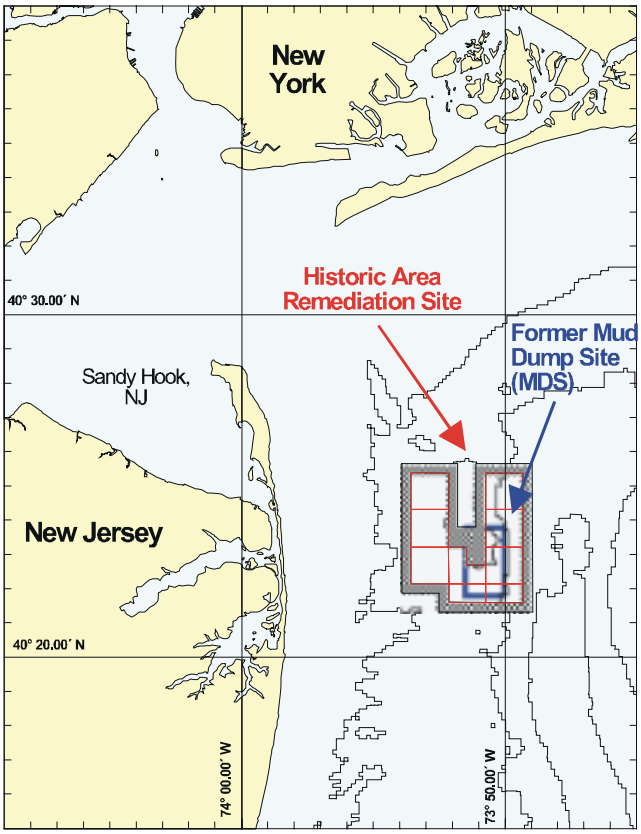
RESULTS FROM THE AUGUST 1998 BATHYMETRIC SURVEY OF HARS REMEDIATION CELLS 1, 2, AND 3



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ACKNOWLEDGMENT

This report presents results of a bathymetric survey conducted at the Historic Area Remediation Site (HARS) by Science Applications International Corporation (SAIC) of Newport, RI, under the Delivery Order 14 of SAIC's Indefinite Delivery Contract No. DACW51-97-D-0014 with the U.S. Army Corp of Engineers – New York District (NYD).

Survey operations were conducted by SAIC staff: Messrs. Jason Infantino, Ed DeAngelo, and Ms. Kate Pickle, aboard the Corps ***M/V Gelberman.*** Logistical and planning support was provided by Mr. Brian May of the NYD. The excellent vessel handling capabilities provided by the crew of the ***M/V Gelberman*** contributed significantly to the quality of the survey. Mr. Ed DeAngelo was the project leader for this Delivery Order and Dr. Scott McDowell is the Program Manager.

Mr. Jason Infantino produced the bathymetric data analysis and graphics. The report was compiled by Mr. Jason Infantino. Mr. Ed DeAngelo provided technical review of the report, while Mr. Tom Fox was responsible for report production.

1.0 INTRODUCTION

1.1 Background

Dredged material from the Port of New York and New Jersey has historically been placed in and around the Mud Dump Site (MDS), located in the open waters of the New York Bight six miles east of Sandy Hook, New Jersey (Figure 1-1). Based on concerns about limited site capacity and the environmental effects of past disposal, EPA Administrator Carol Browner, Secretary of Transportation Frederico Pena, and Secretary of the Army Togo West, Jr. issued a "3 Party Letter" in 1996 announcing the closure of the MDS by September 1, 1997. The 3 Party Letter further states that simultaneous with the closure of the MDS, the site and surrounding areas which have been used historically for disposal of dredged material having elevated levels of chemical contaminants will be redesignated as the Historic Area Remediation Site (HARS). On August 26, 1997, the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) finalized the rule providing for simultaneous closure of the MDS and designation of the HARS.

Region II of the EPA and the New York District (NYD) of the USACE together are responsible for managing the HARS to reduce the presently elevated contamination and toxicity of surface sediments to acceptable levels. The two agencies have prepared a Site Management and Monitoring Plan (SMMP) for the HARS which identifies a number of actions, provisions and practices to manage remediation activities and monitoring tasks (USEPA/USACE 1997). The planned remediation will consist of placing a one-meter "cap" layer of uncontaminated dredged material on top of the existing surface sediments within each of the nine, 1-nmi^2 Remediation Cells of the HARS (Figure 1-2). The "remediation material" to be used for capping is defined as dredged material that meets current Category I standards and will not cause significant undesirable effects, including through bioaccumulation.

