Delaware Department of Natural Resources and Environmental Control
Delaware Coastal Management Program

Initial Review: _____
Updated On: _____
Complete: _____
Official Use Only

Coastal Zone Management Act Federal Consistency Form

This document provides the Delaware Coastal Management Program (DCMP) with a Federal Consistency Determination or Certification for activities regulated under the Coastal Zone Management Act of 1972, as amended, and NOAA's Federal Consistency Regulations, 15 C.F.R. Part 930. Federal agencies and other applicants for federal consistency are not required to use this form; it is provided to applicants to facilitate the submission of a Consistency Determination or Consistency Certification. In addition, federal agencies and applicants are only required to provide the information required by NOAA's Federal Consistency Regulations.

Project/Activity Name:	White Creek Dredging and Beneficial Use Project

I. Federal Agency or Non-Federal Applicant Contact Information:

Contact Name/Title: Terry Deputy

Federal Agency Contractor Name (if applicable): _____

Federal Agency: USACE
(either the federal agency proposing an action or the federal agency issuing a federal license/permit or financial assistance to a non-federal applicant)

Mailing Address: 285 Beiser Boulevard, Suite 102

City: Dover State: DE Zip Code: 19904

E-mail: terry.deputy@delaware.gov Telephone #: 302-739-9921

II. Federal Consistency Category:

- (●) Federal Activity or Development Project (15 C.F.R. Part 930, Subpart C)
- ( ) Outer Continental Shelf Activity (15 C.F.R. Part 930, Subpart E)
- ( ) Federal Financial Assistance (15 C.F.R. Part 930, Subpart F)
- ( ) Federal License or Permit Activity (15 C.F.R. Part 930, Subpart D)
- ( ) Federal License or Permit Activity which occurs wholly in another state (interstate consistency activities identified in DCMP's Policy document)

III. Detailed Project Description (attach additional sheets if necessary):

The proposed Project includes hydraulic dredging at White Creek (including the main channel and two prongs at the headwaters) to the previously maintained depth of -4 MLLW. An adjoining portion of the adjacent Assawoman Canal channel (northernmost 0.4 miles of canal) will be also be hydraulically dredged to the previously maintained depth of -3 MLLW. An additional 1-foot overdredge is included in the design. Dredged material will be transported via pipeline running the length of the Assawoman Canal to the beneficial use (BU) placement site at Muddy Neck Marsh Complex. Dredged material will be applied using thin layer placement (TLP) methodologies to enhance marsh elevations and restore this system which has been subject to expansive ponding and deterioration in recent decades. See Permit Supplement for site map and additional project overview. Please see attached project description.

IV. General Analysis of Coastal Effects (attach additional sheets if necessary):

The proposed Project is regulated under the Coastal Zone Management Act of 1972, as amended, and the National Oceanic and Atmospheric Administration's Federal Consistency Regulations (15 Code of Federal Regulations 930). Therefore, a Delaware Coastal Management Program Federal Consistency Determination form has been completed to support the proposed Project. As identified, the proposed Project is consistent with applicable policies. The proposed Project would reduce navigational constraints for users of White Creek and enhance wetland resiliency in the Muddy Neck Marsh Complex. The Project includes best management practices and controls to ensure environmental protections. Please see attached Permit Supplement.

V. Detailed Analysis of Consistency with DCMP Enforceable Policies (attach additional sheets if necessary)**:**

Policy 5.1: Wetlands Management

The proposed Project goal is to restore an area of highly degraded coastal salt marsh using dredged material, thereby providing enhanced resiliency to coastal wetlands from the continued effects of sea level rise and other environmental stressors. Therefore, the proposed Project is consistent with Policy 5.1. See Permit Supplement for details.

Policy 5.2: Beach Management

No direct or indirect impact to beaches

Policy 5.3: Coastal Waters Management (includes wells, water supply, and stormwater management. Attach additional sheets if necessary)

The proposed Project improves navigability in White Creek and restores an area of highly degraded coastal salt marsh. There will be no long term impact to water quality and therefore is consistent with Policy 5.3

Policy 5.4: Subaqueous Land and Coastal Strip Management

The proposed Project is not located on the Coastal Strip and therefore will not effect Policy 5.4

Policy 5.5: Public Lands Management

The proposed Project will not develop any public lands. BU for placement at the wetlands will enhance these public lands by restoring coastal habitat. Therefore, the proposed Project is consistent with Policy 5.5.

Policy 5.6: Natural Lands Management

BU for placement at the wetlands will enhance natural lands by restoring coastal habtiat. Therefore, the proposed Project is consistent with Policy 5.6.

Policy 5.7: Flood Hazard Areas Management

The proposed Project does not locate any built structure within the floodplain. The Project will restore an area of highly degraded coastal salt marsh using dredged material, thereby providing enhanced resiliency to coastal wetlands from the continued effects of sea level rise, and is consistent with Policy 5.7.

Policy 5.8: Port of Wilmington

The proposed Project is not within the Port of Wilmington

Policy 5.9: Woodlands and Agricultural Lands Management

The proposed Project will not impact woodlands or agricultural land.

Policy 5.10: Historic and Cultural Areas Management

There are no known cultural resources in the White Creek or immediate Muddy Neck area (DNREC, 1995). However, outside of the BU area, several culturally sensitive sites exist across the adjacent water body of Miller Creek (Appendix F). To ensure an unanticipated find would be protected, the following cultural resources measure would be added to the construction contracts:
• In the unlikely event that any artifact or an unusual amount of bone, shell, or non-native stone is encountered during construction, work shall be immediately stopped and relocated to another area. The contractor shall stop construction within 30 feet of the exposure of these finds until a qualified archaeologist can be retained to evaluate the find. Examples of such cultural materials might include concentrations of ground stone tools, such as mortars, bowls, pestles, and manos; chipped stone tools, such as projectile points or choppers; flakes of stone not consistent with the immediate geology, such as obsidian or fused shale; a historic trash pit containing bottles or ceramics; or structural remains. If the resources are found to be significant, they shall be avoided or shall be mitigated consistent with Delaware's State Historic Preservation Office guidelines.

Policy 5.11: Living Resources

No special status species are expected to be affected during dredging; the proposed Project area does not contain critical habitat.

Policy 5.12 Mineral Resources Management

No effect on mineral resources

Policy 5.13: State Owned Coastal Recreation and Conservation

The proposed Project enhances coastal habitat at the Muddy Neck Marsh Complex, which is part of the Assawoman Wildlife Area. Therefore, the proposed Project is consistent with Policy 5.13

Policy 5.14: Public Trust Doctrine

The proposed Project improves navigability in White Creek consistent with public trust provisions to support the right of the public for navigation and fishery on all streams where the tide ebbs and flow.

Policy 5.15: Energy Facilities

No effect

Policy 5.16: Public Investment

No effect

Policy 5.17: Recreation and Tourism

The proposed Project reduces navigational constraints for users of White Creek, which supports recreation. In addition, it will enhance wetland resiliency in the Muddy Neck Marsh Complex thereby supporting passive recreation in the Assawoman Wildlife Area.

Policy 5.18: National Defense and Aerospace Facilities

No effect.

Policy 5.19: Transportation Facilities

No effect.

Policy 5.20: Air Quality Management

No effect.

Policy 5.21: Water Supply Management

No effect.

Policy 5.22: Waste Disposal Management

No effect.

Policy 5.23: Development

No effect. No development proposed.

Policy 5.24: Pollution Prevention

The proposed Project will employ best management practices to reduce the potential for short term effects to water quality during dredging and material placement.

Policy 5.25: Coastal Management Coordination

The applicant has coordinated with multiple state and federal agencies to support the project.

VI. JPP and RAS Review (Check all that apply)**:**

Has the project been reviewed in a monthly Joint Permit Processing and/or Regulatory Advisory Service meeting?

☒ JPP ☐ RAS ☐ None

*If yes, provide the date of the meeting(s): 8/19/2021

VII. Statement of Certification/Determination and Signature (Check one and sign below)**:**

☐ **FEDERAL AGENCY CONSISTENCY DETERMINATION.** Based upon the information, data, and analysis included herein, the federal agency, or its contracted agent, listed in (I) above, finds that this proposed activity is consistent to the maximum extent practicable with the enforceable policies of the Delaware Coastal Management Program.

OR

☐ **FEDERAL AGENCY NEGATIVE DETERMINATION.** Based upon the information, data, and analysis included herein, the federal agency, or its contracted agent, listed in (I) above, finds that this proposed activity will not have any reasonably foreseeable effects on Delaware's coastal uses or resources (Negative Determination) and is therefore consistent with the enforceable policies of the Delaware Coastal Management Program.

OR

☒ **NON-FEDERAL APPLICANT'S CONSISTENCY CERTIFICATION.** Based upon the information, data, and analysis included herein, the non-federal applicant for a federal license or permit, or state or local government agency applying for federal funding, listed in (I) above, finds that this proposed activity complies with the enforceable policies of the Delaware Coastal Management Program and will be conducted in a manner consistent with such program.

Signature:	Terry L. Deputy		
Printed Name:	Terry Deputy	Date:	03/04/2022

Pursuant to 15 C.F.R. Part 930, the Delaware Coastal Management Program must provide its concurrence with or objection to this consistency determination or consistency certification in accordance with the deadlines listed below. Concurrence will be presumed if the state's response is not received within the allowable timeframe.

Federal Consistency Review Deadlines:

Federal Activity or Development Project (15 C.F.R. Part 930, Subpart C)	60 days with option to extend an additional 15 days or stay review (15 C.F.R. § 930.41)
Federal License or Permit (15 C.F.R. Part 930, Subpart D)	Six months, with a status letter at three months. The six month review period can be stayed by mutual agreement. (15 C.F.R. § 930.63)
Outer Continental Shelf Activity (15 C.F.R. Part 930, Subpart E)	Six months, with a status letter at three months. If three month status letter not issued, then concurrence presumed. The six month review period can be stayed by mutual agreement. (15 C.F.R. § 930.78)
Federal Financial Assistance to State or Local Governments (15 C.F.R. Part 930, Subpart F)	State Clearinghouse schedule

OFFICIAL USE ONLY:

Reviewed By:	Fed Con ID:	Date Received:
Public notice dates: to	Comments Received: ☐ NO ☐ YES *[attach comments]*	
Decision type: *(objections or conditions attach details)*	_ Decision Date:	

ENVIRONMENTAL QUESTIONNAIRE
FOR CORPS OF ENGINEERS PERMIT APPLICATIONS
Philadelphia District, Corps of Engineers
Philadelphia, Pennsylvania 19107
CENAP-OP-R

INTRODUCTION AND INSTRUCTIONS

The District Engineer is required by law to assess the initial, cumulative, and long-term effects of any proposed permit on all aspects of the environment.

To speed the analysis of the probable impact of the proposed work, each applicant is required to submit appropriate environmental data as part of a permit application. We ask that you provide a thorough description of your proposed project and answer each question as it applies to the work and the results of that work. Complete and accurate answers will prevent unnecessary delays in processing your permit application

Parts I and II will be filled out by all applicants. Part I is self-explanatory. In Part II, the Environmental Impact Checklist, you should indicate the impacts of your project on all aspects of the environment that are listed. Use the space under "Qualifying Remarks" to indicate the specific impacts that your project will have. This may include types of plants or animals affected, specific adverse, beneficial, or mitigative effects, changes to existing conditions, etc. Although space for answers has been provided, you may wish to supply additional information on attached pages. If you do not anticipate an impact on a certain item, simply place a check in the "No" column.

Part III will be filled out by all applicants applying for a permit to perform dredging.

Part IV will be filled out by all applicants applying for a permit to perform filling operations. This includes activities such as filling behind bulkheads.

Refer any questions you may have concerning this supplemental form to the Regulatory Branch at (215) 656-6728.

PART I

I. PROJECT DESCRIPTION:

A. General Site Location: Accurately locate the project site with respect to State, county, or other subdivision, and in relation to streams and rivers.

White Creek is located in Sussex Co., DE, and extends north to the Indian River Bay. Assawoman Canal is connected to White Creek to the south and extends 5 miles south to Little Assawoman Bay. The Muddy Neck Marsh Complex (Muddy Neck) is located in the Assawoman Wildlife Area in Little Assawoman Bay, Sussex Co., DE. Miller Creek is located south of the marsh.

B. Specific Site Locations: Completely locate the project site with respect to cove, creek, property owner, plot number, etc.

The proposed Project would occur in White Creek (main channel and two prongs at the headwaters, i.e., the Eastern and Western prongs) and a portion of the Assawoman Canal in Sussex County, Delaware. The Muddy Neck restoration area is located west of the southern end of Assawoman Canal. Construction plans showing site locations are included as supporting information in the permit application.

