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FINAL

PLAN FOR THE SAMPLING OF AMBIENT AIR PCB CONCENTRATIONS DURING LOWER HARBOR CAD CELL (LHCC) CONSTRUCTION

New Bedford Harbor Superfund Site,
New Bedford, MA

October 2013

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ACRONYMS AND ABBREVIATIONS

CAD	confined aquatic disposal
CY	cubic yards
EPA	U.S. Environmental Protection Agency
Jacobs	Jacobs Engineering Group, Inc.
LHCC	lower harbor CAD cell
mm	millimeter
NBH Site	New Bedford Harbor Superfund Site
ng/m^3	nanograms per cubic meter of air
PCB	polychlorinated biphenyl
PUF	Polyurethane Foam

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1.0 INTRODUCTION

The Environmental Protection Agency (EPA) is preparing to construct a Lower Harbor confined aquatic disposal (CAD) cell (LHCC) at the New Bedford Harbor Superfund Site (NBH Site). In June 2010, Jacobs Engineering Group, Inc. (Jacobs) submitted a report titled *Final Evaluation of the Impact of Dredging and CAD Cell Disposal on Air Quality, New Bedford Harbor Superfund Site, New Bedford, MA* (Jacobs 2010). This modeling report described the air dispersion modeling that was conducted to estimate the air quality impacts of mechanically dredging, transporting by scow, and disposing of harbor sediments into the LHCC.

As part of the LHCC preparations, the EPA is proposing to remove the polychlorinated biphenyl (PCB)-impacted sediment from the footprint of the LHCC prior to the construction of the CAD cell. The EPA estimates that approximately 20,000 cubic yards (CY) of PCB-impacted material will be removed during this seven to nine week activity.

This Air Plan presents the rationale for the locations and the overall sampling strategy for collecting ambient air PCB concentration data at sampling station locations. These samples will be collected only during the Phase I and Phase II top of CAD cell removal of the PCB-impacted sediments from the footprint of the LHCC. A separate sampling plan may be developed for the remedial dredging, transport, and disposal activities associated with the placement of PCB-impacted sediments into the LHCC based on the results of this data collection effort.

The development of the health-based cumulative exposure budgets is presented in the *Draft Final Development of PCB Air Action Levels for the Protection of the Public* (Foster Wheeler 2001a) (the Development Document). The principal components associated with the implementation of the cumulative exposure tracking program are described in the document *Draft Final Implementation Plan for the Protection of the Public from Volatilized PCBs During Contaminated Sediment Remediation at the New Bedford Harbor Superfund Site* (Foster Wheeler 2001b) (the Implementation Plan).

The Implementation Plan provided guidelines for implementing the principal components of an air sampling program including: locating sampling stations, collecting air samples, evaluating air sample data, tracking cumulative exposures, and recommending appropriate responses to reduce or mitigate potential PCB inhalation exposures to the public. The tracking of cumulative exposures includes identifying when "triggers" occur i.e., conditions that indicate when follow-up analysis of projected emissions sources or their potential impact on exposures to the public is warranted.

This Plan is divided into five sections. Section 1.0 is the Introduction. Section 2.0 provides a brief background of the site along with a discussion of the LHCC. Section 3.0 provides an overall summary of cumulative exposure budgeting and tracking. A discussion of the role of atmospheric dispersion modeling also is presented in Section 3.0. Section 3.0 describes how the time series of airborne PCB concentrations will be developed and the use of a network of sampling station locations to collect the data needed to track projected exposures relative to the established budgets. Section 4.0 specifies the locations, sampling schedules and sampling frequencies for the sampling station locations. Section 5.0 lists the references cited in this Plan.

