

APPENDIX S NEW DREDGING PROJECTS

- * Please make sure that answers to all of the questions in this appendix correspond to the information on the application drawings.
- * See Joint Application Form Reference Guide - "How to Calculate Square Feet, Cubic Feet and Cubic Yards."

1. CLASSIFICATION OF CREEK TO BE DREDGED

How is the creek classified according to the State dredging program's classification system? Is it open to dredging, open to dredging but requiring further study, or restricted due to environmental sensitivity? See example "Classification System" on page 54 of this application. For further explanation, refer to Section 2.0 of the "Goals and Objectives - Creek Evaluation Dredging Criteria" dated April, 1986.

Step One: If the creek to be dredged is "restricted", an application cannot be accepted.

Step Two: If the creek is "open" to dredging, the applicable parts of this application must be completed.

Step Three: If the creek is "open" to dredging but requiring further analysis, submit information request as part of procedure outlined on page 4 and further explained in Section 2.4 of the Dredging Study.

Dredging would take place within the existing Delaware River Philadelphia to the Sea Federal navigation channel. The existing Delaware River Philadelphia to the Sea Federal navigation channel is open to dredging.

2. SITE LOCATION OF DREDGING PROJECT

Locate the project site with respect to the county, creek, tributary (enclose 8 1/2" x 11" map).

Refer to Figure 2-1 in the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment.

3. DESCRIPTION OF DREDGING PROJECT

Describe the proposed project including the equipment to be used, quantity of material to be dredged, extent of the area to be dredged, place and method of disposal, etc. Detail is important.

Refer to Sections 2.4, 2.5 and 2.6 in the enclosed April 2009 Delaware River

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Main Stem and Channel Deepening Project Environmental Assessment. The proposed construction schedule is attached to this appendix. While the order of contracts will be dependent on funding, the time of year that dredging occurs will remain the same as that shown on the attached schedule to conform with Delaware River Basin Fish and Wildlife Management Cooperative recommended dredging restrictions for protection of fishery resources in the Delaware River and Bay.

4. PURPOSE OF PROPOSED DREDGING PROJECT

Define the purpose and need of the proposed dredging project. Who will benefit?

Refer to Section 2.9 in the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment.

Submit color photos of site and bordering upland with explanation of the views shown (prints only).

Color photos of traffic movements (oil tanker and barge) that use the existing 40-foot Delaware River Navigation Channel; confined upland disposal areas (Reedy Point North and South, Killcohook, Artificial Island); the Kelly Island wetland restoration site and Broadkill Beach are attached.

5. How often will maintenance dredging be required?

The required maintenance dredging of the 45-foot channel will increase by 862,000 cubic yards per year (cy/yr) from the current 3,455,000 average cy/yr for the 40-foot channel for a total of 4,317,000 cy/yr. Areas more shallow than 45 feet will be dredged.

ENVIRONMENTAL CONSIDERATIONS OF THE DREDGING PROJECT

*** A sediment analysis must be performed in accordance with the attached sampling plan.**

6. CHARACTERIZE THE SUBSTRATE TO BE DREDGED

A. What is the chemical composition of the material to be dredged? Does the substrate contain organic or inorganic pollutants in relation to known clean bay sediments of similar composition?

A review of sediment quality concerns associated with the Delaware River Philadelphia to the Sea navigation channel was provided in Section 4 of the 1997 Final Supplemental Environmental Impact Statement (enclosed on CD). That information is incorporated here by reference. The review included bulk sediment analyses, elutriate sediment analyses, Toxicity Characteristic Leaching Procedure (TCLP) analyses, biological effects based sediment testing, and high resolution PCB congener analyses. Additional data collected since 1997 is provided in Section 4.1.4 of the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment. Technical reports pertaining to sediment contaminants are enclosed on CD.

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- B. What is the physical composition of the substrate? State percent of sand, gravel, mud, silt. Does it contain shell fragments?

The following is the physical composition of the material to be dredged in the river and bay portion of the project by Station in the State of Delaware.

