U.S. Army Corps of Engineers (USACE)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

For use of this form, see 33 CFR 325. The proponent agency is CECW-COR.

Form Approved - OMB No. 0710-0003
Expires: 2027-10-31

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: http://dpcld.defense.gov/Privacy/SORNsIndex/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED 05/12/2025	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First – Jeremey Middle – Last – Ashe Company – E-mail Address – jeremey.ashe@delaware.gov	First – Melissa Middle – Last – Kalb Company – E-mail Address – mkalb@kleinfelder.com
6. APPLICANT'S ADDRESS: Address – 89 Kings Highway City – Dover State – DE Zip - 19901 Country – US	9. AGENT'S ADDRESS: Address – 550 Bay Street City – Dover State – DE Zip – 19901 Country – US
7. APPLICANT'S PHONE NOs. w/AREA CODE a. Business b. c. Fax +13027399081	10. AGENTS PHONE NOs. w/AREA CODE a. Primary b. c. Fax +14107396007

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Melissa Kalb to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

/s/ - provided on authorized agent form 05/12/2025

SIGNATURE OF APPLICANT Date

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

Leipsic Research Vessel Dock and Storage Building

13. NAME OF WATERBODY, IF KNOWN (if applicable)

Leipsic River

14. PROJECT STREET ADDRESS (if applicable)

Address 67 Lombard St

City – Leipsic State – DE

Zip – 19901

15. LOCATION OF PROJECT

Latitude: ◦N 39.2425921 Longitude: ◦W -75.5128602

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID 4-13-03910-01-3100-00001 Municipality –

Section – Township –

Range –

17. DIRECTIONS TO THE SITE

ROM DOVER: Take US13 north to Leipsic Rd, turn right onto Leipsic Rd. Turn left onto DE-9N, Take Main St to Lombard St in Leipsic.

18. Nature of Activity (Description of project, include all features)

The 5.7 +/- acre project area (Site) is on the Whedbee Property at the eastern terminus of Lombard Street, in Leipsic, Delaware. The parcel is generally bound to the north and west by the Leipsic River, to the east by marsh, and to the south by residences. The project area is comprised of mainly marshland, open water, a residence, and outbuildings. Current structures on the property are limited to one residence, sheds, and remnants of a wooden dock. Project activities involve construction of a new research vessel dock, fueling facility, and a storage building. The dock is intended to support one (1) research vessel, the First State, that is 60 long. Other vessels may be moored at the dock from time to time; however, no more than four (4) vessels will utilize the dock at any one time. The dock will be fixed, with water and electric service. The gangway and dock width are necessary to provide space for pallet jacks and personnel to transport large equipment from the research vessel to the storage facility, and to safely use a hydraulic boat boom to move oyster equipment. The storage building will be uninhabited, but with electric and plumbing. No engine maintenance will occur at the site.

The proposed dock construction will not result in any loss of wetlands. The dock will results in Section 10 impacts to an estuarine, unconsolidated bottom, subtidal channel (E1UBL). All areas disturbed during construction will be restored to pre-construction or better conditions.
The project will require the repair and slight reconfiguration of existing pavement. The impacts associated with the pavement maintenance are being addressed under a Nationwide Permit 3.

The proposed dock will be made of prefabricated aluminum decking sections that are 20 x 10. The decking will consist of 8.625-inch-wide aluminum planks with a 3/8th inch gap between planks.
The dock will be 120 long x 10 wide (six prefabricated sections) with an attached 5 x 5 platform holding a hose reel. The dock will have water and electric service. The dock will be fixed at the end of a 10 x 27 raised aluminum decking gangway. The structure extends approximately 25.2 feet channelward of MLW and approximately 41.1 feet channelward of MHW. The dock and gangway will require 18 galvanized steel support pilings. The building will be on the upland part of property and will be 60 x 66 with a portion (20 x 66) dedicated to boat storage and office space. The building will be uninhabited and equipped with electric and plumbing.
The proposed location of the dock piles is close enough to the shoreline that the contractor will drive piles from the shoreline.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

The purpose of the project is to have a place for DNREC Fish and Wildlife to dock a research vessel and to establish a fueling facility and storage building.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