2.0 BACKGROUND

The NBH Site is located in Bristol County, Massachusetts, approximately 55 miles south of Boston, and is bordered by the Towns of Acushnet and Fairhaven on the east side, and by the City of New Bedford on the west. From north to south, the NBH Site extends from the upper reaches of the Acushnet River estuary, through New Bedford's commercial port, and into Buzzards Bay (Figure 1). Background information on the PCB contamination at the NBH Site is described in detail in *Final Evaluation of the Impact of Dredging and CAD Cell Disposal on Air Quality, New Bedford Harbor Superfund Site, New Bedford Harbor, Massachusetts* (Jacobs 2010).

The NBH Site is geographically divided into three areas. The "Upper Harbor" refers to that portion of the Harbor north of the Coggeshall Street Bridge. The "Lower Harbor" refers to that part of the Harbor south of the Coggeshall Street Bridge and north of the Hurricane Barrier. The "Outer Harbor" is that portion of the Harbor south of the Hurricane Barrier.

For modeling purposes, the three areas of the NBH Site (Upper Harbor, Lower Harbor, and Outer Harbor), were subdivided into six zones based on PCB concentrations detected in sediment samples during investigation activities. These investigations were performed by Foster Wheeler as part of its pre-design field activities (Foster Wheeler 2001a). Zone five is the general location of the LHCC. The average concentration of PCBs in the sediment is approximately 155 parts per million (ppm) (Foster Wheeler 2001a).

The June 2010 Jacobs report titled *Final Evaluation of the Impact of Dredging and CAD Cell Disposal on Air Quality, New Bedford Harbor Superfund Site, New Bedford, MA* details the air dispersion modeling that was conducted to estimate the air quality impacts of mechanically dredging, transporting by scow, and disposing of these sediments into the LHCC (Jacobs 2010).

The proposed LHCC is sited in the lower harbor (Figure 2). The cell has a design capacity of about 300,000 CY to accommodate the dredging volume. An engineered

excavation would be created and filled with sediment dredged from an area extending from Sawyer Street south to the Route 6 Bridge. It is assumed that an open top scow would be towed to the CAD cell, and that the dredged sediment would be placed into the LHCC by either (a) opening a split-hull scow or (b) using a clam shell bucket. After the CAD is filled to its design depth, a cover of clean sandy material would be placed to prevent contact with aquatic life and to prevent migration of contaminants out of the cell. Figure 2 shows the planned areas to be dredged and the assumed LHCC location.

3.0 AMBIENT AIR MONITORING PROGRAM

This section reviews the overall approach currently being used to track potential cumulative public exposures to PCB concentrations in ambient air during remedial activities at New Bedford Harbor (Jacobs 2006). In general, this includes the measurement of ambient air PCB concentrations around New Bedford Harbor. The process for defining the cumulative exposure budget for a sampling location is reviewed in Section 3.1. The role of air dispersion modeling in the overall air management effort is discussed in Section 3.2, and the approach for tracking cumulative exposures to PCBs in air to the public is summarized in Section 3.3. The description of the current program is provided as this approach will be used for the LHCC air sampling program.

3.1 CUMULATIVE EXPOSURE BUDGETS

As described in the Development Document an exposure budget is a target ambient air concentration trend over time that, if achieved, will document that potential public exposures to PCBs are below acceptable health-based target levels established for PCB exposure at the NBH Site. The adverse health effects associated with PCB inhalation are associated in the literature with long-term, or chronic, exposure. As such, the exposure budget is designed to be cumulative to reflect that the measured concentrations and projected inhalation exposures should be managed over time as the remediation operations are performed.

As is presented in the Development Document, the slope of the cumulative exposure budget line is the allowable ambient PCB concentration at the sampling station that is protective of the most sensitive target receptor. This slope is quantitatively dependent on three primary established risk assessment criteria factors (as defined in the Development Document):

1. the Allowable Ambient Limit assuming a Target Risk of 1×10^{-5}; a Cancer Slope Factor of 0.4 milligrams per kilogram per day $(mg/kg/day)^{-1}$; and an exposure duration of 5 years (EPA-estimated project duration presented in the LHCC modeling effort);

2. the Annual Average Background Concentration of airborne PCBs at the point of potential exposure; and
3. the Air Dispersion Factor between the sampling station and the assumed point of exposure.