C. Description of Proposed Action: Carefully describe the action proposed, including the method of construction, equipment, and materials to be used. Details in your description are important. Attach additional sheets if necessary.

The Project involves hydraulically dredging approximately 70,000 cubic yards of sediment from White Creek and Assawoman Canal waterways, transporting the material via pipeline along Assawoman Canal, and then placing the material via thin layer placement (TLP) methodologies within ponded and degraded target sites in the Muddy Neck. See Permit Supplement for more details.

D. Purpose of Proposed Action: Define the purpose of the proposed structure or work. For example, the purpose of bulkheading may be to stabilize an eroding bank; whereas, the purpose for a pier may be for the mooring of a private boat, for access to a public or private facility, for a marina, or for another purpose.

The purpose of the Project is to improve navigability in White Creek and restore an area of highly degraded coastal salt marsh using dredged material, thereby providing enhanced resiliency to coastal wetlands from the continued effects of sea level rise and other environmental stressors. See Permit Supplement for details.

E. Submit color photographs of the site, with explanations of the views shown (prints only). Photographs help us to better understand your project. The more photographs you provide, the easier it is to understand and process your application.

See supporting appendices of the permit application for site plans, photographs, and characterization reports.

PART II – ENVIRONMENTAL IMPACT CHECKLIST			
ENVIRONMENTAL IMPACT	**YES**	**NO**	**QUALIFYING REMARKS**
A. Physical			
1. Topography	☐	X	Sediment placement will restore marsh to elevations conducive to low and high marsh species, including nearer term sea level rise considerations.
2. Geological Elements and Leaching	☐	X	
3. Air	☐	X	
4. Transportation	☐	X	
5. Handling of Hazardous Materials	☐	X	
6. Spoil Disposal	☐	X	The proposed project involves beneficial use of dredged materials as an ecological resource.
7. Sewage and Solid Wastes	☐	X	
8. Water Resources			
a. Water Quality	X	☐	Temporary sediment disturbance at dredging and placement site will be controlled with best management practices (see Section 2 of Permit Supplement for details)
b. Hydrography, Circulation, Littoral Drift.	X	☐	Placement of dredged materials in low-lying marsh and expanding pond areas will restore previously existing low and high marsh elevations and provide flooding and drainage patterns present in healthy, natural marsh systems
c. Ground Water	☐	X	
B. Biological			
1. Vegetation			
a. Terrestrial	☐	X	Upland and aquatic vegetation will be planted as part of restoration plans at Muddy Neck. No SAV exists in the dredging area.
b. Aquatic	☐	X	
2. Fish and Wildlife			
a. Mammals	☐	X	Construction may cause short term impacts to area fish and wildlife. However, they may avoid the area during construction. No long term impacts are expected. The project will restore wetland habitat to support coastal species.
b. Birds	X	☐	See Permit Supplement for characterization of temporary impacts on species, including those of special status. There would be no impact to rare or endangered species
c. Amphibians	X	☐	
d. Reptiles	X	☐	
e. Fish	X	☐	
f. Shellfish	X	☐	
g. Invertebrates	X	☐	
3. Rare or Endangered Species	☐	X	

ENVIRONMENTAL IMPACT	YES	NO	QUALIFYING REMARKS
C. Cultural			
1. Land Use	☐	X	
2. Population Density and Trends	☐	X	
3. Regional Development	☐	X	
4. Historic Places	☐	X	
5. Archaeological Sites	☐	X	
6. Aesthetics	☐	X	Temporary construction equipment-related aesthetic impacts along White Creek will be minimized by use of hydraulic rather than mechanical dredging methodologies.
7. Utilities	☐	X	
8. Transportation Systems	☐	X	
9. Recreation	☐	X	Recreational watercraft use will benefit from restored navigability in White Creek. Restoration of previously existing marsh habitat will provide improved wildlife viewing and recreational hunting opportunities at Muddy Neck.
10. Public Health	☐	X	
D. Other Factors			
1. Secondary Effects	☐	X	
2. Controversiality	☐	X	
3. Is significant dredging involved?	☐	X	This is a maintenance dredging project which will restore navigability to the previously dredged waterways. New dredging is not proposed.
4. Is significant filling involved?	☐	X	TLP will restore marsh elevations to within the narrow functional habitat elevation for low and high marsh plant species and not significantly fill the marsh area relative to preexisting conditions

Part III

Considerations of a Dredging Proposal:

A. Describe characteristics and locations of the proposed dredged material disposal site. Provide photographs.

The dredged material will be transported via pipeline for TLP at Muddy Neck. See supporting appendices of the permit application for site plans and photographs.

B. Is there a comprehensive plan for disposal sites that takes into account the accumulative effect over time and the decreasing amount of suitable sites for disposal?

Yes, the "Sediment Management Plan" for Rehobeth Bay, Sussex County, Delaware, prepared for DNREC (Moffatt & Nichol, 2007) details the scarcity of dredged material disposal sites for White Creek and other waterways in Delaware's Inland Bays. This plan also proposes a variety sustainable beneficial use opportunities and/or overall strategies for sediment management.

C. Describe the present land use of the disposal site.

Muddy Neck is part of the Assawoman Wildlife Area. It is comprised of an expansive tidal marsh system and adjacent, largely forested upland areas. The marsh system is used for recreational hunting and wildlife viewing.

D. Describe characteristics of the material to be disposed, including:

1. Physical source of material (i.e. sand, silt, clay, etc.) Give percentages of the various fractions if available.

   The material is well-graded providing a wide spread of grain sizes from medium sand through clays. This range of grain size is optimal for TLP placement. See Permit Supplement for details.

2. Chemical composition of material: Many areas, especially marinas, highly industrialized areas, etc., have sediments with high concentrations of pollutants (chemicals, organic material, etc.). These materials may be re-suspended or reintroduced into the water and result in serious environmental damage. If your proposed dredging is in an area such as described above, a chemical analysis of the material to be dredged should be provided.

   A comprehensive evaluation and risk-screening of the chemical composition of the sediments targeted for dredging and subsequent ecological restoration has been completed. See Permit Supplement and "Analysis of Chemical Constituents Report" provided as an appendix to the permit application for detailed analysis.

3. Dewatering properties of the material to be disposed.

   No active dewatering is proposed. Following placement the dredged materials will passively dewater following multiple weeks of drainage and flooding during normal tide cycles. Perimeter drainage controls will remain in place following construction andbe maintained as needed until material has sufficiently stabilized (as documented in monitoring reports).

4. Compactability of material and settling rates of material to be disposed.

   See Permit Supplement and "Analysis of Chemical Constituents Report" for information related to physical properties of the dredged

5. Dredging and disposal schedule to insure that operations do not degrade water quality during times of anadromous fish migration.

   Operations are planned for October 2022 through March 2023.

E. When the project involves land disposal, discuss the following:

1. Method of disposal to be utilized, i.e., pipeline discharge, barge, hopper (underway or stationary).

   See Permit Supplement for details. The beneficial reuse sediment will be transported by pipeline and then applied in a wetland environment via thin layer placement (TLP) methodologies.

2. Describe method of dredged material containment (i.e. embankment, behind bulkhead, etc.)

   Material containment will be achieved through operational controls such as the use of perimeter transition zones between active placement areas and adjacent marsh/waterway areas. Engineering controls such as coir logs and turbidity curtains will also be utilized. See Permit Supplement for details.

3. What type of leachates will be produced from the spoil material and what is planned for protection of the groundwater?
   See Permit Supplement and "Analysis of Chemical Constituents Report" provided as an appendix to the permit application for detailed analysis of sediment chemistry. The chemical composition of the sediments indicate that associated leachates will not negatively impact the environment.
4. Methods to insure that spoil water does not adversely affect water quality, both during construction and after completion of the project.
   See Permit Supplement and "Analysis of Chemical Constituents Report" provided as an appendix to the permit application for detailed analysis of sediment chemistry.
5. Provisions for monitoring during discharge: water quality, sediment transport, and precautions to prevent "short-circuiting" dumping.
   Project specifications will require the contractor to ensure TLP material is placed uniformly. Perimeter controls will be inspected daily during TLP operations. Water quality will be visually monitored by construction oversight personnel and if required, turbidity measurements will be taken in the field to assess if field operations need to be modified.

F. Consider and discuss the following for water disposal:
   1. Describe methods to be used for water disposal, including volumes and site selection.
      N/A
   2. Describe the existing water characteristics at the site, including chemical analysis for water quality.
      N/A

G. Discuss the frequency and amount of maintenance dredging which will be required; discuss the resulting impacts.
   Maintenance dredging may be required within 10 years of the work based on the observed shoaling that has occurred since the prior maintenance dredging event in 2001. Additional maintenance dredging would require additional thin layer placement within Muddy Neck in areas that have not previously received material.

H. Alternatives.
   1. Discuss all alternatives to the project, including the "no action" alternative.
      See Permit Supplement and Analysis of Alternatives provided with the permit application for details.
   2. Discuss alternative types and methods of dredging and disposal, such as pipeline discharge, barging, or hopper method.
      See Section 2 of Permit Supplement and Analysis of Alternatives provided with the permit application for details.
   3. Discuss alternatives to dredging.
      If no dredging occurs, navigational hazards in White Creek and continued degradation of Muddy Neck will persist. See Permit Supplement and Analysis of Alternatives provided with the permit application for details.
   4. Discuss alternative areas of sites for spoil disposal.
      See Section 2 of Permit Supplement and Analysis of Alternatives provided with the permit application for details.
   5. Discuss impact of port docking patterns upon the demand for dredging. Can alternative patterns reduce the amount of dredging required to support port operations?
      N/A
   6. Support alternative means of construction that would prevent or minimize water quality degradation using EPA standards for guidance.
      See Section 2 of Permit Supplement and Analysis of Alternatives provided with the permit application for details.
   7. State in detail impacts resulting in alternative locations for the proposed project.
      A complete evaluation of potential alternative locations for beneficial use was conducted resulting in the finding of no practicable alternatives to the Muddy Neck location. See Permit Supplement and Analysis of Alternatives provided with the permit application for details.

Part IV

CONSIDERATIONS OF A FILLING PROPOSAL:

A. Describe in detail the existing characteristics of the area proposed for filling (i.e. aquatic area, marsh, mudflat, swamp, etc.). In your description, be sure to include the types of vegetation present and the types of animals that use the area. Provide photographs.

This project involves thin layer placement (TLP) of dredged materials within a degraded wetland environment. This placement approach will retain elevations within the functional range for low and high marsh plant species survival. See photographs and site investigation results provided as appendice to this permit application for details.

B. Give the following information in regard to the project size:

1. Total area to be filled.

   No new area of fill. TLP will restore wetlands. See discussion (right) and Project Supplement

2. Size of underwater area to be filled.

   N/A

3. Area of intertidal zone to be filled.

   N/A

TLP will mimic natural deposition by adding 6-9 inches of sediment (and up to 18 inches in the most degraded areas devoid of vegetation), not to exceed elevations of state-regulated wetlands or the local line of mean higher high water. Using the unconfined placement approach (relying on existing site topography to contain sediment dispersion throughout the area) and biodegradable physical barriers (e.g., coir logs), TLP will be applied in 3-inch increments with designated settlement and consolidation periods; at any time, TLP will not exceed 6 inches above target elevation to avoid damaging existing vegetation. An adaptive management approach will guide implementation to account for any variation in bulking, settlement, and consolidation of the material.

4. Area of wetlands to be filled.

   No Fill of wetlands, Material will be deposited using TLP to enhance degraded wetlands system

5. Proposed height of fill.

   See above, TLP will not exceed 6 inches above target elevation to avoid damaging existing vegetation

6. Volume of material that will be used in filling.

   70,000 cy

C. Describe in detail the material to be used as fill including as follows:

1. Type of fill to be used (sand, stone, rubble, etc.). If the material is a composite (i.e., rubble), list the types of materials it will contain.

   See Permit Supplement for physical and chemical characteristics of sediment within White Creek and Assawoman Canal.

2. Give the specific location of the source of this material.

   White Creek and Assawoman Canal

3. What types of leachates will be produced from the fill material and what is planned for protection of surface and groundwater?

   N/A

D. Carefully describe the method of fill, including the following:

1. Method of fill placement, including equipment used in deposition and grading.

   See Permit Supplement for description of thin layer placement.

2. Method of stabilization of banks from erosion, sloughing, wave action, boat wakes, etc.

   N/A

3. Method of stabilization of the surface of the fill.

   N/A

4. Length of time needed for completion of the project. State if filling will be continuous, intermittent, etc.
   The entire Project will take place October 2022 through March 2023. Filling will be continuous during this period.

5. Method of controlling turbidity when filling an underwater area.
   N/A

E. Purpose of the Project:
   1. What is the intended use of the filled area?
      No use - restoration of degraded wetlands

   2. What structures, if any, will be constructed on the fill?
      N/A

   3. What benefits would you gain from the proposed fill?
      TLP will result in a more stable and resilient marsh, with vibrant vegetative species.

