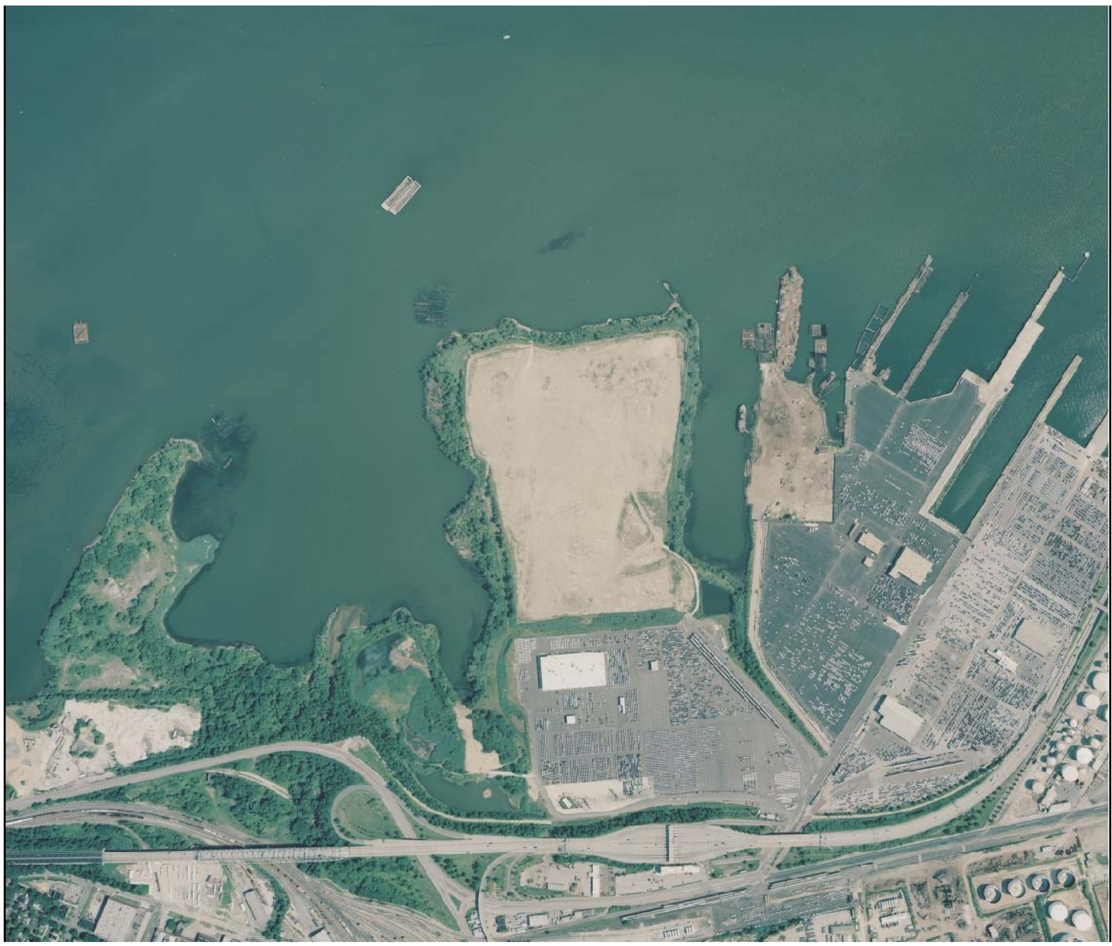
SUPPLEMENT
TO THE
TIERED DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE
PROPOSED MASONVILLE DREDGED MATERIAL CONTAINMENT FACILITY
BALTIMORE, MARYLAND

JUNE 2006



Prepared by:
U.S. Army Corps of Engineers
Baltimore District
Regulatory Branch
Baltimore, Maryland

June 2006

NATIONAL ENVIRONMENTAL POLICY ACT

COVER SHEET

LEAD AGENCY

U.S Department of Defense

TITLE **Supplement to the Draft Environmental Impact Statement (DEIS) EIS Number 2006184 for the Proposed Masonville Dredged Material Containment Facility, Baltimore, Maryland**

CONTACT

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ABSTRACT

In accordance with the requirements of the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers (USACE), Baltimore District, has prepared a Supplement to the Draft Environmental Impact Statement (DEIS) (dated May 2006) for the proposed Masonville Dredged Material Containment Facility (DMCF). This Supplement to the DEIS is associated with the Maryland Port Administration's application for a Department of the Army permit to construct a DMCF in waters of the United States, including jurisdictional wetlands, pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. This Supplement to the DEIS evaluates an alternative source for sand borrow for construction of portions of the structure . It evaluates the environmental benefits and consequences of taking sand borrow from the dredging of the Seagirt Marine Terminal channel, berths, and turning basin and using it to construct the dike at the proposed Masonville DMCF. Both the State of Maryland Dredged Material Management Program and the Federal Dredged Material Management Program recommend the development of several confined disposal areas for Baltimore Harbor dredged sediments during the next 20 years. The creation of a DMCF at Masonville was one of three actions recommended by the State of Maryland's Dredged Material Management Plan Executive Committee. This facility is preferred for development prior to the other two proposed facilities by Harbor Team to meet the short-term dredged material placement need. A shortfall of dredged material placement capacity is expected to occur in State fiscal year 2007. This shortfall presents an urgent need to study, select, and implement new options capable of accepting the annual volume of 1.5 million cubic yards of material. The USACE is making the Draft EIS available to the public for review and comment through a Notice of Availability published in the Federal Register May 19, 2006. This supplemental document recommends the use of the sand borrow from the Seagirt Marine Terminal dredging for the construction of a DMCF at Masonville capable of receiving 16 million cubic yards of material dredged from the Baltimore Harbor Channels over a 20 year period.

AVAILABILITY

Copies of the DEIS and Supplement are available for public review at the following public reading rooms:

(1) Enoch Pratt Free Library, 400 Cathedral St., Baltimore, MD 21201-4484

(2) Enoch Pratt Free Library, Cherry Hill Branch, 606 Cherry Hill Rd, Baltimore, MD 21225

(3) Enoch Pratt Free Library, Brooklyn Branch, 300 E. Patapsco Ave, Baltimore, MD 21225

(4) Baltimore County Public Library, Essex Branch, 1110 Eastern Blvd, Baltimore, MD 21221

(5) Baltimore County Public Library, North Point Branch, 1716 Merritt Blvd, Dundalk, MD 21222

PUBLIC COMMENTS

The Department of the Army has encouraged public participation as part of the National Environmental Policy act (NEPA) process. A Notice of Intent (NOI) to prepare an Environmental Impact Statement was published in the Federal Register in May 2005, and a scoping meeting was held in June 2005. A Notice of Availability (NOA) to advertise the DEIS was published in the Federal Register in May 2006, and a public hearing was held on June 21, 2006 to obtain public input on the Proposed Masonville DMCF DEIS. At all public meetings, attendees were invited to provide oral comments and to submit additional comments to the Baltimore District. In addition, comments have been and will continue to be solicited throughout the NEPA process as written, oral, or electronic comments. All persons and organizations that have an interest in the proposed Masonville project are urged to participate in the public involvement process. With publication of the Notice of Availability for the Supplement to the DEIS an additional public hearing will be held on Monday July 31, 2006 at St. John Lutheran Church, 226 Washburn Ave, Baltimore, MD 21225. There will be an informal poster session beginning at 6:00 PM and the public hearing will begin at 7:00 PM. The public comment period for the DEIS has been extended to August 14, 2006.

The U.S. Army Corps of Engineers must receive comments on or before August 14,2006, to ensure consideration in the final plan. Please send written comments concerning this report to: U.S. Army Corps of Engineers, Attn: Mr. Jon Romeo, CENAB-OP-RMN, P.O. Box 1715, Baltimore MD 21203-1715. Telephone: (410) 962-6079. Please submit electronic comments to jon.romeo@usace.army.mil. Your comments must be contained within the body of the message; please do not send attached files. Please include your name and address in the message. Comments received as part of the public scoping process for this project were addressed as appropriate and are included as an appendix to the DEIS. After the public comment period ends on August 14, 2006, the USACE will consider all comments received. The DEIS will be revised, as appropriate, and a Final EIS will be issued.

The USACE has distributed copies of the DEIS and Supplement to appropriate members of Congress, State and local government officials, Federal agencies, and other interested parties.

EXECUTIVE SUMMARY

The purpose of this supplement is to provide information on as potential new source of construction material that has become available after the *Tiered Draft Environmental Impact Statement (DEIS) for the Proposed Masonville Dredged Material Containment Facility (DMCF)* [U.S. Army Corps of Engineers (USACE) 2006] was already released for public review. To ensure that this information is available for public comment, it has been released by the USACE - Baltimore District as a supplement to the document. The comment period for the draft, which was released on May 19, 2006 originally ended on July 7, 2006. The release of this supplement extends the public comment period until August 14, 2006. A second public hearing has been scheduled for July 31, 2006.

As origninally proposed in the DEIS, the main containment portion of the facility would be built to an initial height of +10 feet MLLW and then raised to a temporary height of + 42 feet MLLW before being graded to a final site elevation of +36 feet MLLW. The Wet Basin rock dike would be raised to a height of +8 feet MLLW. The total capacity of the facility would be 16 mcy with a site life of approximately 20 years. The annual placement capacity would be between 0.5 and 1 mcy. This would require up to 2 mcy of sand and coarse materials for dike construction.

Studies completed in April and May of 2006 indicated that there is a significant sand source within the area that will be dredged as part of the Seagirt Marine Terminal (Seagirt) channel deepening and widening project (Figure 1-1). If implemented, the proposed modification would change the borrow source for approximately one fourth of the borrow material required for construction of the proposed Masonville DMCF. This section describes how the change of construction material would affect dike construction at Masonville. The material dredged as part of the Seagirt dredging project is currently slated for placement at the Hart-Miller Island (HMI) DMCF. This supplement addresses a potential change to the construction option of the preferred alternative from the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006). The proposed modification to the preferred construction option (borrow scenario) would utilize 0.5 to 0.8 million cubic yards (mcy) of sand from the Seagirt dredging project for dike construction at the proposed Masonville DMCF. This would likely reduce the amount of onsite borrow from within the Masonville footprint. Since the 0.5 to 0.8 mcy of material from Seagirt was previously slated for placement at the HMI DMCF, it would be transported a shorter distance when barged to the proposed Masonville DMCF site. The use of the material dredged as part of the Seagirt dredging project would likely preclude the use of 0.4 mcy of material from the Arundel clay layer located beneath the onsite sand borrow source. Implementation of the proposed modification to the preferred alternative would shift the construction schedule back several weeks, but would still allow the proposed Masonville DMCF to be operational by the end of 2009.

This proposed shift in the source of construction materials is preferable from both an environmental and an economic standpoint. Using the Seagirt dredged material would reduce the amount of onsite borrow required by 0.4 mcy. This would decrease pollutant emissions by using a split hull barge, therefore reducing the use of the hydraulic dredge and other offloading equipment. Using this material during dike construction would also reduce the turbidity plume created at the site during construction since this material would be placed directly using the barge rather than pumped using a hydraulic dredge. The material from Seagirt has a lower concentration of fine-grained sediment (12 percent) than the material from the Masonville onsite borrow source (30 percent fines), which would also reduce the potential plume size. By using additional material from the Seagirt dredging project, the need for offsite borrow material from an upland source may be reduced, minimizing potential environmental impacts associated with mining the material from the upland source and transporting it to the proposed DMCF site.

Adverse air quality impacts from the Seagirt dredging project would also be lessened by using some of the material for the construction of the proposed Masonville DMCF. This material would be transported a shorter distance to the proposed Masonville DMCF (2.3 miles) rather than to the HMI DMCF (14 miles). Pollutant emissions would be reduced because of the shorter transportation distance and eliminating the need to pump 0.5 to 0.8 mcy of dredged material into the HMI DMCF.

The overall cost of the proposed Masonville DMCF project would be reduced by approximately $5 million, due to the reduction of onsite borrow material required and reduction in the amount of offsite borrow required from an upland source. There would be an additional $5 million in savings for the Seagirt dredging project as a result of decreased transport and placement costs.

The release of this supplement to the *Tiered DEIS for the Proposed Masonville DMCF* extends the public comment period for the DEIS and the supplement to August 14, 2006. The joint permit application for the proposed Masonville DMCF has been revised and a permit modification for the Seagirt dredging project has been requested.

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

ACRONYM LIST

BEWG	Bay Enhancement Working Group
CFR	Code of Federal Regulations
DEIS	Draft Environmental Impact Statement
DMCF	Dredged Material Containment Facility
EA	EA Engineering, Science, and Technology, Inc.
EIS	Environmental Impact Statement
HMI	Hart-Miller Island
ITM	Inland Testing Manual; EPA guidance for disposition of dredged materials in inland waters
mcy	Million Cubic Yards
MLLW	Mean Lower Low Water
MPA	Maryland Port Administration
NEPA	National Environmental Policy Act
PEL	Probable Effects Level
SFY	State Fiscal Year
SMT	Seagirt Marine Terminal
SQG	Sediment Quality Guideline
TEL	Threshold Effects Level
USACE	U.S. Army Corps of Engineers
WES	Waterways Experiment Station of the USACE.

INDEX OF SECTIONS

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BALTIMORE, MARYLAND

1. PURPOSE AND NEED FOR SUPPLEMENT

1.1 INTRODUCTION AND BACKGROUND

A Draft Environmental Impact Statement (DEIS) has been prepared to support a permit application that has been submitted by the Maryland Port Administration (MPA) to the U.S. Army Corps of Engineers (USACE) pursuant to Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. The National Environmental Policy Act (NEPA) of 1969 process is being conducted in accordance with the USACE regulations for implementing NEPA as part of a regulatory action [33 Code of Federal Regulations (CFR) 325 Appendix B]. The DEIS (USACE 2006) was released to the public on May 19, 2006. Both this supplement and the DEIS will be available for public comment through August 14, 2006.

This supplement to the DEIS details a proposed modification to the borrow option of the preferred alternative (see Sections 1.2.4 and 2.1) described in the DEIS. The modification would constitute a change to the construction of the preferred alternative for the proposed Masonville DEIS. Any changes to the impacts from those described in the DEIS are described in Chapter 5 of this supplement.

1.2 PROPOSED MASONVILLE DMCF PROJECT OVERVIEW

This section provides a brief overview of the proposed Masonville dredged material containment facility (DMCF) project. For a more detailed discussion of the project, including background material, an analysis of alternatives, and detailed description of the recommended plan, please refer to the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006), which is available online from the USACE website at the following pathway: http://www.nab.usace.army.mil/Regulatory/PublicNotice/Masonville/content.htm. Hardcopies of the DEIS can be viewed at the Enoch Pratt Free Library (Main Branch, Cherry Hill Branch, and Brooklyn Branch) or at the Baltimore County Public Library (Essex Branch and North Point Branch). Hard copies may be obtained from the USACE – Baltimore District.

1.2.1 Introduction

Sediment dredged from the Patapsco River west of the North Point-Rock Point line is statutorily prohibited, by the State of Maryland, from being re-deposited in an unconfined manner into or onto any portion of the Chesapeake Bay waters or its tributaries outside of Baltimore Harbor (Maryland Code Environment 5-1102). Consequently, dredged materials from the channels within the Baltimore Harbor are placed in confined placement facilities, which is the basis of the need for the Masonville DMCF. The implications of Maryland Statute 5-1102 on dike construction are discussed in Section 2.4. Studies, described in Chapter 3 of the DEIS, have shown that a DMCF is the most feasible option for the management of dredged material from the Baltimore Harbor. A DMCF is a facility where dredged material is placed behind dikes or another enclosure to minimize the interaction of the dredged material with the surrounding environment. Existing placement sites for dredged material from the Baltimore Harbor (Patapsco River west of North Point-Rock Point line) include the Hart-Miller Island (HMI)

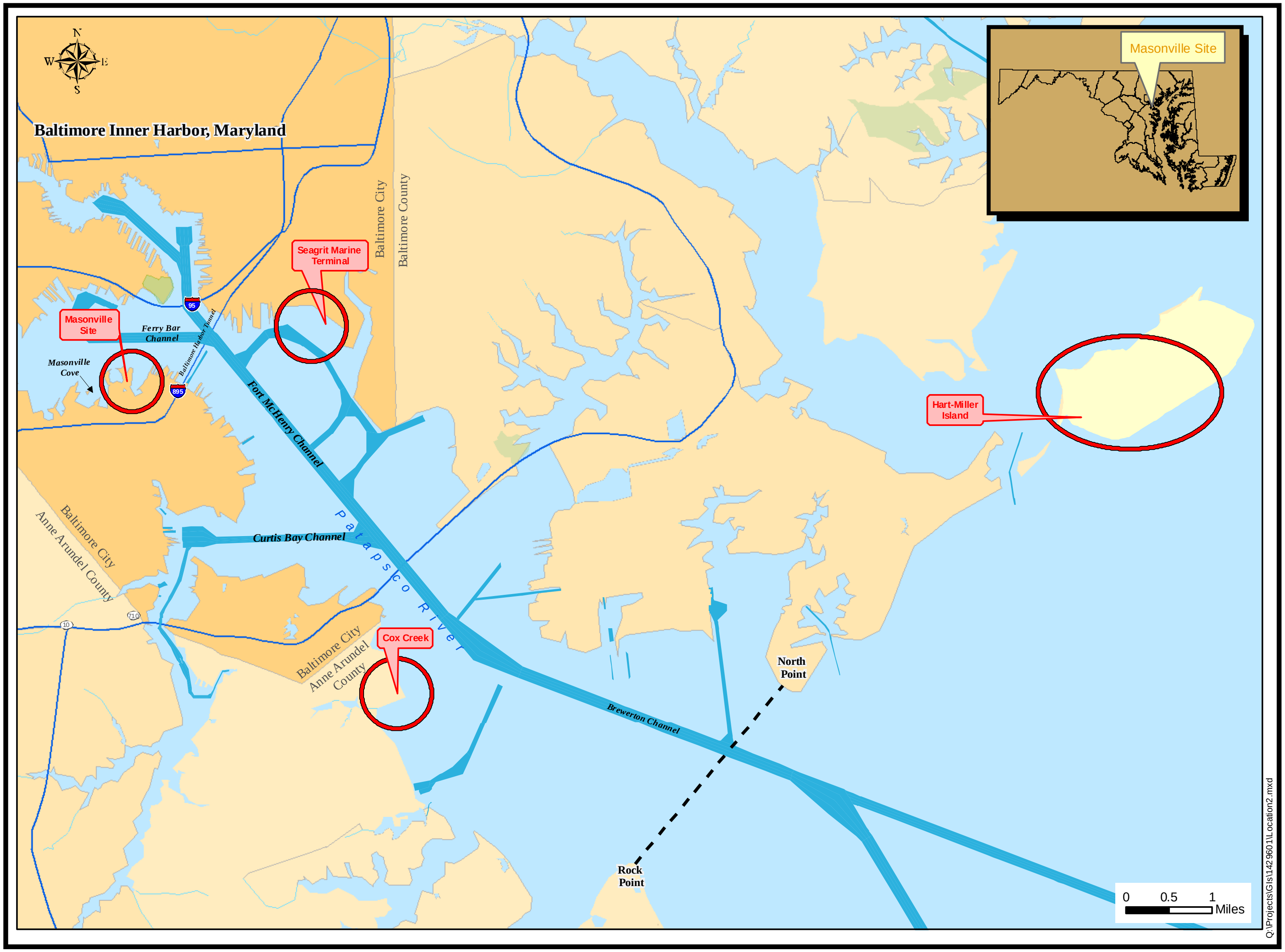

Figure 1-1. Location of Existing and Proposed DMCFs

DMCF and the Cox Creek DMCF (Figure 1-1). Currently, the majority of the Harbor dredged material is placed at the HMI DMCF, which is scheduled to close by December 31, 2009. The Cox Creek DMCF also receives Harbor dredged material, although its placement volume is limited to approximately 0.5 million cubic yards (mcy) annually or 12 mcy total due to its size. Placing a larger annual volume of dredged material than is optimal for maximum capacity in the site is called overloading, which does not allow for efficient dewatering (drying) and consolidation of the dredged material, thereby trapping excess water and reducing the site's overall capacity.

Dredging projects within the Baltimore Harbor proper generate approximately 1.5 mcy of dredged material on an annual basis. This demand for placement of dredged material is expected to continue for the next 20 years and beyond. With only two existing placement sites, a dredged material placement capacity shortfall may begin in Maryland as early as State Fiscal Year (SFY) 2007 (Section 1.2.2). This would result in an urgent need to study, select, and implement new options capable of accepting the annual volume of 1.5 mcy of material dredged from within the Baltimore Harbor.

The MPA proposes to meet the needs for Baltimore Harbor dredged material placement by constructing an additional DMCF in the Patapsco River adjacent to the existing Masonville Marine Terminal. Information on the preferred option of Masonville as the location for the first additional DMCF is detailed in the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006). The proposed Masonville DMCF would have an annual capacity of 0.5 to 1.0 mcy beginning in 2009. To fully meet the Harbor placement need, additional DMCFs would need to be constructed with a combined annual capacity of 1.0. Therefore, the MPA also proposes to create one or more additional DMCFs or implement innovative uses to accommodate additional dredged material placement needs after the proposed Masonville DMCF is open for operation. Prior to the operation of these additional facilities or innovative reuses, overloading may occur at the HMI and Cox Creek DMCFs.

1.2.2 Project Purpose and Need

Purpose

The purpose of the proposed Masonville DMCF project (Figure 1-1) is to meet some of the need for dredged material placement for Baltimore Harbor dredged material that would not be met without the creation of a new DMCF. A shortfall of placement capacity is expected to begin in SFY 2007 and continue until additional facilities are constructed to contain this material or processes are developed to innovatively reuse this material (USACE 2006).

Need

The Port of Baltimore is a major economic force in the region bringing in over 40 million tons of cargo in 2004 and maintaining over 40,000 jobs in the State of Maryland. Foreign trade for 2004 had a value of over $30 billion dollars. These economic benefits require the Port of Baltimore to provide safe passage through navigable waters for ships coming into the Port. Safe passage is achieved through dredging projects, which are essential for providing and maintaining channel depths for reliable and efficient waterborne transportation systems. Additional projects, such as providing access to new facilities and deepening and widening channels to accommodate larger ships, require additional placement capacity. Estimated quantities of dredged material to be placed from 2006 to 2010 range from 1.38 to 6.46 mcy annually. Placement quantities after 2010 are estimated to be approximately 1.5 mcy annually (USACE 2006). Through 2009, both the Cox Creek and HMI DMCFs will be open and available for dredged material placement. The HMI DMCF may be unavailable for placement prior to the closure date because the DMCF will be covered with material suitable for habitat development. Beginning in 2010, only the Cox Creek DMCF will be available, providing 0.5 mcy of placement capacity annually or 6 mcy over a 12-year period (USACE 2006).

1.2.3 Alternatives Considered

Preferred Alternative (in DEIS)

The Preferred Alternative in the DEIS is to develop the proposed Masonville DMCF in the Patapsco River. The preferred construction option involves a containment structure that is approximately 141 acres and for which most of the dike building materials come from on-site sources. The proposed Masonville DMCF has a capacity of 16 mcy over 20 years and could accommodate 0.5 to 1.0 mcy of dredged material annually. If constructed, the DMCF would cover 130 acres are tidal open water, 10 acres are upland area within the Chesapeake Bay Critical Area, and 1 acre is vegetated wetlands.

The containment structure for the proposed Masonville DMCF would consist of four main parts: a cofferdam, an armored dike, a beach dike, and an onshore dike. A rock dike would enclose the area known as the Wet Basin (Figure 1-2). The main containment structures would be constructed to an initial height of +10 ft mean lower low water (MLLW) and then raised to a temporary height of +42 ft MLLW before grading to a final height of +36 ft MLLW, which is consistent with the adjacent shoreline. The Wet Basin rock dike would be constructed to a height of +8 ft MLLW.