Each of the three primary factors affecting the slope of the budget line for a particular sampling location is briefly discussed below.

The Development Document presents the development and calculation of the Allowable Ambient Limits used in cumulative exposure budget calculations (Foster Wheeler 2001a). The health-based Allowable Ambient Limits forming the basis of the cumulative exposure budgets were developed for exposures by both a resident and a commercial worker Each receptor has their own limit based on exposure duration On-site worker protection is regulated by the Occupational Safety and Health Administration (OSHA) and has been addressed in the Site-Specific Health and Safety Plan (SSHP). Both child and adult residents were considered in developing an Allowable Ambient Limit. Appropriate body weights, breath (lung) volumes, and breathing rates were assumed for each receptor. The Allowable Ambient Limits are also seen above to be a direct function of the potential exposure period.

However, in 2005, at the request of the EPA, the estimated duration of the New Bedford Harbor remediation was increased to 26 years. This increase in project duration was based upon the projected annual funding for the project. Subsequently, for the 2005 remediation season, the Allowable Ambient Limit, daily average exposure of PCBs for a child resident and commercial worker were re-calculated for a 26-year exposure period and were calculated as 202 and 344 nanograms per cubic meter of air (ng/m^3), respectively. The PCB baseline concentration used in current calculations for the Lower Harbor is 16.7 ng/m^3.

3.2 AIR DISPERSION MODELING

The *Final Evaluation of the Impact of Dredging and CAD Cell Disposal on Air Quality, New Bedford Harbor Superfund Site, New Bedford, Massachusetts* (Jacobs 2010)

modeling report described the air dispersion modeling that was conducted to estimate the air quality impacts of mechanically dredging, transporting by scow, and disposing of these sediments into the LHCC. Based on the results of the modeling, the predicted maximum concentration is less than 10, 0.25 and 25 ng/m^3, respectively, for each operation.

As part of the LHCC modeling effort, discrete receptors were used in the air dispersion model to represent the air monitoring stations and sensitive residential, school, and industrial locations. The air monitoring locations from the 2008 LHCC modeling effort are presented on Figure 3 with the receptor locations from previous studies.

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4.0 AIR MONITORING LOCATIONS AND FREQUENCY

This Air Plan only covers monitoring during the excavation of the top of the CAD cell, which is presented on Figure 2. The two existing station locations to be used for this portion of the CAD cell excavation include Station #44 (Taber Street Pumping Station) and Station #64 (Pilgrim). Stations #44 and #64 are located along the eastern side of the New Bedford Harbor in Fairhaven. Along the New Bedford shoreline, one of three sampling locations at Area D (Stations #50, #51, or #52), will be sampled. Area D is where the EPA dewatering facility is located. Each sampling event will be chosen based on the upcoming weather forecast during that week. Selection parameters include higher temperature, low wind conditions and low probability of precipitation. During each sampling event, the Area D sampling location will be selected dependent upon the forecasted wind direction. The samples collected from the mechanical dredging platform will be assigned a new station number, Station #65, to uniquely identify the location. Shore-based samples will be collected over a 24-hour period, while the dredge sample will be collected for the work shift of eight hours. Figure 3 shows the proposed sampling locations in relation to previously identified receptors.

During the removal of the PCB-impacted material from the top of the LHCC footprint, the following sampling frequency will be followed:

- Prior to the initiation of mobilization activities, one sampling round consisting of the three shore based locations to collect pre-dredge data;
- During mechanical dredging, bi-weekly sampling events at the stations sampled during the pre-dredge sampling events, plus the dredge location; and
- One post-demobilization round of sampling at the same locations as the pre-dredge sampling round.