Delaware River Portion of Project

1. Station 127+000 to Station 210+000, the material is 100% silt.
2. Station 210+000 to 226+000, the material is 100% sand.
3. Station 226+000 to 249+000, the material is 94% sand and 6% silt.
4. Station 270+000 to 300+000, the material is 100% silt.
5. Station 300+000 to 325+000, the material is 80% sand and 20% silt.
6. There is no dredging from 325+000 to 350+000.

All of the material from the above dredged areas (Station 127+000 to Station 350+000) will be placed in confined upland disposal facilities.

Delaware Bay Portion of Project

In the Delaware Bay portion of the project, between Stations 350+000 and 571+000, material to be dredged will be used for beneficial uses to construct the Kelly Island wetland restoration and for beach nourishment at Broadkill Beach.

1. Station 350+000 to Station 511+000, substrate to be dredged contains in excess of 95% sandy materials.
2. In one area between Station 360+000 and 381+000, there is approximately 240,000 cubic yards of fine-grained substrate. This material will be disposed of within the Kelly Island wetland restoration.

There are no measurable quantities of shells in the material. Refer to Figure 2-1 in the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment for Station locations.

7. CHARACTERIZE THE UNDERLYING SUBSTRATE TO BE EXPOSED BY THE PROJECT

Is the underlying substrate (material at proposed dredging depth) of similar physical composition and chemical quality as material to be dredged? X Yes
 No

8. Project the expected turbidity levels and area of effect (extent of plume) based on the percent of silt, sand, and gravel in the dredged material.

The U.S. Army Corps of Engineers' Improvement of Operations and Maintenance Techniques Research Program has documented suspended sediment concentrations from cutterhead and hopper dredges without overflow to be in the range of 25-250 mg/L within 100 feet of the point of excavation. These turbidity levels are expected to occur within these limits during dredging for the deepening project. WETLANDS

9. CHARACTERIZE THE BIOLOGICAL COMMUNITY

- A. Is the area used as a nursery/spawning area for shellfish and/or finfish?**

Appendix B of the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment provides a 2009 Essential Fish Habitat Evaluation for the project which has been coordinated with the National Marine Fisheries Service.

- B. What are the major benthic (bottom dwelling) species found at the area to be dredged?**

The major benthic species within the work area and potential impacts as a result of the project are discussed in Sections 3.3.3 and 4.2.3, respectively of the April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment.

- C. Is there submerged aquatic vegetation present at or near the project site?**

No

10. CHARACTERIZE THE EXISTING WATER QUALITY

- A. Determine the classification of the stream according to state water quality criteria. Will the dredging project cause violations of the water quality criteria? Will designated water uses be affected?**

Refer to Sections 4.1.3.1 and 4.1.3.2 of the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment for discussions of potential water quality impacts at the point of dredging and at confined disposal facilities, respectively. Designated water uses will not be affected as a result of project construction.

- B. Determine levels of dissolved oxygen (D.O.) in and around the project area. Measure D.O. at the water/substrate interface during worst case conditions (i.e. summer morning).**

According to the December 2008 Delaware River Basin Commission (DRBC) State of the Delaware River Basin Report, the status of dissolved oxygen (DO) in the Delaware River Basin is good with DRBC and State DO standards generally being met. The report does note that DO criteria violations are a common summertime occurrence at the Reedy Island continuous monitoring station. The report states that the cause of the violations is not known. The DRBC DO 24-hour minimum criterion at Reedy Island is 6.0 mg/L.

11. IMPACT TO THE BOTTOM CONTOURS OF THE BAY OR CREEK

- A. What is proposed dredging depth in relation to surrounding bathymetry? Provide map showing surrounding depths.**

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Existing depths of the Delaware River channel and channel bends in areas requiring new work dredging are in the range of 40 feet to 46 feet below MLLW. Adjacent areas beyond the channel limits are also in the depth range of 40 to 46 feet subject to the dredging location considered. A series of bathymetry 'maps' are included to facilitate the discussion of depth in and adjacent to the Delaware River Federal navigation channel.

