APPENDIX Q
404(b)(1) Analysis

Appendix Q

SECTION 404(b)(1) EVALUATION REPORT

Inner Harbor Navigation Canal Lock Replacement Project

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1.0 PROJECT DESCRIPTION

1.1 Location

The proposed new lock would be constructed in the Inner Harbor Navigation Canal (IHNC), Orleans Parish, Louisiana. The project area is located in Orleans Parish in southeastern Louisiana. The area is generally bounded by Lake Pontchartrain on the north, the Mississippi River on the south and west, and Lake Borgne, Breton Sound, and the Gulf of Mexico on the east and south. The IHNC channel connects the Mississippi River, the Gulf Intracoastal Waterway (GIWW), the Mississippi River Gulf Outlet (MRGO) and Lake Pontchartrain and serves the Port of New Orleans. The area potentially affected by changes in vessel traffic includes the navigation channels and related land areas in the vicinity of the project area and in the inland waterway system on the GIWW and the Mississippi River. The new lock would be constructed in the IHNC, north of the existing lock, between the Claiborne Avenue and Florida Avenue Bridges (Figure 1-1).

1.2 Purpose

The purpose of the proposed project is to relieve navigation traffic congestion associated with the existing lock by producing sufficient lock and channel capacity for vessels traveling between the Lower Mississippi River, IHNC, and GIWW. The IHNC lock allows for navigation between the higher water surface elevations of the Mississippi River and the lower water surface elevations of the IHNC, the eastern portion of the GIWW and MRGO. A larger lock would replace the existing lock, which has been in operation since 1923, to accommodate a heavier traffic load and modern deep draft vessels.

1.3 Proposed Project

The Float-in-Place (FIP) lock construction is the proposed action for the IHNC lock replacement project. Fundamentally, the FIP lock construction is very similar to the 1997 EIS Plan. Two separate construction locations would be needed for the FIP Plan, the graving site which allows for lock module construction in the dry, and the lock site. The main component of the plan is a new 1200-foot long by 110-foot wide by 36-foot deep lock connecting the Mississippi River with GIWW via the IHNC.

The construction schedule for lock replacement is complex, and most tasks must be accomplished in very rigid chronological order to maintain existing flood control systems, utilities, and navigation and also to minimize socioeconomic impacts on local residents and commuters. The following narrative description is written in the approximate chronological order in which construction events would take place. Construction activities at the two sites, the IHNC and the graving site, would occur concurrently.

Lock Site

A bypass channel would be constructed east of the new lock site north of Claiborne Avenue. The bypass channel would be constructed by hydraulically dredging approximately 876,000 cy of material to provide for 2-way barge traffic and 1-way ship traffic during lock construction. Three protection cells would be constructed at the south end of the bypass channel concurrent with channel dredging, and a timber guide wall installed before opening the channel. Tug assistance vessels would be stationed at each end of the bypass channel and be available 24 hours daily to assist tows through the channel.

Following the completion of the bypass channel, the footprint of the lock would be hydraulically dredged to a depth of -54 ft for the gatebay modules and -52 ft for the chamber modules. A total of approximately 708,950 cy of material would be hydraulically dredged within the lock footprint. Sheetpile would then be driven along the perimeter of the lock footprint to create a containment wall. A 3-foot thick stone base would be placed at the bottom of the lock footprint. A hopper box lowered to the bottom would be used to place the stone base. Eight 78-foot diameter protection cells would be constructed at both ends of the excavated area. Steel lock pipe piles, 120 ft long and 48 inches in diameter, would be driven within the footprint of the lock. A vibratory hammer would be used to drive piles above the water surface and a hydro-hammer used below the water surface.

As each lock module is floated to the lock site from the graving site, two of the protection cells located on the north end of the lock site would be removed to allow for the lock module passage. Following the placement of a lock module, the two protection cells would be rebuilt. This removal and replacement of protection cells would occur for each lock module. A batch plant for concrete production would be constructed on top of a platform placed on three of the protection cells.

The south lock module would need to be constructed and transported to the lock site first. Prior to the transport of each module, the graving site around that module would be flooded by removing the independent closure system. The closure materials would be stockpiled while the module floated out, the closure rebuilt and the site dewatered again for the next module. Tug boats would pull the lock module from the graving site to the lock site. It is anticipated that transport of a module would take 1 day, and the GIWW/MRGO would be closed to marine traffic during the towing. The module would then be attached to temporary mooring dolphins and then moved into place and attached directly to another already installed lock module.

Using sand ballast, the lock module would be positioned horizontally and vertically in its correct position. Grouting of lock module sections, placement of mechanical components, and underbase infilling would then be completed. The lock module's structural load would then be transferred from jacks (which were holding the lock module in place while the concrete was setting) to the piles. Flooding and then dewatering of the lock module (and adjacent lock modules) would be done to test mechanical equipment and grouted seals.

These same steps would be completed for each of the lock modules until the new lock is completed. Mechanical and electrical components would be installed after all of the lock modules are in place. The lock would be tested, the channel protection cells removed from both ends of the lock, protection riprap placed at both ends of the lock, and the lock opened to traffic. Once the new lock is fully operational, the bypass channel would be closed and new guidewalls put into place. At this time the water depth in the new lock would still be controlled by the old lock. The bypass channel would be filled with a combination of sand and stockpiled dredged material to an elevation of +5 ft.

Levees and floodwalls would be raised and tied into the Mississippi River flood protection system as described in the 1997 EIS. A channel would be constructed around the old lock and the old lock demolished as described in the 1997 EIS. The new lock would then be fully functional.

Graving Site

To prepare the graving site for lock module construction, all of the vegetation on the site would be removed, the flood protection levee relocated, and a small drainage canal rerouted. The site would then be excavated in the wet to a depth of -31 ft National Geodetic Vertical Datum (NGVD) with 1:5 (vertical:horizontal) side slopes and some excavated material used to reinforce the flood protection levee along the GIWW. It is estimated that a total of 664,000 cy of material would be excavated. Of that total, 112,000 cy of material would be used to reinforce the berm and relocated levee and the remaining 552,000 cy stockpiled east of the graving site within a temporary containment facility. However, if it is determined the material excavated is not suitable for levee construction, then suitable borrow material would be used for the relocated levee and the all of the excess material would be stockpiled east of the graving site. The eastern end of the excavated area would be no closer than 110 ft from the base of the Paris Road Bridge piers. The graving site would be dewatered and dewatering maintained for 4 to 5 years during the construction of the lock modules, except during movement of the lock modules from the site. Electricity would be brought to the site along the Paris Road right-of-way for module construction activities and pumping. Pumps for dewatering activities would discharge into the GIWW. A 30-foot wide separating berm, which would provide separation for lock module construction efforts, would be constructed and then removed, and reconstructed four additional times, between each of the lock modules as they are completed and floated out of the GIWW. Following the construction of the lock modules, stockpiled excavated material and any material imported for the realigned levee construction would be used to fill the graving site and return the graving site to the preconstruction elevation. The flood protection levee would be reconstructed to its current alignment and authorized elevation. If it is determined that the volume of material in the stockpile area is not adequate to restore the graving site to the preconstruction elevation, borrow material would be imported to reach this elevation.

Disposal Areas

Six disposal sites are covered in this evaluation: the main channel of the Mississippi River (River Site); an area where IHNC channel material would be deposited to develop wetlands as mitigation for project impacts (the Mitigation Site); the confined disposal facility (CDF) site where soils and sediments demonstrating benthic toxicity and considered unsuitable for aquatic disposal would be deposited (*CDF Disposal Site*); a CDF site adjacent but separate from the *CDF Disposal Site* where material that is suitable for open water disposal – but needed for construction backfill – would be temporarily stockpiled for later use as backfill and capping material (*CDF Backfill Site*); the Graving site and its associated stockpile site (Graving Site); and the new lock (IHNC Backfill Site) that would require backfill of the bypass channels after construction of the new lock. Since material from the project is being reused at both the Mitigation site and the IHNC Backfill Site, these sites are considered Beneficial Use sites. Refer to Figure 1-1 for the location of these features. All of these sites are comprised either primarily or exclusively, of waters of the U.S. (including some wetlands) that are regulated under Section 404 of the Clean Water Act.

Nearly 2.2 million cubic yards of material would be dredged from the IHNC during construction. The dredged material disposal plan consists of two open-water disposal areas that have been proposed for dredged material excavated as part of the lock replacement project. The River site would serve as a primary disposal site for material deemed suitable for open water disposal. Dredged material would be discharged unconfined into the Mississippi River disposal site and is expected to disperse. The Mitigation site is located northeast of the IHNC in a triangular area of subsided marsh bounded by Bayou Bienvenue, an Orleans Parish sewerage treatment plant, and the 9th Ward back protection levee. Material would be placed semi-confined into the Mitigation site to create a sub-aerial platform at typical marsh elevations. It is anticipated that wetland plants would colonize this platform, and that the disposal site would transform into a functioning marsh.

The *CDF Disposal Site* and *CDF Backfill Site* would be constructed to accommodate dredged material that has been determined to be unsuitable for discharge into open-water or would be temporarily stockpiled and later utilized as backfill around the lock construction site. The CDF is located in an area bounded by the north bank of Bayou Bienvenue and the Chalmette Loop hurricane protection levee on the south bank of the GIWW, near the intersection of the IHNC and the GIWW.

1.4 Authority

Authority for replacement of the navigation lock connecting the GIWW and the Mississippi River was established in the River and Harbor Act of 1956 (Public Law 84-455). This was amended by Section 186 of the Water Resources Development Act (WRDA) of 1976 (Public Law 94-587) making the construction of bridges associated with the construction of the MRGO channel a Federal responsibility. A Site Selection Report prepared by the U.S. Army Corps of Engineers (USACE), New Orleans District (CEMVN) and the Port of New Orleans, and approved by the Office of Engineers in 1976 recommended the Lower Site downstream of Violet, Louisiana as the best location for the new lock. The WRDA of 1986 (Public Law 99-662) modified the project to locate the new lock and connecting channels to be in the area of the existing lock or at the Violet site. The Violet site was considered as an alternative site that would have connected the river near English Turn through the St. Bernard Central Wetlands in Violet, Louisiana to the MRGO near Bayou Dupre. Furthermore, the WRDA of 1986 modified the project's cost-sharing agreement. In 1991, the U.S. House of Representatives, Committee on Appropriations drafted the Energy and Water Development Appropriations Bill (Report #101-536), which directed the USACE in conjunction with the local sponsor to develop a community impact mitigation plan to ensure that the communities adjacent to the project remain as complete, livable neighborhoods during and after construction. The WRDA of 1996 (PL 104-303) amended the WRDA of 1986 by requiring the implementation of a comprehensive community mitigation plan as described in the evaluation report of the New Orleans District Engineer dated August 1995. The WRDA of 2007 authorized funds to be appropriated to the Assistant Secretary for Economic Development to support the relocation of Port of New Orleans deep draft facilities from the MRGO, the GIWW, and the IHNC to the Mississippi River.

Figure 1-1 - Project Area and Feature Locations for the Inner Harbor Navigation Canal, New Orleans, Louisiana Project

1.5 General Description of Dredged and Fill Material

1.5.1 General Characteristics

IHNC Channel

Material will consist of dredged sediment excavated for purposes related to deepening of the IHNC channel and new lock construction. Three general sediment and soil types in the project area underlay project features within the IHNC: (1) non-native sediment, which consists of unconsolidated material that has deposited naturally within the IHNC channel since its construction in the 1920s; (2) non-native fill, which consists of material placed adjacent to the IHNC channel for industrial development over the life of the channel; and (3) native subsurface soil consisting of clays and alluvial formations at or below the original IHNC channel bed surface, underlying the non-native fill material and non-native sediment (Figure 1-2). In this evaluation, project dredged sediment and soil types (1), (2) and (3) are designated as "NN"; "F"; and "N".

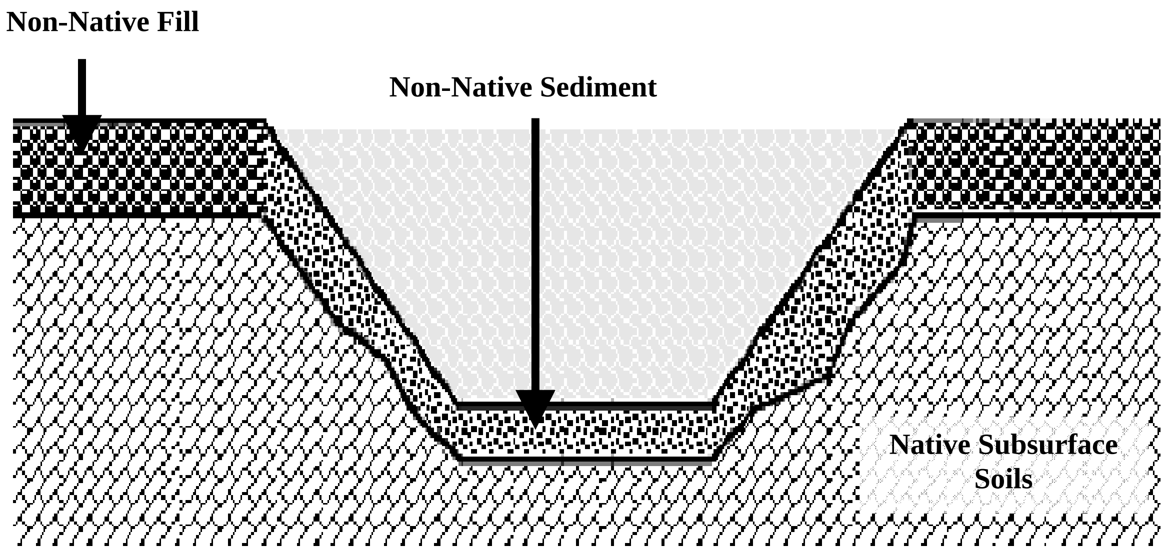

Figure 1-2 - Vertical distribution of sediment and soil types within the IHNC lock project area displayed as a conceptual cross-section.

Based on the location and dimension of the project features and overlap with sediment types and suspected areas of contamination, the project area was divided into 11 non-native sediment dredged material management units (DMMUs), four non-native fill DMMUs, and five native subsurface soil DMMUs . Two to 16 sediment samples were collected from each DMMU (depending on the size of the dredging unit), and subject to chemical, physical, and biological tests. Figure 4 depicts the spatial arrangement of DMMUs, including individual sampling sites for each DMMU, and Table 1-1 details the breakdown of DMMUs into vertical and horizontal units by project feature. Results from sediment and soil tests were used to characterize each DMMU and determine acceptable disposal options for each dredging unit.

Figure 1-3 – DMMU and Sampling Site Layout

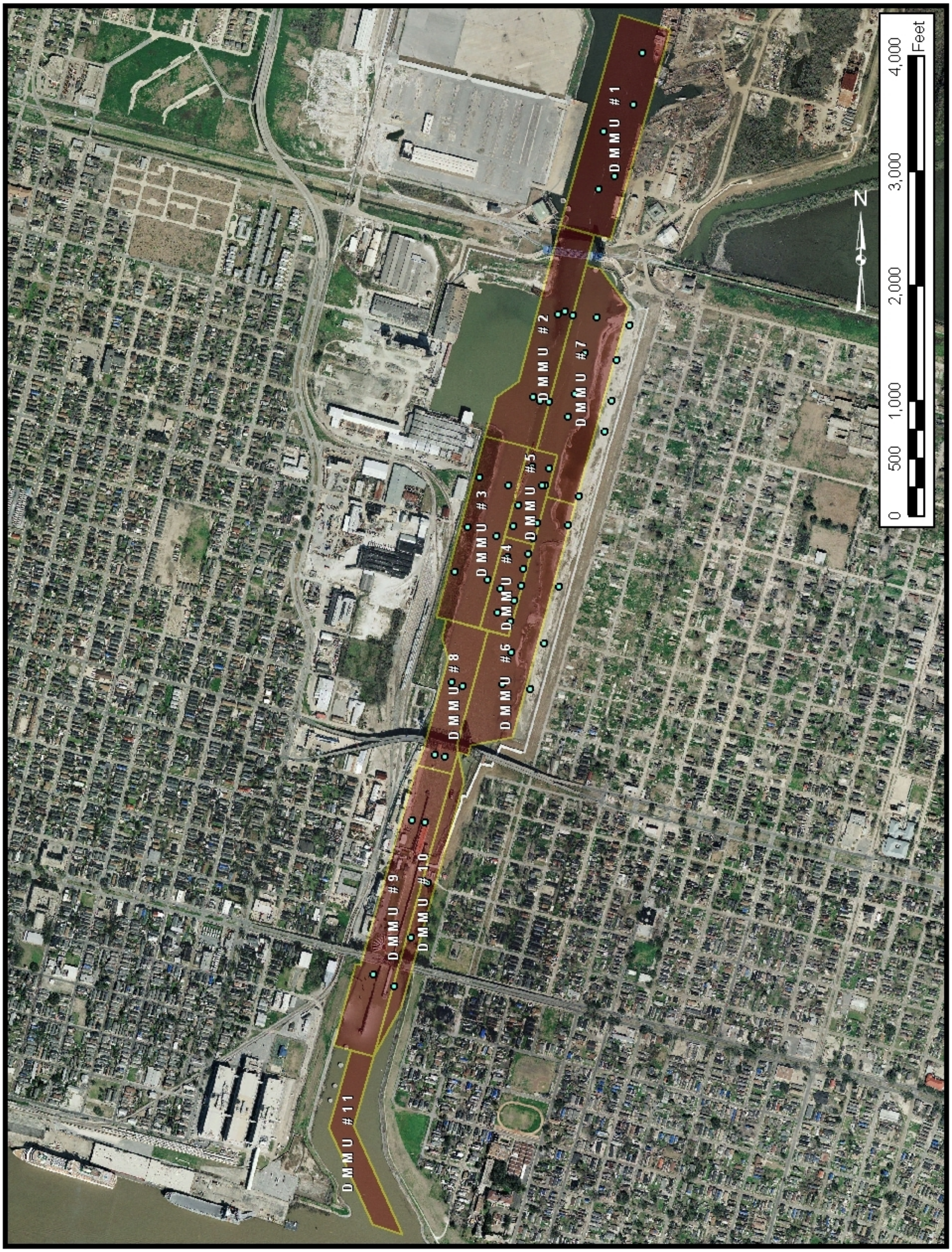

Table 1-1 - IHNC DMMUs and associated project features. Note that non-native sediments occur within the channel, non-native fill are located on the channel banks, and native subsurface soils underlay non-native sediments and soils. *DMMU 4/5 N underlays both DMMUs 4 NN and 5 NN.