21. Type(s) of Material Being Discharged and the Amount of Each Type:

See Appendix C

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

See Appendix C

23. Description of Avoidance, Minimization, and Compensation (see instructions)

Due to the nature of the project, complete avoidance is not practical. The dock was designed to avoid placing any fill in wetlands. No in-water work will occur from March 1 through July 31 to adhere to all RTE guidance. Installation of piles will follow Project Design Criteria outlined in the GARFO ESA Section 7: NLAA Program Verification Form to minimize underwater noise impacts. All work will follow Delaware Erosion and Sediment Control guidelines. The research vessel will operate in adequate depths to avoid propeller scour and ground. No compensation is planned for this project because it will not result in permanent loss of any WoUS.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☑ No

If Yes, describe the completed work:

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

/s/ - provided on authorized agent form		Melissa Kalb	05/12/2025
SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

U.S. Army Corps of Engineers (USACE)

STANDARD PERMIT PROJECT INFORMATION SHEET

(ITEMS 1 THRU 3 TO BE FILLED OUT BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED
		05/12/2025

(ITEMS BELOW TO BE FILLED OUT BY APPLICANT)

4. SELECT THE TYPE OF PERMIT YOU'RE REQUESTING

☐ Standard ☑ Letter Of Permission ☐ General Permit

5. SELECT A DEVELOPMENT TYPE

☐ Commercial ☐ Non-commercial ☑ Government/Tribal

6. APPLICABLE STATUTORY AUTHORITY

☐ Section 404 Clean Water Act ☑ Section 10 Rivers and Harbors Act ☐ Section 103 of the Marine Protection, Research, and Sanctuaries Act

ENDANGERED AND THREATENED SPECIES

7. DESCRIBE YOUR CURRENT KNOWLEDGE OF ENDANGERED SPECIES THAT MAY BE AFFECTED BY ACTIVITIES OCCURRING WITHIN THE PROJECT OR ACTION AREA

ADDITIONAL AFFECTED SPECIES:

In a letter dated May 12, 2025, DNREC- Species Conservation and Research Program (SCRP) indicated that the project area does not lie within a State Natural Heritage Site, nor does it lie within a Delaware National Estuarine Research Reserve. The SCRP requests a work restriction April 1st to July 31st to avoid impacts to marsh nesting birds and a restriction March 1st to May 15th to allow upstream passage of young eels. In addition, the Leipsic River is utilized by anadromous fish so a time of year restriction on in-water work March 15th to June 30th will be followed. SCRP identified habitat on this parcel as ecologically important by the Delaware Ecological Network (DEN) and indicated portions of the project area are classified as a core area and a hub. The DEN, although non-regulatory, is a statewide conservation network developed using GIS and field collected datasets that help to identify and prioritize ecologically important areas for natural resource protection. The DEN includes ecologically important areas such as forests, wetlands, and streams that support rare species and areas of especially high quality. We recommend that this DEN designated area be protected to the fullest extent possible. Project activities are not anticipated to impact the DEN. Consultation with USFWS indicated "No effect" to any federally rare, threatened, or endangered species. The NOAA Essential Fish Habitats (EFH) mapper indicated that the project boundary intersects with EFH for 12 species and one (1) Habitat Areas of Particular Concern (HAPC). Consultation with DNREC SCRP confirmed that the Leipsic River provides anadromous fish habitat, so a NOAA Fisheries Greater Atlantic Regional Fisheries Office Essential Fish Habitat (EFH) Assessment & Fish and Wildlife Coordination Act (FWCA) Consultation Worksheet is included with this application. The NOAA Section 7 mapper indicated three life stages of Atlantic sturgeon and one life stage of Shortnose sturgeon may occur within the vicinity of the action area. A GARFO ESA Section 7: NLAA Program Verification Form is included as supporting information this application.

HISTORIC PROPERTIES

8. DESCRIBE YOUR CURRENT KNOWLEDGE OF HISTORIC PROPERTIES THAT WOULD HAVE THE POTENTIAL TO BE IMPACTED BY ACTIVITIES OCCURRING WITHIN THE AREA OF POTENTIAL EFFECT/PERMIT AREA

The Delaware State Historic Preservation office (SHPO) was notified of the project on April 17, 2024. The 30-day comment period has passed, so we have assumed concurrence with our No Adverse Effects findings.

