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Attention:	Mr. Gary Morin Mr. Mark Anderson USACE, New England District 696 Virginia Road Concord, MA 01742-2751	Date:	August 1, 2006
Project reference:	HTRW DACW33-00-D-0003 Task Order 12 – New Bedford	Project number:	09000-350

We are sending you the following:

Number of originals:	Number of copies:	Description:
10		Final Report – North of Wood Street Area Sampling Report - 2005

Greetings,

Enclosed please find an update package which will complete a final version for the 2005 North of Wood Street Sampling Report. The update package includes the entire body of text for the report, including a new cover page, along with a new package of tables.

The update package also includes a new version of the following figures:

Figure 5 – North of Wood Street Sediment Sampling Locations – 2004
Figure 9 – North of Wood Street Sediment Sampling Locations – 2005-2006 Acushnet river
Figure 10 – North of Wood Street Sediment Sampling – May 2005 w/ PCB Concentrations
Figure 11 – North of Wood Street Sediment Sampling – Sept 2005 w/ PCB Concentrations
Figure 12 – North of Wood Street Sediment Sampling – Jan 2006 w/ PCB Concentrations
Figure 14 – North of Wood Street Soil Sampling – 2005 Locations w/ PCB Concentrations

Please remove the draft versions for all the items listed and replace with the updated versions provided. If there any questions, or you require additional information, give me a call. Thanks, Don

Don Bove

Steve Wolf

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2005 Monitoring Summary Report

North of Wood Street Area Sampling

New Bedford Harbor Superfund Site – New Bedford Massachusetts

Prepared by:

ENSR

CR ENVIRONMENTAL, INC. WBE

Contract:
DACW33-00-D-0003
Task Order 12
ENSR Document No.
09000-350-710

Final - August 2006

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Final - August 2006

CONTENTS

EXECUTIVE SUMMARY **1**

1.0 INTRODUCTION **1**

1.1 Superfund Site Background 1

1.2 Background on Early Action and North of Wood Street Areas 2

2.0 METHODS **4**

2.1 Sediment and Soil Sampling 4

2.1.1 Navigation 4

2.1.2 River Sediments 4

2.1.3 Shoreline Soils 5

2.2 Laboratory Analyses 6

3.0 RESULTS **7**

3.1 River Sediments 7

3.2 Shoreline Soils 8

3.3 Data QC and Database Entry 9

4.0 DISCUSSION **10**

4.1 River Sediments 10

4.2 Shoreline Soils 11

5.0 REFERENCES **13**

Appendix A: NWS Soil and Sediment PCB Data

LIST OF TABLES

Table 1 Station Coordinates – May 2005, September 2005, and January 2006 Sediment Sampling Stations at the North of Wood Street Area

Table 2 Station Coordinates – January - November 2005 Soil Sampling Stations at the North of Wood Street Area

Table 3 Description of Sediment Samples Recovered from the North of Wood Street Area during the 2005-06 Sampling Effort

Table 4 Total PCB Concentrations for Sediment Samples Collected from the Acushnet River in the North of Wood Street Area

Table 5 Total PCB Concentrations in Sediment Trap Samples from North of Wood Street Bridge, Fall 2005

Table 6 Description of Soil Samples Recovered from the North of Wood Street Area during the 2005 Sampling Effort

Table 7 Total PCB Concentrations in North of Wood Street Area Soil Samples Collected in 2005

LIST OF FIGURES

Figure 1 New Bedford Harbor Overview Showing Early Action/North of Wood Street Areas

Figure 2 Early Action and North of Wood Street Areas

Figure 3 Acushnet River and Early Action Area following Remediation and Restoration (looking south – 2002)

Figure 4 Acushnet River and North of Wood Street Area after Remediation (eastern bank, looking north – August 2004)

Figure 5 North of Wood Street River Sediment Sampling Locations and Total PCB Concentrations – 2004

Figure 6 Coring Approach for Harbor Sediments

Figure 7 Sediment Push Core Apparatus and Typical Sediment Core – May 2005

Figure 8 Push Core Sampler and Typical Soil Core – July 2005

Figure 9 North of Wood Street Sediment Sampling – 2005-06 Locations – Acushnet River

Figure 10 North of Wood Street Sediment Sampling – May 2005 Locations with PCB Concentrations – Acushnet River

Figure 11 North of Wood Street Sediment Sampling – September 2005 Locations with PCB Concentrations – Acushnet River

Figure 12 North of Wood Street Sediment Sampling – January 2005 Locations with PCB Concentrations – Acushnet River

Figure 13 North of Wood Street Soil Sampling – 2005 Locations

Figure 14 North of Wood Street Soil Sampling - 2005 Locations with PCB Concentrations

Figure 15 North of Wood Street Sediment Trap Location, 2006 Sediment PCB Concentrations, and Shoreline Soil PCB Concentrations with Approximate Boundary of the Fall 2005 Remedial Excavation

Figure 16 PCB Concentrations at Selected Acushnet River Locations over Five Sampling Events

EXECUTIVE SUMMARY

Sediment and soil sampling was performed in 2005 and early 2006 in Upper New Bedford Harbor at the North of Wood Street Area. This area was previously remediated and restored in 2002-03 to remove polychlorinated biphenyl (PCB) contaminated sediments and soils from the Acushnet River and surrounding shoreline as part of the overall remediation of the New Bedford Harbor Superfund Site. The objectives of the 2005-06 sampling effort were twofold: 1) to evaluate potential changes in river sediment PCB concentrations that may have occurred due to seasonal influences or due to ongoing dredging/remediation efforts in nearby areas; and 2) to provide continued support in mapping out an area of elevated PCB concentrations found in un-remediated soils along the eastern shoreline of the North of Wood Street Area.

River sediments were collected from a series of stations located along the river in the study area in May 2005 to gather data under spring flow conditions and in September 2005 to gather data under late summer flow conditions and as a baseline prior to the start of remedial dredging performed in the fall approximately one-half mile to the south. Samples were also collected in January 2006 following completion of dredging activities. All samples were collected using a push core system, with the top 6 inches of the recovered core sectioned for analysis of PCBs.

The resulting sediment concentrations were compared between events and with previous data collected in 2002-03 (immediately following remediation) and in August 2004 (prior to the start of the 2004 dredge season). Samples from these two earlier data sets were collected using different sampling techniques. Highest concentrations were measured for the August 2004 samples, but the sampling technique (subsampling a 6 inch segment from a larger grab sample) was considered to have potentially biased the results to higher concentrations by including a larger percentage of fine surficial sediments. PCB concentrations declined in the May and September 2005 samples, and increased somewhat in the January 2006 samples.

Some of the changes in sediment concentration noted between the different events may have been related to spatial variability of PCB concentration, i.e., concentration distribution is patchy and can vary significantly over short distances. However, the changes in concentration, particularly those for the 2005-06 events performed using identical sampling techniques, suggest a relatively dynamic sediment system within the main portion of the river channel. Factors that could have contributed to the increase in PCB concentrations between the September 2005 and January 2006 sampling include normal redistribution of sediment within the Upper Harbor, transport of suspended material from the dredging that took place from late September to November approximately one-half mile south of the study area, and potential release of material during the remedial excavation that took place along the eastern shoreline adjacent to the sampled area in November and December.

Shoreline soil sampling was performed in a phased approach with five separate collection efforts during 2005. The combined rounds of sampling and analysis revealed two areas of soil with elevated PCB concentrations along the eastern shoreline, one area approximately 130 feet in length and 40 feet in width just south of River View Park and a smaller second one approximately 150 feet further south. These two areas had not been included in the 2002-03 NWS cleanup due to the lack of characterization data for them (at that time, the area had been thickly vegetated), and thus the areas do not represent areas of recontamination. These areas were excavated, and soils were transported for off-site disposal in November-December 2005.

1.0 INTRODUCTION

This report summarizes the investigative soil and sediment sampling conducted in 2005-06 in Upper New Bedford Harbor at the North of Wood Street Area. This area was previously remediated in 2002-03 to remove polychlorinated biphenyl (PCB) contaminated sediments and soils from the Acushnet River and surrounding shoreline as part of the overall remediation of the New Bedford Harbor Superfund Site. The objectives of the 2005-06 sampling effort were to evaluate potential changes in sediment total PCB concentrations that may have occurred due to seasonality or dredging/remediation related influences and to provide continued support in mapping out an area of elevated PCB concentrations found in shoreline soils south of River View Park in 2004 (ENSR, 2005). This report is organized into five sections. Background information is provided in Section 1. Details of the methodology of sampling are presented in Section 2. The resulting data are presented in Section 3 and discussed in Section 4. Cited references are included in Section 5. This work was performed by ENSR Corporation and its subcontractor CR Environmental under contract to the USACE (Contract No. DACW33-00-D-0003, Task Order 12).

1.1 Superfund Site Background

New Bedford Harbor is located approximately 50 miles south of Boston on the waters of Buzzards Bay in Bristol County, Massachusetts. The sediments in many areas of the Harbor are contaminated with PCBs and metals, primarily from the manufacture of electrical components which occurred at several areas around the Harbor between the 1940s and the mid-1970s. Based on human health concerns and ecological risk assessments, the U.S. Environmental Protection Agency (USEPA) added New Bedford Harbor to the National Priorities List in 1983 as a designated Superfund Site. A 1998 Record of Decision stipulated that remedial measures were required to remove PCB-contaminated sediments from the Harbor. Through an Interagency Agreement between the USEPA and the U.S. Army Corps of Engineers, New England District (USACE), the USACE is responsible for carrying out the design and implementation of the remedial measures.

The New Bedford Harbor Superfund Site extends from the shallow northern reaches of the Acushnet River estuary, south through the commercial harbor of New Bedford and out beyond the City's hurricane barrier into 17,000 adjacent acres of Buzzards Bay. The Superfund Site is divided into three areas: the Upper, Lower, and Outer Harbors defined by geographic features of the Harbor and gradients of sediment contamination (Figure 1). The industrial discharge of PCB contaminated waste, either directly into the Harbor or indirectly through the City's sewer system, was most significant in the Upper Harbor. The location of the associated PCB discharge and the hydrodynamics of the Harbor contributed to the deposition of significant levels of PCB contamination in the Upper Harbor.

