Annex A:

Clean Water Act Section 404(b)(1) Evaluation

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ANNEX A

CLEAN WATER ACT

SECTION 404(b)(1) EVALUATION

ATLANTIC COAST OF MARYLAND STORM PROTECTION PROJECT – BORROW SOURCES FOR 2010-2044

WORCESTER COUNTY, MARYLAND

NOVEMBER 2007

The proposed project evaluated in this analysis is the dredging of sand from four offshore shoals not previously dredged for the Atlantic Coast of Maryland Project and transport of this material through Federal and state waters to several pump-out points located within several thousand feet of the Fenwick Island shoreline in the Atlantic Ocean. Impacts to the beach and nearshore of placement of nourishment sand has already been previously analyzed in the 1980 EIS, 1989 EA, and 1993 GDM EA (Section 1.6). Future beach nourishment practices utilizing sand from these new offshore sources will be similar to current practices evaluated in these previous documents. Accordingly, impacts associated with beach nourishment activities landward of the pump-out points is not reconsidered in this evaluation. Several other alternative offshore shoal borrow sites were also considered and rejected. Impacts of dredging sand from these other alternative borrow sites was evaluated in Sections 4 and 5. Impacts of dredging up to 20,000 cubic yards per year of sand from the ebb shoal and other natural accretion sites in the Ocean City Inlet vicinity under the Long-Term Sand Management (LTSM) Project for placement on Ocean City were previously evaluated in the 1998 Ocean City Water Resources Study EIS. Accordingly, impacts of dredging sand up to this volume from these inlet vicinty sites under the LTSM Project is not included in this analysis. Any potential future impacts that would result from dredging more than 20,000 cubic yards of sand from these sites for placement on Ocean City are not included in this evaluation. In the event that it is decided to dredge more than 20,000 cubic yards per year from the inlet area for Ocean City in the future, supplemental environmental studies would need to be conducted and documentation prepared.

To ensure compliance with the Clean Water Act, a review of the proposed action has been made with regard to impacts on the biological, chemical, and physical integrity of Waters of the United States. A 404(b)(1) analysis was prepared to document this review (Annex A). Dredging alone does not require consideration in a 404b1 analysis if it doesn't produce notable incidental fallback/escape of material. Although hopper or cutter-head dredging of the offshore shoals is an almost ideal situation where minimal water quality impacts would be expected (because of the very minimal fine-grained sediment content), a 404b1 analysis was conducted because the magnitude of volume to be dredged and area of bottom impacted is significant and consequently the cumulative incidental fallback/escape of material may not qualify as minimal.

I. Project Description

a. Location

The project area includes four offshore shoals on the continental shelf ranging from 7 to 14 miles offshore, and the waters of the Atlantic Ocean between the offshore shoals and Ocean City coastline to the 3-mile limit that dredges will transit (Figures 1-2 and 2-3). This area lies between about latitude 38°15' and latitude 38°27'. The project area is shown on National Ocean Service Chart No. 12211, Fenwick Island to Chincoteague Inlet. Coordinates for proposed new borrow sources are provided below (Table 1).

Table 1: Coordinates of centroid of proposed new borrow sites.

Shoal	Latitude[1]	Longitude[1]
A	38°21'23"	-74°53'51"
B (Bass Grounds; First Lump)	38°17'30.03"	-74°53'14.68"
Isle of Wight	38.394663°	-74.924211°
Weaver	38.431566°	-74.922836°

[1] NAD 1983. Cores located closest to shoal visible centroid of various MGS reports.

b. General Description

Over the period of 2010 to 2044, up to 15,000,000 cubic yards of sand will be dredged from a combination of Weaver Shoal, Isle of Wight Shoal, Shoal A, and perhaps Shoal B. Shoal B is currently an important commercial and recreational fishing ground. Dredging of Shoal B will only occur if the value of this shoal as a fishing ground substantially declines, otherwise it will not be dredged. Importance of all these shoals as fishing grounds will be periodically reassessed and details of the borrow plan for each cycle of beach nourishment will be developed in coordination with resource agencies.

c. Purpose

The purpose of the project is to provide sand to maintain the storm protection functions of the project to Ocean City. Current sand sources in state waters will be exhausted after about the year 2010.

d. General Description of Discharge Material

(1) *Characteristics of Fill Material* – No fill material will be placed at the offshore shoals. Minor discharges of material dredged from the seafloor will occur incidental to dredging. The offshore shoal borrow areas are predominantly sand with lesser amounts of gravel and trace amounts of silts and clays. Any discharges would thus consist predominantly of sand with lesser amounts of gravel, silt, and clay.

