U.S. Army Corps of Engineers
Charleston District

APPENDIX M1

CHARLESTON HARBOR POST 45

CHARLESTON, SOUTH CAROLINA

404(b)(1) Assessment (Upland Disposal)

03 October 2014

SECTION 404(b)(1) EVALUATION
CHARLESTON HARBOR NAVIGATION
IMPROVEMENT PROJECT (POST 45)

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1.0 INTRODUCTION.

1.1. Background. This Section 404 (b)(1) evaluation analyzes activities associated with the Charleston Harbor Navigation Improvement Project (here after referred to as the Post 45 project) that involve the discharge of dredged or fill material into waters of the United States, including both construction and long-term maintenance requirements (a separate appendix, M2, contains the 404(b)(1) analysis for the SC DNR Nearshore Reef Rock Placement).

1.2 Scope of 404(b)(1) Analysis. The evaluation requirements of Section 404 of the CWA are guidelines developed by the U.S. Environmental Protection Agency (USEPA) in conjunction with the USACE and codified in 40 CFR Part 230. Under Subpart B of the Section 404(b)(1) Guidelines (Guidelines), the USACE's evaluation of the Post 45 Project's 404 discharges is required to address the following four tests in order to be in compliance with these guidelines.

- **40 CFR 230.10 (a):** Whether there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. The alternative identified by this test is referred to as the *least environmentally damaging practicable alternative* or the LEDPA. The evaluation of the proposed Post 45 Project with respect to this compliance test is found in Section 4.1, "Finding of Practicable Alternatives."
- **40 CFR 230.10 (b):** Whether the discharge would violate any applicable state water quality standards, Section 307 of the CWA, the Endangered Species Act (ESA), or federal laws concerning marine sanctuaries. The evaluation of the proposed Post 45 Project with respect to this compliance test is found in Section 4.2, "Restrictions on Discharge."
- **40 CFR 230.10 (c):** Whether the discharge would cause or contribute to significant degradation of waters of the U.S. The evaluation of the proposed Post 45 Project with respect to this compliance test is found in Section 4.3, "Finding of No Significant Degradation."
- **40 CFR 230.10 (d):** Whether appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem. The evaluation of the proposed Post 45 Project with respect to this compliance test is found in Section 4.4, "Minimization of Potential Adverse Impacts."

The purpose of the Guidelines is to direct the specification of disposal sites for dredged or fill material. The proposed project will be evaluated under all four tests listed above in order to make a determination of compliance with the Guidelines. While making a compliance determination, the USACE may gather information sufficient to support and make its decisions by soliciting comments from other federal, tribal, state, and local resource agencies and the public. However, the USACE is solely responsible for reaching a decision on the Section 404(b)(1) analysis.

1.3 Authority. Based on the Section 905(b) (WRDA 86) Analysis, Charleston Harbor Navigation Improvement Project, Charleston, South Carolina, dated July 2010, a feasibility study to analyze and evaluate improvements to Charleston Harbor is being conducted. The results of the feasibility study to date are stated in the draft Feasibility Report and accompanying Draft Environmental Impact Statement

(FR/EIS) which this appendix accompanies. Preliminary data suggests that there are additional National Economic Development (NED) benefits associated with modifications to Charleston Harbor.

1.4 National Environmental Policy Act. The proposed deepening of the existing Charleston Harbor is a major Federal action that could have a significant effect on the human environment and therefore the USACE, Charleston District has integrated an EIS required pursuant to the National Environmental Policy Act (NEPA) into the Feasibility Report (FR/EIS). According to the Guidelines, the NEPA alternative and impact analysis should provide sufficient information to evaluate compliance with the Guidelines. As stated in the Guidelines:

> *For actions subject to NEPA, the analysis of alternatives required for NEPA environmental documents, including supplemental Corps NEPA documents, will in most cases provide the information for the evaluation of alternatives under these Guidelines.*

This draft Guidelines evaluation document relies on the range of reasonable alternatives and impact analysis developed for purposes of NEPA within the draft FR/EIS, with a focus on the specific decision-making framework required by the Guidelines as applied to the discharge of dredged material subject to 404 of the CWA and associated with upland disposal sites.

Because the effluent being discharged into the Cooper River from the existing Confined Disposal Facilities (CDFs) is the primary aspect of the project subject to Section 404 of the CWA (a separate, supplemental analysis has been conducted for the SC DNR Nearshore Reef Rock Placement in Appendix M2), the draft Guideline's LEDPA analysis contained herein focuses on practicable alternatives to the proposed project's discharge of dredged material effluent from these disposal sites Information from the Draft EIS is incorporated extensively into this draft Guidelines evaluation both by reference and by direct use of information contained therein.

2.0 PROJECT DESCRIPTION.

2.1 Project Location. The Charleston Harbor Federal Navigation Channel is located in Charleston Harbor, South Carolina, which lies approximately midway along the South Carolina coastline. It is approximately 140 statute miles southwest of the entrance to Cape Fear River, North Carolina and 75 statute miles northeast of the Savannah River. Figure 1 depicts the Charleston Harbor and adjacent area.

The harbor covers an area of approximately 14 square miles and is formed by the confluence of the Ashley, Cooper, and Wando Rivers. The City of Charleston is located to the west of the harbor and on Daniel Island, the City of North Charleston borders the harbor on the northwest, James and Morris Island are located to the south, Mt. Pleasant and Sullivan’s Island are located to the north and the Atlantic Ocean is east of the harbor. The majority of upland areas around Charleston Harbor are composed of residential, commercial, and industrial development. Docking and maintenance facilities of the harbor are concentrated along the west shore of the Cooper River extending from Battery Point of the peninsular city to the mouth of Goose Creek.

The Cooper River has its origin at the confluence of its East and West Branches (locally termed "The Tee") from which it flows 32 miles southward to its outlet in Charleston Harbor. The east and west branches of the Cooper River extend some 20 miles inland in a northward direction to Ferguson Swamp.

The Ashley River originates in the coastal plain and flows into the western part of Charleston Harbor. Areas of the river are bordered by historic plantations, but a large portion of the Ashley River Basin is now occupied by residential and commercial development.

The Wando River originates in the coastal plain and flows into the eastern part of Charleston Harbor. Portions of the lower Wando River are bordered by marsh which changes to woodland in the upper reaches of the river. Development along the Wando River has increased over the years with the completion of the interstate highway system. Currently, residences and subdivisions are present along stretches of the river as well as a shipyard and the State Port Authority's Wando River Terminal.

2.2 General Description-Existing Project. Charleston Harbor is divided into three distinct areas called the Upper Harbor, the Lower Harbor and the Entrance Channel (Figure 1). The Upper Harbor includes the reaches from Ordinance Reach to Daniel Island Reach, including Shipyard River. The Lower Harbor includes the reaches from Myers Bend to Mt Pleasant Range. The Entrance channel extends from the end of Mt. Pleasant Range to the 47-foot ocean contour.

The existing Federal navigational project includes a 17-mile long, 47-foot deep, 800-foot wide entrance channel extending from the 47-foot ocean contour to the entrance of the harbor between Sullivan's Island and Morris Island. The 800-foot wide channel is flanked on either side by 100-foot wide wings at a depth of 42 feet. At the entrance to the harbor, the channel transitions to a depth of 45 feet with a varying width of 500 feet to 900 feet and extends approximately 15.5 miles up the Cooper River to the South Carolina State Ports Authority (SCSPA) North Charleston Terminal. An additional 2.08 mile long, 45-foot deep, 400-foot wide channel extends up the Wando River to the SCSPA Wando Welch Terminal. In addition to SCSPA, there are several other private terminals operating in Charleston Harbor.

The mean and spring tidal ranges in the entrance channel are 5.1 feet and 5.9 feet, respectively. The depths vary widely due to shoaling and other natural processes. Rapid shoaling occurs in certain reaches: Lower Town Creek Reach (and Turning Basin), Drum Island Reach, Wando River Turning Basin, Shipyard River, Daniel Island Reach, Ordnance Reach, and Ordnance Reach Turning Basin. Other reaches shoal less rapidly. The sediment in the Charleston Harbor reaches where maintenance dredging occurs are predominately fine-grained sediments except for entrance channel materials which are expected to contain more sand. Future maintenance dredging quantities for Charleston Harbor are expected to be similar to those recorded during the last approximately 15 years. A post improvement shoaling analysis has not yet been completed.

Maintenance Dredging: The anticipated average annual maintenance dredging needs from the Charleston Harbor federal navigation channels are approximately 2,200,000 cubic yards. About 1,360,000 cubic yards of this total currently goes to the Charleston Ocean Dredged Material Disposal Site (ODMDS). The Charleston Harbor channel is presently maintained to -45 feet (47 feet for the ocean entrance channel) below MLLW.

Allowable Advance Maintenance Dredging and Overdepth Dredging: Most of the Charleston Harbor project is presently maintained to a project depth of 45 feet plus 2 feet of advanced maintenance and up to 2 feet of allowable (paid) overdepth. However, due to higher shoaling rates, portions of the following reaches are maintained to either 45 feet plus 4 feet of advance maintenance and 2 feet of allowable overdepth (45+4+2) or 45 feet plus 6 feet of advance maintenance and 2 feet of allowable overdepth (45+6+2): Ordnance Reach and Ordnance Reach Turning Basin, Lower Wando River, Wando Turning Basin, and Lower Town Creek Reach (45+4+2), and Drum Island Reach (45+6+2). The additional

advance maintenance enables Charleston Harbor to be maintained on 12-18 month frequency.

Dredging Methods: Maintenance dredging is typically performed by a combination mechanical excavating and hopper dredging in the Lower Harbor and Entrance Channel and by pipeline dredge in the Upper Harbor. A more detailed description of dredging methods is found in Section 4.2.3 of the DEIS.

Upland Disposal Sites: The six confined upland disposal sites include: Yellow House Creek, Joint Base Charleston, Clouter Creek, Daniel Island, Drum Island, and Morris Island (See Figure 2-13). Together, these sites cover over 3000 acres. The containment dikes for these facilities are maintained and improved to increase their storage capacity, as needed. Currently, only the Clouter Creek Disposal Areas is actively used for the federal project.

Ocean Disposal: The existing four square mile Charleston ODMDS. It is one of the most active, frequently used sites in the South Atlantic. The general area has been used for dredged material disposal activities since 1896 and was last configured in 1995 to avoid sensitive live bottom habitat. It is located approximately 3 miles south of the Entrance Channel and includes an L-shaped berm on the western side to prevent migration of material from the site. It originally had an estimated capacity of 77.4 million cubic yards. As of 2009 the remaining capacity was estimated to be 68% utilized. The need for additional capacity is being addressed concurrently with this feasibility study.

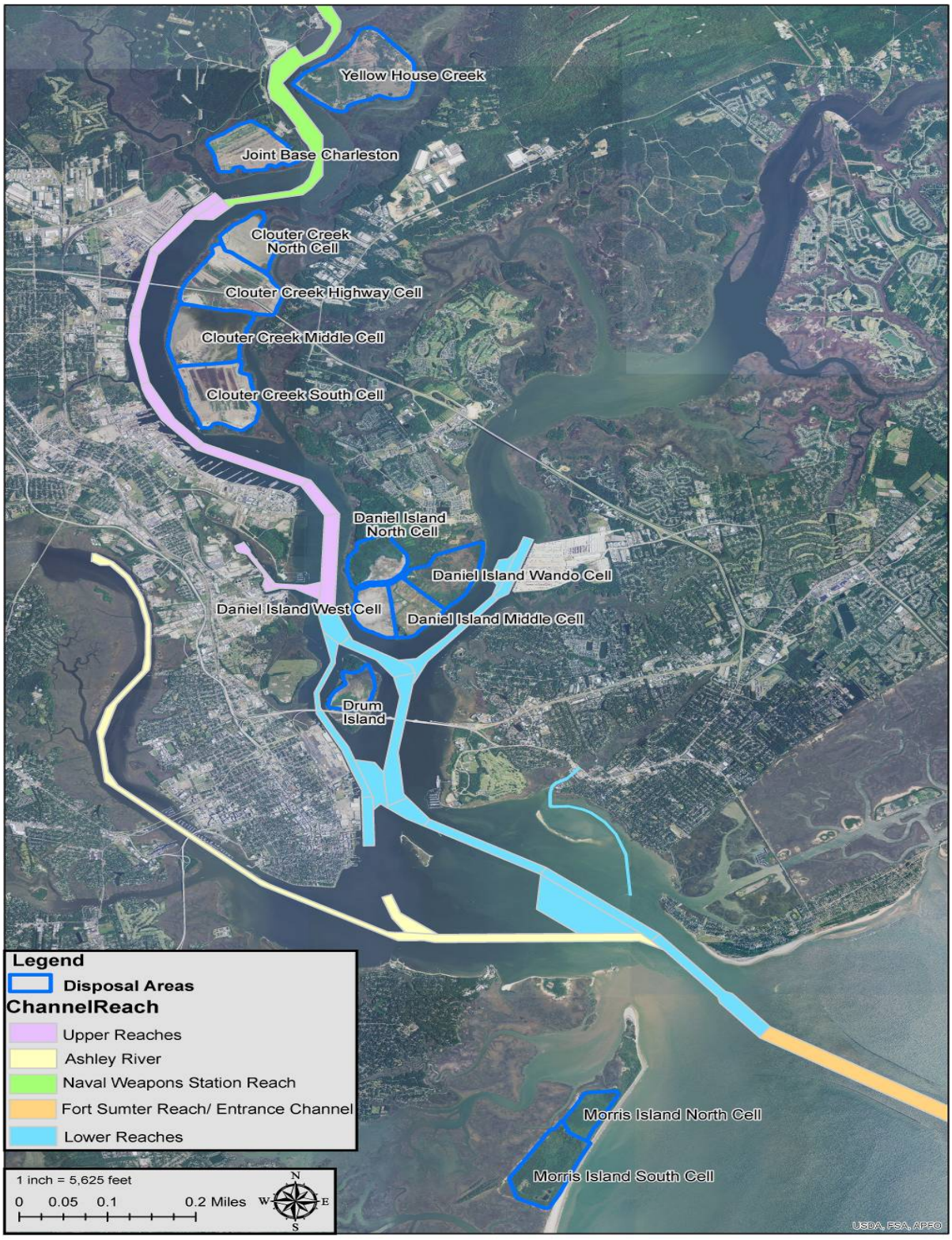


Figure 1. Charleston Harbor Overview

Figure 2. Shipyard River Overview

2.3 Post 45 Project Description (Charleston Harbor Improvements). The Post 45 Project would involve various construction efforts that would require the discharge of dredged or fill material into waters of the United States. The USACE, Charleston District developed and evaluated six channel deepening alternatives (48 foot depth/47 foot depth, 48 foot depth /48 foot depth, 50 foot depth /47 foot depth, 50 foot depth /48 foot depth, 52 foot depth /47 foot depth, and 52 foot depth /48 foot depth), in addition to the No Action Alternative. Each depth alternative is environmentally acceptable. A more detailed description of these alternatives is found in Section 3.0 of the draft FR/EIS.

The 50/48-foot depth alternative is currently identified as the National Economic Development (NED) Plan, which is the plan that maximizes net economic benefits to the Nation. The 52/48-foot depth alternative is the Locally Preferred Plan (LPP) by the SCSPA. Under current Federal planning policy, the NED plan would be recommended for implementation unless there are overriding considerations that favor recommendation of another plan. The 52/48-foot depth LPP alternative would provide additional economic benefits over the NED plan. A more detailed discussion of these depth alternatives is found in Section 4.0 in the draft FR/EIS. Benefits that would accrue from the deepening of Charleston Harbor include reductions in light loading of vessels and vessel delays, enabling shippers to use the larger, more efficient vessels without or with less restriction. The economic benefits increase with each additional depth increment of channel deepening. Environmental impacts associated with all of the depth alternatives are discussed in detail in Section 5.0 of the draft FR/EIS. The 52/48-foot depth LPP

alternative is the selected plan.