Non-Native Sediments	Associated Project Feature
DMMU 1 NN	IHNC Channel Enlargement
DMMU 2 NN	IHNC Channel Enlargement
DMMU 3 NN	New Lock Construction
DMMU 4 NN	New Lock Construction
DMMU 5 NN	New Lock Construction
DMMU 6 NN	North Bypass Channel
DMMU 7 NN	North Bypass Channel
DMMU 8 NN	IHNC Channel Enlargement
DMMU 9 NN	Lock Demolition and IHNC Channel Enlargement
DMMU 10 NN	South Bypass Channel
DMMU 11 NN	IHNC Channel Enlargement

Non-Native Fill	Associated Project Feature
DMMU 3 F	New Lock Construction
DMMU 6 F	North Bypass Channel
DMMU 7 F	North Bypass Channel
DMMU 10 F	South Bypass Channel

Native Subsurface Soils	Associated Project Feature
DMMU 3 N	New Lock Construction
DMMU 4/5 N*	New Lock Construction
DMMU 6 N	North Bypass Channel
DMMU 7 N	North Bypass Channel
DMMU 10 N	South Bypass Channel

A summary of the general physical characteristics of the material proposed for excavation is presented in table 1-2. Physical properties of samples collected within the reaches of the channel were sorted within the table based on sediment type, while ranges were used to distinguish the general variation of physical properties.

Non-native sediments can be characterized as fine-grained material with high moisture content. Combined clay and silt fractions for non-native material were typically greater than 87%, and typically contained less than 12% coarse-grained material, with moisture content ranging between 37% and 58%. By weight, organic carbon content in non-native sediments was variable and ranged from 11,700 to 29,100 mg/kg of organic carbon.

Grain size distribution in non-native fill materials was less consistent. Some fill material contained more than 50% coarse-grained material, while some had very high (up to 96%) proportions of fine-grained material. Organic carbon content varied from 9,270 to 25,300 mg/kg. Moisture content ranged between 27% and 33%. Differences in the physical characteristics of fill material are likely attributable to available sources of material at the time of construction, or differences in construction specifications.

Native subsurface soils had fairly uniform grain size and moisture content. Combined clay and silt fractions ranged between 84% and 96%, and moisture content averaged about 38%. However, organic carbon content varied considerably (7,590 to 44,300 mg/kg). Major coarse-grained alluvial deposits were not apparent, although sand fractions were somewhat greater for a small fraction of the material sampled.

Limits (liquid and plastic) for all channel sediment types were highly variable. All sediments, with the exception of non-native fill material from DMMUs 3 and 10, are grouped as silts and clays under the Unified Soil Classification System (USCS). Non-native fill material from DMMUs 3 and 10 is characterized by silty and clayey sands. With the exception of non-native subsurface soil from DMMU 7, the specific gravity of all channel sediments falls between 2.6 and 2.8

Table 1-2 - Physical Analysis Summary for IHNC Channel and Open Water Disposal site Sediments. Ranges of Physical Properties of DMMUs and Physical Properties of Open Water Disposal Areas - Grain Size Distribution, Percent Moisture, and Organic Carbon Content

	Non-Native Sediment	Non-Native Fill	Native Subsurface Soil	Mississippi River	Mitigation Site
% Clay	33.3 - 66.1	12.4 - 61.4	41.1 - 61.3	12.4	61.4
% Silt	25.7 - 46.2	19.7 - 42	34.9 - 49	29	34.4
% Sand	2.1 - 31.6	3.6 - 57.1	3.4 - 12.2	57.1	3.6
% Gravel	0 - 5.7	0.6 - 9.9	0 - 4	1.5	0.6
% Moisture	37.2 - 57.6	26.5 - 32.9	32.6 - 44.8	33.9	82
Plastic Limit	14.0 - 41.0	17 - 34	17.0 - 55.0	22	83
Liquid Limit	35.0 - 117.0	27 - 90	36.0 - 149.0	35	124
Plasticity Index	19.0 - 85.0	10 - 60	18.0 - 94.0	13	42
Specific Gravity	2.3 - 2.8	2.7 - 2.74	2.6 - 2.8	2.674	2.237
Organic Carbon (mg/kg)	11700 - 29100	9270 - 25300	7590 - 44300	10,300	164,000

Details regarding IHNC, Mississippi River, and Mitigation site sediment characterization can be found in the *Inner Harbor Navigation Canal Lock Replacement Project, New Orleans, LA - Water Quality and Sediment Evaluation* (USACE 2008), as well as the report *Inner Harbor Navigation Canal Evaluation of Material Generated from Lock Construction* (Weston 2008).

Graving Site

The material proposed for excavation at the Graving site consists of previously dredged MRGO sediments that have been placed on top of historic forested wetlands. Graving site material is expected to contain similar physical properties to sediment currently overlying the CDF sites, which is also previously dredged MRGO sediments that have been placed on top of historic forested wetlands.

1.5.2 Quantity of Material

Dredged material volumes for the different disposal sites are presented in Table 1-3.

Table 1-3 - Dredged Material Volumes for Disposal Sites

<table>
<tr><th rowspan="3">DMMU / Location</th><th rowspan="3">Material Type</th><th colspan="4">Volume to Selected Placements (yd3)</th><th rowspan="3">Approx. Year Dredged</th></tr>
<tr><th rowspan="2">Open Water</th><th rowspan="2">Wetland</th><th colspan="2">CDF</th></tr>
<tr><th>Disposal</th><th>Fill Storage</th></tr>
<tr><td>DMMU 1 Sites 1-6</td><td>NN</td><td>0</td><td>0</td><td>48,100</td><td>0</td><td>7</td></tr>
<tr><td>DMMU 2 Sites 1-6</td><td>NN</td><td>0</td><td>0</td><td>88,700</td><td>0</td><td>7</td></tr>
<tr><td>DMMU 3 Sites 1-3</td><td>F</td><td>0</td><td rowspan="2">62,850[a]</td><td>0</td><td>0</td><td>2-3</td></tr>
<tr><td>DMMU 3 Sites 1N-6N</td><td>N</td><td rowspan="2">349,900[a]</td><td>0</td><td>0</td><td>2-3</td></tr>
<tr><td>DMMU 3 Sites 4-6</td><td>NN</td><td>0</td><td>0</td><td>0</td><td>2-3</td></tr>
<tr><td>DMMU 4 Sites 1-8</td><td>NN</td><td>152,800</td><td>0</td><td>0</td><td>0</td><td>2-3</td></tr>
<tr><td>DMMU 5 Sites 1-8</td><td>NN</td><td>0</td><td>0</td><td>78,500</td><td>0</td><td>2-3</td></tr>
<tr><td>DMMU 4/5 Sites 1N-16N</td><td>N</td><td>0</td><td>64,900</td><td>0</td><td>0</td><td>2-3</td></tr>
<tr><td>DMMU 6 Sites 1-2</td><td>NN</td><td rowspan="3">59,100</td><td rowspan="3">0</td><td rowspan="3">0</td><td rowspan="3">404,000</td><td>1</td></tr>
<tr><td>DMMU 6 Sites 3-6</td><td>F</td><td>1</td></tr>
<tr><td>DMMU 6 Sites 1N-6N</td><td>N</td><td>1</td></tr>
<tr><td>DMMU 7 Sites 1-4</td><td>NN</td><td>0</td><td>0</td><td>101,500</td><td>0</td><td>1</td></tr>
<tr><td>DMMU 7 Sites 5-9</td><td>F</td><td rowspan="2">228,000</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">1</td></tr>
<tr><td>DMMU 7 Sites 1N-4N</td><td>N</td></tr>
<tr><td>DMMU 7 Sites 5N-9N</td><td>N</td><td>0</td><td>83,500</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>DMMU 8 Sites 1-4</td><td>NN</td><td>132,000</td><td>0</td><td>0</td><td>0</td><td>7</td></tr>
<tr><td>DMMU 9 Sites 1 & 3</td><td>NN</td><td>150,000</td><td>0</td><td>0</td><td>0</td><td>11</td></tr>
<tr><td>DMMU 9 Sites 2 & 4</td><td>NN</td><td>0</td><td>42,200</td><td>0</td><td>0</td><td>7</td></tr>
<tr><td>DMMU 10 Site 1</td><td>F</td><td rowspan="6">131,400</td><td rowspan="6">0</td><td rowspan="6">0</td><td rowspan="6">0</td><td>7</td></tr>
<tr><td>DMMU 10 Site 2</td><td>F</td><td>7</td></tr>
<tr><td>DMMU 10 Sites 3-4</td><td>NN</td><td>7</td></tr>
<tr><td>DMMU 10 Site 1N</td><td>N</td><td>7</td></tr>
<tr><td>DMMU 10 Site 2N</td><td>N</td><td>7</td></tr>
<tr><td>DMMU 10 Sites 3N-4N</td><td>N</td><td>7</td></tr>
<tr><td colspan="2">Totals:</td><td>1,203,200</td><td>253,450</td><td>316,800</td><td>404,000</td><td></td></tr>
<tr><td colspan="2">Grand Total:</td><td colspan="4">2,177,450</td><td></td></tr>
</table>

[a]Native volumes included with 1-3 and 4-6 volumes above, therefore wetland placement volume is overestimated by the volume underlying DMMU 1 Sites 1-3, and the open water volume is underestimated by the same amount

IHNC Channel

Approximately 2.2 million cy would be dredged from the 10 DMMUs in the IHNC Channel over the project life. DMMU 11 is currently at sufficient depths and would not need to be dredged. Approximately 876,000 cy of material would be dredged to construct a bypass channel for ship traffic during construction. Following the completion of the bypass channel, approximately 708,950 cy of material would be dredged within the lock footprint.

River Site

Approximately 1.2 million cy of material would be deposited into the River Site. Material dredged from DMMU 3NN, 3N, 4NN, 6NN, 6N, 6F, 7F, 7N (area underlying channel sediments), 8NN, 9NN (area south of the existing lock), 10NN, 10F, and 10N would be placed in the Mississippi Site, as shown in Table 1-3.

Confined Disposal Facilities

CDF Disposal Site

Dredged material removed from the IHNC Channel and deemed unsuitable for freshwater disposal would be placed in the *CDF Disposal Site*. Material dredged from DMMUs 1NN, 2NN, 5NN, and 7NN would be placed in the CDF Disposal Site, as shown in Table 1-3. The initial storage volume of the CDF Disposal site is approximately 1,105,133 cy. After the material is dewatered, it is anticipated that 316,800 cy of material would permanently remain in the *CDF Disposal Site*.

CDF Backfill Site

It is anticipated that the initial storage volume of the *CDF Backfill Site* is 1,295,507 cy. Dredged material removed from DMMUs 6NN, 6F, and 6N would be temporarily stockpiled in the CDF Backfill Site, as shown in Table 1-3. Material placed into the *CDF Backfill Site* would be used for stockpiling backfill and capping material for the lock construction site. After the material is dewatered, 404,000 cy would temporarily remain in the *CDF Backfill Site* and would be available for construction backfill.

Beneficial Use

Mitigation Site

It is anticipated that approximately 253,450 cy of material would be placed in the Mitigation Site. Dredged material removed from DMMUs 3F, 4/5N, 7N (area underlying east bank fill), and 9NN (area north of the existing lock) would be placed at the Mitigation Site for wetland creation, as shown in Table 1-3.

IHNC Backfill Site

It is anticipated that 354,000 cy of material would be placed as backfill at the IHNC Backfill Site.

Graving Site

It is anticipated that a total of 664,000 cubic yards of material would be excavated from the Graving site. Of that total, 112,000 cubic yards of material would be used to reinforce the berm and relocated levee and the remaining 552,000 cubic yards of material would be stockpiled east of the Graving site within a temporary containment facility. However, if it is determined that material excavated is not suitable for levee construction, then suitable borrow material would be used for the relocated levee and all of the excess material would be stockpiled east of the graving site. Following construction of the lock modules, the stockpiled excavated material would be used to fill the Graving site and return it to the preconstruction elevation.

1.6 Description of Proposed Discharge Sites

1.6.1 Location and Size

IHNC Channel

Material would be dredged from the IHNC Channel for construction of the new lock. Discharge associated with the IHNC Channel is discussed in the IHNC Backfill site section.

River Site

The River site would be used to dispose a portion of the material excavated between St. Claude Avenue and the Mississippi River. Material deposited in the river would be discharged beyond the 50-foot contour of the river, in the vicinity of the IHNC. The River site is not defined by topographical limits.

Confined Disposal Facilities

CDF Disposal Site

The CDF Dispoal site is located between Bayou Bienvenue and the GIWW, near the intersection of the GIWW and the IHNC. To the west is a salvage yard operation, to the south Bayou Bienvenue, and more open land extends eastward to Paris Road. The CDF would contain two sites: a Disposal site that would permanently contain dredged material and a Backfill site that would temporarily contain dredged material until it would be needed for backfill around the lock construction site. The CDF Disposal site would be approximately 71 acres. Preliminary perimeter dike profile assumes a grade elevation of -2 ft, an overall dike width of 306.5 ft, a total height of 17 ft above grade (+15 elevation), and a 7 ft crest width. Interior dike slopes specified were 3 horizontal to 1 vertical. A minimum setback of 295 ft from Bayou Bienvenue was specified (ERCD 2008).

CDF Backfill Site

The location of the CDF Backfill site is similar to that of the CDF Disposal site. The CDF Backfill site would be approximately 138 acres in size. The dike location and size for the CDF Backfill site are similar to those described for the CDF Disposal site.

Beneficial Use

Mitigation Site

The Mitigation site is located to the northeast of the new lock construction site, in a large triangular-shaped body of shallow, brackish water. The triangular area is bounded by Bayou Bienvenue (Main Outfall Canal) on the north and west, the Back Protection Levee of the 9th Ward on the south, and a landfill and sewerage treatment plant on the east. The Mitigation site is approximately 440 acres, consisting of shallow, brackish water with scattered, remnant cypress stumps. The Mitigation site would be built within the perimeter of the large triangular area, just south of Bayou Bienvenue, so that the existing land would act as a corridor for animals and plants to colonize the Mitigation site. Wetlands would be created within the large triangular area, adjacent to the south bank of Bayou Bienvenue. Potentially recoverable wetland area was estimated to range between 37 acres and 148 acres for mitigation in this area.

IHNC Backfill site

The IHNC Backfill site would be within the corridor of the IHNC. Since the new lock would be built in the IHNC, large amounts of backfill would be required to fill in the north bypass channel constructed for the new lock project. The IHNC lock Backfill site would be constructed after the lock has been constructed. Stone wing dikes would be constructed from the northern corners of the new lock to the north bank of the bypass channel creating a cell approximately 110 acres on the north side of the lock. This area would then be backfilled with material from the CDF Backfill site.

Graving Site

The Graving site would be located on the south bank of the GIWW, east of the Paris Road Bridge. The graving site is approximately 19 acres and the stockpile site is approximately 15 acres for a total area of approximately 34 acres for the graving site. A levee would be constructed around the graving site and dikes would be constructed to contain the stockpiled material.

1.6.2 Type of Site/Habitat of Discharge Sites

IHNC Channel

The area around the lock construction site is highly industrialized and provides minimal habitat for terrestrial species. The channel provides poor habitat for aquatic species.

River Site

The river site is the main channel of the Mississippi River where the depth is over 50 ft. Under the Cowardin, et al. (1979) system, the area is riverine, lower perennial, unconsolidated sand and mud bottom. The existing subaqueous habitat at the river site is characterized by moving sediments, mostly of fine sand and silt. The number of fish species that utilize the main channel of the Mississippi River is limited by high flow rates, lack of food items, and normally high turbidity levels. Some species that may be found in this area are blue catfish, gizzard shad, channel catfish, buffalo fish, yellow bass, largemouth bass, white crappie, and river shrimp.

Confined Disposal Facilities

CDF Disposal Site

The Cowardin, et al. classification for the CDF Disposal site is palustrine, forested and scrub/shrub wetland, broad-leaved deciduous, saturated to seasonally flooded soil, and impounded. The proposed CDF Disposal site is heavily wooded scrub/shrub bottomland hardwood habitats and was historically part of the intertidal marsh system. The dredging of the MRGO/GIWW, done in the 1950s and 1960s, substantially altered these wetlands. The area was previously used as a dredge material disposal area in 1958 and 1959, which raised the elevation. Dikes remain on the site and fairly large ditches of unknown depth bisect the site adjacent to the dikes. It has not been used for disposal in recent years and has overgrown with early successional stage bottomland hardwoods and scrub/shrub. Much of the wooded lands were heavily damaged by Hurricane Katrina and woody vegetation was destroyed by the winds and high water from the storm. Very little mature vegetation remains in the area and much of the recruitment is Chinese tallow. Other species include elderberry, red maple, box elder, roughleaf dogwood, and black willow. Mid-story and understory vegetation present within the CDF Disposal site includes elderberry, poison ivy, blackberry, rattlebox, yaupon, wax myrtle, groundseltree, smartweed, and dog fennel. A majority of the wooded areas are periodically flooded, primarily from rainfall and close proximity to ground water. The CDF areas are at an elevation that is high enough to restrict tidal flows. However, during major rain events and high tides, the area is hydraulically connected to exterior surface waters through eroded retention dikes. Confinement dikes and hurricane protection levees surround the area. These habitats are imbedded within the urban areas of New Orleans and support wildlife species more tolerant of disturbance including those that provide state income in the form of hunting license fees, such as white-tailed deer, American alligator, wild boar, swamp rabbit, raccoon, fox/gray squirrels, and wood duck. Nongame mammals that occur in the study area include Virginia opossum, nine-banded armadillo, and several species of bats, rodents, and insectivores (USFWS 2008).

CDF Backfill Site

The habitat type found within the CDF Backfill site is similar to that found in the CDF Disposal site.

Beneficial Use

Mitigation Site

The Mitigation site consists of shallow, open, tidal, brackish water. According to the Cowardin, et al. (1979) system of classifying wetlands, the area is estuarine, subtidal, unconsolidated mud and organic bottom. The Mitigation site provides sheltered, shallow water, and estuarine habitat. The area is a former cypress swamp that has subsided and received increased salt water influence. There are numerous standing, dead cypress trees but smooth cordgrass is currently the dominant species growing around the edges of the area. The open water in the Mitigation site is fairly turbid with highly organic bottom sediments. Recreationally and commercially important finfish and shellfish species utilizing the area include Gulf menhaden, Atlantic croaker, spotted seatrout, sand seatrout, reddrum, black drum, spot, sheepshead, southern flounder, blue crab, and brown and white shrimp. Common wildlife species include mottled ducks, red-breasted mergansers, lesser scaup, and various species of terns, seagulls, wading birds, and shorebirds (USFWS 2008). The area has been heavily impacted by human activities. A large municipal landfill forms the eastern border, and the area receives significant quantities of urban stormwater runoff which is pumped out of the developed areas to the south.