(2) *Fill materials* - Volumes of material dredged from the offshore shoals that escape during dredging are anticipated to be a minor fraction of the total volume dredged. During any given

dredging cycle, approximately 800,000 yd^3 of sand will be dredged for use for beach nourishment. Typically, 10% or less of the total volume dredged is not subsequently present on the beach following placement and immediate post-placement stabilization of the material. The loss of this material occurs in the surf zone during placement, at the pumpout point during offloading of the material from the dredge, during transport from the borrow site to the pumpout point, as well as from fallback at the dredging site. Although the fraction of loss occurring at the borrow site and during transport is not known, a maximum estimate of discharge would be about 80,000 yd^3 every four years at the borrow sites and during transport to the pumpout points.

(3) *Source of Material* - Sand for the project will be dredged from the offshore shoals presented Table 1 above. The offshore shoals are oblong in shape and are oriented southwest/northeast. Additional information on shoal volume, area, length, and width is provided in Table 2.

Table 2: Borrow site morphometrics. Excerpted from Table 2-3 of main report.

Shoal (N to S)	Distance Offshore - Centroid (mi)	Total Sand (yd3)	Base Water Depth (ft)	Area (mi2)	Base Length (mi)	Maxi-mum Width (mi)	Shoal Crest Water Depth (ft)	Relief (ft)
Weaver	7.2	93,000,000	-60	3.8	4.1	1.4	-24	36
Isle of Wight	7.2	136,000,000	-60	5.5	4.9	1.6	-18	42
A	9.6	103,000,000	-60	5.2	3.7	1.5	-32	28
B	11.0	50,000,000	-60	4.4	4.7	1.2	-27	33

e. Description of the Proposed Discharge Site

Discharge sites are locations where incidental loss of dredged material occurs during dredging on the offshore shoals (Table 1) as well as open waters of the Atlantic Ocean while the dredge is in transit between the offshore shoals and pumpout point.

f. Description of Dredging Method

Current Atlantic Coast Project practices offer a likely description of how work would be conducted for the foreseeable future. Beach nourishment for the Atlantic Coast Project generally takes place every 4 years, however work may occur more frequently as necessary to maintain storm protection functions of the Ocean City beach. It is expected that a hopper dredge or cutterhead dredge will be used to dredge sand from the offshore shoals. One or more dredges may be used at a time. If a trailer suction hopper dredge is used, sand will be dredged off the shoal and pumped into the vessel while the hopper dredge is transecting the borrow area until the hopper is full. Current Island-Class hopper dredges have an effective hopper capacity of 1,888 yd^3. Maximum thickness of material removed in a single pass by a trailer suction hopper dredge could be as much as 1.5 feet (50 cm) or more if the ship speed is slow and sand conditions suitable. However, in sand of medium density, removal of about 1 foot (30 cm) in a single pass would probably be more typical. In conditions where more compact sand occurs, as little as 2 to

4 inches (5 to 10 cm) of sand could potentially be dredged on a single pass by a trailer suction hopper dredge. The dredge(s) may make one or multiple passes over any given location in the borrow area.

The hopper dredge will then travel to a pump-out point located up to several thousand feet offshore of Fenwick Island where a barge with a booster pump will be waiting. The barge mounted booster pump will pump the sand in a slurry from the dredge to the beach through a pipeline. The slurry will daylight onto the beach or into the surf zone. The pipeline will lie on the seafloor oriented perpendicularly to the shoreline and be marked with buoys. The weight of the pipe alone will keep it on the bottom; it will not be anchored. Following pumpout, the hopper dredge will then return to the borrow area and resume dredging. To produce 800,000 cubic yards for one anticipated typical nourishment cycle, approximately 425 total round-trip transits to/from the borrow area would be required at 1,888 cubic yard vessel capacity. If a cutterhead dredge is used, sand will be pumped from the borrow area through a pipeline on the sea floor to the beach. If required, a floating booster pump would be added to the pipeline.

Bulldozers will then be used to create areas to trap and shape sand as it exits the pipeline to form the beach. Water will drain from the sand and run into the ocean. Pumping of sand will be done for a maximum distance of up to 4,000 feet north or south of where the pipeline crosses up onto the beach. Beach nourishment will be completed in sections of 8,000 feet. Once an 8,000 ft section of the project is built, the barge and booster pump would be moved to a new pump out point to continue the project. Sand will be placed on the ocean shoreline of Fenwick Island in the area between the Maryland/Delaware State Line and the northern inlet jetty to maintain beach condition according to the construction template (Figure 1-1). Following establishment of dynamic equilibrium within several months with ocean conditions, beach widths will gradually retreat until the time of the next beach nourishment cycle.