The recommended LPP (-52/48 depth) plan contains the following navigation improvements:

1. Deepen the existing entrance channel from a 47-foot project depth to a 54-foot depth over the existing 800-foot bottom width while maintaining the existing stepped 1,000-foot width at a depth of 49 feet; in the entrance channel, the upper section of the channel bottom narrows from 1,000 feet to about 944 feet.

2. Extend the entrance channel approximately three miles seaward from the existing location to the 54-foot project depth contour;

3. Deepen the inner harbor from an existing depth of 45 feet to 52 feet to the container facility on the Wando River and the new SCSPA Navy Base Terminal on the Cooper River and to 48 feet for the reaches above that terminal to the container facility in North Charleston over varying expanded bottom widths ranging from 400 to 1800 feet;

4. Deepen and widen to authorized depths the existing turning basins at the Wando Welch and the new SCSPA Navy Base Terminal to accommodate post Panamax generation 2 and 3 container ships; deepen and widen to authorized depths the North Charleston Terminal turning basin to accommodate post Panamax generation 2 container ships;

5. Place dredged material at the existing upland confined disposal facilities at Clouter Creek and/or Daniel Island for the upper harbor reaches and at the ODMDS for material from the lower harbor and the entrance channel;

6. Raise dikes within the footprint of the existing upland confined disposal facilities at Clouter Creek, Yellow House Creek, and/or Daniel Island to accommodate new work and increased maintenance material;

7. Expand the existing ODMDS to provide increased capacity for new work and maintenance material

Figure 3 depicts the locations of the proposed construction activities and channel features. New work material from the LPP channel deepening and widening would be distributed among the Charleston Harbor ODMDS, and upland confined disposal areas approximately as shown in Table 1.

Figure 3. Locations of the proposed construction activities and channel features.

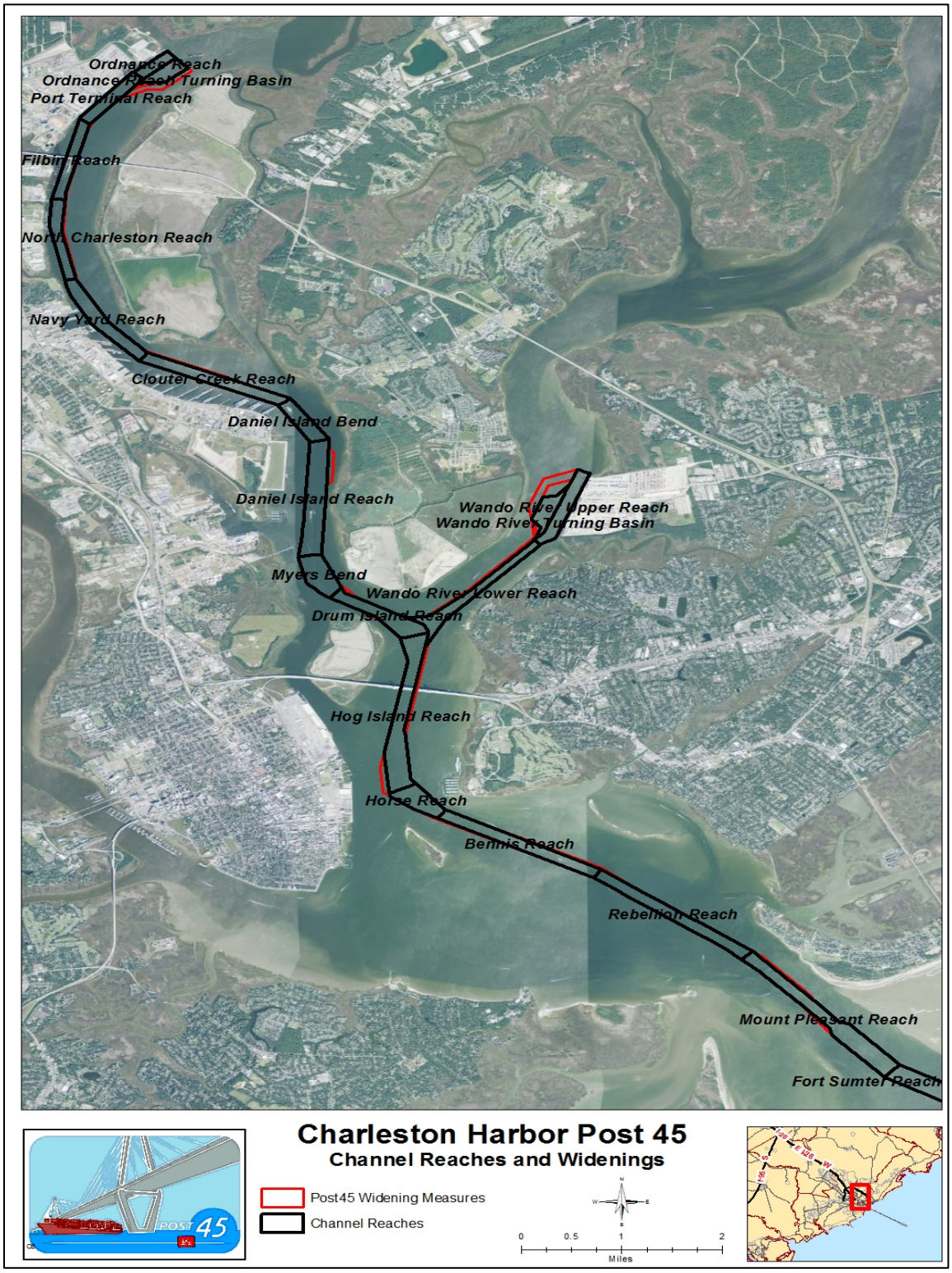


Table 1. New work material from Charleston Post 45 project channel deepening and widening distributed between the Charleston Harbor ODMDS, and upland confined disposal areas (CDFs)

52'/48' Project with Max Wideners						
Channel Reach	Dredge Plant Type	# of Dredges	Estimated # of transits	Placement Area	Deepening Dredge Quantity in Cubic Yards (CY)	Duration (Months)
Fort Sumter Reach EC1	Large Hopper	1	524	ODMDS	2,357,022	4.18
Fort Sumter Reach EC1	Medium Hopper	3	1,571	ODMDS	3,928,371	3.93
Fort Sumter Reach EC1	Rock cutter	1	378	ODMDS Berm	2,266,766	7.49
Fort Sumter Reach EC1	Rock cutter	1	10	DNR Site	60,000	0.24
Fort Sumter Reach EC1	Rock cutter	1	70	Reef Placement	420,000	1.60
Ft. Sumter - Reach EC1	Clamshell with bucket	1	110	ODMDS Berm	660,000	6.62
Ft. Sumter - Reach EC1	Clamshell w/ rock bucket	1	60	Mitigation Site	360,000	4.05
Ft. Sumter - Reach EC1	Clamshell w/ rock bucket	1	30	DNR Site	180,000	2.02
Fort Sumter Reach EC2	Large Hopper	1	432	ODMDS	1,943,512	3.90
Fort Sumter Reach EC2	Medium Hopper	3	1,166	ODMDS	2,915,267	3.30
Fort Sumter Reach EC2	Rock cutter	1	557	ODMDS Berm	3,346,872	12.74
Fort Sumter Reach EC2	Rock cutter	1	70	Reef Placement	420,000	1.60
Fort Sumter Reach EC2	Clamshell w/ rock bucket	1	180	Reef Placement	1,080,000	11.18
Mount Pleasant Reach	Clamshell	1	140	ODMDS	840,083	1.52
Rebellion Reach	Clamshell	1	180	ODMDS	1,081,341	1.96
Bennis Reach	Clamshell	2	324	ODMDS	1,942,858	2.80
Horse Reach	Clamshell	2	59	ODMDS	350,996	0.53
Hog Island Reach	Clamshell	2	352	ODMDS	2,109,994	3.15
Wando River Lower Reach	Clamshell	2	295	ODMDS	1,769,070	2.55
Wando River Upper Reach	Clamshell	2	106	ODMDS	636,251	1.05
Wando River Turning Basin	Clamshell	2	547	ODMDS	3,284,633	4.52
Segment 1 Total					**31,953,036**	**80.94**
Drum Island Reach	Clamshell	2	153	ODMDS	917,473	1.45
Myers Bend	Clamshell	2	142	ODMDS	853,689	1.28
Daniel Island Reach	Pipeline	2	N/A	Daniel Island	2,211,957	2.17
Segment 2 Total					**3,983,119**	**4.90**
Daniel Island Bend	Pipeline	2	N/A	Daniel Island	74,551	0.28
Clouter Creek Reach	Pipeline	2	N/A	Daniel Island	583,150	1.23
Navy Yard Reach	Pipeline	2	N/A	Clouter Creek	358,816	0.74
North Charleston Reach	Pipeline	2	N/A	Clouter Creek	532,693	0.61
Filbin Creek Reach	Pipeline	2	N/A	Yellowhouse	405,420	0.75
Filbin/Port Terminal Intersect	Pipeline	2	N/A	Yellowhouse	31,692	0.08
Port Terminal Reach	Pipeline	2	N/A	Yellowhouse	160,376	0.30
Ordnance Reach	Pipeline	2	N/A	Yellowhouse	118,091	0.33
Ordnance Reach Turning Basin	Pipeline	2	N/A	Yellowhouse	1,549,313	1.70
Segment 3 Total					**3,814,102**	**5.99**
Total Construction					**39,750,257**	**84.05**

As indicated in the project description and in Table 1, above the new work sediment disposal placement areas for the Charleston Upper Harbor will be the following upland Confined Disposal Facilities (CDF's); Yellowhouse, Clouter Creek, and Daniel Island (see Figure 1). New work sediment disposal for both the Lower Harbor and Entrance Channels will be the ODMDS.

Additionally, Table 2, below provides the shoaling rate, placement areas, dredge type, estimated maintenance dredging frequency, quantities, and disposal locations of the deepened Charleston Harbor Post 45 Project.

Table 2. O&M Quantities and Placement Areas for 50 years

Channel Reach	Shoaling Rate in CY/year	Placement Area (PA)	Dredge Type	Dredge Cycle (months)	Estimated Number of Cycles in 50 years	Quantity per Cycle (CY)	Total O&M Quantity in 50 years (CY)
Fort Sumter Reach/Entrance Channel	519,000	ODMDS	Hopper	24	25	1,038,000	25,950,000
Mount Pleasant Reach	0	ODMDS	Clamshell	15	40	0	0
Rebellion Reach	923	ODMDS	Clamshell	15	40	1,154	46,150
Bennis Reach	37,264	ODMDS	Clamshell	15	40	46,580	1,863,200
Horse Reach	16,035	ODMDS	Clamshell	15	40	20,044	801,750
Hog Island Reach	179,838	ODMDS	Clamshell	15	40	224,798	8,991,900
Wando River Lower Reach	69,984	ODMDS	Clamshell	15	40	87,480	3,499,200
Wando River Upper Reach	101,985	ODMDS	Clamshell	15	40	127,481	5,099,250
Wando River Turning Basin	263,097	ODMDS	Clamshell	15	40	328,871	13,154,850
Drum Island Reach	131,287	ODMDS	Clamshell	15	40	164,109	6,564,350
Myers Bend	55,119	ODMDS	Clamshell	15	40	68,899	2,755,950
ODMDS Total	**1,374,532**						**68,726,600**
Daniel Island Reach	231,652	Clouter Creek	Cutterhead	19	32	366,782	11,582,600
Daniel Island Bend	10,497	Clouter Creek	Cutterhead	19	32	16,620	524,850
Clouter Creek Reach	33,501	Clouter Creek	Cutterhead	19	32	53,043	1,675,050
Navy Yard Reach	21,520	Clouter Creek	Cutterhead	19	32	34,073	1,076,000
North Charleston Reach	5,104	Clouter Creek	Cutterhead	19	32	8,081	255,200
Filbin Creek Reach	10,742	Clouter Creek	Cutterhead	19	32	17,008	537,100
Filbin/Port Terminal Intersect		Clouter Creek	Cutterhead	19	32	0	0
Port Terminal Reach	14,581	Clouter Creek	Cutterhead	19	32	23,087	729,050
Ordnance Reach	166,433	Clouter Creek	Cutterhead	19	32	263,519	8,321,650
Ordnance Reach Turning Basin	532,713	Clouter Creek	Cutterhead	19	32	843,462	26,635,650
Upland Disposal Areas	**1,026,743**						**51,337,150**

3.0 GENERAL DESCRIPTION OF DREDGED MATERIAL

3.1 Sediment Testing Overview. Evaluation of dredged material for inland disposal under the Clean Water Act (CWA) relies on the use of physical, chemical, and/or biological tests to determine acceptability of material to be disposed. Testing is conducted in order to assist in making factual determinations regarding the effect of the discharge on the aquatic ecosystem, and in determining whether

the discharge will comply with the 404(b)(l) Guidelines.

The Inland Testing Manual (USEPA/USACE 1998) is national guidance developed by the Corps and EPA which provides best available methods for this CWA evaluation and utilizes a tiered approach in making determinations.

The sediment testing outline in the paragraphs which follow: Tier I (review of results from prior physical, chemical, and biological tests of the proposed dredged material or other information regarding potential contaminants); Tier II (water quality criteria compliance); and Tier III testing (Tier III tests include (1) determination of water column toxicity and (2) assessment of contaminant toxicity and bioaccumulation from the material to be dredged).

Evaluation of Existing Information (Tier I)

The following environmental documents address aspects of the Charleston Harbor dredging program. These documents indicate the environmental acceptability of dredging and dredged material disposal methods for the proposed Charleston Harbor maintenance and improvements.

USACE. *Results of Bioassay Evaluation of Charleston Harbor Sediments, C1-C13*. April 1979.

SC State Ports Authority. *Results of Bioassay Evaluations of Sediments from the Wando River*. April 1979.

USACE. *Results of Bioassay Evaluation of Charleston Harbor Sediments, C14-C17*. April 1979.

USACE. *Chemical Analyses of Sediment from Five Locations in Charleston Harbor and Tissues Exposed to the Sediment*. August 1988.

SC State Ports Authority. *Results of Bioassay Evaluations on Sediments from the Wando Port Terminal Expansion Project.* April 1991.

USACE. *Ecological Evaluation of Proposed Dredged Material from Charleston Harbor.* October 1996.

USACE. *Ecological Evaluation of Proposed Dredged Material from the Charleston Harbor Entrance Channel.* October 1997.

USACE. *Charleston District Report, Charleston Harbor Navigation Project: Lower Town Creek/Cooper River Section 103 Testing and Evaluation.* December 2004.

USACE. *Section 103 Evaluation of Dredged Material Proposed for Ocean Disposal, Charleston Lower Harbor and Entrance Channel, Charleston, South Carolina.* September 2010.

Charleston Harbor sediments were sampled and chemically tested in 1994 and 1996, and results are discussed in the following documents:

Sediment Borings and Sampling Charleston Harbor, Cooper River, Charleston, South Carolina. October 1994.

Sediment Boring and Sediment Testing, Daniel Island Turning Basin, Charleston Harbor, South Carolina. February 1996.