IHNC Backfill site

The IHNC Backfill site is located adjacent to the IHNC, a man-made navigation channel, in a highly developed area with existing industrial activity. Under the Cowardin, et al. system, the IHNC is estuarine (excavated), subtidal, unconsolidated mud bottom. The shoreline of the IHNC is nearly all bulkhead. Remaining shoreline is rip-rapped or dominated by upland grasses. The IHNC disposal site provides poor habitat for aquatic species and no habitat for terrestrial species since it is entirely industrialized.

Graving Site

Similar to the CDF sites, the Graving site consists of early succession woods and scrub/shrub areas. The Cowardin, et al. classification is palustrine, forested and scrub/shrub wetland, broad-leaved deciduous, saturated to seasonally flooded soil, and impounded. This area had been previously used as a dredge material disposal area but has not been used in recent years and has overgrown with early successional woods and scrub/shrub. The majority of the proposed graving site is located on the flood side of GIWW/MRGO and is subject to tidal influence with the exception of a small portion of the area.

1.6.3 Timing and Duration of Discharge

The entire project construction schedule is expected to last about 11 years.   Aside from the placement of CDF backfill material into the IHNC Backfill site and Graving site stockpile material into the Graving site, placement of material would occur simultaneously with dredging.

IHNC Channel

Dredging associated with the 11 DMMUs of the IHNC Channel would follow the assumed dredging sequence and timeline below:

- DMMUs 6 and 7: Year 1 (north bypass channel)
- DMMUs 3, 4, and 5: Years 2 and 3 (new lock excavation)
- DMMUs 1 and 2: Years 6 or 7 (north channel excavation)
- DMMU 8 (Sites 1-3): Year 7 (south channel excavation)
- DMMU 9 (Sites 2 and 4) and DMMU 10: Year 7 (south channel bypass excavation)
- DMMU 9 (Sites 1 and 3): Year 11 (lock demolition, river excavation to St. Claude)
- DMMU 11: Not scheduled to be dredged

River Site

Discharge of material in the River site would occur intermittently during construction and would last for up to several weeks during years 1, 2, 3, 7, and 11 of the construction sequence.

Confined Disposal Facilities

CDF Disposal Site

Discharge of material into the CDF Disposal site would occur during the first, second, third, and seventh years of the construction. Material placed into the CDF Disposal site would be removed from DMMUs 7, 5, 1, and 2. The duration of dredging and duration of pumping associated with these DMMUs and the CDF Disposal site are show in Table 1-4.

CDF Backfill Site

Material placed into the CDF Backfill site would be dredged from DMMU 6 during the first year of construction. The duration of dredging and duration of pumping associated with DMMU 1 and the CDF Backfill site are shown in Table 1-4.

Table 1-4 - Dredging and Disposal Schedule for Material Placed in the CDF Sites

DMMU	In-situ Volume (cy)	Year Dredged	Dredging Duration (days)	Pumping Duration (days)
CDF Disposal Site				
7	101,500	1	7.5	5.8
5	78,500	2 and 3	5	3.9
1	48,100	7	2	1.2
2	88,700	7	3	2.6
Total	316,800			
CDF Backfill Site				
6	404,000	1	26	20
Total	404,000			

Beneficial Use

Mitigation Site

Discharge of material into the Mitigation site would occur during the first, second, and third years of the construction period and may be intermittent over a period up to two years.

IHNC Backfill site

Discharge of material into the IHNC Backfill site would occur in the sixth and seventh years of the construction period.

Graving Site

The Graving site and stockpile area would be constructed in the first year of construction and would be backfilled at year seven at the completion of the last lock module.

1.7 Description of Discharge Methods

IHNC Channel

Due to the volumes of material that would be dredged for lock construction, hydraulic dredging, which allows for the pumping of material to a temporary or permanent disposal site, would be utilized to remove material from the IHNC Channel.

River Site

The material deposited at the river site would be in the form of hydraulic slurry. The slurry would be deposited at the surface of the river. Heavier suspended particles would fall through the water column and become part of the river's bedload. Finer, lighter particles would remain in suspension and would be carried with the river's suspended sediments downstream, eventually to the Gulf of Mexico or coastal estuaries.

Confined Disposal Facilities

CDF Disposal Site

The material deposited in the CDF Disposal site would be deposited hydraulically and confined by low level dikes. Effluent and runoff collected from precipitation would be pumped from the CDF Disposal site over the flood protection levee and into the GIWW where dilution capacity would be adequate. Other dewatering measures include surface trenching, weir management, and vegetation control. Active dewatering of the CDF Disposal site would occur to encourage rapid consolidation and desiccation of dredged material. The CDF Disposal site would be accessed by constructing an earthen ramp across the flood control levee allowing access for trucks for CDF Disposal site maintenance and to recover materials from the fill cell for use as backfill at the lock construction site. Earthen ramps would also be constructed for ingress and regress to the CDF Disposal site and for adequate turn-around and staging space for vehicles. Existing dikes would be upgraded and new dikes would be constructed as necessary to confine the dredged material.

CDF Backfill Site

The method of discharge at the CDF Backfill site would be similar to that for the CDF Disposal site.

Beneficial Use

Mitigation Site

The material deposited in the Mitigation site would also be deposited hydraulically and would be confined by low level dikes. The goal of material placement in the mitigation area would be to create emergent marsh in an area which now contains shallow brackish water. The dredged material would be placed so that after settling, consolidation, and initial subsidence, the elevation would be suitable for the colonization of tidal marsh plant species. The dikes would be breached at several locations after effluent discharge so tidal exchange would be restored between the Mitigation site and Bayou Bienvenue.

IHNC Backfill site

The material used for backfill at the IHNC Backfill site may be deposited by hydraulic dredge. All material deposited hydraulically would be deposited inside of containment levees to prevent the material from running into the IHNC. Discharge of material into the IHNC disposal site would be in a confined manner, using either sheetpiles or stone dikes to prevent material from flowing into the IHNC.

Graving Site

Following the construction of the lock modules, the stockpiled excavated material and any material imported for the realigned levee construction would be used to fill the graving site and return the graving site to the preconstruction elevation. The flood protection levee would be reconstructed to its current alignment and authorized elevation. If it is determined that the volume of material in the stockpile area is not adequate to restore the graving site to the preconstruction elevation, borrow material would be imported to reach this elevation.

2.0 FACTUAL DETERMINATIONS

2.1 Physical Substrate Determinations

2.1.1 Substrate Elevation and Slope

River Site

The disposal of dredged material in the River site would have an insignificant effect on the bottom elevation since it would be dispersed for a distance downstream. The depth of the Mississippi River in the vicinity of the proposed disposal is approximately 95 ft.

Confined Disposal Facilities

The elevation of the CDF sites is about +3 to +10 ft. The elevation would be raised about 5 to 10 ft. CDF dikes would be constructed to a +15 ft crest elevation, which matches the specified interim reconstructed height of the adjacent flood control levee, with a 1 vertical to 3 horizontal slope and +7 ft crest width. Maximum storage depth of the CDF would be +9 ft (ERDC 2008). The CDF Stockpile site would be restored to pre-project elevations following the removal of stockpile material for backfill around the new lock.

Beneficial Use

Mitigation Site

The elevation of Mitigation site would be purposefully altered in order to establish an emergent wetland. The existing elevation of about -2 ft would be raised to an initial slurry height of +3.5 ft to +5 ft, and would settle to an elevation between +1.5 ft and +2.5 ft. Slope of the created marsh would range from approximately 1 vertical on 25 horizontal to 1 vertical on 50 horizontal.

IHNC Backfill Site

The IHNC Backfill site varies from about +10 ft along the industrialized banks of the canal to the bottom of the canal which varies between 30-40 ft deep in the center of the channel. Backfill of the new lock would raise elevations to the east and west of the lock above Mississippi River and IHNC stages.

Graving Site

The elevation of the Graving site and stockpile area are about +3 to +10 ft. Excavation of the Graving site would result in a Graving site pit with a base area at a floor elevation of -31 ft and dimensions of 320 ft by 440 ft. The height of the berm around the Graving site would reach +7 ft, which coincides with a 10-year frequency for a hurricane surge event. The inside slopes from +0 ft to -31 ft would be 1 vertical to 5 horizontal. The Graving site interior slope for the initial closure plug, adjacent to the GIWW Channel, would be 1 vertical to 6 horizontal. The berm from +0 ft to +7 ft would be set back 40 ft from the top of the excavation for the Graving site, with a 1 vertical to 3 horizontal slope and a 10-foot crown (USACE 2007). Graving site stockpile material will be used to backfill the site following the completion of construction activities and the Graving site would be restored to pre-project conditions.

2.1.2 Sediment Type

River Site

The bottom of the Mississippi River has been described as unconsolidated sand and mud. Mississippi River sediments were predominantly coarse-grained (57% sand) with a specific gravity of approximately 2.7, low plastic and liquid limits (22 and 35, respectively), a low moisture content (34%), and a low organic carbon content (10,300 mg/kg). Dredged material placement at the River site would not affect physical characteristics of the river because the channel size and velocity would contribute towards a high level of dispersion of the material.

Confined Disposal Facilities

The sediment surface layer at the CDF sites consist of material dredged from the MRGO during maintenance dredging activities which overlies historic forested wetlands, and is expected to display physical characteristics similar to most IHNC channel material. Because of the similarity between the channel sediment and disposal site sediment, no long-term physical changes in substrate at the disposal site are expected.

Beneficial Use

Mitigation Site

The bed material at the Mitigation site currently consists of unconsolidated mud and organic bottom. Sediments are predominantly fine-grained (96% clay and silt) with low specific gravity (2.24), high plastic and liquid limits (83 and 124, respectively), high moisture content (82%), and high organic carbon content (164,000 mg/kg). Material dredged from the IHNC has lower moisture content and organic carbon content than Mitigation site sediment (material to be placed at the Mitigation site contains an average of 36% moisture and 22,880 mg/kg organic carbon). Significant differences in sediment physical behavior (as indicated by the liquid and plastic limits) and specific gravity between the Mitigation site and channel sediments proposed for placement at the Mitigation site may alter the surface layer of a majority of the Mitigation site (table 2-1). In addition, placement of fill material from DMMU 3, which contains a lower fraction of fine-grained material than the Mitigation site (only 41% clay and silt), would alter the grain size distribution for a fraction of the surface layer of the Mitigation site.

Table 2-1 – Mitigation Site Physical Analysis Summary

	Material Proposed for Mitigation					
	DMMU 9 NN	DMMU 3 F	DMMU 4/5 N	DMMU 7 N	Average	Mitigation site
% Clay	49.3	12.4	41.1	61.3	40.72	61.4
% Silt	41.9	29	49	34.9	37.56	34.4
% Sand	8.6	57.1	9.9	3.8	21.28	3.6
% Gravel	0.2	1.5	0	0	0.44	0.6
% Moisture	42.4	26.7	32.6	44.8	35.80	82
Plastic Limit	28	-	23	41	32.99	83
Liquid Limit	67	27	53.5	98	63.28	124
Plasticity Index	39	-	30.5	57	45.23	42
Specific Gravity	2.734	2.687	2.746	2.713	2.72	2.237
Organic Carbon (mg/kg)	12,700	10,900	7,590	44,300	22881.61	164,000

IHNC Backfill Site

Native material from DMMU 6 would be placed at the IHNC Backfill site. Because the source and destination of the sediment are nearly identical, no alterations to the physical properties of sediment at the backfill site are expected.

Graving Site

Graving site material, which consists of sediment originally excavated from virgin wetlands during construction of the Mississippi River-Gulf Outlet (MRGO) overlying naturally deposited alluvial sediment, is expected to physically resemble the existing surface layer material at the CDF Stockpile site and most IHNC channel material. Due to the proximity of the stockpile area to the Graving site, and because stockpile material will ultimately be reposited into the Graving site, no physical differences between dredged material and disposal site are expected.

2.1.3 Dredged and Fill Material Movement

River Site

The Mississippi River will transport the finer dredged material deposited in the river disposal site downstream and eventually to the Gulf of Mexico. Heavier sediment particles would settle out downstream of the disposal site but would gradually shift downriver with the bed load.

Confined Disposal Facilities

The material deposited within the CDF will be confined by dikes and is not expected to shift or move.

Beneficial Use

Mitigation Site

The material deposited at the Mitigation site is expected to subside due to dewatering and consolidation of the soil. Initially it was thought that a structure would be constructed that would permit containment of solids and water in much the same manner as a CDF. However, due to the condition of the foundation soils throughout the Mitigation site, construction of some type of temporary structure, such as hay bales, may be used instead to minimize flow of solids away from the intended placement area. This would not be sufficient to completely restrict flow of the associated water, and the entire triangular area would function in somewhat the same manner as a containment area.

If confinement dikes are employed for retaining sediment, minimal export of dredged material out of the dikes would be expected. If dredged material is semi-confined by a temporary structure, higher levels of suspended sediment particles would disperse from the site and into the open water that surrounds the temporary structure, but most of the dredged material would remain confined.

IHNC Backfill Site

Material deposited at the IHNC Backfill site would be used to create land around the newly constructed lock. Movement of dredged material out of the Backfill site would not be allowed.

Graving site

The material deposited within the stockpile area would also be confined by dikes and is not expected to shift or move. The stockpiled material would be confined by the Graving site walls when it is reposited as backfill.

2.1.4 Physical Effects on Substrate

River Site

Minimal physical effects on substrate are expected due to the proposed discharge into the Mississippi River. The Mississippi River will transport the finer dredged material deposited in the river disposal site downstream and eventually to the Gulf of Mexico. Heavier sediment particles would settle out downstream of the disposal site but would gradually shift downriver with the bed load. These factors, combined with the significant amount of dispersion of dredged material, would minimize physical effects on Mississippi River substrate.

Confined Disposal Facilities

Physical properties of CDF and IHNC channel sediments are not expected to differ significantly, and therefore no long-term physical alterations of substrate at the disposal site are expected.

Beneficial Use

Mitigation Site

Placement of material dredged from the IHNC would result in a raised substrate elevation at the mitigation area with lower levels of moisture content and organic carbon than sediments native to the Mitigation site. Placement of fill material from DMMU 3 would result in more coarsely grained substrate for a portion of the Mitigation site.

IHNC Backfill Site

Because the source and destination of the sediment used as backfill are nearly identical, no alterations to the physical properties of sediment at the backfill site are expected.

Graving Site

Graving site material, which consists of sediment originally excavated from virgin wetlands during construction of the Mississippi River-Gulf Outlet (MRGO), is expected to contain physical characteristics similar to that of the CDF and IHNC channel material. Due to the proximity of the stockpile area to the Graving site, and because stockpile material will ultimately be reposited into the Graving site, no short- or long-term physical differences between disposal site and dredged material are expected.

2.1.5 Duration and Extent of Change

River Site

Discharge into the River site would occur intermittently during construction and would occur during years 1, 2, 3, 7, and 11. Each disposal event is expected to last several weeks and changes are expected to last the duration of discharge. Changes at the River site would be temporary as material is expected to quickly disperse.

Confined Disposal Facilities

CDF Disposal Site

Material would be permanently placed into the CDF Disposal site. Disposal of material into the CDF Disposal site would begin in the first year of construction and is expected to continue until the seventh year of construction. After this time, the backfill material would be placed over the site and it would be allowed to revegetate.

CDF Backfill Site

The changes at the CDF Backfill site would be temporary. Material would be placed into the site in the first year of construction. Changes are expected to last the entire construction life and material would be removed from the site and used as backfill at the new lock site during the eleventh year of construction. After this time, the CDF Backfill site would revegetate and return to pre-project condition.

Beneficial Use

Mitigation Site

Material would be placed permanently into the Mitigation site. Discharge would occur during the first, second, and third years of construction and may be intermittent over a period of up to two years. Changes could last up to five years as material is discharged into the area. The Mitigation site would change from an open water area to an area suitable for the colonization of tidal marsh species after the material settles, consolidates, and subsides.

IHNC Backfill site

The IHNC Backfill site would be prepared during the first year of construction. Material would be placed into the IHNC Backfill site during the tenth year of construction. Changes are expected to last during the eleven years of the construction life. After lock construction, the area would be backfilled with material originally removed from the site.

Graving Site

Excavation of the Graving site would begin in the second year of construction. It would be dewatered and maintained for 4 to 5 years during the construction of the lock modules. Changes are expected to last up to six years. Following the construction of the lock modules, stockpiled material would be used to fill the Graving site and return it to the preconstruction elevation. It would be allowed to revegetate and return to pre-project condition.

2.1.6 Actions Taken to Minimize Adverse Impacts

Confinement dikes or temporary structures would be used to prevent the flow of dredged material from the Mitigation site. Confinement dikes would prevent the flow of dredged material from the CDF sites and material excavated from the Graving Stockpile site.

2.2 Water Column Determinations

2.2.1 Salinity

River Site

No change in salinity is expected at the River site.

Confined Disposal Facilities

No significant change in salinity is expected for discharges into the receiving waters of the GIWW. Because of the proximity of the GIWW to the IHNC, similar salinities would be expected for the channels. Placement of dredged material from the IHNC channel north of the existing IHNC lock would result in the discharge of water that commonly flows into the GIWW with the tidal cycle.

Beneficial Use

Mitigation Site

If the Mitigation site disposal activities are to be confined, short-term salinity differences may occur within the confined area as compared to tidal waters outside of the disposal area until dikes are breached following consolidation of dredged material. If the disposal activities are to be semi-confined, the short-term differences in salinity could be reduced or eliminated as the temporary confinement structures would allow tidal waters into the Mitigation site. For either confinement method, following the breaching of the confinement structure and settling of dredged material, tidally influenced waters would return salinities to pre-project conditions.

IHNC Backfill Site

No change in salinity is expected for the IHNC, which is where discharges from the IHNC Backfill site would be routed. Material that would be placed at the CDF Stockpile site would dry and consolidate while stockpiled, and when placed as backfill for the new lock would displace water at the backfill site into the neighboring IHNC channel. This water displaced would contain no difference in salinity from the waters of the IHNC channel into which it would discharge.

Graving Site

No change in salinity is expected at the Graving site.