The highest sediment PCB concentrations or "hot-spots", which contained PCB concentrations in excess of 100,000 mg/kg, resided in the sediments located in the immediate area of one discharge in

the Upper Harbor. These "hot-spot" sediments were removed between 1994 and 1995 as part of the USEPA's first cleanup phase (USEPA 1997). Remediation and restoration of wetland and mudflat areas in the northernmost section of the Upper Harbor were performed in 2002-2003 (Tetra Tech FW 2004). Much of the remaining sediment in the Upper Harbor, an area of approximately 190 acres, is still heavily contaminated. Following completion of a sediment dewatering, water treatment, and material handling facility, full-scale dredging was performed in the fall of 2004 and 2005 in the northern portion of the Upper Harbor (Figure 1). The intervals of remedial dredging are expected to continue annually in upcoming years.

1.2 Background on Early Action and North of Wood Street Areas

The Early Action and North of Wood Street Site Areas (abbreviated as EA/NWS Areas) are located in the northern reach of the Acushnet River in Upper New Bedford Harbor (Figure 2). The Early Action Area included approximately 500 feet of shoreline and intertidal area along the eastern side of the river with total PCB concentrations as high as 20,000 mg/kg (TTFW, 2005). The North of Wood Street Area included river sediments and marsh soils along both sides of the Acushnet River extending from the Early Action Area to just south of the Wood Street Bridge (Figures 3 and 4). Sediments and soils in this area had total PCB concentrations as high as 46,000 mg/kg. These areas were prioritized for remediation given their proximity to local residences and shoreline parks.

In May 2001, approximately 2,500 cubic yards of contaminated soil and sediment were excavated from the Early Action Area, and the area was backfilled with clean material and restored with marsh or upland plantings (Figure 3). Remediation activities North of Wood Street were accomplished in the dry; temporary dams were built across the Acushnet to the north and the south, and river flow was diverted through a pump and pipe system. The area was subdivided into six separate compliance demonstration areas based on topography and location. Approximately 15,600 cubic yards of material was excavated in total during the winter months of 2002-03. Shoreline areas were backfilled with clean material, and areas above the low water elevation were restored with marsh or upland plantings (Figure 4). Excavation activities were completed in February 2003, and restoration was completed in the spring of 2003.

Confirmatory soil and sediment samples were collected to determine the endpoint for the remediation of the Early Action and North of Wood Street Areas (TTFW 2004) with the results compared to the cleanup criteria for the site (1 mg/kg for residential intertidal areas [first foot], 10 mg/kg for sub-tidal and mudflat areas and 25 mg/kg for vegetated public access intertidal areas –"beachcombing areas" [first foot]). Sampling was performed in August 2004 to assess potential changes in PCB contamination in marsh soils and river sediments three years following completion of the Early Action effort and a year and a half following completion of the North of Wood Street effort (ENSR, 2005). Results of the August 2004 sampling identified elevated PCB concentrations in river sediments indicating potential recontamination of the area or a potential sampling bias (confirmatory samples following remediation were collected by hand in dry conditions; the 2004 samples were collected by boat using a sediment

grab; ENSR, 2005). The 2004 sampling also identified two locations along the eastern shoreline with elevated PCB concentrations, one in the Early Action Area and one in the North of Wood Street Area. Given the limited extent of elevated PCBs identified in the Early Action Area, no further sampling was required. Follow up sampling was performed at the North of Wood Street Area, and elevated PCB concentrations appeared to extend further along the shoreline south of River View Park. Based on the location of the elevated PCB concentrations (higher in elevation than the previously excavated and restored areas) this area represented an area that had not been included in the previous remediation efforts, rather than recontamination of a clean area (ENSR, 2005).

The sampling summarized in this report includes work performed in May 2005 through January 2006 to further monitor potential changes in river sediments and to fully map the extent of PCB concentrations along the shoreline south of River View Park in preparation for remediation of that area (performed in December 2005).

2.0 METHODS

2.1 Sediment and Soil Sampling

The 2005-06 sampling efforts continued investigations initiated in 2004 (ENSR, 2005) and consisted of two separate components. Sampling of sediments was performed within the Acushnet River at a subset of the stations sampled in 2004 where elevated PCB concentrations had been identified (Figure 5). Sampling was performed in May and September 2005 and January 2006 to evaluate potential seasonal influences on sediment PCB concentrations as well as potential impacts related to the fall 2005 dredging effort. Additional shoreline soil sampling was performed to fully define the spatial extent of contamination that was originally identified in the area of Station C003-013 and south of River View Park in 2004 (Figure 5). This follow up soil sampling was conducted in a series of efforts in May, July, October, and November 2005.

2.1.1 Navigation

The position established for each sediment station is listed on Table 1, and the position for each soil station is listed on Table 2. The coordinate system is NAD-83, Massachusetts State Plane (feet). Navigation to each station was achieved utilizing a Trimble Pro-XRS Differential GPS (DGPS) field unit. The target coordinates for each station were loaded into the Trimble DGPS as a waypoint. Once a station was selected from the navigation menu, the data logger provided range and bearing guidance to the field team to accurately position sampling equipment. The accuracy of the GPS unit guided sampling activities to within approximately 3 feet of the intended target. However, it was necessary to adjust the actual position for sediment sampling stations (as needed) in order to obtain a suitable sample. The initial round of soil stations sampled in May 2005 was located by measuring 25 feet out from the limits of soil contamination determined in 2004. After the sampling point was established, the position was recorded using the GPS unit. The three subsequent rounds of soil sampling were driven by PCB soil data from the previous round of sampling and, in similar fashion, incrementally expanded the spatial boundaries as required.

2.1.2 River Sediments

Sediment collection activities were conducted from an 8 by 12-foot raft platform (Figure 6) equipped with spud poles for station keeping. The raft platform was maneuvered between stations using a Jon-boat. Sampling was performed with a piston type push core sampler (Figure 7) with the collection of samples in hard plastic liners that were decontaminated prior to departure. The core sampler was equipped with a sliding piston designed to ride inside the plastic core liner to assist in recovering an intact sediment-water interface in soft sediments. The core liner and internal piston were secured firmly inside a stainless steel socket assembly that was attached to a T-handled push bar to provide the necessary leverage to drive the core liner to the desired depth and subsequently extract the core liner from the bottom sediment after sample collection.

The general procedure for operation of the piston core sampler was to lower the plastic liner, with the piston sitting just inside the leading edge of the liner, to just above the sediment-water interface. At this point, the line attached to back side of the piston was secured, thus fixing the elevation of the piston with respect to the sediment-water interface. The core liner was pushed into the sediment to the point of refusal, and with the piston held at constant elevation, it effectively slid up in the core barrel as the barrel was being forced into the sediment. The relative motion of the piston thus acts as a syringe, providing negative pressure on the core during retrieval to aid in recovering representative samples with an intact sediment/ water interface.

Once at the surface, the exterior of the core was rinsed with site water. The piston was then extracted from the top of the liner, and the core liner was securely capped at each end (Figure 7). The core sample was labeled, the recovery length was measured, and the particulars of each sample were documented in the field log book. All sampling equipment was washed and decontaminated prior to departing for the next station using a solution of Alconox and tap water. All samples were maintained on ice during field sampling activities and then transferred to a chest freezer for storage at the USACE environmental trailer at the Sawyer Street facility. Frozen core samples were delivered to the project laboratory (Alpha Woods Hole Group), and the top 6 inches of each core was sectioned off and analyzed for total PCBs.

Sediment traps consisted of a weighted plastic bucket which housed a 1-liter Nalgene bottle capped with wide-mouth funnel. The sediment trap was gently lowered to the river bottom by a light line fitted with a marker float. Upon recovery, the Nalgene bottle was removed from the sediment trap and allowed time to settle after which the bottle was weighed and compared to the tare weight of the bottle filled with clean seawater to determine the weight of sediment collected. The deposition rate of sediment recorded by the sediment trap ($mg/m^2/day$) was determined from the recorded weight of sediment collected during the known deployment period across the open area of the funnel. The collection of a sample for PCB analysis was conducted by decanting all the water out of the Nalgene bottle and transferring all the sediment to a glass jar provided by the laboratory (see Section 2.2 for laboratory methods).

2.1.3 Shoreline Soils

Shore-based field sampling was conducted with a stainless-steel AMS Core Soil Sampler using pre-cleaned, removable, butyrate sample liners (6 or 12 inch lengths depending on desired sampling depth). Accessibility to the marsh stations was tidally dependent and was limited to the span of time that was approximately 2 hours either side of low tide. At each station, the sampler was driven to the full penetration depth then carefully removed from the hole (Figure 8). The core liner was then extracted from the core barrel, and sealed at both ends with plastic caps and tape, cleaned, and labeled (Figure 8). The soil sampling approach included the use of new, pre-cleaned core liners at each station. Since soil samples did not come into contact with the core barrel, equipment decontamination was limited to removal of residual soil from the outer core barrel and rinsing with tap water. Soil samples were stored on ice during the field day and transferred to a chest freezer for

storage at the USACE environmental trailer at the Sawyer Street facility. Frozen core samples were delivered to the project laboratory (Alpha Woods Hole Group) and analyzed for PCBs as NOAA 18 congeners or to ESS Laboratory for the analysis of PCBs as Aroclors.

2.2 Laboratory Analyses

Sediment samples selected for analysis were further homogenized at the laboratory, and PCBs were extracted according to EPA's method 3545 (SW-846 method for Pressurized Fluid Extraction). The samples were extracted using a solvent mixture of acetone and dichloromethane and exchanged to hexane for analysis. Diatomaceous earth was also used in the procedure which, along with acetone, desiccates the sample. Extract cleanup steps included activated copper and sulfuric acid before injection to either dual-column GC/ECD or GC/MS instrumentation. Samples selected for homologue analysis were analyzed using LRMS while samples selected for the 18 NOAA congener subset analyses utilized the GC/ECD instrumentation.