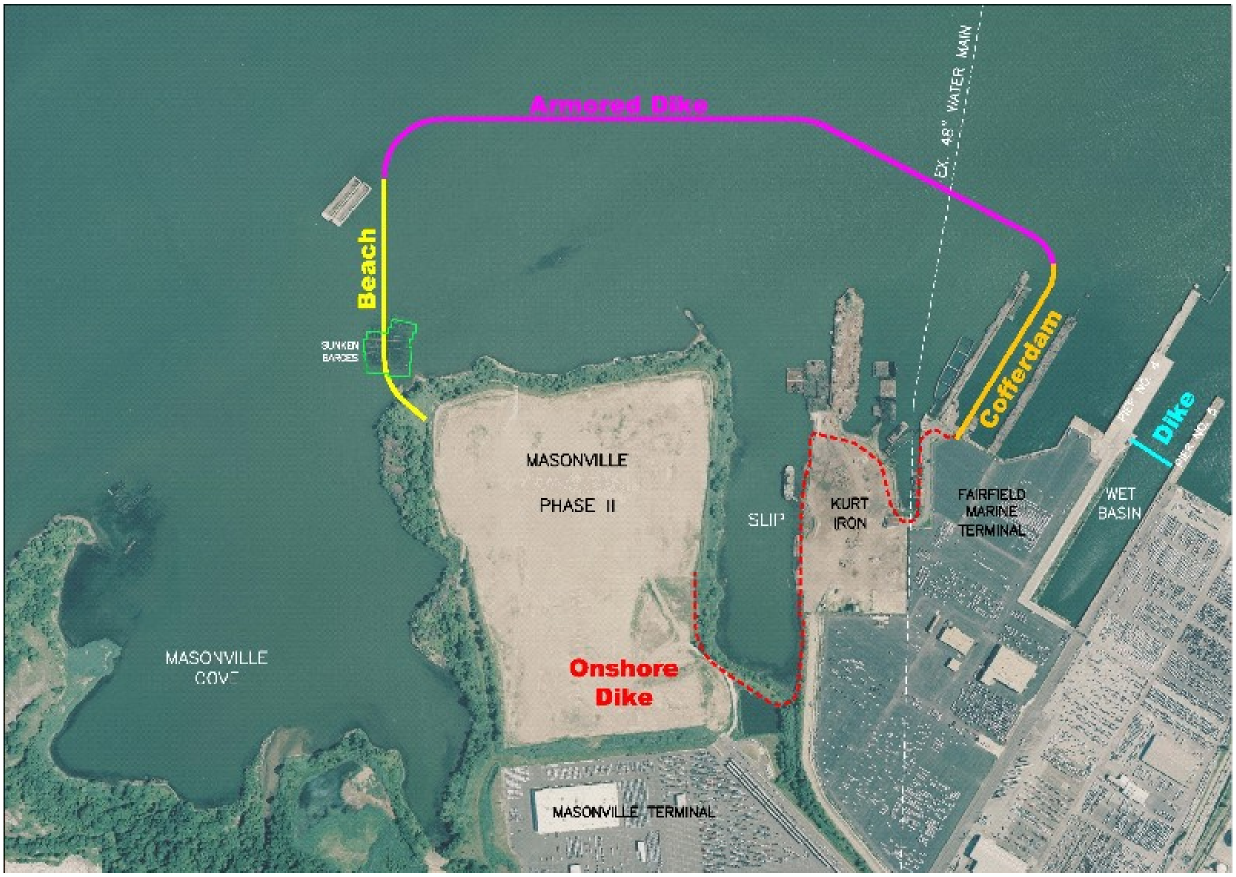

Figure 1-2. Containment Structures of the Proposed Masonville DMCF

No Action Alternative

Under the No Action Alternative, the Masonville DMCF would not be developed. If the Masonville DMCF is not developed, the MPA would either defer currently scheduled dredging of the Port of Baltimore navigation channel system and associated public and private berthing facilities, or overload existing DMCFs, or some combination of these two actions.

1.2.4 Recommended Plan

The recommended plan in the DEIS is the Preferred Alternative. Under this alternative, the proposed Masonville DMCF would be developed to accommodate Baltimore Harbor dredged material and would prevent or minimize overloading or deferment problems that would be associated with the No Action Alternative. As stated above, the preferred construction option outlined in the DEIS included most dike building materials coming from within the Masonville site, including use of some onsite clays and also some common borrow from upland sources.

1.3 NEW INFORMATION

Since the Masonville DMCF DEIS was released, a potential change in project implementation has been identified. The new information involves a potentially new source of dike building material (sand and gravel) from an in-water source in the Patapsco River adjacent to the Seagirt Marine Terminal. This new information is described below.

1.3.1 Seagirt Marine Terminal Sand Source

A dredging area has been proposed for the Seagirt Marine Terminal facility in the Port of Baltimore to deepen the existing facility and access channels, including widening of some areas (Figure 1-3). Although the project has been planned for several years, funding was not available in 2005. Funding has recently been secured to conduct the new work dredging project and, as a first step, geotechnical borings were taken in the channels and widening areas in April 2006. These borings went deeper and into areas not previously sampled for environmental characterizations [Section 4.2.5, EA Engineering, Science, and Technology (EA) 2006].

When the boring logs were analyzed, it became apparent that a significant source of sand and gravel was proposed for dredging and subsequent placement at the Hart Miller Island DMCF. Previous chemical characterizations of the materials around this sand and gravel source indicated that the chemical quality of the sand and gravel was likely to be very good and the material should be suitable for in-water placement (Section 2.4). The quantities available could contribute significantly to the available building materials for (and therefore significantly benefit) the proposed Masonville DMCF, as described in Section 2. The sand/gravel that would have been removed to HMI could be innovatively reused as construction materials in the Masonville dikes.

1.3.2 Purpose of Supplement

The purpose of this supplement is to detail the potential new source of dike building material (sand and gravel) from the Seagirt dredging project within the Patapsco River. This new information became available after the DEIS was already released for public review, and, as such, would not be available for public comment unless it was released as a supplement to the Masonville DEIS. The USACE - Baltimore District considered the proposed changes significant enough to warrant a publicly released supplement to the DEIS in order to solicit public comment.

1.3.3 Effect on the EIS

Releasing a supplement to introduce new information at this point in the Masonville permit and EIS process raises several issues in terms of the proposed Masonville DMCF project timing and both at the proposed Masonville DMCF and Seagirt dredging project site implementation (described in Section 2.5 and Section 5). Some potential impacts may diminish significantly relative to the proposed implementation plans outlined in the DEIS (Section 4). As a result of lesser impacts coupled with the economic benefits of using this sand source, the preferred Masonville DMCF construction option would shift to a scenario that includes the Seagirt material as part of the construction material for Masonville (Section 3). Therefore, the preferred alternative identified in the DEIS would be revised to include Seagirt sand/gravel as part of the dike construction material. If this revised preferred construction option is not implemented, the preferred construction option identified in the DEIS would remain.

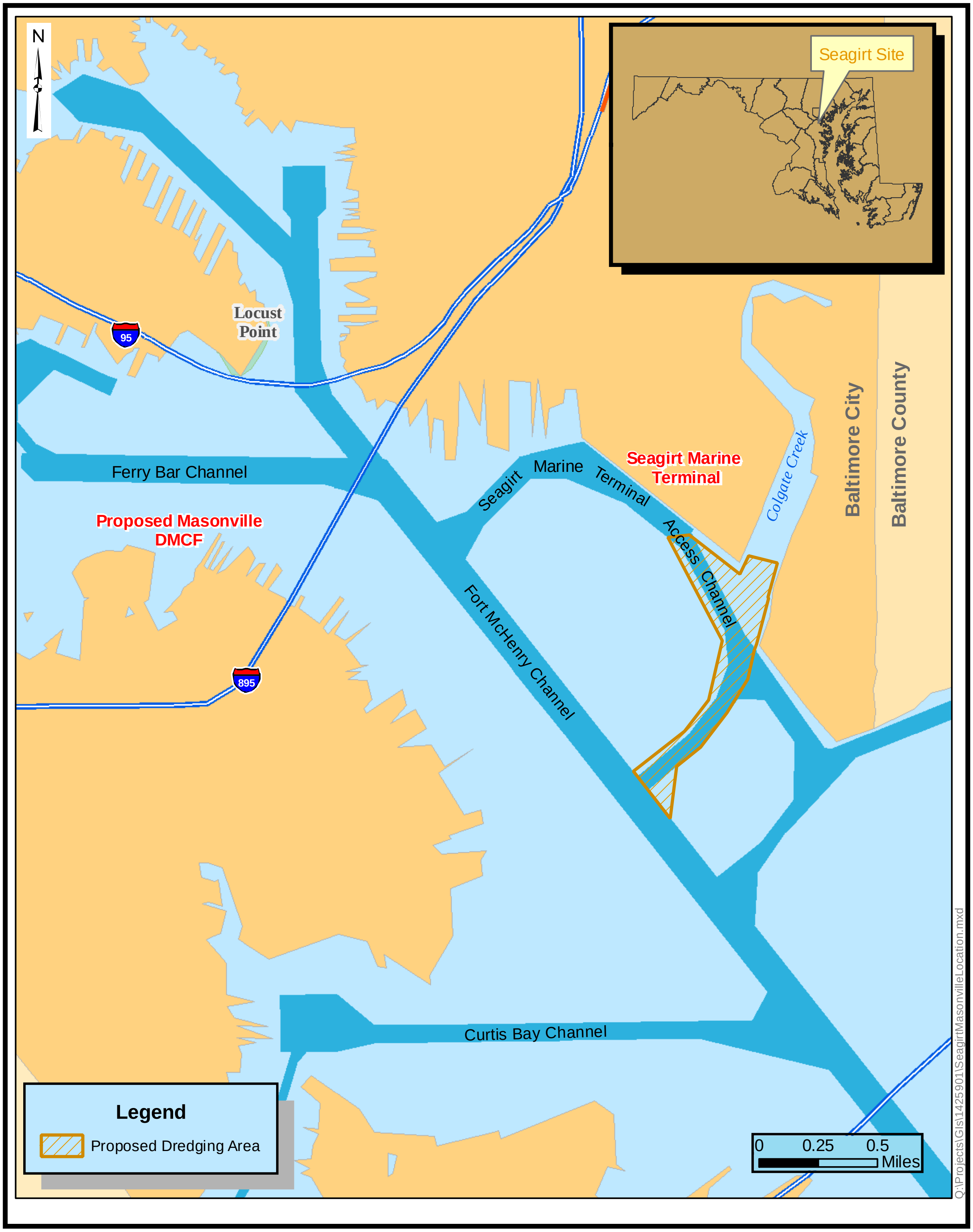

Figure 1-3. Location of the Proposed Dredging Area

2. POTENTIAL MODIFICATION OF THE PREFERRED ALTERNATIVE

The new information obtained on the material to be dredged from the Seagirt Marine Terminal Access Channel, described in Section 1.3, indicates that some of the material dredged from the Seagirt Access Channel is suitable for dike construction at the proposed Masonville dredged material containment facility (DMCF). This section details the new construction option utilizing the Seagirt dredged material and the modifications of both projects that would be required to use that material at Masonville. The use of the Seagirt dredged material would decrease the potential environmental impacts (Chapter 5) and costs (Section 2.6) of both the proposed Masonville DMCF and Seagirt dredging projects.

2.1 SEAGIRT MARINE TERMINAL DEEPENING PROJECT

2.1.1 Introduction

Marine facilities within the Port of Baltimore periodically require new work dredging to provide new access channels and unloading facilities and to improve function and safety within the public terminals and berthing areas. A dredging area has been proposed for the Seagirt Marine Terminal facility in the Port of Baltimore. The project was permitted as part of the Maryland Port Administration Harbor-wide Dredging Permits (issued by the USACE and the Maryland Board of Public Works).

The Seagirt dredging project involves deepening the existing Dundalk West Channel from –42 ft to –50 ft MLLW (Figure 2-1). Additionally a portion of the Colgate Creek Channel and Seagirt Dundalk Connector Channel will also be deepened to –50 ft MLLW (Figure 2-1). The area that lies between these two channels is scheduled for widening in order to make ship turning in the area safer (Figure 2-1). The widening area will also be dredged to –50 ft MLLW. The permits that include the Seagirt project allow for up to 2 feet of overdepth during the dredging process, which would result in depths up to –52 ft within the Seagirt area.

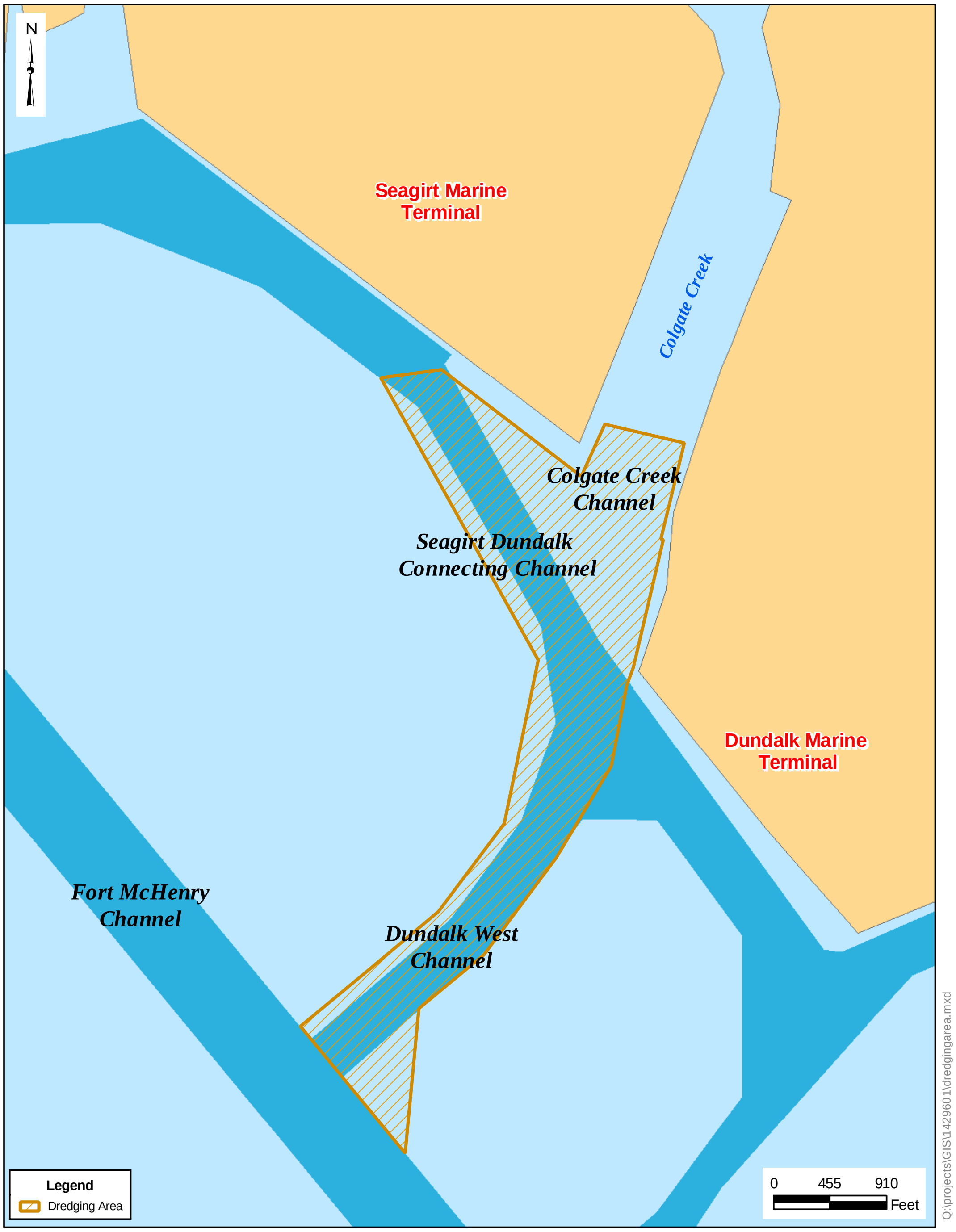

Figure 2-1. Seagirt Dredging Location

Geotechnical evaluations of the dredging area that were conducted prior to initiation of the dredging indicated that a significant amount of sand and gravel were within the authorized dredging area and would, therefore, be removed and placed at the HMI DMCF. The project engineers identified this material as suitable and desirable for dike construction for the proposed Masonville DMCF. Results of the geotechnical evaluations and the sand quantity estimations are described in Section 2.1.2.

2.1.2 Sand Source

Geotechnical borings of the material to be dredged from the Seagirt Marine terminal access channels were completed in April 2006 and processed in May of 2006. The results of this information indicated that some portions of the Seagirt dredging area contain sand and gravel suitable as construction material. The initial boring profile indicates that there is large area with a significant source of sand, portions of which underlie 30 ft of unsuitable material (Figure 2-2). Some of the dredging area does not contain sand material suitable for construction (Figure 2-2).

Figure 2-2. Sand Sources Identified in the Seagirt Dredging Area

It is estimated that there are approximately 0.5 to 0.8 mcy of sand suitable as construction material for the proposed Masonville DMCF in the Seagirt dredging area. This quantity, when combined with the 1.5 mcy of sand available within the Masonville project footprint, should provide a sufficient amount of material to construct the dikes at Masonville. If additional material were required, it would be obtained from a licensed, upland source approved for in-water placement.

Based upon the borings conducted in April 2006 and previous environmental borings in the area (EA 2006), estimates and locations of significant sand and gravel quantities were made for the new work area. The available sand quantities at –50 and –52 feet are indicated in Table 2-1. The April 2006 geotechnical studies included boring to –60 ft MLLW and the strata below –52 feet were found to have significant amounts of sand and gravel.

The potential for using this sand and gravel source as construction material was introduced to the Bay Enhancement Working Group (BEWG) on June 6, 2006. The advantages of retrieving more sand by potentially doing several feet of advance maintenance dredging were discussed with the resource agencies of the BEWG. Concerns about the potential for creating an area considerably deeper than the deepest adjacent channels were raised by the group. The primary concern is that deeper areas could become anoxic or hypoxic and remain so longer than shallower areas, essentially prolonging or exacerbating hypoxia in that area of the Harbor. The adjacent channel (Fort McHenry Channel) is currently authorized to –50 feet but dredging is required to 51 feet (one foot advanced maintenance) and paid to –53 feet (two feet available overdepth). In light of this information, the consensus of the BEWG was that advanced maintenance should be minimized, but that up to 2 feet of advanced maintenance could be allowed. The caveat associated with this decision is that no more than 10 percent of the area could be dredged lower than –54 feet, so any overdepth and advanced maintenance dredging would need to be conducted carefully and conservatively.

Dredging of 2 additional feet in the new work area for borrow would bring the final depths to 54 ft, including 2 feet of over dredging. Approximately 0.5 to 0.8 mcy of sand and gravel could be available (depending upon depth) if dredging for borrow is conducted (Table 2-1). Table 2-1 presents the estimated available sand volumes from the Seagirt dredging project. The sand quantity available at a dredging depth of 52 ft was chosen as the planning-level available sand quantity. This approach should elicit a conservative (lower) figure for cost savings provided by the proposed revision of the construction option.

Preliminary estimates of the material available are shown in Table 2-1 below. These estimates are higher than the amount of material that could actually be used. The usable construction quantities are also shown in Table 2-1. This preliminary estimate was reduced by 15 percent to provide a conservative value of construction material available for use in cost estimation. The 15 percent accounts for potential variances in the sand layers projected between boring locations, as well as the fact that the contractor will not dredge to the exact depth1 the entire dredging template (Seagirt project area).

Table 2-1. Quantity of Sand Borrow Available from the Seagirt Dredging Area

Dredging Depth (ft)	Preliminary Estimate (mcy)	Available for Use[1] (mcy)
50	0.4	0.3
52	0.6	0.5
54	0.9	0.8

[1]The amount available for use considers a 15 percent contingency.

2.2 DESCRIPTION OF THE MODIFICATION OF THE PREFERRED ALTERNATIVE

Based on the new information (Sections 1.3 and 2.1.2) about the material to be dredged from the Seagirt Marine Terminal access channels, approximately 0.5 mcy of suitable borrow material for the construction of the proposed Masonville DMCF will be available as a result of the Seagirt dredging project (Section 2.1). Instead of placing this material at the Hart-Miller Island (HMI) DMCF, this material would then be innovatively reused during the construction of the beach and armored sand dike construction at the proposed Masonville DMCF. To maximize use of this material at the proposed Masonville DMCF, dredging in the Seagirt Marine Terminal access channels may be completed to a maximum depth of up to 54 feet instead of the current authorization of 50 feet plus up to an additional 2 feet of over dredging. The material dredged from the channel would likely replace most of the 0.4 mcy of onsite Arundel clay initially planned for use in constructing the Masonville DMCF containment structure and reduction of the amount of common borrow needed for cofferdam filling. Any material beyond the amount required for initial construction would be placed at the Masonville site for use when raising the dikes to their final height. The use of Seagirt dredged material would reduce both the need for material from upland mining sources and the need to dredge material from the Arundel clay layer within the DMCF footprint for use in the raising of the dikes to their final height of +36 feet MLLW.

This modification of the preferred construction option would require a revision of the joint permit application completed for the proposed Masonville DMCF and an amendment to the existing permit for the Seagirt dredging project to accommodate the potential increase in the dredging depth and change in the placement location for the material (Chapter 7).

2.3 CONSTRUCTION OF THE PROPOSED MASONVILLE DMCF

If implemented, the proposed modification of the preferred construction option would change the borrow source for approximately one fourth of the borrow material required for construction of the proposed Masonville DMCF. This section describes how the change of construction material would affect dike construction at Masonville.

Dike materials retrieved from below the silty overburden at Masonville are being proposed as construction materials for the proposed Masonville DMCF containment structure. The general quality of these materials is better than the quality of the materials that statute 5-1102 was intended to manage (Section 2.4). Therefore, the clean materials from the lower strata have been deemed potentially suitable for dike construction at Masonville. The quality of the Seagirt dredged material proposed for use at Masonville is expected to be of a similar or higher quality than the materials obtained from the Masonville on site sand source.

2.3.1 Implementation of the Current DEIS Preferred Alternative

The following describes what is currently proposed as the preferred alternative (including the preferred construction option) in the DEIS. During pre-dredging, geotechnically unsuitable materials would be removed (pre-dredged) from underneath the footprint of the proposed containment structure and overtop of the onsite borrow area at Masonville. The 1.7 mcy of overburden would be placed at the HMI DMCF. The first section of the containment structure built would be the cofferdam section. Following completion of the cofferdam section, the sand portion of the beach and armored dike sections of the containment structure would be pumped into place from the onsite borrow area. This sand portion would be connected to the cofferdam portion of the containment structure, effectively closing off the interior of the site from the Patapsco River. The remaining inner, clay portion of the beach and armored dike sections would then be pumped from the onsite borrow area into dike sections and mechanically graded to complete the dike.

2.3.2 Implementation of the Proposed Modification

The following describes the revised preferred alternative as defined in this supplement, which includes a revision to the preferred construction option (specifically the borrow scenario). The initial pre-dredging phase would occur as described in Section 2.3.1. Sand from the Seagirt dredging project would then be mechanically dredged by a clamshell bucket dredge and placed in split hull scows for transport to the Masonville site. The sand would be placed within the beach and armored sand dike sections of the containment structure by positioning the scows over the pre-dredged area and opening their hulls (Figure 2-3). The split hull barge would only have a few feet of clearance and would be depositing sand directly into the trench (undercut) that would result when unsuitable material was predredged from under the proposed dike line. All available sand from the Seagirt project would be placed at the Masonville site. The first section of the containment structure built would be the cofferdam portion. Following completion of the cofferdam section, the remaining sand dike portions of the Masonville containment structure would be placed into the dike from the onsite borrow source. It is anticipated that dredging of the clay borrow available at the Masonville site would not be required.

2.3.3 Changes in Construction Materials

The current design of the Masonville containment structure would require a total of 2.8 mcy of construction material (Table 2-2). The preferred construction option from the DEIS would require 1.5 mcy of sand borrow, 0.4 mcy of clay borrow, and 0.9 mcy of upland borrow materials for construction. Using the Seagirt dredged material may decrease the amount of material required from both onsite and upland sources (Table 2-2). Approximately 1.5 mcy would be obtained from onsite, 0.5 to 0.8 mcy would come from the Seagirt dredging area, and 0.5 to 0.8 mcy would come from upland sources or onsite dredging of clay material. These differences are shown in Table 2-3. Under the scenario using Seagirt dredged material, the clay portion of the Masonville containment structure could be entirely replaced with sand from Seagirt. This would be preferable from a construction cost standpoint, as the sand already being dredged from Seagirt may preclude the clay excavation cost.