NATIONAL WILD AND SCENIC RIVERS

9. IF THE PROPOSED ACTIVITY WOULD OCCUR IN A NATIONAL WILD AND SCENIC RIVER SYSTEM OR IN AN OFFICIALLY DESIGNATED STUDY RIVER, LIST THE RIVER OR STUDY RIVER

SECTION 408 USACE CIVIL WORKS PROJECTS

10. WILL THE PROPOSED ACTIVITY REQUIRES PERMISSION FROM THE USACE PURSUANT TO 33 U.S.C. 408 BECAUSE IT WILL ALTER OR TEMPORARILY OR PERMANENTLY OCCUPY OR USE A U.S. ARMY CORPS OF ENGINEERS FEDERALLY AUTHORIZED CIVIL WORKS PROJECT?

☐ Yes ☑ No ☐ I'm not sure

11. IF BLOCK 10 IS YES, HAVE YOU SUBMITTED A WRITTEN REQUEST FOR SECTION 408 PERMISSION FROM THE USACE DISTRICT HAVING JURISDICTION OVER THAT PROJECT?

☐ Yes ☑ No

12. IF BLOCK 11 IS YES, PROVIDE THE DATE YOUR REQUEST WAS SUBMITTED TO THE DISTRICT

SECTION 103 OF THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT

13. HAS THE PROPOSED DISPOSAL SITE BEEN DESIGNATED FOR USE BY THE ADMINISTRATOR, EPA, PURSUANT TO SECTION 102(C) OF THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972, AS AMENDED (33 U.S.C. 1413)?

14. IF BLOCK 13 IS NO, DESCRIBE THE CHARACTERISTICS OF THE PROPOSED DISPOSAL SITE AND AN EXPLANATION AS TO WHY NO PREVIOUSLY DESIGNATED DISPOSAL SITE IS FEASIBLE

15. DESCRIBE KNOWN DREDGED MATERIAL DISCHARGES AT THE PROPOSED DISPOSAL SITE

16. PROVIDE THE EXISTENCE AND DOCUMENTED EFFECTS OF OTHER AUTHORIZED DISPOSALS THAT HAVE BEEN MADE IN THE DISPOSAL AREA (E.G., HEAVY METAL BACKGROUND READING AND ORGANIC CARBON CONTENT)	
17. PROVIDE THE ESTIMATED LENGTH OF TIME DURING WHICH THE DISPOSAL WOULD CONTINUE AT THE PROPOSED SITE (in months)	18. PROVIDE THE SOURCE OF THE MATERIAL
19. DESCRIBE THE TYPE AND COMPOSITION OF THE MATERIAL	20. DESCRIBE THE METHOD OF TRANSPORTATION AND DISPOAL OF THE MATERIAL

Appendix B. Aquatic Resource Inventory:

Aquatic Resource Name	*State*	*Cowardin System*	*Cowardin Class*	*HGM Class*	*Local Waterway Name*	*Measurement Type*	*Measurement Amount*	*Measurement Units*	*Waters Type*	*Latitude*	*Longitude*
Leipsic	DELAWARE	ESTUARINE	E1UB-ESTUARINE, SUBTIDAL UNCONSOLIDATED BOTTM			Area	5.124	ACRE		39.24287	-75.512829
WL1	DELAWARE	ESTUARINE	E2EM-ESTUARINE, INTERTIDAL, EMERGENT			Area	1.4048	ACRE		39.242734	-75.512783

Appendix C. Impact Inventory:

Water Name	*Impact Name*	*Activity*	*Type of Material Being Discharged*	*Resource Type*	*Permanent Loss (Y/N)*	*Impact Duration*	*Amount Type*	*Proposed Length*	*Proposed Width*	*Proposed Amount*	*Amount Units*
Leipsic	Impact 1 - Dock and Gangway	Structure (Sec 10 only)		River/Stream	No	Permanent	Structure Area	161	10	1610	Square Feet

Provide any additional information you may have about the proposed quantity of wetlands, streams, or other types of waters directly affected by the proposed activity. This level of detail is helpful to better understand the type of impacts that are proposed for your project.

Impact 1 represents the structure over a navigable water of the United States that is considered to have an impact on the navigable capacity of the waterbody. The structure extends approximately 25.2 feet channelward of MLW and 41.1 feet channelward of MHW. The structure is T shaped, with a 10-foot wide gangway extending 31.1 feet channelward of MHW and attaching to a dock that is 10 feet wide by 120 feet long (parallel to the riverbank). The average width of the waterway in the location of the project is approximately 175 feet. Therefore, at MHW, the structure will affect less than 25% of the width of the water body and at MLW is less than 20%. Any areas disturbed for temporary construction access will be restored to pre-construction or better conditions.