Dual-column results were processed as specified in the program QAPP (Jacobs 2005) so that the lowest value obtained between the two columns was reported unless analyst discretion required otherwise (e.g. selecting the result without an interference signal). The final total PCB concentration presented in the results represents the sum of the 18 NOAA congeners multiplied by the New Bedford Harbor translation factor of 2.6. All non-detect results were included in the sum at one-half the laboratory's reporting limit.

Soil samples selected for analysis were delivered to ESS Laboratory for a rapid screening level analysis for the determination of PCB Aroclors by EPA's SW-846 method 8082 by gas chromatography with an electron capture device (GC/ECD). Sample segments selected for analysis were homogenized at ESS, and the samples were extracted according to EPA's SW-846 method 3541 (Automated Soxhlet Extraction) using a 1:1 solvent mixture of acetone and hexane. The hexane/acetone solvent extraction may be more effective as an extraction solvent for PCBs in some environmental samples than the methylene chloride/acetone solvent mixture. Use of hexane/acetone generally reduces the amount of co-extracted interferences and improves the signal-to-noise ratio. Diatomaceous earth was also used in the procedure which, along with acetone, desiccated the sample. Extract clean-up steps taken prior to analysis included activated copper clean-up (SW-846 method 3660B) and sulfuric acid clean-up (SW-846 method 3665A). Positive sample results were confirmed by a secondary column confirmation analysis with the higher of the two results reported, unless analyst discretion required otherwise (e.g. the result without an interference signal was selected).

Further details on sample handling and analytical methods can be found in the Project QAPP (Jacobs 2005).

3.0 RESULTS

3.1 River Sediments

Physical Characteristics

A total of 46 sediment cores were collected over the three separate sampling events (May and September 2005, January 2006). Coordinates of target station locations are presented in Table 1, and the locations are shown in Figure 9. Sediment samples collected from the in-water stations were typically black silt material overlying a layer of olive silt or coarse to medium-grained sand. A description of the sediment samples collected is presented in Table 3. The black silt layer composed the top 2 to 6 inch layer for most of the stations. Many of the collected sediments had a faint to mild hydrogen sulfide odor.

PCB Concentrations

The results of PCB analysis for the three 2005-06 sediment sampling efforts are presented together in Table 4 and individually on Figure 10 (May 2005), Figure 11 (September 2005), and Figure 12 (January 2006). Previous sampling efforts are also presented in Table 4; post remediation PCB concentrations ranged from less than 1 to 20 mg/kg, and August 2004 sediment sampling showed elevated PCB concentrations throughout the river (22 to 160 mg/kg). Eight locations sampled in August 2004 were revisited in May 2005, and PCB concentrations ranged from 4 to 81 mg/kg. Twelve locations (including five previously sampled in May 2005) were sampled in September 2005, prior to the start of dredge operations in the Upper Harbor, and PCB concentrations ranged from less than 1 to 82 mg/kg. These 12 locations were resampled in January 2006, 45 days after the completion of 2005 dredging operations, and total PCB concentrations ranged from 1 to 187 mg/kg. A complete record of the analytical results is provided in Appendix A.

A sediment trap was deployed at a location just north of the Wood Street Bridge once nearing the end of the 2005 dredging and once following completion of dredging and demobilization activities (Table 5). The total PCB concentration in the sample collected while dredging was ongoing was 41 mg/kg, and the concentration in the sample collected following completion of dredging activities was 267 mg/kg (Table 5); it is worth noting that the deployment period (11/21 through 12/07/05) partially overlapped the timeframe of the Acushnet shoreline remediation (initiated in December 2005).

3.2 Shoreline Soils

Physical Characteristics

A total of 36 core samples of the top 6 inches of soil were collected over five separate sampling events (January, May, July, October, and November 2005). Coordinates of target station locations are presented in Table 2, and the locations are shown in Figure 13. Soils samples recovered from the eastern shoreline of the Acushnet River south of River View Park were typically highly organic marsh soils, ranging in characteristics from a sandy loam to medium to dark brown peat with organic fibers visible in many samples. Given the remediation/restoration completed in this area in 2002-03, some samples collected along, or in the vicinity of the remediation boundary had characteristics of an engineered sandy loam mixture. A description of the soil samples collected is presented in Table 6.

PCB Concentrations

The results of the five individual soil sampling efforts are presented in Table 7 and are presented on Figure 14. Total PCB concentrations were calculated by multiplying the sum of NOAA 18 congeners by the New Bedford Harbor translation factor of 2.6. For the samples submitted for a rapid assessment of PCB Aroclors, the total PCB concentration was determined by summing the results of the individual Aroclors. A complete record of the analytical results is provided in Appendix A.

From the point of elevated PCB concentrations found at Station C003-013RMc (910 mg/kg) in 2004 (ENSR, 2005), four additional stations (C003-013RMcN, C003-013RMcE, C003-013RMcS, and C003-013RMcW) were sampled in January 2005. PCB concentrations ranged from 1 to 2550 mg/kg in the top 6 inch segment, with the peak value observed at station C003-013RMcN. Visible surface staining, similar to that shown in Figure 14, was associated with the elevated PCB concentrations. The spatial extent of sampling was expanded to stations 05-NWS-01 to 05-NWS-12 in May 2005. The PCB concentrations for this second round of sampling ranged from 1 to 4200 mg/kg in the top 6 inches, prompting additional characterization of the area.

Stations 05-NWS-13 through 05-NWS-23 were sampled in July 2005. Stations north of the drainage swale (05-NWS-13 through 05-NWS-17) had total PCB concentrations ranging from less than 1 to 13 mg/kg. Stations south of the drainage swale (05-NWS-18 to 05-NWS-23) had PCB concentrations ranging from 1 to 166 mg/kg, with the peak value observed at station 05-NWS-22 (Figures 13 and 14).

In October 2005, a 12 inch sample was collected at Stations 05-NWS-24 through 05-NWS-28 to determine PCB concentrations around a stand of mature trees. A visible oily sheen was present in these areas during the sampling event (Figure 14). PCB concentrations in the top 6 inch segments ranged from less than 1 to 103 mg/kg and less than 1 to 251 mg/kg in the 6 to 12 inch segments. A final round of sampling conducted in November 2005 collected 12 inch cores from stations 05-NWS-29

through 05-NWS-32 (Figure 13). PCB concentrations ranged from 1 to 33 mg/kg in the top 6 inch segments and ranged from less than 1 to 39 mg/kg in the 6 to 12 inch segments.

3.3 Data QC and Database Entry

Upon data receipt from the laboratory, ENSR provided a cursory review for completeness and loaded the data into a temporary database for use in draft data reporting. ENSR also performed a quick check of the QC sample results from the temporary database to evaluate overall data quality before transmitting the data to the program database. Electronic files of the hardcopy laboratory reports were generated and provided to Battelle Ocean Sciences for subsequent data validation efforts and uploading into the Project database.

4.0 DISCUSSION

The sediment and soil sampling that was performed in the North of the Wood Street Bridge Area of Upper New Bedford in 2005-06 had two distinct objectives: 1) to evaluate potential changes in sediment PCB concentrations that may have occurred due to seasonal or dredging related influences; and 2) to provide continued support in mapping out an area of elevated PCB concentrations identified in shoreline soils south of River View Park on the Acushnet side of the river in 2004 (ENSR, 2005). Results of the separate sampling efforts are discussed below.

4.1 River Sediments

River sediment PCB data collected in 2005-06 were compared to previous sediment data collected in 2004 and to sediment data collected after the completion of remediation efforts in 2002-03. These data are presented together in Table 4 along with summary statistics. Lowest concentrations were found in the 2002-03 sampling immediately following completion of the remediation effort, with both the median and mean values well below the cleanup criterion of 10 mg/kg (total PCBs) designated for subtidal sediments. For this initial confirmatory sampling, an upper 6 inch composite sample was collected in the dry at each station prior to reflooding of the waterway.

In August 2004, a Ponar grab sampler was used to collect surficial sediments, and a 6 inch subsample was collected from each grab for analysis. This sampling was performed prior to the start of the 2004 remedial dredge season. Total PCB concentrations were approximately ten times higher than for the 2002-03 sampling with a mean of 54 mg/kg (Table 4), and with the elevated concentrations distributed throughout the sampled area (Figure 5). Factors that were considered to have potentially contributed to this change in concentration included sampling bias (subsampling the grab may have weighted the sample to more fine material as compared to the surficial samples collected in the dry in freezing condition as the endpoint of the remediation effort) or recontamination of the area with residual sediment left from the EA/NWS remediation or with sediment from the highly contaminated area of the Upper Harbor to the south of the remediated area.

Based on the 2004 sampling data, it was decided that future sampling of river sediments in the area would be performed using a push core with the upper 6 inches submitted for analysis. A subset of the stations were sampled in May 2005 using this technique, and PCB concentrations were significantly less, with a mean of 22 mg/kg and a median of 9.9 mg/kg total PCBs (Table 4, Figure 10). Sampling was performed in September 2005 prior to the start of the 2005 remedial dredging, and concentrations had decreased further, with a mean of 16 mg/kg and median of 3.4 mg/kg total PCBs (Table 4, Figure 11). Core sampling of river sediments was performed again in January 2006 following completion of the 2005 remedial dredging (approximately one-half mile south of the Wood Street Bridge, Figure 1) and completion of the shoreline remedial excavation that was performed adjacent to

the study area (Figure 15). PCB concentrations increased at most locations, with the overall mean increasing to 30 mg/kg and the median increasing to 10 mg/kg (Table 4, Figure 15).