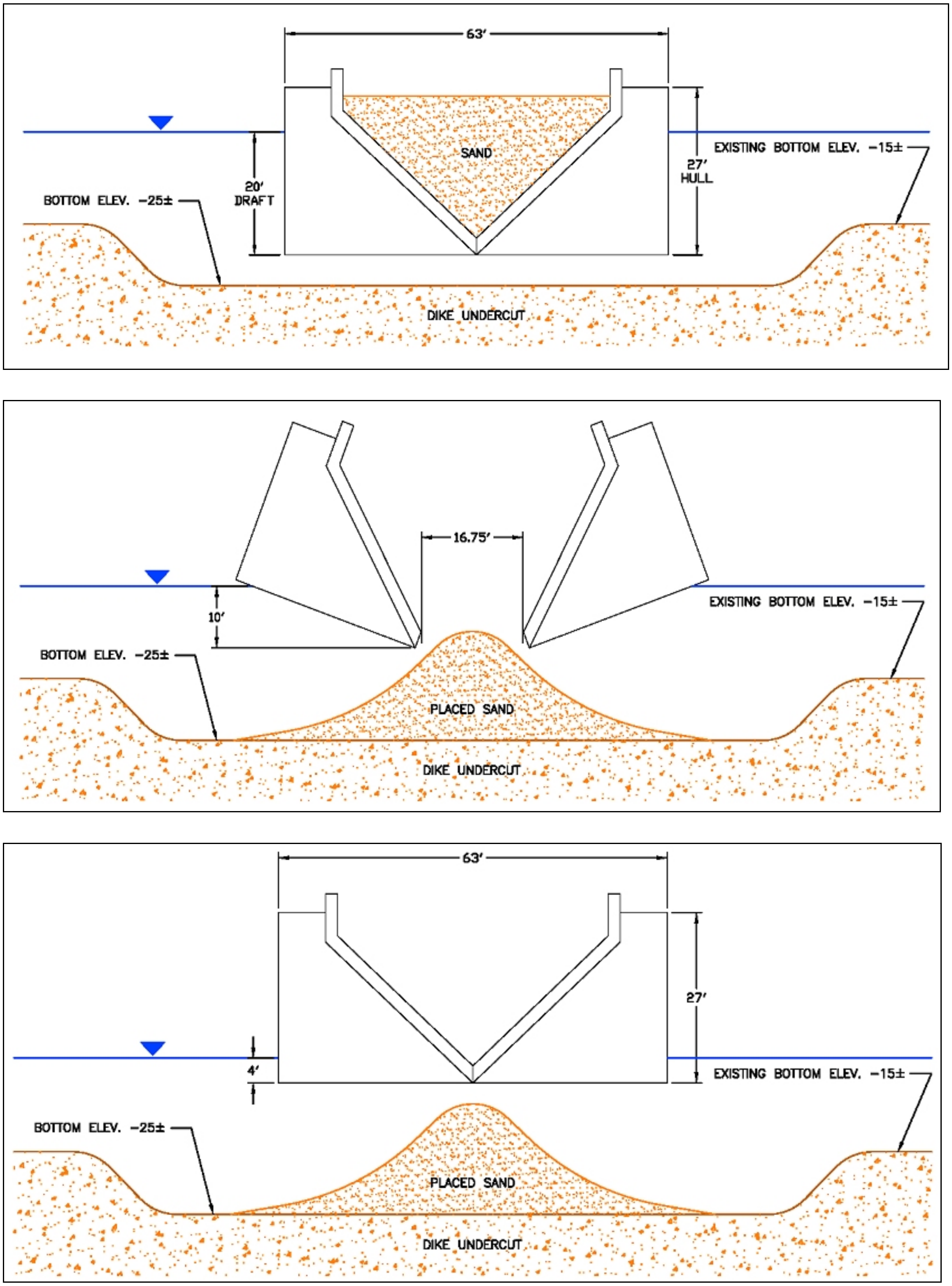

Figure 2-3 – Split Hull Barge Sand Placement Sequence

Table 2-2. Quantity of Borrow Material Required by the Proposed Masonville DMCF

Construction	Borrow Material Required (mcy)
Sand Fill – Sand and Beach Dikes	1.5
Clay or Sand Fill – Sand and Beach Dike	0.5
Cofferdam	0.15
Onshore/Shoreline Dikes	0.03
Future Dike Raising	0.6
Total	**2.78**

Table 2-3. Borrow Material Quantities Used for the Main Containment Structure

Borrow Source	DEIS Preferred Construction Option (mcy)	Proposed Modification, Supplement (mcy)	Difference between Scenarios (mcy)
Onsite – Sand	1.5	1.5	0
Onsite – Clay[1]	0.4	0	- 0.4
Seagirt Dredging Area	0	0.5 to 0.8	+ 0.5 to + 0.8
Upland Mine[2]	0.9	0.5 to 0.8	- 0.4 to – 0.1
Total	**2.8**	**2.8**	**0**

[1] Clay may be used for the construction of the Wet Basin.
[2] The amount of material used from an upland mining source is the difference between the total material required for construction and the amount available from onsite and the Seagirt dredging project.

2.4 CRITERIA FOR IN-WATER PLACEMENT OF DREDGED MATERIAL

The US EPA, the US Army Corps of Engineers, and state resource agencies regulate placement of dredged material into waters of the United States. The general guidelines for testing of dredged materials comes from the following sources:

- USACE-ERDC, 2003 (ERDC/EL TR-03-01). *Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing Manual.*
- USEPA/USACE, 1998 (EPA-823-B-98-004). *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S.-Testing Manual (Inland Testing Manual).*
- USEPA, 1995 (EPA-823-B-95-001). *QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations*.
- USEPA, 2001 (EPA-823-B-01-002). *Methods for Collection, Storage, and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual.*

In order to assess the significance of detected contaminants, sediment chemistry results are compared to sediment quality guidelines. Sediment Quality Guidelines (SQG) are numerical chemical concentrations intended to either be protective of biological resources, or predictive of adverse effects to those resources, or both (Wenning and Ingersoll 2002). The USACE's guidance on using SQGs in dredged material management acknowledges the limitations of approaches used to derive SQGs to date, but concludes that SQGs are still useful as initial screening values in Tier 1 or Tier 2 assessments [USACE–Waterways Experiment Station 1998]. If, based on the initial screening using established SQGs, there is a "reason to believe" that the material is not contaminated, no further chemical or toxicological testing would be necessary as indicated by the *Inland Testing Manual* [USACE–WES 1998].

The SQGs were developed as informal (non-regulatory) guidelines for use in interpreting chemical data from analyses of sediments. Several biological-effects approaches have been used to assess marine/estuarine sediment quality relative to the potential for adverse effects on benthic organisms, including the Threshold Effects Levels (TEL) / Probable Effects Levels (PEL) (MacDonald et al. 1996) approach. The TEL and PEL values were derived using concentrations with both effects and no observed effects (Long and Macdonald 1998). TELs typically represent concentrations below which adverse biological effects were rarely observed, while PELs typically represent concentrations in the middle of the effects range and above which effects were more frequently observed (Long and Macdonald 1998). Concentrations that are between the TEL and PEL represent the concentrations at which adverse biological effects occasionally occur.

Several statutes within the State of Maryland regulate placement of dredged material. For materials within Baltimore Harbor, the key statute is (Maryland Code Environment 5-1102). Subparagraph (a) of the Statute says: "A person may not redeposit in an unconfined manner dredged material from Baltimore Harbor into or onto any portion of the water or bottomland of the Chesapeake Bay or of the tidewater portions of any of the Chesapeake Bay's tributaries outside of Baltimore." Subparagraph (c) of the Statute says: (c) "Except as provided in subsection (d) of this section, a person may not redeposit in an unconfined manner dredged material into or onto any portion of the water or bottomland of the Chesapeake Bay or of the tidewater portion of any of the Chesapeake Bay's tributaries except when used for a beneficial use project undertaken in accordance with State and federal laws. However, the dredged material may be redeposited in contained areas approved by the Department". The intent of the ruling was to make sure that Harbor sediments with elevated levels of contaminants were placed in confined placement facilities and/or not placed outside the Harbor. The materials proposed to construct the dikes at Masonville would come from materials within the Harbor but are generally pre-industrial era sand and gravel deposits that would meet the quality guidelines outlined above for placement in inland waters and be used to construct the type of containment facility outlined in the Statute.

2.5 POTENTIAL ISSUES RESULTING FROM THE MODIFICATION OF THE PREFERRED ALTERNATIVE

A potential change in the source of part of the Masonville dike construction material raises a few issues in project implementation. Most notably, the timing of the availability of the new information (May) and the decision to try to use the Seagirt material for construction at Masonville (early June) occurred while the DEIS was out for public comment. As described in Section 1.3.2, this necessitated a need to release this supplement to the DEIS. It is estimated that the supplement and resulting comment period will add up to 6 weeks to the NEPA process, delaying the record of decision. If the project is permitted, this delay would shorten the available construction time in Fall 2006 and leave less time for construction prior to the anticipated anadromous fish time of year restriction (Feb 15 to June 15). Some work would have to be delayed until June 2007. This would shift equipment usage and affect the current air quality assessment.

Another issue associated with the proposed change is that the Joint State-Federal Wetland permit application for Masonville would need to be revised. Similarly, the Maryland Port Administration (MPA) Harbor-wide Dredging Permits (issued by the USACE and the Maryland Board of Public Works) would also need to be amended to include the potential change in depth (to a maximum depth of –54 ft) and to identify Masonville as the placement site for some of the Seagirt material. These amendment applications have been submitted concurrent to this supplement.

2.6 POTENTIAL BENEFITS OF THE MODIFICATION TO THE PREFERRED ALTERNATIVE

When the sand source below Seagirt was identified as potential dike construction materials for Masonville, an evaluation of the potential benefits of using the material to the overall project was made. These are not necessarily ecosystem benefits, but benefits to the project relative to the preferred borrow scenario, implementation, and potential impacts identified in the DEIS. These benefits (relative to the DEIS preferred construction option) fall into two basic categories: (1) reduction of overall costs and (2) potential reductions in some environmental impacts.

Reductions in the overall project costs, relative to the costs identified in the DEIS, can be attributed to the lessened need to purchase common borrow and the lower travel distances to deliver material to Masonville (relative to the HMI DMCF). Reduced transportation and placement cost for the dredged sand from the Seagirt dredging project is anticipated to provide a savings of $10 per cy of sand dredged. Reduced cost of construction materials for the Masonville site would provide a savings of $9.70 per cy of material by reducing the amount of onsite borrow. The use of the Seagirt sand material would also reduce the need to purchase material from an upland mining source, providing a cost savings of approximately $18 per cy. The combined cost savings provided by using the Seagirt dredged material would be approximately $10 million.

Potential reductions in environmental impacts, relative to the impacts identified in the DEIS, are primarily associated with water and air quality. These are detailed in Sections 5.2.1 and 5.2.4. With respect to water quality, the larger grain-size of the Seagirt materials and the placement method results in less turbidity generated at the Masonville site during placement relative to using the onsite materials borrowed from below the Masonville site and pumped onto the dike. With respect to air quality, the proposed use of Seagirt material for dike construction reduces the need for some hydraulic dredging at Masonville, which results in lesser air emissions at the site. If some Seagirt material is placed at Masonville rather than taken to the HMI DMCF, it would result in less overall transportation and less emissions from pumping the relatively heavy material into the HMI DMCF. This would result in regional reductions in air emissions as well.

3. ALTERNATIVES ANALYSIS

The complete alternatives analysis for the proposed Masonville dredged material containment facility (DMCF), including the analysis that led to the identification of Masonville as the preferred alternative and the preferred construction option for that alternative, can be found in Chapter 3 of the *Tiered Draft Environmental Impact Statement (DEIS) for the Proposed Masonville Dredged Material Containment Facility (DMCF)* (USACE 2006). This chapter provides a summary of the objectives and constraints considered, an overview of the Masonville project alternatives, the evaluation of the alternatives, and the description of the both the preferred alternative for the DEIS and the revised preferred alternative that would result from implementing this supplement.

3.1 OBJECTIVES AND CONSTRAINTS

The alternatives analysis in the DEIS resulted in the selection of Masonville as the Preferred Alternative for a Baltimore Harbor DMCF. The objectives and constraints discussed in this section were used to evaluate the Preferred Alternative and construction option identified in the DEIS, the proposed modification of the preferred construction option at Masonville of the Preferred Alternative, and the No Action Alternative.

3.1.1 Environmental

Environmental resources were evaluated in the context of this project to select an alternative that minimizes adverse environmental impacts and preserves and protects environmental resources to the greatest extent possible. Several seasons of field studies were completed in the vicinity of Masonville to determine the existing environmental resources so that the potential impacts of the alternatives presented could adequately be assessed. These impact categories include:

- Surface Water and Groundwater Quality
- Soil and Sediment Quality
- Air Quality
- Aquatic and Terrestrial Habitats
- Wetlands and Critical Areas
- Aquatic Resources
- Avian and Terrestrial Resources
- Rare, Threatened, and Endangered (RTE) Species
- Cultural and Historical Resources (Phase I)
- Aesthetics and Noise

Potential environmental constraints include the presence of RTE species, Federally, State or Local protected lands, 100-year floodplain, and historical resources. These resource categories are discussed in depth in Chapters 2 and 5 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006) and are discussed as applicable in Chapters 4 and 5 of this Addendum.

3.1.2 Engineering

The objective of the engineering evaluation is to provide the most desirable site characteristics, while minimizing cost and adverse impacts. Site characteristics are the relevant and quantifiable aspects of the site. Important site characteristics include: footprint and effective site area, total and annual site capacity, site life, initial and final dike elevation, final dredged material surface elevation, construction duration, and completion date. These characteristics are quantified by studying the existing physical and environmental conditions at the site and designing the placement option. Site characteristics are used in conjunction with costs and impacts to evaluate and compare each alternative.

The engineering evaluation also considers the soundness of design and the technical feasibility and constructability of each alternative.

3.1.3 Economic

Evaluation of the economics of various alternatives is typically based on the unit cost. This unit cost accounts for the cost of excavating in-situ material, transporting it to a placement site, placing at the site, and any costs associated with providing a facility to accept placement. The unit cost for a specific option is the sum of the costs listed below divided by the option's total capacity.

- **Initial Cost –** sum of study, design, mitigation, and construction costs
- **Site Operational Cost –** cost to maintain and monitor the site while it is accepting dredged material
- **Dike Raising Cost –** cost to raise dikes using approved material, as specified in the design
- **Dredging, Transportation, and Placement Cost –** cost to dredge in-situ material, transport it to the site, and place the material in an approved facility

3.2 ALTERNATIVES CONSIDERED

The process leading to the identification of Masonville as the site for the proposed Masonville DMCF and the analysis that resulted in the identification of the preferred construction-option alignment, dike type, and initial dike elevation for the proposed facility are detailed in Chapter 3 of the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006). The alternatives analysis described in the DEIS preferred Final Feasibility Alignment 3, an initial dike height of +10 feet MLLW, and the construction of a cofferdam in the main alignment instead of a rock dike.

Under the preferred alternative, the 141-acre proposed Masonville DMCF would be constructed along the southern shore of the Patapsco River, adjacent to the existing Masonville Marine Terminal Phase II. The DMCF would consist of a cofferdam, an armored sand dike, a beach dike, and an on shore dike (Figure 1-2). The Wet Basin (Figure 1-2), located adjacent to the former Kurt, Iron, and Metal Facility would be used for additional site capacity. The Wet Basin portion of the DMCF would be contained by a rock dike. The main containment portion of the facility would be built to an initial height of +10 feet MLLW and then raised to a temporary height of + 42 feet MLLW before being graded to a final site elevation of +36 feet MLLW. The Wet Basin rock dike would be raised to a height of +8 feet MLLW. The total capacity of the facility would be 16 mcy with a site life of approximately 20 years. The annual placement capacity would be between 0.5 and 1 mcy.

Four scenarios for obtaining the required construction materials for the site are evaluated in DEIS Section 3.7.6. The modification of the preferred construction option proposed in this Supplement would directly impact the preferred borrow scenario described in the DEIS (a modification of DEIS Scenario A, described below). An additional borrow scenario has been added to address the 0.5 to 0.8 mcy dredged material from the Seagirt dredging project suitable for use in the construction of the proposed Masonville DMCF. The different borrow scenarios are described in Section 3.2.1 and 3.2.2 and evaluated in Section 3.3.

The change in borrow scenarios does not affect the No Action Alternative described in the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006).

3.2.1 DEIS Preferred Borrow Scenario

The DEIS preferred borrow scenario calls for the majority of the necessary borrow material to come from an onsite (Masonville) source. This requires the removal of geotechnically unsuitable material (overburden) from over the borrow source. This overburden would be placed at the HMI DMCF. The onsite borrow source is estimated to be capable of providing most of the construction material for the Masonville DMCF (1.5 mcy of sand and 0.4 mcy of Arundel clay, Table 2-3). Due to scheduling issues, some borrow from an offsite upland source would also be used under this scenario for cofferdam filling and onshore dike construction.

3.2.2 Modified Borrow Scenario

The containment structure for the modified borrow scenario would have essentially the same containment structure design as the DEIS Alternative (Figure 1-2). However, the total capacity of the facility would be decreased by approximately 0.6 mcy to 15.4 mcy with an accompanying 1-year decrease in site life (from 20 to 19 years). (This is because the annual placement capacity would remain between 0.5 and 1 mcy and approximately one year of capacity would be lost).

The modified borrow scenario would utilize sand from the Seagirt new work dredging project as construction material for the proposed Masonville DMCF. The onsite borrow source would still provide the available 1.5 mcy of sand. However, the modified borrow scenario would replace the 0.4 mcy of Arundel clay with sand from the Seagirt project (Table 2-3). The Seagirt project is estimated to yield 0.5 to 0.8 mcy of material (Table 2-1). Any sand beyond that needed for initial DMCF construction at Masonville would be stockpiled onsite for future dike raising. Obtaining onsite Masonville sand material would still require the removal of geotechnically unsuitable material (overburden) from overtop of the borrow source. This overburden would still be placed at the HMI DMCF. Due to scheduling issues, some borrow from an offsite upland source would also be used for cofferdam filling and onshore dike construction under this scenario.

3.3 EVALUATION OF ALTERNATIVES

This section compares the environmental, engineering, and cost implications associated with the two borrow scenarios described in Sections 3.2.1 and 3.2.2.

3.3.1 Environmental

The DEIS preferred borrow scenario would require a greater quantity of offsite borrow than the modified borrow scenario (Table 2-3). The additional material required from offsite would cause greater environmental impacts from the mining, transportation, and placement of this material. The DEIS preferred borrow scenario would have greater air emissions, due to the transport of greater quantities of material from an offsite upland source. Mining a greater quantity of material would increase the disturbed area offsite, and irretrievably use upland mining resources. The fines content of the material proposed for borrow from Masonville site is higher than that of the proposed Seagirt sand/gravel sources and would release more turbidity during construction.

The modified borrow scenario would effectively utilize material that would be dredged even if the proposed Masonville DMCF were not constructed, instead of affecting an additional sand source. This modification also allows for the minimizing the use of the Arundel clay layer (which is a less desirable construction material) and less offsite borrow material than the DEIS preferred borrow scenario. The modified borrow scenario would also decrease the air emissions associated with the Seagirt dredging project by transporting 0.5 to 0.8 mcy of dredged material to the Masonville site rather than the HMI DMCF. Air emissions associated with dike construction would decrease since the Arundel clay layer would not be hydraulically dredged. Instead, the Seagirt dredged material would be placed from a split hull barge. Therefore, the modified borrow scenario is a more environmentally preferable construction alternative for the Masonville DMCF.

3.3.2 Engineering

Engineering evaluation of the alternatives results in the selection of the scenario with the most desirable site characteristics, while minimizing both cost and negative impacts.

In comparing the currently preferred DEIS borrow scenario to the proposed revised borrow scenario in this supplement, virtually all of the site characteristics are identical. However, the site capacity and site life are affected by the modification. For costing purposes, it was assumed that only the material that is currently permitted for dredging at Seagirt (to –50 feet with up to a 2 foot overdepth) would be recovered for borrow. If material were borrowed below that level, the volume and cost benefits would be greater. However, the additional material (below –52 feet) may be subject to a royalty so the incremental cost benefits are unknown.

Table 3-1. Comparison of Site Characteristics and Initial Construction Costs

Item	DEIS Alternative	Revised Alternative	Difference
Site Capacity	16.0 mcy	15.4 mcy	0.6 mcy
Site Life	20 Years	19 Years	1Year
Initial Construction Cost	$82.5 million	$78.2 million	$4.3 million
Future Dike Raising Cost	$19.9 million	$18.8 million	$1.1 million

Notes: Costs taken from Appendix A, Table A-4

Table 3-1 shows that the proposed modification would save approximately $4 million in upfront costs and $1 million in future construction costs. The proposed modification does reduce the capacity at the proposed Masonville DMCF by approximately 0.6 mcy, which is equivalent to approximately one year of placement capacity.

Although the revised borrow scenario is still being studied, both borrow scenarios appear to include technically feasible, routine dredging and construction projects. Neither alternative appears to be preferential over the other from a technical feasibility standpoint.

The modified borrow scenario utilizes approximately one third of the equipment of the DEIS preferred borrow scenario for the Seagirt dredging scenario for dredging and placement. Potential interruptions in production and the associated costs to both the contractors and the Maryland Port Administration (MPA) favor the less costly and thus, less risky, revised borrow scenario in this supplement.

From an engineering standpoint, the modified scenario would be preferred. This modified borrow scenario provides Masonville placement capacity at a lower cost, while minimizing negative environmental impacts.

3.3.3 Economic

The modified borrow scenario would reduce the cost of the proposed Masonville DMCF project. The engineering evaluation of the alternatives shows that the initial and future construction costs of the site would be reduced by approximately $5 million. The overall unit cost of the site would also be reduced by approximately $0.12 per cubic yard. Table 3-2 presents the project costs associated with the Masonville DMCF. Descriptions of the project cost line items given in Table 3-2 are found in Section 4.10 of the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006).

Table 3-2. Masonville Project Costs

Line Item	DEIS Alternative	Modified Alternative
Study and Design (millions)	$3.3	$3.3
Initial Construction (millions)	$53.5	$49.2
Mitigation/Infrastructure (millions)	$29.0	$29.0
Site Operations (millions)	$18.1	$17.3
Second Dike Raising (millions)	$19.9	$18.7
Dredging, Transportation, and Placement (millions)	$121/7	$116.9
Total (millions)	$245.6	234.5
Approximate Total Unit Cost ($/cy capacity)	$15.35	$15.23

Note: Values presented in 2005 dollars. The total may not equal the sum of line items due to rounding.

In comparing the costs, there is little difference in the overall unit cost (they both round to the $15 per cy). However, the initial savings of about $5 million is important when the time-value of money is considered.

The cost of the Seagirt dredging project would be reduced by the proposed modification. This cost reduction is attributed to shorter haul distances for the material and less expensive placement methods. Reduced transportation and placement cost for the dredged sand from the Seagirt dredging project is anticipated to provide a savings of $10 per cy of sand dredged. This totals approximately $5 million in savings. Appendix A Table A-2 provides the backup for this cost savings.

3.4 PREFERRED ALTERNATIVE

As stated previously, Masonville is the Preferred Alternative but it now includes a modified construction option with the revised borrow scenario. That is, construction of the proposed Masonville DMCF using both onsite borrow material and the material available from the Seagirt Access Channel deepening and widening project. This now constitutes the preferred construction option from an environmental, engineering, and economic standpoint. This new (revised) alternative minimizes environmental impacts, while providing minimal reduction in Masonville DMCF placement capacity at a lower cost. This alternative also reduces the cost of the Seagirt dredging project, while reducing the risk associated with the equipment package utilized for the sand portion of the dredging.

Specifically, the proposed modification provides the following economic benefits:

- *Masonville DMCF Alternatives*- An initial cost savings of $4 Million, and future dike raising cost savings of about $1 million. These savings are realized while providing almost identical capacity benefits.

- *Seagirt Dredging Project* - Reduced transportation and placement cost for the dredged sand from the Seagirt dredging project is anticipated to provide a savings of approximately $5 Million.

The environmental benefits of the new modified construction option at Masonville include air emissions reduction and improved water quality relative to the DEIS preferred alternative (discussed further in Section 5.2.1 and 5.2.4).

4. AFFECTED ENVIRONMENT

4.1 MASONVILLE

The existing conditions at the proposed Masonville DMCF site have not changed from those described in the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006). The project has one recommended alignment of approximately 141 acres, which would tie into the existing shoreline along an old industrial complex and a previously filled containment facility. The total impacted footprint would be 127 acres of open water. There is an additional 3 acres of previously unauthorized fill, 10 acres of upland habitat, and approximately 1 acre of vegetated wetlands that would be affected by the proposed Masonville DMCF. Of the 127 acres of impacted open water, there is a loss of 123 acres of river bottom (and a conversion of 7 acres of river bottom to manmade bottom at shallower depths due to the dike slope and need to move several sunken barges outside the proposed footprint). Ten of the 141 acres is upland habitats along the current shoreline that would be affected by the proposed Masonville DMCF.

4.2 SEAGIRT MARINE TERMINAL

4.2.1 Setting

Location

Seagirt Marine Terminal is located along the north shore of the Patapsco River, just west of Colgate Creek. The site is approximately 1.5 miles east of Fort McHenry, less than 1 mile east of the Harbor Tunnel (I-895), and approximately 3 miles southeast of the Inner Harbor area of Baltimore. The proposed Masonville DMCF site is approximately 2 miles west of the Terminal. Seagirt Marine Terminal is situated within the Baltimore City limits, but is less than 1 mile from the Baltimore City-Baltimore County line (Figure 4-1).

The site is bordered by Colgate Creek and Dundalk Marine Terminal to the east, the Patapsco River to the south, the Point Breeze Industrial Park to the north, and the Canton Industrial Area to the west (Figure 4-1).

The area proposed for dredging is located in the Patapsco River, just south of Seagirt Marine Terminal (Figure 4-1). This area is owned by the State of Maryland.

Climate

The climate for Seagirt Marine Terminal is the same as the climate described for Masonville in the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006).

Figure 4-1. Location of Seagirt Marine Terminal Dredging Area

4.2.2 Screening of Affected Resources

Table 4-1 lists the resource topics that were dismissed from further evaluation and the reason for screening that particular resource out.

Table 4-1. Resource Topics Dismissed From Further Evaluation

Resource	**Reason for Screening Out**
Soils	The dredging area is located entirely underwater. No soil would be affected by the revised preferred alternative.
Geology	The geology of the area would not be altered or affected by any of the alternatives considered.
Terrestrial Resources	The area where dredging would occur is entirely underwater. No terrestrial resources are found in the area.
Critical Areas	The area where dredging would occur is entirely underwater and, therefore, is not within the 1000-ft critical area or the 100-ft critical area buffer.
Floodplains	The area is located underwater and would not adversely affect existing floodplains along nearby shoreline.
Wild and Scenic Rivers	The Patapsco River is not a Wild and Scenic River.
Prime and Unique Farmland	The area is underwater and therefore does not contain any prime and unique farmland.
Cultural Resources	The dredging project will occur in the existing, maintained shipping channel, no cultural resources are known to exist in this area.
Demographics	No one resides in the project area or at Seagirt Marine Terminal. Seagirt Marine Terminal is surrounded by industrial properties and not residential areas. The project is not expected to affect the demographics of the region.
Land and Water Use	This is a project in an industrial area to support industrial uses. No changes to land or water use in the area are expected.
Environmental Justice	The project site is underwater. Adjacent onshore areas are industrial in nature. No residential areas are in the vicinity of the site so there are no environmental justice impacts
Safety to Children	The project is located offshore in an industrial area. No children would have access to the area where dredging would occur.
Recreation	The dredging is occurring adjacent to Seagirt Marine Terminal in the shipping channels. The proposed dredging area is not known to support much recreational activity.
Noise	The Seagirt dredging is already permitted and the proposed revision would not affect noise in the area. The alterations in equipment to use the Seagirt sand/gravel are expected to have little-to-no affect on construction noise in the Masonville area.