2.2.2 Water Chemistry

2.2.2.1 pH

Dredging and placement may result in short term effects on pH. Factors typically associated with dredging activities may cause pH in receiving area waters to shift toward more acidic conditions. These factors include increased turbidity, organic enrichment, chemical leaching, reduced dissolved oxygen, and elevated carbon dioxide levels, among others.

River Site

Ambient pH values in the Mississippi River ranged from: 7.02 – 7.97 with an average of 7.59; these values were obtained from Louisiana Department of Environmental Quality (LDEQ) ambient water quality monitoring site numbers 51 and 320 and are for measurements taken from 2002 through 2008. Due to the high mixing ability of the river site, as well as high alkalinities observed at the river at these monitoring sites (74.2 – 181 mg/L, with an average of 113.8 mg/L), there is no reason to believe that disposal of dredged material at the site would affect pH.

Confined Disposal Facilities

Ambient pH values in the GIWW ranged from: 7.08 – 7.96 with an average of 7.67; these values were obtained from LDEQ ambient water quality monitoring site number 1064 and are for measurements taken throughout 2006. Discharge of effluent from the CDF sites and into the GIWW could result in a lowering of pH values in the immediate vicinity of the discharge location. As the discharges disperse with the tidally influenced waters, pH levels in the GIWW would return to normal.

Beneficial Use

Mitigation Site

Mitigation site pH ranged from 8.4 to 9.6 during the summer of 2007. Effluent discharges from the Mitigation site would result in a temporary reduction in pH for adjacent waters, including Bayou Bienvenue. The Tidal action in the vicinity of the Mitigation site would help to reduce pH effects by dispersing Mitigation site effluent. For either confinement method proposed, following the breaching of confinement dikes or structures, and establishment of emergent wetland vegetation, pH levels would return to normal.

IHNC Channel

Ambient pH values in the IHNC ranged from: 6.80 – 7.60 with an average of 7.27; this data was obtained from LDEQ ambient water quality monitoring site number 306 and is for measurements taken throughout 2007. Because the material to be placed at the IHNC Backfill site will be dewatered and oxidized prior to placement, it is not expected that placement as backfill would result in the introduction of high concentrations of suspended constituents that would subsequently aid in lowering pH levels within the IHNC.

Graving Site

Ambient pH values in the GIWW ranged from: 7.08 – 7.96 with an average of 7.67; these values were obtained from LDEQ ambient water quality monitoring site number 1064 and are for measurements taken throughout 2006. The placement of dredged material at the Graving Stockpile site, as well as the use of the stockpiled material for backfill following the completion of construction, would result in the discharge of dredged material effluent with suspended sediment particles into the waters of the GIWW. Because of the highly organic nature of this sediment, pH levels in the immediate vicinity of the discharge locations would be reduced. However, this reduction in pH would be temporary and short-lived; tidal action within the GIWW would disperse suspended sediment particles, and pH levels in the GIWW adjacent the Graving site would return to normal.

2.2.2.2 Water Column Impacts

Mississippi River Site

Standard elutriates were prepared using water collected from the Mississippi River open water disposal site near the mouth of the Inner Harbor Navigation Canal in New Orleans. The standard elutriate test, used to model impacts associated with open water disposal, is described in USEPA and USACE (1998), Section 10.1.2.1. Mean and maximum dissolved contaminant concentrations in the elutriates determined for each contaminant of concern, utilizing the results obtained from all DMMU standard elutriates samples, are presented in Addendum A, *Inner Harbor Navigation Canal Lock Replacement Project, New Orleans, LA - Water Quality and Sediment Evaluation*. Geometric means of elutriate concentrations for each DMMU were also calculated in order to evaluate mixing zone requirements for the majority of the dredged material and are presented in Addendum A. The geometric mean takes into account the influence of a few high or low values within a DMMU on the mean.

Elutriate concentrations (maximum and geometric mean values) were compared to the most conservative of acute and chronic Federal and State of Louisiana water quality criteria. Where no such criteria existed, EPA Region 4 water quality screening criteria for hazardous waste sites were used, if available. Where elutriate concentrations exceeded either acute or chronic water quality criteria, dilutions were calculated using background concentrations of the receiving waters. Dilution requirements are expressed as the dilution ratio, which is the ratio of receiving water volume to effluent volume. Where background concentrations exceeded the criteria, dilution was calculated to 10% above background.

Dilution requirements calculated based on comparison of maximum effluent concentrations to water quality criteria indicate a maximum dilution of 69 for barium as required to meet freshwater acute criteria, and a maximum dilution of 697 for Total PCBs as required to meet freshwater chronic criteria. Dilutions based on mean (geometric mean) elutriate concentrations resulted in a maximum dilution requirement of 18 to meet freshwater acute criteria, and a dilution requirement of 90 to meet freshwater chronic criteria (both for barium).

Dilutions were also calculated based on results of elutriate toxicity tests described in Addendum A. Survival in the 100% elutriate treatment was significantly lower than in the control water for non-native surface sediments of DMMUs 1, 6, 7, and 9, native subsurface soils of DMMUs 4/5, 6, 7, and 10 and fill material from the bank of DMMU 6. Maximum dilutions required for those DMMUs to prevent adverse water column impacts ranged from 1 to 384.

Mixing

A determinant for evaluating effects resulting from effluent discharge at the Mississippi River open water disposal site is based on mixing zone modeling. Using physical and chemical properties of the receiving water at the Mississippi River disposal site, attainable dilution was calculated for high and low flow receiving water conditions for barge dump and for continuous pipeline discharge.

Figures 2-1 through 2-4 illustrate the distance required to achieve a specified dilution ratio for the different conditions assumed. These figures show that a dilution of 700 can be achieved for high flow conditions (Figures 2-1 and 2-2) in approximately:

- 1000 ft for pipeline discharge
- 1000 ft for barge discharge

For low flow conditions (Figures 2-3 and 2-4), a dilution of 700 can be achieved in approximately:

- 2100 ft for pipeline discharge
- 1400 ft for barge discharge

Based on the modeling conducted for disposal in the MR disposal site, a 700 fold dilution could be met within 2100 ft from the discharge point for low flow conditions, and within 1000 ft for high flow conditions.

The available mixing will meet the most stringent dilution requirements based on comparison of elutriate concentrations to water quality criteria, and will also satisfy the maximum dilution requirements based on the elutriate toxicity testing. In addition, the dilutions required to be protective based on toxicity can be met within approximately 1400 ft for worst case conditions (low flow, pipeline disposal), as the maximum dilution based on toxicity was less than 400. As these mixing zone dimensions appear to be reasonable according to the Louisiana State Environmental Regulatory Code Part IX, Subpart 1, Chapter 11, §1115C, and consistent with past operation, it appears that none of the materials tested would be excluded from open water disposal in the Mississippi River on the basis of water column impacts outside of an authorized mixing zone. More detailed information regarding mixing zone modeling and dilution of detected analytes is provided in Addendum A.

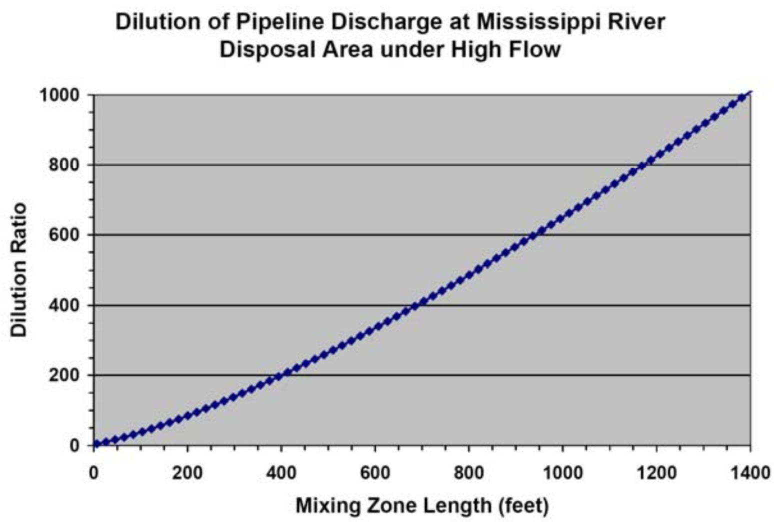

Figure 2-1 - Dilution ratio as a function of distance for pipeline disposal at Mississippi River Disposal Area under high flow conditions

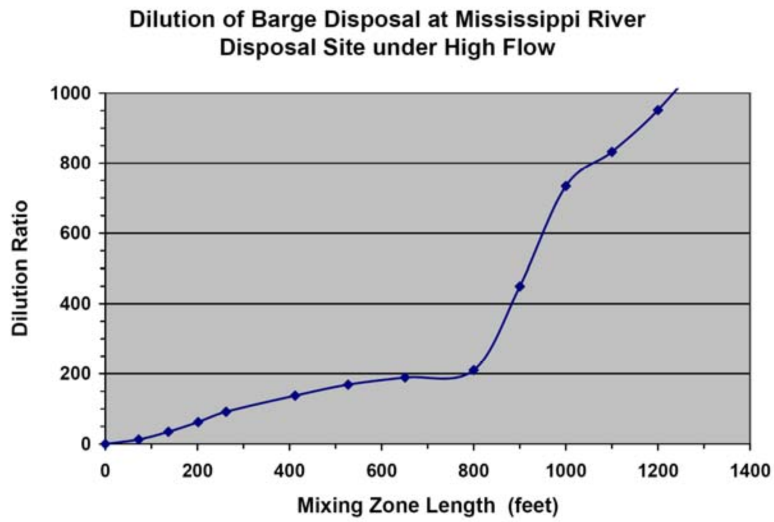

Figure 2-2 - Dilution ratio as a function of distance for barge disposal at Mississippi River Disposal Area under high flow conditions

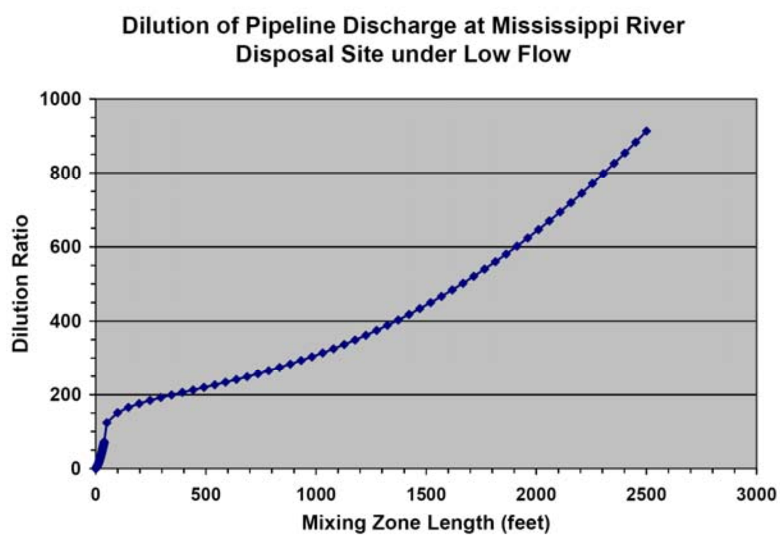

Figure 2-3 - Dilution ratio as a function of distance for pipeline disposal at Mississippi River Disposal Area under low flow conditions

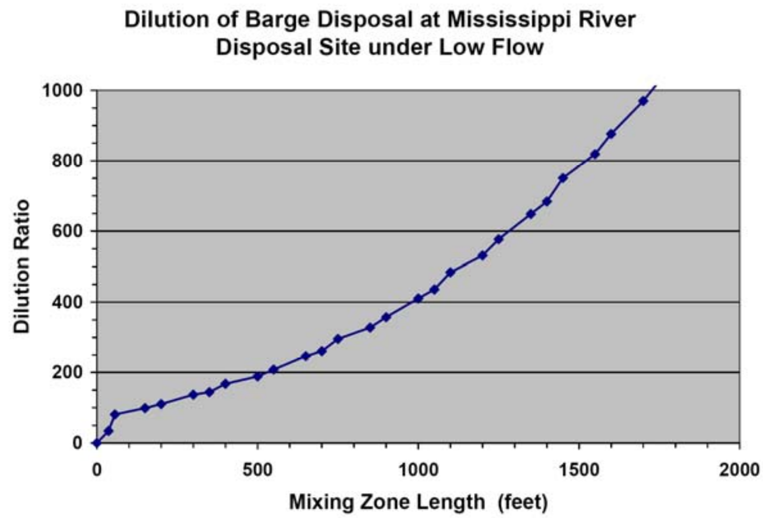

Figure 2-4 - Dilution ratio as a function of distance for barge disposal at Mississippi River Disposal Area under low flow conditions

Confined Disposal Facilities

The modified elutriate test is described in Appendix B of the Upland Testing Manual (UTM) (USACE 2003). The modified elutriate is specified for the assessment of water quality impacts associated with release of effluent from CDFs. The evaluation of effluent discharges should consider the effects of mixing and dispersion. If water quality standards can be met within the prescribed boundaries of an approved mixing zone, there should not be an unacceptable environmental effect as a result of the effluent discharge.

Effluent discharges from the CDF were evaluated based on modified elutriate tests, as presented in detail in Addendum A. For discharge to the GIWW a maximum dilution of 3179 was required for tributyltin to meet marine chronic criteria due to the high concentration of tributyltin in the modified elutriate of one sediment sample from DMMU 4. A maximum dilution of 770 was required for copper to meet marine acute criteria. However, the highest elutriate concentrations for those compounds were considered unreliable due to apparent analytical problems. Maximum dilution based on the highest reliable sample concentration for copper resulted in a dilution ratio requirement of 8 to meet acute and chronic criteria. A similar issue was noted for lead, for which the highest reliable elutriate concentration results in a dilution ratio of 8 to meet marine chronic criteria, and no dilution necessary to meet acute criteria. Dilutions based on mean (geometric mean) elutriate concentrations indicated all marine acute criteria were met without mixing, and a maximum dilution of 6 was required to meet marine chronic criteria.

No toxicity testing was conducted on modified elutriates for determination of dilution requirements for constituents lacking water quality criteria. Modified elutriate concentrations were therefore compared to standard elutriate concentrations to evaluate applicability of standard elutriate toxicity tests in determining modified elutriate dilution requirements. There were no metals for which any concentrations were higher in the modified elutriates (mean, geometric mean or maximum), and for the few organic constituents that were higher, the maximum was only 14% higher than the standard elutriates concentration. Standard elutriates toxicity tests are therefore reasonably representative of toxicity that would be expected with modified elutriates. Survival was not statistically different from control in toxicity testing conducted on marine standard elutriates, and no LC50 values resulted. Therefore, no dilution of effluent is considered necessary for discharge in the marine environment based on toxicity.

Mixing

Dredged material effluent is a high volume flow generated during the period of dredging. As sediment settles within the CDF, the clarified supernatant is collected and discharged. Weir structures are frequently used for controlled discharge of effluent and runoff. Box weirs are one type of discharge structure that could be used in the proposed CDF.

The rate at which effluent and runoff from the CDF is discharged varies depending upon dredge production rate, ponding capacity of the site, dewatering objectives for the sediment and receiving water capacity in terms of both flow and ability to provide dilution for contaminants. There are two possible receiving waters in this case, Bayou Bienvenue and the GIWW. Flow rate in Bayou Bienvenue is thought to be very low and intermittent, and dilution capacity is therefore expected to be correspondingly low. Flow rate and dilution capacity in the GIWW are believed to be much greater.

Although data for the GIWW was limited, and the GIWW was not sampled or analyzed as part of the IHNC characterization effort, sufficient information regarding channel geometry and flow rate was available to estimate mixing zone dimensions necessary to achieve required dilutions. Currents on the GIWW and MRGO are affected by tidal action and freshwater inflows. Reportedly, the mean annual velocity in the channel is about 0.6 fps, but may exceed 2 fps on ebb or flood tides. During periods of low inflows into the lake, July through November, surface ebb and bottom velocities average about 0.8 and 1.7 fps, respectively. Both may exceed 2 fps. Based on a mean annual velocity of 0.6 fps, and an estimated cross sectional area of 2661 m3, average flow in the GIWW was estimated to be approximately 17,000 cfs.

The GIWW would be classified as a Category 3 water body (tidal channel with flow greater than 100 cfs. For such a water body, the zone of initial dilution (within which acute criteria may be exceeded) is restricted to 10 cfs or 1/30 of the flow, whichever is greater. In this case, the average flow in the GIWW was estimated to be approximately 17,000 cfs. The zone of initial dilution would be restricted to 1/30 of the cross sectional area. Similarly, the mixing zone is restricted to 100 cfs or 1/3 of the flow, whichever is greater. The allowable mixing zone would therefore be restricted to 1/3 of the cross sectional area of the GIWW.

The outcome of the mixing zone analysis is summarized here. Mixing zone curves (Figures 2-5 and 2-6) reflect attainable dilution as a function of distance from the discharge point. Figure 2-7 illustrates mixing zone width as a function of distance from discharge point, and Figure 2-8 illustrates the attainable dilution in the GIWW as a function of cross sectional area.

Based on available information, maximum attainable dilution ratio for discharge of effluent to the GIWW is 120. Assuming maximum effluent concentrations for all DMMUs, adequate dilution will be attainable within a mixing zone complying with State of Louisiana requirements for all constituents except tributyltin, total PCBs, Aroclor 1016 and dieldrin (assuming adjusted dilution requirements for copper and lead, as previously discussed). Effluent treatment may be required when dredging areas of the IHNC with elevated concentrations of these constituents. However, the mixing that is inherent in hydraulic dredging will likely reduce peak predicted effluent concentrations, as reflected by the geometric mean elutriate concentrations. For the mean (geometric) predicted effluent concentrations, all dilution requirements can be met within the prescribed mixing zone in the GIWW.

Assuming maximum runoff concentrations from wet, unoxidized material can be conservatively estimated based on modified elutriate concentrations, evaluation of mixing zone requirements for runoff can be estimated based on comparison of modified elutriates to acute criteria. In this case, all dilution requirements for acute criteria would be met within the mixing zone of the GIWW. Determination of the mixing zone requirements for runoff from dried, oxidized material will require evaluation of the simplified laboratory runoff data (SLRP), which has been generated.

Data regarding geometry and flow rate in Bayou Bienvenue was insufficient to permit modeling of a mixing zone as was done for the GIWW. Bayou Bienvenue is sufficiently small in depth and width and the flow rate is sufficiently low that discharge from the CDF would fully envelop and mix with the entire flow of Bayou Bienvenue within a couple hundred ft of the discharge. As such, modeling is not needed and the dilution achieved is simply a ratio of the flow of Bayou Bienvenue and the CDF discharge. Flow rate within Bayou Bienvenue was estimated based on available information and appears to be quite limited, a function of tidal exchange, surface runoff, and stormwater pumping.