The main objective of the HARS SMMP is to ensure that placement of the remediation material does not result in any significant adverse environmental impacts but does result in sufficient modification (i.e., remediation) of currently unacceptable sediment chemistry and toxicity characteristics. Toward these ends, the SMMP includes a tiered monitoring program designed to focus both on the entire HARS and on each of the nine, 1-nmi^2 individual remediation cells in the Priority Remediation Area (PRA). The monitoring to be undertaken at regular intervals includes high resolution bathymetry, sediment profile imaging (SPI), sediment coring, sediment chemistry and toxicity testing, tissue chemistry testing, benthic community analyses, and fish/shellfish surveys. This report presents the results of an initial survey involving high-resolution single-beam bathymetry within remediation cells 1, 2, and 3 of the HARS PRA (Figure 1-2).

1.2 Objective

The objective of the field survey described in this report was to obtain high resolution bathymetric data for remediation cells 1, 2 and 3 of the HARS PRA. This survey was the first

bathymetric survey to be conducted in these areas under the HARS SMMP and was performed subsequent to the placement of a significant (~400,000 yd^3) volume of material in the

remediation cell. The bathymetric data collected in this survey thus provides a comparator against which future expected changes in seafloor topography will be compared. Overall, the information obtained in this baseline survey will be used by disposal site managers from the NYD and EPA to characterize the existing topography in and around remediation cells 1, 2, and 3 and detect all future depth changes associated with placement of remediation material in these areas.

2.0 BATHYMETRIC SURVEY OPERATIONS

Survey operations were conducted aboard the NYD's ***M/V Gelberman*** during the period from September 5 through September 18, 1998. The survey area measured 8200 m (north-south) by 3225 m (east-west) incorporating remediation cells 1-3 of the HARS and the surrounding buffer zone (Figure 1-2).

Vessel positioning and data integration were achieved with SAIC's Portable Integrated Navigation Survey System (PINSS). This PC-based system provides real-time navigation and collection of position, time, and depth soundings for subsequent analysis. Vessel positioning was determined using a GPS receiver. One to 5-m Differential GPS accuracy was achieved by applying corrections to the GPS signals that were acquired from the US Coast Guard broadcast station located at Sandy Hook, NJ.

During field operations, the PINSS provided the navigator and vessel operator with range and bearing to selected targets (i.e., beginning and end of survey lines), signal quality, time of day, and selected data from environmental sensors such as the depth sounder.

Depth soundings were collected with an Odom DF3200 Echotrac® survey echosounder using a 208 kHz transducer with a 3° beam angle. The Odom simultaneously displayed water depth data on a chart recorder and transferred digital sounding data to the PINSS. The echosounder collected 6-8 soundings per second and transmitted an average value to the PINSS at a rate of one sounding per second.

A Seabird Electronics, Inc., Model SBE-19-01 conductivity-temperature-depth (CTD) profiler was used to acquire vertical profiles of sound velocity in the water column at the beginning and end of the survey day.

Water level data from the Sandy Hook, NJ, tide station were obtained from the NOAA Ocean and Lakes Levels Division (OLLD) web-server via the world wide web (http://opsd.nos.noaa.gov/). The NOAA station provides water level readings at 6-minute intervals referenced to Mean Lower Low Water (MLLW). Following the survey, the water level data from Sandy Hook were applied to the bathymetric data from the survey region to remove water level variations due to tides. Because the tide at Sandy Hook is 45 minutes later than the tide at the Mud Dump Site, a time adjustment was applied during the data processing.

Depth soundings were collected along 130 north-south oriented survey lines spaced 25 m apart within the 8200 m by 3225 m survey area. This survey plan will be stored and used with all future bathymetric surveys performed in the area of interest. These data will serve as a comparator grid for future monitoring surveys in the HARS.

Using SAIC's Hydrographic Data Analysis System (HDAS), bathymetric soundings were edited for outliers and corrected for sound velocity, transducer draft, and tidal variation. Following the application of all correctors, the depth soundings were spatially averaged to produce a bathymetric grid of cells each having dimensions of 25 m by 25 m. The gridded bathymetric data were used to

produce the various topographic maps included in this report, and will be incorporated into the GIS database of the Disposal Analysis Network for the New York District (DAN-NY) which resides at the NYD.