B. Will the project change flow or circulation patterns in the bay or creek? Will shoalings patterns be altered?

Three-dimensional numerical hydrodynamic/salinity modeling of the proposed channel deepening indicates that at some locations, and under some circumstances, flow distribution will change when compared to existing conditions. Detailed graphic and tabular results of this comparison are presented in Section 5.11 of the Supplemental Environmental Impact Statement (July, 1997) (enclosed on CD). These data show that during normal to high flow periods with the deepened channel, oyster bed areas in the lower bay will experience small increases in salinity due to steeper longitudinal salinity gradients that accompany high flow conditions. During drought conditions, the predicted upstream movement in salinity due to deepening would be significantly less than the seasonal changes in salinity distribution resulting from normal variations in river flow. The highest salinities would occur in October and November when significant biological functions such as spawning and nursery activities and plant growth do not occur. The impact of those increases on oyster production is viewed as negligible. In the Supplemental Environmental Impact Statement for the project dated July 1997, the Corps concluded (based on modeling by its widely respected Waterways Experiment Station) that the maximum change in salinity over Delaware Bay oyster beds would be 0.3 parts per thousand. According to Dr. Eric Powell of Rutgers University, a nationally recognized expert on oyster ecology, any change up to 1 part per thousand will have no impact on oysters. Changes in the subtidal circulation over the oyster beds due to channel deepening will also be minimal, e.g, less than 1 cm/sec. Impacts that may occur to other environmental resources are also considered to be insignificant. For additional details see Section 4.1.2 of the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment.

No significant changes in the distribution of shoaling are expected to accompany the deepening.

12. IMPACT TO SURROUNDING LANDS

What is the proximity of the dredging project to the nearest creek bank or banks? What are the existing land uses along this bank(s)? What is the primary vegetation?

The dredging project covers the entire Federal navigation channel from Philadelphia to the mouth of the Delaware Bay, over 100 miles. From the Pennsylvania-Delaware line to Wilmington Harbor, the channel is from approximately 650 feet to approximately 2,600 feet from the Delaware shoreline.

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This portion of the river is highly developed and much of the shore has bank protection. From Wilmington to Pea Patch Island the Federal navigation channel is from approximately 650 feet to over 1 mile from the shore. Between Wilmington Harbor and Pea Patch Island the shoreline is less developed with some tidal flats and some channelized wetlands dominated by common reed (*Phragmites australis*). Pea Patch Island is approximately 200 feet from the Federal navigation channel at the southern end. The shoreline of this portion of Pea Patch Island has been protected from further erosion with a stone breakwater. Between Pea Patch Island and Cape Henlopen the shoreline of Delaware Bay is greater than one mile from the Federal navigation channel. The shore in this area is mostly undeveloped with tidal marsh dominated by marsh grass (*Spartina alterniflora*) some with narrow sandy beaches, much in State or Federal ownership. Much of this shoreline is severely eroding.

13. **What measures will be taken during the dredging operation to minimize environmental impact?**

The primary measure to avoid and minimize impacts during dredging on environmental resources is to observe windows for sensitive resources. The proposed construction schedule is attached to this appendix. While the order of contracts will be dependent on funding, the time of year that dredging occurs will remain the same as that shown on the attached schedule to conform with Delaware River Basin Fish and Wildlife Management Cooperative recommended dredging restrictions for protection of fishery resources in the Delaware River and Bay (Appendix C of the April 2009 Environmental Assessment). The construction schedule shows the type of dredge that would be used for different sections of the river for the Deepening Project. Time periods shaded grey are the recommended periods for hopper dredging, cutterhead pipeline dredging, bucket dredging, sand placement and blasting. All windows will be met for the project above River Mile 32. Dredging below River Mile 32 and shoreline work at Kelly Island and Broadkill Beach can not meet the recommended windows. The only period of time that meets all recommended restrictions for these areas is the first half of the month of April. The impact of not meeting the recommendations in these areas is discussed in Section 4 of the April 2009 Environmental Assessment.

During dredging operations, water quality monitoring will take place to evaluate potential impacts to aquatic resources. Monitoring efforts include water quality of effluent discharged from the confined disposal facilities and water quality at the point of cutterhead dredging. See Section 4.1.3.3 of the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment for details.

CONSIDERATIONS FOR DISPOSAL OF DREDGED MATERIALS

14. **What are your plans for disposing of dredged material (i.e., upland disposal, wetland creation, island creation, etc.)? What alternatives have you considered?**

Refer to Section 2.5 in the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment. Also, Figure 2-7 identifies the disposal location for each dredging reach.