4.2.3 Physiography and Groundwater

Physiography

The dredging area abuts a bulkhead adjacent to Seagirt Marine Terminal and covers an area of 128 acres. The existing depth of the site ranges from 15 feet to 47 ft. The site bathymetry is shown in Figure 4-2.

Groundwater

There are two aquifers in the vicinity of the Seagirt dredging area, the Patapsco Formation and the Patuxent Formation. The Patapsco Formation begins at a depth of approximately 30 ft and continues to a depth of approximately 50 ft. A clay confining layer, the Arundel Formation, approximately 100 ft thick separates the Patapsco and Patuxent Formations. The Arundel Formation has a permeability between 10^{-9} and 10^{-11} feet per second. This prevents intrusion from the upper formations to the lower formation. The Patuxent Formation begins at a depth of approximately 150 feet. Beneath the Patuxent Formation is a basement rock formation that is considered impermeable (Chapelle 1985).

Both the Patapsco and Patuxent Aquifers have been intruded with salt-water. Both this contamination and the use of groundwater in the Seagirt area are similar to what was described for Masonville in the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006). Groundwater within the City of Baltimore is not used as a source of potable water.

4.2.4 Hydrology and Hydrodynamics

The area currently is a channel with depths ranging from 15 to 47 feet. Bathymetry information is discussed in Section 4.2.3. Information on the hydrology and hydrodynamics of the Patapsco River in the vicinity of both Masonville and Seagirt Marine Terminal is described in Section 2.1.3 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006).

Seagirt Marine Terminal is subject to wave action primarily from the south. The dredging area is completely within the water and is subject to wind-induced wave action from all directions, though only to a limited extent from the north.

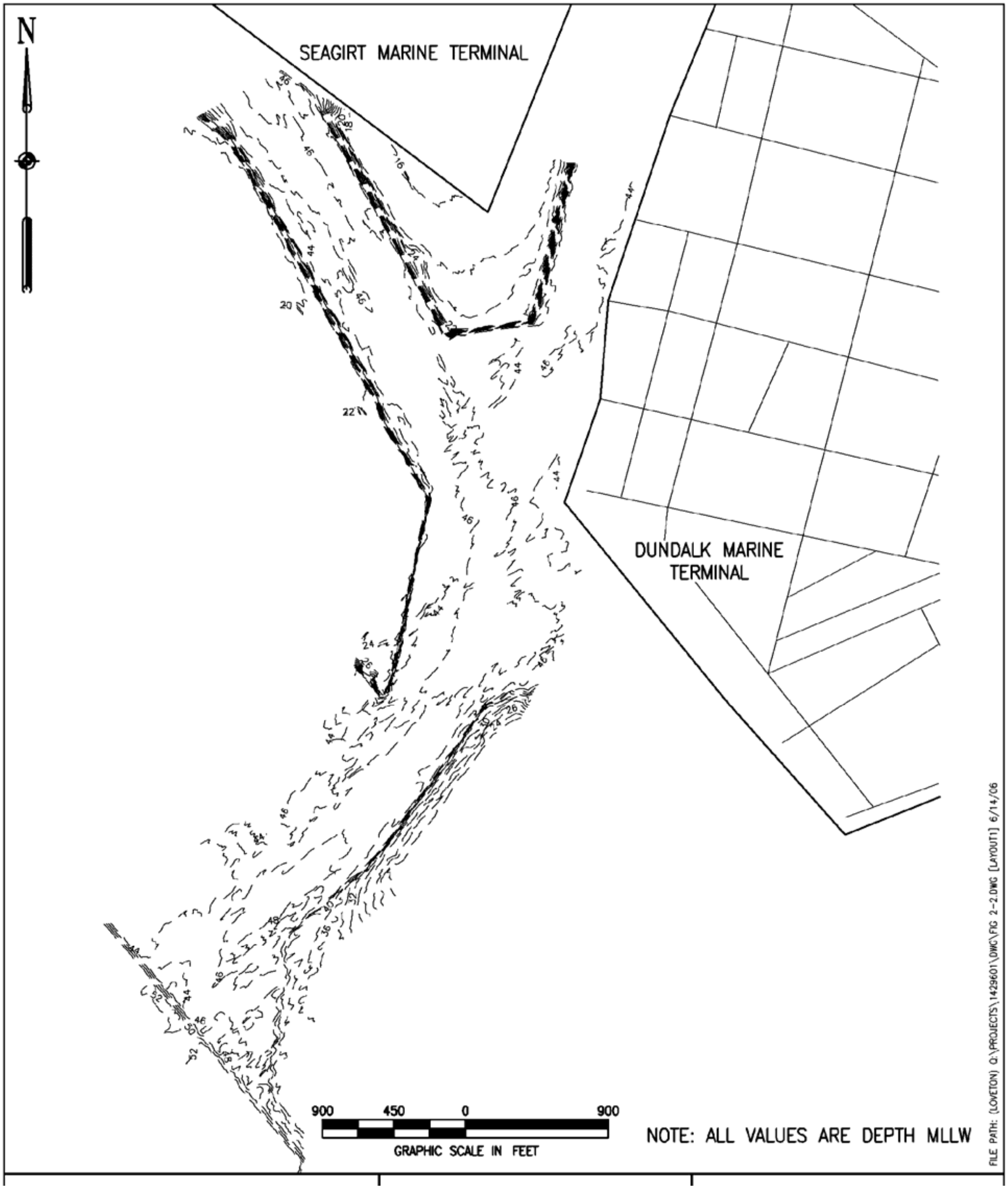

Figure 4-2. Bathymetry of Seagirt Marine Terminal Dredging Area

4.2.5 Sediment Quality

Sediment chemistry testing was completed on samples taken from the Seagirt Access Channel in 2004 and 2005. The program was designed to test the suitability of material proposed for dredging as capping material for Hart Miller Island DMCF. Samples were taken at 5-foot depth intervals to characterize the extent of the contaminated sediments and to differentiate where anthropogenic contaminant concentrations diminished within the marine sediment strata. The results of this testing were compared to sediment quality guidelines (SQGs) for marine sediments (MacDonald et al. 1996) and USEPA Region 3 (April 2006) industrial risk-based concentrations (RBCs). These comparisons to SQGs and RBCs were used to assess the potential for adverse biological effects associated with materials detected in the channel sediments (EA 2006).

The material within the channel from depths of 0 to 15 feet contained elevated levels of many contaminants but was determined to be suitable for placement at the Hart-Miller Island (HMI) DMCF. The sediment from the lower portion of the sediment samples (depths greater than 15 feet) were within the range of concentrations detected in the sediments from the Upper Chesapeake Bay Approach Channels and was considered to be material suitable for capping the HMI DMCF. Material from the Upper Bay Approach channels is generally considered clean enough for habitat restoration and is being used at the Poplar Island Restoration Project. Analytes detected in the samples generally had higher concentrations in the upper layers, which decreased to low background concentrations at below screening criteria at depths 15-feet below the sediment surface. Concentrations of some analytes, such as metals, exceeded screening criteria at depths greater than 15-feet below the sediment surface. Those analytes that were detected at concentrations greater than the range of the Upper Chesapeake Bay Approach Channels were: arsenic chromium, copper, lead, and dieldrin.

This information is summarized from the *Seagirt Marine Terminal Sediment Characterization and Capping Suitability Evaluation* (EA 2006). Additional information on the sediments found in the channel and sampling methods can be obtained from that report. The executive summary for that report can be found in Appendix B. The report may be obtained from the Baltimore District.

The aforementioned sampling program only sampled to the permitted project depth (-50 ft plus 2 foot of over depth) in the existing channels and often much shallower in the widening areas where the overburden of silt was much deeper. Additionally, the type of sampling does not recover sand and gravel well. Consequently few samples were taken in the sand and gravel that is being proposed as building materials for Masonville. As noted above, even some materials in the lower strata contained concentrations of analytes greater than screening criteria (sediment quality guidelines). However, no elutriate testing was conducted to determine the potential for mobilization when the materials are placed in the water. Masonville sediment elutriates were tested as part of the DEIS and the results indicated that no contaminants were detected at levels that exceed surface water criteria. Based upon the Masonville elutriates (which were created with materials of equal or lesser quality than what is expected of the Seagirt sand/gravel), it is expected that elutriates prepared from the Seagirt materials would not contain levels of contaminants in excess of surface water criteria. However, additional sediment sampling in the

Seagirt dredging area is ongoing to confirm this assertion. Results will be included in the Final EIS for the proposed Masonville DMCF.

Grain-size analyses were conducted as part of the both the environmental borings (EA2006) and the more recent pre-dredge geotechnical borings. Generally most of the channels are underlain with sand and gravel, which is covered by a shallow layer of finer materials. The areas proposed for widening have approximately 15 feet of fine overburden predominated by silts and clays and are underlain by sandier strata with clay lenses. The composition of the sand/gravel that is proposed for use at the Masonville site was summarized for the water quality modeling. On average the material is 33% gravel, 55% sand and 12% fines (Appendix D).

4.2.6 Water Quality

General Patapsco River water quality information is discussed in Section 2.1.4 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006).

No site-specific water quality data are available for Seagirt Marine Terminal. The nearest Chesapeake Bay Program water quality monitoring station is WT5.1 and is located approximately 3.6 miles from Seagirt Marine Terminal (Figure 4-1). The station location is tidally influenced, mesohaline, and in approximately 40 feet of water which is similar to the conditions at Seagirt, presently. The average seasonal water quality data from 1995 to 2004 for station WT5.1 is shown in Table 4-2 below.

Table 4-2. Average Seasonal Surface Water Quality Data Measured at CBP Monitoring Location WT5.1 (1995 – 2004)

Parameter	**Winter**	**Spring**	**Summer**	**Fall**
Temperature (^{o}C)	4.48	12.6	25.4	18.8
pH	7.98	8.00	7.99	7.85
Dissolved Oxygen (mg/L)	11.7	9.99	7.49	8.15
Salinity (ppt)	9.47	6.44	7.40	10.2

The Seagirt area ranges from 15 to 47 feet deep. Therefore, most of the project lies below the pycnocline and would be susceptible to seasonal hypoxia and anoxia in warmer months.

4.2.7 Aquatic Resources

Shallow Water Habitat

Shallow Water habitat is defined as any area of tidal open water that is less than 3 M (6.5 feet) deep. There is no shallow water habitat within the dredging area.

Submerged Aquatic Vegetation (SAV)

Neither the 2003 nor the 2004 Virginia Institute of Marine Services flyovers of the Chesapeake Bay found SAV in the vicinity of Seagirt Marine Terminal (VIMS 2006). The water depths in the dredging area do not support SAV.

Plankton and Benthos

General phytoplankton information for the Patapsco River is described in Section 2.1.6.1 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006).

Site-specific benthic quality investigations have not been conducted at Seagirt. The channel is periodically dredged which disturbs the benthic community. The Seagirt area ranges from 15 to 47 feet deep. Therefore, most of the project lies below the pycnocline and would be susceptible to seasonal hypoxia and anoxia. Similar areas within the Harbor and Chesapeake Bay have been monitored as part of the Chesapeake Bay Program and typically have very poor benthic conditions. This has been attributed to annual die off of benthos during seasonal (summer) low oxygen conditions and the benthic communities, therefore, never mature and diversify. These conditions are expected in the Seagirt dredging area.

Fish

The Baltimore Harbor is the tidal, estuarine portion of the Patapsco River. In the reach that includes Seagirt Marine Terminal, the Patapsco River ranges from oligohaline to low mesohaline. This salinity regime supports a slightly different finfish community than the mainstem Chesapeake Bay and outer reaches of the Baltimore Harbor, which tend to have higher average salinities. The dominant species (in all collections) were white perch, silversides, striped bass, largemouth bass, mummichogs, and Atlantic menhaden, and bluefish. Finfish and shellfish support valuable commercial and recreational fisheries. The Patapsco River and Chesapeake Bay also support a diverse fish community beyond those recognized as commercial or recreational resources. The area in the vicinity of the Seagirt Marine Terminal is known to support species of commercial value, although commercial harvesting is prohibited in the shipping channels and, therefore, does not occur in the project area.

There are no unique intertidal or shallow water habitat areas for pelagic fish communities within the dredging area. This area abuts a bulkhead from shore and has a minimum depth of 15 feet, which is too deep to provide nursery habitat for pelagic fish.

No commercial fishing occurs in the dredging area or the shipping channels near Seagirt Marine Terminal. Commercial Fishing in the Patapsco River is described in *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006)

Essential Fish Habitat (EFH)

A Summary EFH Designation specific to the Patapsco River does not exist at this time. However, consultations with local NMFS staff revealed that all areas of the Chesapeake Bay with 0.5 ppt or greater salinity should technically be considered as EFH, based on EFH definitions for those Federally managed species that occur in Maryland tidal waters of the Bay. The Chester River estuary in Kent and Queen Anne's County on Maryland's Eastern Shore was used to prepare an EFH assessment for the Masonville area, and similar species are used for an assessment of impacts to EFH species near Seagirt Marine Terminal.

The Chester River lies within waters designated as EFH for the following species and their life stages: summer flounder (*Paralicthys dentatus*), juvenile and adult stages; bluefish (*Pomatomus saltatrix*), juvenile and adult life stages; windowpane flounder (*Scopthalmus aquosus*), juvenile and adult life stages; cobia (*Rachycentron canadum*) all life stages and Spanish mackerel (*Scomberomorus maculatus*), all life stages (NMFS 2005). Based on informal coordination with NMFS, it was determined that of the species with EFH designated in the project area, only juvenile and adult summer flounder and adult and juvenile bluefish are likely to occur near the Masonville project site. Since the Seagirt dredging site is located only 2.3 miles from Masonville, the same species should be considered of concern for the Seagirt area. Additional information on EFH is available in section 2.1.6.4 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006).

4.2.8 Wetlands

Approximately 128 acres of tidal open water are within the dredging project area. The entire area is open water; therefore, there are no vegetated wetlands in the dredging area.

4.2.9 Rare, Threatened, and Endangered (RTE) Species

RTE species of concern in the Patapsco River are the shortnose sturgeon (*Acipenser brevirostrum*), sea turtles, and large whales. These species are discussed in detail in Section 2.1.8 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006).

The nearest shortnose sturgeon capture occurred approximately 7.6 miles southeast of Seagirt Marine Terminal, in June 2005. No shortnose sturgeon have been captured upstream of the Francis Scott Key Bridge, which is approximately 2.7 miles from Seagirt. NMFS has indicated that shortnose sturgeon are probably transient to the Baltimore Harbor (Nichols 2002) and are only likely using deeper areas such as the shipping channels.

Sea turtles found in the Chesapeake Bay include the following species: loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), leatherback turtle (*Dermochelys coriacea*), and the green sea turtle (*Chelonia mydas*). Neither the Maryland DNR nor the National Aquarium's Marine Animal Rescue Program have any records of sea turtle sightings or strandings in the Inner Harbor or Patapsco River (Kimmel 2005, Perry 2005).

Whales are only rarely found in the Chesapeake Bay and no whale species are known to be using the Patapsco River or Inner Harbor. Five dead listed whales, three fin whales (*Balaenoptera physalus*) and two sei whales (*Balaenoptera borealis*), have been reported in the Baltimore Harbor since 1979, but all appear to have come in on the bows of ships. The most recent of these whales was a sei whale brought into Seagirt Marine Terminal on April 18, 2006 on the bow of a cargo ship. The whale was likely hung up on bow of the ship in the Atlantic Ocean and dragged up the Chesapeake Bay to the Terminal before it was dislodged.

In addition to listed species, the NMFS also expressed concerns about Atlantic Sturgeon (*Acipenser oxyrhynchus*), which have been recorded in the Bay. The closest individual was taken approximately 6.3 miles from Seagirt Marine Terminal, in the mouth of the Patapsco River. Additional information on Atlantic sturgeon in the Patapsco River can be found in the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006).

4.2.10 Air Quality

Since the Seagirt dredging area and Seagirt Marine Terminal are both within the Baltimore air quality region and the Northeast Ozone Transportation Region, the existing air quality conditions for the Seagirt dredging area are the same as those for Masonville. They are described in Section 2.1.9 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006).

4.2.11 Hazardous, Toxic, and Radioactive Wastes (HTRW)

No HTRW are known to occur within the proposed dredging area. However, munitions of explosive concern (MEC) have been found at other locations in the Baltimore Harbor. Ordnance has been discovered in the past while dredging new work projects in the Baltimore Harbor Anchorages. Several MEC and MEC related items were unexpectedly discovered. The closest of these locations are the anchorages in the vicinity of Seagirt Marine Terminal and Dundalk Marine Terminal approximately 1/8 mile from the Seagirt dredging area. No in-water surveys for MEC have been completed at this time. Based upon past experience, there is a very small potential for encountering MEC in the upper depths. The deeper sand and gravel layer is below any depth that would have been potentially subject to MEC. No MEC surveys would be required by the USACE prior to the Seagirt dredging. However, a protocol for dealing with MEC has been established and can be found within Appendix N of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006).

4.2.12 Navigation

Seagirt Marine Terminal is one of the most productive and efficient container handling terminals in the United States (MPA 2006). The Terminal had 371 ship and 150 barge calls in 2005. The Fort McHenry Federal navigation channel is approximately 1.0 mile from the Seagirt dredging project. The dredging project will take place in the Seagirt Marine Terminal Access Channel, which connects Seagirt Marine Terminal with the Fort McHenry Channel.

Seagirt Marine Terminal is 1.2 miles west of Dundalk Marine Terminal and 2.2 miles north of Fairfield Marine Terminal. Access to Dundalk Marine Terminal is via the Fort McHenry Channel and access to the Fairfield Marine Terminal is via the Fort McHenry and Curtis Bay Channels.

4.2.13 Coastal Zone Management

The Seagirt dredging project lies within Maryland's coastal zone as defined by the State's Coastal Zone Management Program (CZMP). Both the CZMP and the Federal Coastal Zone Management Act of 1972 (CZMA) are described in Section 2.1.14 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006). Coordination on CZM issues is ongoing.

4.2.14 Cultural Resources

The Seagirt dredging project lies within an area that is regularly dredged. No cultural resources are known to occur within the dredging footprint.

4.2.15 Employment and Industry

General employment statistics are described in Section 2.3.3 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006). Industry in the City of Baltimore centers on the Port of Baltimore. Therefore, the Port is a major employer in the City. The MPA estimates that the Port employs over 16,000 individuals in direct jobs as well as over 17,000 in induced and indirect jobs (MPA 2005).

4.2.16 Aesthetics

The Seagirt dredging site lies along the northern edge of the Patapsco River in open water. The adjacent shorelines are dominated by industrial and Port facilities.

4.2.17 Most Probable Future Without Project

The 'without project' condition is defined as the most likely condition expected to prevail over the length of the planning period (in this case, 20 years) in the absence of the MPA's implementation of the preferred alternative. The without project condition provides the baseline condition for impacts associated with the proposed project. The without project conditions associated with the Preferred alternative (and preferred construction option) are described in Section 2.5 the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006). The open waters in the vicinity of Masonville would not be filled and the associated derelict vessel cleanup would not occur. Among the major results would be a 0.5-mcy annual shortfall in dredged material placement capacity for Harbor materials with secondary impacts on navigation projects in the Harbor.

If the Masonville project is not implemented, the Seagirt dredging project will occur; the project is already permitted and has been permitted since March of 2005. In this case, approximately

128 acres of the Seagirt access channel would be dredged to a depth of 50 feet (with up to an allowable 2 foot overdepth). Under the existing permit, the material dredged from the channel would be placed at the Hart-Miller Island DMCF and 0.5 mcy of useful construction material would most likely be buried.

If the revised preferred alternative (Masonville built with some Seagirt sand/gravel) is not implemented, but the Masonville project continues to go forward, the original preferred alternative identified within the DEIS would continue to be studied.

5. IMPACTS OF THE MODIFICATION OF THE PROPOSED ACTION

5.1 SCREENING OF AFFECTED RESOURCES

Several resources were screened from consideration for the Seagirt Marine Terminal area. The resources shown in Table 5-1 below would not have impacts that would differ from those described in the *Tiered Draft Environmental Impact Statement (DEIS) for the Proposed Masonville Dredged Material Containment Facility (DMCF)* (USACE 2006). Therefore, these resources are not discussed any further in this section. Please refer to the DEIS for a detailed discussion of the resource areas listed in Table 5-1 below.

Table 5-1. Masonville Area Resources with No Change in Impacts from Those Described in USACE 2006.

Resource	Reason for Screening Out
Soils	Changing the dike construction material would not change the impacts to soils in the Masonville area.
Physiography	Changing the dike construction material would not change the impacts to physiography in the Masonville area.
Hydrology and Hydrodynamics	Changing the dike construction material would not change the impacts to hydrology and hydrodynamics in the Masonville area.
Geology	The geology of the area would not be altered or affected by any of the alternatives considered.
Groundwater	Changing the dike construction material are not expected to change the impacts to groundwater at the Masonville site
Sediment Quality	Changing the dike construction material are not expected to change the impacts to sediment quality. Testing is ongoing.
Wetlands	Changing the dike construction material would not change the impacts to wetlands in the Masonville area.
Terrestrial Resources	Changing the dike construction material would not change the impacts to terrestrial resources.
Critical Areas	Changing the dike construction material would not change the impacts to the Chesapeake Bay Critical Area.
Coastal Zone Management	A coastal zone consistency determination would be required for this project, but this does not change as a result of a different source of construction material.
Floodplains	Changing the dike construction material would not change the impacts to floodplains.
Coastal Barriers	There are no coastal barriers in the vicinity of the Masonville area.
Wild and Scenic Rivers	The Patapsco River is not a Wild and Scenic River.
Prime and Unique Farmland	There are no Prime and Unique Farmlands in the Masonville Area.
Cultural Resources	Changing the dike construction material would not change the impacts to cultural resources.

Land and Water Use	Changing the dike construction material would not change the impacts to land and water use.
Demographics	Changing the dike construction material would not have an effect on the surrounding area.
Employment and Industry	There would be no change in industry or employment as a result of the change in dike construction material.
Environmental Justice	Changing the dike construction material would not change the environmental justice impacts.
Safety to Children	Changing the dike construction material would not change the impacts to children in the Masonville area.
Aesthetics	Changing the dike construction material would not change the impacts to children in the Masonville area.
Recreation	Changing the dike construction material would not change the effects on recreation in the Masonville area.
Noise	Changing the dike construction material is not expected to change the effects on noise in the Masonville area.

The impacts at Seagirt Marine Terminal and in the Seagirt dredging area would occur without the use of Seagirt dredged material for dike construction at the proposed Masonville DMCF. The Seagirt dredging project will occur with or without the Masonville project. Therefore, there are no impacts to the Seagirt dredging area or the Terminal that are the result of the proposed Masonville DMCF project.

5.2 ENVIRONMENTAL IMPACTS

The impacts below are discussed only where they differ from those described in the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (USACE 2006). Please refer to the DEIS for a detailed discussion of all impacts to resource areas.

5.2.1 Water Quality

The changes in water quality impacts as a result of utilizing Seagirt sand/gravel in the Masonville dikes are expected to be positive. At the Masonville site, the Seagirt sand material would equal approximately ¼ of the material needed to construct the dikes, and would be of a larger grain size with only approximately 12 percent fines, on average (Appendix D). The sand in the borrow area of Masonville contains approximately 30 percent fines on average. In addition, the Seagirt materials, if used at Masonville, would be placed within the trench by split hull barge as opposed to being pumped onto the dike line hydraulically from the onsite borrow area. Placement of heavier materials that are placed directly rather than pumped would constitute a significant reduction in the turbidity plume relative to hydraulic placement.

To quantify the reduction in the turbidity plume, STFATE modeling was conducted to simulate the use of a split hull barge to place Seagirt sand/gravel material at Masonville (Appendix D). Turbidity is regulated by the rules for conventional pollutants: the allowed mixing zone in Maryland estuarine waters is defined as 10 percent of the cross-sectional area of the receiving water body (at mean water level). The STFATE model output for turbidity is based upon concentrations of total suspended solids (TSS). Turbidity limits in the surface water resulting from any discharge may not exceed 150 nephelometric turbidity units (NTUs) at any time, and 50 NTUs as a monthly average. NTUs are the unit associated with indirect measurements of turbidity based upon the amount of light reflected (refracted) within the measuring device. The results of the STFATE model of split hull barge placement indicated that, under all tidal conditions, the sediment plumes would be in compliance with the 10 percent cross-sectional area. This is a significant improvement relative to the hydraulic placement of materials. Modeling of the hydraulic placement of the sand from the Masonville borrow area predicted a turbidity plume would exceed 50 to 70 mg/l TSS over 4.5 to 21.2 percent of the cross-section on a monthly average basis if dike building was conducted without any turbidity control techniques.

