APPENDIX B

DESKTOP STUDY FOR TIDAL MITIGATION SITE SELECTION

CALVERT CLIFFS NUCLEAR POWER PLANT UNIT 3 PROJECT

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January 2013

TABLE OF CONTENTS

Table of Contents ii
List of Figures iii
Acronym list iii
1. Introduction 1
1.1 Project Background 1
1.2 Tidal Mitigation Site Selection Process 1
1.3 Objectives of the desktop study 2
2. Screening Criteria 3
3. Data Sources Evaluated 4
3.1 MGS – Side Scan Sonar Data 4
3.2 NOAA – Nautical Charts 4
3.3 CBP – Benthic monitoring data 5
3.4 EMAP – Monitoring Data 5
3.5 CBP – Water Quality monitoring Data 5
3.6 ORP – Site information 6
3.7 MDNR – Oyster bar and Sanctuary GIS Data 6
3.8 MDNR – Oyster Harvest Data 6
4. Evaluation of Potential Tidal Mitigation Sites 7
4.1 Initial screening 7
4.2 Comparison of potential sites to Benthic and Sediment monitoring data 8
4.2 Comparison of potential sites to Water Quality monitoring data 8
4.3 Consideration of ORP Resotration projects 9
4.4 Consideration of MDNR Oyster Harvest Data 9
5. Recommended sites for detailed investigation 10
6. Recommended Material for Placement 11
6.1 MDE Requirements for beneficial use material 11
6.2 Evaluation reuse of Onsite Dredged Material 11
6.3 Material recommended for Placement 11
7. References 12

LIST OF FIGURES

Figure 1	Location Map
Figure 2	Side Scan Sonar Study Areas
Figure 3	Monitoring Locations
Figure 4	Oyster Bars and Oyster Sanctuaries in the Lower Patuxent River and Chesapeake Bay Mainstem
Figure 5	Areas of Suitable Depth for Tidal Mitigation
Figure 6	Oyster Bars, Oyster Sanctuaries, and Side Scan Sonar Data in the Patuxent River and Chesapeake Bay Mainstem
Figure 7	Potential Mitigation Sites After Initial Screening
Figure 8	Aquaculture Enterprise Zones and Rehabilitation Areas

ATTACHMENTS

Attachment A	Comments from National Marine Fisheries Service
Attachment B	Summary of Meeting with National Marine Fisheries Service
Attachment C	Work Plan for Tidal Mitigation Planning, Calvert Cliffs Unit 3 Project
Attachment D	USACE Approval of Work Plan

ACRONYM LIST

AEZ	Aquaculture Enterprise Zone
B-IBI	Benthic Index of Biotic Integrity
CBP	Chesapeake Bay Program
CCNPP	Calvert Cliffs Nuclear Power Plant
EA	EA Engineering, Science, and Technology, Inc.
EMAP	Environmental Monitoring and Assessment Program
ENC	Electronic Nautical Charts
GIS	Geographic Information System
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MGS	Maryland Geological Service
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
ORP	Oyster Recovery Partnership
SAV	Submerged aquatic vegetation

SWH	Shallow water habitat
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UniStar	UniStar Nuclear Energy, LLC

1. INTRODUCTION

1.1 PROJECT BACKGROUND

UniStar Nuclear Energy, LLC (UniStar), on behalf of its subsidiary Calvert Cliffs 3 Nuclear Project, LLC, has proposed construction of a new nuclear power plant (Unit 3) at the project site known as the Calvert Cliffs Nuclear Power Plant (CCNPP). The site is located in the Lusby area of Calvert County, Maryland, along the shoreline of the Chesapeake Bay, about 45 miles southeast of Washington D.C. (Figure 1). Unit 3 has been proposed to provide additional energy service to meet the growing regional demand. Development of Unit 3 would include several actions within the adjacent waters of the Chesapeake Bay to support the proposed unit. These activities are: restoration of and upgrades to an existing barge slip, installation of a discharge pipe and fish return for the new Unit, and modification of the existing intake area. A joint permit application has been submitted to the U.S. Army Corps of Engineers (USACE) and Maryland Department of the Environment (MDE) that describes the proposed actions and identifies the in-water impacts of the project. The total in-water impact area is 5.7 acres. Of this, 4.5 acres is dredging for the barge slip. The remaining 1.2 acres of impact are associated with the installation of the discharge pipe and fish return and modification of the intake area.

USACE has indicated that it will require mitigation to offset impacts to 4.5 acres of dredging impact on Flag Pond Oyster Bar as a condition of the 404 permit. The National Marine Fisheries Service (NMFS) has suggested that mitigation be completed in the form of at least 4.5 acres of restoration or enhancement of benthic habitat to improve foraging habitat for fish species. NMFS has also expressed a preference that this habitat restoration occur on a degraded area of an oyster bar. NMFS' preferred mitigation for this action is the restoration of habitat within the Flag Pond Oyster Bar, which is the historic oyster bar where the project impacts will occur. However, other sites would be acceptable if mitigation at Flag Pond Oyster Bar is determined not to be viable.

1.2 TIDAL MITIGATION SITE SELECTION PROCESS

UniStar and its consultant, EA Engineering, Science, and Technology, Inc. (EA), met with NMFS in December 2010 to discuss potential mitigation sites on Flag Pond Oyster Bar and the feasibility of preliminary mitigation options suggested by NMFS during a November 2010 meeting. A copy of a comment letter sent by NMFS and a summary of the meeting with NMFS are provided as Attachments A and B. At this meeting, UniStar and NMFS developed a process for identifying and implementing a tidal mitigation project. This process will consist of the following steps:

1. Evaluation of potential mitigation sites recommended by NMFS.
2. Desktop study to identify additional suitable mitigation sites within the Chesapeake Bay or its tributaries.
3. Field studies to characterize the short list of potential mitigation sites recommended by the desktop study.
4. Preparation of a data report analyzing field studies.
5. Recommend one of the potential location options for implementation.

6. Development of an implementation plan and project design.
7. Project implementation.

The potential mitigation sites recommended by NMFS have already been evaluated and were not recommended for further evaluation as part of this coordination process (Attachment B). The methodology to identify potential tidal mitigation sites was outlined in the *Work Plan for Tidal Mitigation Planning Calvert Cliffs Unit 3* Project (Attachment C). The work plan was reviewed and approved by the U.S. Army Corps of Engineers (USACE) and Maryland Department of the Environment (MDE) (Attachment D). This report implements the first stage of the work plan.

1.3 OBJECTIVES OF THE DESKTOP STUDY

The objective of this desktop study is to identify a short list of potential tidal mitigation sites that have the characteristics identified in coordination with NMFS. These characteristics are:

1. Depth greater than 6 feet and shallower than 20 feet
2. Located on an delineated oyster bar
3. Located in an area within an oyster bar that is not currently a functioning oyster bed
4. Consist of substrate not suitable for supporting prey species

The ultimate goal of the mitigation project is to sustain a one-foot depth of sand, rock, or stone substrate to create or improve foraging/prey habitat for fish species.

2. SCREENING CRITERIA

Potential mitigation sites will have the following characteristics:

- Depth greater than 6 feet and shallower than 20 feet;
- Located on an delineated oyster bar;
- Located in an area within an oyster bar that is not currently a functioning oyster bed; and
- Consist of substrate not suitable for supporting prey species.

These characteristics were identified in coordination with NMFS at the December 2010 meeting (summary provided in Attachment B). The depth range of between 6 feet and 20 feet has been identified to avoid shallow water habitat (SWH) and potential submerged aquatic vegetation (SAV) beds while also avoiding depths that may be seasonally hypoxic/anoxic. While seasonal anoxia is not expected until a depth of 25 ft, a maximum depth of 20 ft is proposed to ensure that the site and adjacent areas are not seasonally anoxic.

NMFS has specifically requested that the mitigation occur on an oyster bar. To avoid effects to productive oyster areas, the potential site will avoid functioning oyster beds. These potential mitigation sites should also have degraded substrate, such as silts or hard packed clays.

3. DATA SOURCES EVALUATED

Existing data were compiled from a number of government and academic institutions. The data included in the analysis were:

- Maryland Geological Service (MGS) - Side Scan Sonar Data and Bottom Mapping (MGS 2008-2012)
- National Oceanic and Atmospheric Administration (NOAA) – Nautical Charts (NOAA 2011)
- Chesapeake Bay Program (CBP) – Benthic Monitoring Data (CBP 2011a and 2011b)
- U.S. Environmental Protection Agency (USEPA) – Environmental Monitoring and Assessment Program (EMAP) Data (USEPA 2011)
- CBP – Water Quality Monitoring Data (CBP 2011c)
- Oyster Recovery Partnership (ORP) – Oyster Restoration Site Information (Abel 2011)
- Maryland Department of Natural Resources (MDNR) – Oyster Bar and Sanctuary Geographic Information System (GIS) Files (MDNR 1997 and 2010)
- MDNR – Oyster Harvest Data (Marenghi 2011)

Data considered but not included in the evaluation were:

- MDNR – Substrate Mapping – The files are based on MDNR's Acoustic Bay Bottom Survey, which was conducted from 1974 to 1983 (MDNR 2003). These data were not included because they are over 28 years old and substrate has likely shifted or changed since the survey was completed.

3.1 MGS – SIDE SCAN SONAR DATA

The Maryland Geological Service (MGS) has completed side scan sonar surveys within a portion of the Patuxent River (MGS 2008-2011). There are eight areas within the Patuxent River, downstream of Battle Creek's confluence with the Patuxent River, for which side scan sonar data were available (Figure 2). Only a portion of these data have been converted from the raw side scan sonar imagery into substrate types by MGS. Those areas that were not converted from the raw side scan sonar imagery were interpreted by EA.

3.2 NOAA – NAUTICAL CHARTS

The NOAA electronic nautical charts (ENC) were obtained in GIS format from NOAA's ENC Direct to GIS software. This information is not to be used for navigational purposes, but is provided for coastal planning. The data conform to the International Hydrographic Organization Transfer Standard for Digital Hydrographic Data, Special Publication S-57, ENC Product Specification Edition 2.0. These ENC data represent current coverage of the ENCs. As they are created, new ENCs and ENC editions are made available on the first of every month (NOAA 2011).

The NOAA ENCs are a compilation of charted information and original information. NOAA compiles features including: channel limits, aids to navigation, and obstructions. Sources used to

compile ENCs include U.S. Army Corps of Engineers surveys, drawings, and permits, U.S. Coast Guard Local Notices to Mariner, National Imagery and Mapping Agency Notices to Mariners, NOAA hydrographic surveys, and the largest scale paper chart of an area (NOAA 2011).

3.3 CBP – BENTHIC MONITORING DATA

The CBP and State of Maryland have monitored benthic communities since July 1984. The program has been setup to provide information on benthic conditions throughout the Chesapeake Bay. The data available include benthic fauna composition and abundance, benthic fauna biomass determination, Chesapeake Bay Benthic Index of Biotic Integrity (B-IBI) scores, and sediment composition and characteristics. Sampling is completed biannually. This sampling is done independently from the water quality monitoring and plankton monitoring completed by CBP (CBP 2011a and 2011b).

The benthic monitoring program includes 27 fixed monitoring stations and additional random sampling locations that vary annually. Twenty-three of the existing 27 fixed monitoring sites have been sampled since the program began in 1984 and were part of the original fixed monitoring sites in the Chesapeake Bay. The original fixed monitoring sites were sampled beginning in 1984. Two additional sites were added in 1989 and the remaining two sites were added in 1995 (CBP 2011a and 2011b). Fixed monitoring stations within the lower Patuxent River are shown on Figure 3.

There are 25 random sampling locations sampled within the Patuxent River during each sampling event. The random sampling locations are selected using a random point program within geographic information system (GIS) software (CBP 2011a and 2011b). Random sampling locations within the lower Patuxent River are shown on Figure 3.

3.4 EMAP – MONITORING DATA

EMAP is a research program run by EPA that works to monitor, assess, and track national ecological resources. The EMAP program collected field data from 1990 through 2006 in order to "develop the scientific understanding for translating environmental monitoring data from multiple spatial and temporal scales into assessments of current ecological condition and forecasts of future risks to our natural resources" (USEPA 2011). EMAP monitoring sites within the project vicinity are shown on Figure 3.

3.5 CBP – WATER QUALITY MONITORING DATA

CBP provides funding for the States of Maryland and Virginia to routinely complete water quality monitoring at 49 stations in the mainstem of the Chesapeake Bay and its major tributaries. Fixed monitoring stations are shown on Figure 3. This monitoring program began in 1984 and originally consisted of monthly sampling during the late fall and winter months and bimonthly sampling during the warmer months. The frequency of sampling has changed over the life of the program and sampling is also disrupted occasionally by weather or mechanical difficulties (CBP 1993 and 2011c).

At each monitoring station, a hydrographic profile is made including water, temperature, salinity, and dissolved oxygen at approximately one- to two-meter intervals. Chemical analysis is completed on water samples collected at the water surface and bottom of the water column and up to two additional depths, depending on the existence and location of the pycnocline. Information on the tidal condition, site conditions, and weather at the time of sampling is also collected (CBP 1993 and 2011c).

3.6 ORP – SITE INFORMATION

The Oyster Recovery Partnership (ORP) provided information on existing and proposed projects within the Patuxent River, relative to the bars for which side scan sonar data were available from MGS (Abel 2011 and 2012). ORP also provided data on rehabilitation areas, availability to watermen, and other pertinent information on the bars of interest (Abel and Abel 2012).

3.7 MDNR – OYSTER BAR AND SANCTUARY GIS DATA

Oyster Bar and Sanctuary Data include boundaries of historic oyster bars, boundaries of the Yates bars (DNR 1997), and oyster sanctuaries. These bars are shown on Figure 4. Historic oyster bars were delineated using source materials from 1906 to 1977. Additional information on the historic oyster areas is available in a publication called *Maryland's Historic Oyster Bottom, A Geographic Representation of the Traditional Named Oyster Bars from Maryland* (MDNR 1997).

The oyster sanctuaries are defined in MDNR's 2010 publication *Oyster Sanctuaries of the Chesapeake Bay and Its Tidal Tributaries* (MDNR 2010). The coordinates from this document that define the boundaries oyster sanctuaries were input into GIS software for use in mitigation site selection. Oyster sanctuaries in the Patuxent are shown on Figure 4.

3.8 MDNR – OYSTER HARVEST DATA

Oyster Harvest Data by bar within the Patuxent River were obtained for the 2009-2010 and 2010-2011 harvest years from MDNR. Additional oyster harvest data by reach of the Patuxent River, but not bar specific, were obtained for the period from 1989 to the present. This information was provided by staff at MDNR (Marenghi 2011 and 2012).

Aquaculture Enterprise Zones (AEZs) for oysters were also identified. The boundaries of these areas are defined in COMAR 08.02.23.05.

4. EVALUATION OF POTENTIAL TIDAL MITIGATION SITES

4.1 INITIAL SCREENING

The process of identifying potential mitigation sites focused on Flag Pond Bar, located offshore of the Calvert Cliffs property, the Chesapeake Bay proper and oyster bars within the Patuxent River. The Patuxent River is the closest major tributary of the Chesapeake Bay to the location of impacts requiring mitigation.