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15. When do you plan to conduct your dredging/disposal operation (approximate dates of operation)?

The proposed construction schedule is attached to this appendix. While the order of contracts will be dependent on funding, the time of year that dredging occurs will remain the same as that shown on the attached schedule to conform with Delaware River Basin Fish and Wildlife Management Cooperative recommended dredging restrictions for protection of fishery resources in the Delaware River and Bay.

16. Describe the characteristics and location of the proposed dredged material disposal site? What is the present use of the disposal site? Describe pipeline route if applicable.

For Broadkill Beach, material will be hopper dredged and transported to a point offshore of the beach. From that point the material will be pumped from the hopper through a pipeline to the beach. The dredge pipe will be placed on pontoons for a minimum of 1000 feet, beginning at approximately elevation -4.7 NGVD, extending offshore to avoid disrupting along shore traveling by the young sandbar sharks. This distance will be determined by the National Marine Fisheries Service. The remainder of the pipeline extending to the beach, and back to the dredge, can rest on the bottom.

A sand dike, 200 to 300 feet in length, will be constructed above mean high water (MHW) to contain dredged material that is pumped landward of it. The dike will be constructed using existing sand on the beach. The dike will be long enough that most dredged material will drop out on the beach and not return to the bay. As material is deposited the dike may be repositioned seaward to contain the required tilling above MHW for that section of beach. The slurry will still be controlled by the dike along the shoreline. No dredged material will be hydraulically placed below MHW between May 1 and September 15. The dike will be extended down the beach as the area behind the dike is tilled and the dredged pipe is lengthened. The dredged material that has been deposited will be built into dunes. It is expected that little of this material will be re-deposited by wave action during the spring/summer window period since weather is generally mild, except for possible hurricanes. After September 15, some dredged material will be graded into the bay to widen the beach.

At Kelly Island, the sand material for construction and wetland filling will be delivered to the site in the same manner as the beaches except the pipeline will not be floated on pontoons. Once it reaches the site the pipeline will land on the shore and be extended off shore along the alignment of the containment beach. Once the containment structure has been closed, geotubes, the sluice or control structure, and groins will be installed. The area will be filled to grade with sand and silt materials and effluent controlled. Presently the area is open water bordering marshland with a shoreline retreat of up to 30 feet per year.

Confined upland dredged material disposal sites in the State of Delaware that will be used for initial construction include Killcohook, Reedy Point South and Artificial Island. Refer to Figure 2-1 in the enclosed April 2009 Delaware River Main Stem

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and Channel Deepening Project Environmental Assessment for the location of these areas. These sites are all existing, Federally owned dredged material placement sites.

17. CHARACTERISTICS OF THE DREDGED MATERIAL

- A. Based on sediment analysis required or other known factors, does the material contain any contaminants?**

A review of sediment quality concerns associated with the Delaware River Philadelphia to the Sea navigation channel was provided in Section 4 of the 1997 Final Supplemental Environmental Impact Statement. That information is incorporated here by reference. The review included bulk sediment analyses, elutriate sediment analyses, Toxicity Characteristic Leaching Procedure (TCLP) analyses, biological effects based sediment testing, and high resolution PCB congener analyses. Additional data collected since 1997 is provided in Section 4.1.4 of the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment.

- B. What is the bulking factor of the material (e.g., how much will material increase in volume during dredging and disposal operation based on material composition, material water holding capacity and dredging method)?**

The dredged material has been classified as either fine-grained silt and sand. The fine-grained material or silt materials have a bulking factor of 1.8 and the bulking factor for sand is 1.0. There is sufficient capacity to contain the materials to be dredged for initial construction and 50 years of project maintenance.

- C. What is the settling rate of the dredged material?**

The sandy material will settle almost instantaneously. The rate of the fine-grained materials is unknown; however, the ponding of the confined upland disposal facilities will allow the material to settle out prior to returning to the Delaware River and Bay.

- D. What is the mounding ability of the material being disposed of?**

The sandy materials will tend to mound, while the fine-grained materials will not.