Stormwater pumping varies from 20 to 50 cfs on an annual basis with a characteristic average annual discharge rate of 33 cfs (National Marine Fisheries Service 1999). Pumping typically occurs no more than a few days per month and may average about 2 days per month. During these periods of pumping the flow rate may average 500 cfs with instantaneous rates of more than 1000 cfs.

The drainage area is about 2780 acres (National Marine Fisheries Service 1999). The mean annual rainfall is about 50 inches and the mean annual runoff would be about 30 inches. This would yield an average annual discharge rate of 10 cfs and would average about 120 cfs on days when runoff occurs, assuming about 30 runoff events per year.

The tidal flow is diurnal with an average tidal range of 1 ft (Appendix B, Page B-3, Section B.1.9, USACE 1997). Assuming a channel width of 130 ft and channel length of 20,000 ft (with discharge taking place at the southwest corner of the CDF, and along the southern edge of the CDF), the average daily tidal exchange rate is 30 cfs. Tidal exchange may be reduced as an effect of proposed hurricane protection provisions, therefore these assumptions should be reviewed once those structures are in place. In addition, the open area south of the proposed disposal area experiences a daily tidal range of approximately 6 in. over an area of 440 acres, resulting in an effective flow rate of 111 cfs. This area discharges into Bayou Bienvenue, resulting in a combined flow rate in Bayou Bienvenue of approximately 141 cfs (151 cfs including average annual runoff flows). Flow would be much greater (perhaps 700 cfs) following large precipitation events (10 to 20 days per year).

At a flow rate of 141 cfs, the dilution available for effluent discharged at a rate of 47 cfs into Bayou Bienvenue is 3 parts background flow to 1 part effluent (3:1). This dilution is inadequate to meet water quality criteria for the effluent pathway without treatment. It is anticipated that simple broadcasting of activated carbon around the weir of the CDF will be effective in reducing effluent concentrations of organic compounds sufficiently to permit discharge, if required. Bench testing will be required to establish the efficacy of that or other proposed treatment to meet treatment objectives for the IHNC effluent.

Runoff from the CDF would be discharged at a rate up to 1 inch per day from the interior area of the CDF. The interior areas of the disposal cells range from about 35 to 120 acres. Therefore, the runoff discharge rate from the CDF ranges up to 1.5 to 5 cfs. During these days, the flow rate in Bayou Bienvenue is estimated to range from about 220 cfs to 570 cfs, depending on stormwater pumping. As such, the dilution available for runoff discharges into Bayou Bienvenue would range from 44:1 to 380:1 or greater, assuming the entire width and depth of the bayou are enveloped in the mixing zone.

Bayou Bienvenue would be classified as a Category 4 water body (tidal channel with flow less than 100 cubic ft per second) in Louisiana State Environmental Regulatory Code Part IX, Subpart 1, Chapter 11, §1115C. For Category 4 water bodies, the zone of initial dilution is restricted to 1/10 of the average flow over one tidal cycle (effectively, 1/10 of the cross sectional area), and the mixing zone is permitted to encompass the entire cross sectional area and flow.

Based on limited information available regarding bathymetry and flow in Bayou Bienvenue, attainable dilution will be insufficient to accommodate effluent flows.

Maximum attainable dilution ratios for runoff (occurring concurrently with surface runoff and pumping to the Bayou) are estimated to range between 44 and 380, assuming the entire width and depth of the bayou are enveloped in the mixing zone. This is adequate to meet dilution requirements for runoff from unoxidized material without treatment. Dilution requirements for runoff from oxidized material have not yet been determined but are expected to be higher due to increased solubilization of metals under oxidized conditions.

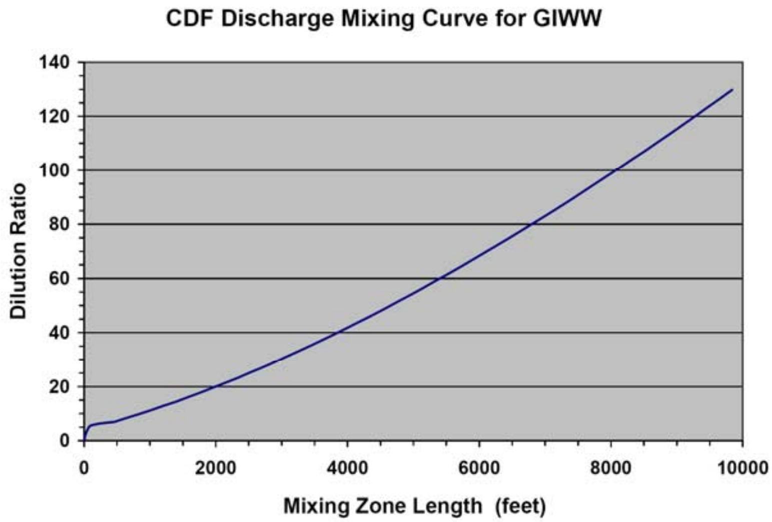

Figure 2-5 - Attainable dilution versus mixing zone length for the GIWW

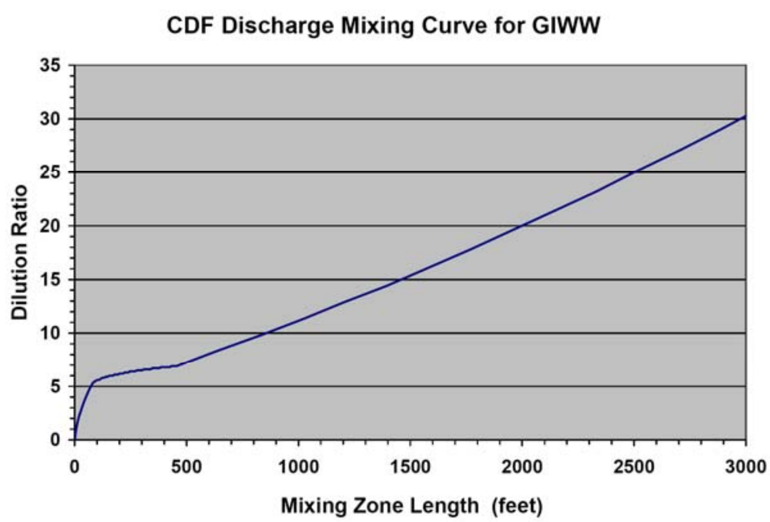

Figure 2-6 - Attainable dilution versus mixing zone length for the GIWW (<1,000 ft)

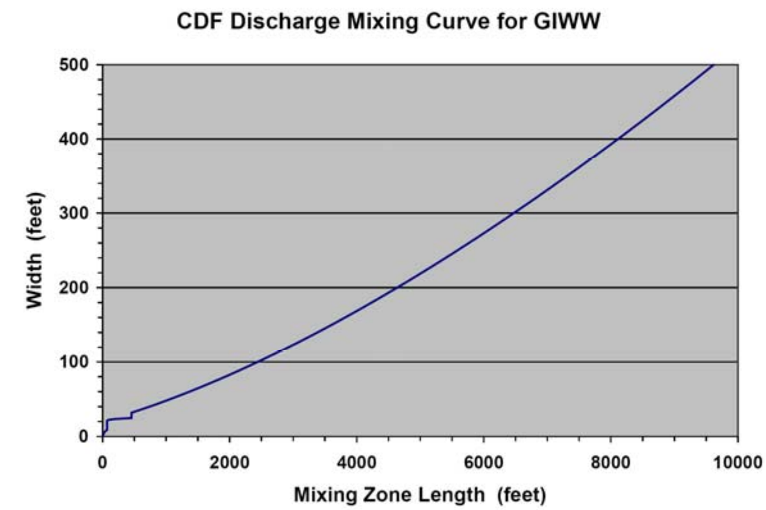

Figure 2-7 - Mixing zone width as a function of distance from discharge point (GIWW)

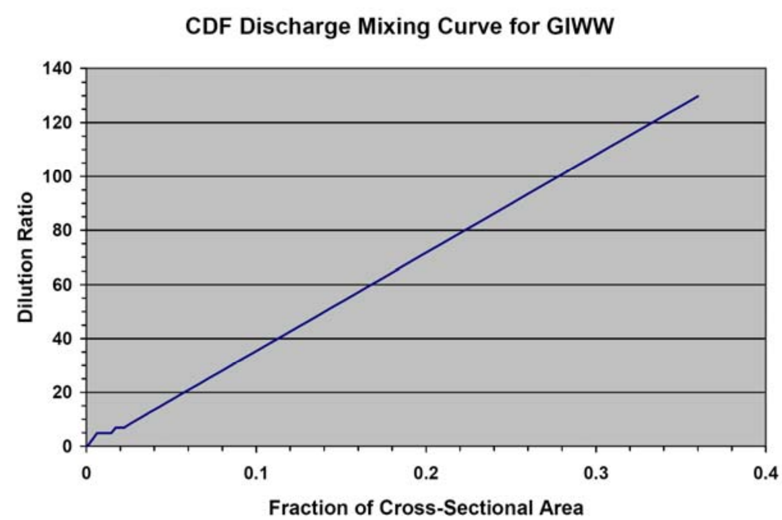

Figure 2-8 - Attainable dilution as a function of cross sectional area (GIWW)

Beneficial Use

Mitigation Site

The area within the site receiving dredged material will be dictated by the logistics of placement, constructability of containment structures, and volume of material available and suitable for beneficial use. Due to present uncertainty regarding method of containment, estimated water column impacts associated with placement of dredged material at the mitigation site was evaluated based on both standard and modified elutriate tests.

Dredged material proposed as suitable for placement in the mitigation site were selected on the basis of potential for benthic toxicity to estuarine invertebrates and also on predicted dilution requirements. Non-native surface sediment from DMMUs 4, 5, 8, and 9 (portion south of the existing lock) and native subsurface soil from DMMU 3 are predicted to be acutely toxic to estuarine benthic organisms and are therefore unsuitable for estuarine open water disposal. In addition, non-native sediment from DMMUs 6 and 10, fill material from DMMUs 6 and 7 and native subsurface soil from DMMUs 3, 6, and 10 were determined by the water-column evaluation to require considerable dilution and are not proposed for disposal at the mitigation site.

Because of no observed benthic or water column toxicity and minimal dilution requirements, non-native sediment from DMMU 9 (portion north of the existing lock), fill material from DMMU 3 and native subsurface soil from DMMUs 4/5 and 7 are considered as potentially suitable for discharge in the mitigation site.

Mean and maximum dissolved contaminant concentrations in the elutriates were determined for each contaminant of concern, utilizing the results obtained from standard and modified elutriates samples, are presented in Addendum. For the DMMUs considered suitable for placement in the mitigation site according to the benthic evaluation, a dilution ratio of 170 for tributyltin as the maximum required dilution to meet chronic water quality criteria, and a dilution ratio of 14 for cyanide as required to meet acute criteria .

Suspended phase toxicity testing conducted on standard elutriates resulted in the prediction of no significant acute toxicity to estuarine organisms even at full strength standard elutriate, as detailed in Addendum A. Modified elutriate concentrations were compared to standard elutriate concentrations to evaluate applicability of standard elutriate toxicity tests in determining modified elutriate dilution requirements. There were no metals for which any concentrations were higher in the modified elutriates (mean, geometric mean or maximum), and for the few organic constituents that were higher, the maximum was only 14% higher than the standard elutriates concentration. Standard elutriates toxicity tests are therefore thought to be reasonably representative of toxicity that would be expected with modified elutriates. Survival was not statistically different from control in toxicity testing conducted on marine standard elutriates, and no LC50 values resulted. Therefore, no dilution of effluent is considered necessary for discharge in the marine environment based on toxicity.

Mixing

Available dilution in the mitigation site was estimated based on total area encompassed by the entire triangular area. Flow in this area is believed to be limited to tidal fluctuations, but little definitive data was available at the time of this analysis. According to NOAA, the Gulf of Mexico experiences a diurnal tide (http://oceanservice.noaa.gov/education/kits/tides/tides07_cycles.html), with only one high and one low tide each day. An estimate of tidal range was obtained in a site visit made by MVN at low tide (0600 hours, June 16, 2008). These suggest the tidal range in this location to be between roughly 5-1/2 and 6-1/4 in. This corresponds well with measurements taken by the

University of Wisconsin, who obtained real-time stage measurements from June 17 and June 18, 2007 of approximately 6 in.

Bottom elevation in the area of the proposed mitigation site ranges from approximately +0.5 ft to 1.5 ft (NAVD88) (Hartman Engineering Inc. 2001). Hartman (2001) estimated maximum average water elevation at +1.64 ft (NGVD 29) based on the Paris Road gauge readings. (These readings did not capture tidal variations because they were taken at 0800 every day and therefore may not reflect actual maximum water levels. Also, there is a difference between reference elevations NAVD88 and NGVD 29 of approximately 0.2 ft.) These assumptions result in an estimated water depth in the mitigation area ranging from 1.14 ft to 3.14 ft (neglecting the adjustment for NAVD88 vs. NGVD 29). Assuming an average maximum water depth of 2 ft, a six inch tidal variation would therefore represent a daily exchange of approximately 25 percent of the maximum water volume, or an effective flow rate of 111 cfs.

The mitigation site would be classified as a Category 6 water body (coastal bays and lakes) (Louisiana State Environmental Regulatory Code Part IX, Subpart 1, Chapter 11, §1115C). For such a water body, the zone of initial dilution for protection of aquatic life (within which acute criteria may be exceeded) is restricted to a radial distance of 50 ft from the point of discharge. Similarly, the mixing zone within which chronic criteria may be exceeded, is restricted to a radial distance of 200 ft.

A 24-h cycle of dredging is estimated to produce a slurry discharge of approximately 47.1 cfs. The dredge is assumed to operate 20 hr per day, which would produce an effective flow rate for a 24 hour period of approximately 39 cfs. Net inflow rate (the volumetric displacement rate) is estimated to be approximately 26 cfs, assuming about one third of the material storage will be above the water level (not displacing resident water) in this case. Given the estimated flow rate in the mitigation area of 111 cfs, this would yield an approximate dilution ratio of 4:1.

Additional consideration must be given to dilution of water leaving the triangular area and flowing into Bayou Bienvenue. Assuming effluent dilution of 4:1 occurs within the triangular area, dilution requirements in Bayou Bienvenue will be reduced somewhat. However, the combined flow from the dredge and the tidal exchange of the triangular area must now be considered as influent to Bayou Bienvenue. An average flow rate in Bayou Bienvenue was estimated assuming a discharge weir would be located at the northeastern-most corner of the triangular area, at which point the bayou is approximately 9000 ft in length. Assuming 130 ft width and a 1 ft tidal range results in an average flow rate within the bayou of 13.5 cfs. Periods of higher flow may be expected, as was previously stated. Based on combined dredge and tidal outflows from the mitigation area of 137 cfs, and average flows in Bayou Bienvenue of 13.5 cfs, this would result in an estimated maximum attainable dilution in Bayou Bienvenue of <<1.

Available dilution in the mitigation site was estimated based on the best information available. The approximate dilution ratio of 4:1 estimated for the effective discharge rate of a 24-in hydraulic dredge is insufficient to meet maximum dilution requirements for acute or chronic criteria, in addition to requiring an area larger than that specified for either a zone of initial dilution or a mixing zone under Louisiana water quality regulations.

Based on estimates of dilution requirements based on standard and modified elutriates for selected DMMUs, available dilution in both the mitigation site and in Bayou Bienvenue are insufficient to meet water quality criteria during dredged material disposal. However, no dilution of effluent is considered necessary for discharge in the marine environment based on the toxicity evaluation of dredged material elutriates.

2.2.3 Clarity/Turbidity

Turbidity affects water quality in several ways. The suspended sedimentary particles decrease the light penetration and interferes with the photosynthetic production of oxygen. At the same time these particles absorb solar energy from the sunlight and transform this energy into heat, thus elevating the temperature of the water. The fact that oxygen is less soluble in warm water than in cold water coupled with the decreased photosynthetic oxygen production can result in decreased oxygen levels.

River Site

Increased concentrations of suspended sediments being discharged at the River site would not cause any significant adverse impacts because of the normal heavy sediment load carried by the river. Turbidity levels in the Mississippi River are naturally high; therefore, any increase in turbidity as a result of the disposal activity would only minimally reduce water clarity. It is estimated that the amount of dredged material discharged into the river would only represent about 6% of the average sediment load.

Confined Disposal Facilities

Dredged material placement at the CDF sites would be retained to allow the settling of suspended materials. Effluent discharges from these facilities are unlikely to affect the clarity of receiving waters.

Beneficial Use

Mitigation Site

Due to present uncertainty regarding method of containment, estimated impacts on water clarity associated with placement of dredged material at the Mitigation site could vary significantly. If dredged material placement is confined, effluent discharges would be best represented by the modified elutriate test results, whereas if material is semi-confined, the impacts of effluent discharges may be appropriately modeled by the standard elutriate test. Total suspended solids measurements obtained for material proposed for beneficial use disposal in the mitigation area indicate higher suspended solids levels due to semi-confinement of dredged material in the mitigation area (see table 2-2). Therefore, if material is semi-confined, higher suspended solids concentrations are expected. These elevated suspended solids concentrations may require additional time to settle out of the water column. However, regardless of the placement method employed, following the completion of material placement, settling of solids, consolidation of sediments, and establishment of wetland vegetation, water clarity would return to normal levels.

Table 2-2 - Estimated Mitigation Site Dredged Material Effluent Discharge Turbidity for both Confined and Semi-Confined Retention Methods, for Material Selected for Mitigation Use. Analyses Used for Estimation of Confined and Semi-confined Effluent Discharges were the Modified and Standard Elutriate Tests, Respectively

	Estimated Mitigation Site Effluent Turbidity	
	Semi-Confined	Confined
Sample	Result (NTU)	Result (NTU)
DMMU 3[a]	10.0	4.0*
DMMU 4/5[b]	12.9	4.0
DMMU 7N[c]	10.0	4.0*
DMMU 9[d]	15.0	4.0*

* Result is below the detection limit, [a] DMMU 3 C1-3 Land, [b] DMMU 4/5N Comp 1&11, Sites 4, 5, 7, 8, 12 &13, [c] DMMU 7N Comp 1-9, [d] DMMU 9 Comp 2&4

IHNC Backfill Site

Similarly, effluent discharge from IHNC Backfill sites would result in a temporary increase in turbidity within the IHNC as a result of disposal activities. These effects are expected to be minimal and short-lived, as backfill sediment stored in the CDF Stockpile site is expected to dry and oxidize prior to placement as backfill and therefore will result in minimal introduction of suspended organic matter from the backfill site and into the adjacent receiving waters; suspended solids within water displaced at the backfill site and into receiving waters would settle out of the water column shortly after disposal operations are complete.