First, NOAA electronic charts and the boundaries of oyster bars and oyster sanctuaries were overlain on a map of the lower Patuxent River and mainstem of the Chesapeake Bay surrounding Flag Pond bar (Figure 5). Based on this map, areas with a depth between 6 ft and 20 ft and within an oyster bar were identified. All of these areas were initially considered potential mitigation sites.

The second step of the site screening process was to evaluate these areas relative to MGS side scan sonar information and bottom mapping data. This information was available for a portion of Flag Pond Bar and for eight areas within the lower portion of the Patuxent River (Figure 6). Mr. Jay Hixson of Morgan State University, who has done extensive fisheries work in the vicinity of Calvert Cliffs, was contacted to see if he had any substrate data available from his work or from other sources. He recommended against consideration of Flag Pond Bar as a placement site because of sediment movement on the Bar. He noted that the bottom type on the bar is highly variable from year to year and that he would not expect material to stay in place on the Bar (Hixson 2011).

Based on Mr. Hixson's input regarding sediment movement on Flag Pond Bar and further discussion regarding the effects of currents and wind action on bottom stability, it was determined that exposed areas such as Flag Pond Bar and other areas in the open bay would not be appropriate mitigation sites.

Further evaluation focused on the areas in the Patuxent with side scan sonar data available (Figure 6). The two areas with side scan sonar data at the mouth of Patuxent were not evaluated, because it would be likely that any material placed at the mouth of the Patuxent would be subject to strong currents and tidal flushing and would not remain in place, similar to sediments on Flag Pond Bar.

Using the MGS data, those areas that were either (1) identified as mud or hard bottom by MGS (if data were available on specific substrate type) or (2) that were identified as mud or soft substrate based on interpretation of side scan sonar imagery, were identified as potential mitigation sites. The areas with appropriate bottom types for the potential mitigation site were overlain on a figure with the oyster bar and sanctuary boundaries and water depths. This resulted in the identification of oyster bars with potential mitigation sites (Figure 7). These oyster bars were: Peterson Bar, Jacks Bay, Jacks Bay Add 1, and Island Creek.

Of the oyster bars with areas that had suitable substrate and water depths for a substrate enhancement project, there were only four areas with an area of greater than 4.5 acres that met the mitigation site criteria. The remaining four sites under consideration are shown on Figure 7.

4.2 COMPARISON OF POTENTIAL SITES TO BENTHIC AND SEDIMENT MONITORING DATA

MDNR annual benthic monitoring data are available throughout the Patuxent River and mainstem of the Chesapeake Bay. Because no sites remain on Flag Pond Bar, no further evaluation of sites in this vicinity has been done on that bar. MDNR monitoring data and USEPA Environmental Monitoring and Assessment Program (EMAP) data sample locations within the lower portion of the Patuxent River are shown on Figure 3.

There was one potential mitigation site with a monitoring location located on the site. The monitoring location on potential mitigation site #2 Jacks Bay includes MDNR monitoring station 16215, which is a random sampling location. Sampling was completed at this station in September 2009. The B-IBI score for this location was 2, which is considered degraded and does not meet CBP's Benthic Community Restoration Goals. The substrate at this sampling station was 84 percent silts and clays.

Broader scale evaluation of the benthic communities of the Chesapeake Bay and its tributaries has been completed by the Chesapeake Bay Program. In 2007 and 2008, the lower Patuxent River achieved 21-40% of the CBP restoration goal (Hopkins 2008 and Weinburg 2009). In 2009, the lower Patuxent River achieved 0-20% of the CBP restoration goal (Weinburg 2010). In 2011, the lower Patuxent River achieved 15-25% of the CBP restoration goal (CBP 2011d). Benthic Index of Biotic Integrity (B-IBI) scores for sampling locations in the lower Patuxent River had scores of 2 or lower, signifying that the benthic communities present are severely degraded (CBP 2011e).

4.3 COMPARISON OF POTENTIAL SITES TO WATER QUALITY MONITORING DATA

Four of the five water quality monitoring locations within the reach of the Patuxent River containing potential mitigation sites are located within the main channel in the Patuxent River. These locations would not provide relevant information on dissolved oxygen concentrations because water depths are greater than within the potential mitigation sites. The remaining site is located approximately 0.5 miles from the closest potential mitigation site (Site #4). None of the data provided on water quality are close enough to specific sites to provide more than general water quality information on a reach of the Patuxent River. There are no site-specific data on dissolved oxygen data to make a determination on seasonal variations of water quality at the bottom of the water column. Dissolved oxygen levels within the lower Patuxent River achieve target goals 0-50% of time during the summer period (CBP 2011f).

4.4 CONSIDERATION OF ORP RESTORATION PROJECTS

Of the four potential tidal mitigation sites, ORP had information on the bars where two of the sites were located. ORP noted that Jacks Bay Bar was rehabilitated in 2009 and that a portion of the site also serves as the site of an AEZ and that the AEZ would not be available as a potential project site. ORP also noted that Jacks Bay Add 1 Bar has also not been used in ORP restoration activities at this time. ORP also noted that Jacks Bay Bar, which includes Site #2 and a portion of Site #1, was also the site of a 2009 rehabilitation project using shell recovered by watermen. The rehabilitation area overlaps with a portion of Sites #1 and #2.

ORP provided data on oyster rehabilitation activity on Peterson Bar, which was partially rehabilitated in 2008 and 2011. The areas rehabilitated are shown on Figure 8. In 2011, watermen reported presence of spat in the rehabilitated areas.

While ORP has no information on bottom types within Jacks Bay, Jacks Bay Add 1, and Peterson Bars, ORP did state that Jacks Bay and Peterson Bars are both open harvest bars (Abel 2011).

4.5 CONSIDERATION OF MDNR OYSTER HARVEST DATA

Both Jacks Bay and Peterson Bars are open harvest areas for oysters. There are some harvest data where the bar on which harvesting occurred is unknown and additional, older data where the identified harvest area is by reach rather than bar name. There are no bar-specific harvest data for the bars where potential mitigation sites are located.

4.6 COORDINATION WITH REGULATORY AGENCIES

During a meeting with UniStar on December 18, 2012, Mr. Naylor of MDNR stated that the presence of an AEZ or one of ORP's restoration projects should not preclude a site from selection. He also noted that the ORP restoration projects were one time projects that brought shell back to the sediment surface.

Mr. Woody Francis of USACE indicated that he had concerns about the use of Site #3 because of the navigation channel to Island Creek. Dolden Moore of the Maryland Board of Public works agreed with this assessment. The represented agencies also noted that there was an aquaculture lease in Island Creek. Mr. Francis also noted that his preference would be to see a project at Sites #2 or #4 because they are the more sheltered locations.

5. RECOMMENDED SITES FOR DETAILED INVESTIGATION

Based on our initial screening, there are no impediments to further evaluation of the portion of Site #1 located on Jacks Bay Add 1 Bar, Site #2 on Jacks Bay Bar, and Site #4 on Peterson Bar. There are potential concerns about interference with navigation and modification of existing navigation channel controlling depths at Site #3. Both Jacks Bay Bar and Peterson Bar are open harvest bars.

We recommend moving Site #2 forward for further evaluation. Site #3 is not recommended for further evaluation because of USACE concerns about development of the site. Site #1 is located adjacent to an area of shoaling near the mouth of Battle Creek and while the potential mitigation area avoids the area of shoaling, it may be in an area subject to scouring. Site #2 is located in the proximity of Site #1 and would preferred because it avoids the area of potential natural scouring.

Site #4 is actively harvested. While this site is feasible and a reasonable alternative, it may conflict with use by watermen. For this reason, Site #2 would be preferable to Site #4.

If siting of tidal mitigation projects at these sites is not feasible, UniStar may also want to consider further bottom mapping efforts on one or two other bars within the Patuxent River for which bottom data are not currently available. The small area of mapped bottom at depths suitable for project development has limited the areas available for consideration within the Patuxent River.

6. RECOMMENDED MATERIAL FOR PLACEMENT

6.1 MDE REQUIREMENTS FOR BENEFICIAL USE MATERIAL

MDE's placement criteria for beneficial use of dredged material in an unconfined manner is that not more than 10 percent of the material can pass through a 100 point sieve.

6.2 EVALUATION OF REUSE OF ONSITE DREDGED MATERIAL

Grain size results from the onsite dredged material show that 28 percent or more of the material, depending on the sample, would pass through a 100 point sieve. This material would, therefore, not meet MDE's requirements for beneficial use of dredged material.

6.3 MATERIAL RECOMMENDED FOR PLACEMENT

Because use of onsite material would not meet MDE's requirements, we recommend that UniStar purchase clean material of a grainsize where less than 10 percent of the material can pass through a 100 point sieve. Based on conversations with NMFS, a more coarse material may be preferred from a habitat perspective. A more coarse grained material would be less likely to move during tidal fluctuations.

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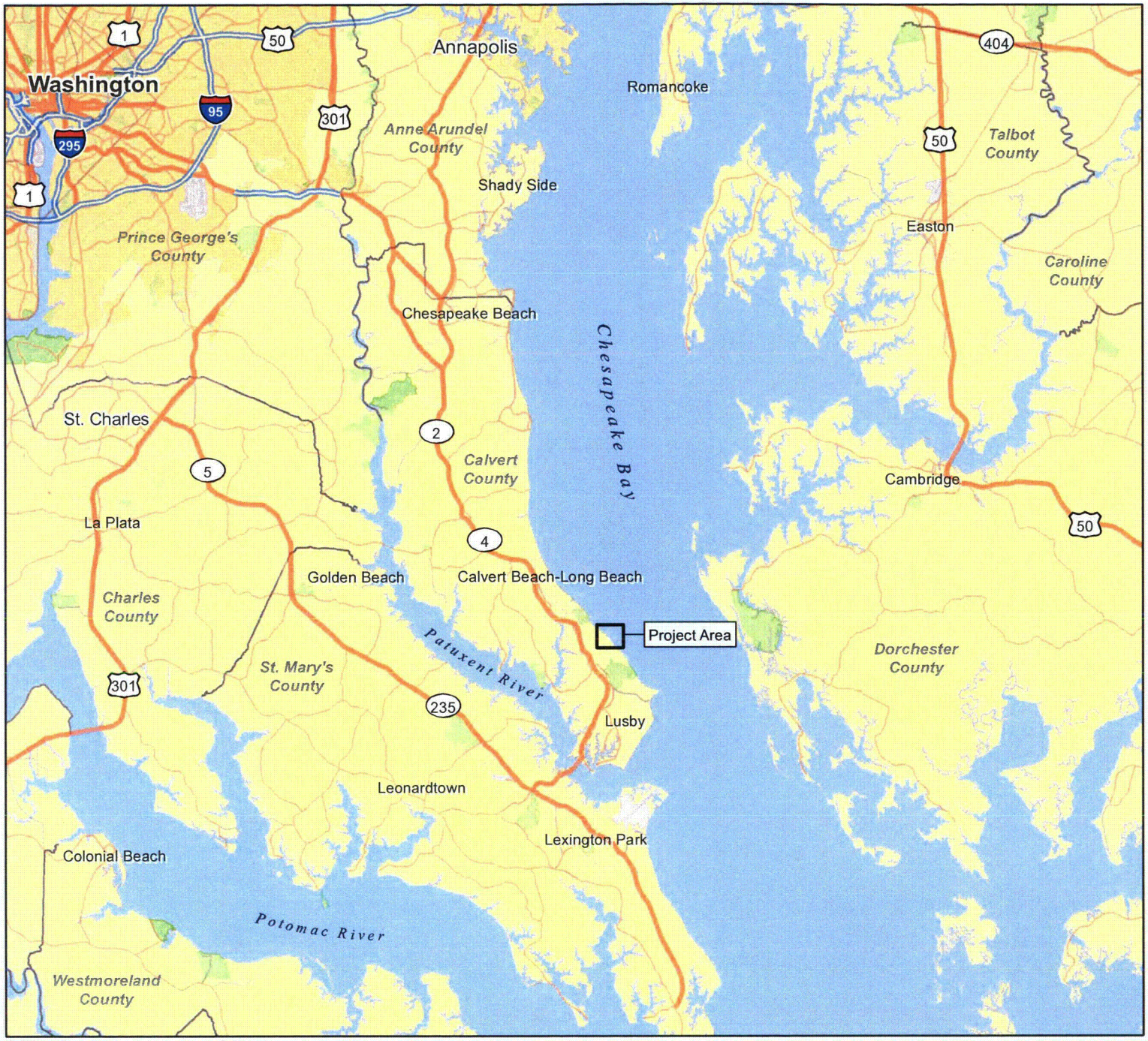
FIGURES

Figure 1
Location Map



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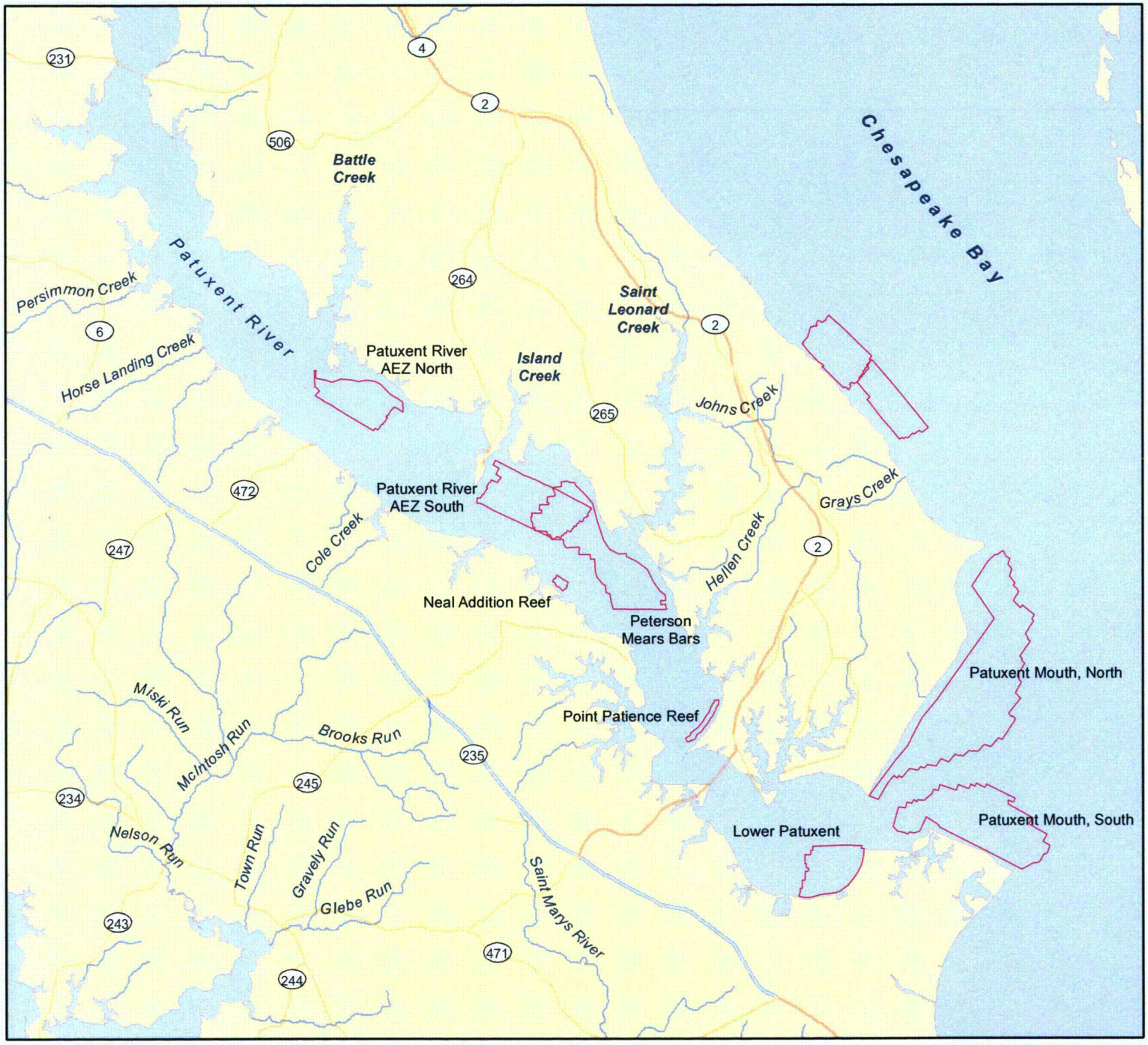