Numerous sediment sampling activities have taken place for permit actions in the Charleston Harbor Area including (but not limited to):

- Allied Terminals 1998 (Ports-Permit)
- Metal Trades 1997 (Ports-Permit)
- Pier Sierra Metal Trades 1997 (Ports-Permit)
- Albemarle Point DA 1997 (Ports-Permit)
- Maybank 2000 (Ports-Permit)
- Naval Complex 1999 (Ports-Permit) Detyens Shipyard 1997 (Ports-Permit)
- Union Pier 2003 (Ports-Permit)
- Shipyard Creek 1999 (Ports-Permit)
- Texaco 1999 (Ports-Permit)
- Naval Weapons Station 1998 (Ports-Permit)
- Pier Quebec 2012 (FLETC-Permit)
- Pier Papa 2011 (USCG Permit)
- Tradd Street Pier 2011
- MSDDC 2011 (Permit)

The previously listed reports contain results of chemical and, in some cases, biological (bioassay and bioaccumulation) analyses performed in accordance with the testing guidance applicable when the tests were performed.

Additionally, a query results from the U.S. Coast Guard Pollution Incident Reporting System. Between January 1, 2009 and September 2102 approximately 360 incidents in the Charleston Harbor Federal Navigation Project vicinity were reported in the U.S. Coast Guard Incident Reporting System. These were mostly minor oil and fuel spills and similar events.

Tier II and Tier III Evaluations

Based on the Tier I (existing information) review including, the physical characteristics, the proximity of the dredged materials to urban and industrial areas, and the information from previous sediment evaluations, the Charleston Harbor dredged materials proposed for discharge require testing to determine compliance with Section 404 Guidelines.

The Tier II analysis and results are described below:

Charleston Harbor sediment samples and site water taken from the Upper Harbor, Lower Harbor and Entrance Channels were collected from October 20 through November 19, 2012 (USACE 2013a) for chemical and biological evaluations. Sample locations are summarized in Table 3. Sample locations are shown in Figures 4-11, which is found in Appendix A.

The entire Charleston Harbor area was sampled. Only Upper Harbor locations, addressed in this evaluation of the proposed discharge into CDFs are provided here. Other harbor location samples are being evaluated for ocean disposal pursuant to the Marine Protection, Research and Sanctuaries Act. Bioaccumulation test were also conducted using exposures to test sediments. These data are not reported here since the contaminant pathway of the discharge would be from a CDF rather than open water placement.

The field sampling occurred between October 20 and November 19, 2014 and consisted of sediment and water collection for physical, chemical, and toxicological analysis. Five sediment subsamples were taken by vibracore from within a specified area (termed a dredging unit) were dredging would occur. The

subsamples were composited and homogenized to create one composite sample for each area.

All sediment samples from the Charleston Upper Harbor were analyzed for tests listed in Table 4, below.

Table 3. Description of samples taken to evaluate Charleston Upper Harbor sediments pursuant to Section 404 of the CWA. See Figures 4-11 in Appendix A for sample locations.

DU	Sample Locations	Sample ID
9	Daniel Island Reach	DANI12
10	Daniel Island Bend, Clouter Creek Reach, & Clouter Creek Reach Widener	CCRK12
11	Navy Yard Reach & North Charleston Reach	NYNC12*
12	Port Terminal Reach, Filbin Creek Reach, & Ordnance Reach	PTFC12
13	Ordnance Reach Turning Basin & Ordnance Reach Turning Basin Widener	ORDT12
17	Daniel Island Reach Widener	DANW12
19	North Charleston Reach & Filbin Creek Reach Wideners	NCW12

* Site water collected at this location.

Table 4. Summary of Laboratory Analysis and Bioassay Test Species (USACE 2014).

SEDIMENT PHYSICAL ANALYSES (all subsamples and composite samples):

- Hydrometer grain size
- Total solids/water content
- Specific gravity
- Atterberg Limits (composite samples only)

SEDIMENT CHEMICAL ANALYSES (composite samples only):

- Metals
- Ammonia
- Total petroleum hydrocarbons (TPH)
- Organotins
- Total organic carbon (TOC)
- Polynuclear aromatic hydrocarbons (PAHs)
- Organochlorine pesticides
- Polychlorinated biphenyl (PCB) congeners
- PCB Aroclors
- Polybrominated diphenyl ethers (PBDEs)
- Dioxins

ELUTRIATES AND SITE WATER ANALYSES:

- Metals
- Ammonia (as total nitrogen)
- PAHs
- Organochlorine pesticides

BIOASSAY TESTS (composite samples only):

Water Column (Suspended Particulate Phase) toxicity tests using three species:

1. Fish: *Menidia beryllina* (inland silverside) (96-hour test duration)
2. Mysid crustacean: *Americamysis bahia* (opossum shrimp)(96-hour duration)
3. Bivalve mollusk: larval *Mytilus galloprovincialis* (Mediterranean mussel)(48-hour test duration)

Whole Sediment (Solid Phase) Bioassay 10-day toxicity tests using two species:

1. Infaunal amphipod crustacean: *Ampelisca abdita*
2. Epifaunal polychaete worm: *Neanthes* arenaceodentata

Sediment Results

Sediment Physical Results (Table 5): Samples DANW12, NYNC12, and PTFC12 were comprised primarily of silt and clay and were classified as clay of high plasticity, elastic silt (CH). Samples DANI12, NCW12, CCRK12, and ORDT12 were comprised primarily of sand (>50% sand) and were classified as either clayey sand (SC) or silty sand (SM).

Sediment Chemical Results (Tables 6 to 9): Sediment chemistry analyses were performed on the composite sample. Sediment analytical results were compared to applicable published sediment screening values. Comparisons were provided for reference only, not for regulatory decisions. Published screening benchmarks include the apparent effects threshold (AET) effects range-low (ERL), and threshold effects level (TEL) soil screening levels.

Metals:

Samples with concentrations exceeding the TEL and ERL are summarized below.

Arsenic – DANW12, PTFC12, ORDT12

Chromium – NYNC12, NCW12, PTFC12

Nickel – DANI12, DANW12, NYNC12, NCW12, PTFC12

Organotins:

Total organotins (as tin) ranged from 2.5 µg/kg at PTFC12 to 0.60 µg/kg at DANI12. There are no published sediment screening criteria (i.e., TEL, ERL) for organotins.

Pesticides:

None of the pesticides tested were detected above the MRL in any sediment sample. No pesticides were present above the sediment screening criteria (i.e., TEL, ERL).

Table 5. Grain Size Distribution for Composited Samples.

Sample ID	Grain Size Distribution[1] (percent by weight)				
	Gravel	Sand	Silt	Clay	USCS[2]
DANW12	0	40.4	28.3	31.3	CH
DANI12	0	50.6	13.3	36.1	SC
NCW12	0	50.1	19.4	30.5	SM
CCRK12	0.3	52.2	18.3	29.2	SC
NYNC12	0	34	32.3	33.7	CH
PTFC12	0	32.2	29.4	38.4	CH
ORDT12	0.2	55.7	12.1	32	SC

[1] Particle sizes: gravel ≥4.750 mm, sand = 0.075–4.749 mm, silt & clay <0.075 mm.

[2] CH = Clay of high plasticity, elastic silt; MH = Silt of high plasticity, elastic silt; SC = Clayey sand; SM = Silty sand; SP = Poorly-graded sand

.

Table 6. Summary of Results for Metals in Sediments

Sample ID	Analyte Concentrations (mg/kg)												
	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
DANI12	0.155	5.78	0.550	0.414	42.5	9.16	5.300	0.020	**19.7**	1.60	0.074	0.187	43.4
DANW12	0.124	**7.52**	0.944	0.591	45.6	7.16	9.290	0.023	**17.3**	1.31	0.105	0.291	47.7
NYNC12	0.236	6.93	0.548	0.423	**57.0**	10.9	4.530	0.019	**22.9**	2.18	0.081	0.173	48.5
NCW12	0.404	6.95	0.538	0.493	**59.4**	11.4	3.590	0.023	**23.5**	2.25	0.079	0.183	48.4
CCRK12	0.122	7.14	0.492	0.294	33.7	8.29	5.010	0.014	15.3	1.35	0.069	0.169	37.2
PTFC12	0.295	**8.48**	0.605	0.438	**61.6**	12.5	6.630	0.020	**24.8**	1.97	0.086	0.182	53.8
ORDT12	0.041	6.99	0.597	0.089	19.7	4.98	7.270	0.012	6.29	0.24	0.036	0.093	25.3
ORDT12 (field split)	0.119	**7.27**	0.728	0.108	20.5	5.32	7.380	0.016	6.87	0.39	0.063	0.125	26.5
TEL	x	7.24	x	0.676	52.3	18.7	30.24	0.13	15.9	x	0.73	x	124
ERL	x	8.2	x	1.2	81	34	46.7	0.15	20.9	x	1	x	150

Bolded numbers indicate a value that exceeds the TEL and/or the ERL.

Table 7. Summary of Results for TPH in Sediments

Sample ID	Analyte Concentrations
	TPH (mg/kg)
DANI12	<140
DANW12	<160
NYNC12	<150
NCW12	150
CCRK12	<140
PTFC12	<150
ORDT12	<150

Table 8. Summary of Results for PAHs in Sediments

Sample ID	Analyte Concentrations (µg/kg)		
	Total LMW PAHs	Total HMW PAHs	Total PAHs
DANI12	18	72	126
DANW12	5.4	6.6	16
NYNC12	13	124	191
NCW12	14	94	148
CCRK12	13	64	110
PTFC12	14	95	155
ORDT12	7.5	40	68
ORDT12 (field split)	8.2	46	77
TEL	312	655	1684
ERL	552	1700	4022

Table 9. Summary of Results for Dioxins in Sediments

Sample ID	Total TEQ (ng/kg)
DANI12	**2.802**
DANW12	**5.943**
NYNC12	**3.198**
NCW12	**2.714**
CCRK12	**2.368**
PTFC12	**2.767**
ORDT12	**3.658**
ORDT12 (field split)	**2.445**
TEL	0.85
AET	3.6

PCBs and Aroclors
Of the 26 PCB congeners and seven aroclors tested, none were detected above the MRL in any sediment sample. Results for total EPA Region 4 PCBs and total NOAA PCBs did not exceed the sediment screening criteria (i.e., TEL, ERL) in any sample.

Dioxins and Furans
The total TEQ for all samples exceeded the TEL and/or AET. TEQ ranged from 2.368 ng/kg in sample CCRK12 to 5.943 ng/kg in sample DANW12.

TPH
Total petroleum hydrocarbons (TPH) was detected above method reporting limits (MRL) only in NCW12 which was estimated at 150 mg/kg (just below the MRL of 170 mg/kg) in the composite sample.

PAHS
No PAH analyte concentration exceeded the sediment screening criteria TEL or ERL.

Elutriate and Water Results

Analyses were performed on the composite elutriate samples and the site water sample. Results for the elutriate sample are presented as concentrations of the total fraction (dissolved plus suspended particulate portions) and the dissolved fraction.

Metals (Table 10):
No metals were detected in concentrations greater than the MRL or CMC in any elutriate or site water sample. Mercury and selenium were not detected above the MRL in any sample. Most other metals were detected above the MRL in elutriate and water samples.

Pesticides
No pesticides were detected in concentrations greater than the MRL or CMC in any elutriate or site water sample.

PAHs (Table 11)
Several samples had PAHs detected in concentrations greater than the MRL. All of the upper harbor/wideners elutriate and site water samples had at least one and up to six PAHs detected in concentrations above the MRL. There are no published CMCs for PAHs. Results for Total LMW PAHs, Total HMW PAHs, and Total PAHs are summarized below. Non-detect (ND) results used the MDL for calculating the Total LMW PAHs, Total HMW PAHs, and Total PAHs.

Water Column Bioassays (Table 12)

Water column tests were performed with the mysid crustacean *Americamysis bahia*, the atherinoid fish *Menidia beryllina*, and larvae of the bivalve mollusk *Mytilus galloprovincialis*.

Ammonia concentrations in the sediment were sufficiently elevated to predict ammonia-related impacts in the elutriate tests with larval mussels. Based on this observation, elutriates were prepared with ammonia-reduced sediments that were tested concurrent to the standard elutriate preparations. Estimated LC_{50}/EC_{50} values were greater than 100% for all samples following ammonia reduction. Based on the results of the ammonia-reduction procedures, toxicity appeared to be related to ammonia in the elutriate preparations.

Table 10. Summary of Results for Metals in Elutriates and Site Waters

Sample ID	Analyte Concentrations (µg/L)												
	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
UHSW12*	1.110	1.96	0.0348	0.036	0.93	0.984	0.744	0.17	0.67	0.3	0.027	0.032	2.33
DANI12	0.908	5.27	0.0007	0.019	0.25	0.055	0.019	<0.02	1.15	<0.2	<0.0004	<0.002	0.34
DANW12	1.160	18.6	0.0076	0.023	0.16	0.177	0.050	<0.02	0.47	0.5	<0.004	0.002	0.24
NYNC12	1.250	3.24	0.0014	0.025	0.35	0.136	0.011	<0.02	1.75	<0.2	0.004	0.003	0.41
NCW12	1.370	2.93	0.0011	0.018	0.33	0.083	0.021	<0.02	2.35	0.5	<0.004	<0.002	0.33
CCRK12	1.520	4.95	0.0031	0.031	0.29	0.142	0.131	<0.02	2.52	0.3	0.010	0.004	0.25
PTFC12	0.968	6.44	0.0023	0.019	0.20	0.125	0.009	<0.02	0.72	<0.2	0.005	0.011	0.33
ORDT12	1.050	11.0	0.0012	0.018	0.19	0.291	0.025	<0.02	0.38	<0.2	<0.004	<0.002	0.78
CMC	X	69	x	40	1100	4.8	210	1.8	74	290	1.9	x	90

Note: * UHSW12 is the site water sample collected at NYNC12

Table 11. Summary of Results for PAHs in Elutriate and Site Waters

Sample ID	Analyte Concentrations (µg/L)		
	Total LMW PAHs	Total HMW PAHs	Total PAHs
UHSW12*	0.036	0.038	0.084
DANI12	0.058	0.0061	0.069
DANW12	0.024	0.0028	0.031
NYNC12	0.034	0.0084	0.047
NCW12	0.038	0.016	0.059
CCRK12	0.028	0.0069	0.040
PTFC12	0.044	0.0099	0.059
ORDT12	0.053	0.018	0.079

Note: * UHSW12 is the site water sample collected at NYNC12

Table 12. Summary of the Water Column Bioassay Results.

		Mysid *A. Bahia*		Fish *M. berylina*		Bivalve Larvae *M. galloprovincialis*		Ammonia Reduced *M. galloprovincialis*	
DU	Sample ID	Survival Statistically < Control	LC_{50}	Survival Statistically < Control	LC_{50}	Survival Statistically < Control	EC_{50}	Survival Statistically < Control	EC_{50}
9	DANI12	NO	>100%	YES	>100%	YES	57.0%	NO	>100%
17	DANW12	NO	>100%	YES	>100%	YES	42.0%	NO	>100%
10	NYNC12	NO	>100%	YES	>100%	YES	68.8%	NO	>100%
11	NCW12	NO	>100%	NO	>100%	YES	69.6%	NO	>100%
19	CCRK12	NO	>100%	YES	>100%	YES	67.9%	NO	>100%
12	PTFC12	NO	>100%	YES	>100%	YES	63.1%	NO	>100%
13	ORDT12	NO	>100%	YES	94.8%	YES	35.2%	NO	>100%

Benthic Bioassays (Table 13).

Solid phase (whole sediment) benthic bioassays were conducted using the amphipod crustacean *Ampelisca abdita* and the polychaete worm *Neanthes arenaceodent*ata . These were 10-day benthic tests. These data indicate that the sediment tested was not toxic to sensitive test organisms.

Mean survival within the *A. abdita* benthic tests ranged from 86% to 94%. Survival within all samples was greater than 80% and not statistically different than the reference.

Mean survival within the *N. arenaceodentata* benthic tests ranged from 98% to 100%. Mortalities in the test sediments did not exceed those in the respective reference samples by more than 10% and were not statistically significantly different.