The majority of receptors in this area are commercial in nature. The exception is the eastern side of the harbor which has mostly residential receptors. Thus, due to the higher number of commercial to residential receptors, the rationale is for one sample location in the City of New Bedford, one on the dredge proper and two sample collection locations in the Town of Fairhaven, one due east and one north-northeast of the LHCC.

4.1 AIR MONITORING EQUIPMENT

Each of the air samples will be collected using a calibrated BGI brand PQ-100 air sampling pump programmed to run for a 24-hour time period for the land-based locations and a maximum of 8 hours for the dredge location (#65). The sampling pump has a mass flow controller to accurately (± 2 percent of total air volume) adjust the 5-liter per minute flow rate based on the calibrated standard temperature and pressure. Media placement will be approximately 1.5 to 2 meters above ground/walking surface. The media used consists of two parts, a 22 millimeter (mm) Supelco Orbo-1500 PUF/XAD-2/PUF sample tube and a 32 mm quartz microfiber filter. Both sections of the media are analyzed together in order to quantify the particulate and vapor fractions of the samples. For each sample round, a trip blank will be submitted for quality control. A duplicate sample will be randomly selected and collected at the frequency of approximately on sample per ten samples collected (10%). A standard chain of custody will be maintained for each sample collected.

4.2 ANALYTICAL METHODS

Air samples will be analyzed for the ten PCB homologue groups by Test America, Inc. in Knoxville, Tennessee using EPA method TO-10A, *Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD)* (EPA, 1999). The analytical method used is EPA-22 1668A. Sample turn-around-time will be scheduled at two weeks. The collected mass of each homologue group will be quantified and normalized to the total volume of air collected to develop concentrations for each homologue group by the laboratory. The homologue group concentrations will then be summed by Jacobs to obtain the ambient air concentration for total PCBs.

4.3 METEOROLOGICAL DATA

The on-site meteorological station, located near the end of Sawyer Street, adjacent to the New Bedford Upper Harbor, is operated continuously. The data being collected at the on-site meteorological station includes wind speed and direction, ambient temperatures at

heights of 2 meters and 10 meters, relative humidity, barometric pressure, solar radiation, and precipitation. The wind speed and direction data will be recorded at five-minute intervals. Complete sets of parameters will be recorded in 60-minute intervals. The meteorological data collected on the days of the air sampling events will be tabulated along with solar radiation data and tide cycle data.

The data for total PCB concentration and the meteorological station will be tabulated and reported to the EPA at the end of the project.

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5.0 REFERENCES

EPA (U.S. Environmental Protection Agency). 1999 (January), *Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD).* Method TO-10A, EPA/625/R-96/010b. U.S. Environmental Protection Agency, Center for Environmental Research Information, Office of Research and Development, Cincinnati, OH.

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———. 2006 (November). *Final Plan for the Sampling of Ambient Air PCB Concentrations to Support Decisions to Ensure the Protection of the Public during Remediation Activities.* New Bedford Harbor Superfund Site, New Bedford Harbor, Massachusetts. ACE-J23-35BG0107-M7-0003