The time history of PCB concentration was plotted for five stations spanning approximately 400 feet of the river to better view the changes over time (Figure 16). The plots show that the maximum PCB concentration was measured in the August 2004 sample for four of the five stations, with concentrations dropping through September 2005 and increasing somewhat or remaining nearly constant in January 2006. For the fifth station, C006-040, concentrations remained elevated at 70+ mg/kg for the August 2004 through September 2005 samples and increased further to 190 mg/kg in the January 2006 sample.

Some of the changes in sediment concentration noted above may be related to spatial variability of PCB concentration, i.e., concentration distribution is patchy and can vary significantly over short distances. However, the changes in concentration, particularly those for the last three events performed using identical sampling techniques, suggest a relatively dynamic sediment system within the main portion of the river channel. Sampling that proved successful at a given location during one event had to be moved in follow up events for some stations because redistribution of sediments had left exposed hard bottom that could not be hand cored.

Factors that could have contributed to the increase in PCB concentrations between the September 2005 and January 2006 sampling include normal redistribution of sediment within the Upper Harbor, transport of suspended material from the dredging that took place from late September to November approximately one-half mile south of the Wood Street Bridge, and release of material during the remedial excavation along the eastern shoreline of the river performed in November and December (Figure 15). Ongoing transport of contaminated sediments under normal (non-remediation) conditions has been established at locations further south in the Upper Harbor (ENSR, 2006), but no baseline data exist for the North of Wood Street Area. Although monitoring of the dredging operations in 2005 demonstrated nearfield release and deposition of suspended sediment with associated PCB contamination (ENSR, 2006), the limited sediment trap data for the North of Wood Street Area revealed movement of sediment with higher PCB concentrations during the period following completion of dredging when shoreline excavation was ongoing in the area (270 mg/kg during shoreline excavation vs. 41 mg/kg during dredging operations; Table 5, Figure 15). The potential influence of the eastern shoreline soil contamination on river sediments is further supported by the location of the highest sediment concentrations measured in the January 2006 sampling (located immediately adjacent to and down river of the shoreline area with elevated PCB concentrations).

4.2 Shoreline Soils

The combined rounds of shoreline sampling and analysis revealed two areas of soil with elevated PCB concentrations, one area approximately 130 feet in length and 40 feet in width just south of River View Park and a smaller area approximately 150 feet further south along the eastern shore (Figure 15).

These two areas had not been included in the 2002-03 NWS cleanup due to the lack of characterization data for them (at that time, the area had been thickly vegetated), and thus the areas do not represent areas of recontamination. These areas were excavated, and soils were transported for off-site disposal in December 2005 by Jacobs Engineering.

5.0 REFERENCES

ENSR, International. 2005. *Sediment Sampling Summary Report, Early Action/ North of Wood Street,* New Bedford Harbor Superfund Site.

ENSR Corporation. 2006. Water Quality Monitoring – Remediation Dredging at OMU-2 and OMU-4, Fall 2005, New Bedford Harbor Superfund Site. Draft, February 2006.

Jacobs Engineering Group. May 2005. *Quality Assurance Project Plan, New Bedford Harbor Superfund Site.*

Jacobs Engineering Group. 2006. Draft After Action Report – 2005 New Bedford Harbor Remedial Action (in preparation March 2006).

Tetra Tech FW, Inc. August 2004. *North of Wood Street Confirmatory Sampling Report, New Bedford Harbor Superfund Site.*

Tetra Tech FW, Inc. April 2005. *After Action Report for North of Wood Street Remediation, New Bedford Harbor Superfund Site, Operable Unit #1, New Bedford, Massachusetts.*

U.S. Environmental Protection Agency. 1997. *Report on the Effects of Hot Spot Dredging Operations – New Bedford Harbor Superfund Site.*

Table 1

Station Coordinates – May 2005, September 2005, and January 2006 Sediment Sampling Stations at the North of Wood Street Area

Date Sampled	Station ID	Easting	Northing
5/11/2005	C006-023	815415.463	2708821.773
5/11/2005	C006-028	815403.060	2708710.097
5/11/2005	C006-033	815415.725	2708618.023
5/11/2005	C006-034	815455.801	2708622.483
5/11/2005	C006-039	815413.280	2708518.878
5/11/2005	C006-040	815467.033	2708520.557
5/11/2005	C006-048	815418.918	2708388.645
5/11/2005	C006-049	815469.892	2708409.095
9/6/2005	C006-023	815416.976	2708810.128
9/6/2005	C006-028	815415.989	2708710.397
9/6/2005	C006-033	815412.697	2708613.814
9/6/2005	C006-038	815389.933	2708520.813
9/6/2005	C006-040	815457.297	2708509.956
9/7/2005	C006-010	815353.616	2709106.631
9/7/2005	C006-016	815402.356	2708975.106
9/7/2005	C006-030W	815498.698	2708682.575
9/7/2005	C006-030E	815363.074	2708653.127
9/7/2005	C006-049	815491.224	2708390.753
9/7/2005	C006-055	815459.050	2708259.545
9/7/2005	C006-062	815558.685	2708163.465
1/11/2006	C006-010	815381.861	2709110.881
1/11/2006	C006-016	815416.192	2708973.021
1/11/2006	C006-023	815416.930	2708822.218
1/11/2006	C006-028	815413.147	2708726.724
1/11/2006	C006-030W	815393.223	2708646.346
1/11/2006	C006-030E	815483.841	2708684.013
1/11/2006	C006-033	815414.707	2708622.195
1/11/2006	C006-038	815371.712	2708532.214
1/11/2006	C006-040	815491.205	2708523.249
1/11/2006	C006-049	815478.675	2708410.563
1/11/2006	C006-055	815461.507	2708267.224
1/11/2006	C006-062	815558.742	2708177.009

Notes: Geographic Reference: NAD 83 Massachusetts State Plane Mainland FIPS 2001 Feet

Table 2

Station Coordinates – January - November 2005 Soil Sampling Stations at the North of Wood Street Area

Date Sampled	Station ID	Easting	Northing
1/13/2005	C003-013RMcN	815495.99	2708835.12
1/13/2005	C003-013RMcE	815522.55	2708820.21
1/13/2005	C003-013RMcS	815505.08	2708784.34
1/13/2005	C003-013RMcW	815477.82	2708806.23
5/9/2005	05-NWS-01	815532.634	2708825.524
5/9/2005	05-NWS-02	815517.705	2708833.236
5/9/2005	05-NWS-03	815513.308	2708843.528
5/9/2005	05-NWS-04	815527.126	2708852.015
5/9/2005	05-NWS-05	815492.137	2708860.524
5/9/2005	05-NWS-06	815508.834	2708869.766
5/9/2005	05-NWS-07	815521.796	2708874.232
5/9/2005	05-NWS-08	815488.700	2708878.873
5/9/2005	05-NWS-09	815510.873	2708885.586
5/9/2005	05-NWS-10	815498.238	2708896.316
5/9/2005	05-NWS-11	815500.814	2708799.483
5/9/2005	05-NWS-12	815520.301	2708797.043
7/8/2005	05-NWS-13	815539.334	2708801.482
7/8/2005	05-NWS-14	815516.316	2708767.867
7/8/2005	05-NWS-15	815542.701	2708775.658
7/8/2005	05-NWS-16	815518.400	2708750.470
7/8/2005	05-NWS-17	815541.633	2708758.321
7/8/2005	05-NWS-18	815521.457	2708723.663
7/8/2005	05-NWS-19	815544.183	2708726.875
7/8/2005	05-NWS-20	815548.589	2708703.658
7/8/2005	05-NWS-21	815524.793	2708697.259
7/8/2005	05-NWS-22	815552.123	2708678.047
7/8/2005	05-NWS-23	815529.251	2708667.969
10/13/2005	05-NWS-24	815531.058	2708773.402
10/13/2005	05-NWS-25	815530.853	2708786.763
10/13/2005	05-NWS-26	815519.633	2708784.983
10/13/2005	05-NWS-27	815526.901	2708796.750
10/13/2005	05-NWS-28	815523.937	2708803.800
11/2/2005	05-NWS-29	815532.651	2708653.206
11/2/2005	05-NWS-30	815532.186	2708661.505
11/2/2005	05-NWS-31	815543.734	2708667.555
11/2/2005	05-NWS-32	815541.399	2708690.682

Notes: Geographic Reference: NAD 83 Massachusetts State Plane Mainland FIPS 2001 Feet

Table 3

Description of Sediment Samples Recovered from the North of Wood Street Area During the 2005-06 Sampling Effort