Table 13. Summary of the 10-Day Benthic Bioassays.

	Ampelisca abdita		*Neanthes arenaceodentata*	
Sample ID	**Mean Survival (%)**	**Statistically Less than Reference? (yes/no)**	**Mean Survival (%)**	**Statistically Less than Reference? (yes/no)**
Control	92		100	
RS-CH-A*	91		98	
DANI12	94	No	100	No
CCRK12	94	No	100	No
NYNC12	90	No	98	No
PTFC12	94	No	98	No
ORDT12	88	No	98	No
DANW12	86	No	98	No
NCW12	94	No	100	No

Note: * The reference sample RS-CH-A was a marine sediment collected in the nearshore Atlantic Ocean off Charleston Harbor .

A summary of the sediment evaluation conducted is included as Table 14. In conclusion, this evaluation of sediment quality indicates: 1) disposal of the proposed dredge material will not significantly impact the environmental integrity of the proposed CDFs, and 2) the effluent from the disposal area will not represent a significant source of impact to the surrounding water quality. This conclusion applies regardless of the depth alternative ultimately selected. Therefore, the proposed dredge material from the Charleston Harbor area is suitable for disposal in the proposed CDFs.

Table 14. Charleston Post 45 Sediment Testing Summary.

					Sediment Chemistry								Solid Phase Bioassays		Water Column Bioassays							
				Elutriate Chemistry	Metals	TPH	PAHs		Organotins	PCBs	Pesticides	Dioxins	Polychaeta *N. arenaceodentata*	Amphipod *A . abdita*	Mysid *A. Bahia*		Fish *M. berylina*		Bivalve Larvae *M. galloprovincialis*		Ammonia Reduced	
DU	Dredging Unit Name	Composite Sample ID	Average Passing # 200 sieve	Exceed CMC?	>ERL or TEL	(mg/kg)	Total PAH (µg/kg)	>ERL or TEL	>MRL	>MRL	>MRL	TEQ (ng/kg)	Mean Survival (%)		Survival Statisitically < Control	LC_{50}	Survival Statistically < Control	LC_{50}	Survival Statistically < Control	EC_{50}	Survival Statistically < Control	EC_{50}
9	Daniel Island Reach	DANI12	49.6	NO	Ni	<140	126					2.80	100	94	NO	>100%	YES	>100%	YES	57.0%	NO	>100%
17	Daniel Island Reach Widener	DANW12	59.6	NO	As, Ni	<160	16					5.943	98	86	NO	>100%	YES	>100%	YES	42.0%	NO	>100%
10	Daniel Island Bend, Clouter Creek Reach, Clouter Creek Reach Widener	CCRK12	47.5	NO		<140	110					2.368	100	94	NO	>100%	YES	>100%	YES	68.8%	NO	>100%
11	Navy Yard Reach, North Charleston Reach	NYNC12	66	NO	Cr, Ni	<150	191		Tri-n-Butyltin			3.198	98	90	NO	>100%	NO	>100%	YES	69.6%	NO	>100%
19	North Charleston Reach Widener and Filbin Creek Reach Widener	NCW12	49.9	NO	Cr, Ni	150	148		Tri-n-Butyltin			2.714	100	94	NO	>100%	YES	>100%	YES	67.9%	NO	>100%
12	Port Terminal Reach, Filbin Creek Reach, Ordnance Reach	PTFC12	67.8	NO	As, Cr, Ni	<150	155		Tri-n-Butyltin			2.767	98	94	NO	>100%	YES	>100%	YES	63.1%	NO	>100%
13	Ordnance Reach Turning Basin, Ordnance Reach Turning Basin Widener	ORDT12	44.1	NO		<150	68					3.658	98	88	NO	>100%	YES	94.8%	YES	35.2%	NO	>100%
Notes	Samples were made from 5 subsamples homogenized to one composite			Analyte List: Metals Ammonia Pesticides PAHs	No entry means no exceedences			No entry means no exceedences	No entry means conc < MRL	No entry means conc < MRL	No entry means conc < MRL											

MRL - Method Reporting Limit

CMC - criteria maximum concentration

200 Sieve - 0.075 mm

TEL - threshold effects level; ERL - effects range low (Buchman, 2008)

3.2 Quantity of Sediments (Cubic Yards). The following new work dredging estimates (Table 1) for the LPP indicate the following:

The Charleston Post 45 Project LPP (52 foot/48 foot depths) Plan for the Upper Harbor channels: Approximately 2,869,658 cubic yards of sediment will dredged by hydraulic pipeline and placed in Daniel Island CDF, 891,509 cubic yards of sediment will be placed in Clouter Creek CDF, and 2,264,892 cubic yards of sediment will be placed in Yellowhourse CDF.

The Charleston Post 45 Project LPP (52 foot/48 foot depths) Plan for the Lower Harbor and Entrance Channel (including offshore mitigation sites): About 33,724,198 cubic yards of sediment will be dredged by hopper, clamshell with barge, and/or rock cutter head hydraulic pipeline dredge with barge and placed in the Charleston Harbor ODMDS.

Once the Charleston Harbor Federal navigation channels are deepened, the following operation and maintenance (O&M) quantities and placement areas (Table 2) for the 50 year project are proposed:

The Charleston Harbor Upper Harbor channels: Annually, approximately 1,026,743 cubic yards of O&M sediment will be dredged by hydraulic pipeline dredge and placed in the Daniel Island CDF, Clouter Creek CDF, and/or the Yellow House CDF.

The Charleston Harbor Lower Harbor and the Entrance Channel: About 1,534,609 cubic yards of O&M sediment will be dredged by either hopper and/or clamshell dredge annually and placed in the Charleston Harbor ODMDS.

Dredged material volumes overall for the NED Plan (50/48) and 48/48 plan alternatives would be less than for the LPP. However, for the Upper Harbor, all three alternatives (52/48, 50/48 and 48/48) would deepen to 48 feet, generating the same volume of new work and maintenance dredged material for disposal in the upland CDFs, as discussed in this analysis.

Table 15 shows the current and future capacity within the CDFs located within the Charleston Upper Harbor.

Table 15. Current and Future Capacity of the CDFs located within the Charleston Upper Harbor.

Disposal Area	Current Capacity (CY)	Capacity after 5' Dike Raise (CY)	New Work Material (CY)
Yellow House Creek DA	1.9M	6.3M	2.2M
Daniel Island DA – Wando Cell	87K	2.4M	2.2M
Daniel Island DA – Middle Cell	1.3M	4.0M	660K
Clouter Creek DA – South Cell	2.8M	6.1M	890K
TOTALS	**6.9M**	**18.8M**	**5.9M**

3.3 Source of Material. All of the dredged or fill material subject to this Section 404 (b)(1) analysis for the Charleston Harbor Post 45 project (i.e., the LPP plan) would be placed by hydraulic pipeline dredge into Daniel Island, Clouter Creek, and Yellowhouse CDF's. Only the effluent from these CDF's would be discharged back into the waters of the United States. The source of material of this effluent would emanate from the bottom sediments from the Cooper River in Charleston Harbor.

4.0. COMPLIANCE WITH THE 404(b)(1) GUIDELINES

The evaluation requirements of Section 404 of the CWA are contained in the Guidelines developed by the U.S. Environmental Protection Agency (USEPA) in conjunction with the USACE and codified in 40 CFR Part 230. Under Subpart B of the Guidelines, the USACE's evaluation of the Post 45 Project is required to address the following four tests in order to be in compliance with these guidelines.

4.1 Finding of Practicable Alternatives (40 CFR 230.10 [a])

The first compliance test of the Guidelines states that:

Except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

The Guidelines define a *practicable alternative* as one that is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" (40 CFR 230.10 [a][2]). Practicable alternatives may include activities which

do not involve a regulated discharge or discharges at other locations (40 CFR 230.10(a)(1)). Section 404(b)(2) of the CWA provides that consideration should also account for, "in any case where such guidelines under [404(b)(1)] alone would prohibit the specification of a site, ... the application additionally of the economic impact of the site on navigation and anchorage." Section 4.1 forms the basis of the USACE, Charleston District's analysis of practicable alternatives for the Guidelines evaluation. This analysis focuses on practicable alternatives to the proposed project's 404 discharge of dredged or fill material resulting from the runoff from contained upland disposal areas to be used for the disposal of Upper Harbor dredged materials. As noted above, Lower Harbor and Entrance Channel materials are to be disposed of in an EPA-approved ODMDS pursuant to the provisions and regulations of the Ocean Dumping Act (33 USC 1413).

4.1.1 Offsite Discharge Locations and Configurations.

Offsite locations were considered for the disposal of the Upper Harbor dredged material:

Ocean disposal: This alternative was considered impracticable due to the cost and logistics associated with utilizing barges large enough to transport the material offshore to the Charleston ODMDS located up to 36 miles one way from the Upper Harbor channels (i.e., Port Terminal and Ordnance Reaches).

Alternate, Existing CDFs: There are no alternate upland existing CDFs other than the ones selected (i.e., Daniel Island, Clouter Creek and Yellow House) that have the capacity for the new work and long-term sediments for the deepening of the Upper Harbor (see the Charleston Harbor DMMP (USACE 2009a). Drum Island and Morris Island CDFs are not feasible based on capacity limitations. Therefore, the Daniel Island, Clouter Creek and Yellow House CDFs were selected as the most reasonable and most cost effective alternative for disposal.

New CDFs: In lieu of pumping the material from the Upper Harbor channels to the Daniel Island, Clouter Creek and Yellow House CDFs, the District considered developing new alternate upland CDFs. The excavated material from the deepened Upper Harbor channels would be pumped to new CDFs located near the project site. However, since all existing upland areas adjacent to the project area are already developed, only the marshes and wetlands of the Cooper Rivers would be available for these new proposed CDFs, which would mean greater impacts to the aquatic ecosystem. The time required acquire the necessary real estate interests and develop new disposal sites would be logistically problematic. In addition, for civil works purposes mitigation is a construction cost, and the significant cost to mitigate the impacts to the adjacent marshes and wetlands of the Cooper River would be of concern. Due to the significant additional time and cost to the Charleston Post 45 project, and considering the need to minimize aquatic ecosystem impacts, this alternative was not considered to be a reasonable or practicable alternative.

4.1.2 Onsite Configurations

Expansion of existing CDFs: The alternative of expanding one or more of the existing CDFs was considered. The alternative would involve all of the obstacles of new CDFs in terms of greater aquatic ecosystem effects as well as prohibitive logistics and cost, though potentially to a lesser degree. However, this alternative would still involve greater environmental impact (among other things, it would not avoid special aquatic sites) and prove impracticable for the Post 45 project.

4.1.3 No Action Alternatives

No Action Alternative:
The No-Action Alternative would result in no new work dredged material from constructing deeper channels being disposed of in the identified upland CDFs. This would mean that purpose of and need for the Project would not be met. This would limit the Charleston Upper Harbor channels to their existing 45-foot depth. Because the trend to larger container ships will continue regardless of deepening, navigation efficiency and safety would be compromised. In contrast, additional channel depth in the Charleston Upper Harbor would allow current and future shippers to more fully utilize larger class vessels and would reduce anticipated future congestion. By decreasing future shipping inefficiencies in the Upper Harbor channels, safety would also be increased. Keeping the Charleston Harbor channels at their existing 45-foot depth by adopting the No Action alternative would not improve navigation efficiencies and would not improve maritime safety. Therefore, the No Action alternative for upland dredged material disposal was not considered further.

4.1.4 Least Environmentally Damaging Practicable Alternative (LEDPA):

Application of the provisions of section 230.10(a) of the Guidelines identifies use of the existing upland CDFs for Upper Harbor dredging as the LEDPA. As noted above, the activity regulated under section 404 for this project is the effluent being discharged into the Cooper River from the existing upland CDFs (i.e., Daniel Island, Clouter Creek, and Yellow House). Both the 50/48, 52/48, and 48/48 depth alternatives evaluated in the main FR/EIS would involve dredging the Upper Harbor to a 48-foot depth. Because of the availability, logistics, and cost obstacles identified above, and because of the greater aquatic ecosystem impacts of the offsite and onsite alternatives, the use of these existing upland CDFs for Upper Harbor disposal is the selected alternative. The no action alternative would not meet the Project's purpose and need, and the loss of use of these sites would have a significant negative effect on the needs of the port and navigation. Accordingly, the proposed discharge complies with the requirements of section 230.10(a) of the Guidelines.

4.2 Additional Restrictions on Discharge (40 CFR 230.10[b])

The second compliance test under the Guidelines considers specific impacts that may warrant additional restrictions on discharge. Specifically, the Guidelines state that no discharge of dredged or fill material may be permitted if it will:

1. Cause or contribute to violations of any applicable State water quality standard.

2. Violate any applicable toxic effluent standard or prohibition under Section 307 of the CWA.

3. Jeopardize the continued existence of species listed as endangered or threatened under the ESA of 1973, or result in the potential for adverse impacts (destruction or adverse modification) of a habitat which is determined by the Secretary of the Interior or Commerce to be a critical habitat under the ESA of 1973. If an exemption has been granted by the Endangered Species Committee, the terms of the exemption shall apply, in lieu of this paragraph.

4. Violate any requirement imposed by the Secretary of Commerce to protect any marine sanctuary designated under Title III of the Marine Protection, Research, and Sanctuaries Act of

1972.

The proposed use of upland CDFs, and the larger deepening effort of which it is a part, does not violate applicable State water quality standards or Section 307 prohibitions or effluent standards (see Sections 3.0 and 5.0 in this analysis and Section 5.0 of the FR/EIS for additional information supporting this determination). The proposed activity does not jeopardize the continued existence of federally listed threatened or endangered species or affect their critical habitat (see Section 5.0 in this analysis and the BATES in Appendix F of the draft FR/EIS for additional information supporting this determination). Formal consultation has been initiated with FWS and NMFS and the resulting biological opinions will be included as an appendix to the final FR/EIS. The proposed activity does not violate the requirements of a federally designated marine sanctuary (see the EFH assessment in Appendix H in the draft FR/EIS for additional information supporting this determination). Accordingly, the Charleston Post 45 Project is in compliance with the requirements of section 230.10(b) of the Guidelines.

4.3 Finding of No Significant Degradation (40 CFR 230.10[c])

The third compliance test under the Guidelines considers the potential for the proposed discharge to cause or contribute to the degradation of waters of the U.S. The Guidelines state that except as provided under Section 404(b)(2), the discharge of dredged or fill material that will cause or contribute to significant degradation of waters of the U.S. may not be authorized. The Guidelines further define the types of effects that may, either individually or collectively, contribute to the significant degradation of waters of the U.S. These include:

1. Significant adverse effects of discharge of pollutants on human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife and special aquatic sites;

2. Significant adverse effects of discharge of pollutants on life stages of aquatic wildlife and other wildlife dependent on aquatic ecosystems, to include the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and/or chemical processes;

3. Significant adverse effects of discharge of pollutants on aquatic ecosystem diversity, productivity, and stability including but not limited to the loss of fish and wildlife habitat, or the loss of the capacity of wetland to assimilate nutrients, purify water, or reduce wave energy; and

4. Significant adverse effects of discharge of pollutants on recreational, aesthetic, and/or economic values.

The proposed disposal of dredged material in the identified upland CDFs will not cause or contribute to significant degradation of waters of the United States. This finding of no significant degradation is based on the following: extensive sampling, testing and evaluation of the harbor sediments consistent with Subpart G of the Guidelines; an evaluation pursuant to Section 103 of the MPRSA (USACE 2014) (found in Appendix J of the draft FR/EIS); and, additional findings and determinations pursuant to Subparts C through F of the Guidelines, with special emphasis on the persistence and permanence of the effects (see also Section 5.0 of the draft FR/EIS for additional information supporting this determination). Accordingly, the Charleston Post 45 Project is in compliance with the requirements of section 230.10(c) of the

Guidelines.