Figure 2
Side Scan Sonar Study Areas

Legend

Side Scan Sonar Study Boundaries

0 1 2 4
Miles

Sources:
ESRI, 2006
MGS, 2008-11

H:\projects\1462107\MXD\SideScanSonar

Figure 3
Monitoring Locations

Legend

MDNR Water Quality Monitoring Station

EMAP Benthic Monitoring Station

CBP Benthic Monitoring Station

NOAA Depth Data (6ft-20ft)

NOB 19-2

Oyster Bars [Includes Historic Yates Bars]

0 0.5 1 2
Miles

Sources:
CBP, 2011
Conkwright, 2008
ESRI, 2006
MDNR, 1997, 2009
NOAA, 2010
USEPA, 2011

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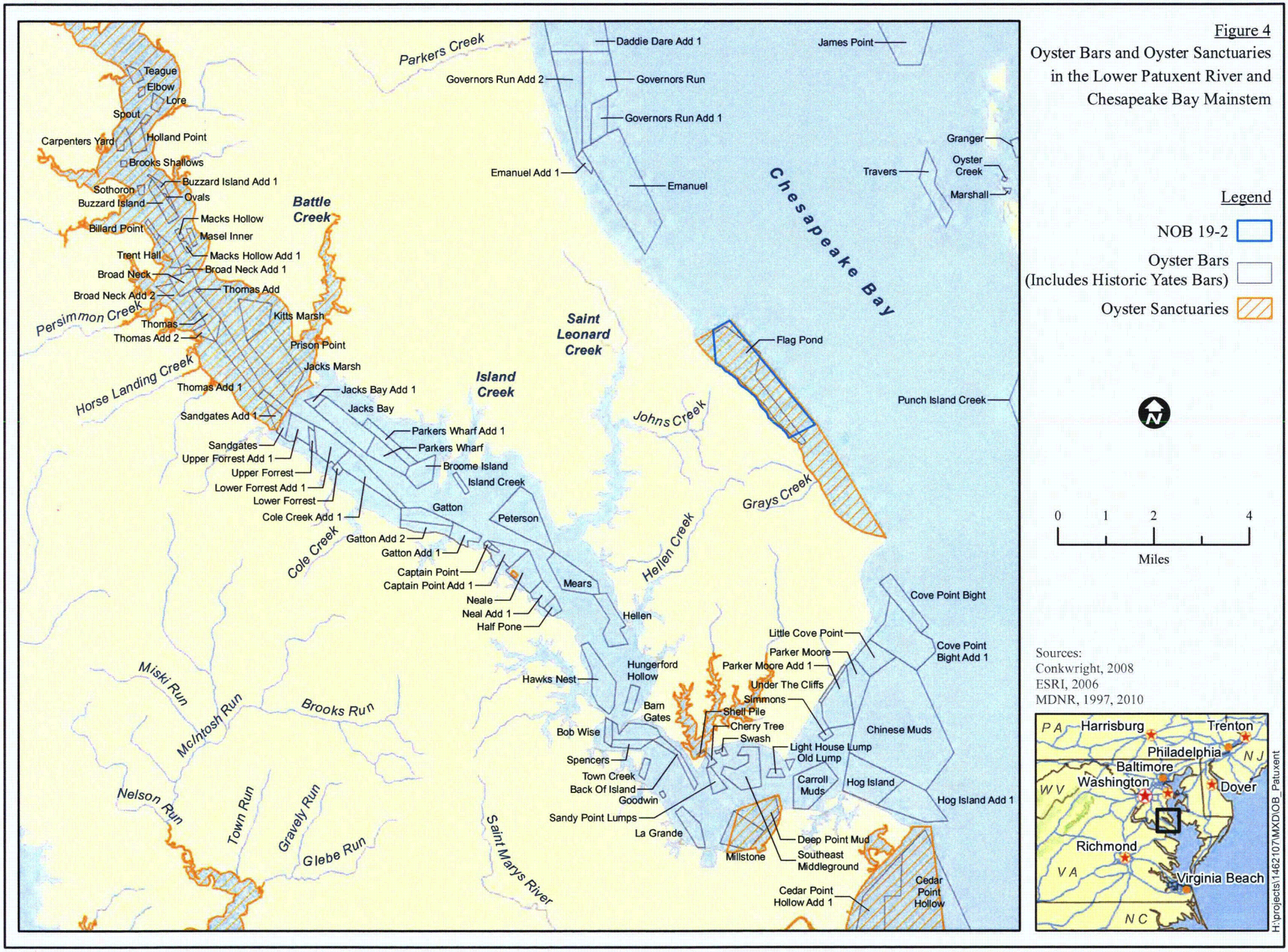

Figure 4
Oyster Bars and Oyster Sanctuaries in the Lower Patuxent River and Chesapeake Bay Mainstem

Figure 5
Area of Suitable Depth
for Tidal Mitigation

Legend

- NOAA Depth Data (6ft-20ft)
- NOB 19-2
- Oyster Bars (Includes Historic Yates Bars)
- Oyster Sanctuaries

0 1 2 4
Miles

Sources:
Conkwright, 2008
ESRI, 2006
MDNR, 1997, 2010
NOAA, 2010

Path: J:\EA\projects\1462107\MXD\Depth.mxd

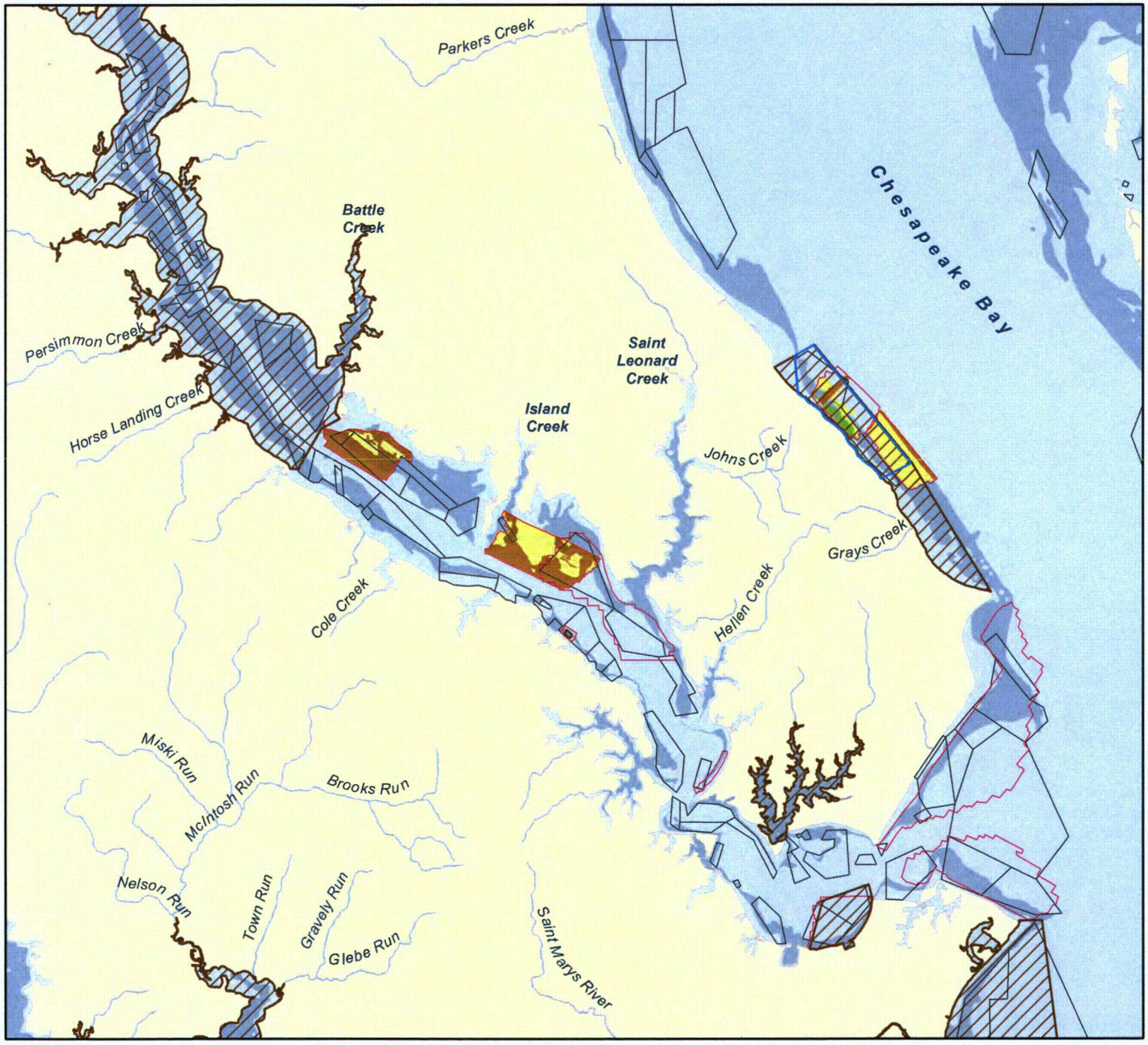

Figure 6
Oyster Bars, Oyster Sanctuaries, and Side Scan Sonar Data in the Patuxent River and Chesapeake Bay Mainstem

Legend

- NOAA Depth Data (6ft-20ft)
- NOB 19-2
- Oyster Bars (Includes Historic Yates Bars)
- Oyster Sanctuaries
- Side Scan Sonar Study Boundaries
- MGS Substrate Data
  - Mud, Mud/Shell
  - Sand, Sand/Shell
  - Shell

N

0 1 2 4
Miles

Sources:
Conkwright, 2008
ESRI, 2006
MDNR, 1997, 2010
MGS, 2008-11
NOAA, 2010

Path: J:\EA\projects\1462107\MXD\OBOS_SSS.mxd

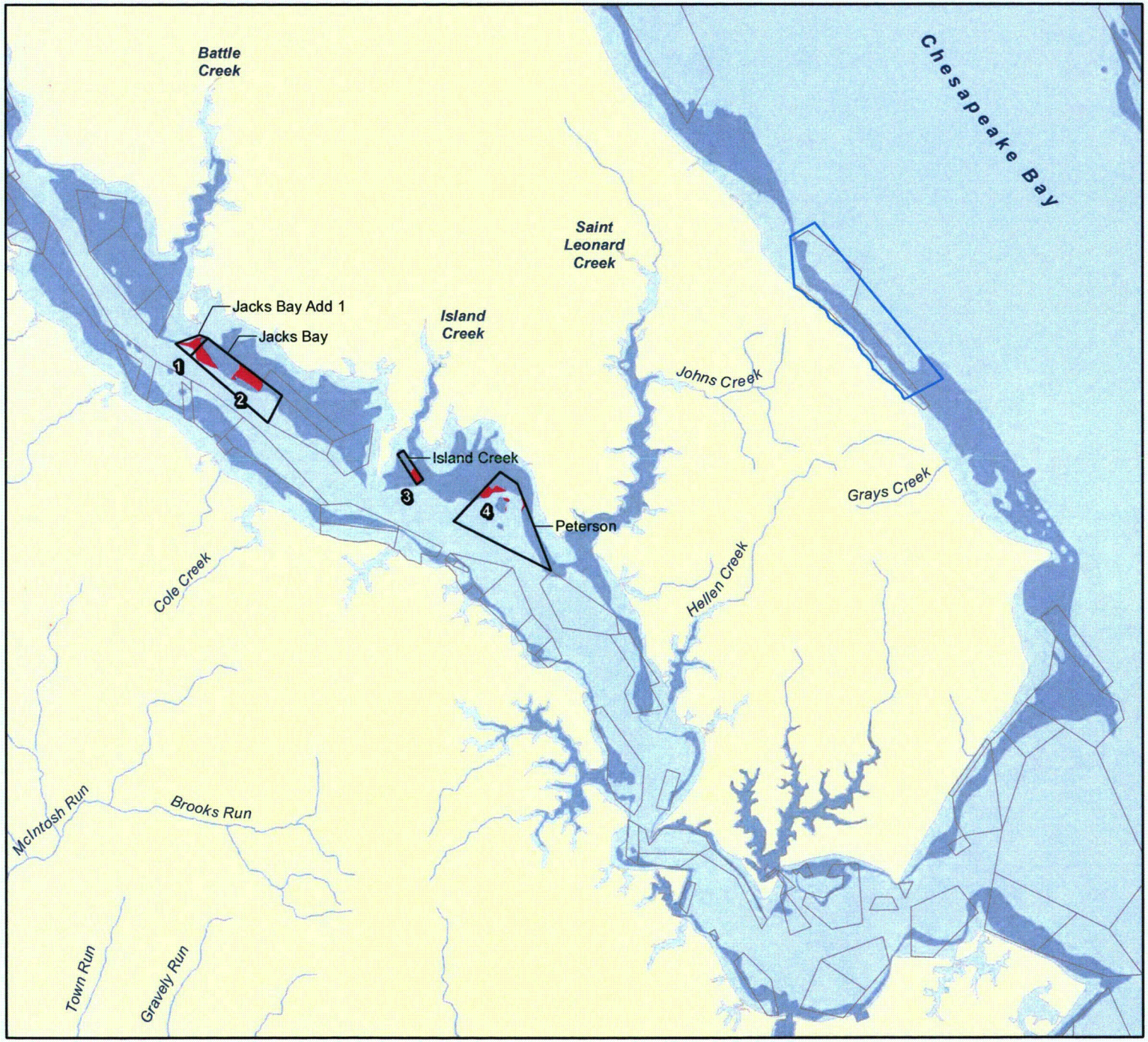

Figure 7
Potential Mitigation Sites
After Initial Screening

Legend

NOAA Depth Data (6ft-20ft)

NOB 19-2

Oyster Bars
[Includes Historic Yates Bars]

