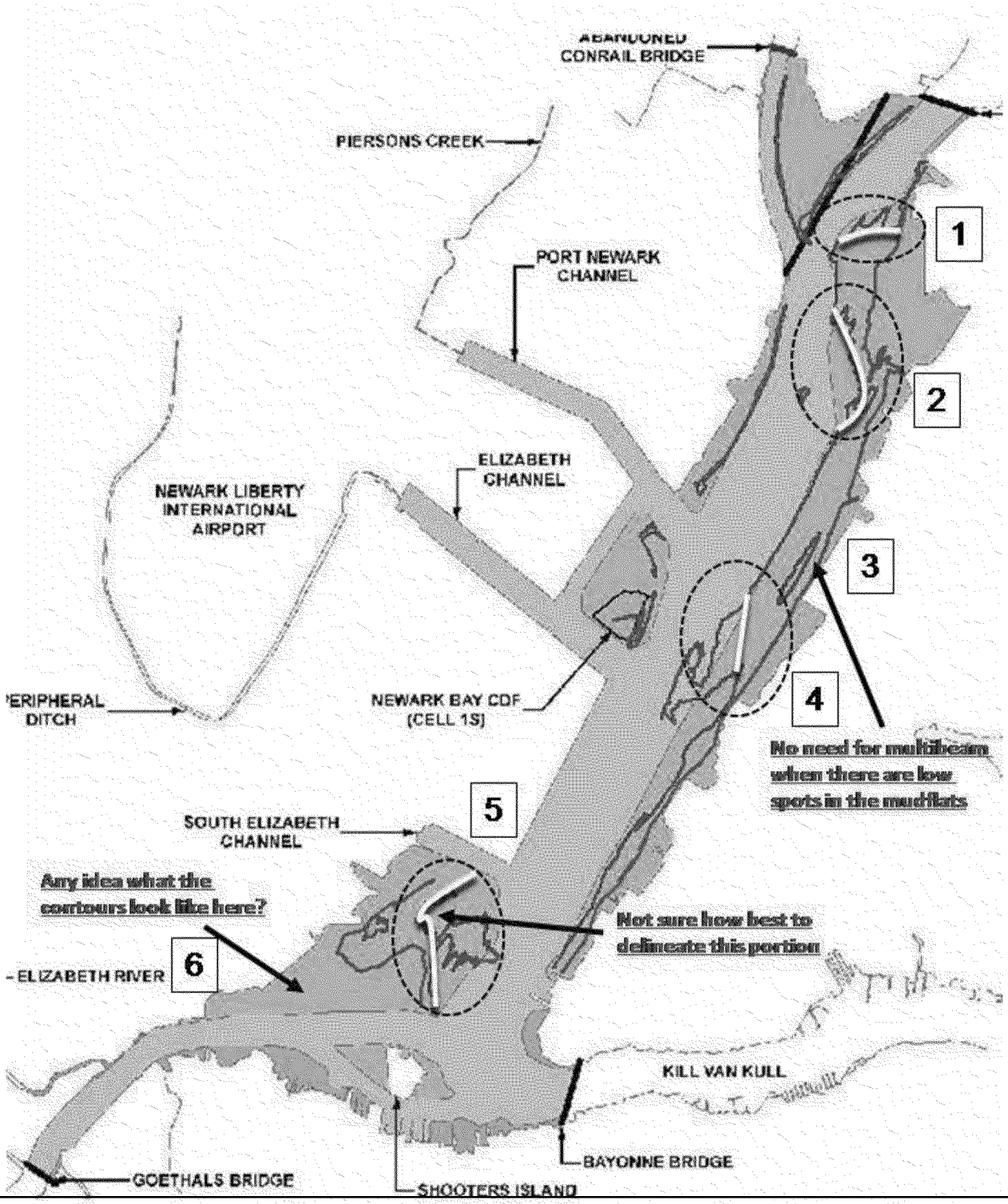
Method (source): *Operation time for single-beam equipment (QAPP Section 1; FSP Section 2.3; SOP #5*
Procedure Proposed for Modification and Rationale for Change:
The QAPP, FSP, and SOP originally specify that single-beam surveying work will be conducted at +/- 2.5 hours around the high tide. *This specification was made for the shallow operating area only and this field modification has been developed to clarify the timing and use of the single-beam equipment.*
Proposed Modification:
Single-beam data acquisition will be conducted in shallow operating areas (i.e., approaching the - 2 to - 3-ft water depth, the shallow limit for safe vessel/equipment operation) during times of high water. The time of high water is the +/- 2.5-hour limit centered on predicted high tide as specified in the QAPP, FSP, and applicable SOPs. The single-beam equipment can be utilized for deeper areas at any time.

Method (source): *Beam angle for multi-beam survey (QAPP Section 2 Worksheets #17, #18)*	
Procedure Proposed for Modification and Rationale for Change:	
The QAPP specifies the use of multi-beam data will be limited to +/- 45 degrees from nadir. *This specification was determined following the procedures that were in place for the survey work previously conducted along the Lower Passaic River. This limitation on the beam data is unnecessary since the increased beam angle has been proven to not add uncertainty to the dataset.*	
Proposed Modification:	
To improve the production rate of the survey, multi-beam survey methods can include data to +/- 60 degrees from nadir (120-degree total swath), PROVIDED interim patch/performance testing continues to show that testing data fall within U.S. Army Corps of Engineers' specifications to the +/- 60-degree beam angles. All standard calibrations and checks will be conducted and documented.	
Submitted by: *Carlie Thompson (Tierra Solutions, Inc.)*	**Date:** *12/28/2012*
USEPA Approval:	**Date:**
Reviewed by Survey Manager: *George Reynolds (Ocean Surveys, Inc.)*	**Date:** *12/19/2012*
Reviewed by QA Manager: *Rob Reed (ARCADIS)*	**Date:** *12/19/2012*

FOIA_07123_0005855_0002

Attachment A

Newark Bay Study Area
Bathymetry Reconnaissance



Notes for graphic:

1. Bathymetry data provided by Ocean Surveys, Inc. (OSI) on December 14, 2012 and notes were added by U.S. Environmental Protection Agency (USEPA) on December 17, 2012.
2. The red lines are an approximation of the -6 feet (ft) National Geodetic Vertical Datum of 1929 (NGVD29).
3. The blue lines are an approximation of the -8 ft NGVD29.
4. White lines represent the approximate smooth line connection between areas where the -8 ft NGVD29 elevation meanders in effort to simplify survey coverage between multi-beam and single-beam methods as suggested by USEPA.
5. Red text represents notes and recommendations provided by USEPA.