F. Alternatives
   1. Discuss the "no action" alternative and how this would affect your present and future plans for the development of the area.
      No dredging in White Creek and Assawoman Canal will result in loss of navigability of a critical waterway.

   2. Discuss alternative locations for the proposed fill.
      Refer to Alternatives Analysis Report provided with permit application

   3. Discuss the use of elevated structures (i.e. causeways, elevated platforms, etc.) in place of the proposed fill.
      N/A

   4. Discuss any other alternatives you have considered prior to formulating the presently submitted proposal.
      Refer to Alternatives Analysis Report provided with permit application

February 2022
White Creek Dredging and Beneficial Use Project

Permit Supplement

Prepared for Delaware Department of Natural Resources and Environmental Control

February 2022
White Creek Dredging and Beneficial Use Project

Permit Supplement

Prepared for
Delaware Department of Natural Resources
and Environmental Control
Shoreline and Waterway Management
Section
89 Kings Highway
Dover, Delaware 19901

Prepared by
Anchor QEA-Woods Hole Group
Joint Venture
755 Business Center Drive, Suite 220
Horsham, Pennsylvania 19044

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TABLES

FIGURES

ABBREVIATIONS

CDF	confined disposal facility
CWA	Clean Water Act
DNREC	Delaware Department of Natural Resources and Environmental Control
EFH	Essential Fish Habitat
HDPE	high-density polyethylene
IPaC	Information for Planning and Consultation
MLLW	mean lower low water
MLW	mean low water
NOAA	National Oceanic and Atmospheric Administration
Project	White Creek Dredging and Beneficial Use Project
TLP	thin-layer placement
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

1 Introduction

This document has been developed on behalf of the Delaware Department of Natural Resources and Environmental Control (DNREC) Division of Watershed Stewardship to support applications for federal- and state-related permits and approvals necessary for maintenance dredging at White Creek, Sussex County, Delaware, and beneficial use (BU) of the dredged material at the Muddy Neck Marsh Complex of Assawoman Wildlife Area (AWA), Little Assawoman Bay, Delaware (Project). As part of the Project, approximately 70,000 cubic yards of sediment will be dredged from White Creek and Assawoman Canal consistent with previous dredge design depths, transported to Muddy Neck Marsh Complex, and placed by thin-layer placement (TLP) to restore the existing wetland area.

This Permit Supplement document provides additional Project background and supporting material for the following permits and regulatory approval:

- U.S. Army Corps of Engineers (USACE):
  - Clean Water Act (CWA) Section 404 (33 United States Code 1344): The Project would require a Section 404 permit for the dredging and fill activities associated with the Project.
- DNREC Wetlands and Subaqueous Lands Permit:
  - DNREC Wetlands and Subaqueous Lands Permit and Appendices H, L, M, and R
  - CWA Section 401 (33 United States Code 1344)
  - An Erosion and Sediment Control Plan approval will be provided to DNREC when obtained.
- Coastal Zone Management Act:
  - The Project would require a consistency determination.

1.1 Project Location

Dredging would occur in White Creek and a portion of the Assawoman Canal in Sussex County, Delaware (Figure 1). The Muddy Neck Marsh Complex restoration area is located west of the southern end of Assawoman Canal. Photographs of the Project areas are provided along with the permit application materials.

Figure 1
Project Location Map

1.2 Project Purpose

The purpose of the Project is to improve navigability in White Creek and restore an area of highly degraded coastal salt marsh using dredged material, thereby providing enhanced resiliency to coastal wetlands from the continued effects of sea level rise and other environmental stressors. To accomplish these goals, the following key Project objectives must be accomplished:

- Dredge approximately 70,000 cubic yards of shoaled sediments from the White Creek navigation channel and Assawoman Canal, consistent with previous dredge design depths.
- BU of the dredged material for wetland restoration at the Muddy Neck Marsh Complex, located in close proximity to the dredging site, to restore historically degraded wetlands, and to improve coastal resiliency of the marsh (from future storm events).

- Use TLP to minimize marsh impacts and to restore the marsh so that natural recolonization of vegetation is promoted where suited.

1.3 Existing Conditions

White Creek is a 3.6-mile tidally influenced navigational channel serving as a connection between the Assawoman Bay through the Assawoman Canal to the south and the Indian River Bay to the north. Figure 2 is a photograph of present conditions.

Figure 2
Present Conditions

The channel is popular for recreational boating and is surrounded by sandy shoreline, salt marshes, and open water. White Creek was last dredged in 2001. Sedimentation and shoaling since that time has led to navigational hazards and White Creek was identified during a 2019 stakeholder survey[1] as a high-priority waterway for maintenance dredging activity (DNREC 2022). Bathymetric surveys conducted in 2019 confirmed high sediment deposition and evidence of shoaling within the main channel and southernmost prongs, which are located parallel with Betts Avenue in Ocean View. Both the main channel and prongs of White Creek have been selected for maintenance dredging to maintain navigation; if dredging does not occur, sedimentation may inhibit navigational access for up to 16 public/private boat ramps, 15 marinas, and more than 600 boat slips dispersed throughout the Project area.

[1] This study was conducted by DNREC from October to November 2019. In a total of three public meetings, more than 1,000 survey responses helped provide data on waterway use, navigation, and dredging need.

Table 1 describes five dredging events in White Creek since 1971, with the most recent maintenance dredge of 15,000 feet conducted in 2001. Dredged material generated from the 2001 event was placed in an adjacent confined disposal facility (CDF) site.

Table 1
Historical Dredging Projects in White Creek

Date Dredged	Material Dredged (cubic yards)	Location in White Creek
October 1971 – August 1972	135,000	Entire Channel
September 1997 – December 1997	30,000	Unknown
February 1999 – May 1999	5,000	Prongs
October 1999 – April 2000	10,000	Prongs
October 2000 – February 2001	15,000	Unknown

Muddy Neck Marsh Complex is an expansive coastal salt marsh system stretching up to a half mile from the adjacent upland shoreline. Miller Creek is located immediately south of the marsh system. Figure 3 provides an aerial view of the Muddy Neck Marsh Complex. The site is a fragmented tidal wetland complex within the AWA, located within the Little Assawoman Bay watershed. Predominant vegetative species in the area include smooth cordgrass, salt hay cordgrass, spike grass, common reed, glassworts, sea lavender, marsh elder, groundsel bush, salt marsh bulrush, and switchgrass (AQ-WHG JV 2022a). The AWA also supports a variety of fish species, including Atlantic silverside, mummichog, spot, striped killifish, summer flounder, and sheepshead minnow (McGowan et al. 2017). The marsh is remotely located with limited and infrequent recreational access for hunting.

Figure 3
Aerial View of the Muddy Neck Marsh Complex

The Muddy Neck Marsh Complex has experienced widespread ponding and fragmentation over the last 60 to 70 years. U.S Geological Survey (USGS) aerials, taken from the U.S. Department of Agriculture's National Agriculture Imagery Program and National Aerial Photography Program photographs, show the striking loss of wetlands over time (see Figures 4 through 10). Between 2007 and 2017 alone, the proposed restoration areas within Muddy Neck Marsh Complex have experienced approximately 11 acres of pool expansion and associated loss of vegetated area (CIB 2021; see Figure 11). Of the approximately 123 acres proposed for TLP, this imagery analysis shows that approximately 70 acres, or 57% of the overall area, is now unvegetated. Causes of this ponding and of this fragmentation are suspected to include sea level rise, sediment deficiency, herbivory by snow geese (*Chen caerulescens*), and sudden wetland dieback (CIB 2021; DNREC 2021a; Jo et al. 2014). Other ponded and pooled areas in the AWA have not naturally recovered over time, demonstrating the need for restoration in a sediment-starved system (CIB 2021). In the absence of restoration activities, the Muddy Neck Marsh Complex will continue to experience pond expansion, erosion, loss of high and low marsh vegetation, and degradation of valuable wildlife habitat that this area provides.

1.4 Muddy Neck Existing Conditions Data

Site conditions at the Muddy Neck Marsh Complex were documented during a January 2022 site investigation to verify the presence of degraded conditions evident in aerial imagery and provide a

baseline dataset for comparison in future monitoring efforts. The following investigations were performed as part of that effort:

- Field reconnaissance and collection of field photographs of the Site
- Collection of surface sediment samples for geotechnical evaluation
- Collection of a topographic survey transects via real-time kinematic (RTK) GPS of vegetated and unvegetated areas
- Mid-Atlantic Tidal Wetland Rapid Assessment Method (MidTRAM) data collection characterizing bio-benchmarks and wetland health

Lab data, field forms, and figures associated with this baseline conditions are provided along with the permit application attachments.

2 Project and Construction Methods

The Project design is illustrated in the construction plans that are included as part of the permit application package. Construction is expected to commence in October 2022, with an estimated completion by April 2023.

2.1 Dredging at White Creek

The Project involves hydraulically dredging 70,000 cubic yards within the historical dredging footprint in the main channel and eastern and western prongs of White Creek. Dredging will also occur within the northernmost 0.4 mile of the adjoining Assawoman Canal. Sediment removal will be conducted using a cutter suction dredge and 10- to 12-inch high-density polyethylene (HDPE) dredge pipeline. Floats will be attached to the dredge pipeline so that the pipeline remains on the surface and it will be clearly marked for navigational boaters. The Project will restore depths of -4 feet below mean lower low water (MLLW) in the 60-foot-wide main channel and 35-foot-wide prongs. Assawoman Canal will be dredged to achieve depths of -3 MLLW in a 35-foot-wide channel. Previous dredging within the canal included dredging to -3 mean low water (MLW) plus a 1-foot allowable overdredge. The difference between MLLW and MLW in this region is 0.21 foot and only in areas where the entirety of the overdredge is realized will this represent a slight increase in navigable depth relative to historical dredging. Aligning the Project datums and associated depths of channels between White Creek and Assawoman Canal will provide for more consistency in dealing with changes to tidal datums that will be encountered with anticipated sea level rise. Dredged material will be transported along the up to 5-mile route from White Creek to Assawoman Canal, utilizing the aforementioned pipeline as well as up to four strategically located booster pumps that will provide necessary power to convey material through the pipeline at this distance.

Dredging will be conducted in winter months (offseason, October to March) to minimize disruption to migrating fish and native aquatic species in the creek.

Table 2
Proposed Dredging Area and Volumes

Dredged Area	Length of Project Area (linear feet)	Width of Project Area (linear feet)	Depth of Project Area (MLLW)*	Quantity of Dredged Material (cubic yards)**
White Creek – Main Channel	11,700	60	-4	29,000
White Creek – Eastern Prong	2,600	35	-4	17,000
White Creek – Western Prong	3,700	35	-4	22,000
Assawoman Canal	2,400	35	-3	2,000
Total	**--**	**--**	**--**	**70,000**

Note:
*Not inclusive of 1-foot allowable overdredge depth to be applied for all dredge areas.
**Inclusive of 1-foot allowable overdredge volume

2.2 Beneficial Use at Muddy Neck Marsh Complex

The dredged material will be transported via pipelines to the Muddy Neck Marsh Complex for wetland restoration using TLP methodologies. TLP is a USACE accepted form of BU that involves the placement of sediments in thin uniform layers over eroding wetlands to enhance resiliency of marshes and maintain existing natural vegetation and habitat (Mohan and Piercy 2021). For this Project, TLP will mimic long-term natural deposition processes by adding 6 to 9 inches of sediment (and up to 18 inches in most degraded areas) over the wetland planform, without exceeding elevations of state-regulated wetlands or the mean higher high water when accounting for modest near-term sea level rise considerations. Consistent with the procedures in the pending USACE guidance on TLP (Mohan and Piercy 2021), dredged material will be placed without lateral confinement (i.e., relying on existing site topography to contain sediment dispersion throughout the area). Limited areas of biodegradable or temporary physical barriers (e.g., coir logs and silt curtains, respectively) will be placed in the field. TLP will be applied in 3- to 6-inch increments with designated settlement and consolidation periods. At any time, TLP will not exceed the maximum target elevation to avoid damaging existing vegetation. An adaptive management approach will guide implementation to account for any variation in bulking, settlement, and consolidation of the material.

TLP will be applied to three cells in Muddy Neck Marsh Complex, shown in Figure 12. The corresponding volumes per cell are included in Table 3.

Figure 12
Cells in Muddy Neck Marsh Complex

Table 3
Dredged Material Quantities per Muddy Neck Marsh Complex BU Cell

Cell	Area (acres)	Volume Placed (cubic yards)
1	16.07	13,200
2	53.35	85,000
3	53.49	50,000

Restoration at Muddy Neck Marsh Complex was determined as the preferred option in the *Analysis of Alternatives* (AQ-WHG JV 2022a) due to the combination of ecological uplift (via marsh restoration), improved resiliency, lower implementation costs, and minimal community impacts when compared to other BU alternatives.