Date Sampled	Station ID	Recovery (inches)	Description
5/11/2005	C006-023	13.5	2" black silt over 11.5" of olive silt. Mild H2S odor.
5/11/2005	C006-028	16	4" black silt over 12" of olive silt. Mild H2S odor.
5/11/2005	C006-033	17.5	7" black silt over 3" of black sand and 7.5" of brown sand. Mild H2S odor.
5/11/2005	C006-034	14.5	7" black silt over 7.5" of olive grey silt with shell hash. Mild H2S odor.
5/11/2005	C006-039	17	6" black silt over 11" of olive grey silt. Moderate H2S odor.
5/11/2005	C006-040	10	2" black silt over 8" of olive grey silt. No H2S odor.
5/11/2005	C006-048	7.5	Top 3" black silt over 2" of black silty sand and 2.5" of olive grey silt
5/11/2005	C006-049	9	4" black silt over 5" of olive grey silt.
9/6/2005	C006-023	13	3.5" black silt over 3.5" transition zone (black silt and olive brown sediment mix) and 6" olive brown sediment. H2S odor.
9/6/2005	C006-028	9	1.5" black silt over 2" transition zone (black silt and olive brown sediment mix) and 5.5" olive brown sediment.
9/6/2005	C006-033	12	1.5" black silt over 3" of coarse sand olive sediment and 7.5" of brown olive sediment.
9/6/2005	C006-038	8	4" black silt over 1" of coarse sandy brown sediment with silt and 3" sandy coarse brown sediment.
9/6/2005	C006-040	11	6" black silt over 5" dark olive silt with black silty clay.
9/7/2005	C006-010	7	Black silt.
9/7/2005	C006-016	5.5	Dark brown olive silty sediment.
9/7/2005	C006-030W	6	Brown sandy loam.
9/7/2005	C006-030E	6	Brown sandy loam with plant material.
9/7/2005	C006-049	13	3" black silt over 4" transition zone (black silt and olive brown sediment mix) and 6" olive sediment.
9/7/2005	C006-055	6	2.5" black silt over 3.5" of brown coarse sand.
9/7/2005	C006-062	10.5	2" black silt over 8.5" of olive brown material with sand.
1/11/2006	C006-010	10	Coarse sand and gravel
1/11/2006	C006-016	7	Coarse sand and gravel with fine material
1/11/2006	C006-023	9.5	Top 1.5" black silt over 8" of olive colored sediment
1/11/2006	C006-028	14	Black silt over 9" of olive sediment
1/11/2006	C006-030W	6	3" black silt over 3" of olive sediment
1/11/2006	C006-030E	6	3" black silt over 3" of olive sediment
1/11/2006	C006-033	8	Dark olive sediment mixed with black silt over 2" of olive colored fine sand
1/11/2006	C006-038	11	1" black silt over coarse to fine sands
1/11/2006	C006-040	8	2" of black silt over olive sediment
1/11/2006	C006-049	13	2" of black silt over olive sediment
1/11/2006	C006-055	12	6" of black silt over olive sediment
1/11/2006	C006-062	14.5	Olive sediment

Table 4

Total PCB Concentrations for Sediment Samples Collected from the Acushnet River in the North of Wood Street Area

Station ID	February 2003 PCB Concentration (mg/kg)	August 2004 PCB Concentration (mg/kg)	May 2005 PCB Concentration (mg/kg)	September 2005 PCB Concentration (mg/kg)	January 2006 PCB Concentration (mg/kg)
C006-010	6.1	20	-	82	1
C006-016	4.6	13	-	18	16
C006-023	8.3	22	4	2	4
C006-028	0.5	63	10	0.2	11
C006-030	4.8	63	-	-	-
C006-030E	-	-	-	0.7	89
C006-030W	-	-	-	0.4	5
C006-033	0.4	65	22	1	17
C006-034	20	71	10	-	-
C006-038	0.5	36	-	5	9
C006-039	0.5	64	5	-	-
C006-040	2.9	72	81	73	187[3]
C006-048	0.4	23	9	-	-
C006-049	12	160	37	6	4
C006-055	0.4	61	-	7	20
C006-062	7.4	19	-	0.9	1
Mean	4.9	54	22	16	30
Median	3.8	62	9.9	3.4	10

Notes:

1. Reported concentrations are total PCB based on the sum of NOAA-18 congeners multiplied by the New Bedford Harbor translation factor of 2.6
2. All samples represent a composite of the top 6" of sediment. The August 2004 samples were collected by grab sampler and all 2005 samples were collected by push core device. February 2003 represent post-remediation PCB concentrations for samples that were collected in the dry prior to restoring normal river flows
3. January 2006 sample collected at Station C006-040 was approximately 30 feet closer to the Acushnet shoreline, which may have been impacted by the December 2005 intertidal clean-up.

Table 5

Total PCB Concentration in Sediment Trap Samples from North of Wood Street Bridge, Fall 2005

Station ID	Date Deployed	Date Collected	Number of Days Deployed	Number of Dredge Days	Total PCB* mg/Kg
During Dredging					
NWS-ST-1	11/8/2005	11/21/2005	14	7	41
After Dredging					
NWS-ST-1	11/21/2005	12/07/2005	17	0	267**

Notes:

* (18 NOAA Congeners) x (Site specific 2.6 multiplier)

** Sample volume too small to perform final % moisture test, sample results based on assumed 100% solids and results may be biased low. After dredging sample had a deployment period which briefly overlapped with the Acushnet shoreline clean-up effort initiated in December 2005.

N/A = No data available

Table 6

Description of Soil Samples Recovered from the North of Wood Street Area during the 2005 Sampling Effort

Date Sampled	Station ID	Core Size (inches)	Description
1/13/2005	C003-013RMcN	6	Engineered organic sandy loam matrix with a well drained substrate.
1/13/2005	C003-013RMcE	6	Engineered organic sandy loam matrix with a well drained substrate.
1/13/2005	C003-013RMcS	6	Engineered organic sandy loam matrix with a well drained substrate.
1/13/2005	C003-013RMcW	6	Engineered organic sandy loam matrix with a well drained substrate.
5/9/2005	05-NWS-01-0.0-0.5	6	Engineered organic sandy loam matrix with a well drained substrate.
5/9/2005	05-NWS-02-0.0-0.5	6	Engineered organic sandy loam matrix with a well drained substrate.
5/9/2005	05-NWS-03-0.0-0.5	6	Engineered organic sandy loam matrix with a well drained substrate.
5/9/2005	05-NWS-04-0.0-0.5	6	Engineered organic sandy loam matrix with a well drained substrate.
5/9/2005	05-NWS-05-0.0-0.5	6	Sandy loam with root fibers.
5/9/2005	05-NWS-06-0.0-0.5	6	Sandy loam with root fibers.
5/9/2005	05-NWS-07-0.0-0.5	6	Light to medium brown sandy peat.
5/9/2005	05-NWS-08-0.0-0.5	6	Medium brown peat with some fine sand.
5/9/2005	05-NWS-09-0.0-0.5	6	Sandy loam with wood chips.
5/9/2005	05-NWS-10-0.0-0.5	6	Medium brown sandy loam with root fibers.
5/9/2005	05-NWS-11-0.0-0.5	6	Engineered organic sandy loam matrix with a well drained substrate.
5/9/2005	05-NWS-12-0.0-0.5	6	Dark brown sandy peat.
7/8/2005	05-NWS-13-0.0-0.5	6	Dark brown organic material with root debris.
7/8/2005	05-NWS-14-0.0-0.5	6	Medium brown material, loam with fine sand.
7/8/2005	05-NWS-15-0.0-0.5	6	Organic material, dark to medium brown, some fine sand and some reddish mottles.
7/8/2005	05-NWS-16-0.0-0.5	6	0-2" black to dark brown loam with fine sand, 2-6" medium brown loam with fine sand.
7/8/2005	05-NWS-17-0.0-0.5	6	0-1.5" medium brown organic material with fine sand, 1.5-6" dark brown organic material.
7/8/2005	05-NWS-18-0.0-0.5	6	Dark brown loam with fine sand.
7/8/2005	05-NWS-19-0.0-0.5	6	Dark brown organic material, some fine sand, with root debris.
7/8/2005	05-NWS-20-0.0-0.5	6	Loose dark brown loam, with organic matter.
7/8/2005	05-NWS-21-0.0-0.5	6	Medium/ dark brown organic material, some fine sand.
7/8/2005	05-NWS-22-0.0-0.5	6	Loose dark brown loam, with organic matter.
7/8/2005	05-NWS-23-0.0-0.5	6	Loose dark brown loam, with organic matter.
10/13/2005	05-NWS-24-0.0-0.5	12	Dark brown sandy loam with organic material.
10/13/2005	05-NWS-24-0.5-1.0	12	Dark brown sandy loam with organic material.
10/13/2005	05-NWS-25-0.0-0.5	12	Dark brown sandy loam peat.
10/13/2005	05-NWS-25-0.5-1.0	12	Peat with organic material.
10/13/2005	05-NWS-26-0.0-0.5	12	Dark brown sandy peat.
10/13/2005	05-NWS-26-0.5-1.0	12	Dark brown sandy peat.
10/13/2005	05-NWS-27-0.0-0.5	12	Dark brown sandy loamy peat.
10/13/2005	05-NWS-27-0.5-1.0	12	Dark brown sandy loamy peat.
10/13/2005	05-NWS-28-0.0-0.5	12	Dark brown peaty sand.
10/13/2005	05-NWS-28-0.5-1.0	12	Tan sandy loam.
11/2/2005	05-NWS-29-0.0-0.5	12	Dark to light brown sandy loam with organic material.
11/2/2005	05-NWS-29-0.5-1.0	12	Dark brown loam with coarse sand.
11/2/2005	05-NWS-30-0.0-0.5	12	Dark brown sandy loam with organic material.
11/2/2005	05-NWS-30-0.5-1.0	12	Dark brown sandy loam with organic material.
11/2/2005	05-NWS-31-0.0-0.5	12	Dark brown sandy loam with organic material.
11/2/2005	05-NWS-31-0.5-1.0	12	Light brown loam with fine sands.
11/2/2005	05-NWS-32-0.0-0.5	12	Light to medium brown sandy loam with organic material.
11/2/2005	05-NWS-32-0.5-1.0	12	Dark brown loam with fine sands.