3.0 RESULTS AND DISCUSSION

The bathymetric survey results are presented in a variety of graphical data products to illustrate the topography of the study area. All graphic data products have been plotted in NAD83 latitude/longitude coordinates, and depth values are relative to Mean Lower Low Water (MLLW). For reference, the HARS remediation cells 1-3, and the buffer zone have been included in the plots.

Figure 3-1 is a two-dimensional plot of bathymetric contours within the survey area generated from the results of the September, 1998 survey. The topography in remediation cells 1-3 is characterized by a trough with a NW-SE orientation. The deepest portion of the trough has a water depth of 82.5 ft and is located in the NW corner of the survey. To the south and east, water depths decrease to 47.7 ft along the slope of an historic dredged material mound that accumulated in the early part of this century (SAIC 1995).

The color bathymetric contour plot represented in Figure 3-2 is useful for visual interpretation of the bathymetric survey results. The deepest (blue) regions towards the central portion of the survey area contrast well with the shallower regions (yellow) to the northeast and to the southwest.

Three-dimensional contour plots are helpful for graphically portraying the topography of the survey area. For example, Figure 3-3 presents a three-dimensional view of the study area, facing northwestward. The deepest regions are in the foreground, while the shallowest area appears to the east. The topography to the southwest contrasts well with the relatively smooth topography in the remaining northern area of the survey. The southern portion of the survey area is composed of a group of relatively steep, linear topographic features oriented east and west. These linear features are an extension of the Shrewsbury Rocks. Note that the steepness of these features in the plot is misleading and a direct result of the vertical exaggeration in the figure. The depth axis in this figure has been stretched by a factor of 43:1 to exaggerate and better illustrate the topography of the survey area.

Figure 3-4 presents a shaded relief perspective of the three-dimensional topography of the study area, illustrating the smooth topography of the central portion of the survey area as compared to the irregular mounds to the southwest. The shading algorithms used in creating this plot enhance the visibility of small features on the seafloor. In March 1998, ~400,000 yd^3 of material was disposed in PRA Cell 1. The yellow circle plotted on the shaded relief plot marks the disposal area for the Passenger Ship Terminal dredging project. Small disposal mounds related to this disposal project were observed in this region of PRA Cell 1.

Baseline bathymetric data were collected in the vicinity of the HARS in August 1995 and May 1996 prior to the closure of the Mud Dump Site. The objective of these surveys was to collect reconnaissance information about the general topography of the area surrounding the MDS. As such, bathymetric data were collected along survey lines spaced 100 m apart. Bathymetric data collected at this resolution is not sufficient to use as a baseline comparator in a depth difference analysis.

4.0 REFERENCES

SAIC. (1995). Results from the August 1995 Bathymetric Survey of the Expanded Mud Dump Area. Report #26 of the New York Mud Dump Site Studies. USACE-CENAN, Contract DACW51-95-D-0027. SAIC Report No. 353.

Figure Captions for DO 14 Base Bathymetric Report

Figure/Table #	*Filename*	*Caption*
Figure 1-1	HARS998b_shorline_map.SRF	The location of the Historic Area Remediation Site in the New York Bight. The location of the Mud Dump Site is also shown.
Figure 1-2	HARS_bathy_cell1-3.SRF	The September 1998 Baseline bathymetric survey area and Primary Remediation cells. The location of the buffer zone and the Mud Dump Site are also shown.
Figure 3-1	HARS998b_2D_LL.SRF	Two dimensional contour of topographic features within the HARS cells 1-3 Project Area. In addition the HARS buffer zone area and adjacent cells 4 and 8 have been included.
Figure 3-2	HARS998b_2D_CLR_LL.SRF	Two dimensional color contour of topographic features within the HARS cells 1-3 Project Area. In addition the HARS buffer zone area and adjacent cells 4 and 8 have been included.
Figure 3.3	HARS998b_3D_LL.SRF	Three dimensional mesh plot of the topographic features within the HARS cells 1-3 Project Area.
Figure 3-4	HARS998b_SHR_LL.SRF	Hillshade plot of the topographic features within the HARS cells 1-3 Project Area. In addition the HARS buffer zone zrea and adjacent cells 4 and 8 have been included.