4.4 Minimization of Potential Adverse Impacts (40 CFR 230.10[d])

The fourth compliance test under the Guidelines considers the extent to which steps have been taken to minimize potential adverse effects. The Guidelines state that, except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.

All appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem. CDFs are routinely used for both new work and maintenance dredging of the harbor. See the discussion under "Actions to minimize adverse effects (Subpart H)," below, for details regarding specific minimization measures. Accordingly, the Charleston Post 45 Project is in compliance with the requirements of section 230.10(d) of the Guidelines.

5.0 SPECIFIC CATEGORIES FOR EVALUATION UNDER THE 404(b)(1) GUIDELINES

This section covers the evaluation criteria in Subparts C – H of the Guidelines used to make the factual determinations and findings of compliance with the Guidelines.

Potential effects on physical and chemical characteristics of the aquatic ecosystem (Subpart C)

Sec. 230.20 Substrate. The substrate of the aquatic ecosystem underlies open waters of the U.S. and constitutes the surface of wetlands. It consists of organic and inorganic solid materials and includes water and other liquids or gases that fill the spaces between solid particles. The substrate to be discharged into the CDFs is composed mainly of fine-grained sediments and will be contained within the disposal basin. Suspended sediment will be allowed to settle prior to the effluent being discharged into the Cooper River. The effluent generated from the CDFs, would have no effect on the composite and/or bottom contours of the Cooper River. Therefore, the proposed discharge will have no significant adverse effects on the substrate.

Sec. 230.21 Suspended particulates/turbidity. Suspended particulates in the aquatic ecosystem consist of fine-grained mineral particles, usually smaller than medium sands, and organic particles. Suspended particulates may enter water bodies as a result of surface runoff, flooding, vegetative and planktonic breakdown, re-suspension of streambed sediments, and man's activities including dredging and filling. Particulates may remain suspended in the water column for variable periods of time as a result of such factors as water velocity, turbulent agitation of the water mass, particle shape, specific gravity, and diameter, and physical and chemical properties of particle surfaces. The extent and persistence of these adverse impacts caused by discharges depend upon the relative increase in suspended particulates above the amount occurring naturally, the duration of the higher levels, the current patterns, water level, and fluctuations present when such discharges occur, the volume, rate, and duration of the discharge, particulate deposition, and the seasonal timing of the

discharge. Suspended solids within the effluent generated from the CDFs could affect turbidity within in the Cooper River. Dredged material is placed within the CDFs and the sediments are allowed to settle out before the effluent is discharged into the river. As a result, the majority of the sediment remains within the CDFs and would not be discharged with the effluent or enter the water column. The amount of effluent that would be discharged from the CDF into the Cooper River would be insignificant compared to the volume of water currently within the waterway. Any suspended solids within the effluent would be diluted in the water column; therefore, the proposed discharge will have no significant adverse effects on suspended particulates/ turbidity.

Although sediment removed by a hopper dredge, mechanical dredge (clamshell and barge), and/or hydraulic rock cutterhead pipeline dredge with barge would be discharged into the ODMDS, pumping to overflow is a common practice when the sediments to be dredged are mostly fine grain sediment and sand, which are free of contaminants. Pumping to overflow allows the hopper dredge, mechanical dredge (clamshell and barge), and/or hydraulic rock cutterhead pipeline dredge with barge to take on the maximum load of material before it takes the material to the ODMDS. When the hopper dredge, mechanical dredge (clamshell and barge), and/or hydraulic rock cutterhead pipeline dredge with barge is inside of the 3-mile line, this overflow of dredged material from the hopper is considered a discharge of dredged material into waters of the United States. Consequently, the discharge of dredged material associated with hopper dredge overflow must be addressed using the Section 404 (b)(1) Guidelines. However, no significant water quality degradation would be expected from allowing the practice of dredging to overflow when dredging in the open ocean. The material would be mostly fine-grained sediments. The increase in suspended solids and turbidity from these dredging operations would be temporary in nature and be considered ***de minimus***.

Sec. 230.22 Water. Water is the part of the aquatic ecosystem in which organic and inorganic constituents are dissolved and suspended. It constitutes part of the liquid phase and is contained by the substrate. Water forms part of a dynamic aquatic life-supporting system. Water clarity, nutrients and chemical content, physical and biological content, dissolved gas levels, pH, and temperature contribute to its life-sustaining capabilities. Suspended solids within the effluent generated from the CDFs could affect turbidity in the Cooper River. Dredged material is placed within the CDFs and the sediments are allowed to settle out before the effluent is discharged into the harbor. As a result, the majority of the sediment remains within the CDFs and would not be discharged from the CDFs with the effluent or enter the water column. The Upper Harbor channels are traditionally navigable water with strong currents and tidal flushing. The amount of effluent that would be discharged into the harbor would be insignificant compared to the volume of water currently within the waterbody. Any suspended solids within the effluent would be diluted in the water column; therefore, the proposed discharge will have no significant adverse effects on water.

Sec. 230.23 Current patterns and water circulation. Current patterns and water circulation are the physical movements of water in the aquatic ecosystem. Currents and circulation respond to natural forces as modified by basin shape and cover, physical and chemical characteristics of water strata and masses, and energy dissipating factors. The Cooper River is traditionally navigable water with strong currents and tidal influence. The amount of effluent that would be discharged into these waters would be insignificant compared to the volume of water within the waterway; therefore, the proposed discharge will have no significant adverse effects on current patterns and

water circulation.

Sec. 230.24 Normal water fluctuations. Normal water fluctuations in a natural aquatic system consist of daily, seasonal, and annual tidal and flood fluctuations in water level. Biological and physical components of such a system are either attuned to or characterized by these periodic water fluctuations. The Cooper River is traditionally navigable water with strong currents and tidal fluctuations. The amount of effluent that would be discharged into these waters would be insignificant compared to the volume of water currently within the waterbody; therefore, the proposed discharge will have no significant adverse effects on normal water fluctuations.

Sec. 230.25 Salinity gradients. Salinity gradients form where salt water from the ocean meets and mixes with fresh water from land. Obstructions which divert or restrict flow of either fresh or salt water may change existing salinity gradients. The CDFs proposed for use by the USACE, Charleston District are located along the upper harbor channels which are tidally influenced by the Atlantic Ocean. Effluent discharged into these waters would have on average close to or similar salinity levels as the water at the project site. Therefore, the proposed discharge will have no significant adverse effects on salinity gradients.

Potential effects on biological characteristics of the aquatic ecosystem (Subpart D)

Sec. 230.30 Threatened and endangered species. The Guidelines specifically state that "where consultation with the Secretary of the Interior occurs under section 7 of the Endangered Species Act, the conclusions of the Secretary concerning the impact(s) of the discharge on threatened and endangered species and their habitat shall be considered final."

A Biological Assessment of Threatened and Endangered Species (BATES) was prepared for the Charleston Harbor Post 45 Project (see Appendix F in the draft FR/EIS). The BATES reached the following conclusions:

The Charleston Post 45 project may affect and is likely to adversely affect the loggerhead, green and Kemp's ridley sea turtles when hopper dredges are operating during the new work construction and O&M dredging in the Entrance Channel. The project may affect but is not likely to adversely affect the loggerhead, green and Kemp's ridley sea turtles when a cutterhead, mechanical dredged and any bed leveling is performed. All other activities will have no effect on these species. The project construction methods will have no effect on the leatherback sea turtle. Protective dredging measures will be incorporated consistent with the existing SARBO. In addition to these short term construction impacts, the project will have no effect on marine sea turtle food supplies, habitats, or life periods as a result of channel modifications. The loggerhead, leatherback, Kemp's ridley and green sea turtles will be analyzed under Section 7 consultation with the NMFS and a Biological Opinion may be developed in order to account for any takes that may occur.

No whales are likely to be adversely affected by the proposed project. Transportation to and from dredging sites and the disposal areas may affect but is not likely to adversely affect the North Atlantic right whale and the humpback whale. All other construction aspects and the changed channel dimensions will have no effect on these species food supply, life stage, nor habitats. North

Atlantic right whales have been observed in the project area and dredging conditions outlined in the 2008 South Atlantic Regional Biological Opinion on Hopper Dredging will be followed in order to avoid impacts to North Atlantic right whales. Humpback whales are not likely to be in the project area but the same protective conditions will be followed in order to avoid potential impacts. A Biological Opinion may also be written on whales by NMFS.

The USFWS has standard manatee protection conditions involving water-borne construction projects including dredging. With implementation of these conditions the proposed project construction may affect but is not likely to adversely affect the West Indian manatee. The channel modifications will have no effect on food supplies, habitats, or life period. In addition the USFWS and NMFS may also include special terms and conditions in a Biological Opinion for this project.

Both the shortnose and Atlantic sturgeon will have protective conservation measures in place as outlined in the SARBA. The NMFS may also include additional protective terms and conditions in a Biological Opinion that will be adhered to. With the implementation of the protection measures in place the proposed project construction methods (i.e., hopper, cutterhead and mechanical dredging) may affect, and is likely to adversely affect shortnose and Atlantic sturgeon. If trawling is used during construction or O&M both species are likely to be adversely affected. Channel modifications may affect but are not likely to adversely affect sturgeon species food supplies, habitats, or life periods.

Most aspects of the proposed project construction and O&M dredging will have no effect on the American wood stork, piping plover, or red knot.

There will be no effect on seabeach amaranth as no records of the species occurrence in the project area have been found. If seabeach amaranth is in the project area it would be expected to be outside of the construction areas as it is a beach dwelling plant.

The BATES will be submitted to both the USFWS and the NMFS for their review and approval. Once USFWS and NMFS provides the USACE, Charleston District with their respective Biological Opinions for the Charleston Harbor Post 45 Project all Terms and Conditions mentioned in their respective BO's will be complied with. The effluent discharged from the Upper Harbor CDFs into the Cooper River is not expected to adversely impact any threatened and/or endangered species.

Sec. 230.31 Fish, crustaceans, mollusks, and other aquatic organisms in the food web.
Aquatic organisms in the food web include, but are not limited to, finfish, crustaceans, mollusks, insects, annelids, planktonic organisms, and the plants and animals on which they feed and depend upon for their needs. All forms and life stages of an organism, throughout its geographic range, are included in this category. The majority of the suspended solids would settle out within the CDF before entering the water column (i.e. the Cooper River). These waters are traditionally navigable waters with strong currents and tidal influence. The amount of effluent that would be discharged into these waters would be insignificant compared to the volume of water currently within the waterbody. Any suspended solids within the effluent would be diluted in the water column. In addition, the receiving water (i.e. the Cooper River) would be similar to the effluent. As a result, the impacts of the return water on aquatic organisms are expected to be negligible; therefore, the

proposed discharge will have no significant adverse effects on fish, crustaceans, mollusks or other aquatic organisms (see EFH Assessment in Appendix H in the DEIS).

Sec. 230.32 Other wildlife. Wildlife adjacent to the CDFs include resident and transient mammals, birds, reptiles, and amphibians which would not be impacted by return water discharge into the Cooper River. Therefore, it has been determined that the proposed discharge will have no significant adverse effects on wildlife.

Potential Effects on Special Aquatic Sites (Subpart E)

Sec. 230.40 Sanctuaries and refuges. Sanctuaries and refuges consist of areas designated under State and Federal laws or local ordinances to be managed principally for the preservation and use of fish and wildlife resources. There are no sanctuaries or refuges in or near the upland CDFs. The closest refuge is the Cape Romain National Wildlife Refuge located approximately 27 miles from the upland CDFs where the material will be discharged in the Cooper River. Therefore, the proposed discharge will have no significant adverse effects on sanctuaries and refuges.

Sec. 230.41 Wetlands. Wetlands consist of areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. No wetlands (including tidal salt water marshes adjacent to the Upper Harbor CDFs) will be filled by the discharge of return water from the CDFs.

Sec. 230.42 Mud flats. Mud flats are broad flat areas along the sea coast and in coastal rivers to the head of tidal influence and in inland lakes, ponds, and riverine systems. Coastal mud flats are exposed at extremely low tides and inundated at high tides with the water table at or near the surface of the substrate. There are no mudflats located at the CDF effluent discharge points. The effluent from the CDFs will discharge into the Cooper River. Therefore, the proposed project will have no significant adverse effects on mudflats.

Sec. 230.43 Vegetated shallows. Vegetated shallows (such as eel grass beds and/or submerged aquatic vegetation) are permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as freshwater species in rivers and lakes. There are no vegetated shallows in or adjacent to the upland CDFs or at the CDF effluent discharge locations. The effluent will be discharged into the Cooper River. Therefore, the proposed discharge will have no significant adverse effects on vegetated shallows.

Sec. 230.44 Coral reefs. Coral reefs consist of the skeletal deposit, usually of calcareous or silicaceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef. There are no coral reefs in the Cooper River or near the upland CDFs; therefore, the proposed discharge will have no significant adverse effects on coral reefs.

Sec. 230.45 Riffle and pool complexes. There are no riffle and pool complexes adjacent to the Upper Harbor CDFs or at their effluent discharge points.

Potential effects on human use characteristics (Subpart F)

Sec. 230.50 Municipal and private water supplies. Municipal and private water supplies consist of surface water or ground water which is directed to the intake of a municipal or private water supply system. The proposed discharge from the existing upland CDFs will have no significant adverse effects on municipal and/or private water supplies.

Sec. 230.51 Recreational and commercial fisheries. Recreational and commercial fisheries consist of harvestable fish, crustaceans, shellfish, and other aquatic organisms used by man. Areas where effluent is being discharged from CDFs has been noted by fishermen to be beneficial sites for fishing. However, that may be related to currents and tidal fluctuations more than the discharge of return water. The dredge sediment placed within these Upper Harbor CDFs would significantly reduce turbidity by allowing the heavier sediment and the majority of turbidity to be retained in the CDF's. Only the cleaner effluent being discharged from the CDFs would be discharged into the Cooper River as a result of the project would be minor and temporary on recreational and commercial fisheries; resuming normal conditions after dredging is completed. Sediment testing was conducted for this project and the results indicated that there will be no unacceptable levels contaminants of concern released into the environment as a result of the project (USACE 2013 and 2014). Based on these sediment test results, reduced amounts of turbidity discharged into the Cooper River, and the EFH Assessment found in Appendix H in the DEIS, the proposed discharge will have no significant adverse effects on recreational or commercial fisheries.

Sec. 230.52 Water-related recreation. Water-related recreation encompasses activities undertaken for amusement and relaxation. Activities encompass two broad categories of use: consumptive, e.g., harvesting resources by hunting and fishing; and non-consumptive, e.g. canoeing and sight-seeing. The location of the upland CDFs is adjacent to the Cooper River and effluent from the CDF discharges into that waterbody. The Cooper River is utilized heavily in this area for boating, waterborne commerce, and fishing. There are miles of coastline and marsh utilized for water-related activities in this area. The discharge from the existing, upland CDFs will have no significant adverse effects on water-related recreation.

Sec. 230.53 Aesthetics. Aesthetics associated with the aquatic ecosystem consist of the perception of beauty by one or a combination of the senses of sight, hearing, touch, and smell. Aesthetics of aquatic ecosystems apply to the quality of life enjoyed by the general public and property owners. The only visible portion of the proposed project related to the discharge is the end of the culvert where the effluent is discharged from the upland CDFs into the Cooper River. The discharge may result in a minor sediment plume which could be visible at the surface; however, it will be temporary and return to normal at the completion of the project. The basic appearance of the CDFs will not change as a result of the proposed action. Based on the above, it has been determined that the proposed discharge will have no significant adverse effects on aesthetics.