Additionally, although a nearby CDF was used for the previous dredging operation, it is now full and privately owned. Moreover, extensive recent development along the waterway limits availability of proximal, public space for a dewatering facility. Use of TLP will enhance the resiliency of the fragmented marsh areas by providing ecological uplift and facilitating revegetation of native marsh grass, while avoiding propagation of invasive phragmites. Because of these outcomes, BU has been recommended by the Center for Inland Bays and DNREC as a priority for restoration in areas where

natural marsh restoration is limited by development, sea level rise, saltwater intrusion, and other degradation factors, such as in the Project's targeted area (CIB 2021; DNREC 2021a). The extent of TLP will be limited to historical marsh habitat and not create habitat in open water.

An adaptive management plan was developed for Muddy Neck Marsh Complex restoration and is included within the *Project Monitoring Plan* (AQ-WHG JV 2022b) provided as part of the permit application package. As part of the plan, a post-construction survey of the BU area and a post-dredge bathymetry study of the White Creek main channel and prongs will be submitted (pre-dredge bathymetric surveys were completed September 2019; see submittal as part of permit package).

2.2.1 Muddy Neck Thin Layer Placement Layout

The Muddy Neck TLP design involves multiple-point, low-pressure, on-shore discharge to three identified placement cells. The location and extent of the individual cells was established following evaluation of marsh topography, limits of interior ponds and mudflats, and location of tidal creeks and channels in the marsh interior. Cell placement limits were refined by applying a horizontal offset from the marsh shoreline to minimize the potential for transport of placed materials beyond the intended limits and into adjacent waterways. A transition zone was established for each placement cell to establish acceptable limits for final deposition of placed material and to provide nourishment for low-lying areas of vegetated marsh. The transition zone was generally established as a 50-foot horizontal offset from the targeted placement area.

Cell capacities were determined for each area based on available LIDAR data. The anticipated settlement of the underlying marsh and consolidation of placed material will be evaluated to further refine cell capacities prior to implementation.

2.2.2 Discharge Locations and Controls

Approximate discharge locations for each cell will be indicated in the final construction drawings, although the selected restoration contractor will be able to seek approval to modify designated discharge locations to correspond to the specific equipment used to conduct the work. Generally, discharge locations will be established near the boundary of the cell closest to the borrow source so the dredged material can move across the placement cell from the discharge point. Use of wye assemblies and multiple discharge points will reduce the pressure of the slurry in the pipeline at the point of discharge. The pipeline discharge shall be outfitted with an energy-reducing attachment to promote spreading of the placement material and prevent scour of the underlying marsh surface near the discharge point.

2.2.3 Containment

Thin layer placement operations will use various techniques to prevent overflow material from potentially entering the adjacent waterbody. Unconfined placement will rely on existing site topography to act as natural obstacles to material movement. Biodegradable physical barriers will be positioned to protect key marsh features such as tidal creeks, channels, and shoreline areas near placement cells.

The unconfined placement approach has been used successfully in similar projects and has many benefits for the proposed project. Because the placement cells were designed using site topographic data to target areas of lower elevation, they can be effectively bound by the areas of higher elevation marsh that surround them. By engineering with nature through use of these natural topographic changes, the placement operations will result in gradual, natural transitions of restoration material over the existing marsh as the placement thickness tapers out along the perimeter within the defined transition zones and the even distribution of material is promoted during periods of inundation. Recent thin layer placement restoration projects in Delaware and Georgia, and pilot projects in New Jersey, detail the difficulty in removing marsh containment following thin layer placement because the hay bales or coir logs are saturated and difficult to move without construction equipment. The use of low-ground-pressure equipment to remove the controls and frequent traffic over the marsh areas can cause substantial distress to areas that would otherwise be undisturbed by the placement operations. Furthermore, leaving perimeter controls in place for too long after thin layer placement disrupts natural inundation patterns and can delay marsh recovery. Limiting physical controls to only critical boundaries, and not fully encircling any placement areas, reduces overall disruption of the marsh footprint and promotes more natural edges following placement.

Areas of limited placement for physical containment barriers are shown in the construction drawings. Placement boundaries may be supplemented in the field, as necessary. Containment in these areas shall be biodegradable coir log constructed with natural fibers from coconut husk and between 12 and 18 inches in diameter. This material is strong, relatively waterproof, and resistant to saltwater damage. It has proven to be a successful tool for managing sediment movement in wetland environments. Coir logs shall be secured in place using wood stakes prior to the start of placement. Because the coir log will not completely surround the placement area at any location, the thin layer placement cells will not be isolated from typical inundation patterns and removing the coir logs shortly following placement is not as critical. As the edge of placement adjacent to a coir log consolidates over the initial 30-90 days following placement, the stakes securing the containment can be removed and the material can be allowed to degrade naturally. This will avoid the need to further disturb the marsh footprint by removing the containment materials.

2.2.4 Placement Elevations

Anchor QEA performed a water level analysis to estimate tidal datum elevations that are relevant to the restoration project and to inform the project design. Specifically, the mean tide level (MTL) and mean higher high water (MHHW) tidal datum elevations were estimated since the range between MTL and MHHW corresponds to the known survival range for native low and high marsh vegetation species that are targeted for restoration.

The water level analysis was performed using water level elevation data from USGS station 01484696 Jefferson Creek at South Bethany, Delaware which is close to (i.e., less than one mile) the Muddy Neck TLP areas (USGS 2022). High resolution water level data (e.g., 6-minute interval) for over 14 years was available and used in the evaluation (October 1, 2007 through December 31, 2021). To estimate the MTL and MHHW tidal datum elevations, the USGS water level data was evaluated using the National Oceanic and Atmospheric Administration (NOAA) Center for Operational Oceanographic Products and Services (CO-OPS) Tidal Analysis Datum Calculator (NOAA 2022). The NOAA tidal datum calculator computed a MTL elevation equal to 0.26 foot North American Vertical Datum of 1988 (NAVD88) and a MHHW elevation equal to 0.71 foot NAVD88.

An additional evaluation was performed to estimate a 10-year sea-level rise value to incorporate into the project design. The evaluation was based on guidance published by the Delaware Sea-Level Rise Technical Committee in November 2017 in the *Recommendation of Sea-Level Rise Planning Scenarios for Delaware: Technical Report* (DE SLR TC 2017). The approach of incorporating sea-level rise (SLR) in ecological restoration projects is consistent with policies established in Delaware's *Climate Action Plan* (DNREC 2021b). Figure 13 shows the sea-level rise (SLR) planning scenario curves from DE SLR TC (2017). As shown on Figure 13, to estimate the amount of SLR that may occur during the 10-year period from 2023 to 2033, the intermediate SLR value in 2033 was converted to be relative to mean sea level 2023 using the methodology described in DE SLR TC (2017) and equaled 0.37 foot. To further evaluate the estimated intermediate 10-year SLR from the DE SLT TC (2017), the linear trend of the last ten years of water level data from USGS 01484696 was evaluated (January 1, 2012 through December 31, 2021). Figure 2 shows the USGS data and the linear trendline slope computed for the data. Based on the linear trendline slope shown on Figure 14, the estimated 10-year SLR equaled 0.36 foot, which was approximately equal to the estimated intermediate 10-year SLR using the recommended planning scenario curves. Therefore, a 10-year SLR value equal to 0.37 foot was selected to inform the project design.

To increase the resiliency of the restored marsh areas, the project design maximum fill elevation within the Muddy Neck TLP areas considered both the computed MHHW elevation and the estimated intermediate 10-year sea-level rise value. The design fill elevation equaled 0.71 foot NAVD88 plus 0.37 foot of sea-level rise, which equaled 1.08 feet NAVD88, but was set to 1.0 foot NAVD88 for constructability considerations.

2.3 Best Management Practices

The following best management practices and construction controls would be included as part of the construction plans and specifications to ensure the Project is completed in accordance with the design and applicable regulations:

- Taking lessons from recent TLP projects in New Jersey that demonstrated that physical perimeter controls can result in negative impacts on adjacent sites and water quality when installed and removed (The Nature Conservancy and New Jersey Department of Environmental Protection 2021), the Project will instead rely on alternative methods for containment, including the following:
  - Transition zones comprising up to 50-foot horizontal offsets from marsh edges
  - Biodegradable coir logs and hay bales secured by wooden stakes (by hand) and maintained to withstand inclement weather throughout the duration of the Project (stakes to be removed after 30 to 90 days to allow for sediment consolidation); installed for protection of existing shoreline, tidal creeks, and channels
- Unconfined placement will rely on existing site topography to limit material movement to unintended areas (i.e., elevated marsh will confine TLP to the targeted pond areas).
- The pipeline transporting the dredged material slurry will be submerged in White Creek and along the Assawoman Canal, solely in the Project area, to avoid impacts to adjacent wetlands.
- Dredging during the winter months will limit disruption to migrating fish and aquatic species that would otherwise be impacted by turbidity impacts.
- Proper construction oversight will also be used to ensure no negative impacts to adjacent water quality (e.g., daily site inspections of perimeter controls and adjacent marsh areas by construction manager).
- The staging area for the TLP will be located at the CDF used in 2001, though only for means of access to the site. No dredged material will be placed at the CDF. To protect the upland area, construction access shall be by means that avoid or minimize impacts on terrestrial and aquatic sites (e.g., low pressure equipment, biodegradable erosion blanket, and mats).
- Project workers shall not harass or impact any waterfowl or fish in the Project area.
- To monitor the variable settlement and consolidation rates, an adaptive management plan has been developed.

2.4 Project Alternatives Considered

In absence of the Project, no dredging would occur, and navigational constraints would remain for 16 public/private boat ramps, 15 marinas, and more than 600 boat slips in White Creek. In addition, further degradation of the Muddy Neck Marsh Complex and continued creation of open water pools within the marsh system and associated loss of critical wetland habitat would occur. In the *Analysis of*

Alternatives (AQ-WHG JV 2022a), additional dredged material management alternatives were thoroughly explored in lieu of ultimate BU placement at Muddy Neck Marsh Complex:

- As discussed above, a CDF was constructed at the Sagers Property for the prior White Creek dredging project, but the option is no longer viable. The facility is now full, and ownership has changed since 2001, prompting multi-year negotiations that could delay the project.
- Construction of a mechanical dewatering facility was explored but eventually invalidated due to lack of surrounding upland space, community impacts, and the nearly twofold cost, relative to the other operations.
- In addition to considering Muddy Neck Marsh Complex as a potential BU repository, alternate sites at James Farm, Slough's Gut, and Indian River Bay Marsh Complex were also explored due to similar material compatibility and constructability. However, based on the observed level of wetland degradation, Muddy Creek Marsh Complex was ultimately selected as the most viable BU option and best opportunity for marsh enhancement.
- A no-action alternative was considered but would result in continued navigability concerns within the Project waterways and continued degradation of the Muddy Creek Marsh Complex.

3 Environmental Analysis

The following subsections provide additional information about the Project and potential effects on the environment because of the Project.

3.1 Sediment and Water Quality

Material in the navigational channels is primarily a mix between fine silt/clay and medium-to-fine sand. Samples range from 4.3% to 77.4% fine content and 22.6% to 95.6% sand content based on the sample area. Sand content is highest at the mouth and headwaters of White Creek.

Shell fragments were not noted in the available characterization data, but it is assumed that they would be present to some extent in this marine environment. Average salinity recorded between October and March from USGS gauges located in the vicinity of White Creek and Muddy Neck Marsh Complex, per the Delaware Water Quality Portal, are similar, with monthly average differences ranging from 0.05 to 3.51 parts per trillion (Center for Environmental Monitoring and Analysis 2022).

A chemical characterization found levels of arsenic in the proposed dredged material exceed DNREC screening criteria; however, they are less than alternate screening values and are also consistent with the range of background values observed in the inland bay region. Other contaminants[2] detected were determined to be low enough to not pose risks to ecological or human health at the Project site. Therefore, the results of the analysis support BU of White Creek dredged material in Muddy Neck Marsh Complex. Further physical and chemical characterization reports of the material and surrounding area can be found as an attachment in the permit package and a detailed screening of sediment chemistry is provided in *Analysis of Chemical Constituents in Sediments* (AQ-WHG JV 2022c) provided along with the Project permit application materials.

As discussed in Section 2.2.3, to control turbidity, silt screens and other biodegradable controls will be placed in and along areas where dredging is to occur and will be monitored frequently, per State of Delaware requirements. Dredging during the winter months will also limit disruption to migrating fish and aquatic species that would otherwise be impacted by turbidity impacts. In addition, close construction administration will also be implemented to ensure no negative impacts to adjacent water quality (e.g., daily site inspections by the construction manager).