Table 7

Total PCB Concentrations in North of Wood Street Area Soil Samples Collected in 2005

Date Sampled	Station ID	PCB Concentration (mg/kg)
1/13/2005	C003-013RMcN	2550
1/13/2005	C003-013RMcE	30
1/13/2005	C003-013RMcS	1
1/13/2005	C003-013RMcW	1
5/9/2005	05-NWS-01-0.0-0.5	9
5/9/2005	05-NWS-02-0.0-0.5	28
5/9/2005	05-NWS-03-0.0-0.5	129
5/9/2005	05-NWS-04-0.0-0.5	12
5/9/2005	05-NWS-05-0.0-0.5	4200
5/9/2005	05-NWS-06-0.0-0.5	14
5/9/2005	05-NWS-07-0.0-0.5	1
5/9/2005	05-NWS-08-0.0-0.5	239
5/9/2005	05-NWS-09-0.0-0.5	8
5/9/2005	05-NWS-10-0.0-0.5	12
5/9/2005	05-NWS-11-0.0-0.5	1
5/9/2005	05-NWS-12-0.0-0.5	373
7/8/2005	05-NWS-13-0.0-0.5	1
7/8/2005	05-NWS-14-0.0-0.5	< 1
7/8/2005	05-NWS-15-0.0-0.5	13
7/8/2005	05-NWS-16-0.0-0.5	1
7/8/2005	05-NWS-17-0.0-0.5	8
7/8/2005	05-NWS-18-0.0-0.5	**3**
7/8/2005	05-NWS-19-0.0-0.5	**3**
7/8/2005	05-NWS-20-0.0-0.5	**25**
7/8/2005	05-NWS-21-0.0-0.5	**1**
7/8/2005	05-NWS-22-0.0-0.5	**166**
7/8/2005	05-NWS-23-0.0-0.5	**10**
10/13/2005	05-NWS-24-0.0-0.5	26
10/13/2005	05-NWS-24-0.5-1.0	251
10/13/2005	05-NWS-25-0.0-0.5	103
10/13/2005	05-NWS-25-0.5-1.0	26
10/13/2005	05-NWS-26-0.0-0.5	< 1
10/13/2005	05-NWS-26-0.5-1.0	< 1
10/13/2005	05-NWS-27-0.0-0.5	67
10/13/2005	05-NWS-27-0.5-1.0	48
10/13/2005	05-NWS-28-0.0-0.5	65
10/13/2005	05-NWS-28-0.5-1.0	2
11/2/2005	05-NWS-29-0.0-0.5	**13**
11/2/2005	05-NWS-29-0.5-1.0	**6**
11/2/2005	05-NWS-30-0.0-0.5	**33**
11/2/2005	05-NWS-30-0.5-1.0	**39**
11/2/2005	05-NWS-31-0.0-0.5	**1**
11/2/2005	05-NWS-31-0.5-1.0	**< 1**
11/2/2005	05-NWS-32-0.0-0.5	**3**
11/2/2005	05-NWS-32-0.5-1.0	**< 1**

Notes: 1. Reported concentrations are total PCBs based on the sum of NOAA-18 congeners multiplied by the New Bedford Harbor translation factor of 2.6. Bold numbers represent total PCBs based on sum of Aroclors.

2. All samples collected with push core device

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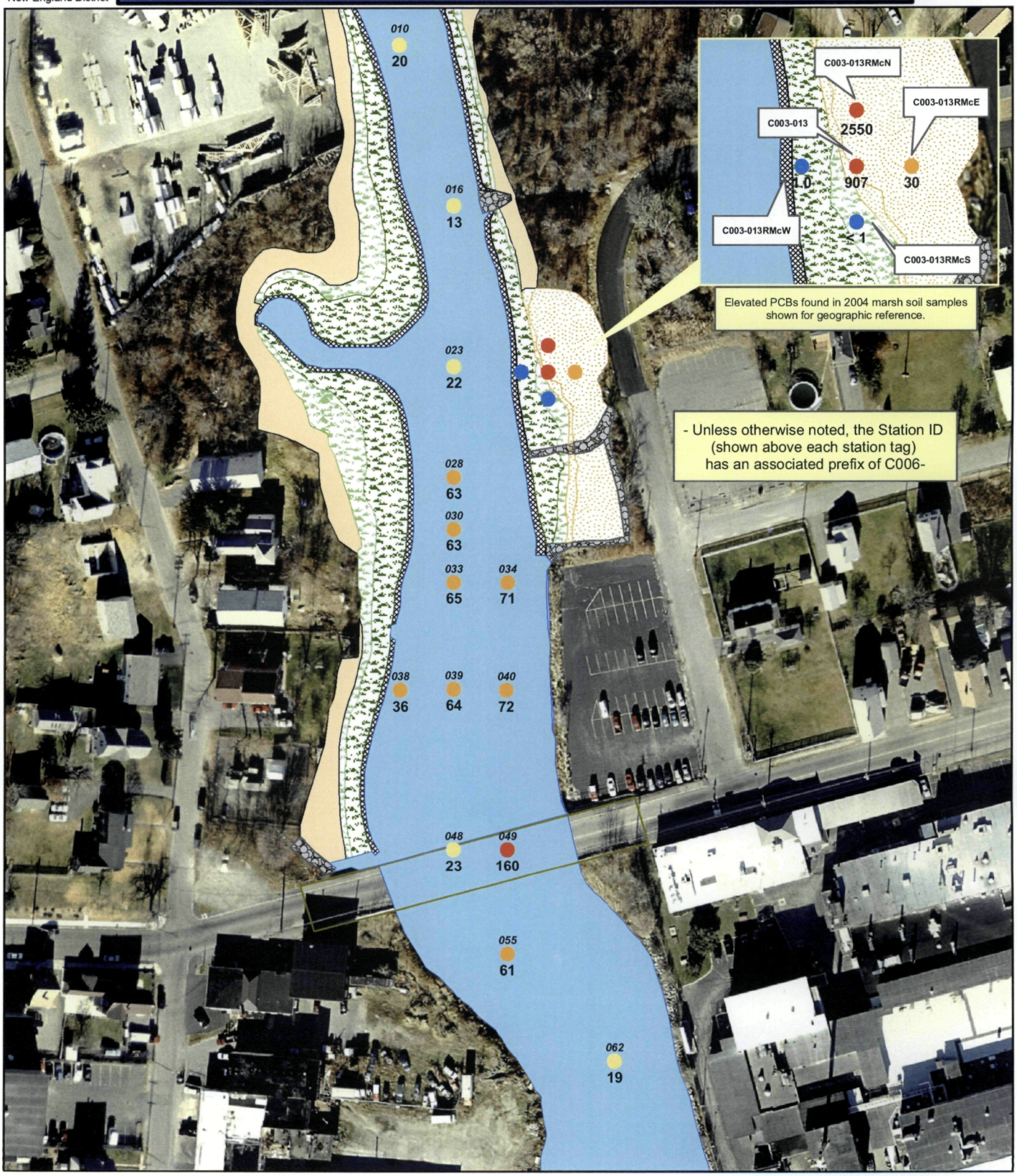

Figure 5. North of Wood Street Sediment Sampling Locations - 2004

Sources: MassGIS 2-m orthophoto
NAD 83 Mass State Plane Feet
Date: 08.01.06

Note: -Sediment samples collected in August 2004
-Soil samples collected in August 2004 and January 2005

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0 25 50 100 150 200 Feet

Habitat Cover Type

- High Marsh Planting
- Low Marsh Planting
- Phragmites Removal Area
- Upland Seed Mix
- Rip-Rap
- River
- Toe Stone

PCB Concentration (mg/kg)*

- 0.0 - 1.0
- 1.1 - 10.0
- 10.1 - 25.0
- 25.1 - 100.0
- > 100.1

* Based on sum of NOAA Congeners * 2.6

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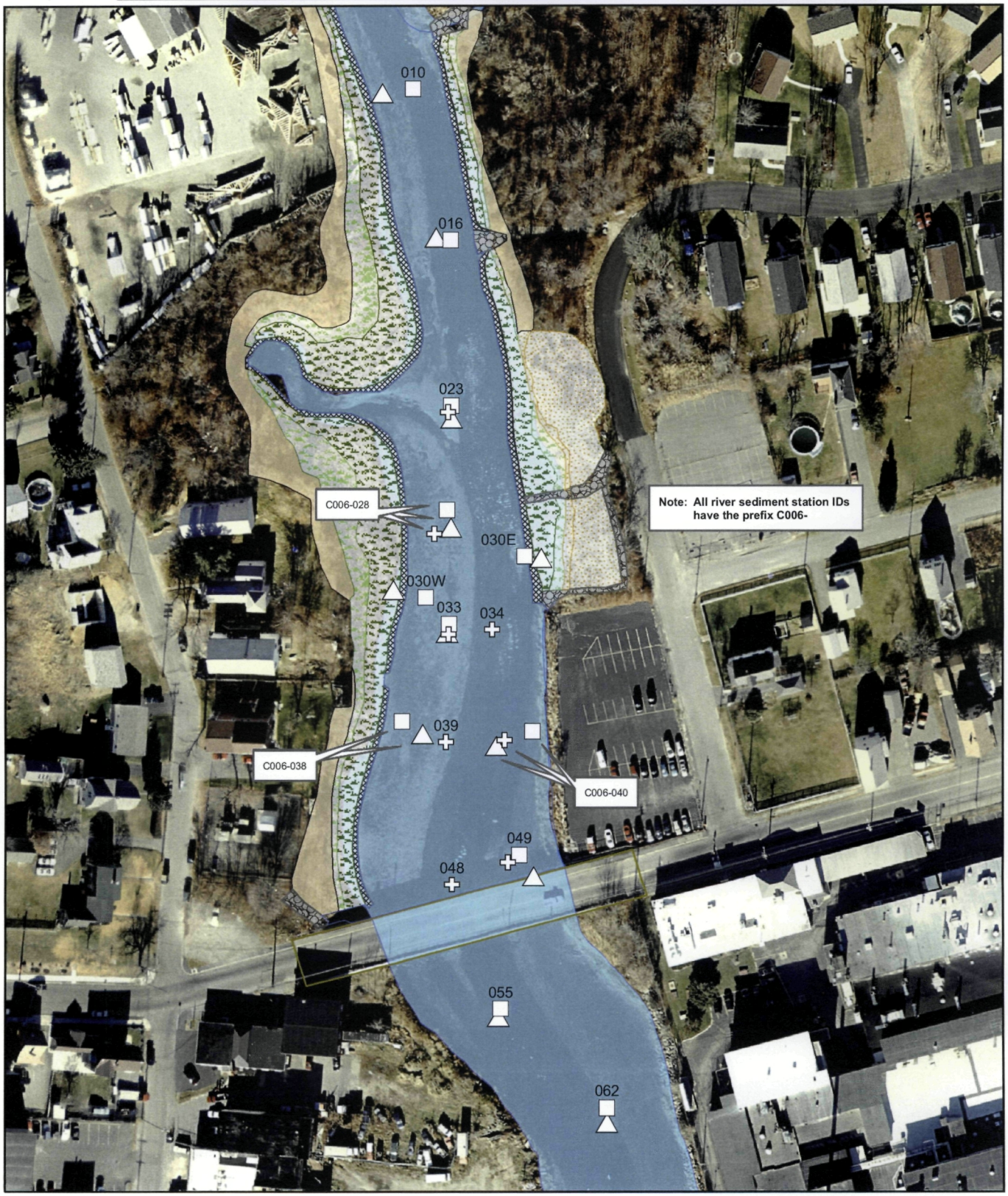