18. CONSIDERATIONS FOR HABITAT DEVELOPMENT

The only area for habitat development in the State of Delaware is the Kelly Island wetland restoration. The Broadkill Beach design is for storm damage reduction, however, Broadkill Beach information will be included in this Section as appropriate.

- A. Does similar habitat already exist in the area proposed for development?**

Similar habitats exist at Kelly Island and Broadkill Beach. These are common, but eroding habitats along the shore of Delaware Bay.

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B. What is the depth of water at mean low water?

Existing depths over most of the Kelly Island wetland restoration site are less than 5 feet mllw. The exception is at the northern terminus of the sand containment dike, where existing depths attain 9 feet mllw. The depth at the Broadkill Beach sand placement site is less than 5 feet mllw.

C. What is the salinity of water at the proposed site of development?

Salinity within Delaware Bay varies depending on location, tidal stage, and antecedent hydrologic conditions. The salinity range at Kelly Island is between 10 and 30 ppt. Broadkill Beach is further down bay, closer to the ocean. Salinity is less variable at Broadkill Beach remaining around 30 ppt.

D. What is the salinity of water from which material is being dredged?

Salinity of material dredged for wetland restoration and beach nourishment would range between 10 and 30 ppt depending on dredging location, tidal stage, and antecedent hydrologic conditions.

E. Is the composition of the dredged material similar to the substrate at the site of habitat development?

Yes for Broadkill Beach, no for Kelly Island. The substrate at Kelly Island is mainly silt and the dredged material is mostly sand.

F. What are the biological characteristics of the site proposed for development? Are there oyster bars, spawning grounds, submerged aquatic vegetation, or other fragile ecosystems which require temporary or permanent protection? These sites should be avoided for habitat development.

A description of the affected biological resources and potential environmental effects of project construction at Kelly Island and Broadkill Beach are provided in chapters 3.0 and 4.0, respectively of the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment.

G. What are the wind and current conditions at the site? Do they change seasonally?

WINDS. Prevailing wind direction reported from a variety of weather stations and from different time periods vary from southwest to northwest. Wind data for the period from 1924-1941 at the U.S. Weather Bureau Breakwater Harbor station shows that southwest is the prevailing wind direction, but winds from other directions occur nearly as often. Gale force winds, those over 30 miles per hour, originate most often from the northwest, and winds of more than 60 miles per hour originate from seven of the eight principal compass directions.

Wind data summarizing annual and seasonal wind speed and direction from the
Dover Air Force Base station show that the most frequently occurring winds blow

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from the northwest. Monthly data show that the wind regime varies from season to season with stronger winter winds prevailing from the northwest and summer winds prevailing from the southwest. The dominant winds (highest velocity) are from the northeast.

CURRENTS. Tidal currents in the estuary are directly related to the astronomical tidal elevations and as such vary with the phase and amplitude of the various tidal constituents. Peak ebb and flood currents are largest along the axis of the bay and decrease toward either side. Based on results from a hydrodynamic model, the National Ocean Service published a tidal circulation atlas for the Delaware River and Bay (NOAA 1987). The charts show the speeds and directions of the tidal current in the Delaware River and Bay for each hour of an average tidal cycle. The current charts reflect the effects of channels, shoals, and other bathymetric features but do not include meteorological effects or river flow. River runoff can considerably modify the speed and direction of currents in the bay. Strong winds can cause nontidal currents.

From the entrance of the Delaware River and Bay to Artificial Island the effects of wind generally dominate over river effects. However, increases in ebb currents in the lower bay have been observed when there is a large increase in the river flow. During periods of northerly or northwesterly winds ebb currents increased and delayed times of weaker floods. Stronger ebbs were also observed after periods of increased water levels resulting from easterly or southeasterly winds. This effect can persist for up to 2 days. Northwesterly winds produced an opposite effect by temporarily lowering the water levels throughout the bay followed by a return to normal water levels.

H. Will habitat development interfere with any existing commercial or recreational activities?

The Kelly Island wetland restoration should increase horseshoe crab spawning areas, which should benefit this fishery. The beach will also protect the tidal marshes behind them from further erosion, which should maintain these areas for migratory waterfowl for hunting. Maintaining the tidal marshes will also benefit the recreational fishery, since many fish species use these areas for nursery habitat. Kelly Island will be monitored after construction to insure the success of the wetland restoration and to protect adjacent resources such as oyster beds and insure that any commercial activity, such as boats using the Mahon River, will not be impacted.