Graving Site

Dredged material placement at the Graving Stockpile site would be confined to allow the settling of suspended materials. Discharges from these facilities are unlikely to affect the clarity of receiving waters.

The Graving site backfill material is expected to dry and oxidize significantly prior to placement as backfill, and is therefore expected to result in minimal introduction of suspended organic matter from the Graving site and into the GIWW during backfilling of the Graving site. In addition, flow and tidal variation in the GIWW would permit the dilution and dispersion of any effluent discharges of elevated turbidity. In general, impacts on water clarity in the vicinity of the Graving site are expected to be minimal and short-lived.

2.2.4 Color

River Site

No changes in water color are expected at the River site, as the dispersion of dredged material by this receiving waterbody would result in the disappearance of any color difference observed due to placement of dredged material from the IHNC.

Confined Disposal Facilities

Dredged material placement at the CDF sites would be retained to allow the settling of suspended materials. Discharges from these facilities are unlikely to affect the color of receiving waters.

Beneficial Use

Mitigation Site

During dike/temporary structure construction and disposal activities, temporary changes in water color may occur at the Mitigation site. The disturbance of organic soils at the Mitigation site could also affect the color of the water column. Turbidity levels are expected to remain high until dewatering and consolidation of the dredged material takes place. Consequentially, a difference in water color would likely be noticeable until settling and consolidation occur, with the difference being amplified if material is semi-confined. However, no significant long-term changes in water color are expected.

IHNC Backfill Site

Placement of stockpiled material as backfill is not expected to result in a significant change in water color within the IHNC channel. The drying and oxidation of material at the CDF Stockpile site would reduce constituents which promote changes in color at receiving waters during dredged material placement.

Graving Site

Dredged material placement at the Graving Stockpile site would be retained to allow the settling of suspended materials. Discharges from these facilities are unlikely to affect the color of receiving waters.

During backfill of the Graving site, temporary changes in color may occur in the GIWW and adjacent wetlands as sediment would displace water at the Graving site. Water color would return to background conditions after completion of backfill of the Graving site, and no significant long-term changes in water color would occur.

2.2.5 Odor

IHNC Channel

The recording of odors in sediment borings during IHNC sampling indicated that some of the non-native sediment and fill contained a petroleum odor, which in most cases was a slight odor. The petroleum odor found in some of the sediment to be excavated may be an indicator of petroleum hydrocarbons bound to the sediment, the extent of which are more accurately characterized through sediment chemistry and toxicity testing.

Soils along the east bank of the IHNC where past industrial activities have taken place are known to have been contaminated with odorous constituents such as petroleum hydrocarbons and chlorinated hydrocarbons. As a result of the hazardous, toxic, and radioactive waste (HTRW) remedial investigation, conducted as a part of the engineering investigations for this project, all "industrial waste" soil materials were excavated and removed to an industrial landfill in 2007. This material removed is estimated to have been approximately 26,000 cubic yards. Excluding this material which has already been disposed as industrial waste, the materials to be excavated from the east bank of the canal largely are expected to have no odor associated with them.

A previous investigation of toxic substance chemistry of the tidal passes into Lake Pontchartrain was conducted by the University of New Orleans under contract from the Corps of Engineers as part of the Lake Pontchartrain, Louisiana, and Vicinity, Hurricane Protection Study. One sampling station was located in the IHNC near the entrance to Lake Pontchartrain. The majority of pollutants detected in the IHNC were polynuclear aromatic hydrocarbons (PAHs). It is noted that of the three tidal passes into Lake Pontchartrain, the IHNC has the highest general organic pollutant burden, the highest level of PAH contaminations, and the highest level of industrial organic pollution. It was also noted during the HTRW initial assessment and HTRW remedial investigation that many of the industrial facilities located on the IHNC banks reportedly had spills, deteriorated drums and tanks, and in some cases dumped materials directly into the canal, or allowed spills to runoff into the canal. Chemicals and compounds are too numerous to list and tanks and drums stored on the premises have not been tested to determine contents, but it is obvious that a large variety of chemicals are present on these industrial sites or once were present. All drums and underground storage tanks have subsequently been removed from Port property by the Port of New Orleans.

Urban runoff from the industrialized area surrounding the IHNC canal in combination with a total pumping capacity of 3,770 cubic ft per second (cfs) from stormwater drainage pumping and small amounts of domestic sewage from infiltration/exfiltration of the sewer system, all combined with sluggish flow in the canal creates additional potential odor problems. Stagnant water and sewerage odors may also be present during dredging and disposal activities of the IHNC sediments. Petroleum and sewerage odors may occur both at the dredging site and the disposal sites.

River Site

Since the material to be disposed in the river will only constitute about 6% of the river's normal sediment load, mixing is expected to confine odor to the immediate disposal site with no odor expected to be associated with the Mississippi River water downstream of the disposal site. The nearest municipal water supply intake is 4.7 miles downstream of the proposed disposal activities and odor is not expected to be a concern.

Confined Disposal Facilities

Based on the above description of odors found in IHNC channel sediment, disposal into the CDF would result in a slight petroleum odor. However, dredged material in the CDF sites is dewatered, resulting in the drying and oxidation of sediments, odors at the CDF site would diminish.

Beneficial Use

Mitigation Site

If material is placed at the Mitigation site, it is possible that a slight petroleum odor would persist until after the site is dominated by wetland vegetation. The Mitigation site contains highly organic sediment and is known to experience algal blooms, both of which contribute to a persistent undesirable odor at the site. The addition of wetland could aid in reducing the odors currently observed at the site by breaking down petroleum hydrocarbons present in dredged sediment and removing nutrients from the adjacent water column.

IHNC Backfill Site

Sediments placed at the backfill site would be dewatered in the CDF Stockpile site prior to placement. Therefore, odors would be significantly diminished upon placement as backfill. Placement of this material into the IHNC Backfill site would therefore not result in any undesirable odors in the project vicinity.

Graving Site

Levels of organic carbon at the Graving site are similarly high to those observed at the Mitigation site. Excavation and placement of Graving site backfill material would introduce an undesirable odor at the Graving site and adjacent GIWW for periods during and following excavation and backfill. Although these undesirable odors are expected, the Graving site is isolated such that odors will not affect commercial, industrial, or residential areas of New Orleans East. Additionally, dispersion of suspended sediment entering the GIWW from the Graving site would prevent any long term odors within the waterway due to any high biological oxygen demand and high organic content contained by the sediment. Overall, no long-term odor effects are expected.

2.2.6 Taste

The nearest potable water intake along the Mississippi River is 4.7 miles downstream of the IHNC entrance. Any possible effects would diminish long before reaching the closest municipal water intake. There are no potable water intakes along the IHNC or in the vicinity of the Mitigation site, CDF sites, or the graving and stockpile sites. Therefore alteration of taste in these areas will also be of no consequence.

2.2.7 Dissolved Gas Levels

Short-term decreases in dissolved oxygen could occur due to introduction of organics from the sediment into the water column, as well as the release of nutrients. Turbidity affects water quality in several ways, one which may markedly affect dissolved oxygen levels. The introduction of nutrients and organic material to the water column as a result of the discharge can lead to a high biochemical oxygen demand (BOD), which in turn can lead to reduced dissolved oxygen, thereby potentially affecting the survival of aquatic organisms. IHNC channel sediment is highly organic, and therefore there is potential for temporarily lowering dissolved oxygen levels at some of the disposal areas.

River Site

Ambient dissolved oxygen levels near the River site ranged from: 4.63 – 13.51 mg/L with an average of 8.31 mg/L; these values were obtained from LDEQ ambient water quality monitoring site number 320 and are for measurements taken from 2002 to 2008. It is estimated that the amount of dredged material discharged into the river would only be about 6% of the average sediment load. Therefore, no significant alterations in dissolved gases at the River site would be expected.

Confined Disposal Facilities

Ambient dissolved oxygen levels near the GIWW ranged from: 4.73 – 10.66 mg/L with an average of 7.70 mg/L; these values were obtained from LDEQ ambient water quality monitoring site number 1064 and are for measurements taken throughout 2006. Material placed at the confined disposal facilities may result in a temporary reduction in dissolved oxygen or release of ammonia within the GIWW. However, it is expected that the mixing within the GIWW would allow for sufficient dispersion of suspended sediments such that effects on dissolved oxygen levels and introduction of ammonia would be minimal and short-lived.

Beneficial Use

Mitigation Site

Ambient dissolved oxygen levels at the mitigation site ranged from 3 mg/L to 11 mg/L, with most measurements falling between 6 and 9 mg/L during the summer of 2007 (WRM 2008). Ambient dissolved oxygen levels within Bayou Bienvenue ranged from: 4.03 – 10.75 mg/L with an average of 7.40 mg/L; these values were obtained from LDEQ ambient water quality monitoring site number 307 and are for measurements taken throughout 2006.

Impacts to dissolved oxygen levels could vary based on the method of confinement used. Because of the high organic carbon levels existing at the site, it is not expected that levels of organic carbon released during discharge of dredged material at the Mitigation site would have a significant impact on dissolved gas levels. Considering the lack of mixing available at the Mitigaiton site, effects related to the release of ammonia from channel sediments could occur. Management of dredged material during placement, including the use of a baffle plate at the end of the discharge pipeline, would introduce oxygen to the dredged material slurry and dissipate ammonia. Additional management strategies would be employed within the disposal areas, as needed, to further dissipate ammonia.

IHNC Backfill Site

Ambient dissolved oxygen levels within IHNC ranged from: 3.95 – 11.1 mg/L with an average of 7.23 mg/L; these values were obtained from LDEQ ambient water quality monitoring site number 306 and are for measurements taken throughout 2007. Ambient dissolved oxygen levels measured at Lake Pontchartrain crossover number 7 (30°4’38”N, 90°8’34”W) ranged from 5.57 – 11.12 mg/L with an average of 8.86 mg/L; these values were obtained from LDEQ ambient water quality monitoring site number 137 and are for measurements taken from 1997 though 1998.

Placement of material stockpiled at the CDF would not be expected to have an effect on dissolved gases for discharges into the IHNC. CDF Stockpile material is expected to dewater before being used as backfill, which would allow for the drying and oxidation of the sediment, as well as a reduction in organic content and dissolved gases such as ammonia. Placement of dewatered dredged material would also result in a lower turbidity during discharge than placement of wet dredged material. All of these contributing factors indicate that effects on dissolved gases would be insignificant for effluent discharges into the IHNC.

Graving Site

Ambient dissolved oxygen levels near the GIWW ranged from: 4.73 – 10.66 mg/L with an average of 7.70 mg/L; these values were obtained from LDEQ ambient water quality monitoring site number 1064 and are for measurements taken throughout 2006. Graving site sediment is presumed to be very similar to the sediment underlying the previously dredged sediment at the CDFs, and therefore is expected to contain elevated levels of organics. Stockpiled sediment would initially leach water during the initial dewatering phase, thus creating a discharge into the GIWW. Additionally, backfilling of the Graving site would introduce suspended sediment particles from the Graving site into the GIWW. Organic material suspended by discharges may have effects on dissolved oxygen levels in the GIWW in the immediate vicinity of the Graving site. In addition, these discharges may introduce higher than normal levels of ammonia into the GIWW. It is not expected that these elevated levels will persist, as the mixing in the GIWW would disperse organics and ammonia released during effluent discharges from the Graving site.

2.2.8 Nutrients & Eutrophication

River Site

Because the dredged material discharge would represent only 6% of the average sediment load at the river site, the discharge would not result in eutrophication of the river.

Confined Disposal Facilities

Decomposition of organic material within the CDF sites following discharges of dredged material may result in a release of ammonia. However, tidal action within the GIWW would allow for the dispersion of these discharges such that no eutrophication would be observed for the receiving waters.

Beneficial Use

Mitigation Site

The mitigation site presently contains highly organic sediments. Placement of dredged material from the IHNC channel would result in an overlying layer of sediment at the Mitigation site with lower organic carbon levels in relation to site sediment. Therefore, it is not likely that IHNC channel sediment will enhance the current levels of eutrophication experienced by the mitigation site. Additionally, as the Mitigation site will be used to create wetland, the site could eventually serve to aid in the decrease of nutrient levels within adjacent waters.

IHNC Backfill Site

Because the sediment to be placed at the IHNC Backfill site will dry and oxidize in the CDF Stockpile site prior to placement as backfill, it is not expected that organic material will be present in sufficient quantities to decompose and result in the release of ammonia in high concentrations. Therefore, effluent from the IHNC Backfill site is not expected to result in the eutrophication of the adjacent receiving waters.

Graving Site

The action of stockpiling dredged material excavated from the Graving site, as well as the backfilling of the site, would result in the discharge of dissolved and suspended organic matter into the adjacent GIWW. Tidal action within the GIWW would allow for the dispersion of these discharges such that no eutrophication would be observed for the receiving waters.

2.2.9 Actions Taken to Minimize Adverse Impacts

Management of dredged material during placement, including the use of a baffle plate at the end of the discharge pipeline, would introduce oxygen to the dredged material slurry and dissipate ammonia. Additional management strategies would be employed within the disposal areas, as needed, to further dissipate ammonia.

2.3 Water Circulation, Fluctuation, and Salinity Gradient Determination

River Site

The Mississippi River disposal site is dependent upon upstream runoff and, to a lesser extent, tidal fluctuation. Due to the size and flowrate of the Mississippi River, the proposed discharge of dredged material would have little effect on water level fluctuations. Current patterns would not be affected, as dredged material is expected to predominantly remain suspended in the water column and would be carried out to the Gulf of Mexico, and would therefore have little impact on the contours of the river. No effects on salinity gradients are expected.

Confined Disposal Facilities

Because they are situated above tidally influenced waters (+3 to +5 ft NAVD88 [Estes 2008]), dredged material would have no affect on the hydrodynamics of any waterbody. Salinity gradients within the GIWW, which are largely influenced by tidal action, would not be affected.

Beneficial Use

Mitigation Site

Although the Mitigation site is currently open to tidal fluctuation, tidal currents are very sluggish. There is no flow through the area into other wetlands or water bodies. It is a "dead-ended" area. Tidal flows enter and exit the site through several connections with Bayou Bienvenue.

If confinement dikes are utilized for mitigation, water levels would be elevated during the deposition of material and may be either higher or lower than normal levels until dikes are breached, depending on rainfall and evaporation. Tidal currents will be blocked from the Mitigation site so that dredged material is not transported out of the site. For a period of 1-3 years following disposal into the Mitigation site, tidal flows would be curtailed by the confinement dikes. The dikes would be breached following consolidation and colonization of dredged material by vegetation, thereby reestablishing tidal flows.

If temporary structures are used instead for a semi-confined placement method, tidal currents would have a dampened effect on the Mitigation site, as these structures would allow tidal currents to enter the Mitigation site but at a reduced flow rate, and therefore would only slightly impact water levels by acting as a buffer to tidal flows. For a period of 1-3 years following disposal into the Mitigation site, tidal flows would be reduced by temporary structures. These structures would be breached following consolidation and colonization of dredged material by vegetation, thereby reestablishing tidal flows.

No stratification of waters at this site is expected because of its shallow nature.

IHNC Backfill Site

Normal water levels within the IHNC are generally dependent upon tidal action and storm water runoff. The IHNC Backfill site would replace what is currently an open water channel to the east and west of the new lock. In addition, the site would aid in the alteration of current pattern, flow, normal water level fluctuations, and salinity gradients for the channel reach between the old and new locks, which would no longer be influenced by the GIWW and Lake Ponchartrain but instead would be connected to the Mississippi River.

Graving Site

During lock module construction, flow would be allowed into the Graving site while the wall separating the site and the GIWW is removed for lock module transport. This would result in a temporary change in current pattern, flow, and normal water level fluctuations, as an area predominantly above tidal influence would become connected to the GIWW.

Because the Graving Stockpile site is situated above tidal influence, dredged material placed at the site would have no affect on the hydrodynamics of any waterbody.

Following the completion of construction activities the Graving site would be backfilled with material originally excavated from the Graving site and temporarily placed at the Graving Stockpile site, and thus hydrodynamic conditions would revert to pre-project conditions for both the Graving site and the Graving Stockpile site.

Salinity gradients within the GIWW, which are largely influenced by tidal action, would not be affected.

2.3.1 Actions Taken to Minimize Adverse Impacts

Breaching of confinement dikes at the Mitigation site following consolidation and colonization of dredged material with vegetation would return the site to normal salinity and water level patterns. The CDF Stockpile site, the Graving site and the Graving Stockpile site would be returned to existing elevations at the completion of their use as project elements.

2.4 Contaminant Determinations

Average Concentration of Metals

Sediment quality benchmarks have been developed by National Oceanic & Atmospheric Administration to serve as a quick screening tool to assess sediment quality. These benchmarks include the *Effects Range Median* (ER-M) that represents the median of chemical concentrations observed or predicted to be associated with biological effects. ER-Ms for arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc were compared to values observed at each DMMU and disposal area. Observed concentrations were standardized by the ER-M for each metal and averaged across a given DMMU or disposal area to produce an ER-M Quotient (ER-M_Q). An ER-M_Q approaching or exceeding 1.0 may potentially be associated with adverse biological effects to benthic invertebrates, while values closer to zero are expected not to be associated with adverse effects. The highest ER-M_Q was observed at the mitigation site (0.47), and was influenced primarily by high concentrations of lead, mercury, silver, and zinc. There is considerable variation among non-native sediments, with ERM-$_Q$ ranging from 0.07 to 0.30. ERM-$_Q$s were above 0.2 in non-native DMMUs 2, 4, 5, and 7, and were influenced primarily by high concentrations of lead and zinc. ER-M_Qs were less then 0.1 for the remaining non-native and disposal reference sediments, all non-native fill material, and all native subsurface soils.

Chlorinated Pesticides, Total Aroclors, and Sum PAHs

The organochlorine pesticides (DDTs), Aroclors, and semi-volatile polycyclic aromatic hydrocarbons (PAH) are classes of organic compounds that may be associated with adverse ecological effects when present in sediment at total concentrations above 7, 180, and 40,000 ppb (respectively). Sediment total organic carbon (TOC) concentration has a major influence on the bioavailability and toxicity of hydrophobic organic contaminants in sediments and soils. For sediments with the same bulk concentration of a hydrophobic compound, the sediment with the highest TOC content is expected to contain the lowest bioavailable fraction and lowest porewater concentration of that compound. The sediment with the higher TOC content would be associated with the lowest bioaccumulation of that compound in exposed organisms. Therefore, presentation of TOC-normalized total concentrations of hydrophobic organic contaminants in sediments provide metrics that can be used to estimate potential for bioaccumulation or potential to promote toxicity in benthic organisms exposed to these sediments.