Figure 9. North of Wood Street Sediment Sampling - 2005-06 Locations - Acushnet River

Sources: MassGIS 2-m orthophoto
NAD 83 Mass State Plane Feet
Date: 08.01.06

May 2005 Sampling Stations
September 2005 Sampling Stations
January 2006 Sampling Stations

Habitat Cover Type

High Marsh Planting
Low Marsh Planting
Phragmites Removal Area
Upland Seed Mix
Rip-Rap
River
Toe Stone

ENSR AECOM

0 25 50 100 150 200 Feet

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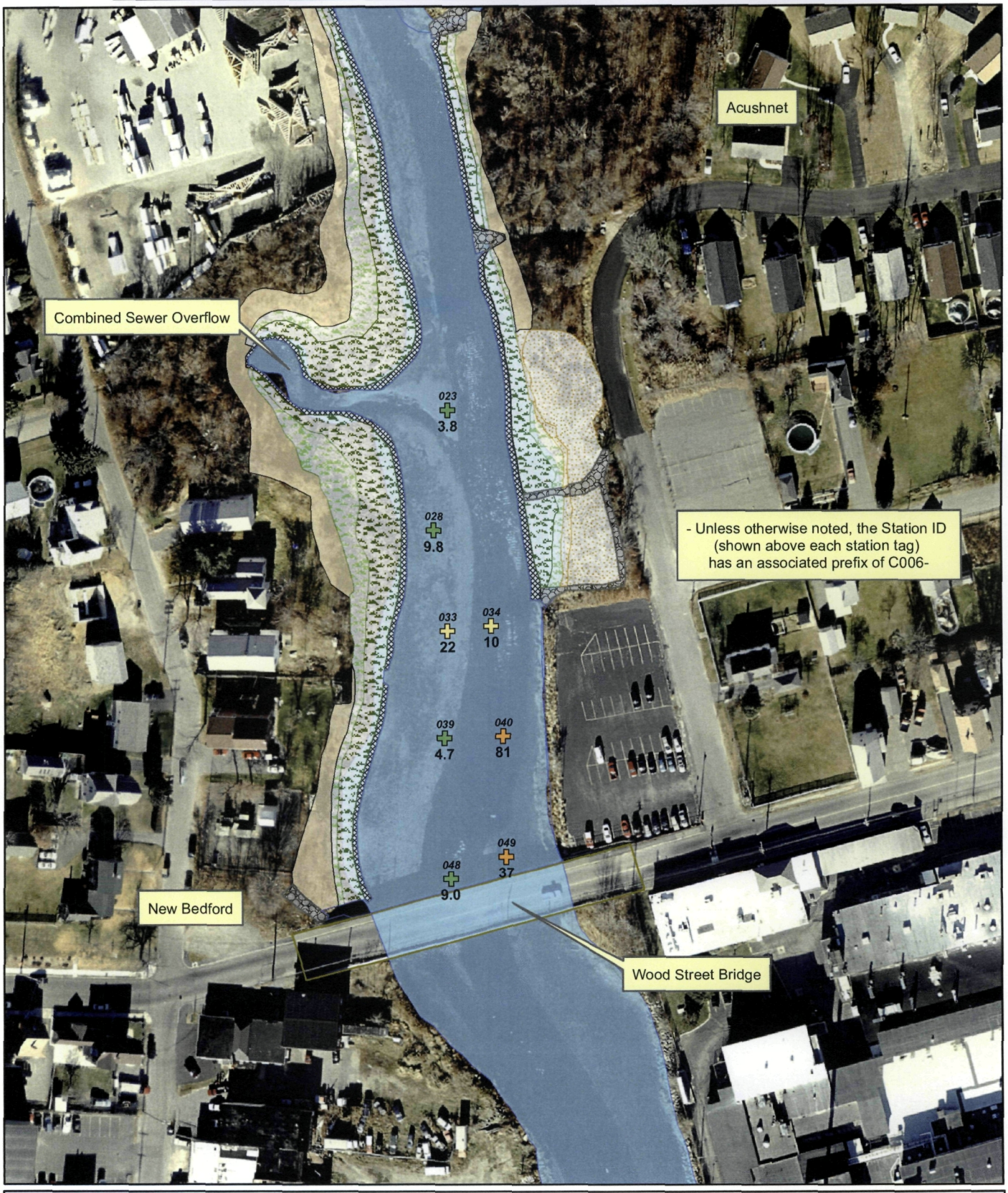

Figure 10. North of Wood Street Sediment Sampling - May 2005 Locations w/ PCB Concentrations - Acushnet River

Sources: MassGIS 2-m orthophoto
NAD 83 Mass State Plane Feet
Date: 08.01.06

May 2005 Sampling Stations

Habitat Cover Type

- High Marsh Planting
- Low Marsh Planting
- Phragmites Removal Area
- Upland Seed Mix
- Rip-Rap
- River
- Toe Stone

PCB Concentrations

- 0.0 - 1.0
- 1.1 - 10.0
- 10.1 - 25.0
- 25.1 - 100.0
- > 100.1

*PCB Values are in mg/kg (ppm)
** Based on (sum of NOAA Congeners) * 2.6

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0 25 50 100 150 200 Feet

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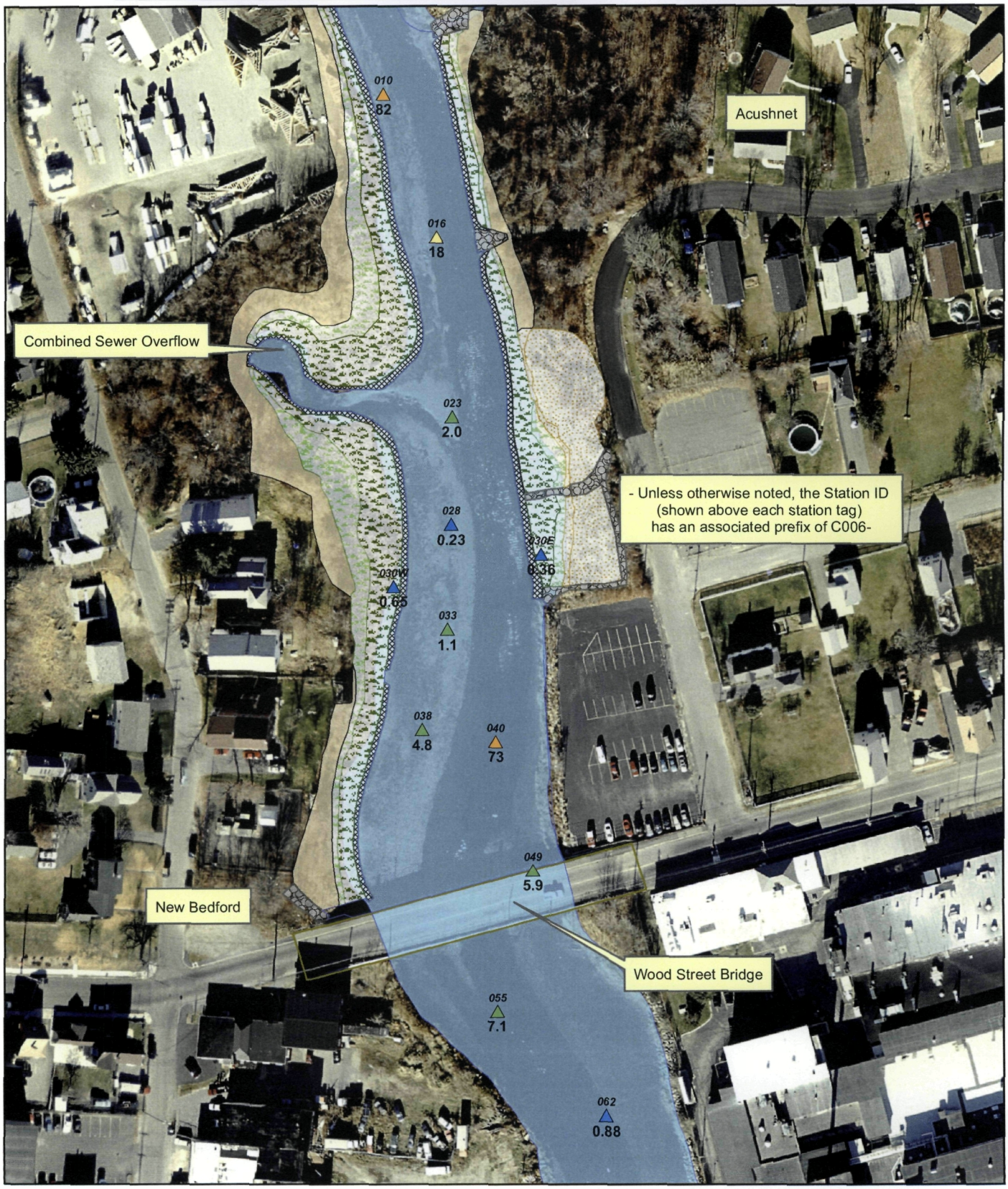

Figure 11. North of Wood Street Sediment Sampling - September 2005 Locations w/ PCB Concentrations - Acushnet River