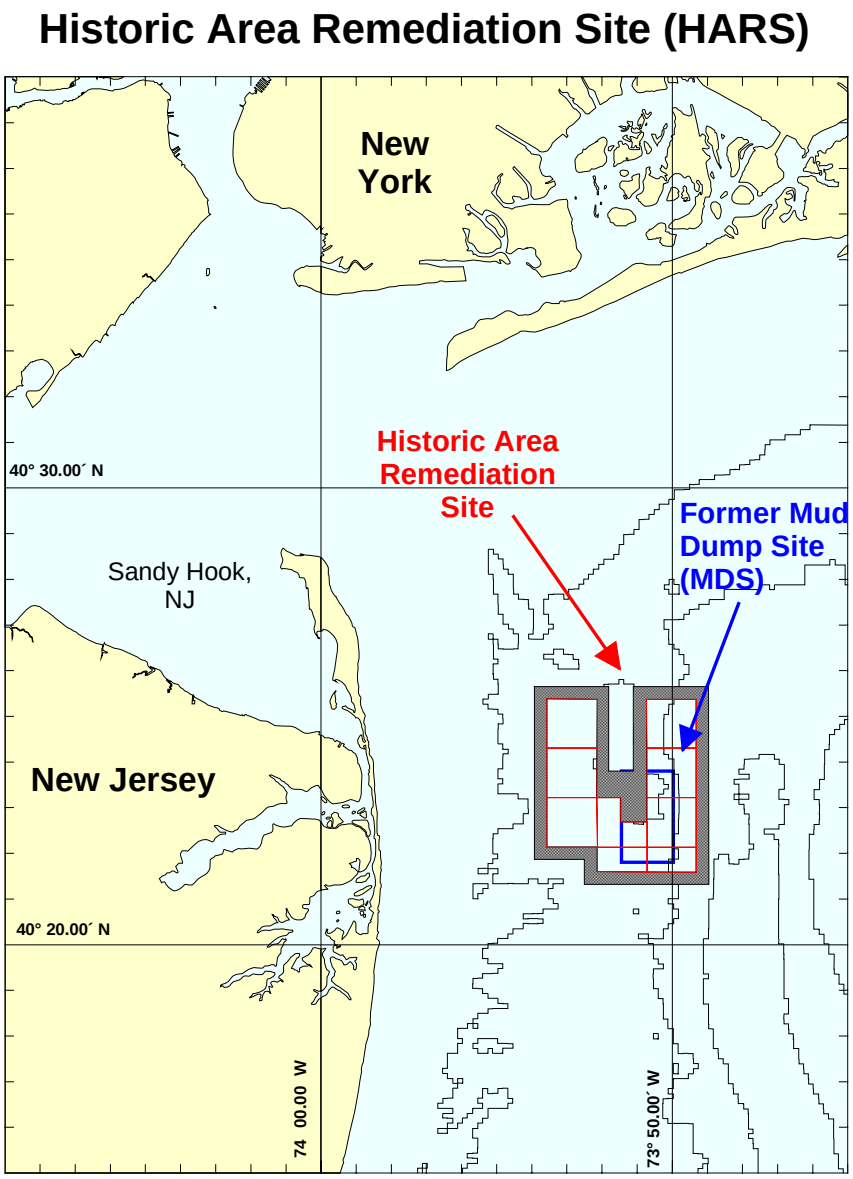

Figure 1-1. The location of the Historic Area Remediation Site in the New York Bight. The location of the Mud Dump Site is also shown.