Based upon the elutriate testing of the borrow material (sand) at Masonville, the toxics that would dissolve into the water when the sand is placed on the dike never exceeded surface water criteria. Some nutrient were released in the testing and can be expected to be released during hydraulic placement of the Masonville sand on the dike line. The quality of the sand/gravel at Seagirt is expected to be of equal or better quality, so toxicant and nutrient releases are expected to be even lower if Seagirt sand/gravel is used in the Masonville dikes. In addition, the Seagirt material would be placed from a split hull barge, en masse, which slurries the material less and would also lessen the potential for chemical releases.

The Seagirt sand/gravel would only replace approximately 25% of the materials needed to build the Masonville dikes so the improvements would only be realized for approximately ¼ of the dike construction timeframe. The remaining dike materials would still be hydraulically placed on the dike line and mined from onsite sources at Masonville during 75% of the construction timeframe. The water quality impacts described in the DEIS would prevail duing these times.

A second water quality impact improvement that is more difficult to ascertain would potentially occur at the HMI DMCF. The heavy nature of the Seagirt sand/gravel would require higher volumes of water to slurry for placement in the site, requiring two or more times the volume typically used to offload dredged material. Although the water quality of the slurry would be expected to be relatively good due to the low percentage of fines and the presumed good quality of the sand/gravel, the HMI site would still have to manage and discharge the additional water. Placing the sand/gravel at Masonville would not require any slurrying and would preclude the need to pump additional water into the HMI DMCF.

One final water quality concern was raised by the BEWG relative to the Seagirt portion of the project. (As mentioned in Section 2.1.2, the construction and cost advantages of retrieving more sand by potentially using several feet of borrow for advanced maintenance dredging were discussed with the resource agencies of the BEWG). Concerns about the potential for creating an area considerably deeper than the deepest adjacent channels were raised by the group. The primary concern is that deeper areas could become anoxic or hypoxic and remain so longer than shallower areas, essentially prolonging or exacerbating hypoxia in that area of the Harbor. The Seagirt dredging area ranges from 15 to 47 feet deep, and once dredged, would lie completely below the pycnocline. Most of the project area is currently susceptible to low oxygen condtions in summer and would continue to be after dredging.

The adjacent channel (Fort McHenry Channel) is currently authorized to –50 feet but dredging is required to 51 feet (one foot advanced maintenance) and paid to –53 feet (two feet available overdepth). The proposed dredging would be no more than 1-2 feet deeper than the adjacent channel and be physically connected. Therefore it is expected that dredging Seagirt to –54 feet would not impact water quality relative to the current conditions or the currently permitted –52 feet permitted depth.

5.2.2 Aquatic Resources

There would be a localized beneficial impact to aquatic resources if material from the Seagirt Access Channel is used for dike construction at Masonville. Modeling indicates that use of the Seagirt material would reduce turbidity during placement of approximately ¼ of the material needed to build the dikes. This is expected to lessen the water quality impacts and associated impacts to aquatic habitat and resources relative to the preferred alternative in the DEIS. This also includes a lessening of the potential to impact Submerged Aquatic Vegetation (SAV) in Masonville Cove.

Potential adverse impacts described in the DEIS to plankton, benthos, and fish, including EFH species, would be lessened because of the lesser turbidity impacts associated with using the Seagirt sand/gravel for approximately ¼ of the Masonville dikes. The decrease in turbidity impacts associated with the change in borrow scenario would have a lesser impact on water quality than the exclusive use of Masonville dredged material. Poor water quality would adversely affect phytoplankton, by decreasing the amount of light penetration and, therefore, the area of the water column available to phytoplankton for use. Poor water clarity also adversely affects fish species that rely on their vision to locate prey.

By using the Seagirt sand/gravel and lessening the use of the hydraulically placed onsite Masonville materials , there would be less fines, toxics and nutrients released into the water. Fines can settle to the bottom, potentially smothering, degrading, or otherwise adversely affecting benthic habitat. Release of toxicants and nutrients degrade water quality. Toxicants can be harmful to aquatic life and nutrients can stimulate algal growth which has been linked to eutrophication and low dissolved oxygen. These adverse impacts would be lessened by the use of the Seagirt dredged material for the reasons described in the water quality section..

5.2.3 Rare, Threatened, and Endangered Species

Use of Seagirt sand/gravel and lessened use of hydraulically pumped onsite borrow at Masonville would lessen the adverse water quality impacts described in Section 5.2.1. This would decrease potential effects on RTE species that may be in the area. This includes transient shortnose sturgeon (*Acipenser brevirostrum*).

Reduced potential effects to shortnose sturgeon would be similar to those described for aquatic species in section 5.2.2. As discussed in the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006), it is unlikely that sea turtles or large whale species are using the Baltimore Harbor. However, these lessened impacts to water quality would decrease adverse impacts to those species described in the DEIS, if they were to occur in the Masonville area of the Patapsco River. The revision of the preferred alternative would not alter the amount of ship traffic coming into or out of the Port (relative to the DEIS). Barge traffic between Masonville and Seagirt would increase for several months, but this would constitute an overall shorter distance for some of the material to be transported (relative to being placed at HMI). In addition, no large listed whales are known to occur within the project area so the change in barge shipping patterns would not affect whales.

5.2.4 Air Quality

The changes in air quality impacts as a result of utilizing Seagirt sand/gravel in the Masonville dikes are expected to be positive. At the Masonville site, approximately ¼ of the material needed to construct the dikes would come from Seagirt, which reduces the need for some hydraulic dredging at Masonville. The emissions were calculated for two conditions (1) the base project condition (Masonville constructed as it was proposed in the DEIS) and (2) if approximately ¼ of the dike material comes from the Seagirt dredging project instead of from the Masonville site or an upland borrow source. The calculations are the result of a an ongoing general conformity analysis and the preliminary results are presented in Appendix E. The analysis includes a refinement of the air emissions analysis presented in the Masonville DEIS. A more comprehensive report of this analysis will be completed and available for the FEIS.

The air emissions analysis indicates that using Seagirt sand/gravel for Masonville dike construction would result in over reductions of all pollutant emissions. Most significantly, NOx would be reduced by 20.81 tons in 2007 and 37.31 tons in 2008. Details can be found in Appendix E.

5.2.5 Navigation

Use of the Seagirt dredged material would increase the amount of ship traffic between Seagirt Marine Terminal and the Masonville project area for a few months while the sand/gravel is recovered and shipped.. Although all construction would occur outside of the federal channels, increased barge and tug traffic could temporarily interact with the current shipping traffic, particularly when construction materials are being moved. There would be an estimated 250 roundtrips covering 4.6 miles (round trip) made by barges pushed by tugs to deliver Seagirt borrow material to the Masonville project site. A total of 2 barges and 1 tug would be used to transport the material to the Masonville site.

Additional impacts to navigation are described in the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006).

5.2.6 Hazardous, Toxic, and Radioactive Wastes (HTRW)

There is a very small potential that Munitions of Explosive Concern (MEC) might be present in the new work areas at Seagirt, entrained in the dredged material. They are less likely to be present in the deeper sand/gravel deposits that would be used for dike construction than in the shallower overburden materials that would be removed to HMI. If separation can occur at the dredge point by using a debris barge, the potential for MEC to be transported to Masonville can be reduced.

5.3 ENVIRONMENTAL BENEFITS

The potential benefits of using the Seagirt material as part of the materials used to build the Masonville dikes are not necessarily ecosystem benefits, but benefits to the project relative to the preferred borrow scenario, implementation, and potential impacts identified in the DEIS.

Potential reductions in environmental impacts are primarily associated with water and air quality. These are detailed in Sections 5.2.1 and 5.2.4. With respect to water quality, the larger grain-size of the Seagirt materials and the placement method results in less turbidity generated at the Masonville site during placement relative to using the onsite materials borrowed from below the Masonville site and pumped onto the dike. There would be secondary benefits to aquatic habitat and species from the reduced sediment plumes that would be generated. With respect to air quality, the proposed use of Seagirt material for dike construction reduces the need for some hydraulic dredging at Masonville, which results in lesser air emissions at the site. If some Seagirt material is placed at Masonville rather than taken to HMI, it would result in less overall transportation and less emissions from pumping the relatively heavy material into HMI. This would result in regional and cumulative reductions in air emissions.

5.4 IRRETRIEVABLE USES OF RESOURCES

The use of Seagirt dredged material would result in a lessening of the need for common borrow for cofferdam filling. Therefore approximately 63,000 cy of material that would have be irretrievably lost from upland mining sources would no longer be used by the Masonville project. All other irretrievable uses of resources are described in Section 5.6 of the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006).

5.5 SUMMARY OF IMPACTS

Table 5-2 below summarizes the changes to the impacts described in the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006). These changes are described in greater detail in Section 5.2 of this Supplement.

Table 5-2. Summary of the Change to Impacts by Using Seagirt Dredged Material

Resource	Change to Impact
Water Quality	Lessened adverse impacts by reducing the need to hydraulically pump finer materials from beneath Masonville. This would lessen the turbidity impacts and the amount of fines released into the water.
Aquatic Resources	Potential lessening of water quality impacts
RTE Species	Lessened adverse impacts by lessening adverse water quality impacts particularly turbidity.
Air Quality	Masonville dike construction would result in over reductions of all pollutant emissions. NOx would be reduced by 20.81 tons in 2007 and 37.31 tons in 2008.
Navigation	Increased ship traffic between Seagirt Marine Terminal and the proposed Masonville DMCF for a few months. Approximately 2 additional barges and 1 tug would make a total of 250 roundtrips between Seagirt Marine Terminal and the proposed Masonville DMCF.
HTRW	Small potential for MEC to be present in the Seagirt project area.
Irretrievable Resources	Reduction in use of irretrievable resources of sand from upland mined sources

5.6 CUMULATIVE IMPACTS

The Seagirt Marine Terminal Access Channel widening and deepening is addressed in the cumulative impacts section of the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006). There would be no change to the cumulative impacts described in that document other than an overall improvement in air quality emissions relative to the impacts described in the DEIS. The improvements in water quality impacts are expected to be site-specific and not cumulative.

The changes in cumulative air quality impacts as a result of utilizing Seagirt sand/gravel in the Masonville dikes are expected to be positive. Approximately 0.5 to 0.8 mcy of dredged material from the Seagirt site that would have been placed in the HMI DMCF (approximately 14 miles away) will only need to be shipped 2 miles to the Masonville site. Air emissions analysis for the difference in tug running time has been conducted to develop an estimation of the reduction in regional emissions. The results of the calculations are included in Appendix E.

The air emissions analysis indicates that using a portion of the Seagirt new work dredged material for Masonville dike construction (instead of transporting it to and pumping it into HMI) would result in regional reductions of all pollutant emissions. Most significantly, NOx would be reduced by 44.22 tons in 2007 and 74.53 tons in 2008. Details can be found in Appendix E.

Cumulatively, the project specific reductions (detailed in section 5.2.4) in conjunction with the regional reductions presented above would result in total NOx reductions 65.03 tons in 2007 and 111.84 in 2008.

6. CHANGES ASSOCIATED WITH THE IMPLEMENTATION OF THE PREFERRED ALTERNATIVE

The Maryland Port Administration has decided to pursue combining the Masonville pre-dredging and the Seagirt dredging projects contractually prior to the availability of the new boring information at Seagirt (Section 6.1). The proposed modification of the preferred alternative of the DEIS would result in changes to the implementation of both the combined Masonville Pre-dredging / Seagirt dredging project and the Masonville Dredged Material Containment Facility (DMCF) project. The key impacts to the two projects are in the construction methods and their scheduling. This chapter outlines the implementation process for the existing Masonville and Seagirt projects, the changes in the process associated with the proposed modifications, and the issues associated with implementation.

6.1 IMPLEMENTATION PROCESS

This chapter outlines the reasons for combining the Pre-dredging and Seagirt Dredging projects, the implementation process for the existing Masonville and Seagirt projects, and the changes in the process associated with the proposed modifications.

6.1.1 Combination of the Masonville Pre-dredging and Seagirt Dredging Projects

The MPA has decided to pursue combining the Masonville Pre-dredging project with the Seagirt dredging project contractually for the following reasons:

1) Economies of scale – Larger dredging projects typically provide a reduction in costs per cubic yard of material dredged. Combining the two projects into one contract is anticipated to reduce overall costs for both projects.
2) Reduction in mobilization and demobilization costs – By combining the two projects, the MPA ensured payment for only one mobilization and one demobilization of the hydraulic unloader necessary for placement at HMI.
3) Increased efficiency of placement operations at HMI – Letting one contract effectively eliminates the coordination issues from separate dredging contractors for the Masonville pre-dredging and Seagirt projects simultaneously at HMI.

Figure B-1 in Appendix B contains the schedule for the combined project.

The schedule proposes the Masonville pre-dredging portion of the project being completed prior to the Anadromous fish restriction. The Seagirt portion of the project then begins and is completed during the restriction.

6.1.2 Existing Masonville Implementation Process

The pre-dredging phase is only a portion of the Masonville project. The implementation process for the Masonville DMCF project is described in detail in Chapter 7 of the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment*

Facility (USACE 2006). This section provides a brief outline of the process, which involves engineering, permitting, "procurement, bid, and award", and construction.

Currently, various portions of the Masonville project are in various stages of the four-stage process. Engineering is still underway for the majority of the portions. A permit decision for all of the construction portions requiring one is currently anticipated by October 2006. Generally, award of the construction projects would take place in the proper sequence (this sequence is described in DEIS Chapter 7) following the permit decision. Completion of the DMCF project is currently anticipated during the 2008-2009 dredging season.

6.1.3 Existing Seagirt Implementation Process

The permit for the Seagirt project was issued on March 9th 2005. The construction plans and specifications are currently being developed and with completion anticipated in late July 2006. Following completion of the plans and specifications, the advertisement, bid, and award can begin. However, the start of the advertisement phase has not yet been scheduled, as combining the Seagirt dredging and Masonville pre-dredging projects has effectively tied the Seagirt project to the issuance of the permit for the Masonville DMCF.

6.1.4 Changes in the process Associated with the Proposed Modifications

Impacts to the Masonville Project

Generally, the pre-dredging phase (impacts described below) is the only construction phase impacted by the proposed modifications. It is possible that the pre-dredging underneath the cofferdam section of the containment dike will need to be contracted separately from the rest of the pre-dredging in order for cofferdam pre-dredging to be completed prior to the Anadromous fish restriction. Completion of this portion of the pre-dredging prior the restriction is critical for attaining the desired DMCF construction completion date. The proposed modifications would not have any foreseeable negative impacts on the Masonville DMCF project, as completion of the DMCF's construction would not be altered by the proposed modification.

Impacts to the Combined Masonville Pre-Dredging and Seagirt Dredging Projects

The plans and specifications for the combined project would need to be altered to account for transporting borrow material from the Seagirt project to the Masonville site. The proposed modification would also likely cause a delay in the permit decision for the Masonville DMCF permit, due to the requirement for approval of this Supplement. This would likely result in moving the pre-dredging phase (not including the cofferdam portion) of the Masonville project until after the Anadromous fish restriction period.

The construction plans and specifications for Seagirt dredging would need to be altered to direct the dredging contractor to treat the sand and overburden materials differently at the Seagirt site. The start of the construction phase may be delayed due to the proposed modification. The Maryland Port Administration has not identified delaying of the Seagirt as a concern.

The anticipated schedule with the proposed modifications imposed is presented in Figure B-2 of Appendix B. The schedule shows the finish of the Seagirt overburden removal being directly tied to the end of the Anadromous fish restriction. This would allow the Masonville pre-dredging and subsequent dredging of the sand at Seagirt to occur at the earliest possible date. This schedule shows that the Masonville entire dredging contract is completed in October 2007.

6.2 PROJECT SCHEDULE

Should the supplement be accepted, the project schedule is anticipated to be that shown in Figure B-2 from Appendix B. A very general description of the schedule follows. Currently, various portions of the Masonville project are in various stages of the four-stage implementation process (described in 6.1.2). Engineering is still underway for the majority of the portions. Permit decisions for all of the construction portions requiring a permit is currently anticipated by mid December 2006. Generally, award of the construction projects would take place in the proper sequence (this sequence is described in DEIS Chapter 7) following acquisition of the permits. Completion of the proposed DMCF project would still be anticipated during the 2008-2009 dredging season.

6.3 PROJECT COST

The permit for the Seagirt project was issued on March 9th 2005. The construction plans and specifications are currently being developed and with completion anticipated in late July 2006. Following completion of the plans and specifications, the advertisement, bid, and award can begin. However, the start of the advertisement phase has not yet been scheduled, as combining the Seagirt dredging and Masonville pre-dredging projects has effectively tied the Seagirt project to the issuance of the permit for the Masonville DMCF.

The ultimate cost of the Masonville project with and without the use of the Seagirt sand/gravel has been detailed in Section 3.3.3. It should be noted that no decision has yet been made as to whether the Seagirt dredging would be conducted to the currently permitted depth (-50 plus 2 feet of allowable overdepth) or to a maximum of –54 feet (permitted depth with some potential borrow for advanced maintenance). The cost advantages to innovatively reusing the Seagirt sand/gravel at Masonville have been calculated assuming that only the material that is currently permitted for dredging at Seagirt would be recovered for borrow. If material is borrowed below that level, the volume and cost benefits would be greater. However, the additional material (below –52 feet) may be subject to a royalty so the incremental cost benefits to the Masonville project are unknown.

6.4 IMPLEMENTATION ISSUES

Currently the site is being designed using sand dredged from onsite and placed in open water. If insufficient volumes are found onsite or the newly identified Seagirt dredging project source, upland mined material may be utilized. Because there is some concern that the 2001 Dredged Material Management Act (Statute 5-1102, described in Section 2.4) may prohibit the redeposition of harbor dredged material, MPA and MDE are working together to ensure that all legal requirements would be met.

Dredging portions of the construction phases may cause near-field turbidity, which could affect fish spawning and migration patterns. To minimize impacts due to turbidity, contractors would adhere to Time of Year (TOY) restrictions on dredging spanning from February 15th to June 1st of each year. Further, the minimization of impacts during construction would be pursued, as discussed in section 6.4 of the DEIS and section 6.5 below.

6.5 MINIMIZATION OF IMPACTS

Implementation of the modified preferred alternative would offset air emissions relative to the DEIS preferred alternative. The turbidity plume and water quality impacts would be minimized by placing approximately 25 percent of the dike construction material by split hull barge instead of hydraulically placing the material. The turbidity plume impacts would also be minimized by using the material from the Seagirt dredging area (12 percent fines) instead of the material from the onsite borrow area (30 percent). All other minimization of impacts is the same as described in Chapter 7 of the *Tiered DEIS for the Proposed Masonville DMCF* (USACE 2006).

7. AGENCY COORDINATION AND ENVIRONMENTAL COMPLIANCE

7.1 AGENCY COORDINATION

The possibility of using Seagirt Marine Terminal Access Channel dredged material for the construction of the proposed Masonville DMCF was brought before the Bay Enhancement Working Group (BEWG) on June 6, 2006. The U.S. Fish and Wildlife Service, the Maryland Department of Natural Resources, the National Marine Fisheries Service, and the U.S. Environmental Protection Agency were in attendance at this meeting. All of the agencies present were generally supportive of the idea of using the Seagirt dredged material, as long as the sediment quality is similar or better than that at Masonville. They were concerned, however, about excavating below the originally permitted grade because of potentially exacerbating hypoxia and anoxia in the area. Minutes from the BEWG will be available on the MPA Safe Passage website (http://www.mpasafepassage.org/).

7.2 ENVIRONMENTAL COMPLIANCE

7.2.1 Permits

Modifications have been requested for both the Department of the Army permits and Maryland Department of the Environment Authorizations to reflect the revised construction option of the preferred alternative. The existing permit for the Seagirt dredging project approves the placement of the material dredged from the channel at the Hart-Miller Island (HMI) DMCF. While most of the material dredged from the channel would still be placed at HMI [approximately 1.7 million cubic yards (mcy)], 0.5 to 0.8 mcy of material would be used for the construction of the proposed Masonville DMCF. The volume of material would be dependent upon whether Seagirt sand/gravel was borrowed to the currently permitted depth (-50 feet plus an allowable 2 feet overdepth) or a maximum of –54 feet (to include some potential borrow for advanced maintenance dredging).

The joint permit application filed with the U.S. Army Corps of Engineers (USACE) and the Maryland Department of the Environment (MDE) were revised to note the change in construction material and the changes to the facility that would occur as a result of this change in the source of construction material. The revised joint permit application would note that the onsite borrow quantity would be 1.5 mcy of sand instead of 1.9 mcy of sand and clay and that the overall capacity of the facility would decrease from 16 mcy to 15.4 mcy since the clay layer would be left in place. In addition, the applications were revised identifying the 0.5 mcy to 0.8 mcy of sand/gravel used for construction from the Seagirt dredging project. Neither the site life nor the average annual capacity would change from the initial estimates. The revised permit applications were submitted to the USACE and MDE.

The revision of the permit application requires that the change also be acknowledged in the supporting Draft Environmental Impact Statement (DEIS), which has been completed in accordance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations. This is discussed in Section 7.2.2.

7.2.2 National Environmental Policy Act (NEPA) Process

The *Tiered Draft Environmental Impact Statement (DEIS) for the Proposed Masonville Dredged Material Containment Facility (DMCF)* (USACE 2006) was issued on May 19, 2006. The initial public scoping was held in June 2005, which led to the completion of the DEIS. A joint public hearing for the project was held on June 21, 2006.

To support the modifications to the permit application and to comply with the NEPA, this supplement to the DEIS has been made available to the public beginning at the public hearing and will be made available by Notice of Availability in the Federal Register on June 30, 2006. The comment period for the DEIS has been extended to accommodate the supplement and will now end on August 14, 2006 instead of July 7, 2006 and a second public hearing has been scheduled for July 31, 2006. Written comments concerning this report or the DEIS should be sent to: U.S. Army Corps of Engineers, Attn: Mr. Jon Romeo, CENAB-OP-RMN, P.O. Box 1715, Baltimore MD 21203-1715. Telephone: (410) 962-6079. Electronic comments should be sent to jon.romeo@usace.army.mil.

The DEIS and supplement will be integrated into the Final Environmental Impact Statement (FEIS), which be released after the comment period on the DEIS has been closed.

8. CONCLUSIONS

Implementation of the revised construction option of the preferred alternative described in Chapters 2 and 3 of this supplement would change the environmental and economic impacts of the proposed Masonville DMCF. These changes to the environmental and economic impacts are the result of a shift in the construction materials and implementation of the proposed project. The changes to the implementation of the proposed project are:

- Shift in construction material to use 0.5 to 0.8 mcy of material from the Seagirt dredging project (Section 2.1) to potentially replace 0.4 mcy of material from the Arundel clay layer of the onsite borrow source and approximately 62,0000 cy of material from an offsite, upland mining source.
- Placement of approximately 25% of the dike materials at Masonville by split hull barge instead of hydraulic dredging and placement.

Additional benefits would be realized by changes made to the Seagirt dredging project. Approximately 0.5 to 0.8 mcy of material would be transported to the proposed Masonville DMCF and innovatively reused for construction instead of being at buried the HMI DMCF.

The changes to the implementation of the construction option for the preferred alternative would result in a decrease in the adverse impacts associated with air emissions and water quality relative to those described in the DEIS for Masonville. The reduction in air emissions is the result of:

- Decreasing the amount of time for hydraulic dredging and placement of material from the onsite borrow source,
- Placing the material from the Seagirt dredging area at Masonville using a split hull barge instead of placing it hydraulically at the HMI DMCF.
- Transporting 0.8 mcy of material from the Seagirt dredging area to the proposed Masonville DMCF (2.3 miles away) instead of the HMI DMCF (14 miles away), therefore reducing equipment usage, and
- Potentially decreasing the amount of material that would need to be transported from an offsite, upland borrow source to the proposed Masonville DMCF, therefore decreasing the amount of equipment used for hauling this material.

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The cumulative reduction in NOx emissions would be 65 tons in 2007 and 112 tons in 2008.

There would be a reduction in adverse water quality impacts by decreasing the turbidity plume and nutrient/toxics releases associated with construction of the proposed Masonville DMCF. The extent of the turbidity plume and the nutrient/toxic releases would be reduced by:

- Using material from the Seagirt dredging project, which has a fines content of 12 percent, instead of using additional material from the proposed Masonville DMCF, which has a fines content of 30 percent, for 25% of the dike material and
- Directly placing 0.5 to 0.8 mcy of material with a split hull barge instead of pumping material hydraulically into the dike.

Secondary benefits as a result of lessening the adverse water quality impacts would include lessened degradation of habitat for aquatic species, such as SAV, fish and benthos. Any rare,

threatened, and endangered species that may be in the area, such as transient shortnose sturgeon, sea turtles, or whales, would also experience lessened habitat degradation as well.
The overall cost savings of the proposed Masonville DMCF is estimated to be approximately $10 million. These cost savings are the result of:

- Decreasing the amount of material that needs to be hydraulically dredged from the onsite borrow source,
- Decreasing the amount of material that needs to be purchased from an offsite, upland mining source,
- Decreasing the distance that 0.5 to 0.8 mcy of the Seagirt dredged material would be transported, and
- Reduction in mobilization costs associated with the placing of material at the HMI DMCF by combining the Masonville predredging and the Seagirt dredging projects.

Implementation of the revised construction option of the preferred alternative would shift the project schedule by several weeks. A revised joint permit application for the proposed Masonville DMCF project has been submitted and a modification for the existing Seagirt dredging project permit has been requested.