3.2 Special Status Habitat and Species

The area supports a variety of nektonic species, including Atlantic silverside, mummichog, spot, striped killifish, summer flounder, sheepshead minnow, and blue crab (McGowan 2017). The shorelines and inner, upland areas in and along White Creek consist of intertidal flats, emergent wetlands, and scrub-shrub wetlands. Intertidal flats consist of mainly smooth cordgrass. Emergent

[2] Contaminants include five pesticides, two polycyclic aromatic hydrocarbons, seven metals, and polychlorinated biphenyls.

wetlands, or tide marsh, consist of low marsh and high marsh vegetation species. Scrub-shrub wetlands contain upland portions of the tidal marshes with mainly marsh elder and groundsel bush. The following are common vegetation species native to the area in and along White Creek: smooth cordgrass, salt hay cordgrass, spike grass, common reed, glassworts, sea lavender, orach, marsh elder, groundsel bush, salt marsh bulrush, and switchgrass (DNREC 1995). However, within the proposed White Creek dredging area, there is no reported submerged vegetation to be affected (DNREC 2021a); additionally, dredging will be limited to the center of the channel and will not directly impact surrounding wetlands.

A hydraulic cutterhead dredge shall be used to transport sediment from the areas being dredged to the planned TLP locations. The use of a dredge is necessary but is limited in size to enable optimal production for the TLP and marsh nourishment operations without overloading receiving cells and creating water management issues. Additionally, pipeline installation may create temporary effects on wildlife, but management will be supported by a low-ground pressure or amphibious excavator to move or reposition pipelines and wye valve assemblies. Dredging flow rate and production will be controlled in the field by the dredging operator and at the discretion of construction managers to minimize runoff from the TLP locations into White Creek, Indian River Bay, and nearby tidal creeks.

TLP will cause initial smothering of vegetation; however, by limiting lift thickness to less than 9 to 12 inches,[3] currently vegetated areas are expected to regrow within two to three growing seasons. Vegetation monitoring will be conducted to document marsh recovery and to confirm no long-term adverse vegetative impacts. Vegetative impacts will be monitored and assessed with respect to wetland vegetation dominance, percent coverage, presence of invasive species, inundation patterns, and wetland soils. Additional details are provided in the *Project Monitoring Plan* for the Project (AQ-WHG JV 2022b).

3.2.1 Special Status Species

Data from the U.S. Fish and Wildlife Service Information for Planning and Consultation (IPaC) planning tool and species list for the State of Delaware was used to determine the potential for special status species to occur within the Project areas (USFWS 2022a, 2022b). Table 4 presents the federally listed special status species with the potential to occur in or adjacent to the Project area. None of the special status species are expected to be affected during dredging; the Project area does not contain critical habitat for the eastern black rail and the species does not forage in the open water. Eastern black rail populations have been declining in the eastern United States for more than a century. This decline has resulted in a retraction of its breeding range, an overall reduction in the

[3] Up to approximately 18 inches may be applied in currently unvegetated areas.

number of breeding locations within its core range, and a loss of individuals within historical strongholds.

While monarch butterflies may be within the dredging area during the October and early November timeframe, they would be expected to avoid the dredging equipment and activities. Monarch butterflies would not be present in the area and any similar species that may be present would be expected to leave the area during dredging operations. The IPaC report is included at an attachment to the permit package.

Table 4
Federal Special Status Species within the Project Area

Scientific Name	Common Name	Category	Special Status
Laterallus jamaicensis ssp. *jamaicensis*	Eastern black rail	Birds	Federally Threatened
Danaus plexippus	Monarch butterfly	Insects	Candidate Species

Source: USFWS 2022b

Delaware maintains a list of species of greatest conservation need and has developed the Delaware Wildlife Action Plan (DNREC 2015). Of the listed species, several including the bog turtle (*Glyptemmys mulenbergii*) and the spotted turtle (*Clemmys guttata*) are associated with wetlands and are likely to be in the Project area during TLP. Similar to species discussed above, these species would be expected to leave the immediate Project area during construction but would benefit from additional habitat following marsh restoration.

3.2.2 Essential Fish Habitat

The Project area contains Essential Fish Habitat (EFH) for both highly migratory and New England/Mid-Atlantic species that may be adversely affected during dredging, though the expected construction window in the winter accommodates many dredging restrictions, such as that of summer flounder, and limits impacts to when aquatic species are not as active as in other seasons. Juveniles and adults are expected to vacate the area once construction starts; however, nearby ponds outside of the placement area will remain and can serve as EFH. The disturbance of bottom sediments associated with dredging could interfere with feeding, predation, and avoidance patterns. However, adverse impacts are expected to be temporary and highly localized. Some eggs and larvae may be entrained during dredging operations; however, this would be temporary and localized to the area being dredged. The Project will ensure low marsh remains in the area to benefit the heterogeneity of fish species. EFH Assessment Worksheets are included as an attachment to the permit package.

Table 5
Species for Which Essential Fish Habitat is Mapped within Delaware Bay and the Delaware Inland Bays

Species	Upper Delaware Bay	Lower Delaware Bay	Inland Bays
Black Sea Bass	JA	JA	JA
Bluefish	JA	JA	JA
Clearnose Skate		A	A
Little Skate		A	A
Red Hake		A	
Scup	JA	JA	JA
Summer Flounder	JA	JA	LJA
Windowpane Flounder	ELJA	ELJA	ELJA
Winter Flounder	ELJA	ELJA	ELJA
Winter Skate		A	A
Butterfish	JA	LJA	JA
Longfin Inshore Squid	X	X	X
Total Species	**8**	**12**	**11**

Abbreviations: E: eggs; L: larvae; J; juveniles; A: adults; X: data not developed for individual life stages
Source: NOAA/TNC

3.3 Cultural Resources

There are no known cultural resources in the White Creek or immediate Muddy Neck Marsh Complex area (DNREC 1995). However, outside of the BU area, several culturally sensitive sites exist across the adjacent waterbody of Miller Creek. To ensure any unanticipated find would be protected, the following cultural resources measure would be added to the construction plan and contract:

- In the unlikely event that any artifact or an unusual amount of bone, shell, or non-native stone is encountered during construction, work shall be immediately stopped and relocated to another area. The contractor shall stop construction within 30 feet of the exposure of these finds until a qualified archaeologist can be retained to evaluate the find. Examples of such cultural materials might include concentrations of ground stone tools, such as mortars, bowls, pestles, and manos; chipped stone tools, such as projectile points or choppers; flakes of stone not consistent with the immediate geology, such as obsidian or fused shale; a historical trash pit containing bottles or ceramics; or structural remains. If the resources are found to be significant, they shall be avoided or shall be mitigated consistent with Delaware's State Historic Preservation Office guidelines.

3.4 Aesthetics

The Project will result in aesthetic impacts, though they will be localized and temporary. Residents proximal to the Project area will be able to view the dredge, but operations will be limited to the 5- to 6-month construction window (fall and winter) and will not coincide with typical peak months of recreation. Staging equipment at the existing CDF makes use of an area with consistent purpose, instead of creating a new construction area that could interfere with aesthetics. The pipeline used to transport the dredged material will be submerged to reduce both navigational and visual impact, though navigational buoys will mark the pipeline's location. The target marsh areas will not differ visually from others in the system, except for the initial months of vegetation smothering and elevated platforms, with vegetative restoration reoccurring within two to three growing seasons.

3.5 Coastal Consistency

Delaware Coastal Programs manages the Delaware's Coastal Zone Management Federal Consistency reviews to ensure that state and federal actions in the coastal zone are consistent and coordinated. Delaware's Coastal Zone Act Program regulates new and existing manufacturing and heavy industrial activities in Delaware's Coastal Zone, which generally runs the length of the state along the Delaware River, the Delaware Bay, the Inland Bays, and the Atlantic Ocean. The Project is regulated under the Coastal Zone Management Act of 1972, as amended, and the National Oceanic and Atmospheric Administration's Federal Consistency Regulations (15 Code of Federal Regulations 930). Therefore, a Delaware Coastal Management Program Federal Consistency Determination form has been completed to support the Project. As identified, the Project is consistent with applicable policies. The Project would reduce navigational constraints for users of White Creek and enhance wetland resiliency in the Muddy Neck Marsh Complex. The Project includes best management practices and controls to ensure environmental protections.

3.6 Notice to Navigational Interests

Because the Project would occur partially within the navigational channel, assuming the Project is approved by USACE, a Notice to Navigational Interests would be filed prior to initiating work. During construction, navigational buoys will indicate the location of the submerged pipeline along Assawoman Canal for safety.

4 Summary

In summary, the Project improves navigation in waterways extensively used by local residents and tourists, by removing shoaled sediment. Dredged material from the Project will restore historically degraded wetlands in the area and improve ecological value and overall resilience of the marsh from future coastal storms. No environmental detriments exist for the project and project construction impacts are determined to be temporary and controlled by construction means and methods (via project specifications and construction contract).

5 References

AQ-WHG JV (Anchor QEA-Woods Hole Group Joint Venture), 2022a. *Analysis of Alternatives.* White Creek Maintenance Dredging and Beneficial Use Project.

AQ-WHG JV, 2022b. *Project Monitoring Plan*. White Creek Dredging and Beneficial Use Project. February 2022.

AQ-WHG JV, 2022c. *Analysis of Chemical Constituents in Sediments.* White Creek Dredging and Beneficial Use Project.

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Figures

LEGEND:

Proposed Thin Layer Placement Cells

NOTES:

0 1,000
Feet

Publish Date: 2021/12/29, 2:40 PM | User: nwagner
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ANCHOR QEA

Figure 4
Aerial Analysis Year: 1926

LEGEND:

Proposed Thin Layer Placement Cells

NOTES:

0 1,000

Feet

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ANCHOR QEA

Figure 5
Aerial Analysis Year: 1954

LEGEND:

Proposed Thin Layer Placement Cells

NOTES:

0 1,000

Feet

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ANCHOR QEA

Figure 6
Aerial Analysis Year: 1961

LEGEND:

Proposed Thin Layer Placement Cells

NOTES:

0 1,000
Feet

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ANCHOR QEA

Figure 7
Aerial Analysis Year: 1992

LEGEND:

Proposed Thin Layer Placement Cells

NOTES:

0 1,000

Feet

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ANCHOR QEA

Figure 8
Aerial Analysis Year: 2002

LEGEND:

Proposed Thin Layer Placement Cells

NOTES:

0 1,000

Feet

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ANCHOR QEA

Figure 9
Aerial Analysis Year: 2007

LEGEND:

Proposed Thin Layer Placement Cells

NOTES:

0 1,000
Feet

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ANCHOR QEA

Figure 10
Aerial Analysis Year: 2017

LEGEND:

- Proposed Thin Layer Placement Cells
- Ponding Extents (2007)
- Ponding Extents (2017)

NOTES:

1. Source: Deleware First Map DE_Imagery/DE_Imagery_2017
2. Extents of ponding are based on research and spatial analysis conducted by the University of Delaware's Water Resources Center and the Delaware Center for the Inland Bays

0 500
Feet

Publish Date: 2022/01/18, 12:40 PM | User: nwagner
Filepath: \\orcas\GIS\Jobs\DelawareDNREC_2191\WhiteCreekDredging\Maps\Analysis_of_Alternatives_Report\AQ_WhiteCreekDredging_PondingAnalysis_Fig03_2017.mxd