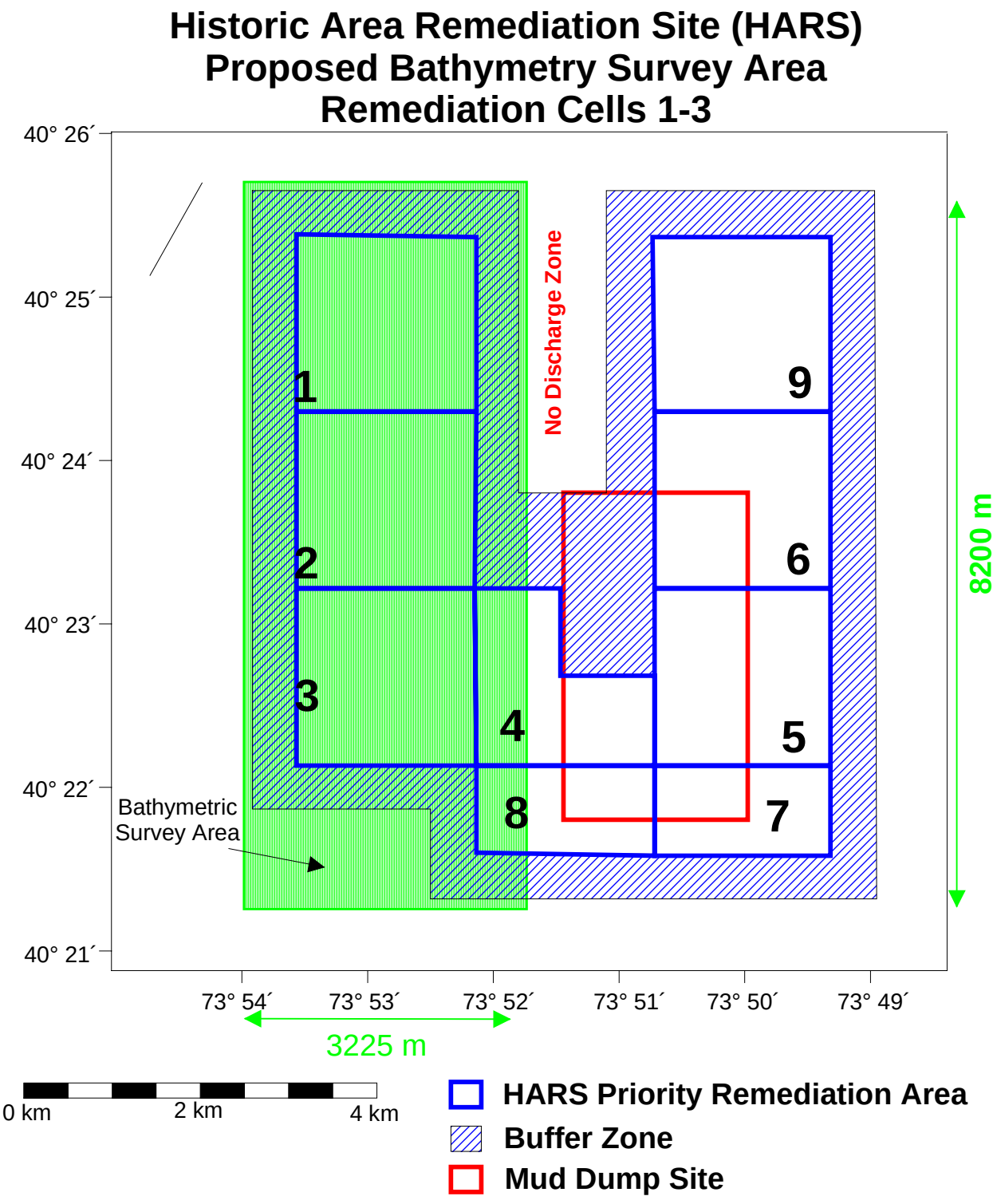

Figure 1-2. Map of the HARS showing the nine remediation cells which comprise the Priority Remediation Area (PRA). The September 1998 baseline bathymetric survey area encompassing remediation cells 1, 2, and 3 is shown in green. The location of the HARS buffer zone and the former Mud Dump Site are also shown.