Sec. 230.54 Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves. These preserves consist of areas designated under Federal and State laws or local ordinances to be managed for their aesthetic, educational, historical, recreational, or scientific value. The Charleston Post 45 project CDF discharges will not involve

encroachment into or location adjacent to parks, national monuments, national seashores, wilderness areas, research sites, and similar preserves. Therefore, impacts to these resources as a result of the disposal of dredged material into the CDFs are expected to be of no effect.

Evaluation and testing (Subpart G)

Sec. 230.60 and 230.61 General evaluation of dredged or fill material and Chemical, Biological and Physical evaluation and testing.

Section 3.0 General Description of Dredge Material in this 404(b)(1) evaluation and theSection 103 evaluation (USACE 2014), which is found in Appendix J in the draft FR/EIS fully describes the chemical, biological, and physical evaluation and testing of the harbor sediment for the Charleston Post 45 project.

Actions to minimize adverse effects (Subpart H)

Actions regarding the location of the discharge, the material to be discharged, controlling the material after discharge, the method of dispersion, those related to technology, plant and animal populations, spawning or migration seasons and other biologically critical time periods were considered. In evaluating this Section 404(b)(1) analysis, the direct fill in waters of the U.S. has been minimized to the maximum extent practicable.

The following special conditions will either be included in the Environmental Commitments section in the FR/EIS and/or within the contract specifications to protect the integrity of the aquatic environment and protect fish and wildlife resources:

That the USACE, Charleston District will ensure that the dredging contractor is aware that it is the expectation of this office that environmentally responsible dredging take place at all times. It is also a requirement of the contract that the disposal site have an on-site inspector (this inspector can be an employee of the Dredging Contractor or the “Engineer”) monitoring the disposal site and outfall at a minimum of 24 hours per day throughout the dredging activity to ensure that the disposal site and outfall are properly maintained and all the requirements of the “Dredging and Disposal Plan” (with all revisions addressed above) are adhered to. It is noted that increased turbidity will occur with heavy overflow from the disposal area that contains high levels of suspended solids. Therefore, it is essential that care and diligence is taken to assure that the disposal area embankments are not breached, material overflow does not occur, and the spillway is properly and carefully maintained. The material should be pumped into the disposal area at such a rate as to allow settling at the spillway thereby minimizing suspended solids. The contractor is NOT allowed to pump into the disposal area whereby the effluent from the disposal area is mud or water with high levels of suspended solids. If this occurs the inspector should require that dredging operations halt immediately, take pictures immediately of the area in the immediate vicinity of the discharge pipe, and contact this office immediately. The District agrees that dredging shall be conducted with a hydraulic cutterhead dredge with the dredged material placed in the Daniel Island, Clouter Creek, and Yellow House CDFs. The contractor shall perform the following actions throughout the life of dredging project in order to minimize and contain any re-suspended sediments during dredging: Constant monitoring of the pipeline from the proposed dredge site to

the proposed CDFs (excluding the submerged pipeline) to ensure that there are no leaks in the pipeline. Monitoring is required 24 hours per day, seven days per week throughout the life of the dredging project. Should any leaks occur or if the pipeline breaks, all dredging will cease until the leak/break is repaired. The condition of the pipeline will be recorded on the "Daily Construction Quality Control Report" (Daily Log). Constant monitoring of the dewatering area/CDF will be conducted to ensure that the structural stability of the dikes is not compromised. Should the structural stability of the dikes by compromised, all dredging shall cease, and the contractor shall notify the Corps of Engineers immediately to determine a course of action to stabilize the dikes. Dredging shall not resume until the dikes are stabilized. The contractor will visually monitor the water return structure to ensure that the return water does not contain elevated levels of suspended solids. Should elevated solids levels occur, the contractor shall add boards to the outfall structure, as needed to allow for more settling time. If adding boards does not reduce the level of suspended solids in the effluent, all dredging shall cease until the suspended solids levels are satisfactorily reduced. Should any of the above conditions occur where dredging must cease, the contractor shall notify the Corps within 24 hours of the occurrence or by 9:00 AM the following Monday morning if the incident occurs on the weekend and the "Daily Construction Quality Control Report" (Daily Log) shall accurately reflect all events.

6.0 FACTUAL DETERMINATIONS (SUBPART B, SECTION 230.11)

Physical substrate (40 CFR 230.11(a)). As discussed previously, the dredged material placed in the upland CDFs consists mainly of fine-grained sediments. Once in the CDF, the sediment will settle out prior to being discharged into the Cooper River. The substrate of the Cooper River at the discharge location is consistent with the material being dredged from the project site. Sediments suspended in the effluent are expected to be minimal upon discharge and will disperse quickly into the water column resulting in no accumulation at the discharge point; therefore, the discharge will have a negligible effect on the physical substrate in the immediate vicinity of the discharge point or the surrounding substrate on the Cooper River.

Water circulation, fluctuation, and salinity (40 CFR 230.11(b)). The Cooper River is traditionally navigable water with strong currents and tidal influence. The amount of effluent that would be discharged into the river from the CDFs will be insignificant compared to the volume of water currently in harbor. The material and associated water from the project site are also located in an estuarine landscape and are of similar salinity to that at the discharge point along the river; therefore the discharge will have a negligible effect on the salinity regime of the river at this location. In addition, the insignificant amount of effluent being released from the CDFs will have a negligible effect on the water circulation and fluctuation in the receiving waterbody.

Suspended particulate/turbidity (40 CFR 230.11(c)). Suspended solids within the effluent generated from the CDFs could affect turbidity within in the Cooper River. However, once the dredged material is placed within the CDFs, the sediments are allowed to settle out before the effluent is discharged into the river. As a result, the majority of the sediment will be contained within the CDFs and will not be discharged with the effluent or enter the water column. The amount of effluent that would be discharged from the CDF into the Cooper River would be

insignificant compared to the volume of water currently within the harbor. Any suspended solids within the effluent would be diluted in the water column and be immediately dispersed. Once the project construction is complete, turbidity levels at the discharge point will return to normal levels. Therefore, the proposed discharge will have a minimal, short term effect on turbidity.

Contaminant availability (40 CFR 230.11(d)). As described above in the Evaluation and Sediment Testing Section 3.0 and in USACE (2013 and 2014), sediments in the areas proposed for dredging were tested. Sediment testing concluded pollutants were found to be within acceptable parameters. Based on the results of the sediment testing and subsequent report, it is not anticipated that there will be any adverse impacts to the aquatic ecosystem from contaminants, nor will there be any violations of state water quality standards resulting from the discharge from the CDFs.

Aquatic ecosystem effects (40 CFR 230.11(e)). The effluent from the CDFs being discharged into the Cooper River is insignificant compared to the water existing within the system. Sediment testing concluded (Section 103 Evaluation (USACE 2014), which is found in Appendix J in the DEIS) pollutants were found to be within acceptable parameters, will not be harmful to the aquatic environment or organisms therein; therefore, impacts to the aquatic ecosystem and organisms is expected to be negligible.

Proposed disposal site (40 CFR 230.11(f))(1). A close evaluation of 40 CFR 230.11(f))(1) states that each disposal site shall be specified through the application of the Guidelines defined within this section. These guidelines relate specifically to disposal sites in open waters and the factors to consider when determining the acceptability of a proposed mixing zone. No sediment dredged from the Upper Harbor channels will be placed in open waters of the Cooper River. Only the effluent from the existing upland CDFs in the upper Harbor will be discharged within the waters of the Cooper River, therefore this section is not applicable.

Cumulative effects (40 CFR 230.11(g)). A cumulative impact analysis has been prepared for the Charleston Harbor Post 45 Project and can be found in Appendix O in the draft FR/EIS. This analysis focused on the potential cumulative impacts of the overall proposed project to various resources in the estuary including wetlands, fisheries, groundwater, and Threatened and Endangered species, Air Quality, etc. The use of existing upland CDFs as disposal sites for dredged material from the Upper Harbor is not expected to materially contribute to any adverse cumulative impacts associated with the deepening of portions of the navigation channels. The disposal of dredged material for purposes of constructing the SC DNR nearshore reef (see Appendix M2) likewise concludes that there will be no material contribution to adverse cumulative impacts.

Secondary effects (40 CFR 230.11(h)). The use of upland CDFs is a mature and well-established dredged material management alternative. These facilities are designed to minimize the direct and secondary impacts of discharging dredged material. Even under the No Action alternative, the Upper Harbor CDFs will continue to occupy the same footprint and continue to receive dredged material for harbor maintenance. Because testing indicates that harbor sediments are within acceptable levels for contaminants, there is no expected secondary impact due to leaching of material discharged into the CDFs. Many of the secondary impacts associated with the overall dredged and fill material placement plan for the Charleston Harbor Post 45 Project are positive,

since they are part of the project's mitigation plan (for example, the near shore artificial reef addressed in Appendix M2). Based on the well-established ability of upland CDFs to limit secondary effects, the Corps has determined that the proposed discharge into these facilities will have a negligible effect.

7.0 FINDINGS OF COMPLIANCE

This document constitutes a draft of the USACE's evaluation of the Charleston Post 45 Project compliance with the Guidelines. The District will not finalize its compliance determination regarding the Charleston Post 45 Project until after the public has had an opportunity to comment on the DRAFT FR/EIS and the final EIS has been published. At that time, the USACE will issue an ROD describing its decision on the Charleston Post 45 Project and its final determination of whether the proposed project complies with the Section 404 (b)(1) Guidelines. At this time and based on the foregoing analysis, the District's draft finding is that the proposed disposal sites for the discharge of dredged material are in compliance with the requirements of the Guidelines.

REFERENCES

Gayes, Paul, Cheryl Ward, Jenna Hill, Shinobu Okanu, Jeff Marshall, Brian Johnson, Jamie Phillips, Bradley Craig, Richard Viso. 2013. Hardbottom and Cultural Resource Surveys of the Post 45 Charleston Harbor Project Study Area, Charleston, South Carolina. Prepared by Coastal Carolina University, Burroughs and Chapin Center for Marine and Wetland Studies. Prepared for US Army Corps of Engineers, Charleston District. (URL: http://www.sac.usace.army.mil/Portals/43/docs/civilworks/post45/1_CCU%20Charleston%20Harbor%20Post%2045%20final.pdf). Appendices available upon request.

Panamerican Consultants, Inc. 2013. Diver Identification and Assessment of Anomalies in the Lower Harbor of the Charleston Harbor Post 45 Study Area, Charleston County, South Carolina. Prepared for US Army Corps of Engineers, Charleston District. Under Contract to: DCA/GEC, A Joint Venture, LLC. Contract No. W912-HN-12-D-0016. (URL: http://www.sac.usace.army.mil/Portals/43/docs/civilworks/post45/Charleston%20Harbor%20Post%2045%20Final.pdf)

U.S. Army Corps of Engineers. 2005. Charleston Ocean Dredged Material Disposal Site. Site Management and Monitoring Plan. Charleston District, South Atlantic Division. November 2005.

U.S. Army Corps of Engineers, Charleston District. 2009a. Dredged Material Management Plan, Preliminary Assessment, Charleston Harbor, Charleston, South Carolina.

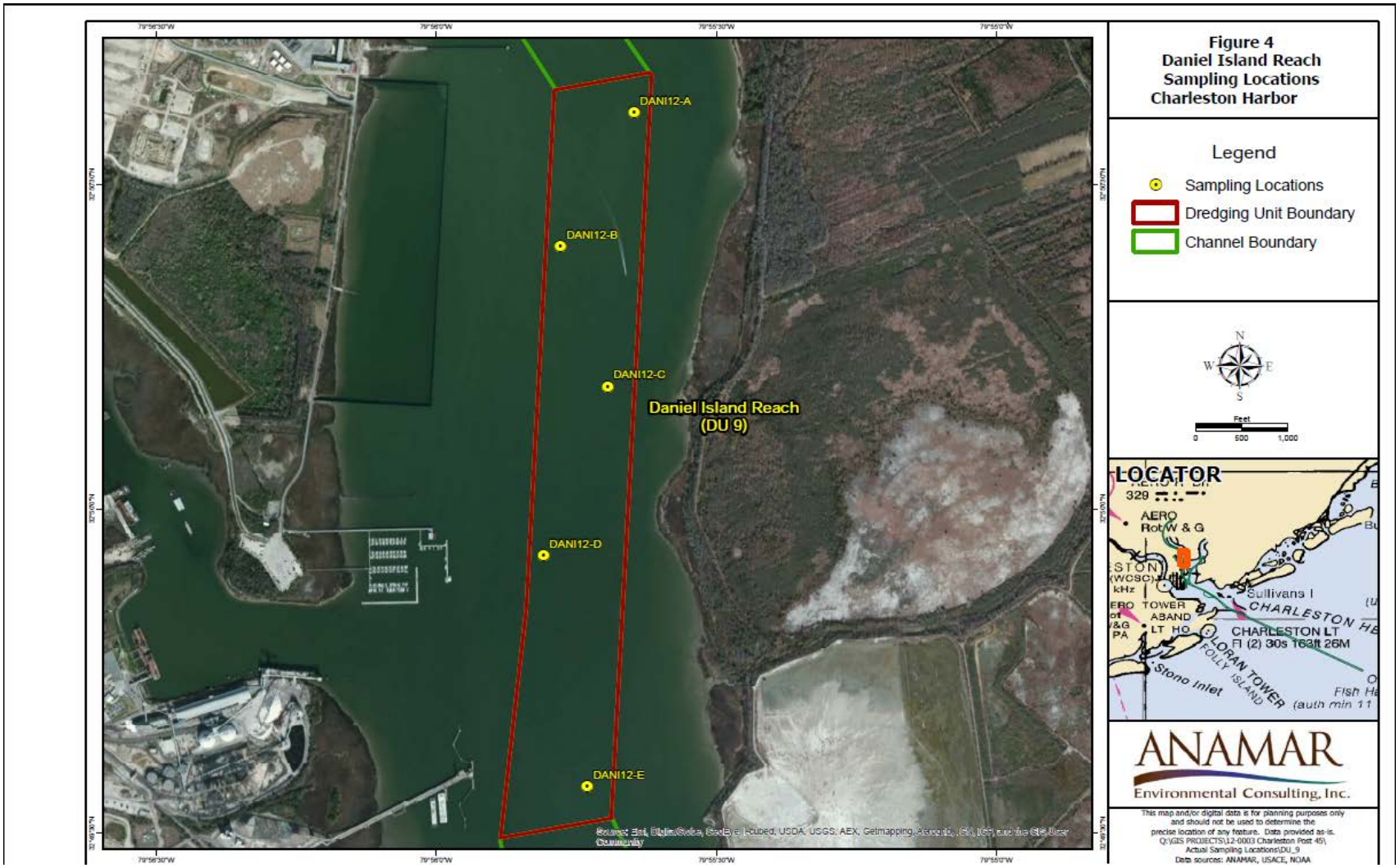
US Army Corps of Engineers, Charleston District. 2009b. Final Environmental Assessment: Additional Advanced Maintenance, Charleston Harbor, South Carolina, August 2009.

US Army Corps of Engineers, Savannah District. 2012. Savannah Harbor Expansion Project Final General Re-Evaluation Report.

U.S. Army Corps of Engineers. 2013. Charleston Harbor Navigation Improvement Project (Post 45) Dredging MPRSA Section 103 Sediment Testing and Analysis, Charleston, SC. Prepared by AMAMAR Environmental Consulting, Inc. Gainesville, FL.

U.S. Army Corps of Engineers. 2014. Section 103 Evaluation of Dredge Material Proposed for Ocean Disposal Charleston Harbor, Charleston, South Carolina.