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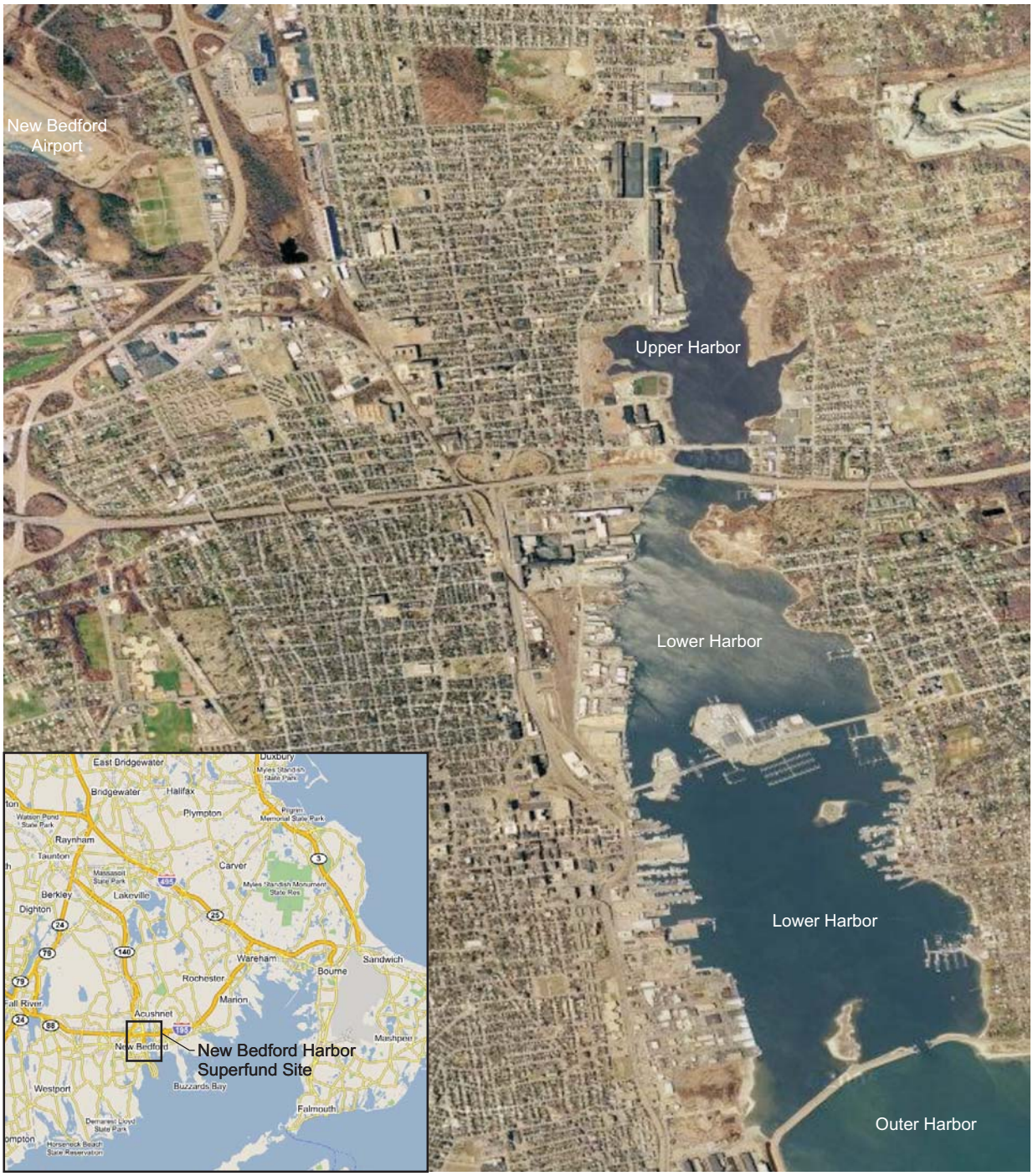
FIGURES