ANCHOR QEA

Figure 11
Ponding Analysis: 2007-2017

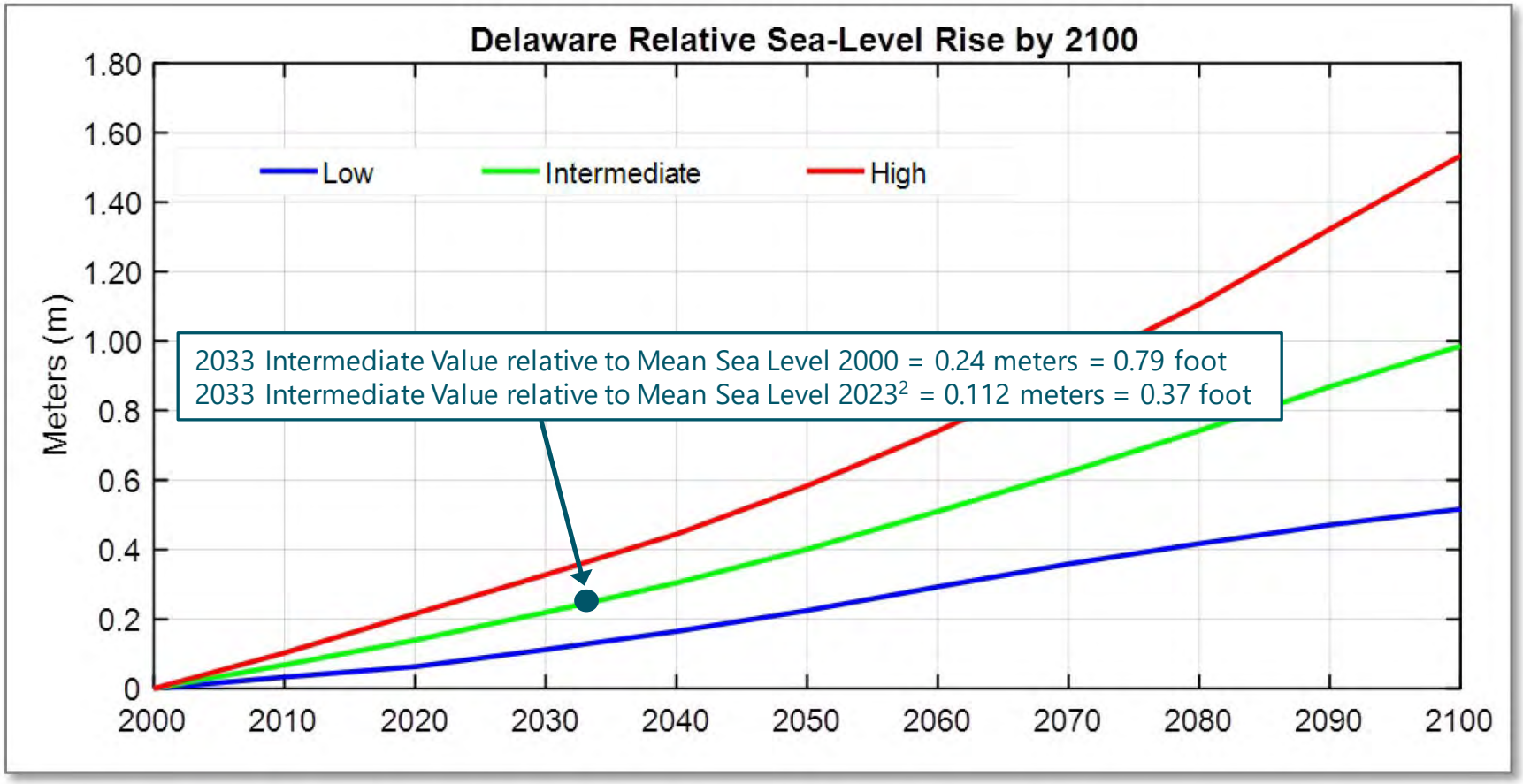
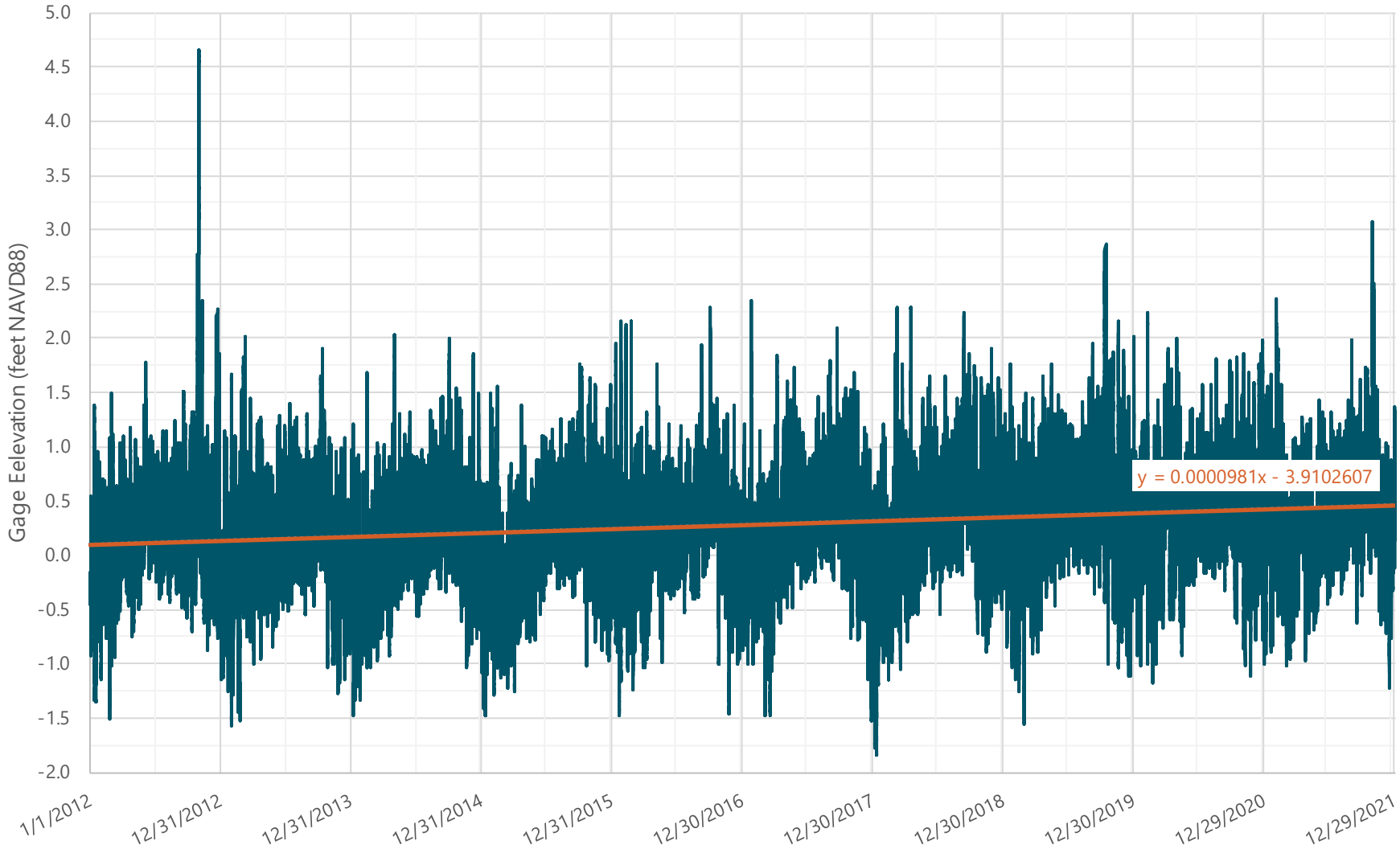


Figure ES-7. The 2017 Delaware SLR planning scenario curves to the year 2100. The Low, Intermediate and High planning scenarios correspond with the 5%, 50%, and 95% probability levels.

Notes:
1. Figure shown is from *Recommendation of Sea-Level Rise Planning Scenarios for Delaware: Technical Report* dated November 2017 developed by the Delaware Sea-Level Rise Technical Committee (DE SLR TC 2017).
2. 2033 Intermediate Sea Level Rise value converted to be relative to Mean Sea Level 2023 using methodology described in DE SLR TC (2017) to estimate 10-year sea-level rise.



Notes:
1. Data shown is high resolution (e.g., 6-minute interval) gage elevation data from USGS 01484696 from 1/1/2012 through 12/31/2021.
2. Trendline slope represents feet per day. Estimated 10-year sea-level rise = (0.0000981 foot/day) x (365 days/year) x (10 years) = 0.36 foot.

ANCHOR QEA

Figure 14

Water Level Data from 2012 through 2021 from USGS 01484696 Jefferson Creek at South Bethany, Delaware

White Creek Dredging and Beneficial Use Project

NOAA Fisheries Greater Atlantic Regional Fisheries Office Essential Fish Habitat (EFH) Assessment & Fish and Wildlife Coordination Act (FWCA) Consultation Worksheet

August 2021 rev.

Authorities

The Magnuson Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with NOAA Fisheries on any action or proposed action authorized, funded, or undertaken by such agency that may adversely affect essential fish habitat (EFH) identified under the MSA. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in the consultation process.

The Fish and Wildlife Coordination Act (FWCA) requires that all federal agencies consult with NOAA Fisheries when proposed actions might result in modifications to a natural stream or body of water. The FWCA also requires that federal agencies consider the effects that these projects would have on fish and wildlife and must also provide for improvement of these resources. Under the FWCA, we work to protect, conserve and enhance species and habitats for a wide range of aquatic resources such as shellfish, diadromous species, and other commercially and recreationally important species that are not federally managed and do not have designated EFH.

It is important to note that these consultations take place between NOAA Fisheries and federal action agencies. **As a result, EFH assessments, including this worksheet, must be provided to us by the federal agency, not by permit applicants or consultants.**

Use of the Worksheet

This worksheet can serve as an EFH assessment for **Abbreviated EFH Consultations**, and as a means to provide information on potential effects to other NOAA trust resources considered under the FWCA. An abbreviated consultation allows us to determine quickly whether, and to what degree, a federal action may adversely affect EFH. Abbreviated consultation procedures can be used when federal actions do not have the potential to cause substantial adverse effects on EFH and when adverse effects could be alleviated through minor modifications.

The intent of the EFH worksheet is to provide a guide for determining the information needed to fully assess the effects of a proposed action on EFH. In addition, the worksheet may be used as a tool to assist you in developing a more comprehensive EFH assessment for larger projects that may have more substantial adverse effects to EFH. <u>However, for large, complex projects that have the potential for significant adverse effects, an **Expanded EFH Consultation** may be warranted and the use of this worksheet alone is not appropriate as your EFH assessment</u>.

An **adverse effect** is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Consultation under the MSA is not required if there is no adverse effect on EFH or if no EFH has been designated in the project area. However, because the definition of "adverse effect" is very broad, most in-water work will result in some level of adverse effect requiring consultation with us, even if the impact is temporary or the overall result of the project is habitat restoration or enhancement. It is important to remember that an adverse effect determination is a trigger to consult with us. It does not mean that a project cannot proceed as proposed, or that project modifications are necessary. An adverse effect determination under the EFH provisions of the MSA simply means that the effects of the proposed action on EFH must be evaluated to determine if there are ways to avoid, minimize, or offset adverse effects. Additional details on EFH consultations, tools, and resources, including frequently asked questions can be found on our website.

Instructions

This worksheet should be used as your EFH assessment for **Abbreviated EFH Consultations** or as a guide to develop your EFH assessment. It is not appropriate to use this worksheet as your EFH assessment for large, complex projects, or those requiring an Expanded EFH Consultation.

When completed fully and with sufficient information to clearly describe the activities proposed, habitats affected, and project impacts, as well as the measures taken to avoid, minimize or offset any unavoidable adverse effects, this worksheet provides us with required components of an EFH assessment including:

1. A description of the proposed action.
2. An analysis of the potential adverse effects on EFH and the federally managed species.
3. The federal agency's conclusions regarding the effects of the action on EFH.
4. Proposed mitigation, if applicable.

When completing this worksheet and submitting information to us, it is important to ensure that sufficient information is provided to clearly describe the proposed project and the activities proposed. At a minimum, this should include the public notice (if applicable) or project application and project plans showing:

- location map of the project site with area of impact.
- existing and proposed conditions.
- all in-water work and the location of all proposed structures and/or fill.
- all waters of the U.S. on the project site with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked.
- Habitat Areas of Particular Concern (HAPCs).
- sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom or natural rocky habitat areas, and shellfish beds.
- site photographs, if available.

Your analysis of effects **should focus on impacts that reduce the quality and/or quantity of the habitat or result in conversion to a different habitat type** for all life stages of species with designated EFH within the action area. Simply stating that fish will move away or that the project

will only affect a small percentage of the overall population is not a sufficient analysis of the effects of an action on EFH. Also, since the intent of the EFH consultation is to evaluate the direct, indirect, individual and cumulative effects of a particular federal action on EFH and to identify options to avoid, minimize or offset the adverse effects of that action, is it not appropriate to conclude that an impact is minimal just because the area affected is a small percentage of the total area of EFH designated. The focus of the consultation is to reduce impacts resulting from the activities evaluated in the assessment. Similarly, a large area of distribution or range of the fish species is also not appropriate rationale for concluding the impacts of a particular project are minimal.

Use the information on the our EFH consultation website and NOAA's EFH Mapper to complete this worksheet. The mapper is a useful tool for viewing the spatial distribution of designated EFH and HAPCs. Because summer flounder HAPC (defined as: " all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH") does not have region-wide mapping, local sources and on-site surveys may be needed to identify submerged aquatic vegetation beds within the project area. The full designations for each species may be viewed as PDF links provided for each species within the Mapper, or via our website links to the New England Fishery Management Councils Omnibus Habitat Amendment 2 (Omnibus EFH Amendment), the Mid-Atlantic Fishery Management Councils FMPs (MAMFC - Fish Habitat), or the Highly Migratory Species website. Additional information on species specific life histories can be found in the EFH source documents accessible through the Habitat and Ecosystem Services Division website. This information can be useful in evaluating the effects of a proposed action. Habitat and Ecosystem Services Division (HESD) staff have also developed a technical memorandum *Impacts to Marine Fisheries Habitat from Non-fishing Activities in the Northeastern United States,* NOAA Technical Memorandum NMFS-NE-209 to assist in evaluating the effects of non-fishing activities on EFH. If you have questions, please contact the HESD staff member in your area to assist you.