Dredging for the Atlantic Coast Project has historically occurred predominantly between the months of April and October to avoid winter sea conditions (Table 1-1 of main report); minimal to no dredging typically occurs during the months of July and August. Future dredging could potentially occur during any month of the year, but substantial winter dredging would be unlikely because of greater ocean wave energy and resultant higher risk to ships and crew as well as difficulty of operation. Dredging conducted since 1998 typically took up about 8 weeks to complete. Inclement weather or equipment problems may increase the amount of time required. Additional work delays may occur if incidental take of sea turtles is exceeded (Section 6.5.3 of main report).

II. Factual Determinations

a. Physical and Substrate Determinations

(1) *Substrate elevation and slope* - Water depths on each shoal and the adjacent seafloor are presented in Table 2. Slopes on the shoals are very gentle. Dredging may create a series of parallel furrows in the seafloor up to several feet deep, with remnant ridges left between the furrows. Following dredging, depths in the borrow area on each shoal will be increased by up to about 10 feet. The shoal crest and overall shape of the shoal will be maintained.

(2) *Sediment Type* - The sediment on the shoals to be dredged is predominantly medium to coarse sand.

(3) *Dredged/Fill Material Movement* - Following dredging, over a period of several years, partial infilling of the borrow area is expected by sand transported from adjacent areas of the shoal and any localized pits, furrows, or ridges produced by dredging wil be modified to form an ambient smooth surface.

(4) *Other Effects* - None.

(5) *Actions Taken to Minimize Impacts* - Dredging impacts to the physical character of the shoals will be minimized by dredging no more than 5% of the total shoal volume, avoiding the shoal crest, dredging a uniform thickness of material to remove no more a maximum of about 10 feet, and where suitable sand is present dredging preferentially on the up and downdrift portions of the shoals.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) *Water*

(a) Salinity - No change expected.
(b) Chemistry - No change expected.
(c) Clarity - Minor and temporary reduction expected during dredging due to turbidity. No long-term impact expected.
(d) Color - Minor and temporary change expected during dredging due to minor increase in turbidity. No long-term impact expected.
(e) Odor - No change expected.
(f) Taste - Not applicable.
(g) Dissolved Gas Levels - No change expected.
(h) Nutrients - No change expected.
(i) Eutrophication - Not expected to occur.
(j) Temperature - No change expected.

(2) *Current Patterns and Circulation*

(a) Current Patterns and Flow - Following dredging, the borrow area on the offshore shoals will have a slope comparable to the existing shoal bottom and alteration in current patterns are exected to be minor. However, wave energies that during storm conditions currently focus over shallow areas of the shoals will be reduced in areas that are deepended.
(b) Velocity - Increased depths on formerly shallow areas of the shoal will likely induce a reduction in velocity of storm-driven currents in these areas.
(c) Stratification - No change expected.
(d) Hydrologic Regime - No change expected.

(3) *Normal Water Level Fluctuations* - No change expected.

(4) *Salinity Gradients* - No change expected.

(5) *Actions That Will Be Taken to Minimize Impacts* – Dredging guidelines that minimize changes in shoal topographic condition as described previously will minimize induction of long-term changes in currents and circulation patterns.

c. Suspended Particulate/Turbidity Determinations

(1) *Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Placement Site* - Minor, localized, and short term impacts are expected to occur during dredging. Coarse grain-size of material will cause rapid settling of dredged and placed material. Turbidity levels are expected to rapidly return to background levels once dredging is completed.

(2) *Effects (degree and duration) on Chemical and Physical Properties of the Water Column*

(a) Light Penetration - Minor, temporary, and localized reduction in light penetration due to turbidity may occur during dredging on shoals. No change expected after dredging.

(b) Dissolved Oxygen - No change expected during or after dredging.

(c) Toxic Metals and Organics - No toxic metals or organics are expected to be released into the water column. No change expected after dredging.

(d) Pathogens - No pathogens are expected to be released into the water column.

(e) Aesthetics - A temporary and minor reduction in aesthetic value within the area of dredging is expected to occur during dredging activities. No change expected after dredging.

(f) Temperature - No change expected.