Potential Mitigation Site

0 0.5 1 2
Miles

Sources:
Conkwright, 2008
ESRI, 2006
MDNR, 1997
MGS, 2008, 2010
NOAA, 2010

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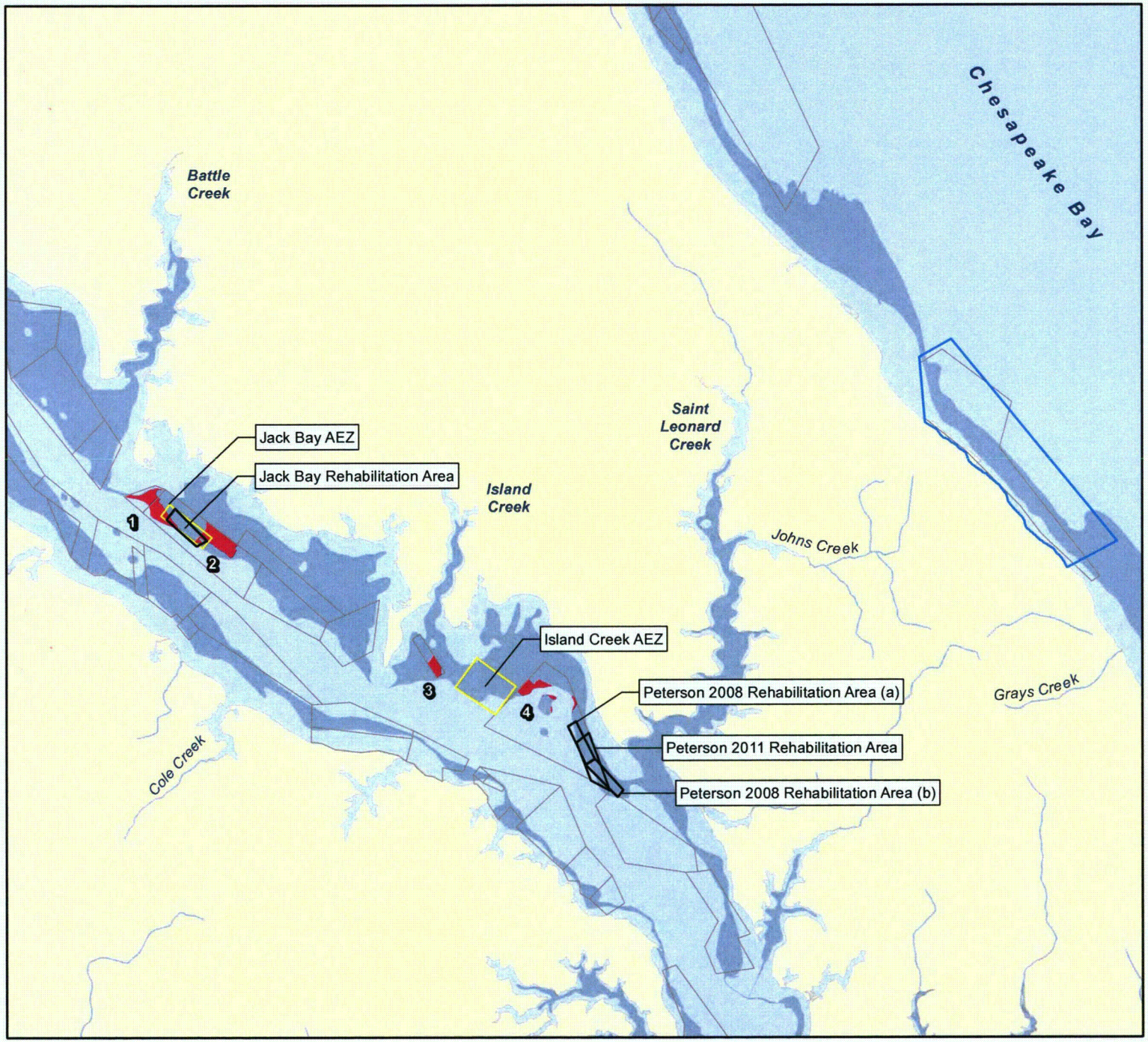

Figure 8
Aquaculture Enterprise Zones and Rehabilitation Areas

Legend

- Aquaculture Enterprise Zone
- Rehabilitation Area
- NOAA Depth Data (6ft-20ft)
- NOB 19-2
- Oyster Bars [Includes Historic Yates Bars]
- Potential Mitigation Site

N

0 0.5 1 2
Miles

Sources:
Abel, 2011
COMAR, 2011
Conkwright, 2008
ESRI, 2006
MDNR, 1997
MGS, 2010
NOAA, 2010

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ATTACHMENT A

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

Kathy Anderson
Regulatory Branch, Maryland Permits - South
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203-1715

AUG 20 2010

Attn: Woody Francis

Dear Ms. Anderson:

The National Marine Fisheries Service (NMFS) has reviewed Public Notice CENABOP-RMS 2007-08123, dated September 3, 2008; and, the draft environmental impact statement (DEIS) and essential fish habitat (EFH) assessment, dated April, 2010, for the Combined License for Calvert Cliffs Nuclear Power Plant, Unit 3. We had not responded to the public notice until now as your office had agreed to postpone processing of the permit application until completion of the NEPA document. We offer the following comments and recommendations.

The Nuclear Regulatory Commission and the Baltimore District are acting as cooperating agencies for the review of this proposal, and are participating in a joint essential fish habitat (EFH) consultation as required under the Magnuson Stevens Fishery Conservation and Management Act. We understand that the Corps of Engineers has the authority to respond to recommendations we have provided that pertain to project construction activities, such as dredging, which will be authorized under the Clean Water Act and/or Rivers and Harbors Act. This response to your agency is specifically to address our EFH conservation recommendations and our Fish & Wildlife Coordination Act recommendations on this proposal.

NMFS, in general, does not object to the proposed new unit. Locating the proposed unit at the site of the existing Constellation Generation facility will consolidate impacts to fish resources. The proposed closed loop cooling system, lower intake volumes from the Bay, and use of intake design parameters that minimize fish entrainment and impingement will maintain fish mortality rates at levels significantly lower than those from the existing plant intake.

Our outstanding issues that remain, relative to the proposed facility, pertain to compensatory mitigation requirements for tidal and non-tidal impacts. We offer the following comments and recommendations on the mitigation issue.

ESSENTIAL FISH HABITAT: NEW DREDGING OF THE ACCESS CHANNEL TO THE RESTORED BARGE UNLOADING FACILITY

The proposed lengthening of the access channel to the barge unloading facility will directly affect the substrate of Natural Oyster Bar 19-2 (Flag Pond Oyster Bar). While oyster

productivity on the Flag Pond Bar is currently low, surficial substrate within the proposed dredge area on the bar is comprised chiefly of sand, and is of oyster-producing quality.

Similar to other oyster bars in the mesohaline section of the Bay, the Flag Pond Bar supports benthic and pelagic communities important to local food webs. The sand substrate is preferred habitat for many benthic invertebrates, including mysid shrimp (*Mysis spp.*), sand shrimp (*Crangon spp.*); and, the commercially important soft clam (*Mya arenaria*). Sand bottom also provides unique and select foraging opportunities for bottom fish, and is preferred forage ground for many predatory species such as summer flounder (*Paralichthys* dentatus) and weakfish (*Cynoscion regalis*).

The proposed new dredging will permanently alter 4.5 acres of sandy bottom on the Flag Pond Oyster Bar. Deepening the dredge area to minus 16 feet, mean low water (MLW), may expose under-lying clay sediments, and will facilitate settling and accretion of fine-grain materials on the dredged channel bottom. Fine-grain substrate occurring adjacent to the previously dredged barge unloading facility likely reflects the habitat conditions that will exist in the newly dredged access channel.

The proposed dredging will permanently impact coarse-substrate benthic community, as well as forage habitat important to managed species such as summer flounder. Therefore, NMFS recommends that compensatory mitigation be required for the 4.5 acres of dredging impact on Flag Pond Bar. The compensatory action should be in–kind; and, at a 2:1 replacement ratio. NMFS recommends pursuant to Section 305(b)(4)(A) of the Magnuson-Stevens Fishery Conservation & Management Act that the Corps of Engineers adopt the following EFH conservation recommendation.

Many oyster bars in the mesohaline section of the Chesapeake Bay have areas of substrate comprised of hard-pan clay and/or compacted mud. For example, one such area is Kent Narrows Bar in Queen Anne's County, where strong tidal currents maintain a surficial substrate of hard-pan clay. Opportunities exist in on these bars for enhancement of substrate with additions of sand and gravel.

1. With assistance from the Maryland Department of Natural Resources, Unistar should identify nine acres of public oyster bar within the mesohaline section of the mid-Chesapeake Bay with compacted clay/mud bottom. The selected nine acres of bottom may be distributed over one to three different public bars, and should be checked for firmness and ability to support additions of coarse material additions prior to material placement (e.g., through poling of the substrate). Selection of bars swept by strong bottom tidal currents is preferred, to avoid excessive siltation of the new substrate.

2. The substrate of the identified nine acres should be built-up or raised in elevation through placement of clean coarse sand, pea-gravel, small cobble from an upland source, to a thickness that will facilitate natural maintenance of the modified substrate (e.g., 24-36 inches).

3. The enhancement site(s) should be monitored by Unistar over a five-year period for resilience of the modified bottom as coarse substrate. Success of the enhancement action should be gauged by it producing at least 4.5 acres of stable coarse bottom substrate by the end of the five-year monitoring period. In the event of failure to meet the 4.5-acre threshold of success, Unistar would have the post monitoring requirement to provide additional tidal compensatory mitigation at the end of the monitoring period at the discretion of the federal regulatory/resource agencies.

FISH & WILDLIFE COORDINATION ACT RECOMMENDATIONS

PROTECTION OF THE JOHNS CREEK NONTIDAL WATERSHED

With proposed displacement of headwater tributaries to Johns Creek, NMFS has been particularly concerned about adverse hydrologic impacts associated with this project throughout the Johns Creek watershed. Consequently, we are strong supporters of the proposed use of Regenerative Stormwater Management (RSM) within upper Johns Creek and its headwater tributaries, a process for transferring surface water run-off from impervious surface to the shallow ground water system which feeds downstream base-flow. RMS has been practiced in other Maryland counties, particularly Anne Arundel County, to minimize typical watershed impacts associated with deforestation and increased impervious surface. NMFS requests that our Annapolis Habitat Field Office receive updates on installation of RSM systems associated with this project, as well as monitoring results (including photographic evidence) on the success of these systems in protecting and/or enhancing the hydrologic integrity of the Johns Creek watershed.

NONTIDAL WETLAND & STREAM COMPENSATORY MITIGATION

A significant portion of the proposed mitigation for nontidal wetland and stream impacts involves eradication of *Phragmites australis*. In consideration of the resistance of this species to control measures, the proposed control actions should be employed within designated areas in perpetuity, in order to better ensure success. Permanent common reed control measures that are the responsibility of the applicant should be required as special conditions in the authorized 404 permit for this project, with monitoring reports on success required up to 5-years following initiating of the enhancement action.

If you have any questions concerning this matter, you should contact John S. Nichols of our Annapolis, Maryland, Habitat Office; (410) 267-5675; or, John.Nichols@NOAA.GOV.

Sincerely,

Peter Colosi

Peter D. Colosi, Jr.
Assistant Regional Administrator
for Habitat Conservation

ATTACHMENT B

MEETING SUMMARY

UniStar
NUCLEAR ENERGY

EA Engineering, Science, and Technology

Meeting Date: December 15, 2010

Meeting Attendees: John Nichols (NMFS), Dimitri Lutchenkov (UniStar), Jim Burkman (UniStar), Ed Miller (UniStar), Carla Logan (UniStar), Christine Papageorgis, Ph.D. (EA), Kaitlin McCormick (EA)

Subject: Tidal Wetland Mitigation; Calvert Cliffs Nuclear Power Plant Unit 3

Summary:

Mr. Miller began the meeting by laying out the meeting objectives: 1) to discuss additional information regarding the tidal mitigation option recommended by Mr. Nichols at the November Joint Evaluation Committee (JE) meeting and 2) to discuss UniStar's proposed approach to provide tidal mitigation.

NMFS is seeking 4.5 acres (1:1 mitigation ratio) of sand/coarse substrate habitat in an oyster reef area to provide forage for fish. Initially, NMFS requested 9 acres (2:1 mitigation ratio) of mitigation via letter to the U.S. Army Corps of Engineers dated 20 August 2010, but the mitigation requested was been reduced to 4.5 acres after discussions at the September and November 2010 JE meetings. At the November JE meeting, Mr. Nichols recommended consideration of two areas identified by the Maryland Geological Survey (MGS) in their 2008 survey of NOB 19-2 as not having such substrate. MGS reported some evidence of anoxic conditions from grab samples in those areas and Mr. Nichols proposed placing material and bringing the area to a depth that would not have seasonal hypoxia.

Figure 1 (attached) shows the two areas (A and B) suggested by Mr. Nichols and a depth analysis completed by EA. Ms. McCormick explained that the depth in these areas is currently less than 25 feet, which is the depth at which MGS indicated areas would not be seasonally hypoxic or anoxic (MGS 2008). Ms. McCormick further explained that site bathymetry data (EA 2006) do not indicate any channels or depressions in areas A and B.

Figure 2 (attached) presents the MGS substrate data for areas outside A and B. MGS' data do not include mapped substrate type for areas A and B. A Maryland Department of Natural Resources (MDNR) dataset for areas A and B is shown on the figure. MDNR data indicate that area B currently has suitable substrates for benthic habitat and that at least a portion of area A also has suitable substrates. These two areas do not seem to be suitable for substrate enhancement projects. In addition to habitat conditions not warranting restoration, Mr. Miller

and Ms. Logan indicated that there were some operational concerns about placement of material near the intake channel and the potential for turbidity to affect operations of Units 1 and 2 at Calvert Cliffs.

As an alternative for potential restoration sites, Ms. McCormick then presented Figure 3 (attached), which shows MDNR substrate data for the remaining area of NOB 19-2. Ms. McCormick noted that there was a large area at the northern edge of the oyster bar that has degraded habitat (mud). Mr. Nichols indicated that the area is a potential restoration opportunity, but that he would want additional information on the site. Mr. Nichols indicated that UniStar should characterize the substrate of this area to determine if it would support the required material to create viable benthic habitat.

Mr. Miller pointed out to Mr. Nichols that coordination with Maryland Department of the Environment (MDE) had indicated that the dredged material from the project would not be suitable for placement. MDE's placement criteria for beneficial use of dredged material in an unconfined manner is that not more than 10 percent of the material can pass through a 100 point sieve. UniStar provided Mr. Nichols with a copy of the grain size results, which shows that 28 percent or more of the material, depending on the sample, would pass through a 100 point sieve. Mr. Nichols noted that he had also spoken to Jonathon Stewart at MDE and noted that this project is being held to Maryland's very high standard. From NMFS perspective, a material of 70 percent sand would be allowable for this use. Mr. Nichols would like to see the dredged material used, if possible, or suitable portions used and the rest disposed of in other areas. Mr. Miller noted that at this time the disposal site for the dredged material was on Calvert Cliffs Nuclear Power Plant property at Lake Davies.

Mr. Miller asked Mr. Nichols if he would be amenable to coarser material than sand being placed, such as gravel. Mr. Nichols noted that this would be better material than sand, if the substrate in the area would support it. Mr. Miller asked if it was possible to place less than 3 feet of material, because of the high cost of material from an upland source. Mr. Nichols stated that he would be willing to allow 1 foot of placement, if coarser material, such as gravel was used, and the underlying substrate was suitable (e.g., hard pan clay). Mr. Nichols would like to see:

- More specific identification of an area, based on site investigations
- Field investigations of the specific site, including:
    - Substrate characterization
    - Bathymetry
    - If areas are near or below -20 feet mean sea level (MSL), seasonal oxygen monitoring data

Mr. Nichols indicated that he did not want to see a net loss of hard bottom with suitable benthic substrate on oyster bars. He indicated that scoured hard pan clay would be an ideal substrate to improve. He wants to make sure that substrate enhancement occurs in an area that is suitable for the enhancement and that monitoring is critical. If there is not at least one foot of material left during the monitoring period, Mr. Nichols would want material to be augmented to allow a permanent substrate change.