Federal agencies or their non-federal designated lead agency should email the completed worksheet and necessary attachments to the HESD New England (ME, NH, MA, CT, RI) or Mid- Atlantic (NY, NJ, PA, DE, MD, VA) Branch Chief and the regional biologist listed on the Contact Regional Office Staff section on our EFH consultation website and listed below.

We will provide our EFH conservation recommendations under the MSA, and recommendations under the FWCA, as appropriate, within 30 days of receipt of a **complete** EFH assessment for an abbreviated consultation. Please ensure that the EFH worksheet is completed in full and includes detail to minimize delays in completing the consultation. If we are unable to assess potential impacts based on the information provided, we may request additional information necessary to assess the effects of the proposed action on our trust resources before we can begin a consultation. If the worksheet is not completely filled out, it may be returned to you for completion. **The EFH consultation and our response clock does not begin until we have sufficient information upon which to consult**.

If this worksheet is not used, you should include all the information required to complete this worksheet in your EFH assessment. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. You may need to prepare a more detailed EFH assessment for more substantial or complex projects to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. The format of the EFH worksheet may not be sufficient to incorporate the extent of detail required for large-scale projects, and a separate EFH assessment may be required.

Regardless of the format, you should include an analysis as outlined in this worksheet for an expanded EFH assessment, along with any additional necessary information including:

- the results of on-site inspections to evaluate habitat and site-specific effects.
- the views of recognized experts on habitat or the species that may be affected.
- a review of pertinent literature and related information.
- an analysis of alternatives that could avoid or minimize adverse effects on EFH.

For these larger scale projects, interagency coordination meetings should be scheduled to discuss the contents of the EFH consultation and the site-specific information that may be needed in order to initiate the consultation.

Please contact our Greater Atlantic Regional Fisheries Office, Protected Resources Division regarding potential impacts to marine mammals or threatened and endangered species and the appropriate consultation procedures.

HESD Contacts*

New England - ME, NH, MA, RI, CT

Chris Boelke, Branch Chief	christopher.boelke@noaa.gov
Mike Johnson - ME, NH	mike.r.johnson@noaa.gov
Kaitlyn Shaw - ME, NH, MA	kaitlyn.shaw@noaa.gov
Sabrina Pereira -RI, CT	sabrina.pereira@noaa

Mid-Atlantic - NY, NJ, PA, MD, VA

Karen Greene, Branch Chief	karen.greene@noaa.gov
Jessie Murray - NY, Northern NJ (Monmouth Co. and north)	jessie.murray@noaa.gov
Keith Hanson - NJ (Ocean Co. and south), DE and PA, Mid-Altantic wind	keith.hanson@noaa.gov
Maggie Sager - NJ (Ocean Co. and south), DE and PA	lauren.m.sager@noaa.gov
Jonathan Watson - MD, DC	jonathan.watson@noaa.gov
David O'Brien - VA	david.l.obrien@noaa.gov

Ecosystem Management (Wind/Aquaculture)

Peter Burns, Branch Chief	peter.burns@noaa.gov
Alison Verkade (NE Wind)	alison.verkade@noaa.gov
Susan Tuxbury (wind coordinator)	susan.tuxbury@noaa.gov

***Please check for the most current staffing list on our contact us page prior to submitting your assessment.**

EFH Assessment Worksheet rev. August 2021

Please read and follow all of the directions provided when filling out this form.

1. General Project Information

Date Submitted:

Project/Application Number:

Project Name:

Project Sponsor/Applicant:

Federal Action Agency (or state agency if the federal agency has provided written notice delegating the authority[1]):

Fast-41: Yes ☐ No ☐

Action Agency Contact Name:

Contact Phone: Contact Email:

Address, City/Town, State:

2. Project Description

[2]Latitude: Longitude:

Body of Water (e.g., HUC 6 name):

Project Purpose:

The purpose of the Project is to improve navigability in White Creek and Assawoman Canal and restore an area of highly degraded coastal salt marsh using dredged material, thereby providing enhanced resiliency to coastal wetlands from the continued effects of sea level rise and other environmental stressors. See Permit Supplement for details.

Project Description:

The proposed Project includes hydraulic dredging at White Creek (including the main channel and two prongs at the headwaters) to the previously maintained depth of -4 MLLW. An adjoining portion of the adjacent Assawoman Canal channel (northernmost 0.4 miles of canal) will be also be hydraulically dredged to the previously maintained depth of -3 MLLW. An additional 1-foot overdredge is included in the design for all areas. Dredged material will be transported via pipeline running the length of the Assawoman Canal to the beneficial use (BU) placement site at Muddy Neck Marsh Complex located within Assawoman Wildlife Area. Dredged material will be beneficially used through thin layer placement (TLP) methodologies to enhance marsh elevations and restore the wetlands which have been subject to expansive ponding and deterioration in recent decades. See Permit Supplement for site map and additional project overview.

Anticipated Duration of In-Water Work including planned Start/End Dates and any seasonal restrictions proposed to be included in the schedule:

October 2022-April 2023

[1] A federal agency may designate a non-Federal representative to conduct an EFH consultation by giving written notice of such designation to NMFS. If a non-federal representative is used, the Federal action agency remains ultimately responsible for compliance with sections 305(b)(2) and 305(b)(4)(B) of the Magnuson-Stevens Act. [2] Provide the decimal, or the degrees, minutes, seconds values for latitude and longitude using the World Geodetic System 1984 (WGS84) and negative degree values where applicable.

3. Site Description

EFH includes the biological, chemical, and physical components of the habitat. This includes the substrate and associated biological resources (e.g., benthic organisms, submerged aquatic vegetation, shellfish beds, salt marsh wetlands), the water column, and prey species.

Is the project in designated EFH[3]? ☑ Yes ☐ No

Is the project in designated HAPC? ☐ Yes ☑ No

Does the project contain any Special Aquatic Sites[4]? ☐ Yes ☑ No

Is this coordination under FWCA only? ☑ Yes ☐ No

Total area of impact to EFH (indicate sq ft or acres): 0

Total area of impact to HAPC (indicate sq ft or acres): NA

Current range of water depths at MLW _____ Salinity range (PPT): _____ Water temperature range (°F): _____

[3]Use the tables in Sections 5 and 6 to list species within designated EFH or the type of designated HAPC present. See the worksheet instructions to find out where EFH and HAPC designations can be found. [4] Special aquatic sites (SAS) are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. They include sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes (40 CFR Subpart E). If the project area contains SAS (i.e. sanctuaries and refuges, wetlands, mudflats, vegetated shallows/SAV, coral reefs, and/or riffle and pool complexes, describe the SAS, species or habitat present, and area of impact.

4. Habitat Types

In the table below, select the location and type(s) for each habitat your project overlaps. For each habitat type selected, indicate the total area of expected impacts, then what portion of the total is expected to be temporary (less than 12 months) and what portion is expected to be permanent (habitat conversion), and if the portion of temporary impacts will be actively restored to pre- construction conditions by the project proponent or not. A project may overlap with multiple habitat types.

Habitat Location	Habitat Type	Total impacts ($lf/ft^2/ft^3$)	Temporary impacts ($lf/ft^2/ft^3$)	Permanent impacts ($lf/ft^2/ft^3$)	Restored to pre-existing conditions?*
Estuarine	Wetland (emergent)*				Yes
Estuarine	Shore (vegetated non-wetla				Yes
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one

*Restored to pre-existing conditions means that as part of the project, the temporary impacts will be actively restored,such as restoring the project elevations to pre-existing conditions and replanting. It does not include natural restoration or compensatory mitigation.

EFH Mapper Report

EFH Data Notice

Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Query Results

Degrees, Minutes, Seconds: Latitude = , Longitude =
Decimal Degrees: Latitude = , Longitude =

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Little Skate	Juvenile Adult	New England	Amendment 2 to the Northeast Skate Complex FMP
		Atlantic Herring	Juvenile	New England	Amendment 3 to the Atlantic Herring FMP
		Red Hake	Adult	New England	Amendment 14 to the Northeast Multispecies FMP
		Windowpane Flounder	Adult Larvae Eggs Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
		Winter Skate	Adult Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP
		Clearnose Skate	Adult Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP
		Smoothhound Shark Complex (Atlantic Stock)	ALL	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Longfin Inshore Squid	Eggs	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
		Bluefish	Adult Juvenile	Mid-Atlantic	Bluefish

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Atlantic Butterfish	Eggs Larvae Adult Juvenile	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
		Spiny Dogfish	Sub-Adult Female	Mid-Atlantic	Amendment 3 to the Spiny Dogfish FMP
		Scup	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Summer Flounder	Larvae Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Black Sea Bass	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass

Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

HAPCs

Link	Data Caveats	HAPC Name	Management Council
		Summer Flounder	Mid-Atlantic

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

EFH Mapper Report

EFH Data Notice

Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Greater Atlantic Regional Office
Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 38º 34' 29" N, Longitude = 76º 53' 53" W
Decimal Degrees: Latitude = 38.575, Longitude = -75.102

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

*** W A R N I N G ***

Please note under "Life Stage(s) Found at Location" the category "ALL" indicates that all life stages of that species share the same map and are designated at the queried location.

EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Little Skate	Juvenile Adult	New England	Amendment 2 to the Northeast Skate Complex FMP
		Atlantic Herring	Juvenile	New England	Amendment 3 to the Atlantic Herring FMP
		Red Hake	Adult	New England	Amendment 14 to the Northeast Multispecies FMP
		Windowpane Flounder	Adult Larvae Eggs Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
		Winter Skate	Adult Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP
		Clearnose Skate	Adult Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP
		Longfin Inshore Squid	Eggs	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Bluefish	Adult Juvenile	Mid-Atlantic	Bluefish
		Atlantic Butterfish	Adult Juvenile	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
		Spiny Dogfish	Sub-Adult Female Adult Male	Mid-Atlantic	Amendment 3 to the Spiny Dogfish FMP
		Scup	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Summer Flounder	Larvae Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Black Sea Bass	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass

Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data. ****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**
All spatial data is currently available for the Mid-Atlantic and New England councils, **Secretarial EFH**, Bigeye Sand Tiger Shark, Bigeye Sixgill Shark, Caribbean Sharpnose Shark, Galapagos Shark, Narrowtooth Shark, Sevengill Shark, Sixgill Shark, Smooth Hammerhead Shark, Smalltail Shark

Submerged Aquatic Vegetation (SAV) Present?:

Yes: ☐ No: ☑

If the project area contains SAV, or has historically contained SAV, list SAV species and provide survey results including plans showing its location, years present and densities if available. Refer to Section 12 below to determine if local SAV mapping resources are available for your project area.

Sediment Characteristics:
The level of detail required is dependent on your project – e.g., a grain size analysis may be necessary for dredging. In addition, if the project area contains rocky/hard bottom habitat [6](pebble, cobble, boulder, bedrock outcrop/ledge) identified as Rocky (coral/rock), Substrate (cobble/gravel), or Substrate (rock) above, describe the composition of the habitat using the following table.

Substrate Type* (grain size)	Present at Site? (Y/N)	Approximate Percentage of Total Substrate on Site
Silt/Mud (<0.063mm)	Yes	
Sand (0.063-2mm)	Yes	
Rocky: Pebble/Gravel /Cobble(2-256mm)**	Yes	
Rocky: Boulder (256-4096mm)**	No	
Rocky: Coral	No	
Bedrock**	No	

[6]The type(s) of rocky habitat will help you determine if the area is cod HAPC.
* Grain sizes are based on Wentworth grain size classification scale for granules, pebbles, cobbles, and boulders.
** Sediment samples with a content of 10% or more of pebble-gravel-cobble and/or boulder in the top layer (6-12 inches) should be delineated and material with epifauna/macroalgae should be differentiated from bare pebble-gravel-cobble and boulder.

If no grain size analysis has been conducted, please provide a general description of the composition of the sediment. If available please attach images of the substrate.

Diadromous Fish (migratory or spawning habitat- identify species under Section 10 below):
Yes: ☑ No: ☐

5. EFH and HAPC Designations

Within the Greater Atlantic Region, EFH has been designated by the New England, Mid-Atlantic, and South Atlantic Fisheries Management Councils and NOAA Fisheries. Use the EFH mapper to determine if EFH may be present in the project area and enter all species and life stages that have designated EFH. Optionally, you may review the EFH text descriptions linked to each species in the EFH mapper and use them to determine if the described habitat is present at your project site. If the habitat characteristics described in the text descriptions do not exist at your site, you may be able to exclude some species or life stages from additional consideration. For example, the water depths at your site are shallower that those described in the text description for a particular species or life stage. We recommend this for larger projects to help you determine what your impacts are.