Beach nourishment at Broadkill Beach should enhance recreational activities for beach users.

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I. Is there enough material to achieve desired elevations? Is the potential site of development large enough to accommodate the dredged material?

There is sufficient material for both the Kelly Island wetland restoration and beach nourishment at Broadkill Beach. The authorized project also included restoration of intertidal habitat adjacent to Egg Island Point, New Jersey. However, due to the reduction in estimated quantities of dredged material, this element of the project is

being deferred until such time as sufficient dredged material quantities are available to support its construction.

J. Who is the owner of the site proposed for development? Who will maintain the new habitat?

The Kelly Island site is owned by the U.S. Fish and Wildlife Service. The site will be maintained by the U.S. Army Corps of Engineers. Broadkill Beach is a combination of private and public ownership. A list of owners will be obtained during the acquisition of temporary easements for placement of sand. Broadkill Beach would not be maintained by the U.S. Army Corps of Engineers as part of the Delaware River Main Stem and Channel Deepening Project.

K. What types of wildlife are to be attracted to the site? What is required in the way of habitat and food?

The Kelly Island wetland restoration will attract spawning horseshoe crabs on the large sand berm that will contain the dredged material. Migratory shorebirds will be attracted to the horseshoe crab eggs. The wetland behind the berm will attract migratory waterfowl and shorebirds, long-legged wading birds as well as other wildlife.

L. What measures will be taken to reduce potential environmental impact?

Due to competing time of year work restrictions for shoreline construction and dredging in Delaware Bay, it is not possible to construct the Kelly Island and Broadkill Beach projects and adhere to all recommended seasonal restrictions. For protection of over-wintering blue crab, no dredging will occur in this portion of the channel between December 1 and March 31. Construction at Kelly Island and Broadkill Beach will begin in April since April and May are acceptable dredging months. Construction activity on Broadkill Beach will last four months and is scheduled from April through July. Construction activity on Kelly Island will last six months and is scheduled from April through September. As such, there would be some level of impact to spawning horseshoe crabs at both sites. This level of impact is not considered significant because studies indicate that horseshoe crab spawning at both sites is low in comparison to other monitored bay beaches. Reconstruction of the Kelly Island site will provide suitable horseshoe crab spawning habitat along its entire length, which should greatly improve the spawning productivity of the area. Monitoring can be employed during construction of Kelly Island to remove horseshoe crabs that attempt to access the work area and relocate them to a suitable spawning beach.

As previously stated, at Broadkill Beach the dredge pipe will be placed on pontoons for a minimum of 1000 feet, beginning at approximately elevation -4.7 NGVD, extending offshore to avoid disrupting along shore traveling by the young sandbar sharks. In addition, no dredged material will be hydraulically placed below MHW between May 1 and September 15.

There could be impacts to *Sabellaria* colonies and reefs at Broadkill Beach and Kelly Island. Construction impacts to *Sabellaria* can be compensated by placing suitable

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substratum, large rocks in groins or jetties or cobble-sized gravel on sand beaches at mean low water during the late summer or early fall settlement period following shoreline restoration. Kelly Island and Broadkill Beach will be evaluated prior to construction to determine the most appropriate course of action.

19. CONSIDERATIONS FOR UPLAND DISPOSAL

- A. What is the distance from the dredging operation to the proposed site of disposal?**

Varies between ½ mile near the Killcohook confined disposal facility in the river to 10 miles for Kelly Island and Broadkill Beach in the bay.

- B. What method of disposal is to be utilized (i.e., pipeline discharge, barge, hopper, etc.)?**

Hydraulic pipeline for the upland confined disposal facilities. Hopper dredging with pipeline discharge for Kelly Island and Broadkill Beach.

- C. Describe the proposed method of containment for the dredged material.**

The material will be contained within existing, Federally owned upland confined disposal facilities. Confined upland dredged material disposal sites in the State of Delaware that will be used for initial construction include Killcohook, Reedy Point South and Artificial Island. Refer to Figure 2-1 in the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment for the location of these areas.