Ms. McCormick explained that UniStar is also willing to look at other sites on oyster bars and had mapped MDNR substrate data over oyster bars in the region, shown on Figure 4 (attached). Ms. McCormick also confirmed that Mr. Nichols would be amenable to work on an area of NOB 19-2 that did not currently have substrate mapping, if sufficient data were collected to verify the suitability of the site. He also noted that if a project was done in shallower areas (<20 ft), then seasonal oxygen studies would not be needed.

Mr. Nichols noted that his understanding is that he and the Corps of Engineers are requesting 4.5 acres of benthic mitigation, rather than the 9.0 acres originally contemplated in the 20 August 2010 NMFS letter to satisfy the tidal mitigation requirements of the project. He would want monitoring a period of 5 years, and corrective actions as needed to ensure that the site met the tidal mitigation goals.

Mr. Miller noted that UniStar's goal is to meet the requirements, but that the identification of a specific area with supporting investigations could not be completed in time to meet the current timing requirements of the Final Environmental Impact Statement (FEIS) for the project and for the Corps permit decision. He inquired as to whether or not there was a way to come to an understanding of a conceptual tidal mitigation plan and process that would allow for development of a sound detailed plan and would meet the permitting and approvals schedule. Mr. Lutchenkov further noted that resolution of tidal mitigation was the critical path for finalizing the FEIS. Mr. Lutchenkov then asked whether or not it would be possible for the permit to be worded to allow 4.5 acres of substrate enhancement to be completed with the mitigation site to be finalized, based on NMFS approval, after studies were completed. Mr. Nichols noted that there have been several cases where the permit conditions have identified a process or a project to be completed with some flexibility based on project development process, funding processes, and other needs. Mr. Miller indicated that this is what UniStar was hoping for, because it is willing to commit to a concept plan, but the time to complete the studies does not support the current FEIS schedule. He also noted that it is not in NMFS or UniStar's interest to have an unsuccessful tidal mitigation project that would require substantial corrective management or development of a new project.

Mr. Nichols agreed that a description of the mitigation concept and outline of steps to finalize the design and implement the project would satisfy the current needs of the permitting process. UniStar agreed to develop a meeting summary for Mr. Nichols' review and comment or concurrence that could be forwarded onto the Corps and other project stakeholders summarizing the next steps. Further, both Mr. Burkman and Mr. Nichols will follow up with Mr. Woody Francis of the Corps to make him aware of the discussions.

UniStar and Mr. Nichols agreed upon the following process to identify a suitable mitigation site for placing coarse substrate on mud/silt bottom or scoured hardpan clays:

1. Determine the suitability of the dredged material from the project for use in the substrate enhancement project. It must be technically feasible and cost effective to use the on-site material or material from an upland source will be used.
2. Complete substrate and bottom mapping of the proposed mitigation site

a. Complete a desktop study of available data to select one or more potential sites
b. Complete field investigations to confirm the substrate suitability to support sand/gravel/dredged material
c. Complete a bathymetric survey

3. Complete seasonal studies of dissolved oxygen to determine viability of habitat at the proposed mitigation site if a site with depths greater than 20 feet is proposed.
4. Develop a project schedule to complete the surveys and studies for site identification and mitigation project implementation.

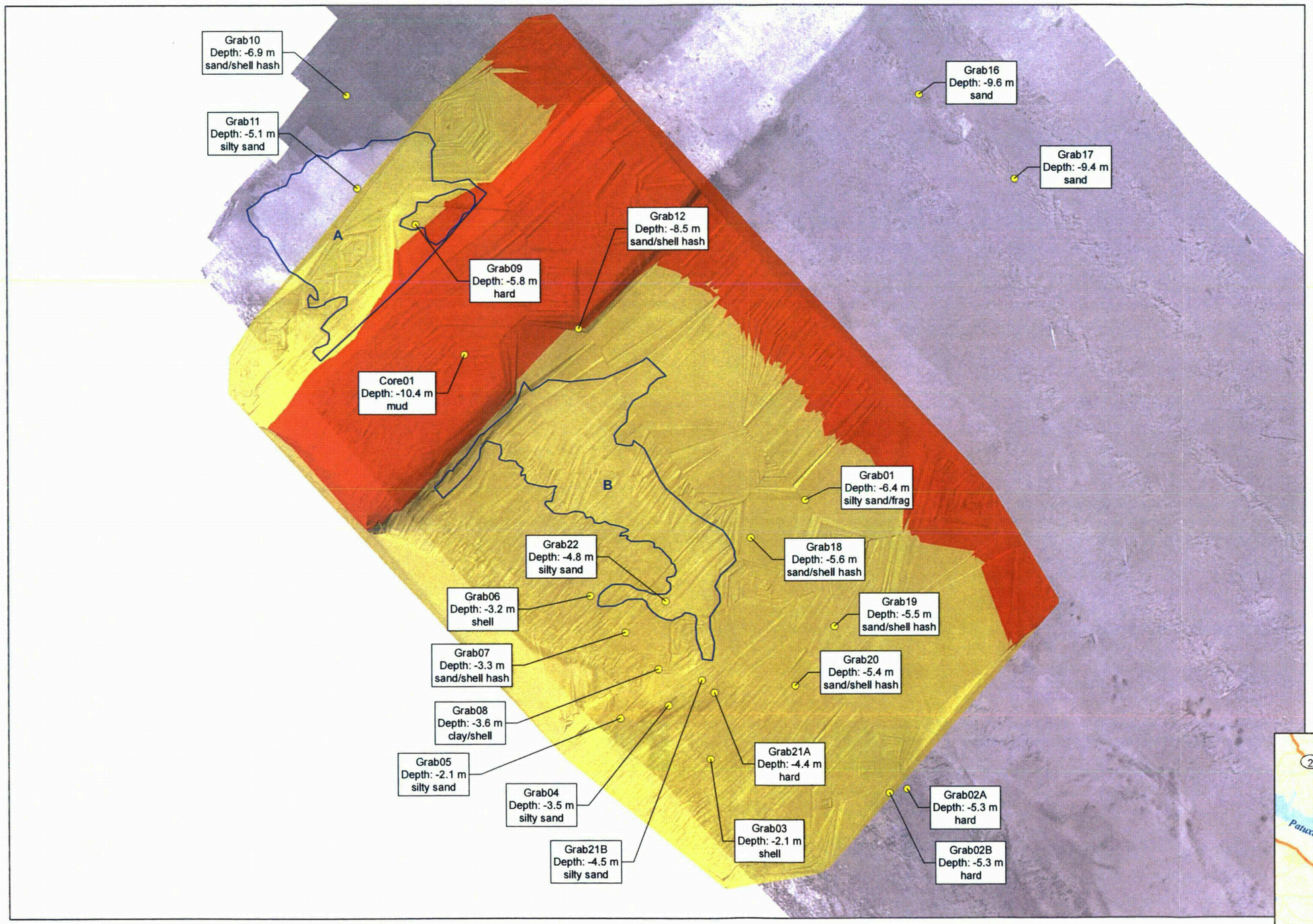
These tasks will be included in the concept plan.

Ms. McCormick asked how Mr. Nichols would want material placed. Mr. Nichols indicated that bottom dumping of the material from a scow was acceptable to him and that he did not think additional grading would be required, because the material would settle into place with the water currents.

Mr. Miller and Ms. Logan asked whether Mr. Nichols believes a silt curtain would be required during placement if coarse material, such as gravel, was placed. Mr. Nichols indicated that placement of coarse material would not necessarily require silt curtains and noted that silt curtains were not as successful in open water conditions as in more sheltered areas. However, since the action would occur on an oyster bar, silt curtains could be required especially if placement were within 500 yards of cultch. Mr. Nichols also noted that there may be time-of-year (TOY) restrictions for oysters. Mr. Nichols stated that both the winter and summer TOY periods would likely be implemented, but that a waiver could be requested from the state and Corps.

Mr. Burkman inquired as to whether or not this mitigation could potentially conflict with any submerged aquatic vegetation (SAV) habitat. Mr. Nichols indicated that the depths for oyster bars were greater than the 2 meter depths that would support SAV.

Mr. Lutchenkov requested confirmation that this approach and creation of 4.5 acres of benthic habitat (coarse substrate one foot deep) would meet NMFS requirement for tidal mitigation. Mr. Nichols indicated that this would satisfy the NMFS tidal mitigation requirement.



Legend

- Grab Samples (MGS, 2008)
- Fill Areas

Depth (EA, 2006)

- < 25 ft
- > 25 ft (max: 40.87)

Note
Area A = 12.97 Acres
Area B = 15.06 Acres

0 200 400 800
Feet

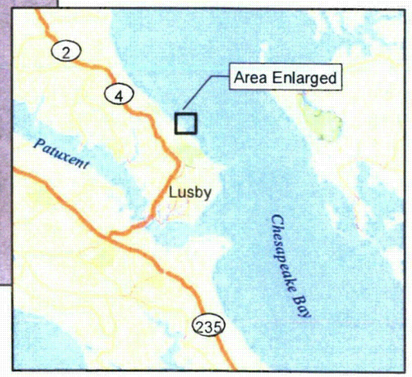


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Figure 1
Depth Analysis based on MGS 2008 Grab Samples and Side Scan Sonar and EA's 2006 Bathymetric Survey