(3) *Actions Taken to Minimize Impacts* - Because of the rapid settling rate of sand and very minor component of silts and clays in the material to be dredged, no actions or mitigation measures are proposed to reduce particulate or turbidity impacts. If the dredge accidentally dredges too deep or in the wrong site and dredges up fines unintentionally, pumping would be rapidly shut down since these materials are incompatible with beach needs.

d. Contaminant Determinations

Environmental coordination letters and historical research indicate that no contaminant sources are located in the area which will be affected by the dredging. Clean sand will be used for beach nourishment; therefore, no significant levels of contaminants are anticipated to be released into the water column. However, the sand borrow sites have a moderate probability of containing munitions and explosives of concern (MEC). Several potential mitigation measures to prevent entrainment and or placement of MEC on the Ocean City beach are under consideration (Seciton 6.6.14). It is anticipated that while dredging a screening mechanism would be deployed on the intake of the dredging apparatus and or material may be screened during pumpout and placement to prevent these materials from reaching the Ocean City beach. Information on location of MEC may be obtained during a magnetometer survey of the ocean bottom conducted prior to dredging to locate potential historic and cultural resource sites. In the event an MEC site is located in the magnetometer survey, it would likely be avoided.

e. Aquatic Ecosystem and Organism Determinations

(1) *Effects on Plankton* - Impacts from entrainment into the dredge and because of potential turbidity during dredging are anticipated to be minor and temporary because plankton are widely dispersed throughout the study area. No detrimental long-term impacts to populations are expected.

(2) *Effects on Benthos* - Dredging of shoals will destroy sessile and relatively non-motile benthic organisms that inhabit the borrow areas. The areas impacted during each dredging cycle are anticipated to be on the order of about 500 acres. Total area impacted through the remainder of the project life to 2044 is anticipated to be on the order of about 5,000 acres. It is expected that benthos will recolonize dredged areas and benthos of the individuals of species destroyed will recolonize the disturbed areas to pre-project levels within several months to a year following dredging. Negligible and temporary impacts may occur during dredging as a result of increased turbidity.

(a) Primary Production, Photosynthesis - No impacts expected since no higher life form primary producers are present on bottom of dredging and placement areas. No change expected after dredging.

(b) Suspension/Filter Feeders - Dredging will destroy relatively non-motile suspension/filter feeders that inhabit the shoal borrow areas as described above. Additional minor, temporary, and localized impacts to suspension and filter feeders in the dredging area may occur due to turbidity created by dredging activities. Suspension and filter feeders are expected to recolonize the dredging and placement sites and recover to pre-project levels within several months to several years following project dredging. Long-lived benthic organism populations will take longer time to produce old large individuals.

(c) Sight Feeders - Minor, temporary, and localized impacts due to turbidity may occur during dredging. Nonsignificant change expected after dredging.

(3) *Effects on Nekton* - Any dredging conducted during cold weather months may entrain and destroy sluggish benthic nekton juveniles and adults. Although benthic nekton may be destroyed during cold weather months, no significant impacts to benthic nekton populations are expected because the areas proposed for dredging are not known to be exclusive areas of high concentrations of individuals of any species. During warm weather months, juvenile and adult benthic nekton should readily be able to avoid entrainment and destruction. Nekton would be able to return to borrow areas immediately following dredging.

(4) *Effects on Aquatic Food Web* - The aquatic food web is anticipated to be temporarily impacted to a minor degree by dredging activities. Destruction of benthos will temporarilly detrimentally impact the aquatic food web for a period of months to years until benthos recolonize the borrow site. Following recovery of food resources, no long-term impact to the aquatic food web is expected.

(5) *Effects on Special Aquatic Sites*

(a) Sanctuaries and Refuges - Dredging and transport of sand will not occur in close vicinity to any formal sanctuaries or refuges. In the event that its importance as a fishing

grounds declines, dredging may take place in the vicinity of fish havens on Shoal B (Bass Grounds, First Lump). While not a formal park, these artificial reefs are important recreational fishing areas and they were excluded from consideration as borrow areas to avoid detrimental impacts to fishing and to avoid damagin the dredge. In the possible event that Shoal B is dredged, no direct impacts to the fish haven areas would occur since no dredging would occur there.

(b) Wetlands - No wetlands are present in the study area. No impacts.

(c) Tidal flats - No tidal flats are present. No impacts.

(d) Vegetated Shallows - No SAV present. No impacts.

(6) *Threatened and Endangered Species* - Threatened and endangered species known to occur in project area waters are listed in Table 2-9. Among these species, coordination with National Marine Fisheries Service (NMFS) has determined that only sea turtles are of concern to be impacted by dredging or tranpsort of dredged material.

(7) *Other Wildlife* - Although seaducks and dolphin may be in project area waters during dredging, no direct impacts to individuals of these species are expected since they are highly mobile and should be able to readily avoid physical injury.