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11. ORGANIZATIONAL CONFLICT OF INTEREST STATEMENT

NEPA FINANCIAL DISCLOSURE STATEMENT FOR PREPARATION OF U.S. ARMY CORPS OF ENGINEERS ENVIRONMENTAL IMPACT STATEMENT

Council on Environmental Quality Regulations at 40 CFR 1506.5 (c), which have been adopted by the U.S. Army Corps of Engineers (ER 200-2-2), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial interest or other interest in the outcome of the project. The term "financial or other interest in the outcome of the project" for the purposes of this disclosure is defined in the March 23, 1981, guidance, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 Federal Register. 18,026 – 18,038, Questions 17a and 17b.

"Financial or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)," 46 Federal Register. 18,031.

In accordance with these requirements, the undersigned hereby certifies that the company and any of its proposed subcontractors have no financial or other interest in the outcome of the above named project.

20 June 2006
Date

Michael S. Battle
Signature

Michael S. Battle, P.G.
Name

Senior Vice President, Operations
Title

EA Engineering, Science, and Technology, Inc.
Company

APPENDIX A

COST ANALYSIS

Introduction

Appendix A provides backup to for the cost savings associated with the proposed modification of the preferred alternative identified in the DEIS. The four tables in this appendix breakdown the costs involved and are described as follows: Table A-1 provides a summary of the cost savings from the proposed action. This includes the savings for the Seagirt dredging, the initial dike construction, and future dike raising.

Table A-1 – Summary of Cost Savings Associated with the Proposed Modification

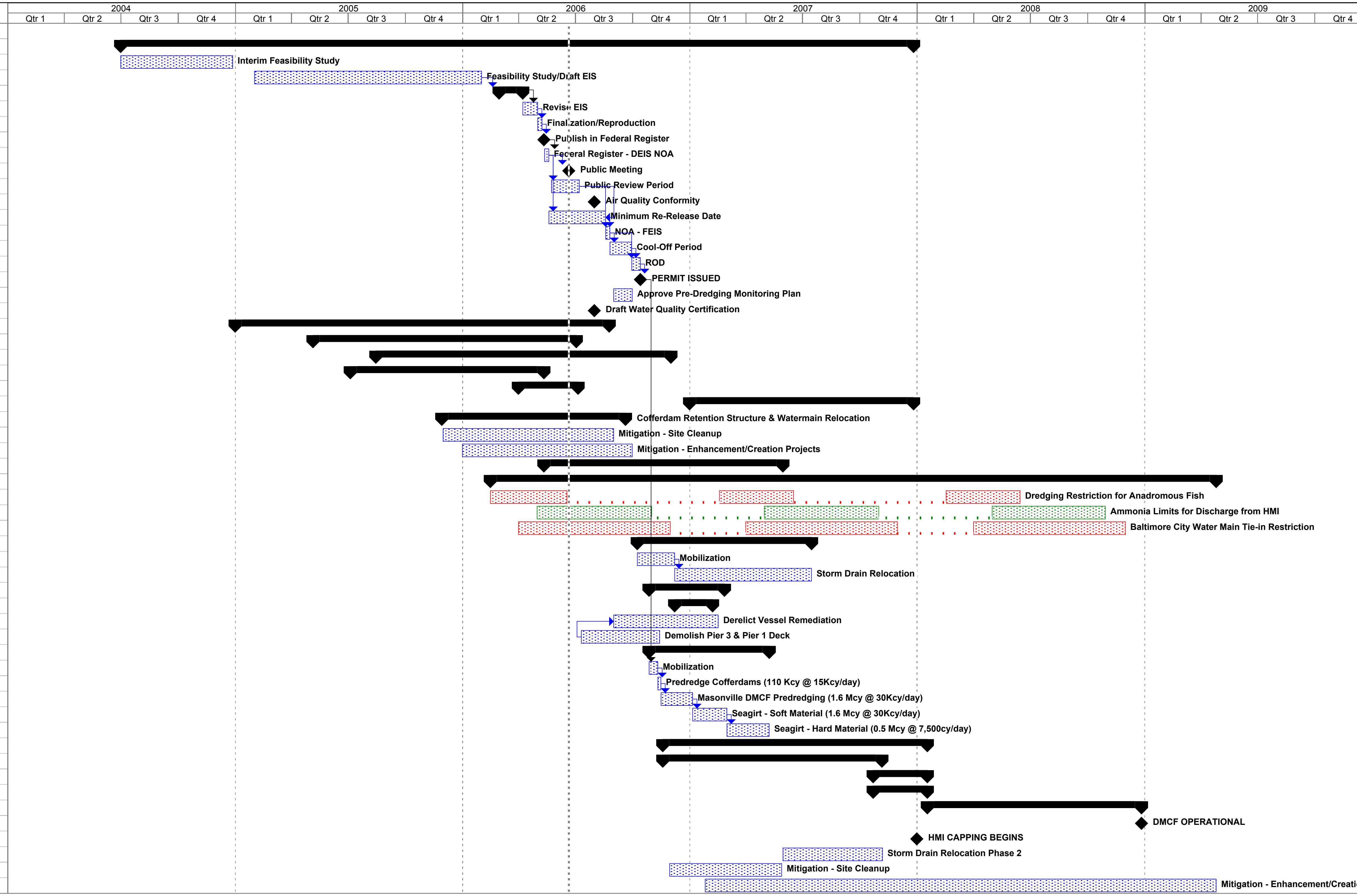
Item	Dredging Quantity (cy)	Unit Savings ($/cy)	Savings
Masonville Clay Dredging	436,500	$9.70	$4,232,000
Seagirt Savings	500,000	$10.37	$5,185,000
Common Borrow Savings	63,500	$18.00	$1,143,000
	Total Savings		**$10,562,000**

APPENDIX B

REVISED SCHEDULE

Figure B-1 - PROPOSED MASONVILLE DMCF
ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT - DRAFT

ID	Task Name
1	
2	**ENGINEERING**
3	Interim Feasibility Study
4	Feasibility Study/Draft EIS
5	**Cooperating Agencies**
12	Revise EIS
13	Finalization/Reproduction
14	Publish in Federal Register
15	Federal Register - DEIS NOA
16	Public Meeting
17	Public Review Period
18	Air Quality Conformity
19	Minimum Re-Release Date
20	NOA - FEIS
21	Cool-Off Period
22	ROD
23	PERMIT ISSUED
24	Approve Pre-Dredging Monitoring Plan
25	Draft Water Quality Certification
26	**Storm Drain Relocation Phase 1 & 48" Watermain Tie-ins**
31	**Derelict Vessel Remediation**
34	**Storm Drain Reclocation Phase 2**
40	**Demolish Pier 3 & Pier 1 Deck**
43	**Predredging**
50	**DMCF Dike & Spillways**
59	**Cofferdam Retention Structure & Watermain Relocation**
67	Mitigation - Site Cleanup
68	Mitigation - Enhancement/Creation Projects
69	**PROCUREMENT**
79	**CONSTRUCTION**
80	Dredging Restriction for Anadromous Fish
81	Ammonia Limits for Discharge from HMI
82	Baltimore City Water Main Tie-in Restriction
83	**Storm Drain Relocation Phase 1 & 48" Waterline Tie-ins**
84	Mobilization
85	Storm Drain Relocation
86	**Waterside Tie-in**
96	**Landside Tie-in**
105	Derelict Vessel Remediation
106	Demolish Pier 3 & Pier 1 Deck
107	**DMCF Predredging & Seagirt Dredging**
108	Mobilization
109	Predredge Cofferdams (110 Kcy @ 15Kcy/day)
110	Masonville DMCF Predredging (1.6 Mcy @ 30Kcy/day)
111	Seagirt - Soft Material (1.6 Mcy @ 30Kcy/day)
112	Seagirt - Hard Material (0.5 Mcy @ 7,500cy/day)
113	**Cofferdam Retention Structure & Water Main Relocation**
114	**Cofferdam Retention Structure**
123	**48" WATERLINE**
124	**Waterside Construction - 48" Watermain**
131	**DMCF Dike and Spillways**
139	DMCF OPERATIONAL
140	HMI CAPPING BEGINS
141	Storm Drain Relocation Phase 2
142	Mitigation - Site Cleanup
143	Mitigation - Enhancement/Creation Projects



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Date: Tue 6/20/06

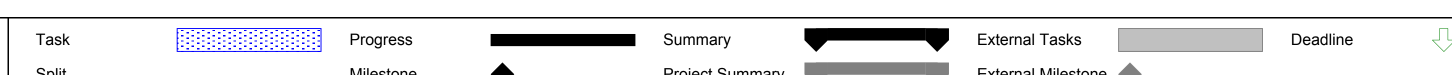
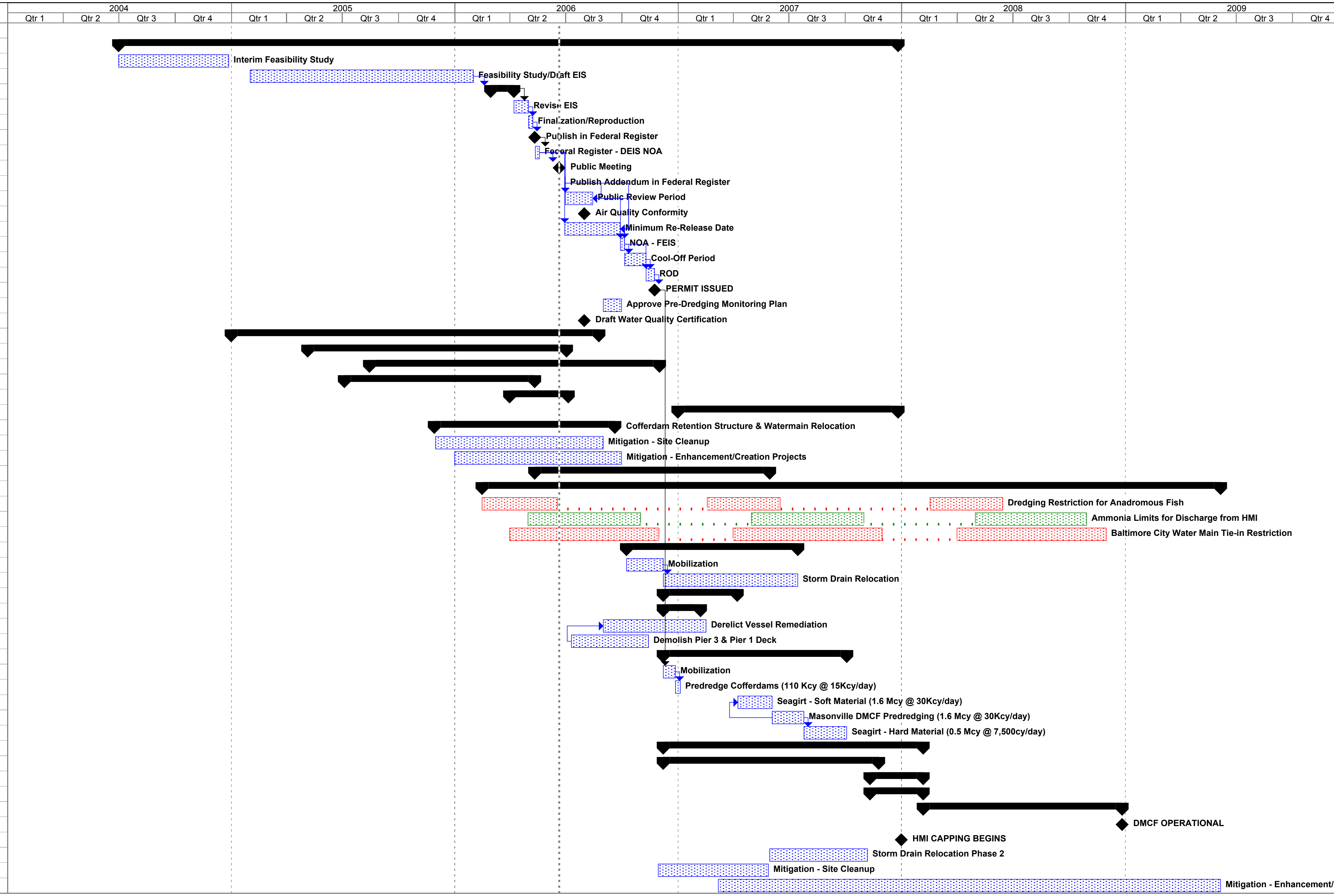
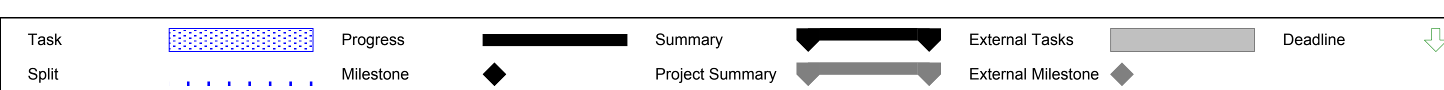


Figure B-2 - PROPOSED MASONVILLE DMCF
ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT - DRAFT

ID	Task Name
1	
2	**ENGINEERING**
3	Interim Feasibility Study
4	Feasibility Study/Draft EIS
5	**Cooperating Agencies**
12	Revise EIS
13	Finalization/Reproduction
14	Publish in Federal Register
15	Federal Register - DEIS NOA
16	Public Meeting
17	Publish Addendum in Federal Register
18	Public Review Period
19	Air Quality Conformity
20	Minimum Re-Release Date
21	NOA - FEIS
22	Cool-Off Period
23	ROD
24	PERMIT ISSUED
25	Approve Pre-Dredging Monitoring Plan
26	Draft Water Quality Certification
27	**Storm Drain Relocation Phase 1 & 48" Watermain Tie-ins**
32	**Derelict Vessel Remediation**
35	**Storm Drain Reclocation Phase 2**
41	**Demolish Pier 3 & Pier 1 Deck**
44	**Predredging**
51	**DMCF Dike & Spillways**
60	**Cofferdam Retention Structure & Watermain Relocation**
68	Mitigation - Site Cleanup
69	Mitigation - Enhancement/Creation Projects
70	**PROCUREMENT**
80	**CONSTRUCTION**
81	Dredging Restriction for Anadromous Fish
82	Ammonia Limits for Discharge from HMI
83	Baltimore City Water Main Tie-in Restriction
84	**Storm Drain Relocation Phase 1 & 48" Waterline Tie-ins**
85	Mobilization
86	Storm Drain Relocation
87	**Waterside Tie-in**
97	**Landside Tie-in**
106	Derelict Vessel Remediation
107	Demolish Pier 3 & Pier 1 Deck
108	**DMCF Predredging & Seagirt Dredging**
109	Mobilization
110	Predredge Cofferdams (110 Kcy @ 15Kcy/day)
111	Seagirt - Soft Material (1.6 Mcy @ 30Kcy/day)
112	Masonville DMCF Predredging (1.6 Mcy @ 30Kcy/day)
113	Seagirt - Hard Material (0.5 Mcy @ 7,500cy/day)
114	**Cofferdam Retention Structure & Water Main Relocation**
115	**Cofferdam Retention Structure**
124	**48" WATERLINE**
125	**Waterside Construction - 48" Watermain**
132	**DMCF Dike and Spillways**
140	DMCF OPERATIONAL
141	HMI CAPPING BEGINS
142	Storm Drain Relocation Phase 2
143	Mitigation - Site Cleanup
144	Mitigation - Enhancement/Creation Projects



Project: mville 05-25-06 - masonville d
Date: Tue 6/20/06



APPENDIX C

SEAGIRT MARINE TERMINAL SEDIMENT CHARACTERIZATION AND CAPPING SUITABILITY EVALUATION

FINAL

SEAGIRT MARINE TERMINAL

SEDIMENT CHARACTERIZATION AND CAPPING SUITABILITY EVALUATION

Prepared for:

Maryland Environmental Service
259 Najoles Road
Millersville, MD 21108

Under Contract to:

Maryland Port Administration
MPA Contract No 500912
MPA PIN No: 54000010
EPATS Task 45

Prepared by:

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May 2006

EXECUTIVE SUMMARY

Marine facilities within the Port of Baltimore periodically require new work dredging to provide new access channels and unloading facilities and to improve function and safety within the public terminals and berthing areas. A new work dredging area has been proposed for the Seagirt Marine Terminal facility in the Port of Baltimore to deepen the existing facility and access channels.

The purpose of this sediment evaluation was to document the existing physical and chemical characteristics of the sediments within and adjacent to the existing Seagirt Marine Terminal access channel. The investigation specifically assessed the quality of the sediment in the Seagirt Marine Terminal new work dredging area to: 1) identify potential areas of contamination, 2) provide data to assess the potential suitability of material for capping at Hart-Miller Island (HMI), 3) delineate the boundary between contaminated and uncontaminated materials, 4) calculate the volume of dredged material using bathymetric and sediment boring data, and 5) identify the lateral and horizontal extent of the sand in the new work area by drilling exploratory borings.

Hart-Miller Island (HMI) is a dredged material containment facility (DMCF) in Baltimore County, Maryland that is scheduled for closure in 2009. Dredged material from Baltimore Harbor (north of the Rock Point/North Point line) is currently placed at either HMI or Cox Creek, the only two sites designated for placement of Baltimore Harbor dredged material. Currently, it is planned that dredged material from Upper Chesapeake Bay Approach Channels will be used for the cap at HMI. However, it has been proposed that uncontaminated sediment from the bottom portion of the proposed new work dredging area at the Seagirt Marine Terminal access channel could potentially be suitable for use as the HMI cap if the sediment is of similar/comparable quality to that from the Upper Chesapeake Bay Approach Channels. To assess whether the sediments from the bottom portion of the new work dredged area had the physical and chemical characteristics that would be suitable for use in the HMI cap, specific physical, chemical, and capping-related tests were conducted.

Chemical testing of the bulk sediment included: volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), priority pollutant metals, chlorinated pesticides, organophosphorus pesticides, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) aroclors and congeners, dioxin/furan congeners, butyltins, cyanide, total sulfide, acid volatile sulfides/simultaneously extracted metals (AVS/SEM), hexavalent chromium, ammonia, total Kjeldahl nitrogen (TKN), total phosphorus, nitrate + nitrite, biological oxygen demand (BOD), chemical oxygen demand (COD), oil and grease, and total organic carbon (TOC). Physical testing of the bulk sediment included: grain size, Atterberg limits, percent solids, specific gravity, and permeability. Specific capping related tests included: calcium carbonate equivalents, cation exchange capacity, carbon:nitrogen ratio, diethylene triamine pentaacetic acid (DTPA) metals, and pyrite oxidation analysis.

ES.1 FIELD SAMPLING PROGRAM

Two separate sediment sampling programs were conducted to adequately characterize the chemical and physical characteristics of the sediment in the proposed new work dredged area at the Seagirt Marine Terminal and access channel. A preliminary sediment investigation was conducted in 2004, and the results of that study were used to identify target locations and depths for additional sampling conducted as part of a supplemental sediment study conducted in 2005. Results of both the preliminary investigation and the supplemental study are presented in this report.

ES.1.1 Preliminary Sediment Investigation

A preliminary surface and sub-surface sediment characterization was conducted for the proposed new work dredging area at the Seagirt Marine Terminal and access channel in 2004. The preliminary investigation consisted of collecting surficial sediment and sediment cores at three locations (SGT03-A, SGT03-C, and SGT03-D) within the proposed new work areas at Seagirt Marine Terminal (Figure ES-1). The sediment cores were collected from depths ranging from 5 to 35 feet (ft) below the sediment surface. Surface sediments (0 to 1 ft), whole-core composites, sediments from 5-ft depth intervals (0 to 5 ft, 5 to 10 ft, and 10 to 15 ft below the sediment surface), and sediments from 10-ft depth intervals (15 to 25 ft and 25 to 35 ft below the sediment surface) were targeted for physical testing and chemical analysis. Because water depths at location SGT03-D were deeper than originally anticipated (22-ft), sediment sampling was conducted 30-ft below the sediment surface in order to obtain samples representative of the depth of the proposed new work dredging project (–52 ft MLLW). Therefore, the bottom depth interval tested and characterized at location SGT03-D was a five foot depth interval (25 to 30 ft), instead of the 10 foot depth interval (25 to 35 ft) tested at locations SGT03-A and SGT03-C.

Based on the results of the preliminary investigation and discussions with Maryland Port Administration (MPA), a more detailed plan for additional surface and sub-surface sampling within the proposed new work dredging area was designed and implemented. The additional sampling was conducted in the proposed new work dredging area at Seagirt Marine Terminal and in the access channel in 2005 to further characterize the physical and chemical sediment quality and to identify potential sand sources at depth.

ES.1.2 Supplemental Sediment Study

A total of thirteen locations were sampled during the supplemental study (2005) to delineate the lateral and vertical extent of target chemical constituents in sediment from the proposed new work dredging area at Seagirt Marine Terminal (Figure ES-1). Sediment samples were collected from the area proposed for dredging - both adjacent to and within the access channel. Sediment samples collected within the access channel included surface sediment (maintenance dredging material) and sediment cores to 5-ft below the sediment surface (new work dredging to a project depth of –52 ft MLLW). A total of four locations (SGT05-E, SGT05-I, SGT05-K, and SGT05-L) were sampled within the access channel.

In the areas proposed for new work dredging adjacent to the access channel, sediment samples from six locations (SGT05-F, SGT05-G, SGT05-H, SGT05-J, SGT05-M, and SGT05-N) were tested at two depth intervals: the "upper portion" of the cores from 0 to15 ft below the sediment surface and a "lower portion" of the cores from 15-ft below the sediment surface to the project depth of –52 ft MLLW. In addition, sediment from the three locations sampled during the preliminary investigation (SGT03-A, SGT03-C, and SGT03-D) was collected and tested following the same analytical testing scheme.

As part of the supplemental study (2005), geotechnical borings were conducted to verify and delineate the presence and extent of a sand layer at depth in the Seagirt Marine Terminal access channel proposed new work dredging area. Geotechnical borings were collected to a minimum of –65 ft MLLW at each of the ten additional locations. At each location, if sand was encountered at or above –65 ft MLLW, boring continued to –100 ft MLLW or refusal of the sampling equipment. Calculations to determine the approximate amount of sand contained in the sand horizon were performed using the results of the sand borings.

ES.2 SEDIMENT CHEMISTRY RESULTS

Concentrations of detected analytes in sediment samples from Seagirt Marine Terminal and the access channel were compared to sediment quality guidelines (SQGs) for marine sediments (MacDonald et al. 1996) and USEPA Region 3 (April 2006) industrial risk-based concentrations (RBCs) to assess the sediment quality of the material proposed for dredging. SQGs [Threshold Effects Level (TEL) and Probable Effects Level (PEL) values] and RBCs were used to identify potential adverse biological effects associated with detected concentrations of target analytes in the Seagirt Marine Terminal project area sediments.

ES.2.1 Comparison to Sediment Quality Guidelines and Industrial Risk-Based Concentrations

Results of the preliminary investigation (2004) indicated that there were elevated concentrations of metals and organics in the upper section of the sediment (surface, 0 to 5 ft depth interval, 5 to 10 ft depth interval, and 10 to 15 ft depth interval) at the Seagirt Marine Terminal sampling locations. However, below the 10 to 15 ft depth interval, analytes detected in the upper sections of the sediment cores either decrease to concentrations below the TEL, or were not detected at all. Analytes that were infrequently detected or detected only at low concentrations (e.g. Aroclors, SVOCs) were typically detected only in the surface or upper depth intervals (0 to 15 ft) of the cores.

Results of the supplemental study (2005) indicated a similar pattern to that from the preliminary investigation (2004). Concentrations of detected analytes were generally higher in the upper (less than 15-ft below the sediment surface) portions of the cores, decreasing to low background concentrations below screening criteria in the lower portions (15-ft below the sediment surface and deeper) of the cores. However, concentrations of some analytes, primarily metals, exceeded screening criteria at depth (15-ft below the sediment surface and deeper).

In sediments from the Seagirt Marine Terminal access channel, concentrations of nine metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc) were between the TEL and the PEL in samples from the 0 to 5 ft depth interval. Concentrations of detected constituents at location SGT05-I were generally higher than detected concentrations at other sampled Seagirt Marine Terminal access channel locations (Table ES-1). Generally, for sediment samples from the access channel, concentrations of detected analytes decreased with increasing depth below the sediment surface. The 4,4-DDT concentration at location SGT05-L and the acenaphthylene concentration at SGT05-I were the only constituents with concentrations that exceeded TEL values in the 0 to 5 ft depth interval in the access channel sediments (Table ES-1). Concentrations of arsenic and iron exceeded the industrial RBC values for each access channel sampling location (Table ES-1).

For sediments collected from the lower portion of the cores at locations adjacent to the access channel, concentrations of nine metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc), seven PAHs (2-methylnaphthalene, acenaphthene, acenaphthylene, dibenz(a,h)anthracene, fluoranthene, fluorene, and naphthalene) and one chlorinated pesticide (dieldrin) exceeded TEL values (Table ES-2). Location SGT05-C was the only location where detected concentrations of metals exceeded PEL values in the lower portion of the cores. In addition, location SGT-C was the only location where the detected PAHs were had concentrations between TEL and the PEL values. Concentrations of arsenic and iron exceeded the industrial RBC values for the majority of the sample locations in sediment samples from greater than 15-ft below the sediment surface at locations adjacent to the access channel (Table ES-2).