Calvert Cliffs Nuclear Power Plant
Sediment Characterization
2010

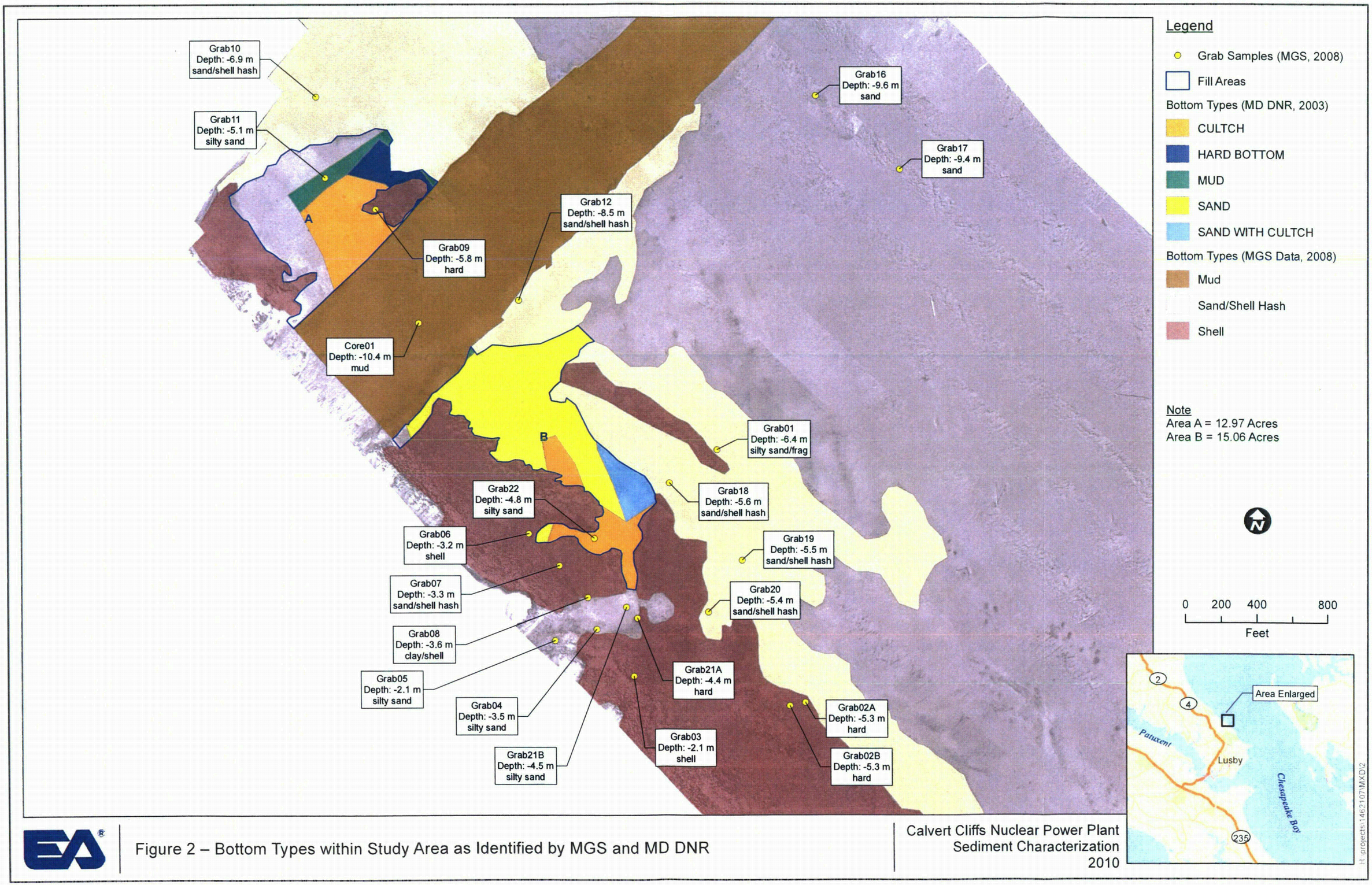

Figure 2 – Bottom Types within Study Area as Identified by MGS and MD DNR

Calvert Cliffs Nuclear Power Plant
Sediment Characterization
2010

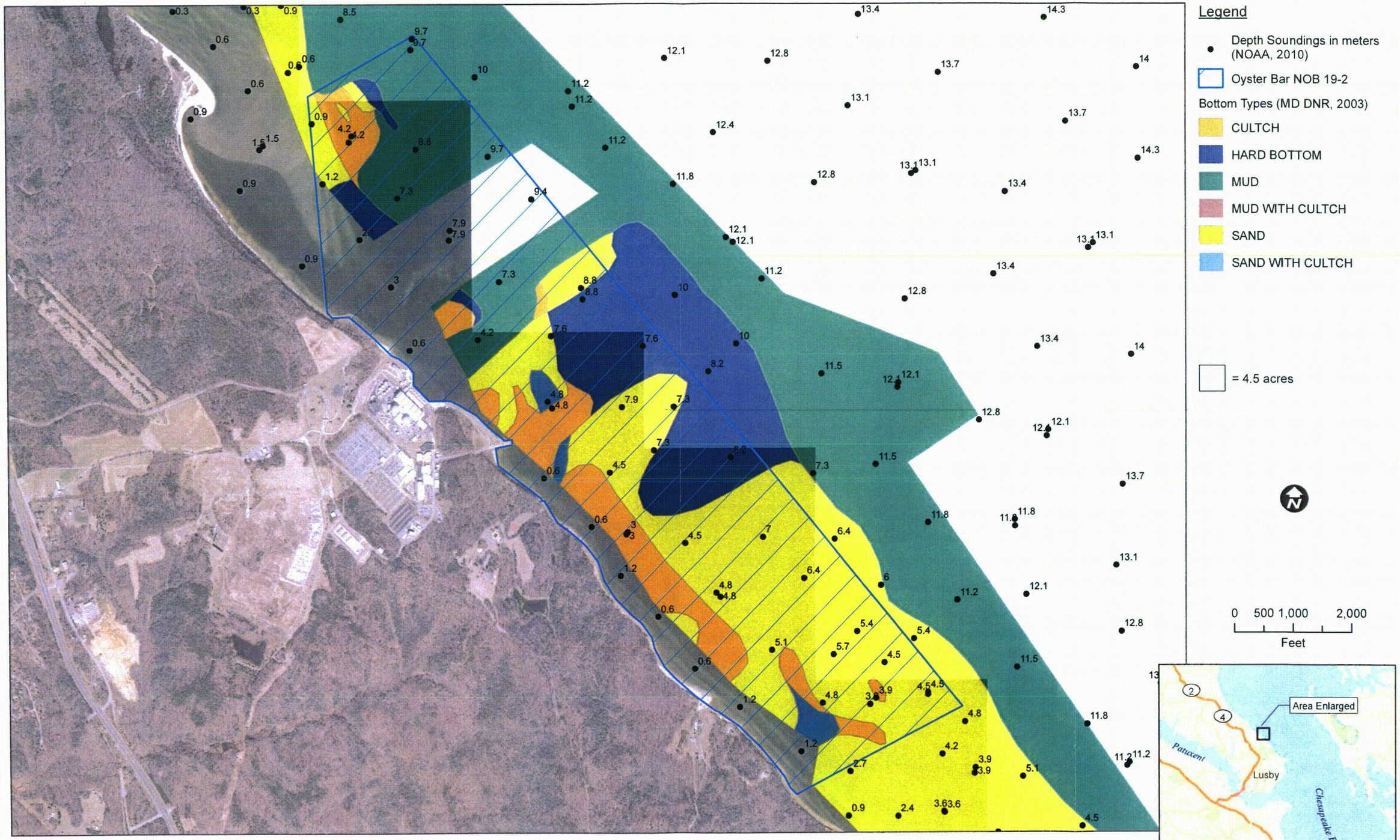

Figure 3 – Bottom Types within Oyster Bar NOB 19-2 as Identified by MD DNR

Calvert Cliffs Nuclear Power Plant
Sediment Characterization
2010

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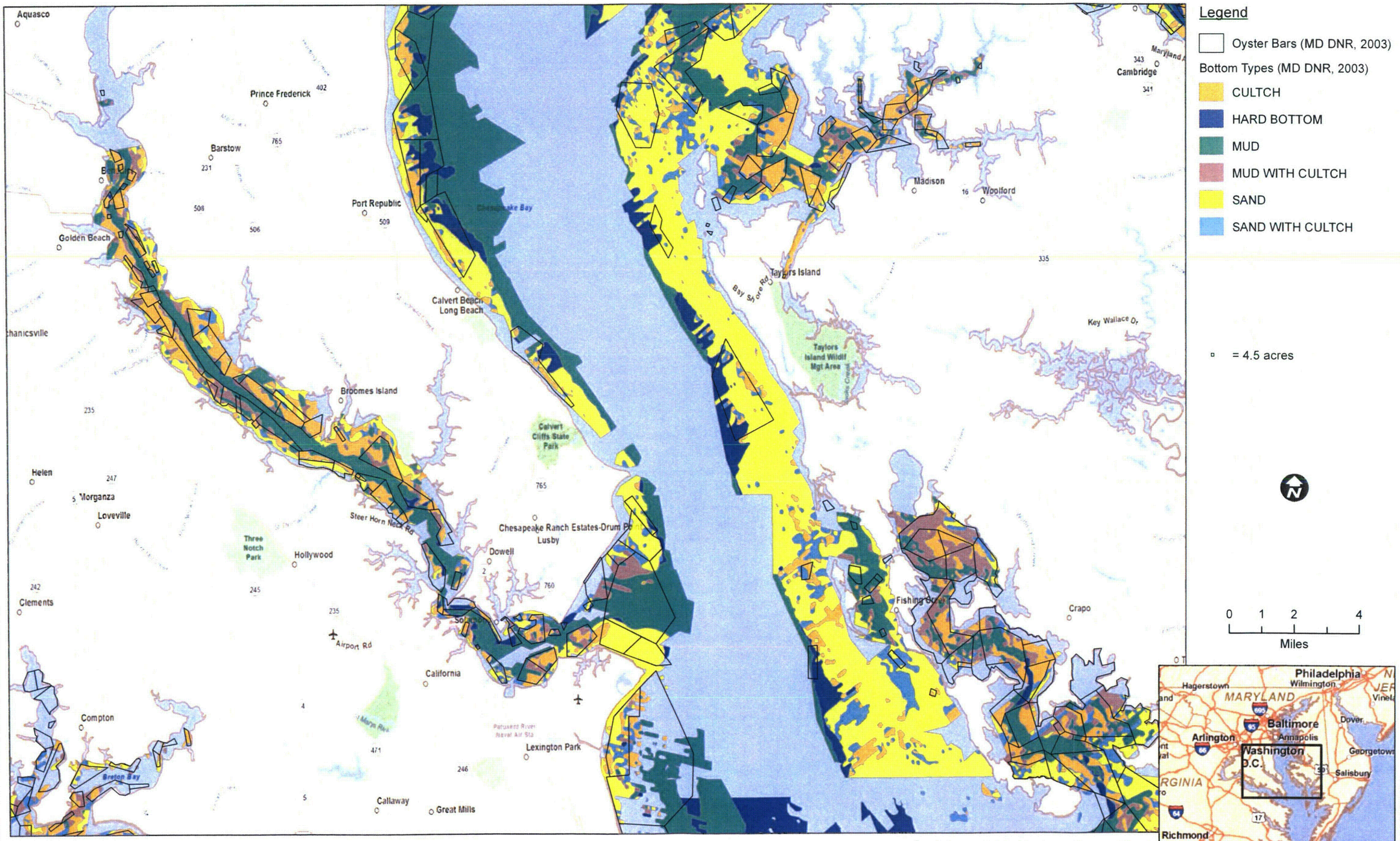

Figure 4 – Bottom Types within the Vicinity of the Patuxent River as Identified by MD DNR

Calvert Cliffs Nuclear Power Plant
Sediment Characterization
2010

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ATTACHMENT C

Work Plan

for

Tidal Mitigation Planning

Calvert Cliffs Unit 3 Project

Prepared by:

EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152

Prepared for:

Calvert Cliffs 3 Nuclear Project, LLC
750 E. Pratt Street, 14th Floor
Baltimore, Maryland, 21202

April 13, 2011

Table of Contents

1. Introduction 1
2. Evaluation of Previously Recommended Sites 1
3. Identification of Other Potential Sites 2
4. Evaluation of Identified Sites and Recommendation of Mitigation Site 2
5. Implementation 3
6. References 5

1. Introduction

UniStar Nuclear Energy, LLC (UniStar), on behalf of its subsidiary Calvert Cliffs 3 Nuclear Project, LLC, has proposed construction of a new nuclear power plant (Unit 3) at the project site known as the Calvert Cliffs Nuclear Power Plant (CCNPP). The site is located in the Lusby area of Calvert County, Maryland, along the shoreline of the Chesapeake Bay, about 45 miles southeast of Washington D.C. (Figure 1). Unit 3 has been proposed to provide additional energy service to meet the growing regional demand. Development of Unit 3 would include several actions within the adjacent waters of the Chesapeake Bay to support the proposed unit. These activities are: restoration of and upgrades to an existing barge slip, installation of a discharge pipe and fish return for the new Unit, and modification of the existing intake area. A joint permit application has been submitted to the U.S. Army Corps of Engineers (USACE) and Maryland Department of the Environment (MDE) that describes the proposed actions and identifies the in-water impacts of the project. The total in-water impact area is 5.7 acres. Of this, 4.5 acres is dredging for the barge slip. The remaining 1.2 acres of impact are associated with the installation of the discharge pipe and fish return and modification of the intake area.

USACE has indicated that it will require mitigation to offset impacts to 4.5 acres of dredging impact on Flag Pond Oyster Bar as a condition of the 404 permit. The National Marine Fisheries Service (NMFS) has suggested that mitigation be completed in the form of at least 4.5 acres of restoration or enhancement of benthic habitat to improve foraging habitat for fish species. NMFS has also expressed a preference that this habitat restoration occur on a degraded area of an oyster bar. NMFS' preferred mitigation for this action is the restoration of habitat within the Flag Pond Oyster Bar, which is the historic oyster bar where the project impacts will occur. However, other sites would be acceptable if mitigation at Flag Pond Oyster Bar is determined not to be viable.

UniStar and its contractor, EA Engineering, Science, and Technology, Inc. (EA), met with NMFS in December 2010 to discuss potential mitigation sites on Flag Pond Oyster Bar and the feasibility of preliminary mitigation options suggested by NMFS during a November 2010 meeting. At this meeting, UniStar and NMFS developed a process for identifying and implementing a tidal mitigation project. This process provides the basis for this work plan. A summary of the meeting is provided as Attachment A.

2. Evaluation of Previously Recommended Sites

The first phase of mitigation site identification is the evaluation of a mitigation option proposed by NMFS in November 2010. This option consists of two potentially anoxic sites, identified in the Maryland Geological Survey (MGS) investigation of substrate in the vicinity of CCNPP (Conkwright et al. 2008) and shown as areas A and B on Figure 1. These two areas within the MGS survey limits were identified as being potentially seasonally hypoxic/anoxic. It was hypothesized that these areas may be depressions that are at a depth prone to seasonal anoxia. NMFS staff recommended the placement of material to raise these areas to a depth that is no longer seasonally anoxic, which would improve benthic resources in the area.

Further evaluation of these sites indicated that the depth in these areas is currently less than 25 feet (Figure 1), which is the depth at which MGS indicated areas would not be seasonally hypoxic or anoxic (Conwright et al. 2008). Site bathymetry data (EA 2007) do not indicate any channels or depressions in areas A and B that might be subject to anoxic conditions. Furthermore, Maryland Department of Natural Resources substrate characterization data indicate that the habitat is not degraded in this area. Therefore, this option was determined during UniStar's December 2010 meeting with NMFS to be inappropriate for further evaluation. A further conclusion reached by UniStar and NMFS during the meeting was that it would be more appropriate to identify candidate sites where seasonal anoxia is not a concern but where the physical substrate could be improved.

3. Identification of Other Potential Sites

UniStar will identify additional suitable mitigation sites within the Chesapeake Bay or its tributaries. Potential mitigation sites will have the following characteristics:

1. Depth greater than 6 feet and shallower than 20 feet
2. Located on an delineated oyster bar
3. Located in an area within an oyster bar that is not currently a functioning oyster bed
4. Consist of substrate not suitable for supporting prey species

These characteristics were identified in coordination with NMFS at the December 2010 meeting (summary provided in Attachment A). The depth range of between 6 feet and 20 feet has been identified to avoid shallow water habitat (SWH) and potential submerged aquatic vegetation (SAV) beds while also avoiding depths that may be seasonally hypoxic/anoxic. While seasonal anoxia is not expected until a depth of 25 ft, a maximum depth of 20 ft is proposed to ensure that the site and adjacent areas are not seasonally anoxic.

NMFS has specifically requested that the mitigation occur on an oyster bar. To avoid effects to productive oyster areas, the potential site will avoid functioning oyster beds. These potential mitigation sites should also have degraded substrate, such as silts or hard packed clays. Sites on Flag Pond Oyster Bar, where the impacts will occur, will be evaluated first and then areas on other oyster bars in the region will be considered.

A short list of potential mitigation sites will be identified through this desktop study, which will evaluate existing data on fisheries, benthos, water quality, and substrate. Sources of data to be evaluated may include: University of Maryland, Morgan State University, and Maryland Geological Survey. Up to three sites will be retained for site specific field investigations.

4. Evaluation of Identified Sites and Recommendation of Mitigation Site

The next phase of site identification will be field studies to characterize the short list of potential mitigation sites recommended by the desktop study. These field studies will include a bathymetric survey, current measurements, and substrate characterization.

Bathymetric surveys will be conducted at the potential sites in accordance with specifications in the USACE Hydrographic Surveying Manual EM 1110-2-1003 (USACE 2002). Bathymetric surveys will be conducted using an Odom ES3 multibeam echosounder. Survey transects will be spaced at 50 ft intervals within a 20-acre survey area for each potential mitigation site. Upon completion of bathymetric surveying, raw depths will be corrected by subtracting local tide data to obtain bottom elevations in units of ft Mean Lower Low Water (MLLW).

Current velocity measurements will be examined using the Nortek Aquadopp® current meter. Three locations will be chosen based upon results of the desktop study. Current meters will be deployed for three weeks with current meters situated approximately 3 feet (1 meter) above the sediment surface. At the end of the deployment, the current meters will be retrieved; velocity data will be downloaded and used to evaluate site suitability.

Divers from the University of Maryland will perform transect surveys evaluating bottom types in three 20-acre areas and identify a 4 to 5 acre plot of suitable bottom within each target area. Fifty, 100 or 200 meter transect lines will be deployed through the target area, capturing GPS start and end positions, and amount of exposed shell, substrate type, penetration and oyster density will reported by divers every two meters along the transect lines. The transect survey can provide predominant bottom type within a specific plot or area and can be used to generally map the location of different bottom types. Four to six 200-meter transect assessments will be performed in each target area and two or three closer transects will be performed in the area determined to be the best 4.5 acre candidate plot.

After completion of field studies, a data report summarizing the results of the bathymetric survey, the current meter data, and the results of the bottom characterization will be prepared. The report will recommend one of the three potential location options for implementation and then outline the process for developing this mitigation option in an implementation plan. The implementation plan will not include design and logistics information, but will identify the steps needed to develop the design and logistics. The report and implementation plan will be provided to the USACE for review and approval.

5. Implementation

After a specific mitigation site is approved by USACE, UniStar will develop a mitigation design for the project in coordination with USACE. The appropriate grain size and composition of material to be used in the tidal mitigation project will be identified, based on site specific current data, bottom penetration information, and benthic habitat preferences. Potential sources of suitable material will be evaluated.

The use of onsite material from dredging at the barge unloading facility and intake channel will be considered. This material will only be used in development of the mitigation site if it is of an appropriate grain size and composition and can be used in a cost-effective manner. If onsite material cannot be used, then UniStar will identify offsite sources of material.

Design plans, including the source of material to be placed at the mitigation site, will be provided to USACE for approval. The design objective will be to provide suitable substrate one foot deep.

After an approved design is developed, then UniStar and its contractors will determine construction logistics and develop a construction and post-construction monitoring plan. The monitoring plan will be provided to USACE for review and approval.

6. References

Conkwright, Robert D., Katherine A. Offerman, and Stephen Van Ryswick. 2008. *Calvert Cliffs Acoustic Bottom Survey, August 21, 2008.* Maryland Geological Survey, Resource Assessment Service, Maryland Department of Natural Resources.