Definitions and help text

Water Name: The name of the wetland, stream, or other type of water that would be impacted.

Impact Name: Useful if entering more than one impact for the same or multiple waters (e.g., linear projects) and name accordingly. This may be different than the Water Name; keep it short and simple. For example, if Stream-1 is the water, the impact name could be “Crossing-1,” “Crossing-2,” “Crossing-3.” A short name helps describe the impact and is useful when looking at a list of impacts.

Activity: Options are:

- Conversion of waters type (forested wetland to emergent wetland, stream to lake)
- Discharge of dredged material
- Discharge of fill material
- Dredging (Section 10)
- Ecological restoration
- Other (Aquaculture, Work, Aerial or Submarine cable crossings)
- Removal (Sec 10 structures)
- Structure (Sec 10 only)
- Transport of dredged material (Sec 103)

Type of Material Being Discharged: Describe the material to be discharged within USACE jurisdiction. Make sure this description is consistent with your illustrations. Discharge material includes: rock, sand, clay, concrete, etc.

Resource Type: Options are Harbor/Ocean, Lake, Non-Tidal wetland, Other, Pond, River/Stream, and Tidal wetland.

Permanent Loss (Y/N): Only enter “YES” when the ‘discharge of dredged or fill material’ activity types are chosen. A permanent loss means the conversion of an aquatic resource to dry land.

Impact Duration: Options are Permanent or Temporary. An example of a temporary impact is the discharge of fill for temporary access roads that are later removed and returned to pre-construction contours.

Amount Type: Options are Area or Volume.

Amount Units: Options are Acre or Square Feet if Amount Type=Area, Cubic Yards if Amount Type=Volume.

Proposed Length and Proposed Width: Unit is linear feet.

Proposed Amount: Unit is square feet.

Appendix H. Supporting Information:

Document Type	*Document Created Date (YYYY-MM-DD)*	*Document Label*	*Information Source/Citation*	*Uploaded file name*
Aerial Photographs	2025-05-12	Aerial Map	Ce	Aerial Leipsic-r.pdf
Other Information	2025-05-12	DNREC CZM Application	Century Engineering LLC	DNREC_CZMA_SUBMITTAL_Leipsic.pdf
Other Information	2025-05-12	DNREC WSLS Application	Century Engineering LLC	DNREC_WSLS_WQC_SUBMITTAL_LeipsicDock.pdf
FEMA FIRM Maps	2025-05-12	FIRMette	FEMA	FIRMETTE_Leipsic Dock.pdf
Project Plans	2025-05-09	Design Plans	Century Engineering LLC	Leipsic Research Dock Facility Plan Set (5-9-25).pdf
Site Photographs	2025-05-12	Photos	Century Engineering LLC	Leipsic_PhotoLog.pdf
Endangered Threatened Species Information	2025-05-12	NOAA EFH	Century Engineering LLC	NOAA EFH.zip
Endangered Threatened Species Information	2025-05-12	NOAA GARFO NLAA	Century Engineering LLC	NOAA GARFO.zip
National Wetland Inventory Map	2025-05-12	NWI Map	NWI	NWI Leipsic-r.pdf
Other Information	2025-05-12	Adjacent property owners	Century Engineering LLC	Owners Whedbee.pdf
Endangered Threatened Species Information	2025-05-12	DNREC SCRP coordination	DNREC	SCRP.zip
Historic Properties Cultural Resources Information	2025-05-12	SHPO coordination	Century Engineering LLC	SHPO.zip
Other	2025-05-12	Environ. Questionnaire	Century Engineering LLC	USACE_IP_Env Question_Leipsic.pdf
Endangered Threatened Species Information	2025-05-12	USFWS coordination	USFWS	USFWS.zip

US Geological Survey Map	2025-05-12	USGS	USGS	USGS_Leipsic-r.pdf
Other Information	2025-05-12	Location map	Century Engineering LLC	VICINITY_Leipsic-r.pdf
Delineation Report	2025-05-12	Wetland Delineation Report	Century Engineering LLC	Whedbee WoUS.pdf