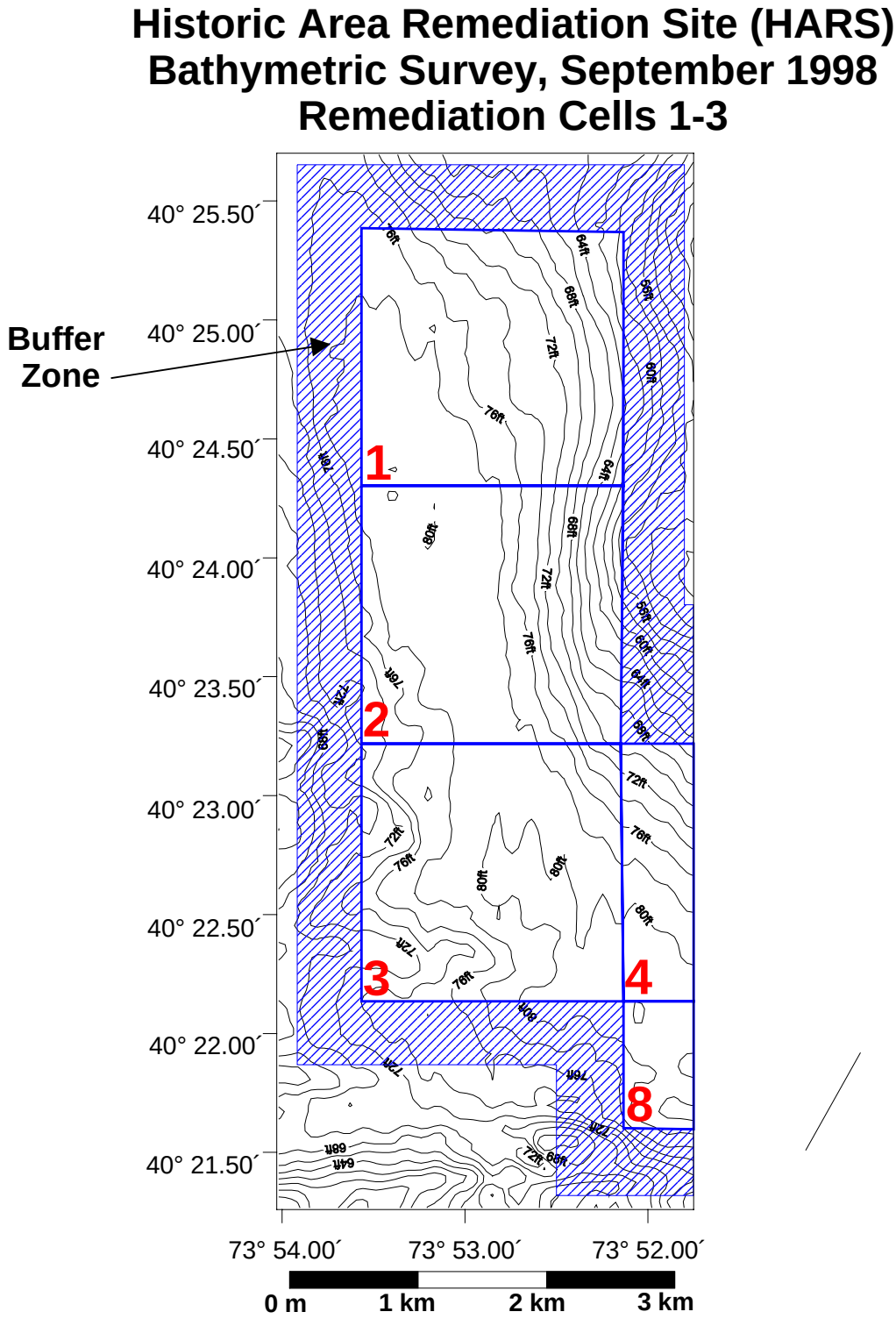

Figure 3-1. Two-dimensional contour of topographic features within remediation cells 1-3. In addition, the HARS buffer zone area and parts of adjacent cells 4 and 8 have been included.