EA Engineering, Science, and Technology, Inc. 2007. *Aquatic Field Studies for UniStar Calvert Cliffs Expansion Project.*

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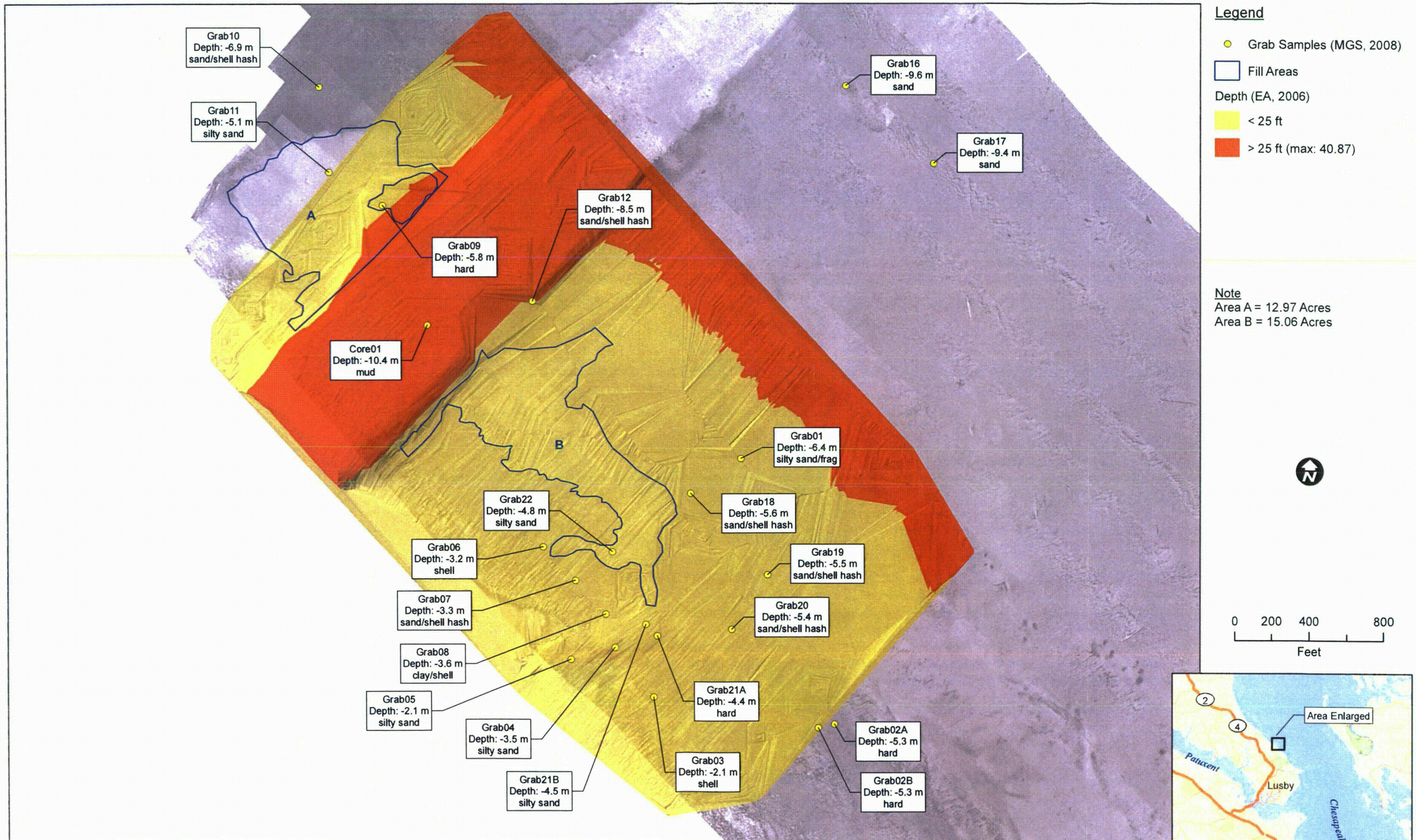


Figure 1
Depth Analysis based on MGS 2008 Grab Samples and Side Scan Sonar and EA's 2006 Bathymetric Survey

Calvert Cliffs Nuclear Power Plant
Sediment Characterization
2010

Attachment A

Meeting Summary

December 15, 2010

National Marine Fisheries Service and UniStar

MEETING SUMMARY

UniStar
NUCLEAR ENERGY

EA Engineering, Science, and Technology

Meeting Date: December 15, 2010

Meeting Attendees: John Nichols (NMFS), Dimitri Lutchenkov (UniStar), Jim Burkman (UniStar), Ed Miller (UniStar), Carla Logan (UniStar), Christine Papageorgis, Ph.D. (EA), Kaitlin McCormick (EA)

Subject: Tidal Wetland Mitigation; Calvert Cliffs Nuclear Power Plant Unit 3

Summary:

Mr. Miller began the meeting by laying out the meeting objectives: 1) to discuss additional information regarding the tidal mitigation option recommended by Mr. Nichols at the November Joint Evaluation Committee (JE) meeting and 2) to discuss UniStar's proposed approach to provide tidal mitigation.

NMFS is seeking 4.5 acres (1:1 mitigation ratio) of sand/coarse substrate habitat in an oyster reef area to provide forage for fish. Initially, NMFS requested 9 acres (2:1 mitigation ratio) of mitigation via letter to the U.S. Army Corps of Engineers dated 20 August 2010, but the mitigation requested was been reduced to 4.5 acres after discussions at the September and November 2010 JE meetings. At the November JE meeting, Mr. Nichols recommended consideration of two areas identified by the Maryland Geological Survey (MGS) in their 2008 survey of NOB 19-2 as not having such substrate. MGS reported some evidence of anoxic conditions from grab samples in those areas and Mr. Nichols proposed placing material and bringing the area to a depth that would not have seasonal hypoxia.

Figure 1 (attached) shows the two areas (A and B) suggested by Mr. Nichols and a depth analysis completed by EA. Ms. McCormick explained that the depth in these areas is currently less than 25 feet, which is the depth at which MGS indicated areas would not be seasonally hypoxic or anoxic (MGS 2008). Ms. McCormick further explained that site bathymetry data (EA 2006) do not indicate any channels or depressions in areas A and B.

Figure 2 (attached) presents the MGS substrate data for areas outside A and B. MGS' data do not include mapped substrate type for areas A and B. A Maryland Department of Natural Resources (MDNR) dataset for areas A and B is shown on the figure. MDNR data indicate that area B currently has suitable substrates for benthic habitat and that at least a portion of area A also has suitable substrates. These two areas do not seem to be suitable for substrate enhancement projects. In addition to habitat conditions not warranting restoration, Mr. Miller

and Ms. Logan indicated that there were some operational concerns about placement of material near the intake channel and the potential for turbidity to affect operations of Units 1 and 2 at Calvert Cliffs.

As an alternative for potential restoration sites, Ms. McCormick then presented Figure 3 (attached), which shows MDNR substrate data for the remaining area of NOB 19-2. Ms. McCormick noted that there was a large area at the northern edge of the oyster bar that has degraded habitat (mud). Mr. Nichols indicated that the area is a potential restoration opportunity, but that he would want additional information on the site. Mr. Nichols indicated that UniStar should characterize the substrate of this area to determine if it would support the required material to create viable benthic habitat.

Mr. Miller pointed out to Mr. Nichols that coordination with Maryland Department of the Environment (MDE) had indicated that the dredged material from the project would not be suitable for placement. MDE's placement criteria for beneficial use of dredged material in an unconfined manner is that not more than 10 percent of the material can pass through a 100 point sieve. UniStar provided Mr. Nichols with a copy of the grain size results, which shows that 28 percent or more of the material, depending on the sample, would pass through a 100 point sieve. Mr. Nichols noted that he had also spoken to Jonathon Stewart at MDE and noted that this project is being held to Maryland's very high standard. From NMFS perspective, a material of 70 percent sand would be allowable for this use. Mr. Nichols would like to see the dredged material used, if possible, or suitable portions used and the rest disposed of in other areas. Mr. Miller noted that at this time the disposal site for the dredged material was on Calvert Cliffs Nuclear Power Plant property at Lake Davies.

Mr. Miller asked Mr. Nichols if he would be amenable to coarser material than sand being placed, such as gravel. Mr. Nichols noted that this would be better material than sand, if the substrate in the area would support it. Mr. Miller asked if it was possible to place less than 3 feet of material, because of the high cost of material from an upland source. Mr. Nichols stated that he would be willing to allow 1 foot of placement, if coarser material, such as gravel was used, and the underlying substrate was suitable (e.g., hard pan clay). Mr. Nichols would like to see:

- More specific identification of an area, based on site investigations
- Field investigations of the specific site, including:
    - Substrate characterization
    - Bathymetry
    - If areas are near or below -20 feet mean sea level (MSL), seasonal oxygen monitoring data

Mr. Nichols indicated that he did not want to see a net loss of hard bottom with suitable benthic substrate on oyster bars. He indicated that scoured hard pan clay would be an ideal substrate to improve. He wants to make sure that substrate enhancement occurs in an area that is suitable for the enhancement and that monitoring is critical. If there is not at least one foot of material left during the monitoring period, Mr. Nichols would want material to be augmented to allow a permanent substrate change.

Ms. McCormick explained that UniStar is also willing to look at other sites on oyster bars and had mapped MDNR substrate data over oyster bars in the region, shown on Figure 4 (attached). Ms. McCormick also confirmed that Mr. Nichols would be amenable to work on an area of NOB 19-2 that did not currently have substrate mapping, if sufficient data were collected to verify the suitability of the site. He also noted that if a project was done in shallower areas (<20 ft), then seasonal oxygen studies would not be needed.

Mr. Nichols noted that his understanding is that he and the Corps of Engineers are requesting 4.5 acres of benthic mitigation, rather than the 9.0 acres originally contemplated in the 20 August 2010 NMFS letter to satisfy the tidal mitigation requirements of the project. He would want monitoring a period of 5 years, and corrective actions as needed to ensure that the site met the tidal mitigation goals.

Mr. Miller noted that UniStar's goal is to meet the requirements, but that the identification of a specific area with supporting investigations could not be completed in time to meet the current timing requirements of the Final Environmental Impact Statement (FEIS) for the project and for the Corps permit decision. He inquired as to whether or not there was a way to come to an understanding of a conceptual tidal mitigation plan and process that would allow for development of a sound detailed plan and would meet the permitting and approvals schedule. Mr. Lutchenkov further noted that resolution of tidal mitigation was the critical path for finalizing the FEIS. Mr. Lutchenkov then asked whether or not it would be possible for the permit to be worded to allow 4.5 acres of substrate enhancement to be completed with the mitigation site to be finalized, based on NMFS approval, after studies were completed. Mr. Nichols noted that there have been several cases where the permit conditions have identified a process or a project to be completed with some flexibility based on project development process, funding processes, and other needs. Mr. Miller indicated that this is what UniStar was hoping for, because it is willing to commit to a concept plan, but the time to complete the studies does not support the current FEIS schedule. He also noted that it is not in NMFS or UniStar's interest to have an unsuccessful tidal mitigation project that would require substantial corrective management or development of a new project.

Mr. Nichols agreed that a description of the mitigation concept and outline of steps to finalize the design and implement the project would satisfy the current needs of the permitting process. UniStar agreed to develop a meeting summary for Mr. Nichols' review and comment or concurrence that could be forwarded onto the Corps and other project stakeholders summarizing the next steps. Further, both Mr. Burkman and Mr. Nichols will follow up with Mr. Woody Francis of the Corps to make him aware of the discussions.

UniStar and Mr. Nichols agreed upon the following process to identify a suitable mitigation site for placing coarse substrate on mud/silt bottom or scoured hardpan clays:

1. Determine the suitability of the dredged material from the project for use in the substrate enhancement project. It must be technically feasible and cost effective to use the on-site material or material from an upland source will be used.
2. Complete substrate and bottom mapping of the proposed mitigation site

a. Complete a desktop study of available data to select one or more potential sites
b. Complete field investigations to confirm the substrate suitability to support sand/gravel/dredged material
c. Complete a bathymetric survey

3. Complete seasonal studies of dissolved oxygen to determine viability of habitat at the proposed mitigation site if a site with depths greater than 20 feet is proposed.
4. Develop a project schedule to complete the surveys and studies for site identification and mitigation project implementation.

These tasks will be included in the concept plan.

Ms. McCormick asked how Mr. Nichols would want material placed. Mr. Nichols indicated that bottom dumping of the material from a scow was acceptable to him and that he did not think additional grading would be required, because the material would settle into place with the water currents.

Mr. Miller and Ms. Logan asked whether Mr. Nichols believes a silt curtain would be required during placement if coarse material, such as gravel, was placed. Mr. Nichols indicated that placement of coarse material would not necessarily require silt curtains and noted that silt curtains were not as successful in open water conditions as in more sheltered areas. However, since the action would occur on an oyster bar, silt curtains could be required especially if placement were within 500 yards of cultch. Mr. Nichols also noted that there may be time-of-year (TOY) restrictions for oysters. Mr. Nichols stated that both the winter and summer TOY periods would likely be implemented, but that a waiver could be requested from the state and Corps.

Mr. Burkman inquired as to whether or not this mitigation could potentially conflict with any submerged aquatic vegetation (SAV) habitat. Mr. Nichols indicated that the depths for oyster bars were greater than the 2 meter depths that would support SAV.

Mr. Lutchenkov requested confirmation that this approach and creation of 4.5 acres of benthic habitat (coarse substrate one foot deep) would meet NMFS requirement for tidal mitigation. Mr. Nichols indicated that this would satisfy the NMFS tidal mitigation requirement.