Because this evaluation was specifically focused on the chemical characterization of the sediments from 15-ft below the sediment surface and deeper that could potentially be used in the cap of HMI, concentrations of analytes detected in sediments from both the access channel (0 to 5 ft) and area adjacent to the access channel (lower portion of the cores) were also compared to mean and maximum concentrations from the Baltimore Harbor and the Upper Chesapeake Bay Approach Channel sediments (EA 2006, 2000a, 2000b) (Tables ES-3 and ES-4). Each of the analytes detected in the areas proposed for new work dredging in the Seagirt Marine Terminal and access channel were within the range of concentrations detected in Baltimore Harbor sediments (Table ES-3). Most of the concentrations of detected analytes also had concentrations within the range of the Upper Chesapeake Bay Approach Channels, with the exception of arsenic, chromium, copper, and lead at SGT-C, chromium, copper, and lead at SGT-I, chromium at SGT-K, and dieldrin at SGT-J (Table ES-4).

ES.2.2 Comparison to Upper Chesapeake Bay Mean Concentrations

Concentrations of constituents detected in sediment samples from the Seagirt Marine Terminal access channel and areas adjacent to the access channel were normalized and compared to normalized concentrations of constituents detected in the Upper Chesapeake Bay Approach Channel sediment. Both the Seagirt Marine Terminal and Upper Chesapeake Bay Approach Channel sediment data sets were evaluated using ND = ½ MDL for non-detected analytes. The data were normalized to enable a direct comparison between detected concentrations by removing the effect of grain size or TOC concentrations on the concentration of the constituent.

Concentrations of the metals were normalized to the proportion of silt-clay in the sediment sample and concentrations of the organic constituents (PAHs, PCBs, and chlorinated pesticides) were normalized to TOC concentrations.

Results indicated that although the mean normalized concentrations of detected analytes were lower in the bottom portion of the sediment from Seagirt Marine Terminal (as compared to the upper portion), some normalized concentrations were greater than the Upper Chesapeake Bay Approach Channel mean normalized concentrations. Generally, mean normalized concentrations in sediment samples from greater than 15-ft below the sediment surface consistently exceeded Upper Chesapeake Bay Approach Channel mean normalized concentrations at three locations (SGT-C, SGT-I, and SGT-M). Location SGT-I is located within the existing access channel, therefore, the sediment samples collected from 0 to 5 ft below the sediment surface represented material to project depth. It is likely that because this sediment is located closer to the surface it has been subject to more substantial anthropogenic influences, such as stormwater runoff and ship traffic in the channel, which could be the source of the elevated concentrations of metals and organics detected at location SGT-I.

If the new work dredging is conducted at Seagirt Marine Terminal and the access channel, it is likely that the sediment would be dredged within one dredging cycle. Therefore, a normalized mean concentration of all the sediment samples combined from the lower portion of the cores collected at Seagirt Marine Terminal and the access channel during the supplemental study (2005) (n=13) was compared to the maximum and the mean normalized concentrations of analytes detected in the Upper Chesapeake Bay Approach Channel sediments (n=111). The results of the comparison indicated that a total of 32 analytes had a mean normalized concentration in the lower portion of the Seagirt sediment samples that was greater than the mean normalized concentration in sediment samples from the Upper Chesapeake Bay Approach Channels to the Port of Baltimore. However, none of these concentrations exceeded the maximum concentration of these analytes detected in the approach channel sediments. Therefore, the sediments collected from 15-ft below the sediment surface to the new work depth (–52 ft MLLW) fall within the range of concentrations reported for the Upper Chesapeake Bay Approach Channels.

ES.2.3 Sediment Chemistry Conclusion

Based on the results of the sediment chemistry, sediment from the upper portion (0 to 15 ft below the sediment surface) of the proposed new work dredging area and sediment from within the access channel is suitable for placement at HMI.

Comparisons to detected concentrations of analytes from the Upper Chesapeake Bay Approach Channels (EA 2006, 2000a, 2000b) indicate that the sediment from the lower portion (15 ft below the sediment surface and greater) of the proposed new work dredging area at Seagirt Marine Terminal is within the range of concentrations detected in the sediments from the Upper Chesapeake Bay Approach Channels. Therefore, sediment from the lower portion (15 ft below the sediment surface and greater) of the proposed new work dredging area at Seagirt Marine Terminal has the potential for use as the cap at HMI. Continued evaluation is recommended to determine if this sediment has the physical and chemical properties necessarily to support the final cap design. Results of specific capping-related tests (i.e., calcium carbonate equivalents, cation exchange capacity, carbon to nitrogen ratio, DTPA metals, and pyrite oxidation analysis) are provided in this report. Results should be evaluated and considered in relation to the cap design requirements.

ES.3 SAND VOLUME CALCULATIONS

The vertical and lateral extent of a subsurface sand layer was estimated by drilling thirteen borings over the 125-acre area to be dredged. Boring locations corresponded to locations where the bulk sediment sampling was conducted (Figure ES-1). Boring depths ranged from –65 ft MLLW to –100 ft MLLW. Geologic cross-sections were developed to define the extent of sandy material that would be considered useable for construction. There were two distinct areas of uncontaminated sand evident from the boring logs - a northern sand source and the southern sand source.

The volume of uncontaminated sand was calculated to estimate the volume of material that could be mined for construction purposes. There were several soil layers within the larger uncontaminated sand units that were classified as a gravel or as a silt. It was assumed that these samples were located in small lenses of these soils and that the characteristics of the materials were similar enough to the uncontaminated sands that if they were hydraulically dredged together, the combined material would still likely be useable for construction.

The volume of each sand source was calculated by comparing two surfaces, the top sand surface and the bottom sand surface. The volume calculations indicated a total uncontaminated sand volume of approximately 1,050,000 cubic yards (CY), including the northern and southern sand sources. These volume calculations were based on significant assumptions about the horizontal and vertical extents of the sand layers and the quality of sand that is acceptable for construction. Calculated sand volumes were reduced by a contingency of 40 percent to offset some of the uncertainty, but it is possible that the calculated sand volumes are significantly lower or even higher than those calculated. Additional geotechnical borings are necessary to more accurately determine the available volume of uncontaminated sand.

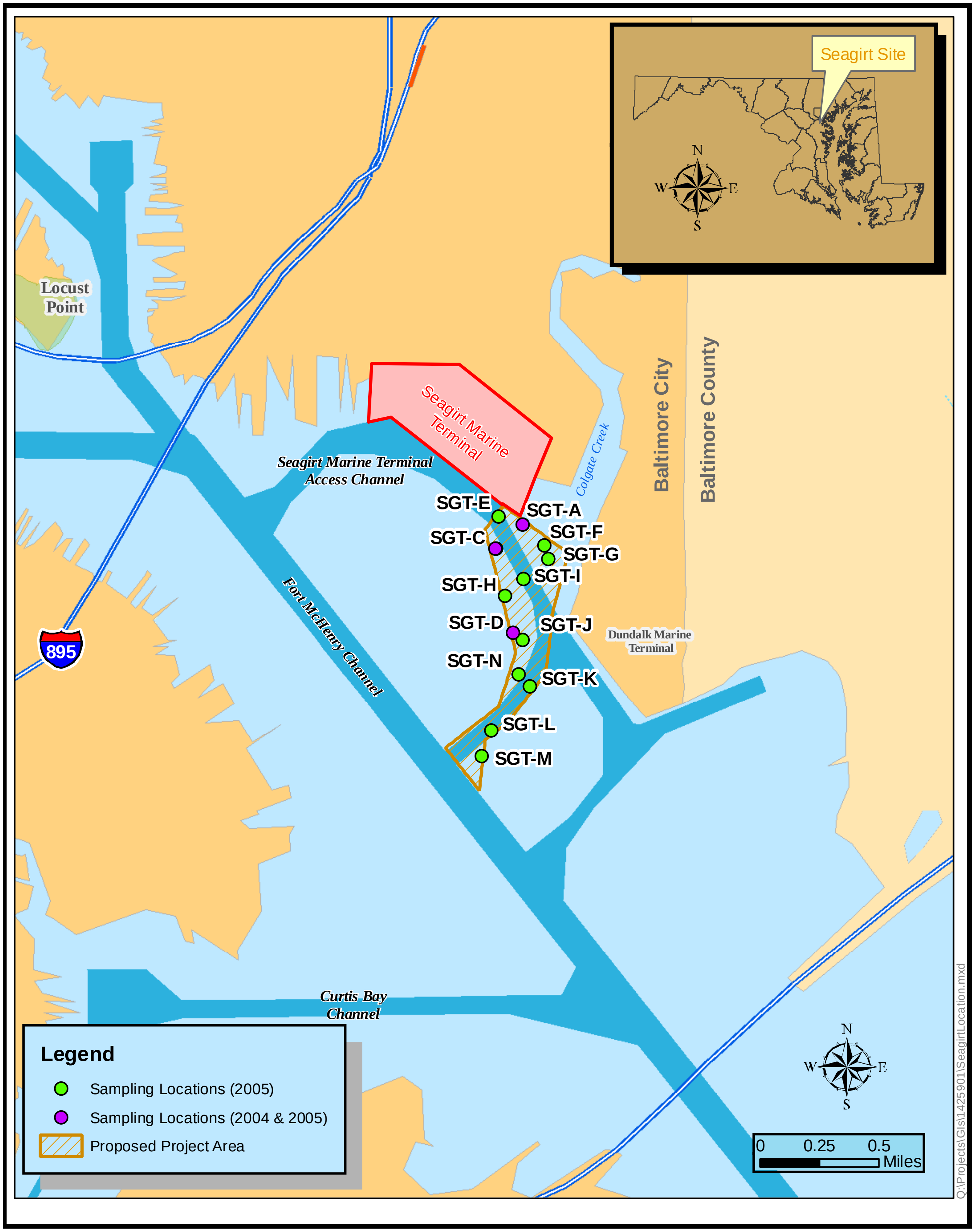

Figure ES-1. Sampling Locations at Seagirt Marine Terminal (2004 and 2005)

TABLE ES-1. CONCENTRATIONS OF ANALYTES THAT EXCEEDED TELs, PELs, AND RBCs IN SAMPLES FROM THE SEAGIRT MARINE TERMINAL ACCESS CHANNEL

SEAGIRT MARINE TERMINAL SUPPLEMENTAL STUDY (2005), BALTIMORE HARBOR, MARYLAND

					ACCESS CHANNEL**			
	UNITS	TEL*	PEL*	RBC*	SGT05-E	SGT05-I	SGT05-K	SGT05-L
METALS								
ARSENIC	MG/KG	7.24	41.6	1.9	9	29	9.3	9.1
CADMIUM	MG/KG	0.676	4.21	--	--	0.78	--	--
CHROMIUM	MG/KG	52.3	160.4	--	--	122	79.4	--
COPPER	MG/KG	18.7	108.2	--	21.7	82.8	55.2	21.5
IRON	MG/KG	--	--	31,000	31,900	43,400	36,200	31,200
LEAD	MG/KG	30.24	112.18	--	--	84.7	--	--
MERCURY	MG/KG	0.13	0.696	--	--	0.18	--	--
NICKEL	MG/KG	15.9	42.8	--	24.4	34.5	40.1	23.9
ZINC	MG/KG	124	271	--	--	222	169	--
PAHs								
ACENAPHTHYLENE	UG/KG	5.87	127.87	6,132,000	--	9.1	--	--
CHLORINATED PESTICIDES								
4,4'-DDT	UG/KG	1.19	4.77	8,420	--	--	--	1.4

**Sources*: MacDonald et al. 1996. Ecotoxicology 5: 253-278; USEPA Region 3 2006; soil RBC for an industrial scenario

**Samples collected from the 0 to 5 ft depth interval during the supplement study (2005)

-- indicates that the detected concentration did not exceed TEL, PEL, or RBC value

TEL = threshold effects level

PEL = probable effects level

RBC = risk based concentration

Concentration exceeded RBC value only (green)

Concentration was between the TEL and PEL (yellow)

Concentration exceeded RBC and was between the TEL and PEL (blue)

TABLE ES-2. CONCENTRATIONS OF ANALYTES THAT EXCEEDED TELs, PELs, AND RBCs IN SAMPLES FROM ADJACENT TO THE SEAGIRT MARINE TERMINAL ACCESS CHANNEL

SEAGIRT MARINE TERMINAL SUPPLEMENTAL STUDY (2005), BALTIMORE HARBOR, MARYLAND

					ADJACENT TO THE ACCESS CHANNEL**								
	UNITS	TEL*	PEL*	RBC*	SGT05-A	SGT05-C	SGT05-D	SGT05-F	SGT05-G	SGT05-H	SGT05-J	SGT05-M	SGT05-N
METALS													
ARSENIC	MG/KG	7.24	41.6	1.9	6.2	**50.8**	10	3.3	2.8	7.5	9.6	18.3	5
CADMIUM	MG/KG	0.676	4.21	--	--	1.3	--	--	--	--	--	--	--
CHROMIUM	MG/KG	52.3	160.4	--	--	**234**	54.8	--	--	--	--	73.9	--
COPPER	MG/KG	18.7	108.2	--	--	**163**	40.2	--	--	21.3	--	56	28.5
IRON	MG/KG	--	--	31,000	--	44,100	38,500	--	--	36,600	57,700	37,900	--
LEAD	MG/KG	30.24	112.18	--	--	**128**	38	--	--	--	--	52	--
MERCURY	MG/KG	0.13	0.696	--	--	0.51	0.43	--	--	--	--	0.3	--
NICKEL	MG/KG	15.9	42.8	--	--	33.8	36.2	--	--	26.9	17.3	32.4	25.3
ZINC	MG/KG	124	271	--	--	**320**	--	--	--	--	--	141	--
PAHs													
2-METHYLNAPHTHALENE	UG/KG	20.21	201.28	408,800	--	45	--	--	--	--	--	--	--
ACENAPHTHENE	UG/KG	6.71	88.9	6,132,000	--	10	--	--	--	--	--	--	--
ACENAPHTHYLENE	UG/KG	5.87	127.87	6,132,000	--	20	--	--	--	--	--	--	--
DIBENZ(A,H)ANTHRACENE	UG/KG	6.22	134.61	390	--	9.4	--	--	--	--	--	--	--
FLUORANTHENE	UG/KG	112.82	1493.54	4,088,000	--	150	--	--	--	--	--	--	--
FLUORENE	UG/KG	21.17	144.35	4,088,000	--	28	--	--	--	--	--	--	--
NAPHTHALENE	UG/KG	34.57	390.64	2,044,000	--	82	--	--	--	--	--	--	--
CHLROINATED PESTICIDES													
DIELDRIN	UG/KG	0.715	4.3	180	--	--	--	--	--	--	1.7	--	--

**Sources* : MacDonald et al. 1996. Ecotoxicology 5: 253-278; USEPA Region 3 2006; soil RBC for an industrial scenario

***Sediment samples collected from the lower portion of the sediment cores during the supplemental study (2005)

-- indicates that the detected concentration did not exceed TEL/PEL value

TEL = threshold effects level

PEL = probable effects level

RBC = risk based concentration

Concentration exceeded RBC value only

Concentration was between the TEL and PEL

Concentration exceeded RBC and was between the TEL and PEL

Concentration exceeded the PEL

TABLE ES-3. COMPARISON OF DETECTED CONCENTRATIONS (NON-NORMALIZED) TO BALTIMORE HARBOR CHANNEL AND UPPER CHESAPEAKE BAY CHANNEL MEAN AND MAXIMUM CONCENTRATIONS

SEAGIRT MARINE TERMINAL ACCESS CHANNEL

SEAGIRT MARINE TERMINAL SUPPLEMENTAL STUDY (2005), BALTIMORE HARBOR, MARYLAND

	UNITS	HARBOR CHANNEL MEAN**	HARBOR CHANNEL MAX**	BAY CHANNEL MEAN**	BAY CHANNEL MAX**	ACCESS CHANNEL***			
						SGT05-E	SGT05-I	SGT05-K	SGT05-L
METALS									
ALUMINUM	MG/KG	15,012	26,500	14,923	34,500	15,900	22,000	15,900	17,500
ARSENIC	MG/KG	25.5	67.5	13.3	20.9	9	29	9.3	9.1
BERYLLIUM	MG/KG	1.81	2.5	1.61	2.30	1.4	1.8	0.96	1.5
CADMIUM	MG/KG	0.849	3.7	0.291	0.920	0.57	0.78	0.31 B	0.11 B
CHROMIUM	MG/KG	151	649	39.7	70.7	37.5	122	79.4	38.7
COBALT	MG/KG	22.5	32	31.6	40.2	13.5	18.9	27.8	13
COPPER	MG/KG	151	763	38.0	59.3	21.7	82.8	55.2	21.5
IRON	MG/KG	43,653	100,000	35,786	68,200	31,900	43,400	36,200	31,200
LEAD	MG/KG	119	375	46.1	80.1	13.3 E	84.7	29.2	15.9
MANGANESE	MG/KG	1,807	8,490	3151	9,040	405	899	547	749
MERCURY	MG/KG	0.485	1.4	0.193	0.650	0.034 B	0.18	0.12	0.064
NICKEL	MG/KG	39.7	63	41.7	63.1	24.4	34.5	40.1	23.9
SELENIUM	MG/KG	5.21	93.5	2.01	5.20	0.65	3.8	1.3	--
SILVER	MG/KG	1.01	18.1	0.478	1.30	0.032 B	0.26 B	0.2 B	0.046 B
THALLIUM	MG/KG	1.63	4.7	0.811	5.10	--	1 B	0.58 B	--
TIN	MG/KG	22.6	42.9	10.3	14.9	1.5 B	4.3 B	3 B	--
ZINC	MG/KG	348	669	225	349	71.4 E	222	169	74.2
PAHs									
1-METHYLNAPHTHALENE	UG/KG	9.64	200	19.3	230	--	7.4 J	4.5 J	--
2-METHYLNAPHTHALENE	UG/KG	20.0	270	44.1	510	--	16 J	10 J	--
ACENAPHTHYLENE	UG/KG	7.75	18.5	19.0	260	--	9.1 J	4.2 J	--
ANTHRACENE	UG/KG	5.44	39	14.3	160	--	15 J	7.4 J	--
BENZO(A)ANTHRACENE	UG/KG	12.1	71	15.0	97.0	--	33	14	2.2 J
BENZO(A)PYRENE	UG/KG	16.2	85	20.2	120	--	34	18	--
BENZO(B)FLUORANTHENE	UG/KG	28.8	190	38.2	250	--	37	20	2.2 J
BENZO(GHI)PERYLENE	UG/KG	13.0	86	15.2	73.0	--	29	17	1.6 J
BENZO(K)FLUORANTHENE	UG/KG	7.81	50	9.40	53.0	--	16 J	9.4 J	--
CHRYSENE	UG/KG	10.7	100	14.0	80.0	--	38	17	2.1 J
DIBENZO(A,H)ANTHRACENE	UG/KG	1.44	5.8	2.14	8.90	--	6.1 J	3.4 J	--
FLUORANTHENE	UG/KG	32.5	320	47.8	400	--	77	35	3.5 J
FLUORENE	UG/KG	10.4	88	22.8	220	--	11 J	4.4 J	--
INDENO(1,2,3-CD)PYRENE	UG/KG	8.04	44	10.5	51.0	--	20	11 J	--
NAPHTHALENE	UG/KG	21.5	150	63.2	710	--	33	23	--
PHENANTHRENE	UG/KG	17.9	310	40.6	460	--	28	16	--
PYRENE	UG/KG	40.7	50	41.9	340	--	55	26	4 J
TOTAL PAHs (ND=0)	UG/KG	232	2,095	450	4,239	0	465	240	15.6
TOTAL PAHs (ND=1/2MDL)	UG/KG	294	2,158	473	4,239	62	474	247	61.2
PCBs									
TOTAL PCBs (ND=0)	UG/KG	30.9	517	4.21	43.5	1.99	10.2	6.65	0.22
TOTAL PCBs (ND=1/2MDL)	UG/KG	38.3	519	8.31	44.1	6.19	11.7	7.64	6.85
CHLORINATED PESTICIDES									
4,4'-DDT	UG/KG	1.00	42	0.333	0.800	--	0.31 J PG	0.28 J	1.4 J
ALPHA-BHC	UG/KG	0.132	0.165	0.190	0.415	--	--	--	0.27 J

**Sources*: EA 2006, 2000a, 2000b

**Baltimore Harbor Channel n=59; Upper Bay Channel n=111

***Samples collected from the 0 to 5 ft depth interval during the supplement study (2005)

NOTE: Values in the table represent detected concentrations

-- indicates that the analyte was not detected at that location

Concentration exceeded RBC value only

Concentration was between the TEL and PEL

Concentration exceeded RBC and was between the TEL and PEL

B (inorganic) **=** compound was detected, but below reporting limit (value is estimated).

E = value is estimated because of presence of interference

J (organic) **=** compound was detected, but below reporting limit (value is estimated).

U = compound was analyzed but not detected

TABLE ES-4. COMPARISON OF DETECTED CONCENTRATIONS (NON-NORMALIZED) TO BALTIMORE HARBOR CHANNEL AND UPPER CHESAPEAKE BAY CHANNEL MEAN AND MAXIMUM CONCENTRATIONS

AREAS ADJACENT TO THE SEAGIRT MARINE TERMINAL ACCESS CHANNEL

SEAGIRT MARINE TERMINAL SUPPLEMENTAL STUDY (2005), BALTIMORE HARBOR, MARYLAND

	UNITS	HARBOR CHANNEL MEAN**	HARBOR CHANNEL MAX**	BAY CHANNEL MEAN**	BAY CHANNEL MAX**	ADJACENT TO THE ACCESS CHANNEL***								
						SGT05-A	SGT05-C	SGT05-D	SGT05-F	SGT05-G	SGT05-H	SGT05-J	SGT05-M	SGT05-N
METALS														
ALUMINUM	MG/KG	15,012	26,500	14,923	34,500	10,100	18,800	23,800	4,600	6,420	16,500	12,400	21,800	11,900
ARSENIC	MG/KG	25.5	67.5	13.3	20.9	6.2	50.8	10	3.3	2.8	7.5	9.6	18.3	5
BERYLLIUM	MG/KG	1.81	2.5	1.61	2.30	0.94	1.8	1.9	0.61	0.69	1.6	1.4	1.7	1.5
CADMIUM	MG/KG	0.849	3.7	0.291	0.920	0.34 B	1.3	--	--	0.26 B	0.66 B	--	0.081 B	--
CHROMIUM	MG/KG	151	649	39.7	70.7	28.3	234	54.8	17.9	24.5	40	52.2	73.9	45.5
COBALT	MG/KG	22.5	32	31.6	40.2	8.6	18.3	19.5	8.4	10.6	16.1	10.6	16.5	18.2
COPPER	MG/KG	151	763	38.0	59.3	15.3	163	40.2	12	15.7	21.3	18.6	56	28.5
IRON	MG/KG	43,653	100,000	35,786	68,200	25,300	44,100	38,500	18,100	20,200	36,600	57,700	37,900	28,800
LEAD	MG/KG	119	375	46.1	80.1	9.2 E	128	38	3.7	5.3 E	16.8 E	11.9	52	13.6
MANGANESE	MG/KG	1,807	8,490	3151	9,040	339	649	941	258	430	1,090	279	705	476
MERCURY	MG/KG	0.485	1.4	0.193	0.650	0.015 B	0.51	0.43	0.0093 B	0.014 B	0.037 B	0.029 B	0.3	0.039
NICKEL	MG/KG	39.7	63	41.7	63.1	15.9	33.8	36.2	11.5	14.8	26.9	17.3	32.4	25.3
SELENIUM	MG/KG	5.21	93.5	2.01	5.20	0.57	7.7	0.9	0.4 B	0.32 B	0.52 B	0.52 B	2.2	0.42 B
SILVER	MG/KG	1.01	18.1	0.478	1.30	--	0.44 B	--	--	--	0.084 B	--	0.095 B	0.048 B
THALLIUM	MG/KG	1.63	4.7	0.811	5.10	--	0.82 B	0.82 B	--	--	--	--	0.76 B	1
TIN	MG/KG	22.6	42.9	10.3	14.9	3.1 B	8.7 B	--	3.1 B	2.8 B	1.7 B	3 B	1.6 B	2.1 B
ZINC	MG/KG	348	669	225	349	49.4 E	320	111	26.6	36.1 E	85.5 E	55.4	141	78.6
PAHs														
1-METHYLNAPHTHALENE	UG/KG	9.64	200	19.3	230	--	20	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	UG/KG	20.0	270	44.1	510	2.5 J	45	5.2 J	--	--	--	--	4.1 J	5.1 J
ACENAPHTHENE	UG/KG	30	330.0	35.9	290.0	--	10 J	--	--	--	--	--	--	--
ACENAPHTHYLENE	UG/KG	7.75	18.5	19.0	260	--	20	--	--	--	--	--	--	--
ANTHRACENE	UG/KG	5.44	39	14.3	160	--	33	4.3 J	--	--	--	--	2.1 J	3.5 J
BENZO(A)ANTHRACENE	UG/KG	12.1	71	15.0	97.0	--	56	8 J	--	--	2.8 J	--	4.4 J	6.8 J
BENZO(A)PYRENE	UG/KG	16.2	85	20.2	120	--	52	7.6 J	--	--	3.6 J	--	4.8 J	8.4 J
BENZO(B)FLUORANTHENE	UG/KG	28.8	190	38.2	250	--	60	12	--	--	4.7 J	--	6.5 J	9.9 J
BENZO(GHI)PERYLENE	UG/KG	13.0	86	15.2	73.0	--	43	5.9 J	1.3 J	--	2.5 J	--	4.3 J	8 J
BENZO(K)FLUORANTHENE	UG/KG	7.81	50	9.40	53.0	--	23	--	--	--	--	--	--	4.8 J
CHRYSENE	UG/KG	10.7	100	14.0	80.0	--	65	9.1	--	--	2.8 J	--	3.9 J	8.2 J
DIBENZO(A,H)ANTHRACENE	UG/KG	1.44	5.8	2.14	8.90	--	9.4 J	--	--	--	--	--	--	--
FLUORANTHENE	UG/KG	32.5	320	47.8	400	--	150	20	--	--	5.3 J	--	10	16
FLUORENE	UG/KG	10.4	88	22.8	220	--	28	3.7 J	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	UG/KG	8.04	44	10.5	51.0	--	29	3.9 J	--	--	1.8 J	--	2.8 J	5.5 J
NAPHTHALENE	UG/KG	21.5	150	63.2	710	--	82	8.4 J	--	--	--	--	5.4 J	11 J
PHENANTHRENE	UG/KG	17.9	310	40.6	460	--	55	9	--	--	3 J	--	4.7 J	7.5 J
PYRENE	UG/KG	40.7	50	41.9	340	--	110	17	1.8 J	--	5.5 J	--	9.3	14
TOTAL PAHs (ND=0)	UG/KG	232	2,095	450	4,239	2.50	890	114	3	0	32	0	62.3	109
TOTAL PAHs (ND=1/2MDL)	UG/KG	294	2,158	473	4,239	61.2	890	135	55	60.3	73	57.6	85.4	141
PCBs														
TOTAL PCBs (ND=0)	UG/KG	30.9	517	4.21	43.5	1.40	10.5	4.00	0.600	0.240	4.77	0.440	0	4.98
TOTAL PCBs (ND=1/2MDL)	UG/KG	38.3	519	8.31	44.1	5.95	11.7	6.58	3.68	4.32	7.99	5.24	7.02	6.96
CHLORINATED PESTICIDES														
4,4'-DDE	UG/KG	0.556	7.1	0.075	0.384	--	0.51 J PG	--	--	--	--	--	--	--
4,4'-DDT	UG/KG	1.00	42	0.085	0.333	--	0.65 J	--	--	--	--	--	--	--
DIELDRIN	UG/KG	0.166	0.225	0.075	0.227	--	--	--	--	--	--	1.7 J	--	--
ENDRIN ALDEHYDE	UG/KG	0.445	9.8	0.085	0.425	--	0.47 J	--	--	--	--	--	--	--

**Sources*: EA 2006, 2000a, 2000b

**Baltimore Harbor Channel n=59; Upper Bay Channel n=111

***Samples collected from the lower portion of the cores (15-ft below the sediment surface and deeper) during the supplement study (2005)

NOTE: Values in the table represent detected concentrations

-- indicates that the analyte was not detected at that location

Concentration exceeded RBC value only

Concentration was between the TEL and PEL

Concentration exceeded RBC and was between the TEL and PEL

Concentration exceeded the PEL

B (inorganic) = compound was detected, but below reporting limit (value is estimated).