The TOC-normalized concentration of Total-DDT (sum concentration of DDD, p,p'DDE, p,p'DDT) in non-native sediment from DMMU 7 was about 3.5 times higher then bioavailabilty in the Mississippi River and mitigation site disposal areas. TOC-normalized concentration for all other DMMUs was comparable or below that measured for the disposal sites. Non-native sediment DMMUs 6 and 9; fill portion of DMMUs 6, 7, and 10 ; and all native subsurface from all DMMUs had TOC-normalized concentration of Total-DDT similar to the Saint Bernard reference sediment.

As with Total-DDT, TOC-normalized concentration of Total Aroclor in non-native sediment from DMMU 7 far exceeded that in the Mississippi River and mitigation site. Concentrations for non-native material from DMMUs 1, 2, 3, and 10 were 1.5 to 16 times higher then concentrations for the disposal areas. Concentrations in non-native sediment from DMMUs 4, 5, 6, and 9; and all fill and native subsurface soil from all DMMUs were similar to that observed at the disposal areas. Aroclor concentration in non-native sediment from DMMU 5, and from native subsurface soil from DMMUs 3 and 7 were comparable to that in the Saint Bernard reference sediment.

With the exception of surface non-native sediment from DMMU 6, TOC-normalized concentration of Total PAHs (sum concentration of acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) was 10 to 80 times higher for all DMMUs compared to the Mississippi River and mitigation site. Concentrations in fill and native subsurface soil from all DMMUs were generally 1.5 to 9 times higher then in the disposal areas. Total PAH concentration for native subsurface soil from DMMUs 3, 7, and 10 were within ranges measured for the disposal sites, and approached those for the Saint Bernard reference area.

2.5 Aquatic Ecosystem Organism Determination

2.5.1 Effects on Plankton

River Site

Due to the existing high turbidity, high current velocities, and shifting substrates, the Mississippi River does not support a large plankton population. Existing plankton populations are those adapted to turbid environments and disposal of material is not anticipated to significantly increase turbidity. Adverse effects on plankton populations are expected to be minimal and localized at the site of disposal.

Confined Disposal Facility

CDF Disposal Site

The CDF disposal site is composed of upland, wooded wetland habitat. Adverse effects on plankton populations at the CDF disposal site are not anticipated.

CDF Backfill Site

The CDF backfill site is composed of upland, wooded wetland habitat. Adverse affects on plankton populations are not anticipated at the CDF backfill site.

Beneficial Use

Mitigation Site

Plankton populations would be decreased substantially during the period of dredged material disposal. The decrease in light penetration from increased suspended sediments during the placement of dredged material would result in the decline of phytoplankton populations. The decline in primary productivity would also reduce zooplankton populations. Once the disposed material becomes consolidated and vegetated and the site is reconnected to the tidal system, planktonic populations should return to levels similar to existing conditions surrounding the open water areas remaining around the disposal site.

IHNC Backfill Site

The IHNC Backfill Site would become sub-aerial after placement of dredged material. Plankton populations present before placement would be permanently displaced.

2.5.2 Effects on Benthos

2.5.2.1 Physical Effect on Benthos

River Site

Due to the existing high turbidity, high current velocities, and shifting substrates, the Mississippi River does not support a large benthic population. Therefore, the potential impact to benthos is anticipated to be slight at the river disposal site.

Confined Disposal Facility

CDF Disposal Site

The CDF disposal site is composed of upland, wooded wetland habitat. Adverse effects on benthos populations at the CDF disposal site are not anticipated.

CDF Backfill Site

The CDF backfill site is composed of upland, wooded wetland habitat. Adverse affects on benthos populations are not anticipated at the CDF backfill site.

Beneficial Use

Mitigation Site

The diversity of the benthic community is expected to be low due to the substrate type and the proximity of the site to urban stormwater pumping stations and urban landfills. The water bottoms of the mitigation site consist of fine-grained sediments mixed with a larger portion of decaying organic material. Most of the organic material consists of the remains of cypress trees and other woody vegetation which once occurred on the site. Cypress wood is very resistant to decay organisms and organisms that live in decaying wood. The dredged material to be deposited at the site would be mainly alluvial, mineral soils. Discharge of dredged material into the mitigation site is expected to bury sessile benthos living in the mitigation site. Material placed at the disposal site would be placed at a higher elevation than what previously existed in the area and conditions are expected to become drier. Benthic organisms typical of muddy, silty water bottoms would be expected to colonize the area after placement of dredged material in the areas where elevations remain low.

IHNC Backfill

The IHNC backfill site contains a limited benthic population due to the poor quality of habitat found within the channel. Placement of dredged material may result in the debilitation or death of less mobile organisms by smothering, exposure to chemical contaminants in dissolved or suspended form, exposure to high levels of suspended particulates, or alteration of the substrate upon which they are dependent. After the placement of dredged material, the area would become sub-aerial and benthos would be permanently displaced.

Graving Site

The graving site is composed of upland, wooded wetland habitat. Adverse affects on benthos populations are not anticipated at the CDF backfill site.

2.5.2.2 Toxic Effect and Bioaccumulation on Benthos

River Site

Freshwater benthic toxicity and bioaccumulation tests were conducted as described in Addendum A. The conclusions of the evaluation are presented.

Based on results from previous evaluations, poor survival of benthic organisms and proximity of sediment collection sites to suspected areas of contamination, dredged material from DMMUs 1 and 2 were determined to be unsuitable for freshwater open water placement and therefore is not proposed for placement at the Mississippi River open-water disposal site (Addendum A).

Based on the results of the benthic toxicity evaluation, IHNC non-native sediments from DMMU 5 and from DMMU 7 are predicted to be acutely toxic to freshwater benthic organisms as the survival of freshwater amphipods exposed to dredged material from those DMMUs was significantly lower than for the reference site in solid-phase toxicity tests. Therefore DMMUs 5 and 7 are unsuitable for disposal in the Mississippi River. Dredged material from the remaining DMMUs are not predicted to be acutely toxic to freshwater benthic organisms and were further evaluated for bioaccumulation potential using solid-phase exposures of a freshwater clam to dredged material. Details of the benthic toxicity evaluation are presented in Addendum A.

The benthic bioaccumulation evaluation revealed that tissue concentrations of all contaminants of concern for DMMUs evaluated were either statistically less than USFDA action levels or there are no USFDA levels for the contaminants. For contaminants with USFDA action levels, body burden in clams exposed to dredged material were lower than reported action levels by over two orders of magnitude. Moreover, tissue concentration associated with the DMMUs evaluated for bioaccumulation were statistically less than Fish Contaminant Goals (FCGs) developed by The California Office of Environmental Hazard Assessment (OEHHA) or there are no FCG for the contaminants. Therefore, proposed placement of IHNC material at the Mississippi River open-water disposal site would not pose adverse human health risks due to bioaccumulation.

Further evaluation revealed that statistically elevated tissue residue relative to the reference site was detected for at least one contaminant of concern for all DMMUs investigated for bioaccumulation potential. Compounds statistically elevated in tissue residue which are considered of low concern as bioaccumulative compounds were aluminum, barium, chromium, 4-methylphenol, diethyl phthalate and phenol. Compounds with high potential concern as bioaccumulative compounds were lead, nickel, selenium, tributyltin, PAHs, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane and PCBs. Despite their statistically elevated concentration, compounds with both low and high bioaccumulative potential would not promote unacceptable adverse biological effects based on: 1) the low magnitude of exceedence; 2) the small number of contaminants with potential to bioaccumulate in predator fish; and 3) prediction of no adverse biological effects associated with measured body residue in invertebrates and predicted body residue in predator fish. DMMUs proposed for discharge at the Mississippi River disposal site would therefore not result in adverse impacts to aquatic organisms due to bioaccumulation. Details of the bioaccumulation potential evaluation are presented in Addendum A.

In conclusion, the proposed disposal of dredged material from the IHNC into the Mississippi River open water disposal site is not likely to have an unacceptable adverse effect on survival, growth or reproduction of aquatic organisms or pose a human health risk due to bioaccumulation. Neither the magnitude of bioaccumulation nor tissue residues of metals and organic compounds in tissues of organisms exposed to sediment and soils from canal indicate a cause for concern for aquatic organisms living at the proposed placement sites or for humans who may consume those organisms.

Beneficial Use

Mitigation Site

Estuarine benthic toxicity and bioaccumulation tests were conducted as described in Addendum A. The conclusions of the evaluation are presented.

Based on the results of the estuarine solid-phase toxicity tests, non-native surface sediment from DMMUs 4, 5, 8, and 9 (portion south of the existing lock) and native subsurface soil from DMMU 3 are predicted to be acutely toxic to estuarine benthic organisms and are therefore unsuitable for estuarine open water disposal. Because of no observed benthic or water column toxicity and minimal dilution requirements, non-native sediment from DMMU 9 (portion north of the existing lock), fill material from DMMU 3 and native subsurface soil from DMMUs 4/5 and 7 are considered as potentially suitable for discharge in the mitigation site and were evaluated for bioaccumulation potential using solid-phase exposures of a marine clam to dredged material.

The benthic bioaccumulation evaluation revealed that tissue concentrations of all contaminants of concern for DMMUs potentially suitable for discharge in the mitigation were either statistically less than USFDA action levels or there are no USFDA levels for the contaminants. For contaminants with USFDA action levels, body burden in clams exposed to dredged material were lower than reported action levels by over three orders of magnitude. Moreover, tissue concentration associated with the DMMUs potentially suitable for discharge in the mitigation for bioaccumulation were statistically less than FCGs developed by OEHHA or there are no FCG for the contaminants. Therefore, proposed placement of DMMU 9 (portion north of the existing lock), fill material from DMMU 3 and native subsurface soil from DMMUs 4/5 and 7 at the mitigation site would not pose a human health risk due to bioaccumulation.

Further evaluation revealed that statistically elevated tissue residue relative to the reference site was detected for at least one contaminant for DMMUs considered for discharge at the mitigation site, except for DMMU 4/5, which had no exceedance. Compounds statistically elevated in tissue residue which are considered of low concern as bioaccumulative compounds were aluminum, barium, 1.4-dichlorobenzene, and 4-methylphenol. Compounds with high potential concern as bioaccumulative compounds were lead, PAHs, 4,4'-DDT, delta-BHC, dieldrin, endosulfan II, heptachlor epoxide. Despite their statistically elevated concentration, compounds with both low and high bioaccumulative potential are not likely to promote unacceptable adverse biological effects based on: 1) the low magnitude of exceedence; 2) the small number of contaminants with potential to bioaccumulate in predator fish; and 3) prediction of no adverse biological effects associated with measured body residue in invertebrates and predicted body residue in predator fish.

In conclusion, the proposed disposal of dredged material from the IHNC into the mitigation site is not likely to have an unacceptable adverse effect on survival, growth or reproduction of aquatic organisms or pose a human health risk due to bioaccumulation. Neither the magnitude of bioaccumulation nor tissue residues of metals and organic compounds in tissues of organisms exposed to sediment and soils from canal indicate a cause for concern for aquatic organisms living at the proposed placement sites or for humans who may consume those organisms

2.5.3 Effects on Nekton

River Site

Nekton populations at the river site are not expected to be affected due to the paucity of nekton in the main channel of the river and the localized area of disturbance expected from dredged material disposal.

Confined Disposal Facility

CDF Disposal Site

The CDF disposal site is composed of upland, wooded wetland habitat. Adverse effects on Nekton populations at the CDF disposal site are not anticipated.

CDF Backfill Site

The CDF backfill site is composed of upland, wooded wetland habitat. Adverse affects on nekton populations are not anticipated at the CDF backfill site.

Beneficial Use

Mitigation Site

Nekton populations in the mitigation site, and nearby tidal waters, are expected to be adversely impacted by turbidity plumes created during the placement of dredged material. Increased turbidity could cause a decrease in primary productivity, plankton concentrations, and oxygen levels. Once the material consolidates and becomes vegetated, and the site is reconnected to the tidal system, populations of nekton and other aquatic organisms are expected to be higher than existing conditions due to the primary production of the created wetlands.

IHNC Backfill Site
After the placement of dredged material, the area would become sub-aerial and benthos would be permanently displaced.

Graving Site

The graving site is composed of upland, highly vegetated and wooded wetland habitat. Averse affects on nekton populations are not anticipated at the graving site.

2.5.4 Effects on Aquatic Food Web

River Site

Disposal of material into the Mississippi River would have minimal impacts on associated aquatic habitats due to the localized nature of material placement. Increased concentrations of suspended sediments being discharged at the river site should not cause any significant adverse impacts because of the normal heavy sediment load carried by the river. Turbidity levels in the river are naturally high and any disposal activity would be localized and only minimally reduce water clarity in the short-term. Disposal of material into the Mississippi River would increase the river's sediment load by approximately 27,000 tons per day, which represents about 6 percent of the river's average daily sediment load (approximately 436,000 tons per day; maximum average 1.576 million tons in 1951 and minimum average 219,000 in 1988) at New Orleans (LDNR 2008). Given the high ambient suspended sediment concentration in the river and high flow rates, suspended sediments would rapidly be carried downstream and return to ambient suspended sediment concentrations. No measurable adverse impacts on aquatic life downstream would be expected.

Confined Disposal Facility

CDF Disposal Site

The CDF Disposal site is composed of upland, wooded wetland habitat. Adverse affects on the aquatic food web are not anticipated at the CDF disposal site.

CDF Backfill Site

Impacts on the aquatic food web in this area are expected to be similar to those associated with the CDF Disposal site.

Beneficial Use

Mitigation Site
The aquatic food web at the mitigation site is expected to be affected for a period of a few months after the deposition of dredged material. Populations of organisms at all levels of the food web would be decreased or eliminated in the vicinity of the disposal site from a combination of effects including turbidity, decreased dissolved oxygen, physical burying and displacement. The decrease in light penetration from increased turbidity would cause a decline of phytoplankton populations. This decline

in primary productivity would also reduce zooplankton populations and populations of filter feeders and other high order predators. A viable food web is expected to reestablish after the completion of disposal activities and consolidation of sediments.

IHNC Backfill Site

Low current velocities exist in the IHNC between the Mississippi River and the junction with the GIWW/MRGO making this area insignificant habitat for aquatic organisms. Placement of dredged material in this area would bring it to sub-aerial elevations permanently disrupting the aquatic food web. After the consolidation of material, the area would represent terrestrial habitat.

Graving Site

The graving site is composed of upland, highly vegetated and wooded wetland habitat. Averse affects on the aquatic food web are not anticipated at the graving site.

2.5.5 Special Aquatic Sites Effects

Not applicable.

2.5.5.1 Sanctuaries and Refuges

Not applicable.

2.5.5.2 Wetlands

River Site

Wetland areas are confined to the batture along the river banks and would not be impacted by disposal operations.

Confined Disposal Facility

CDF Disposal Site

The CDF Disposal site is primarily composed of scrub/shrub and early successsional stage bottomland hardwood habitats that are periodically flooded, primarily from rainfall. The CDF is not connected to nearby water bodies most of the time. Placement of dredged material is expected to impact 209 acres of wooded lands at the CDF. However, these areas are expected to revert back to wooded lands after dredged material placement is completed and mitigation measures for impacts are proposed. WVA analysis for the total 209-acre CDF determined that there would be a loss of 29.06 Average Annual Habitat Units (AAHUs) as a result of its construction. This includes the temporary impacts from the Backfill site and the permanent impacts from the Disposal site. The loss of AAHUs in these areas would be mitigated by the creation of wetlands in the Mitigation area. It is anticipated that the CDF Disposal site would reforest with native hardwoods after the completion of construction.

CDF Backfill Site

Effects on wetlands at the CDF Backfill site would be similar to those anticipated at the CDF Disposal site. However, effects at the CDF Backfill site would be temporary and only last until material was removed to be used as backfill material in the construction site. The CDF Backfill site is expected to naturally reforest after construction activities are completed.

Beneficial Use

Mitigation Site

The mitigation site contains the largest tract of coastal wetlands in the immediate project vicinity. Material dredged during the construction of the IHNC lock, which is in excess to the project's needs and determined suitable for wetland restoration, would be beneficially used as mitigation for wetland impacts at the CDF and graving site. A total loss of 36.28 AAHUs would be the net impact resulting from the placement of material in the CDF and graving site. It is anticipated that between 37 acres and 148 acres of wetlands would be created if adequate material is available. The net benefits of creating 85 acres of wetlands would fully mitigate the anticipated loss of 36.28 AAHUs associated with construction of the CDF and the graving site. If the entire mitigation cannot occur at the triangular-shaped mitigation area located south of Bayou Bienvenue due to a lack of suitable material, CEMVN would fully mitigate for the loss of 36.28 AAHUs associated with the implementation of the project. Material proposed to be placed into the mitigation site from the IHNC is unlikely to pose any unaccepatable adverse effects on survival, growth or reproduction of aquatic organisms. Material would be placed so that after settling, consolidation, and initial subsidence, the elevation would be suitable for the colonization of tidal marsh plant species.

IHNC Backfill Site

The area around the IHNC is highly urbanized and no wetland habitats occur in this area.

Graving Site

The Graving site is primarily composed of scrub/shrub and early successsional stage bottomland hardwood habitats that are periodically flooded, primarily from rainfall. It is anticipated that 38 acres of wooded lands at the graving site would be impacted as the result of dredged material placement. WVA analysis determined there would be a total loss of 7.22 AAHUs associated with graving site construction. The loss of AAHUs in this area would be mitigated by the creation of wetlands in the Mitigation area. At the completion of construction, the graving site would be backfilled and ambient elevations restored allowing for similar habitat to re-establish in this area.

2.5.5.3 Mud Flats.

Not applicable.

2.5.5.4 Vegetated Shallows

IHNC Channel

Not applicable

River Site

Not applicable.

Beneficial Use

Mitigation Site

The submerged aquatic vegetation present in the area would be covered by the placement of dredged material. The created wetlands would provide a habitat for foraging, breeding, spawning, and cover for a variety of larval, juvenile, and adult fishes. More nutrients and detritus would be added to the food web, thereby increasing fish productivity and providing a benefit to local fisheries.

IHNC Backfill Site

Not applicable.

Graving Site

Not applicable.

2.5.5.5 Coral Reefs.

Not applicable.