CENTURY ENGINEERING
A Kleinfelder Company
550 Bay Road
Dover, DE 19901
P: 302.734.9188

AERIAL IMAGERY

LEIPSIC RESEARCH DOCK FACILITY

KENT COUNTY, DELAWARE

Aerial Imagery Source: FirstMap (2022)
ArcGIS Online

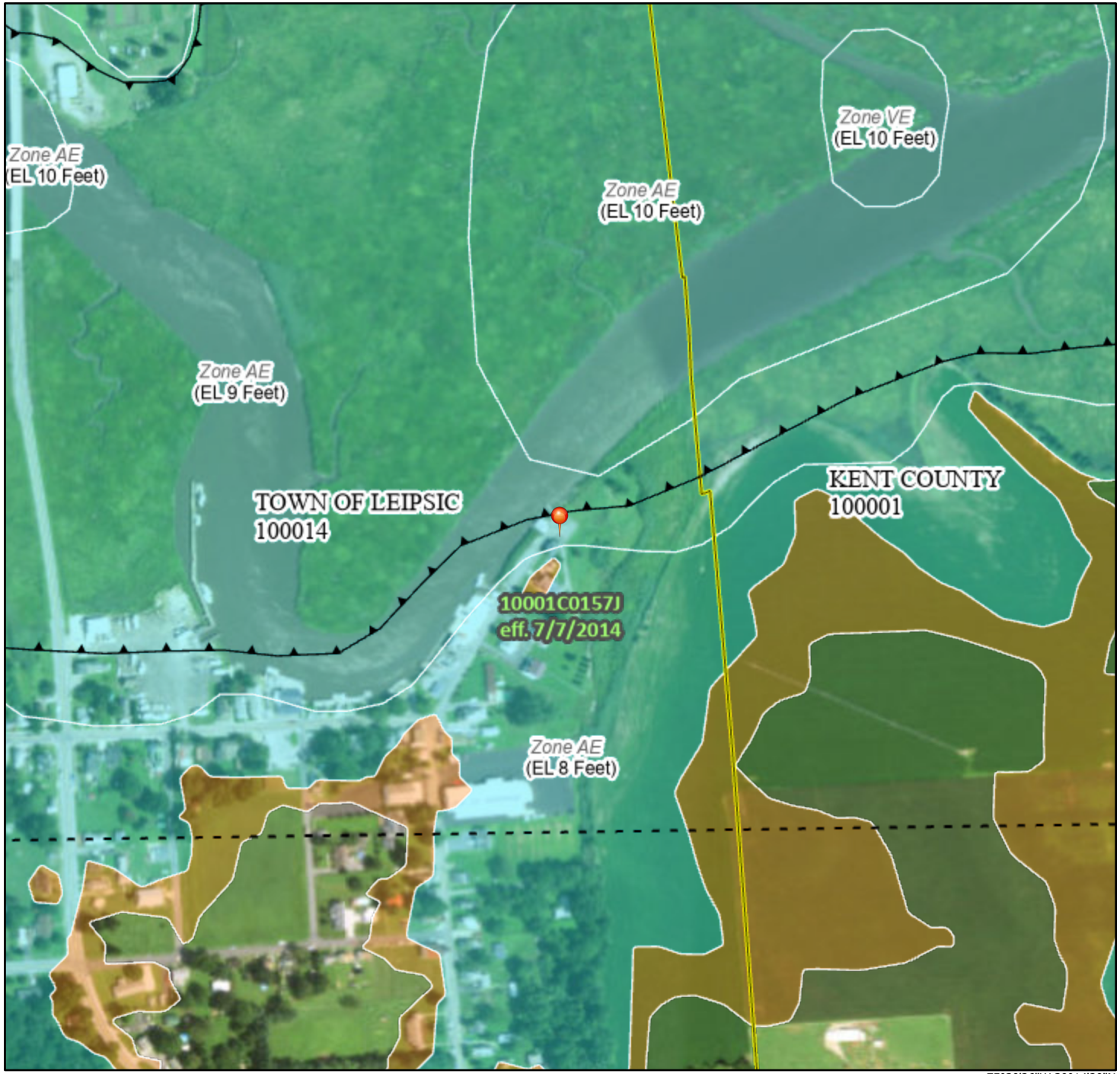
N

1 inch = 200 feet

National Flood Hazard Layer FIRMette

FEMA

75°31'4"W 39°14'48"N



75°30'26"W 39°14'20"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/3/2022 at 11:58 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