Sources: MassGIS 2-m orthophoto
NAD 83 Mass State Plane Feet
Date: 08.01.06

△ September 2005 Sampling Stations

Habitat Cover Type

- High Marsh Planting
- Low Marsh Planting
- Phragmites Removal Area
- Upland Seed Mix
- Rip-Rap
- River
- Toe Stone

PCB Concentrations

- 0.0 - 1.0
- 1.1 - 10.0
- 10.1 - 25.0
- 25.1 - 100.0
- > 100.1

*PCB Values are in mg/kg (ppm)
** Based on (sum of NOAA Congeners) * 2.6

0 25 50 100 150 200 Feet

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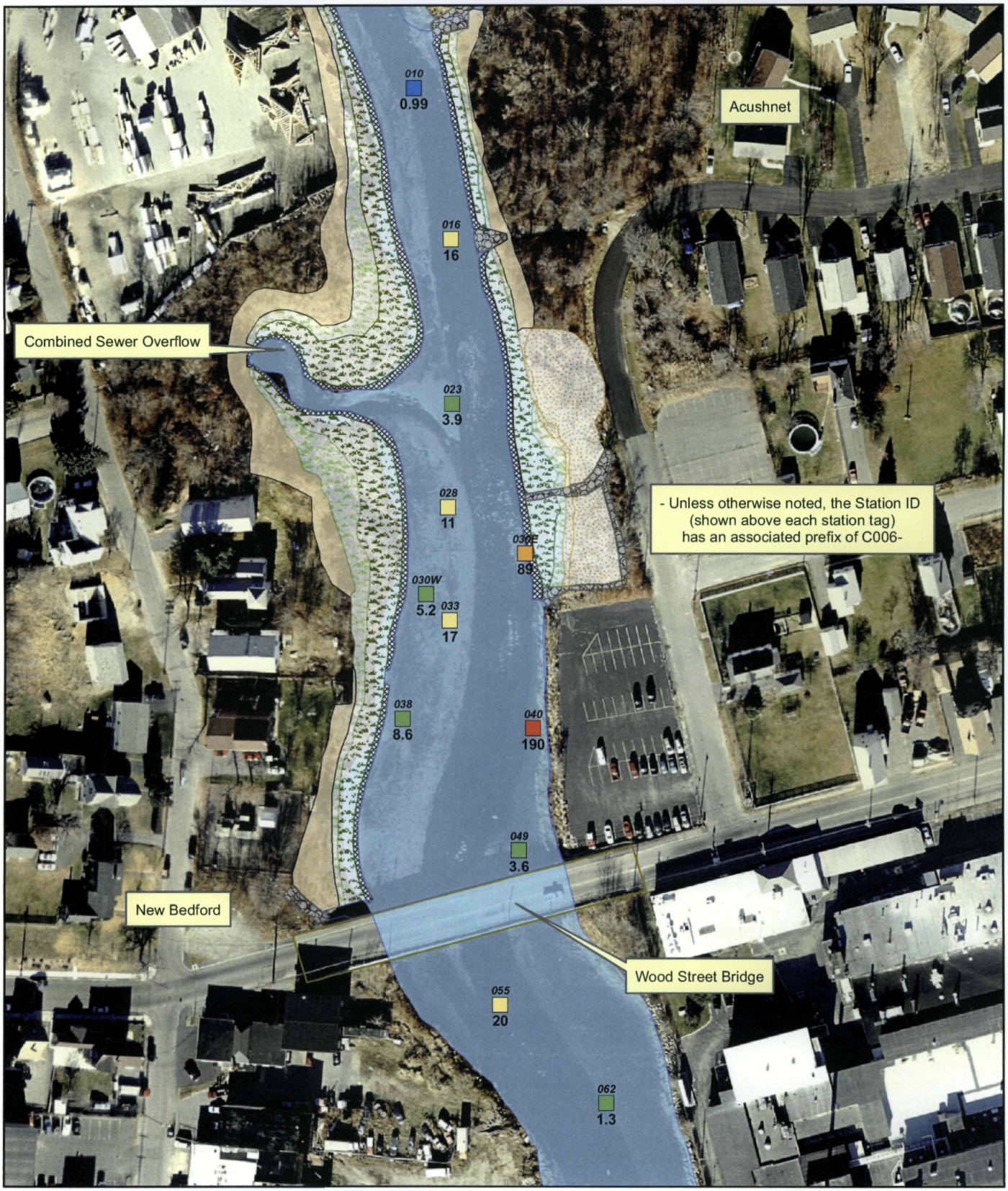

Figure 12. North of Wood Street Sediment Sampling - January 2006 Locations w/ PCB Concentrations - Acushnet River

Sources: MassGIS 2-m orthophoto
NAD 83 Mass State Plane Feet
Date: 08.01.06

January 2006 Sampling Stations

0 25 50 100 150 200 Feet

Habitat Cover Type

- High Marsh Planting
- Low Marsh Planting
- Phragmites Removal Area
- Upland Seed Mix
- Rip-Rap
- River
- Toe Stone

PCB Concentrations

- 0.0 - 1.0
- 1.1 - 10.0
- 10.1 - 25.0
- 25.1 - 100.0
- > 100.1

*PCB Values are in mg/kg (ppm)
** Based on (sum of NOAA Congeners) * 2.6

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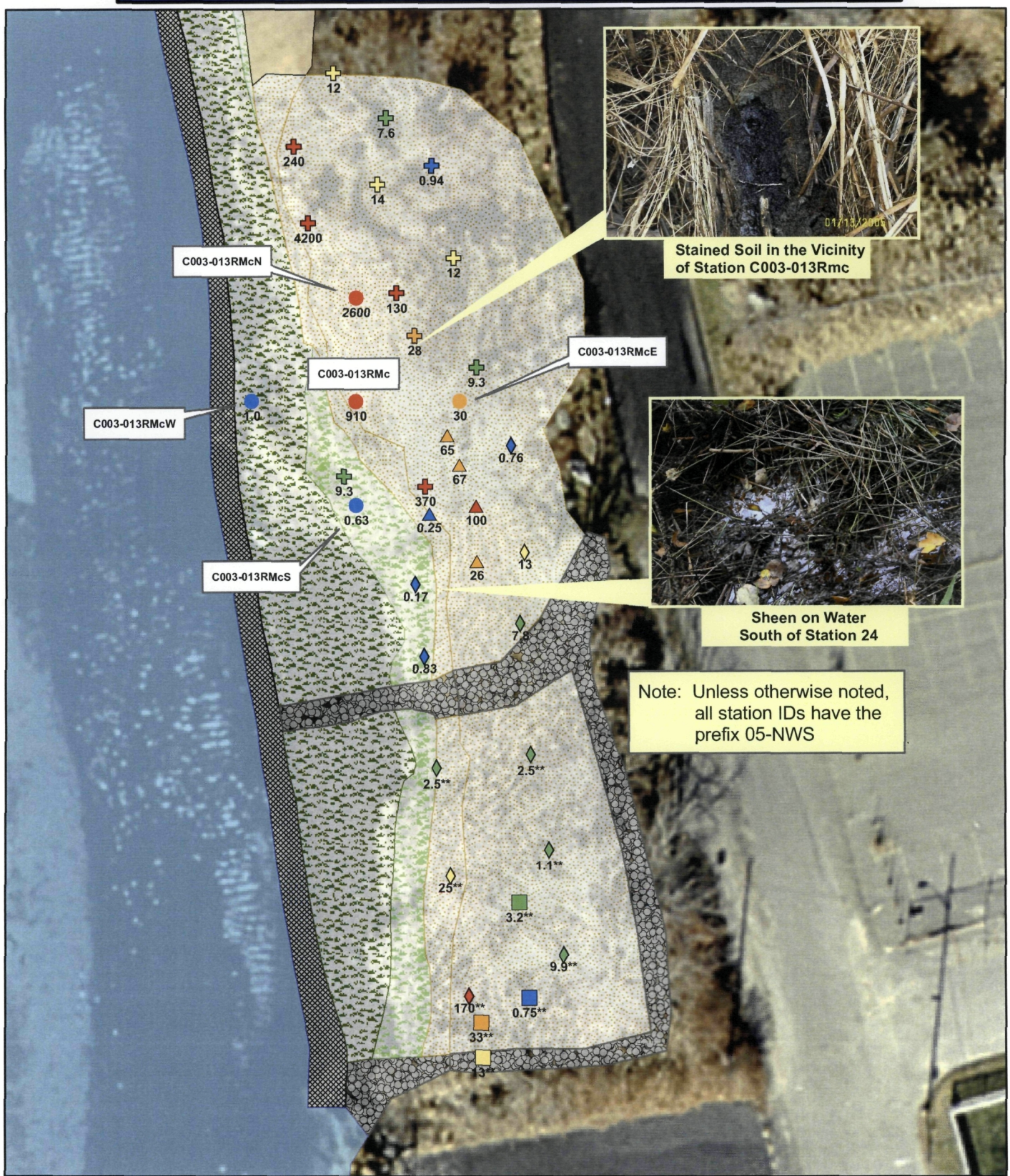

Figure 14. North of Wood Street Soil Sampling - 2005 Locations w/ PCB Concentrations

Sources:
NAD 83 Mass State Plane ft
Date: 08.01.06

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- Stations Sampled in Aug 2004 / Jan 2005
- Stations Sampled in May 2005
- Stations Sampled in July 2005
- Stations Sampled in October 2005
- Stations Sampled in November 2005

0 10 20 40 60 80 100 Feet

Habitat Cover Type

- High Marsh Planting
- Low Marsh Planting
- Phragmites Removal Area
- Upland Seed Mix
- Rip-Rap
- River
- Toe Stone

PCB Concentration (mg/kg)*
Total Detected PCB Aroclors**

- 0.0 - 1.0
- 1.1 - 10.0
- 10.1 - 25.0
- 25.1 - 100.0
- > 100.1

Notes: * Based on (sum of NOAA Congeners) * 2.6
PCB results are based on the 0 - 6 inch layer.

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