2.5.5.6 Riffle Pool Complexes.

Not applicable.

2.5.6 Effects on Threatened and Endangered Species

Several Federally-listed species are known to occur in the vicinity of the lock replacement project. These species are brown pelican (*Pelecanus occidnetalis*), endangered; Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), threatened; pallid sturgeon (*Scaphirhynchus albus*), endangered; and West Indian manatee (*Trichechus manatus*); endangered. Due to the developed and industrialized nature of the project area, the construction of the graving site and placement of dredged materials in the confined disposal facility and marsh creation areas is expected to not likely have an adverse effect on threatened or endangered species. Dredging, in-situ lock construction and modifications to the St. Claude and Claiborne Avenue Bridges would result in disturbance of substrates in the IHNC and would temporarily increase turbidity in the Mississippi River and shallow estuarine waters adjacent to the project area. Because of a lack of foraging or nesting habitat in the project vicinity, CEMVN has determined the

IHNC lock replacement project would not adversely affect the brown pelican. CEMVN has determined there are no bald eagle nests in the vicinity of the project area. Dredging could temporarily reduce the availability of forage items for Gulf sturgeon, pallid sturgeon and West Indian manatee through the loss or damage of invertebrates and small fish. However, these protected species would forage and rest in unaffected areas at a sufficient distance from the project features as to cause no adverse impact during construction activities. Based upon the proposed construction activities for the IHNC lock replacement project and mitigation measures to be implemented during construction, CEMVN has determined that dredging and lock construction activities would not likely adversely affect any threatened or endangered species in the project area.

2.5.7 Other Wildlife

River Site

Not applicable.

Confined Disposal Facilities

Construction activities have the potential to disrupt or displace wildlife species. The impacts are expected to be temporary and localized to an area that has little wildlife value and most wildlife species would be able to move to an area with more favorable conditions and return after construction is completed. Wooded lands in the area of the proposed CDF represent relatively low quality habitat for wildlife. It is anticipated that 209 acres of scrub/shrub and bottomland hardwood habitat would be impacted as a result of the placement of dredged material in the CDF. Some impacts to less mobile and juvenile wildlife species would occur during the construction of the CDF. However, adults of most species would disperse during construction activities and mortality would primarily be limited to eggs and larvae and less mobile reptiles and amphibians. Other habitats of similar quality are available nearby. These areas are expected to revert back to wooded lands after the completion of dredged material placement and similar species that are currently found in the area would be expected to return.

Beneficial Use

Mitigation Site

A variety of avian species use the shallow open water in the mitigation site for feeding. Some species observed in the area are lesser scaup, red-breasted mergansers, double-crested cormorants, great egrets, and several species of gulls and terns. Some of these species would be displaced during disposal activities, while others would likely continue to feed and forage in similar habitats surrounding the mitigation site. The created wetlands would, after the material settles and vegetation establishes, provide increased nesting, brood-rearing, and foraging habitat for a wider range resident and migrant avian species and wintering habitat for waterfowl and other species found in brackish marshes. The species currently using the area would be able to continue to feed and forage in the shallow waters surrounding the land created with dredged material. The additional acres of brackish marsh habitat would also be beneficial to furbearers, game mammals, reptiles, and amphibians.

IHNC Backfill Site

The area around the IHNC Backfill Site provides minimal habitat for aquatic and terrestrial species.

Graving Site

The graving site provides low quality habitat for wildlife species. However, it is anticipated that some impacts would occur to less mobile and juvenile wildlife species during the removal of material from the graving site. Adults of most species would be able to disperse during construction and mortality would be limited to eggs, larvae, and less mobile reptiles and amphibians. Construction is expected to impact 38 acres of wooded wetlands at the graving site. The area would be backfilled after construction and ambient elevations would be restored allowing for similar habitat to re-establish.

2.5.8 Actions to Minimize Adverse Effects

The project area is not essential habitat for threatened or endangered species. Construction specifications would include measures for threatened and endangered species if they are observed in or near the construction site. Placement of contaminated dredged material into the CDF, an area that has been previously used as a disposal site, significantly reduces the potential for adverse impacts to fish and wildlife from contaminants in the material. Permanent confinement of contaminated dredged material at the CDF Disposal site would minimize impacts outside of this area. Material removed from various aspects of the project would be used as backfill in those same areas to minimize adverse effects caused by placement of material.

2.6 Proposed Discharge Site Determinations

River Site

Based on the modeling conducted for disposal in the Mississippi River disposal site, a 700 fold dilution could be met within 2100 ft from the discharge point for low flow conditions, and within 1000 ft for high flow conditions. The available mixing will meet the most stringent dilution requirements based on comparison of elutriate concentrations to water quality criteria, and will also satisfy the maximum dilution requirements based on the elutriate toxicity testing. Dredged material from all DMMUs would be not excluded from open water disposal in the Mississippi River on the basis of water column impacts outside of an authorized mixing zone.

Confined Disposal Facilities

Maximum attainable dilution ratio for discharge of CDF effluent to the GIWW is 120. Assuming maximum effluent concentrations, adequate dilution will be attainable within a mixing zone complying with State of Louisiana requirements for all constituents except tributyltin, total PCBs, Aroclor 1016, and dieldrin. However, the mixing that is inherent in hydraulic dredging will likely reduce peak maximum predicted effluent concentrations, as reflected by the geometric mean elutriate concentrations. For the predicted geometric mean effluent concentrations, all dilution requirements can be met within the prescribed mixing zone in the GIWW. Based on limited information available regarding bathymetry and flow in Bayou Bienvenue, attainable dilution at that site is inadequate to meet water quality criteria for the effluent pathway. It is anticipated that simple broadcasting of activated carbon around the weir of the CDF will be effective in reducing effluent concentrations of organic compounds sufficiently to meet water quality criteria for the effluent pathway.

Beneficial Use

Mitigation Site

The approximate dilution ratio of 4:1 estimated for the effective effluent discharge rate from a hydraulic dredge into the mitigation site is insufficient to meet all maximum dilution requirements for acute or chronic criteria, in addition to requiring an area larger than that specified for either a zone of initial dilution or a mixing zone under State of Louisiana water quality regulations. Available dilution in Bayou Bienvenue is also insufficient to meet water quality criteria during dredged material disposal. However, no dilution of effluent is considered necessary for discharge in the estuarine environment based on the toxicity evaluation of dredged material elutriates.

2.7 Determination of Cumulative Effects on the Aquatic Ecosystem

2.7.1 Potential Effects on Aquatic Ecosystems

River Site

CEMVN is planning the closure of the MRGO at the Bayou LaLoutre ridge which would stop all maritime access (deep-draft and shallow-draft) in the MRGO to the Gulf of Mexico from the IHNC. The proposed closure structure would be constructed of rip rap and built to an elevation of +5 feet National Geodetic Vertical Datum (NGVD), connecting the historic Bayou LaLoutre ridgeline. Once completed, there would be no further access for maritime traffic between the Mississippi River, Breton Sound, and the Gulf of Mexico to the eastern leg of the GIWW besides the IHNC lock. The cumulative effect of disposal at the river site is expected to be insignificant. Because of the existing sediment load carried by the river, rapid movement of material by the river, the amount of sediment currently dredged from the river, and normal scouring, the cumulative effect of the added sediment would be minimal.

Confined Disposal Facilities

The construction of the CDF sites to contain contaminated dredged material in combination with other projects being implemented in the vicinity of the project area, such as the 100-year level of flood protection projects, would lead to the loss of hundreds of acres of wetlands. Impacts on these habitats would be mitigated by restoration or creation of wetlands, and this mitigation would be mitigated by restoration or creation of wetlands, and this mitigation would be a component of all projects in the region. However, even with mitigation in place, there would be a temporary cumulative loss of function of wetland habitats until such a time as the mitigation sites have achieved adequate wetland functions.

Beneficial Use

Mitigation Site

Numerous projects have been proposed in the vicinity of the mitigation site. University of Colorado students built a temporary viewing platform overlooking the triangular are south of Bayou Bienvenue. The platform includes steps providing access over the Sewerage and Water Board’s levee and sheetpile flood wall. Additionally, the University of Wisconsin-Madison has been planning restoration concepts for the 440-acre triangular mitigation site with the goal of restoring cypress swamp.

IHNC Backfill site

The IHNC Backfill Site would become sub-aerial and terrestrial making it unavailable to aquatic organisms.

Graving Site

The cumulative effects caused by the construction of the graving site would be similar to those associated with the construction of the CDF sites. The development of the site for graving operations would make the site more attractive for potential users including vessel repair companies and the shipping industry. Industrial use of the site would continue after construction and has the potential to further spur development on adjacent lands east of Parish Road on the north bank of the GIWW/MRGO.

2.7.2 Potential Effects on Human Use Characteristics

a. Municipal and Private Water Supply

Water intakes must also be considered so that the proposed mixing zone will not adversely impact water quality in these locations. The only drinking water intake that could be found between mile markers 93 and 83 of the Mississippi River (the Inner Harbor Navigation Canal is located at mile marker 92.6), serves the St. Bernard Parish waterworks and is located at 29° 55' 31.046"N, 89° 57' 34.925"W (approximately 4.7 miles below the mouth of the IHNC, personal communication Jesse Means, State of Louisiana, April 2, 2008). This is well beyond the boundaries of the proposed mixing zone for the open water disposal site, and should not be impacted by the disposal operation. To verify this, dissolved standard elutriate concentrations were compared to federal primary and secondary drinking water standards, and produced a maximum dilution requirement of 120. This dilution ratio is estimated to be met within approximately 50 to 300 ft for all scenarios considered.

b. Water Related Recreation

The only types of water-related recreational activity known to occur in the mitigation site is fishing. Some hunting for rabbits and wild hogs could occur in the CDF sites and the graving site. These areas are not especially scenic, being flanked by development and landfills. The mitigation site and nearby water bodies are used for recreational and commercial fishing. Crab traps are common throughout the area and shrimp are harvested from Bayou Bienvenue, which is the only tidal channel connecting the mitigation site and adjacent waters with the tidal system. Some recreational angling also occurs, mainly for spotted seatrout, red drum, and Atlantic croaker. Impacts detailed in other sections of this evaluation, including turbidity, reduced dissolved oxygen levels, physical disturbance, and release of contaminants, may temporarily reduce populations of harvested species.

Since Hurricane Katrina damaged many of the parks and other recreation-related amenities in the area, recreational opportunities remain limited. Opportunities are limited primarily to the use of open space areas such as the levee and batture within the Holy Cross neighborhood and the newly constructed temporary Bayou Bienvenue fishing and bird watching platform in the Lower Ninth Ward. Resources are lacking to improve and maintain the parks, playgrounds, and recreational areas within the project area (CMBC 2007). The greatest effect on recreational opportunities would be the loss of accessibility to the levee area during construction activities. Following construction, a path on the protected side of the 4-foot high T-wall cap would continue to provide access for walking and jogging south of the St. Claude Avenue Bridge. It is anticipated that many of the parks and recreation center would be rebuilt during the project's construction life. The reduced accessibility to these areas would be temporary and would return to pre-construction conditions following completion of the new IHNC lock. Community facilities would be constructed by the Federal government in the four nearby neighborhoods as mitigation for impacts on recreational areas. These would be operated by non-Federal interests. Restoration of portions of the 440-acre triangular-shaped mitigation site would provide improved habitat quality for nearby residents increasing bird watching and fishing opportunities.

c. Aesthetics

IHNC Channel

During construction activities, including levee and floodwall construction, new lock construction, demolition of the existing lock and bridge replacement, there would be adverse impacts on aesthetics, as views of the IHNC would include construction equipment and activities.

River Site

Adverse impacts to aesthetics are not expected at the river site.

CDF

The CDF would have a 15-foot high berm and upon completion of construction would be visible from parts of the Lower Ninth Ward and from bridge crossings. Immediately following construction of the CDF, only herbaceous vegetation would be growing on the CDF and unvegetated areas would be visible detracting from the visual environment. However, given its proximity to a metal scrap yard which currently piles plastic and metal debris at elevations equivalent to the final elevation of the CDF, and that the CDF would be allowed to vegetate with trees and shrubs after construction is completed, adverse impacts to aesthetic resources in this area are expected to be short-term.

Beneficial Use

Mitigation Site

During the placement of dredged material construction equipment and placement activities would have adverse effects on aesthetics in the mitigation site. These effects are expected to be short term and last until the dredged material placed in the mitigation area has settled and vegetated. Restoration of portions of the 440-acre triangular-shaped mitigation site would provide improved habitat quality for nearby residents increasing bird watching opportunities and overall aesthetics in the area.

IHNC Backfill Site

Construction equipment and activities would have adverse effects on the aesthetics at the IHNC Backfill Site during construction of the new lock. Both sides of the new lock would be backfilled and landscaped to create greenspace and recreation areas for community use after construction of the project.

Graving Site

Since the habitat and aesthetics are similar to that found at the CDF site, adverse effects at the graving site would be similar to those found at the CDF site. The graving site would be backfilled and ambient elevations restored, allowing for similar habitat to re-establish in these areas.

d. Parks, National Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves.

Two structures eligible for listing in the National Register of Historic Places would be removed. These are the St. Claude Avenue Bridge and the existing IHNC Lock. The removal of these structures would be an adverse effect. A permanent historical record of eligible structures has been prepared in coordination with the State Historic Preservation Officer (SHPO), the Advisory Council for Historic Preservation (ACHP), and the New Orleans Historic Districts Landmarks Commission. One or more of the key historically-significant components of the old lock and the St.Claude Avenue Bridge would be salvaged and displayed.

Construction of the CDF sites has the potential to disturb unknown deeply buried cultural resources. A cultural resources monitor would be in place during all ground disturbing activities during CDF construction.

2.8 Determination of Secondary Effects on the Aquatic Ecosystem

The proposed project is not expected to have any significant secondary adverse effects on the aquatic ecosystem, other than the effects discussed in previous sections (some of which may be considered secondary).

3.0 FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

3.1 Adaption of the Section 404(b)(1) Guidelines to this Evaluation

No significant adaptations of the guidelines were made relative to this evaluation.

3.2 Evaluation of Availability of Practicable Alternatives to the Proposed Discharge that Would Have Less Adverse Impact on the Aquatic Ecosystem

Alternatives to the proposed project were discussed and analyzed in SEIS, *Alternatives*. The proposed project represents the least environmentally damaging practicable alternative. No practicable alternative exists that meets the study objectives and does not involve discharge of fill into waters of the United States.

3.3 Determination of Compliance with Applicable Water Quality Standards

River Site

The available mixing at the Mississippi River disposal site will meet the most stringent dilution requirements based on comparison of elutriate concentrations to water quality criteria, and will also satisfy the maximum dilution requirements based on the elutriate toxicity testing.

Confined Disposal Facilities

Maximum attainable dilution ratio for discharge of CDF effluent to the GIWW is 120. Assuming maximum effluent concentrations, adequate dilution will be attainable within a mixing zone complying with State of Louisiana requirements for all except four constituents. However, the mixing that is inherent in hydraulic dredging will likely reduce peak maximum predicted effluent concentrations For the predicted mean effluent concentrations, all dilution requirements can be met within the prescribed mixing zone in the GIWW. Based on limited information available regarding bathymetry and flow in Bayou Bienvenue, attainable dilution at that site is inadequate to meet water quality criteria for the effluent pathway.

Beneficial Use

Mitigation Site

The approximate dilution ratio estimated for the effective effluent discharge rate from a hydraulic dredge into the mitigation zone area is insufficient to meet all maximum dilution requirements for acute or chronic criteria, in addition to requiring an area larger than that specified for either a zone of initial dilution or a mixing zone under Louisiana water quality regulations. Available dilution in Bayou Bienvenue is also insufficient to meet water quality criteria during dredged material disposal. However, no dilution of effluent is considered necessary for discharge in the estuarine environment based on the toxicity evaluation of dredged material elutriates. Therefore, based on the site-specific toxicity evaluation, no acute toxicity effects on water column organism are expected from dredged material effluent discharge into the mitigation site. Given the potentially significant environmental and community benefit associated with restoration of the wetland, justification for a waiver from water quality criteria for IHNC dredged material placement in the Mitigation Site may be warranted

3.4 Compliance with Applicable Toxic Effluent Standard of Prohibition Under Section 307 of the Clean Water Act

This project would be in full compliance of Section 307 of the Clean Water Act and would not violate the Toxic Effluent Standards. Appropriate evaluations of analytical and ecotoxicological testing of sediment, water column, and elutriate revealed that no adverse impacts would result from the proposed project.

3.5 Compliance with the Endangered Species Act of 1973

3.6 Compliance with the Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972

Not Applicable.

3.7 Evaluation of Extent of Degradation of the Waters of the Unites States

The proposed placement of dredged material would not contribute to significant degradation of waters of the United States. Nor would it result in significant adverse effects on human health and welfare, including municipal and private water supplies; recreation and commercial fishing; life stages of organisms dependent on the aquatic ecosystem; ecosystem diversity, productivity, and stability; or recreational, aesthetic or economic values.

3.8 Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

Confinement dikes or temporary structures would be used to prevent the flow of dredged material from the Mitigation site. Confinement dikes would prevent the flow of dredged material from the CDF sites and material excavated from the Graving Stockpile site.

Management of dredged material during placement, including the use of a baffle plate at the end of the discharge pipeline, would introduce oxygen to the dredged material slurry and dissipate ammonia. Additional management strategies would be employed within the disposal areas, as needed, to further dissipate ammonia.

Breaching of confinement dikes at the Mitigation site following consolidation and colonization of dredged material with vegetation would return the site to normal salinity and water level patterns. The CDF Stockpile site, the Graving site and the Graving Stockpile site would be returned to existing elevations at the completion of their use as project elements.

The project area is not essential habitat for threatened or endangered species. Construction specifications would include measures for threatened and endangered species if they are observed in or near the construction site. Placement of contaminated dredged material into the CDF, an area that has been previously used as a disposal site, significantly reduces the potential for adverse impacts to fish and wildlife from contaminants in the material. Permanent confinement of contaminated dredged material at the CDF Disposal site would minimize impacts outside of this area. Material removed from various aspects of the project would be used as backfill in those same areas to minimize adverse effects caused by placement of material.

4.0 EVALUATION RESPONSIBILITY

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The proposed discharges of dredged material, fill, and effluent comply with the requirements of the 404(b)(1) guidelines, with the inclusion of appropriate and practicable methods to minimize adverse effects to the aquatic ecosystem.

Date:_________________ _________________________________

Alvin B. Lee,
Colonel, U.S. Army
District Commander

5.0 REFERENCES

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