E = value is estimated because of presence of interference

J (organic) = compound was detected, but below reporting limit (value is estimated).

U = compound was analyzed but not detected

APPENDIX D

MODELING APPENDIX

APPENDIX D

Placement of Seagirt sand and Gravel at Masonville Site with a Split Hull Barge

The placement of Dredged material at the Masonville Site with a split hull barge was modeled to predict resulting TSS distribution in the water column. As part of Masonville dike construction, unsuitable material is to be removed resulting in an undercut to a depth of approximately 30 ft in an area with original depths of approximately 13 ft. One proposal is to fill these undercut areas with dredged material transported to the site in a split hull barge. The placement of material with a split hull barge was modeled with the STFATE model. STFATE is a USACE model used for computing the fate of material placed from either a split-hull barge or a hopper dredge.

The source of the dredged material is from channel improvements at the Seagirt Marine Terminal. Specific areas to be dredged at Seagirt have a very high sand and gravel content, a desirable attribute for use in the undercut areas. Particle size information for 20 samples at the Seagirt site is provided in Table 1. In these 20 samples, the gravel fraction ranges up to 60 percent and the sand fraction ranges from 22 to 90 percent. Particle size attributes resulting from averaging the 20 samples into a composite are provided at the bottom of Table 1. The composite sample is 33.3 percent gravel, 54.8 percent sand, and 12.0 percent fines (clay and silt).

The barge characteristics modeled with STFATE are as follows:

Length of hopper	185 ft
Width of hopper	60 ft
Draft empty	4 ft
Draft full	20 ft (4,000 yd^3 sand and gravel)
Partial draft	15 ft (3,000 yd^3 sand and gravel)

The STFATE model was executed for three sediment fractions: gravel, sand, and fines. The moisture content of the dredged material was assumed to be 20 percent. It was also assumed that an additional 20 percent by volume of water would be added to the barge as resulting from the operation of the dredge bucket. Thus the total moisture content of the material in the barge was set at 40 percent. The volume fraction of the three modeled constituents are summarized in the following table.

Sediment	Volume Fraction Insitu	Volume Fraction In Barge
Gravel	0.332	0.199
Sand	0.547	0.329
Fines	0.120	0.072

The placement operation was modeled as a barge with a 20 ft draft (4,000 yd^3) adjacent to a 30-ft deep undercut area. This scenario was executed for ambient velocities of 2 cm/sec, 6 cm/sec and 10 cm/sec. These are the same velocities used for the other suspended sediment modeling at the Masonville site and represent a near slack water condition, an average tide condition, and a full ebb or flood condition. Placement with a 15 ft draft barge (3,000 yd^3) and a 30 ft depth was also modeled. STFATE would not execute using a 20 ft depth with either a 15 ft or 10 ft draft barge. The STFATE model output provided a TSS matrix for the maximum water column concentration. These concentrations are assumed to be near bottom. The lateral distribution of TSS for the 6 cm/sec scenario (4,000 yd3) is provided in Table 3 for 20 minutes, 30 minutes and 40 minutes after the barge release. An examination of Table 3 shows the downstream movement of the higher concentration plume area with time.

The Maryland water quality regulations address a 10-percent cross-sectional receiving water area as an allowed mixing zone. Predicted plume cross-sectional areas were calculated for the 150 NTU's at any time, or 50 NTU's as a monthly average. The NTU standards were associated with a range of TSS concentrations. The plume width along the maximum concentration cross-section for each TSS of interest was determined. This width was then multiplied by a 4 m (13 ft) water depth typical of the area surrounding the northern dike. The resulting cross-sectional areas are provided in Table 2 for 50, 70, 150, and 240 TSS concentrations. This was performed for the plume 20, 30 and 40 minutes following the barge release. Table 2 also provides the maximum TSS concentration in the plume at each time step.

An examination of Table 2 indicates that at the 2 cm/sec near slack water condition, TSS concentrations never reach a 50 mg/L level resulting in no impact relative to the mixing zone. At a 6 cm/sec velocity, 50-70mg/L TSS contours enclose 2.1-3.5 percent of the cross-section at the Masonville site. At 10 cm/sec, concentrations are slightly higher resulting in 3.0-4.4 percent of the cross-section at 50-70 mg/L levels. The 6 cm/sec/3,000 yd3 scenario at 30 and 40 minutes resulted in slightly higher cross-sections than the 4,000 yd3 scenario. The smaller release volume may have resulted in less entrainment of the of the descending plume.

Table 1 Particle Size Distribution of Seagirt Marine Terminal Sediment Samples

Classification	Sediment Fraction (%) for Station and Depth (ft)									
	E-6 51.5-53.5	**E-11** 50-52	**E-12** 49-51	**E-15** 51-53	**E-18** 50-52	**E-19** 44-46	**E-19** 46-48	**E-19** 50-52	**E-19** 52-54	**E-20** 50-52
Gravel	58.9	35.6	22.0	72.1	69.6	39.3	54.2	0.0	0.0	53.1
Sand	39.1	58.3	72.4	22.3	27.5	52.0	41.4	50.9	90.4	38.7
Silts & Clays	2.0	6.1	5.6	5.6	2.9	8.7	4.4	49.1	9.6	8.2
Finer (%)	Diameter (mm)									
D85	18.4	15.5	8.44	27.3	30.3	11.2	23	0.919	0.667	31
D60	9.13	3.47	0.648	17.8	12.6	4.6	8.28	0.126	0.348	8.71
D50	6.67	1.68	0.457	13.6	9.38	2.36	5.61	0.0781	0.302	5.56
D30	2.05	0.661	0.282	5.38	4.67	0.484	1.76	--	0.221	0.949
D15	0.744	0.306	0.196	0.932	1.91	0.205	0.496	--	0.159	0.233
D10	0.523	0.206	0.167	0.383	1.05	0.127	0.298	--	0.0808	0.134

Classification	Sediment Fraction (%) for Station and Depth (ft)										
	E-21 46.5-48	**E-21** 50-52	**E-21** 52-54	**E-23** 44-46	**E-23** 46-48	**E-23** 52-54	**E-24** 42-44	**E-34** 48-50	**E-34** 50-52	**E-34** 52-54	**Composite Sample**
Gravel	9.7	7.3	56.4	0.0	0.8	32.2	8.6	48.0	60.7	37.0	33.28
Sand	77.3	89.6	26.6	89.3	50.3	58.9	72.9	46.8	33.9	56.8	54.77
Silts & Clays	13.0	3.1	17.0	10.7	48.9	8.9	18.5	5.2	5.4	6.2	11.96
Finer (%)	Diameter (mm)										
D85	3.69	2.42	41.8	0.568	0.347	14.8	0.424	23.5	33.5	11.3	14.95
D60	1.41	0.87	15.5	0.329	0.176	2.25	0.29	8.33	24.4	3.88	6.16
D50	0.954	0.646	9.47	0.286	0.0913	0.943	0.245	3.98	10.7	1.73	3.74
D30	0.406	0.369	0.725	0.21	--	0.349	0.16	0.538	1.66	0.735	1.20
D15	0.162	0.235	--	0.141	--	0.185	--	0.243	0.353	0.355	0.43
D10	--	0.194	--	--	--	0.0985	--	0.183	0.223	0.221	0.28

Table 2 Predicted TSS Concentrations for the Placement of Dredged Material at the Masonville Site with a Split Hull Barge

20 Minutes After Release from Barge

Lateral Distance (m)	TSS Concentration (mg/L) at Downstream Distance (m)										
	-61.0	-30.5	0.0	30.5	61.0	91.4	121.9	152.4	182.9	213.4	243.8
152.4	0	0	0	0	0	0	0	0	0	0	0
121.9	0	0	0	0	0	0	0	0	0	0	0
91.4	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0	0	0	0
61.0	0.00	0.01	0.12	0.55	0.64	0.12	0.00	0	0	0	0
30.5	0.00	0.09	1.90	13.80	28.50	4.51	0.08	0	0	0	0
0.0	0.00	0.22	4.99	49.5	139.0	19.4	0.24	0	0	0	0
-30.5	0.00	0.09	1.90	13.80	28.50	4.51	0.08	0	0	0	0
-61.0	0.00	0.01	0.12	0.55	0.64	0.12	0.00	0	0	0	0
-91.4	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0	0	0	0
-121.9	0	0	0	0	0	0	0	0	0	0	0
-152.4	0	0	0	0	0	0	0	0	0	0	0

30 Minutes After Release from Barge

Lateral Distance (m)	TSS Concentration (mg/L) at Downstream Distance (m)										
	-61.0	-30.5	0.0	30.5	61.0	91.4	121.9	152.4	182.9	213.4	243.8
152.4	0	0	0	0	0	0	0	0	0	0	0
121.9	0	0	0	0	0	0	0	0	0	0	0
91.4	0	0.00	0.00	0.02	0.05	0.07	0.03	0.00	0	0	0
61.0	0	0.00	0.03	0.33	1.59	2.89	1.19	0.11	0	0	0
30.5	0	0.01	0.19	2.40	18.10	48.00	19.40	1.25	0	0	0
0.0	0	0.01	0.34	4.87	45.9	139.0	55.4	3.12	0	0	0
-30.5	0	0.01	0.19	2.40	18.10	48.00	19.40	1.25	0	0	0
-61.0	0	0.00	0.03	0.33	1.59	2.89	1.19	0.11	0	0	0
-91.4	0	0.00	0.00	0.02	0.05	0.07	0.03	0.00	0	0	0
-121.9	0	0	0	0	0	0	0	0	0	0	0
-152.4	0	0	0	0	0	0	0	0	0	0	0

40 Minutes After Release from Barge

Lateral Distance (m)	TSS Concentration (mg/L) at Downstream Distance (m)										
	-61.0	-30.5	0.0	30.5	61.0	91.4	121.9	152.4	182.9	213.4	243.8
152.4	0	0	0	0	0	0	0	0	0	0	0
121.9	0	0	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0
91.4	0	0	0.00	0.01	0.07	0.23	0.37	0.24	0.06	0.01	0
61.0	0	0	0.01	0.08	0.65	2.98	6.28	4.36	0.92	0.07	0
30.5	0	0	0.02	0.32	2.92	17.40	44.00	31.40	5.95	0.37	0
0.0	0	0	0.03	0.50	4.95	32.8	88.2	63.4	11.60	0.67	0
-30.5	0	0	0.02	0.32	2.92	17.40	44.00	31.40	5.95	0.37	0
-61.0	0	0	0.01	0.08	0.65	2.98	6.28	4.36	0.92	0.07	0
-91.4	0	0	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0
-121.9	0	0	0	0	0	0	0	0	0	0	0
-152.4	0	0	0	0	0	0	0	0	0	0	0

Table 3 Cross-Sectional Area of Predicted Sediment Plumes Resulting from Placement of Material at the Masonville Site with a Split Hull Barge

Time After Release (min)	Maximum TSS Conc (mg/L)	Cross-Sectional Area (%)			
		Monthly Average		Maximum	
		50 mg/L	70 mg/L	150 mg/L	240 mg/L
2 cm/sec Tidal Velocity					
20	1.74	0	0	0	0
30	7.31	0	0	0	0
40	12.3	0	0	0	0
6 cm/sec Tidal Velocity					
20	139	3.0	2.4	0	0
30	139	3.5	2.9	0	0
40	89.1	3.2	2.1	0	0
10 cm/sec Tidal Velocity					
20	239	3.5	3.1	1.8	0
30	148	3.6	3.0	0	0
40	174	4.4	3.6	1.2	0
6 cm/sec Tidal Velocity (3,000 cubic yd)					
20	148	2.4	1.7	0	0
30	189	3.7	3.2	1.3	0
40	120	3.7	2.9	0	0

APPENDIX E

EMISSIONS APPENDIX

APPENDIX E
MASONVILLE DMCF AIR QUALITY ANALYSIS

This report presents a comprehensive analysis of the air quality impacts due to construction of the proposed Masonville Dredged Material Containment Facility (DMCF). This is a refinement of the air emissions analysis presented in the Masonville DEIS. A more comprehensive report of this analysis will be completed and available for the FEIS. However this preliminary version was prepared to support the addendum to the DEIS.

The proposed Masonville project entails the construction of a disposal site for dredged material in the Middle Branch of the Patapsco River, at Masonville, Baltimore City, Maryland. The Masonville DMCF project on completion will provide a disposal site to accommodate dredged materials generated by various dredging projects that will occur over the next 5 to 10 years in the Baltimore Harbor area.

The goal of this air quality report was to demonstrate that a cumulative air emissions reduction will be achieved if some of the dredged materials (25%) from a new work dredging project at Seagirt will be placed at Masonville site as part of the dike building operations rather than placed at HMI DMCF. This emissions reduction will result from reduced activities at the Masonville site (less material borrowed from below the site for dike construction), which will give rise to lesser equipment use and reduced project time (relative to placing Seagirt material at HMI). .

To support this emissions reduction claim, two separate project scenarios were analyzed and emissions resulting from each of the scenario were calculated using the equipment list and operating schedules provided by the project contractors for both scenarios. Scenario one looked at the emissions that will result from the Masonville project without the Seagirt materials (the preferred option from the DEIS), while Scenario Two looked at the emissions when the Seagirt material is used for the Masonville dikes. Table 1 presents the emissions summary for the Masonville DMCF project. The left-hand side of Table 1 presents emissions that will result from the Masonville project without the Seagirt materials, and the right-hand side presents the emissions from the project when the Seagirt materials are considered. The overall Masonville project emissions reductions were established in the lower right-hand side of the table.

Table 2 presents the summary of emissions from combined (regional) Masonville and Seagirt projects. The left-hand side of the table presents emissions scenario when both projects are executed independent of each other (i.e. Seagirt dredged material sent to HMI), and the right-hand side presents emissions scenario when 25% of Seagirt dredged material are sent to Masonville. The lower right-hand table presents a cumulative NOx emissions reduction from both projects.

Table 1 - Masonville DMCF Emissions Summary

Masonville without Seagirt material (tons)

	CO	NOx	PM2.5	PM10	SO2	VOC
CREW A	1.855	10.032	0.274	0.278	1.674	0.245
CREW B	28.568	149.716	4.337	4.413	24.060	3.588
CREW C	23.215	144.904	3.690	3.696	24.430	2.634
CREW C1	1.420	2.751	0.141	0.153	0.060	0.248
CREW D	8.784	26.481	1.283	1.324	6.126	1.295
CREW E	0.345	0.349	0.018	0.020	0.058	0.043
CREW F	3.020	6.738	0.340	0.370	0.399	0.619
TOTAL	**67.21**	**340.97**	**10.08**	**10.25**	**56.81**	**8.67**

Emissions Percentage Distribution

	CO	NOx	PM2.5	PM10	SO2	VOC
CREW A	3%	3%	3%	3%	3%	3%
CREW B	43%	44%	43%	43%	42%	41%
CREW C	35%	42%	37%	36%	43%	30%
CREW C1	2%	1%	1%	1%	0%	3%
CREW D	13%	8%	13%	13%	11%	15%
CREW E	1%	0%	0%	0%	0%	0%
CREW F	4%	2%	3%	4%	1%	7%
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

Total Annual Emissions Compared to The General Conformity (GC) Threshold (tons)

Pollutant	GC Threshold	2006	2007	2008	2009	TOTAL
CO	**NA**	7.82	41.29	17.67	0.43	67.21
NOx	**100**	34.19	**207.05**	98.77	0.95	340.97
PM2.5	**100**	1.15	6.23	2.66	0.05	10.08
PM10	**NA**	1.17	6.34	2.69	0.05	10.25
SOx	**NA**	6.07	34.76	15.92	0.06	56.81
VOC	**50**	1.04	5.33	2.21	0.09	8.67

Masonville with Seagirt materials (tons)

	CO	NOx	PM2.5	PM10	SO2	VOC
CREW A	1.855	10.032	0.274	0.278	1.674	0.245
CREW B	28.568	149.716	4.337	4.413	24.060	3.588
CREW C	14.202	86.784	2.228	2.234	14.572	1.619
CREW C1	1.420	2.751	0.141	0.153	0.060	0.248
CREW D	8.784	26.481	1.283	1.324	6.126	1.295
CREW E	0.345	0.349	0.018	0.020	0.058	0.043
CREW F	3.020	6.738	0.340	0.370	0.399	0.619
TOTAL	**58.19**	**282.85**	**8.62**	**8.79**	**46.95**	**7.66**

Emissions Percentage Distribution

	CO	NOx	PM2.5	PM10	SO2	VOC
CREW A	3%	4%	3%	3%	4%	3%
CREW B	49%	53%	50%	50%	51%	47%
CREW C	24%	31%	26%	25%	31%	21%
CREW C1	2%	1%	2%	2%	0%	3%
CREW D	15%	9%	15%	15%	13%	17%
CREW E	1%	0%	0%	0%	0%	1%
CREW F	5%	2%	4%	4%	1%	8%
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

Total Annual Emissions Compared to The General Conformity (GC) Threshold (tons)

Pollutant	GC Threshold	2006	2007	2008	2009	TOTAL
CO	NA	7.82	38.06	11.88	0.43	58.19
NOx	100	34.19	**186.24**	61.46	0.95	282.85
PM2.5	100	1.15	5.70	1.72	0.05	8.62
PM10	NA	1.17	5.81	1.75	0.05	8.79
SOx	NA	6.07	31.23	9.59	0.06	46.95
VOC	50	1.04	4.96	1.56	0.09	7.66

Activity Percentage Distribution

	2006	2007	2008	2009
CREW A	20%	80%	0%	0%
CREW B	16%	84%	0%	0%
CREW C	0%	36%	64%	0%
CREW C1	0%	0%	100%	0%
CREW D	30%	70%	0%	0%
CREW E	66%	34%	0%	0%
CREW F	0%	41%	45%	14%

NOx Emissions Reduced (tons)

2006	2007	2008	2009	TOTAL
0.00	**20.81**	**37.31**	**0.00**	**58.12**

Table 2 Regional (Masonville and Seagirt Combined)

Emissions Summary for Seagirt - Masonville Project (Seagirt to HMI Scenario) (tons)

	CO	NOx	PM2.5	PM10	SO2	VOC
CREW A	1.855	10.032	0.274	0.278	1.674	0.245
CREW B1	28.568	149.716	4.337	4.413	24.060	3.588
CREW B2	49.834	261.171	7.565	7.698	41.971	6.259
CREW C	23.215	144.904	3.690	3.696	24.430	2.634
CREW C1	1.420	2.751	0.141	0.153	0.060	0.248
CREW D	8.784	26.481	1.283	1.324	6.126	1.295
CREW E	0.345	0.349	0.018	0.020	0.058	0.043
CREW F	3.020	6.738	0.340	0.370	0.399	0.619
TOTAL	**117.04**	**602.14**	**17.65**	**17.95**	**98.78**	**14.93**

Emissions Percentage Distribution

	CO	NOx	PM2.5	PM10	SO2	VOC
CREW A	2%	2%	2%	2%	2%	2%
CREW B1	24%	25%	25%	25%	24%	24%
CREW B2	43%	43%	43%	43%	42%	42%
CREW C	20%	24%	21%	21%	25%	18%
CREW C1	1%	0%	1%	1%	0%	2%
CREW D	8%	4%	7%	7%	6%	9%
CREW E	0%	0%	0%	0%	0%	0%
CREW F	3%	1%	2%	2%	0%	4%
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

al Annual Emissions Compared to The General Conformity (GC) Threshold (to

Pollutant	C Thresho	2006	2007	2008	2009	TOTAL
CO	**NA**	7.82	91.12	17.67	0.43	**117.04**
NOx	**100**	34.19	**468.22**	98.77	0.95	**602.14**
PM2.5	**100**	2.67	13.79	2.66	0.05	**17.65**
PM10	**NA**	1.17	14.03	2.69	0.05	**17.95**
SOx	**NA**	6.07	76.73	15.92	0.06	**98.78**
VOC	**50**	1.02	11.52	2.18	0.09	**14.81**

Activity Percentage Distribution

	2006	2007	2008	2009
CREW A	20%	80%	0%	0%
CREW B1	16%	84%	0%	0%
CREW B2	0%	100%	0%	0%
CREW C	0%	36%	64%	0%
CREW C1	0%	0%	100%	0%
CREW D	30%	70%	0%	0%
CREW E	66%	34%	0%	0%
CREW F	0%	41%	45%	14%

Emissions Summary for Seagirt - Masonville Project (Seagirt to Masonville Scenario) (tons)

	CO	NOx	PM2.5	PM10	SO2	VOC
CREW A	1.855	10.032	0.274	0.278	1.674	0.245
CREW B1	28.568	149.716	4.337	4.413	24.060	3.588
CREW B2	28.568	149.716	4.337	4.413	24.060	3.588
CREW B3	8.015	51.279	1.290	1.290	8.696	0.899
CREW C	13.834	86.330	2.198	2.202	14.554	1.570
CREW C1	1.420	2.751	0.141	0.153	0.060	0.248
CREW D	8.784	26.481	1.283	1.324	6.126	1.295
CREW E	0.345	0.349	0.018	0.020	0.058	0.043
CREW F	3.020	6.738	0.340	0.370	0.399	0.619
TOTAL	**94.41**	**483.39**	**14.22**	**14.46**	**79.69**	**12.09**

Emissions Percentage Distribution

	CO	NOx	PM2.5	PM10	SO2	VOC
CREW A	2%	2%	2%	2%	2%	2%
CREW B1	30%	31%	31%	31%	30%	30%
CREW B2	30%	31%	31%	31%	30%	30%
CREW B3	8%	11%	9%	9%	11%	7%
CREW C	15%	18%	15%	15%	18%	13%
CREW C1	2%	1%	1%	1%	0%	2%
CREW D	9%	5%	9%	9%	8%	11%
CREW E	0%	0%	0%	0%	0%	0%
CREW F	3%	1%	2%	3%	1%	5%
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

Total Annual Emissions Compared to The General Conformity (GC) Threshold (

Pollutant	GC Thresh	2006	2007	2008	2009	TOTAL
CO	**NA**	7.82	80.43	5.73	0.43	94.41
NOx	**100**	34.19	**424.00**	24.25	0.95	483.39
PM2.5	**100**	1.15	12.26	0.76	0.05	14.22
PM10	**NA**	1.17	12.45	0.79	0.05	14.46
SOx	**NA**	6.07	70.20	3.36	0.06	79.69
VOC	**50**	1.04	10.10	0.86	0.09	12.09

Nox Emissions reduced (tons)

2006	2007	2008	2009	TOTAL
0.00	**44.22**	**74.53**	**0.00**	**118.75**