STATE OF DELAWARE

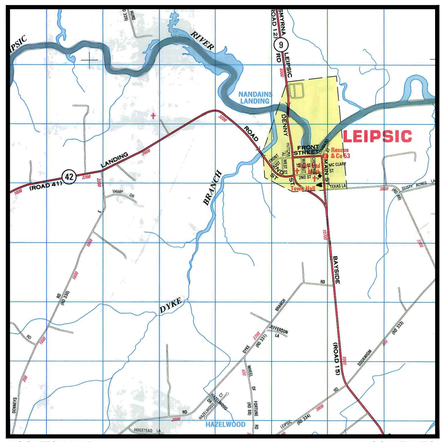
DIVISION OF FISH AND WILDLIFE

LEIPSIC RESEARCH DOCK FACILITY

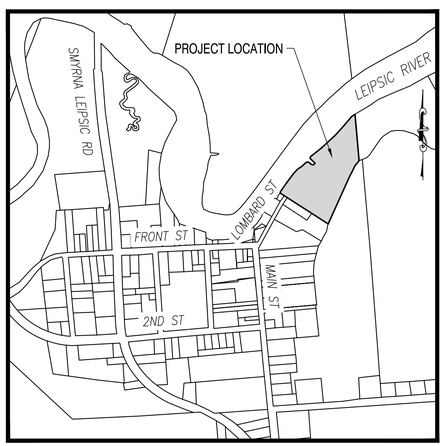
LEIPSIC, KENT COUNTY, DELAWARE

DFW CONTRACT #NAT 202301-LEIPSICRESEARCHDOCK

90% DESIGN REVIEW PLAN SET



LOCATION MAP SCALE: NTS



SITE MAP SCALE: 1" = 500'

DATA COLUMN

1. TAX PARCEL NUMBER: 4-13-03910-01-3100-00001
2. TAX PARCEL AREA: 4.45 ACRES
3. ADDRESS OF SITE: 86 LOMBARD ST, LEIPSIC, DE 19901
4. DATUM: VERTICAL – NAVD88; HORIZONTAL – NAD83
5. FLOODPLAIN MAP: PER FEMA MAP NO. 10001C0157J, DATED JULY 7, 2014 THE MAJORITY OF THE SITE PARCEL IS DETERMINED TO BE WITHIN ZONE AE (1% ANNUAL CHANCE FLOOD HAZARD). IN ADDITION, A PORTION OF THE SITE IS LOCATED IN THE 0.2% ANNUAL CHANCE FLOOD HAZARD (BASE FLOOD ELEVATION DETERMINED: ELEV.: 8).
6. SITE BREAKDOWN:

EXISTING SITE	
IMPERVIOUS:	0.486 ± ACRES
OPEN SPACE:	3.964 ± ACRES
OVERALL TOTAL:	4.450 ± ACRES
PROPOSED SITE	
IMPERVIOUS:	0.571 ± ACRES
OPEN SPACE:	3.879 ± ACRES
OVERALL TOTAL:	4.450 ± ACRES

PROPOSED INCREASE IN IMPERVIOUS AREA: 0.085 ACRES

7. TOTAL LAND DISTURBANCE: THE TOTAL LAND DISTURBANCE PROPOSED BY THIS PLAN IS 0.831± ACRES
8. TOPOGRAPHY: TOPOGRAPHY TAKEN FROM SITE SURVEY PREFORMED BY CENTURY ENGINEERING, LLC. IN NOVEMBER 2023
9. WETLANDS: A SITE INVESTIGATION PERFORMED BY CENTURY ENGINEERING, LLC. ON NOVEMBER 2023, FOUND THAT STATE AND FEDERALLY REGULATED WETLANDS AND WATERS WERE LOCATED WITHIN THE SITE AREA.
10. OWNER/DEVELOPER: STATE OF DELAWARE, DIVISION OF FISH AND WILDLIFE, 89 KINGS HIGHWAY, DOVER, DE 19901
11. APPLICANT: STATE OF DELAWARE, DIVISION OF FISH AND WILDLIFE, 89 KINGS HIGHWAY, DOVER, DE 19901, JEREMEY ASHE, (302) 739-9921/JEREMEY.ASHE@DELAWARE.GOV
12. ENGINEER: CENTURY ENGINEERING, LLC., 550 BAY ROAD, DOVER, DE 19901, ARTHUR L. WILGUS, P.E., (302) 734-9188/ LWILGUS@KLEINFELDER.COM