Note:
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Scale in Meters

JACOBS™

New Bedford Harbor Site Location Map

New Bedford Harbor Superfund Site
New Bedford, Massachusetts

02/24/10 dmf Fig01 NBH Loc.cdr

Figure 1

Legend

EPA CAD CELL

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0 300 600 Feet

1:7,200

Aerial Photography MASSGIS 2009

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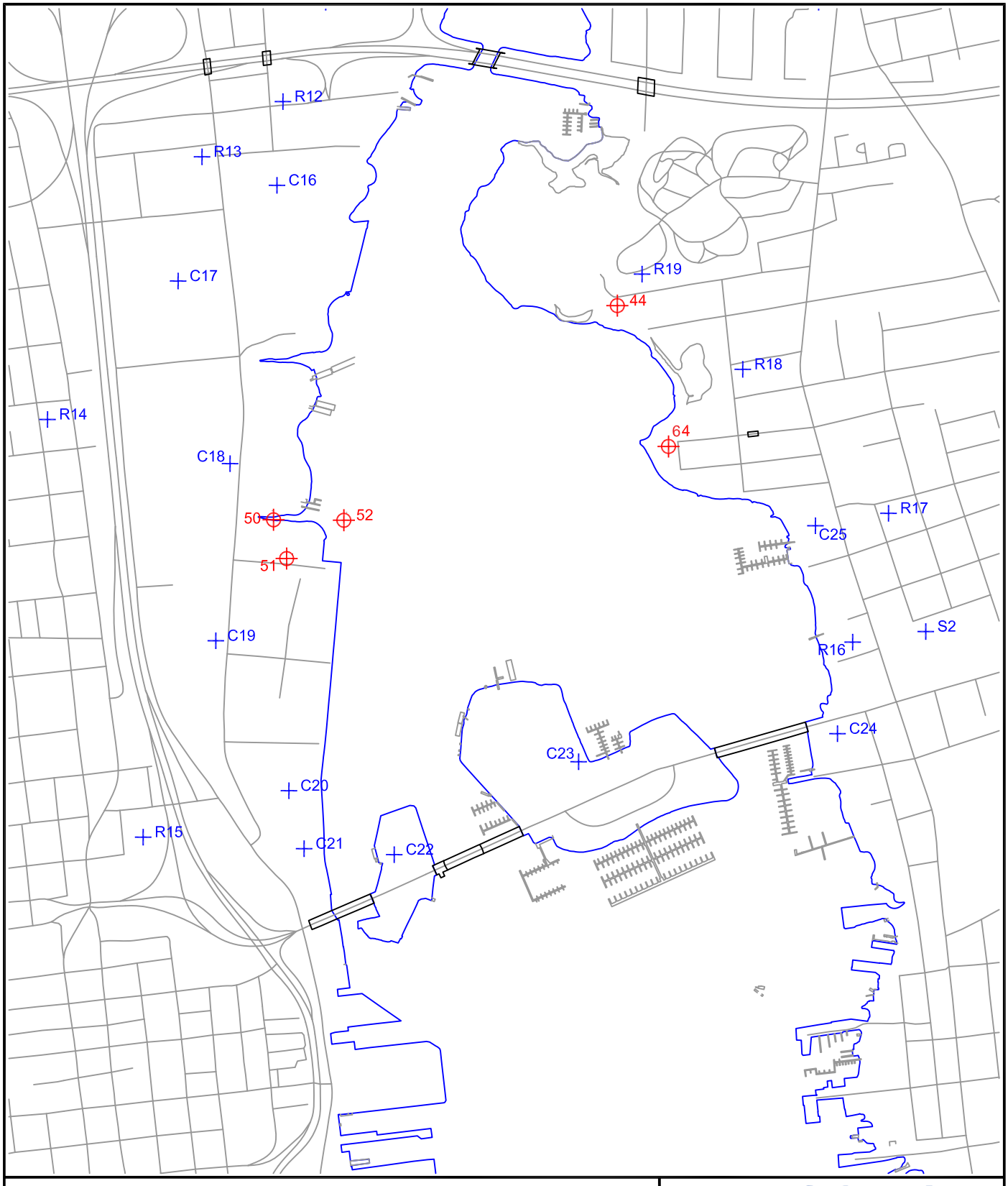
Lower Harbor
Showing EPA CAD Cells

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 10/16/2013

Figure 2

Path: Y:\NBH\Projects\35BG07082013101\5\ArcGIS\lower_harbor_epa_cad_cells.mxd



Legend

- Air Monitoring Station
- Discrete Receptors

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Scale in Meters

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Key Receptor Locations and Monitoring Stations

New Bedford Harbor Superfund Site
New Bedford, Massachusetts

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Figure 3