- D. How much acreage is required for the quantity of material being disposed of?**

The capacity of the confined disposal facilities is in excess of the required quantity to be placed, including bulking factors. The existing sites have adequate capacity for initial construction and 50 years of project maintenance.

- E. Provide an engineering drawing of the proposed disposal facility.**

Drawings for the Reedy Point South and Killcohook confined upland disposal facilities are provided on CD (Philadelphia District, 2009, Dredging, Delaware River Philadelphia to the Sea PA, NJ and DE, w/Options for Deepening Construction Solicitation and Specifications, IFB W912BU-09-B-0005, 26 June 2009.).

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- F. What measures will be taken to reduce potential environmental impact?**

Effluent discharged from the confined disposal facilities during disposal operations will be monitored to insure Delaware surface water quality standards are met. See Section 4.1.3.3 of the enclosed April 2009 Delaware River Main Stem and Channel Deepening Project Environmental Assessment for details. The concentration of suspended sediment discharged with the effluent will be controlled by raising the weir as necessary, which increases the retention time of water in the site prior to

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discharge. In addition, surface sediment samples of material will be collected from the facilities after the material has dried and bulk sediment data will be evaluated for potential impacts to humans and wildliferesources using risk assessment procedures.

G. What is estimated life of the dredge spoil disposal site?

Reedy Point South will only be used for placement of dredged material from initial construction. The Killcohook and Artificial Island sites have 50 years of disposal capacity remaining.

20. Has an Erosion and Sediment Control Plan been approved by the county conservation district for the project? _____ Yes X No

Dredging and use of dredged material for beach fill and wetland restoration/ protection has not required an erosion and sedimentation plan and approval. However, if the dikes at the existing Federally-owned confined upland facilities are to be raised the Corps will require that the selected contractor prepare and obtain approval of the erosion and sedimentation plan from the appropriate county district.

* Approved plans must be received by this office prior to approval being issued.

SAMPLING PLAN FOR NEW DREDGING PROJECTS

1. **Physical and Chemical Analysis of Sediment**

- A. Particle size distribution and percent solids analysis on core samples taken to depth of proposed dredging. Percentage sand, silt and clay should be based on:

given

sand: Greater than or equal to 0.0625mm
silt: Less than 0.0635mm but greater then 0.0039mm
clay: Less than 0.0039mm

- B. Bulk sediment analysis (mg/lg) core samples taken to depth of proposed dredging for parameters on page 55 of this application.
- C. Elutriate analysis (mg/l) on core samples taken to depth of proposal dredging for parameters listed on page S-7 of this application. Dredge site water should be used for the dilution water.

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- D. **Surface water analysis (mg/l) on one composite sample from dredging area for parameters listed on Chemical Parameters, for Analysis, page S-7 of this application.**

2. Biological Sampling

- A. **Benthic Invertebrate survey based on minimum of three surface grab samples or benthic dredge. Organisms should be identified to genus-level species where possible.**
- B. **Description of emergent and submerged vegetation in or adjacent to the proposed dredging area.**

* **Date to be provided by applicant. Actual number of samples dependent on size of area to be dredged and suspected pollution level. As a general rule, a minimum of three sampling stations should be established.**

* **If sediment contaminants are shown to exist by the above analyses of a bioassay may be required. Suspected contaminated sediment proposed for upland disposal should be subjected to an EP Toxicity analysis.**

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CHEMICAL PARAMETERS FOR ANALYSIS

Laboratory Analyses - Required

**Total Phosphorus
Total Nitrogen
Total Organic Carbon
Oil and Grease
Cadmium
Chromium
Mercury
Lead
Nickel
Zinc
Copper**

Laboratory Analyses - Recommended

**Arsenic
DDT and Metabolites
Phenols
PCS's
Endrin
Lindane
Toxaphene
Methoxychlor
2-4-D
2, 4, 5-TP**

Field Measurements of Water Column (Bottom and Surface) Required

**Dissolved Oxygen
Temperature
Salinity
pH**

* The state may modify the requested parameter list dependent on site conditions.

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