(8) *Actions to Minimize Impact* - To prevent entrainment of sea turtles in the dredge, each dredge will be equipped with a turtle excluder device operated in manner approved by NMFS the for this purpose. Observers will be utilized to ensure that the TED performs correctly. Coordination with the NMFS has indicated that with these safeguards, significant adverse impacts to sea turtles are unlikely. Dredging of Shoal B in the future will occur only if it is determined that recreational and commercial fishery activities there have substantially lessened.

f. Proposed Disposal Site Determinations

(1) *Mixing Zone Determination* - Coarse grained-sand will rapidly settle to the bottom both at the dredging site(s) and at the placement site.

(2) *Determination of Compliance with Applicable Water Quality Standards* - Dredging activities will be conducted in accordance with practices utilized in adjacent state waters. Transport of dredged material will comply with state water quality standards.

(3) *Potential Effects on Human Use Characteristic*

(a) Municipal and Private Water Supply - Not applicable.

(b) Recreational and Commercial Fisheries - Minor short-term negative impact to commercial and recreational fishery anticipated during dredging and following loss of benthos. Benthic fauna on shoals are expected to recover within several months to esveral years following dredging. No long-term impact to fisheries are expected from dredging because of large shoal fields off Maryland and compartively minor area and volume of impact.

(c) Water Related Recreation - Recreational boating is very limited in offshore Atlantic waters, accordingly no impacts are expected.

(d) Aesthetics - Sea aesthetics will be modified temporarily by the physical presence of the dredge during borrow activities.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves - Two fish havens are located on Shoal B, but no dredging will occur in these areas and no impacts are expected.

g. Determination of Cumulative Effects on the Aquatic Ecosystem - Borrow activities out to 2044 for this project will cumulatively impact about 5,000 acres of seafloor. It is anticipated however, that with the mitigation measures incorporated into the project through dredging guidelines and constraints that long-term detrimental habitat impacts will be effectively minimized.

h. Determinations of Secondary Effects on the Aquatic Ecosystem - Indirect effects resulting from the project have been discussed previously in this analysis under each category. No significant detrimental secondary effects are anticipated.

III. Finding of Compliance

a. Adaptation of the Section 404(b)(1) Guidelines to This Evaluation - No adaptations of the Guidelines were made relative to this Evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem. - The project is by its nature water-dependent and will require activity within the aquatic realm.

c. Compliance With Applicable State Water Quality Standards. - The proposed placement of fill material will be in compliance with Maryland state water quality standards.

d. Compliance With Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act. - The proposed fill material is not anticipated to violate the Toxic Effluent Standard of Section 307 of the Clean Water Act.

e. Compliance With Endangered Species Act of 1973 - The project will not significantly detrimentally impact any endangered species or its critical habitat, and is therefore in compliance with the Endangered Species Act of 1973. To avoid detrimental impacts the needs of endangered species, mitigation measures will be utilized dredging to minimize the risk of entraining and destroying sea turtles. These measures include outfitting dredges with sea-turtle deflectors, conducting dredging operations in a manner to minimize risk of sea turtle entrainment, crew training, and the use of NMFS-approved observers. These protective measures are stipulated in a November 2006 Biological Opinion (BO) prepared for the study by NMFS (Annex E). NMFS issued a species-specific incidental take statement for fresh dead sea turtles (takes) as a function of volume of sand dredged (Table 6-3 of main report) that exempts destruction of one Kemp's ridley sea turtle for every 10 loggerheads over the project life. The take statement exempts from 1 to 4 sea turtle takes per dredging cycle as a function of volume

dredged per cycle. In the event this take is exceeded, the Corps would re-open consultation with NMFS to determine how to proceed.

f. Compliance With Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972 - No Marine Sanctuaries, as designated in the Marine Protection, Research, and Sanctuaries Act of 1972, are located within the study area.

g. Evaluation of Extent of Degradation of Waters of the United States - The proposed dredging will result in significant adverse impacts to benthic invertebrates at each site, although not to regional populations. However, fill associated with the project would not. The proposed project would not have signficanct adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish and shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and wildlife will not be significantly adversely affected. Significant adverse impacts on aquatic ecosystem diversity, productivity and stability, and recreation, aesthetics and economic values will not occur as a result of the project.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem - Appropriate steps will be taken to minimize potential adverse impacts of placing the fill material in the aquatic system. Proposed dredging guidelines and constraints were developed to minimize long-term adverse aquatic impacts, and best management practices will be utilized during dredging to minimize adverse environmental impacts.

i. On the basis of the guidelines, the proposed discharge site for the material is specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.