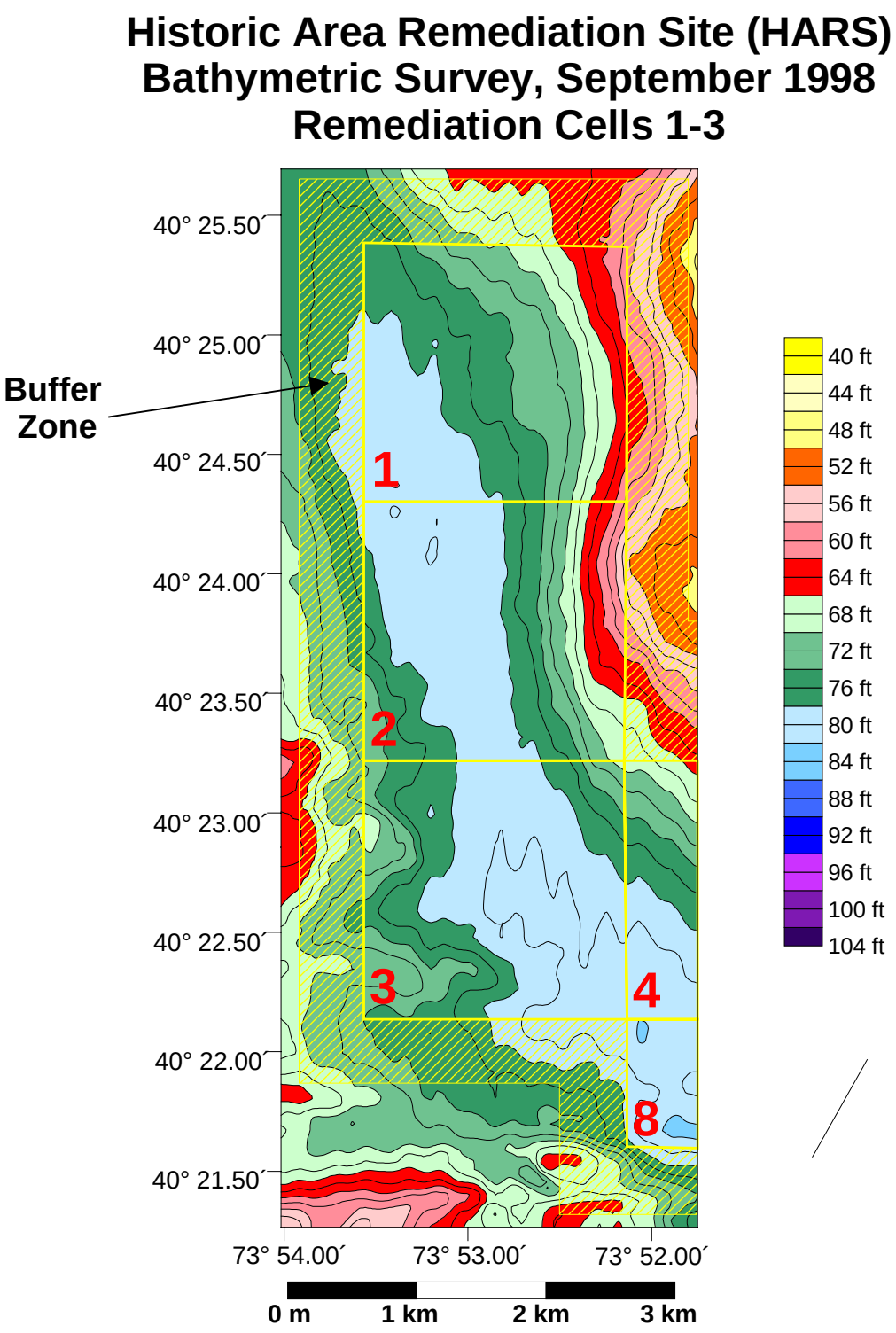

Figure 3-2. Two-dimensional color contour of topographic features within remediation cells 1-3. In addition, the HARS buffer zone area and parts of adjacent cells 4 and 8 have been included.

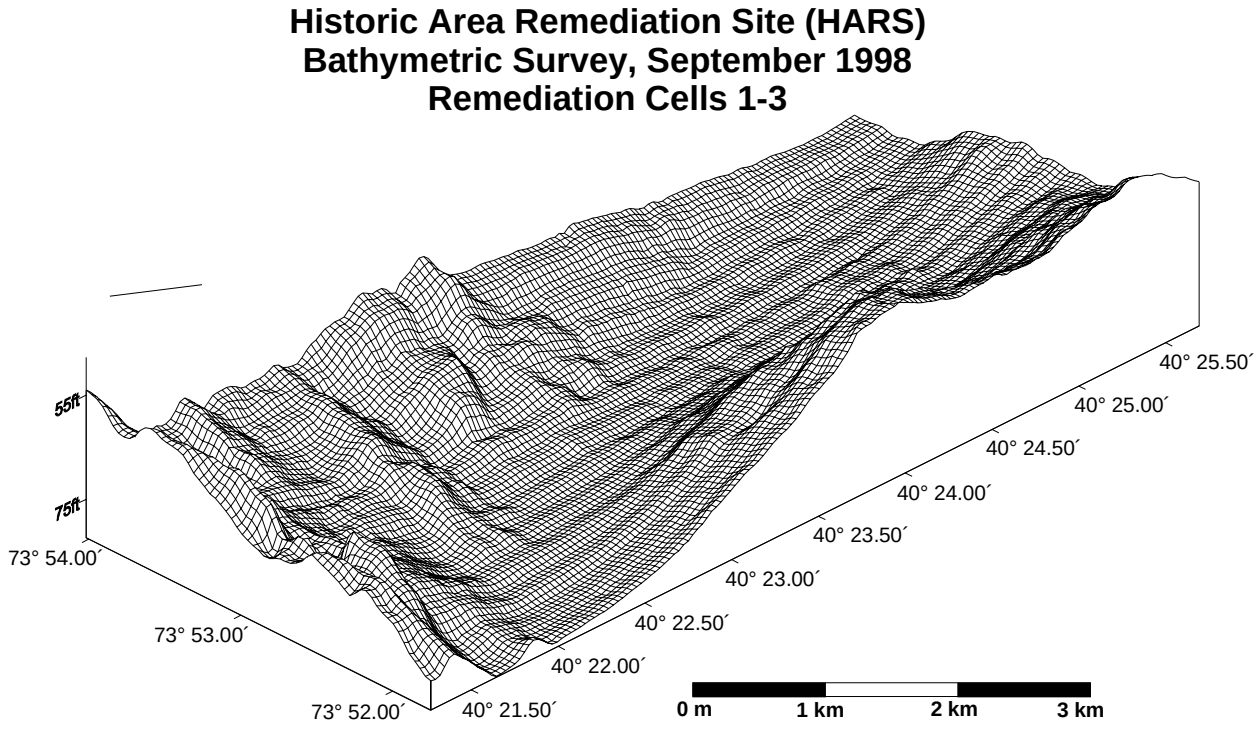

Figure 3-3. Three-dimensional mesh plot of the topographic features within remediation cells 1-3.