ATTACHMENT A. FIGURES SHOWING THE CHARLESTON HARBOR SAMPLING LOCATIONS


DANI12-A
DANI12-B
DANI12-C
DANI12-D
DANI12-E
Daniel Island Reach
(DU 9)
Figure 4
Daniel Island Reach
Sampling Locations
Charleston Harbor
Legend
Sampling Locations
Dredging Unit Boundary
Channel Boundary
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AERO
Rot/W & G
Sullivans I
CHARLESTON LT
Fl (2) 30s 163ft 26M
LORAN TOWER
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Environmental Consulting, Inc.
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and should not be used to determine the
precise location of any feature. Data provided as-is.
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Actual Sampling Locations\DU_9
Data sources: ANAMAR, USACE, NOAA

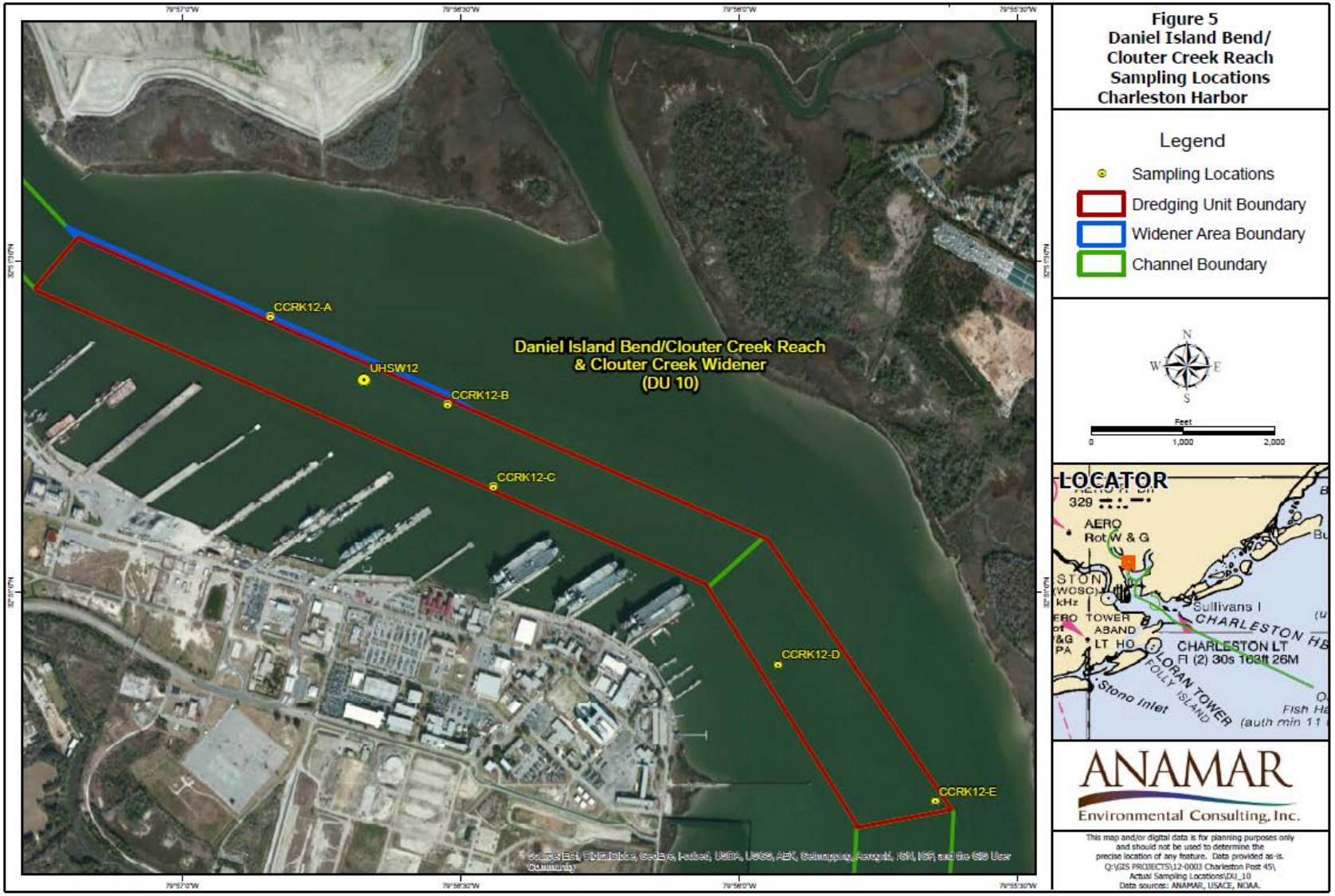
Figure 5
Daniel Island Bend/
Clouter Creek Reach
Sampling Locations
Charleston Harbor
Legend
Sampling Locations
Dredging Unit Boundary
Widener Area Boundary
Channel Boundary
CCRK12-A
UHSW12
CCRK12-B
CCRK12-C
CCRK12-D
CCRK12-E
Daniel Island Bend/Clouter Creek Reach
& Clouter Creek Widener
(DU 10)
Feet
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1,000
2,000
LOCATOR
AERO
Rot W & G
Sullivans I
CHARLESTON HB
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Actual Sampling Locations\DU_10
Data sources: ANAMAR, USACE, NOAA.

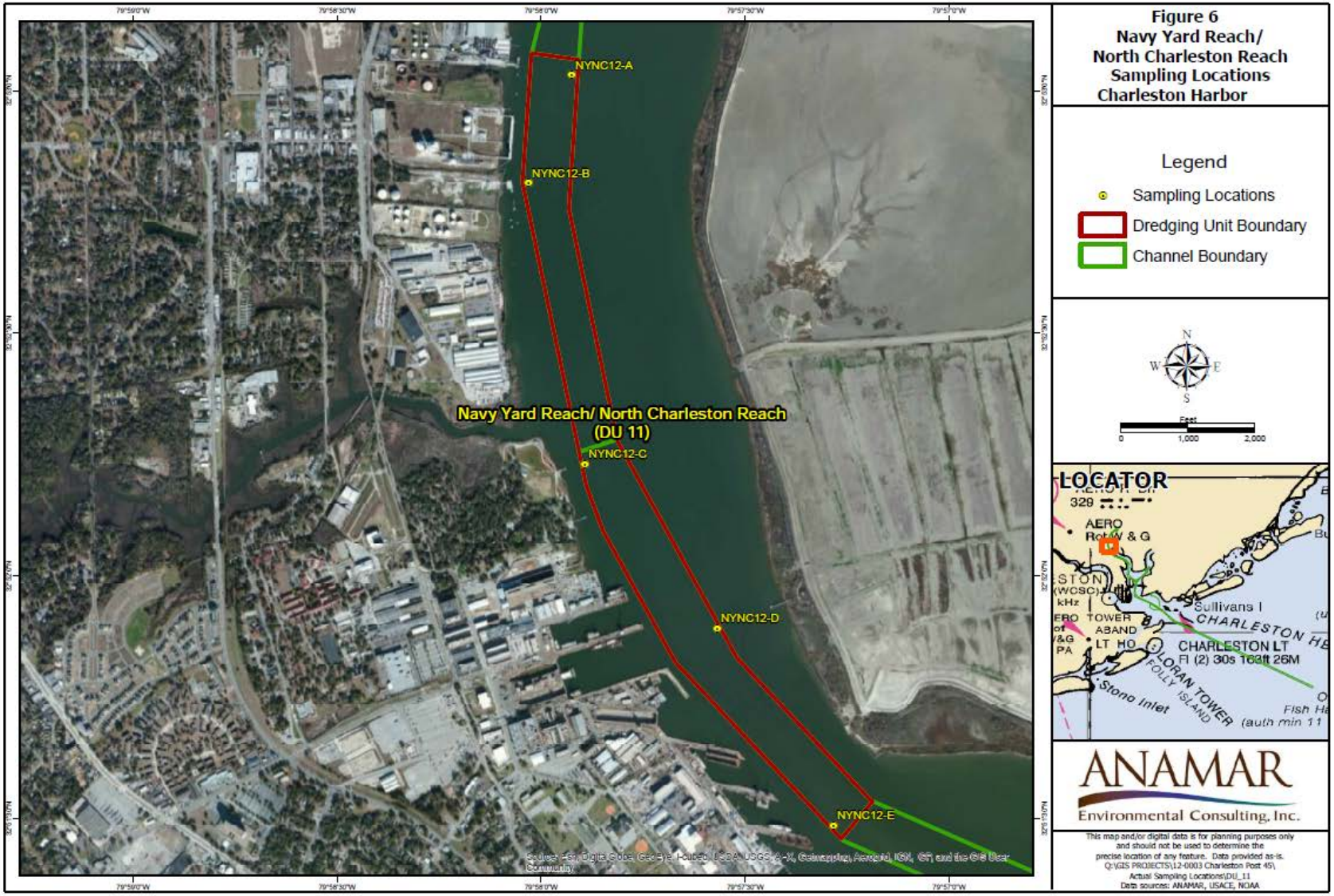
Figure 6
Navy Yard Reach/
North Charleston Reach
Sampling Locations
Charleston Harbor
Legend
Sampling Locations
Dredging Unit Boundary
Channel Boundary
NYNC12-A
NYNC12-B
Navy Yard Reach/ North Charleston Reach
(DU 11)
NYNC12-C
NYNC12-D
NYNC12-E
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precise location of any feature. Data provided as-is.
Q:\GIS PROJECTS\12-0003 Charleston Post 45\
Actual Sampling Locations\DU_11
Data sources: ANAMAR, USACE, NOAA

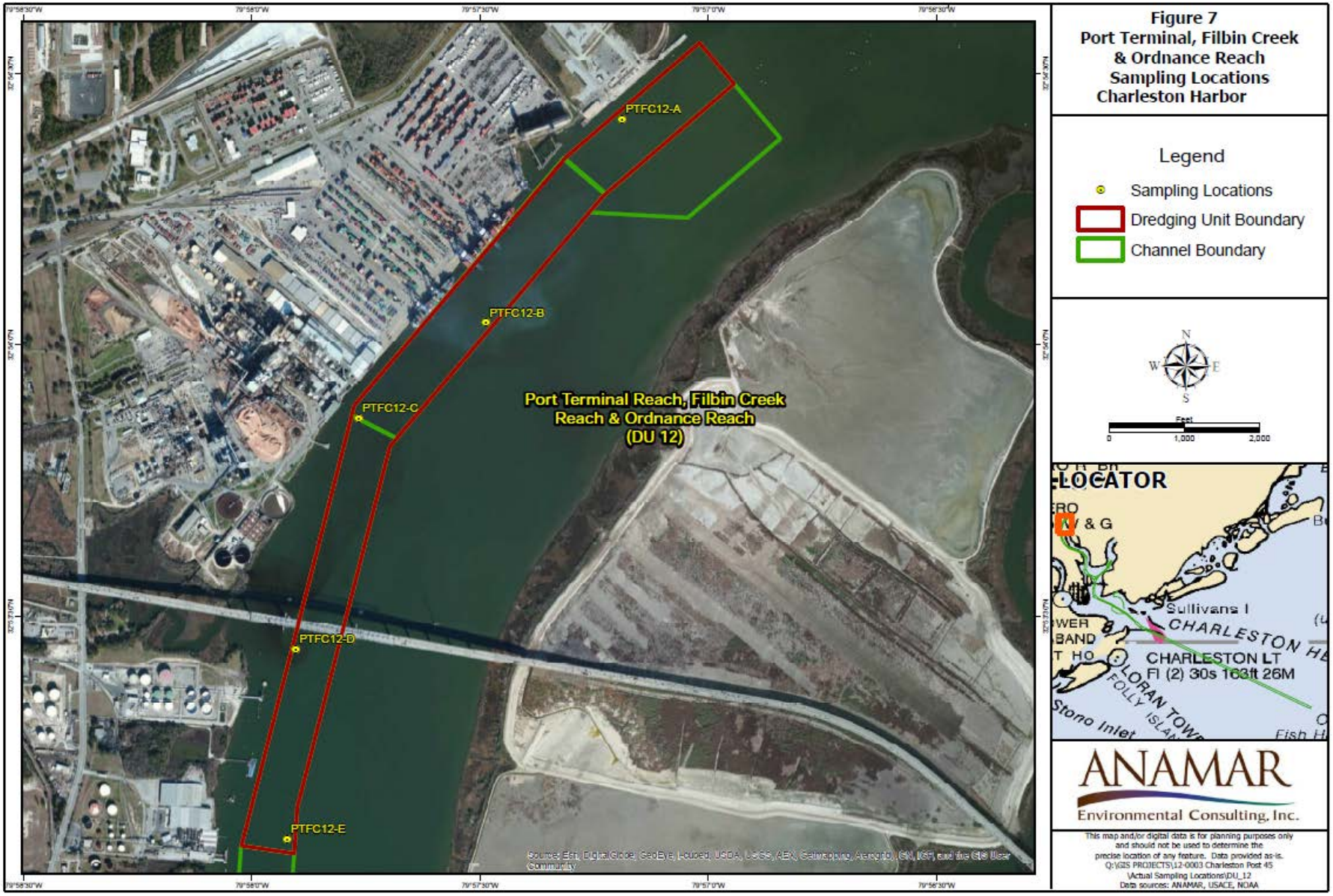
Figure 7
Port Terminal, Filbin Creek
& Ordnance Reach
Sampling Locations
Charleston Harbor
Legend
Sampling Locations
Dredging Unit Boundary
Channel Boundary
PTFC12-A
PTFC12-B
PTFC12-C
PTFC12-D
PTFC12-E
Port Terminal Reach, Filbin Creek
Reach & Ordnance Reach
(DU 12)
N
W
E
S
Feet
0
1,000
2,000
LOCATOR
Sullivans I
CHARLESTON LT
Fl (2) 30s 163ft 26M
Stono Inlet
ANAMAR
Environmental Consulting, Inc.
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\Actual Sampling Locations\DU_12
Data sources: ANAMAR, USACE, NOAA