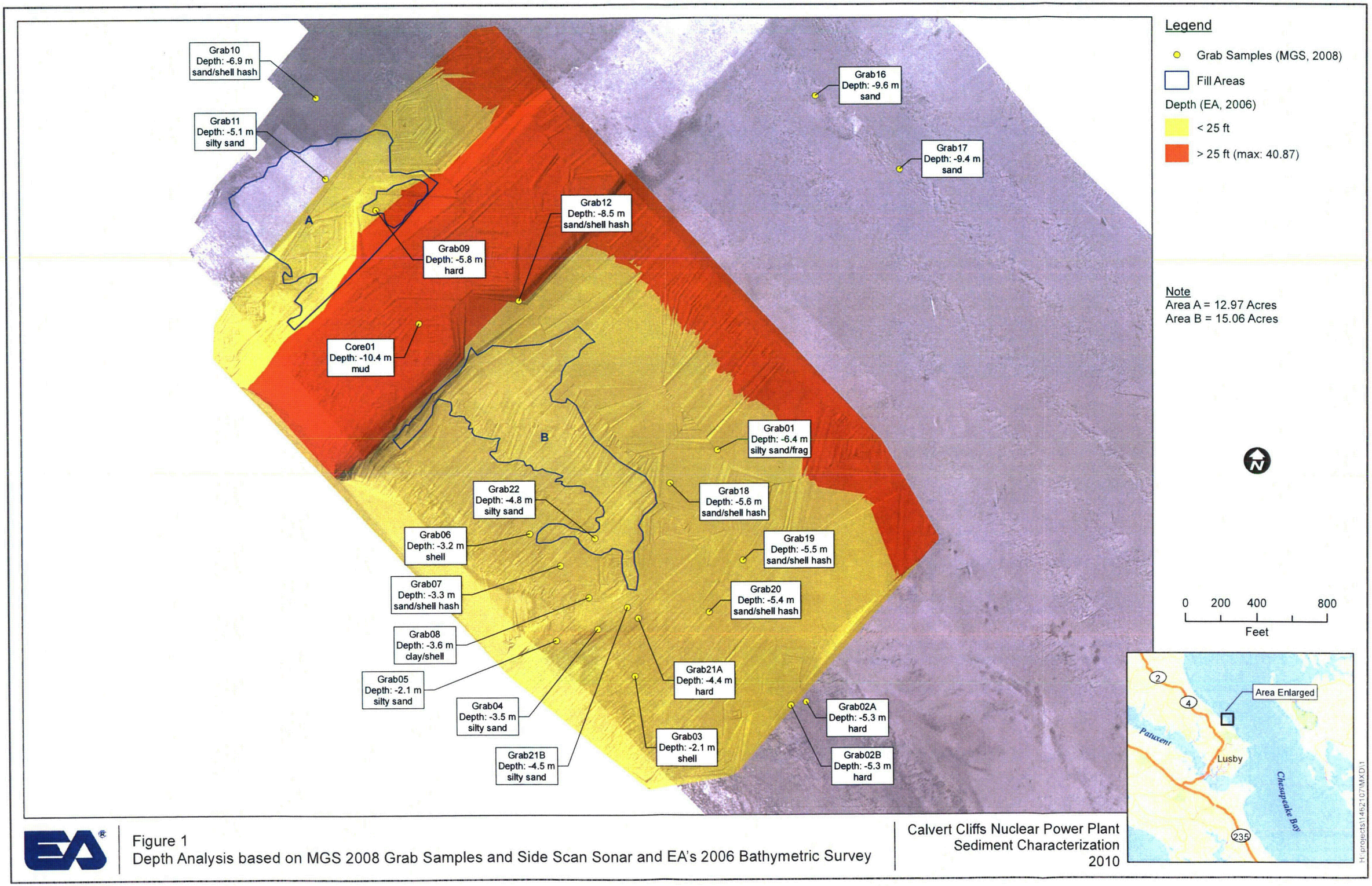
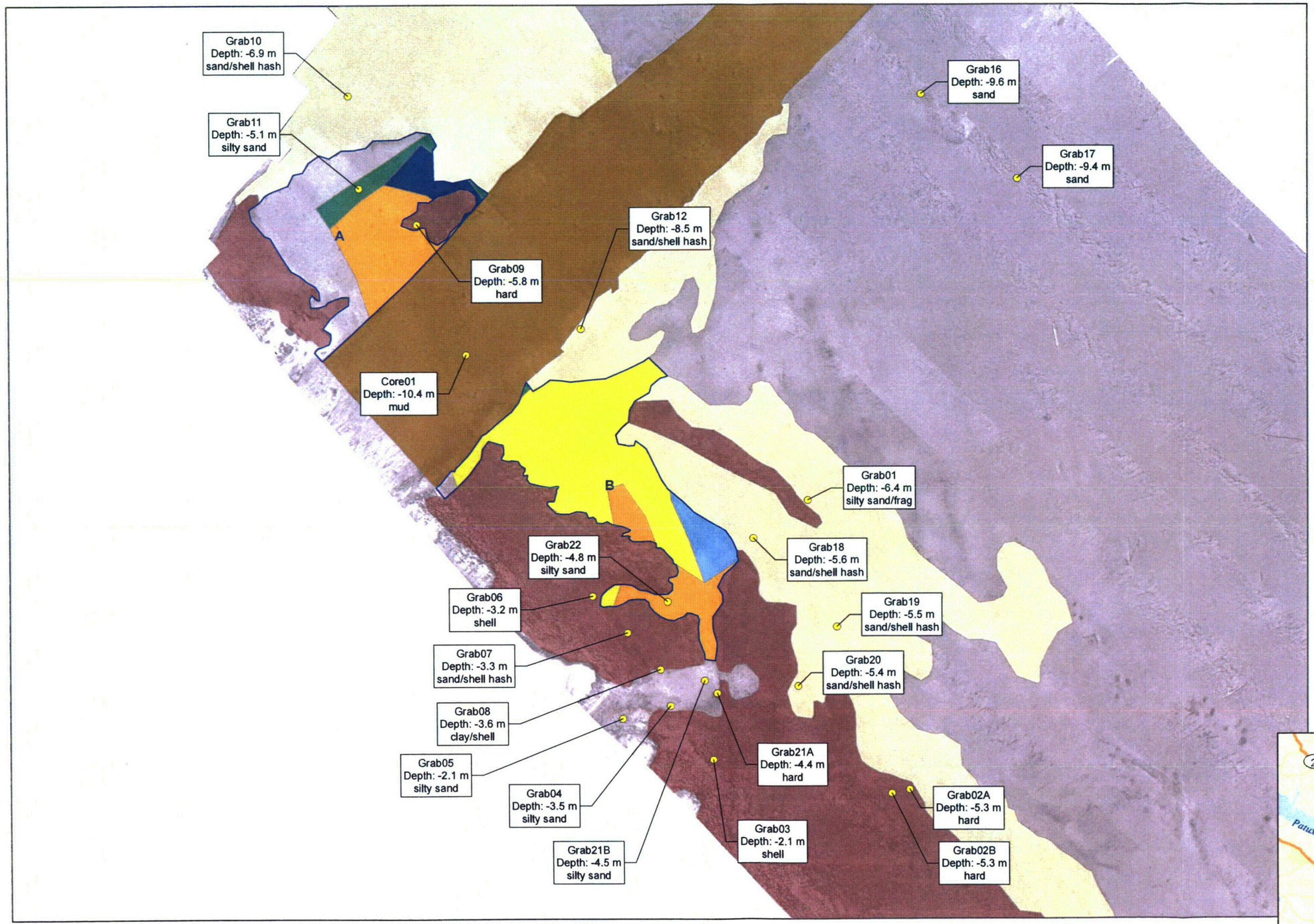


Figure 1
Depth Analysis based on MGS 2008 Grab Samples and Side Scan Sonar and EA's 2006 Bathymetric Survey

Calvert Cliffs Nuclear Power Plant
Sediment Characterization
2010



Legend

- Grab Samples (MGS, 2008)
- Fill Areas

Bottom Types (MD DNR, 2003)

- CULTCH
- HARD BOTTOM
- MUD
- SAND
- SAND WITH CULTCH

Bottom Types (MGS Data, 2008)

- Mud
- Sand/Shell Hash
- Shell

Note
Area A = 12.97 Acres
Area B = 15.06 Acres

0 200 400 800
Feet

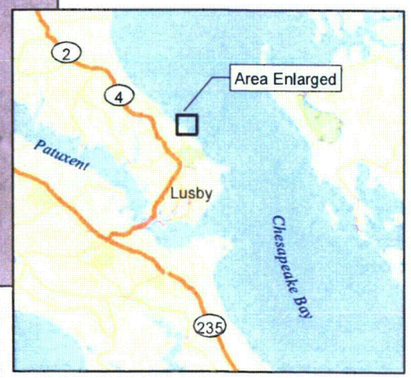


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Figure 2 – Bottom Types within Study Area as Identified by MGS and MD DNR

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2010

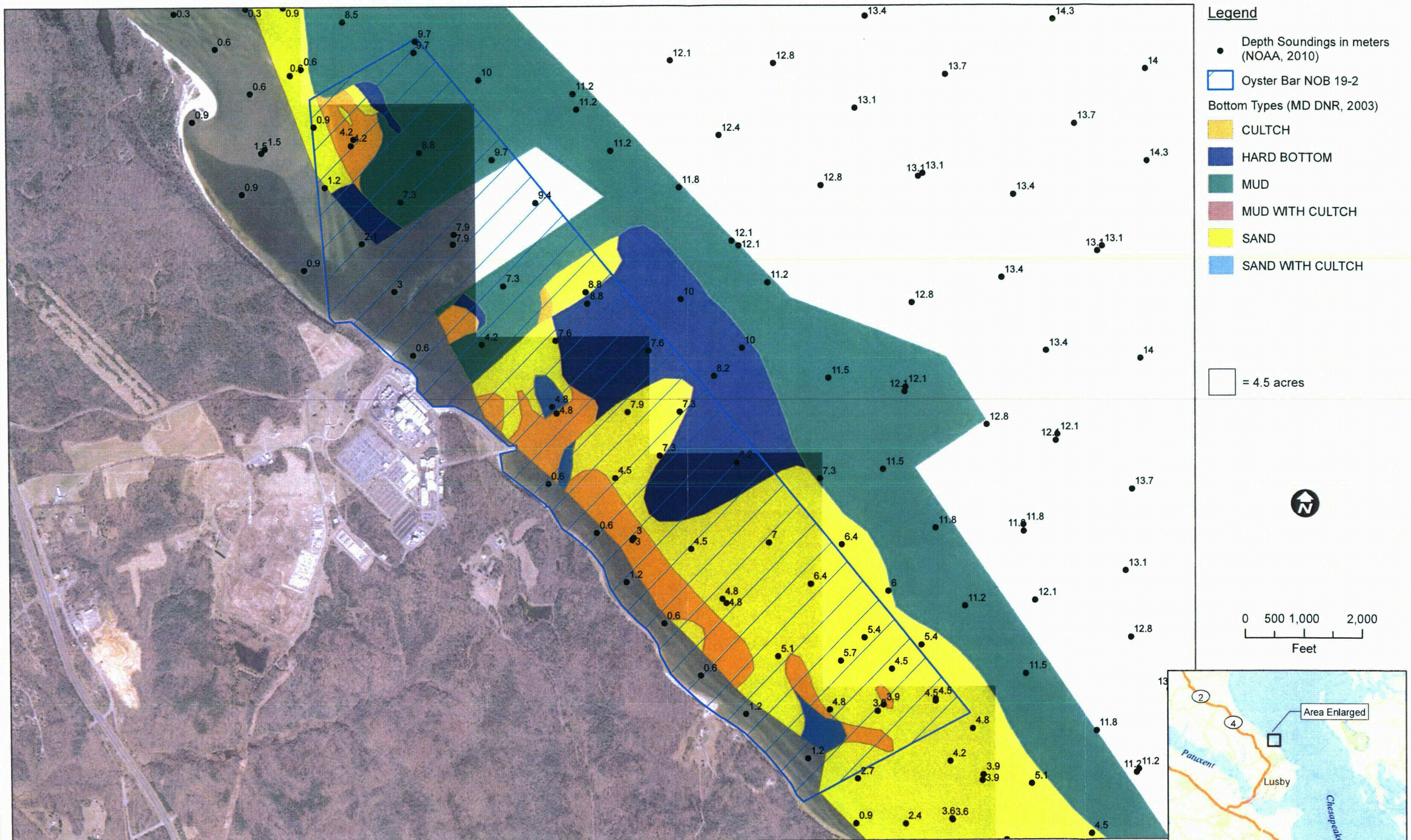

Figure 3 – Bottom Types within Oyster Bar NOB 19-2 as Identified by MD DNR

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2010

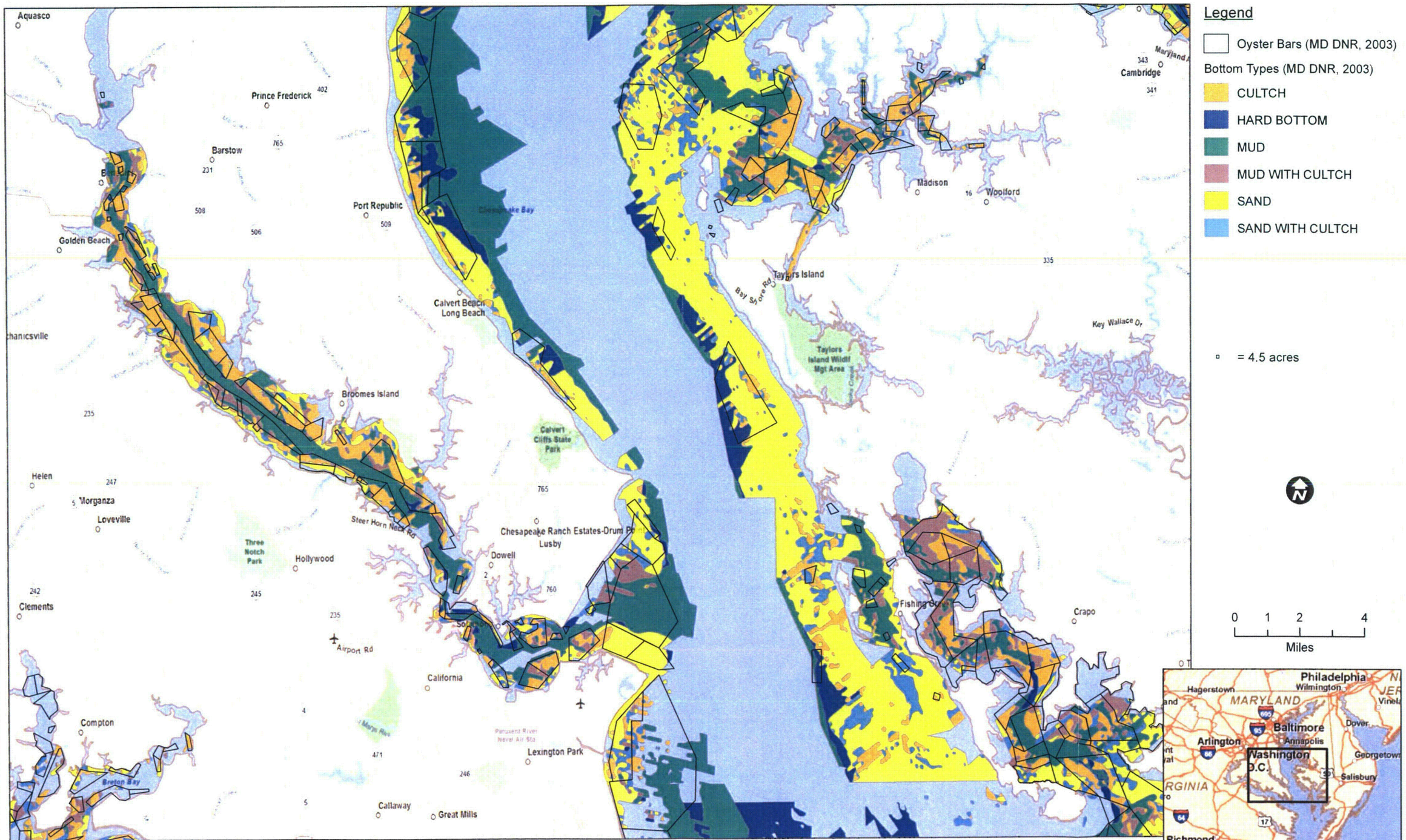

Figure 4 – Bottom Types within the Vicinity of the Patuxent River as Identified by MD DNR

Calvert Cliffs Nuclear Power Plant
Sediment Characterization
2010

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ATTACHMENT D

From: Anderson, Kathy NAB [mailto:Kathy.Anderson@usace.army.mil]
Sent: Friday, July 15, 2011 7:19 AM
To: Miller, Edward A; Lutchenkov, Dimitri
Cc: Francis, Woody NAB; Robert Tabisz
Subject: CENAB-OP-RMS (NAB-2007-08123-M01 (Calvert Cliffs 3 Nuclear Project, LLC/UniStar Nuclear Operating Services, LLC) (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Mr. Miller and Mr. Lutchenkov,

The Corps reviewed the Work Plan for Tidal Mitigation Planning Calvert Cliffs Unit 3 Project dated April 13, 2011 and we concur with its implementation.

Thank you,

Kathy B. Anderson
Chief, Maryland Section Southern
U.S. Army Corps of Engineers, Baltimore District
Operations Division, Regulatory Branch
(410) 962-5690
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Directions to office:

http://www.nab.usace.army.mil/about%20Us/directions.htm

Classification: UNCLASSIFIED

Caveats: NONE