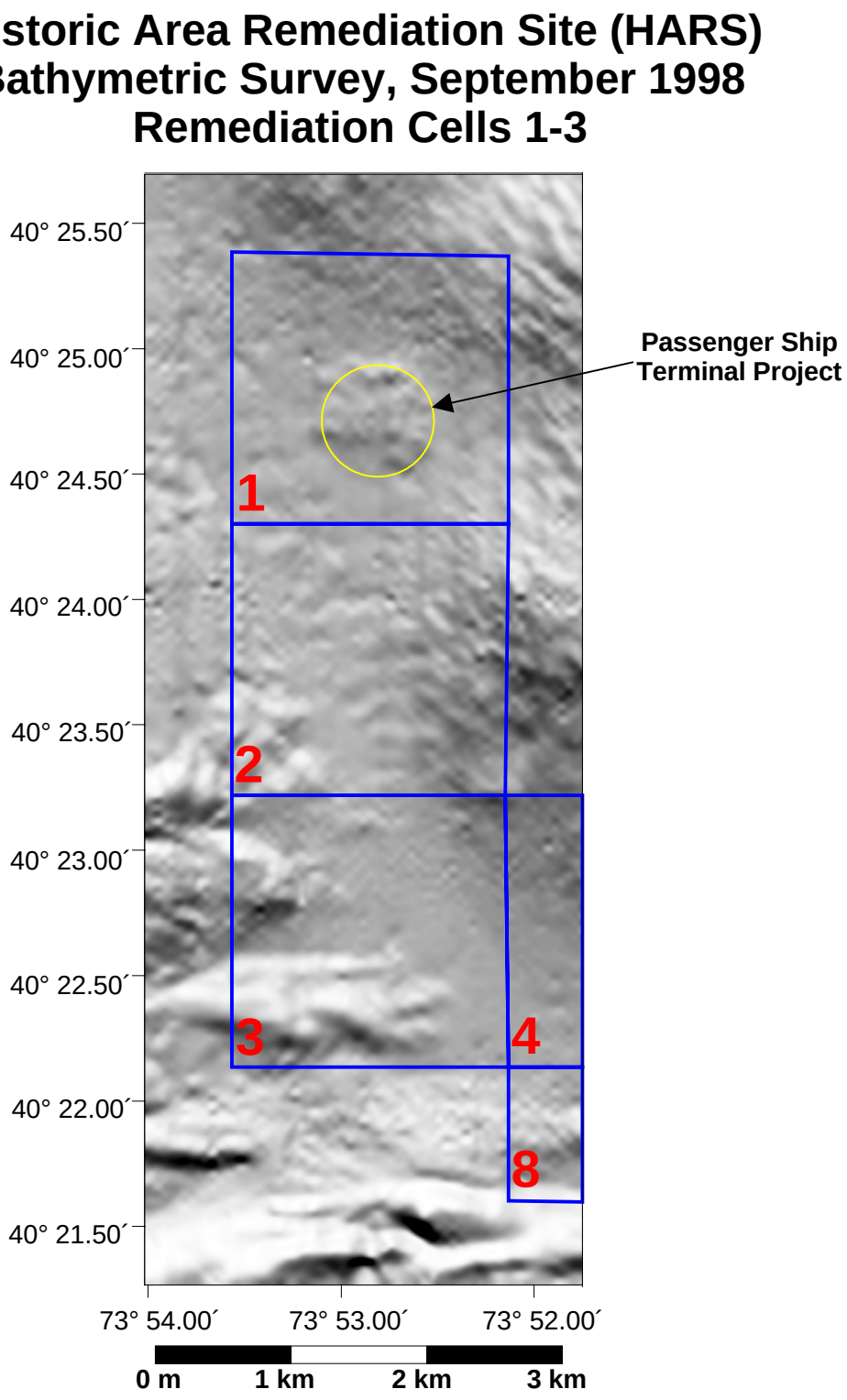

Figure 3-4. Hillshade plot of the topographic features within remediation cells 1-3.