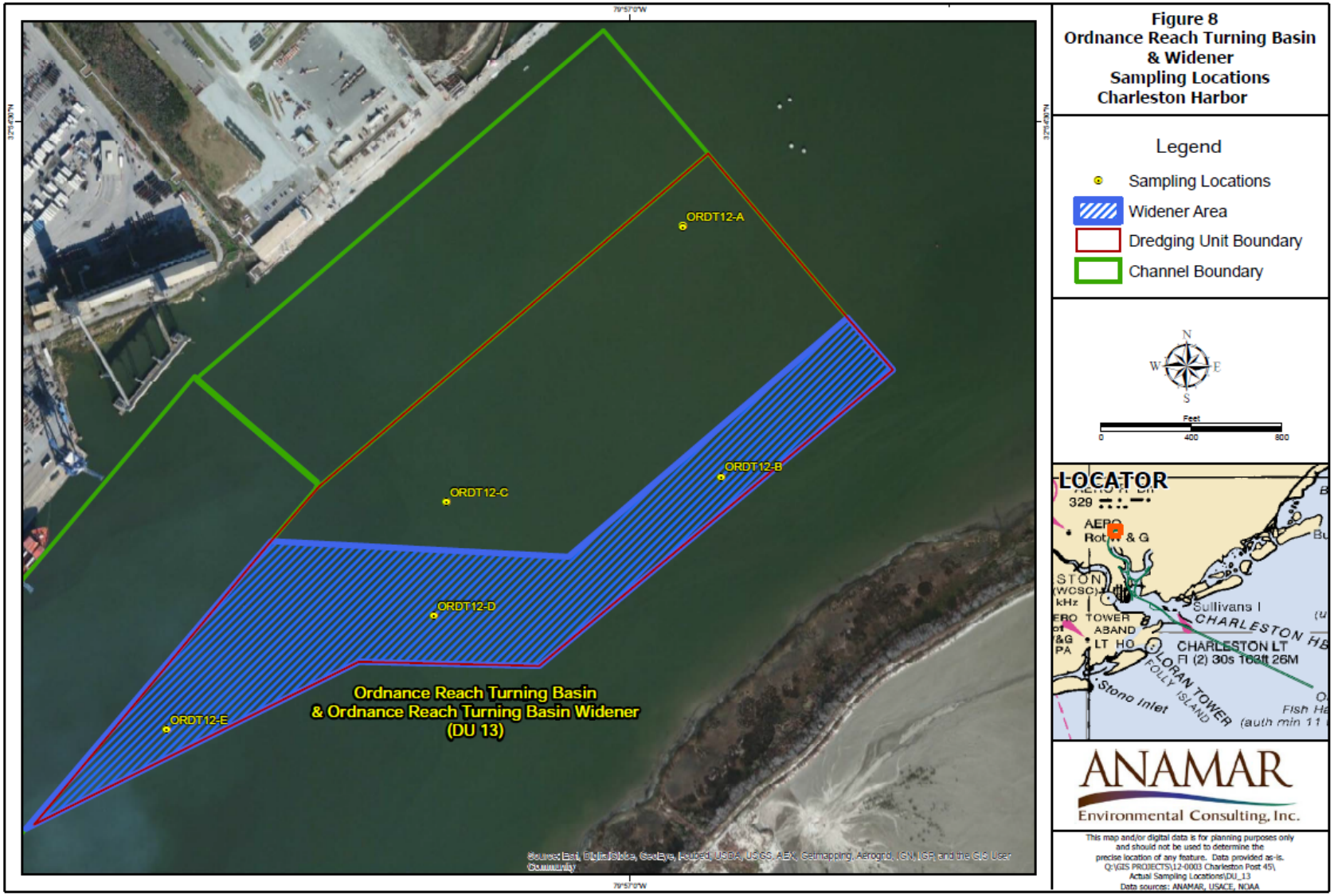
Figure 8
Ordnance Reach Turning Basin
& Widener
Sampling Locations
Charleston Harbor
Legend
Sampling Locations
Widener Area
Dredging Unit Boundary
Channel Boundary
ORDT12-A
ORDT12-B
ORDT12-C
ORDT12-D
ORDT12-E
Ordnance Reach Turning Basin
& Ordnance Reach Turning Basin Widener
(DU 13)
N
W
E
S
Feet
0
400
800
LOCATOR
Sullivans I
CHARLESTON LT
LORAN TOWER
Stono Inlet
FOLLY ISLAND
ANAMAR
Environmental Consulting, Inc.
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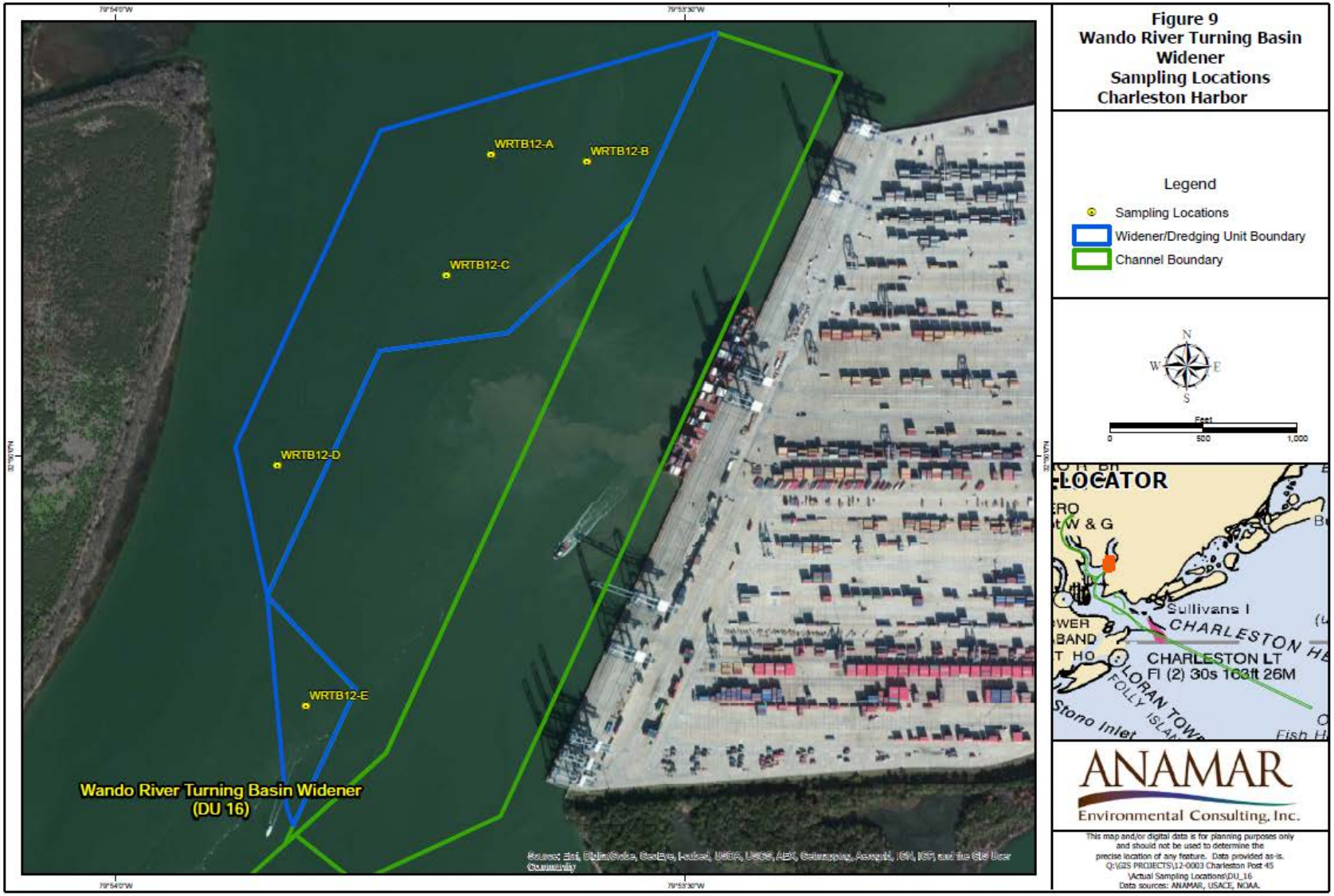
Q:\GIS PROJECTS\12-0003 Charleston Post 45\
Actual Sampling Locations\DU_13
Data sources: ANAMAR, USACE, NOAA


79°54'0"W
79°53'30"W
WRTB12-A
WRTB12-B
WRTB12-C
WRTB12-D
WRTB12-E
Wando River Turning Basin Widener
(DU 16)
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community
Figure 9
Wando River Turning Basin
Widener
Sampling Locations
Charleston Harbor
Legend
Sampling Locations
Widener/Dredging Unit Boundary
Channel Boundary
N
W
E
S
Feet
0
500
1,000
LOCATOR
Sullivans I
CHARLESTON LT
Fl (2) 30s 163ft 26M
Stono Inlet
ANAMAR
Environmental Consulting, Inc.
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Q:\GIS PROJECTS\12-0003 Charleston Post 45
\Actual Sampling Locations\DU_16
Data sources: ANAMAR, USACE, NOAA.

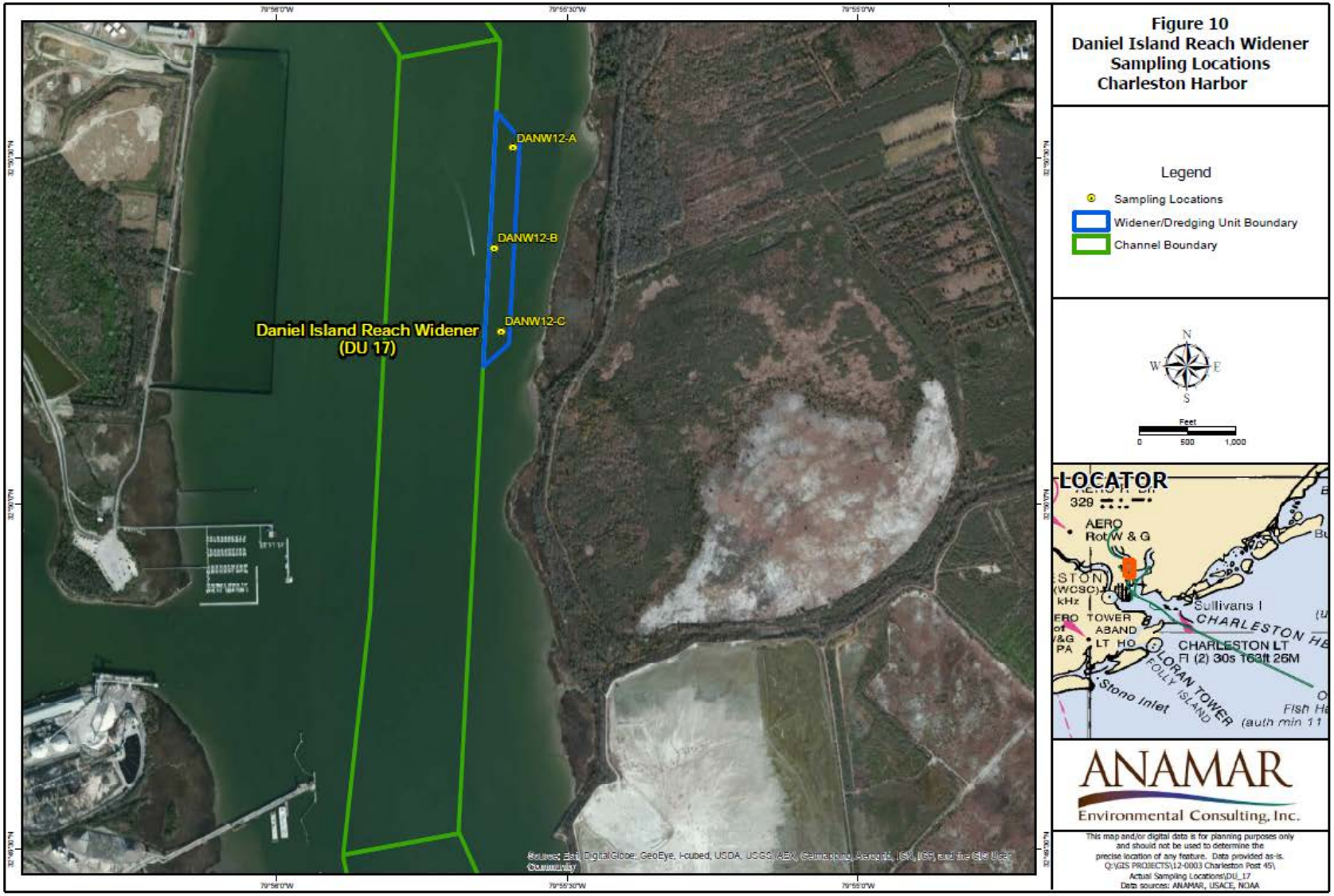
Figure 10
Daniel Island Reach Widener
Sampling Locations
Charleston Harbor
Legend
Sampling Locations
Widener/Dredging Unit Boundary
Channel Boundary
DANW12-A
DANW12-B
DANW12-C
Daniel Island Reach Widener
(DU 17)
N
W
E
S
Feet
0
500
1,000
LOCATOR
AERO
Rot W & G
Sullivans I
CHARLESTON LT
Fl (2) 30s 163ft 26M
LORAN TOWER
Stono Inlet
FOLLY ISLAND
ANAMAR
Environmental Consulting, Inc.
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Q:\GIS PROJECTS\12-0003 Charleston Post 45\
Actual Sampling Locations\DU_17
Data sources: ANAMAR, USACE, NOAA

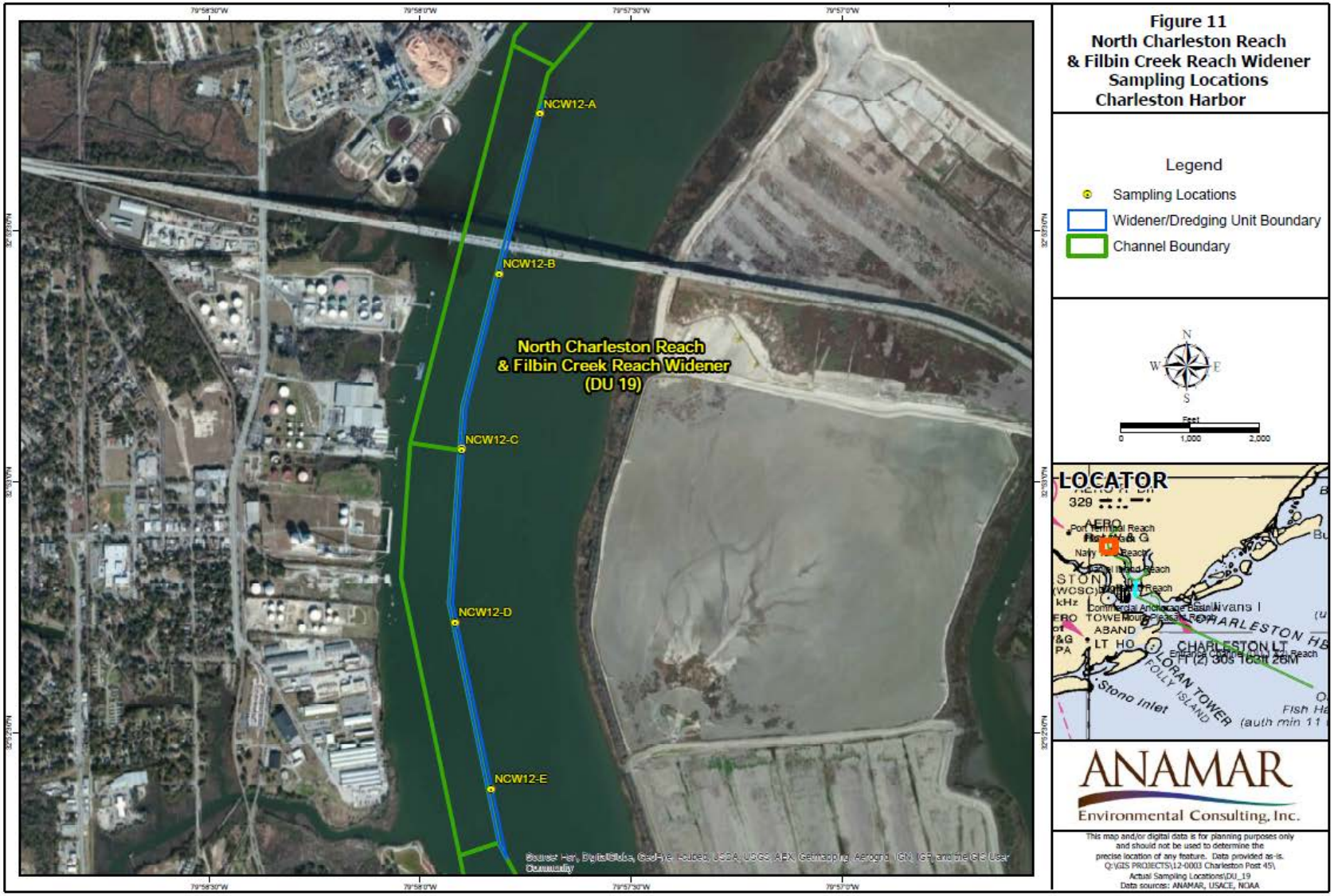
Figure 11
North Charleston Reach
& Filbin Creek Reach Widener
Sampling Locations
Charleston Harbor
Legend
Sampling Locations
Widener/Dredging Unit Boundary
Channel Boundary
NCW12-A
NCW12-B
NCW12-C
NCW12-D
NCW12-E
North Charleston Reach
& Filbin Creek Reach Widener
(DU 19)
LOCATOR
ANAMAR
Environmental Consulting, Inc.
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Data sources: ANAMAR, USACE, NOAA