Species Present	**EFH is designated/mapped for:**				**What is the source of the EFH information included?**
	EFH: eggs	**EFH: larvae**	**EFH: juvenile**	**EFH: adults/ spawning adults**	
Black sea bass	☐	☐	✔	✔	EFH Mapper c
blue shark	☐	☐	✔	✔	EFH Mapper c
clearnose skate	☐	☐	☐	✔	EFH Mapper c
little skate	☐	☐	☐	✔	EFH Mapper c
scup	☐	☐	✔	✔	EFH Mapper c
summer flounder	☐	✔	✔	✔	EFH Mapper c
winter flounder	✔	✔	✔	✔	EFH Mapper c
windowpane flounder	✔	✔	✔	✔	EFH Mapper c
Select One	☐	☐	☐	☐	Select One
Select One	☐	☐	☐	☐	Select One
Select One	☐	☐	☐	☐	Select One

6. Habitat Areas of Particular Concern (HAPCs)

HAPCs are subsets of EFH that are important for long-term productivity of federally managed species. HAPCs merit special consideration based their ecological function (current or historic), sensitivity to human-induced degradation, stresses from development, and/or rarity of the habitat.While many HAPC designations have geographic boundaries, there are also habitat specific HAPC designations for certain species, see note below. Use the EFH mapper to identify HAPCs within your project area. Select all that apply.

☐	Summer flounder: SAV[7]	☐	Alvin & Atlantis Canyons
☐	Sandbar shark	☐	Baltimore Canyon
☐	Sand Tiger Shark (Delaware Bay)	☐	Bear Seamount
☐	Sand Tiger Shark (Plymouth-Duxbury-Kingston Bay)	☐	Heezen Canyon
☐	Inshore 20m Juvenile Cod[8]	☐	Hudson Canyon
☐	Great South Channel Juvenile Cod	☐	Hydrographer Canyon
☐	Northern Edge Juvenile Cod	☐	Jeffreys & Stellwagen
☐	Lydonia Canyon	☐	Lydonia, Gilbert & Oceanographer Canyons
☐	Norfolk Canyon (Mid-Atlantic)	☐	Norfolk Canyon (New England)
☐	Oceanographer Canyon	☐	Retriever Seamount
☐	Veatch Canyon (Mid-Atlantic)	☐	Toms, Middle Toms & Hendrickson Canyons
☐	Veatch Canyon (New England)	☐	Washington Canyon
☐	Cashes Ledge	☐	Wilmington Canyon
☐	Atlantic Salmon		

[7] Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included. Use local information to determine the locations of HAPC.

[8] The purpose of this HAPC is to recognize the importance of inshore areas to juvenile Atlantic cod. The coastal areas of the Gulf of Maine and Southern New England contain structurally complex rocky-bottom habitat that supports a wide variety of emergent epifauna and benthic invertebrates. Although this habitat type is not rare in the coastal Gulf of Maine, it provides two key ecological functions for juvenile cod: protection from predation, and readily available prey. See EFH mapper for links to text descriptions for HAPCs.

7. Activity Details

Select all that apply	Project Type/Category
☐	Agriculture
☐	Aquaculture - List species here:
☐	Bank/shoreline stabilization (e.g., living shoreline, groin, breakwater, bulkhead)
☐	Beach renourishment
☑	Dredging/excavation
☐	Energy development/use e.g., hydropower, oil and gas, pipeline, transmission line, tidal or wave power, wind
☐	Fill
☐	Forestry
☐	Infrastructure/transportation (e.g., culvert construction, bridge repair, highway, port, railroad)
☐	Intake/outfall
☐	Military (e.g., acoustic testing, training exercises)
☐	Mining (e.g., sand, gravel)
☐	Overboard dredged material placement
☐	Piers, ramps, floats, and other structures
☑	Restoration or fish/wildlife enhancement (e.g., fish passage, wetlands, mitigation bank/ILF creation)
☐	Survey (e.g., geotechnical, geophysical, habitat, fisheries)
☐	Water quality (e.g., storm water drainage, NPDES, TMDL, wastewater, sediment remediation)
☐	Other:

8. Effects Evaluation

Select all that apply	Potential Stressors Caused by the Activity
☑	Underwater noise
☑	Water quality/turbidity/ contaminant release
☐	Vessel traffic/barge grounding
☐	Impingement/entrainment
☐	Prevent fish passage/spawning
☐	Benthic community disturbance
☐	Impacts to prey species

Select all that apply and if temporary[9] or permanent		Habitat alterations caused by the activity
Temp	Perm	
☐	☐	Water depth change
☐	☐	Tidal flow change
☐	☑	Fill
☐	☑	Habitat type conversion
☐	☐	Other:
☐	☐	Other:

[9] Temporary in this instance means during construction. [10] Entrainment is the voluntary or involuntary movement of aquatic organisms from a water body into a surface diversion or through, under, or around screens and results in the loss of the organisms from the population. Impingement is the involuntary contact and entrapment of aquatic organisms on the surface of intake screens caused when the approach velocity exceeds the swimming capability of the organism.

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Details - project impacts and mitigation

Briefly describe how the project would impact each of the habitat types selected above and the amount (i.e., acreage or sf) of each habitat impacted. Include temporary and permanent impact descriptions and direct and indirect impacts. For example, dredging has a direct impact on bottom sediments and associated benthic communities. The turbidity generated can result in a temporary impact to water quality which may have an indirect effect on some species and habitats such as winter flounder eggs, SAV or rocky habitats. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. Attach supplemental information if necessary.

The Project area contains Essential Fish Habitat (EFH) for both highly migratory and New England/Mid-Atlantic species that may be adversely affected during dredging, though the expected construction window in the winter accommodates many dredging restrictions, such as that of summer flounder, and limits impacts to when aquatic species are not as active as in other seasons. Juveniles and adults are expected to vacate the area once construction start; however, nearby ponds outside of the placement area will remain and can serve as EFH. The disturbance of bottom sediments associated with dredging could interfere with feeding, predation, and avoidance patterns. However, adverse impacts are expected to be temporary and highly localized. Some eggs and larvae may be entrained during dredging operations; however, this would be temporary and localized to the area being dredged. The Project will ensure low marsh remains in the area to benefit the heterogeneity of fish species

What specific measures will be used to avoid and minimize impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided or minimized, why not?

• Taking lessons from recent TLP projects in New Jersey that demonstrated that physical perimeter controls can result in negative impacts on adjacent sites and water quality when installed and removed (The Nature Conservancy and NJ Dept. of Environmental Protection, 2021), the Project will instead rely on alternative methods for containment, including:
– Transition zones comprised of up to 50-foot horizontal offsets from marsh edges
– Biodegradable coir logs and hay bales secured by wooden stakes (by hand) and maintained to wit

Is compensatory mitigation proposed? Yes ☐ No ☑

If compensatory mitigation is not proposed, why not? If yes, describe plans for compensatory mitigation (e.g. permittee responsible, mitigation bank, in-lieu fee) and how this will offset impacts to EFH and other aquatic resources. Include a proposed compensatory mitigation and monitoring plan as applicable.

9. Effects of Climate Change

Effects of climate change should be included in the EFH assessment if the effects of climate change may amplify or exacerbate the adverse effects of the proposed action on EFH. Use the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP) 8.5/high greenhouse gas emission scenario (IPCC 2014), at a minimum, to evaluate the future effects of climate change on the proposed projections. For sea level rise effects, use the intermediate-high and extreme scenario projections as defined in Sweet et al. (2017). For more information on climate change effects to species and habitats relative to NMFS trust resources, see Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes.

1. Could species or habitats be adversely affected by the proposed action due to projected changes in the climate?If yes, please describe how:

Will help ensure habitat resiliency

2. Is the expected lifespan of the action greater than 10 years? If yes, please describe project lifespan:

Yes

3. Is climate change currently affecting vulnerable species or habitats, and would the effects of a proposed action be amplified by climate change? If yes, please describe how:

yes, proposed project goal is to restore wetlands considering sea level rise

4. Do the results of the assessment indicate the effects of the action on habitats and species will be amplified by climate change? If yes, please describe how:

Field surveys confirmed platform elevations at the site indicate subsidence below the local line of mean lower low water (MLLW); causes of this fragmentation include sea level rise, sediment

5. Can adaptive management strategies (AMS) be integrated into the action to avoid or minimize adverse effects of the proposed action as a result of climate? If yes, please describe how:

Yes, an adaptive management plan will be developed

10. Federal Agency Determination

Federal Action Agency's EFH determination (select one)	
☐	There is no adverse effect[7] on EFH or EFH is not designated at the project site. EFH Consultation is not required. This is a FWCA only request.
☐	The adverse effect[7] on EFH is not substantial. This means that the adverse effects are no more than minimal, temporary, or can be alleviated with minor project modifications or conservation recommendations. This is a request for an abbreviated EFH consultation.
☐	The adverse effect[7] on EFH is substantial. This is a request for an expanded EFH consultation. We will provide more detailed information, including an alternatives analysis and NEPA documents, if applicable.

[7] An adverse effect is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

11. Fish and Wildlife Coordination Act

Under the FWCA, federal agencies are required to consult with us if actions that the authorize, fund, or undertake will result in modifications to a natural stream or body of water. Federal agencies are required to consider the effects these modifications may have on fish and wildlife resources, as well as provide for the improvement of those resources. Under this authority, we consider the effects of actions on NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats, that are not managed under a federal fisheries management plan. Some examples of other NOAA-trust resources are listed below. Some of these species, including diadromous fishes, serve as prey for a number of federally-managed species and are therefore considered a component of EFH pursuant to the MSA. We will be considering the effects of your project on these species and their habitats as part of the EFH/FWCA consultation process and may make recommendations to avoid, minimize or offset and adverse effects concurrently with our EFH conservation recommendations.

Please contact our Greater Atlantic Regional Fisheries Office, Protected Resources Division regarding potential impacts to marine mammals or species listed under the Endangered Species Act and the appropriate consultation procedures.

Fish and Wildlife Coordination Act Resources	
Species known to occur at site (list others that may apply)	**Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.**
alewife	
American eel	
American shad	
Atlantic menhaden	
blue crab	
blue mussel	
blueback herring	
Eastern oyster	
horseshoe crab	
quahog	
soft-shell clams	
striped bass	
other species:	
other species:	
other species:	

12. Useful Links

National Wetland Inventory Maps
EPA's National Estuary Program (NEP)
Northeast Regional Ocean Council (NROC) Data Portal
Mid-Atlantic Regional Council on the Ocean (MARCO) Data Portal

Resources by State

Maine
Maine Office of GIS Data Catalog
Town shellfish information including shellfish conservation area maps
State of Maine Shellfish Sanitation and Management
Eelgrass maps
Casco Bay Estuary Partnership
Maine GIS Stream Habitat Viewer

New Hampshire
NH Statewide GIS Clearinghouse, NH GRANIT
NH Coastal Viewer
State of NH Shellfish Program

Massachusetts
MA DMF Shellfish Sanitation and Management Program
MassGIS Data (Including Eelgrass Maps)
MA DMF Recommended TOY Restrictions Document Massachusetts
Bays National Estuary Program
Buzzards Bay National Estuary Program
Massachusetts Division of Marine Fisheries
Massachusetts Office of Coastal Zone Management

Rhode Island
RI Shellfish and Aquaculture
RI Shellfish Management Plan
RI Eelgrass Maps
Narragansett Bay Estuary Program
Rhode Island Division of Marine Fisheries
Rhode Island Coastal Resources Management Council

Connecticut

CT Bureau of Aquaculture

Natural Shellfish Beds in CT

Eelgrass Maps

Long Island Sound Study

CT GIS Resources

CT DEEP Office of Long Island Sound Programs and Fisheries

CT River Watershed Council

New York

Eelgrass Report

Peconic Estuary Program

NY/NJ Harbor Estuary Program

New York GIS Clearinghouse

New Jersey

Submerged Aquatic Vegetation Mapping

Barnegat Bay Partnership

NJ GeoWeb

NJ DEP Shellfish Maps

Pennsylvania

Delaware River Management Plan

PA DEP Coastal Resources Management Program

PA DEP GIS Mapping Tools

Delaware

Partnership for the Delaware Estuary

Center for Delaware Inland Bays

Delaware FirstMap

Maryland

Submerged Aquatic Vegetation Mapping

MERLIN (Maryland's Environmental Resources and Land Information Network)

Maryland Coastal Atlas

Maryland Coastal Bays Program

Virginia

VMRC Habitat Management Division

Submerged Aquatic Vegetation mapping