WETLAND DELINEATION

THIS PROPERTY, TAX MAP 4-13-03910-01-3100-00001, HAS BEEN EXAMINED BY CENTURY ENGINEERING, LLC. FOR THE PRESENCE OF WATERS OF THE UNITED STATES, INCLUDING WETLANDS (SECTION 404 AND SECTION 10), STATE SUBAQUEOUS LANDS AND STATE REGULATED WETLANDS AS ESTABLISHED BY THE REVIEWING AGENCIES IN THE FORM OF MANUALS, POLICIES AND PROCEDURES IN PLACE AT THE TIME THAT THE INVESTIGATION AS CONDUCTED. THE WETLAND INFORMATION CONTAINED IN THIS PLAN SET IS IN ACCORDANCE WITH THIS CRITERIA. THE WETLAND DELINEATION FOR THIS PROJECT WAS COMPLETED BY CENTURY ENGINEERING, LLC.

TJ AUSTIN, PWS DATE
CENTURY ENGINEERING, LLC.
550 BAY ROAD
DOVER, DELAWARE 19901
PHONE: (302) 734-9188 / FAX: (302) 734-4589

OWNER CERTIFICATION

I, JEREMEY ASHE, CERTIFY THAT ALL LAND CLEARING, CONSTRUCTION AND DEVELOPMENT SHALL BE DONE PURSUANT TO THE APPROVED STANDARD PLAN AND THAT RESPONSIBLE PERSONNEL (I.E., BLUE CARD HOLDER) INVOLVED IN THE LAND DISTURBANCE WILL HAVE A CERTIFICATION OF TRAINING PRIOR TO INITIATION OF THE PROJECT, AT A DNREC SPONSORED OR APPROVED TRAINING COURSE FOR THE CONTROL OF EROSION AND SEDIMENT DURING CONSTRUCTION. IN ADDITION, I GRANT THE DNREC SEDIMENT AND STORMWATER PROGRAM AND/OR THE RELEVANT DELEGATED AGENCY THE RIGHT TO CONDUCT ON-SITE REVIEWS.

JEREMEY ASHE – CONSTRUCTION MANAGER DATE
STATE OF DELAWARE
DELAWARE DIVISION OF FISH & WILDLIFE
89 KINGS HIGHWAY
DOVER, DE 19901
PHONE: (302) 632-5404

CERTIFICATION OF PLAN ACCURACY

I, ARTHUR L. WILGUS, HEREBY CERTIFY THAT THIS PLAN HAS BEEN PREPARED UNDER MY SUPERVISION AND TO THE BEST OF MY KNOWLEDGE COMPLIES WITH THE APPLICABLE STATE AND LOCAL REGULATIONS AND ORDINANCES.

ARTHUR L. WILGUS, P.E., DE NO. 6538 DATE
CENTURY ENGINEERING, LLC.
550 BAY ROAD
DOVER, DELAWARE 19901
PHONE: (302) 734-9188 / FAX: (302) 734-4589

INDEX OF SHEETS

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

COVER SHEET

SEAL:

CIVIL ENGINEER:

CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

DATE: 05-01-2025

SCALE: AS SHOWN

SHEET NO.: C100

PROJECT NO.: 00175013.092A

NOTE:
100 YEAR FLOOD ELEVATION = 8.0'
FP-AE FP-AE

TRUE NORTH
PROJECT NORTH

0' 30' 60' 90'
SCALE: 1" = 30'

REVISIONS:
DATE: DESCRIPTION: BY:

LEIPSIC RESEARCH DOCK FACILITY

EXISTING CONDITIONS

SEAL:

CIVIL ENGINEER:
CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW
DRAWN BY: DFS
CHECKED BY: ALW
DATE: 05-01-2025
SCALE: 1" = 30'
SHEET NO.: C103
PROJECT NO.: 00175013.092A

G:\Projects\00175013.001A (DNREC 2017 Engineering DE)\175013.92 Leipsic Dock\CAD\Sheets\C103 - FEMA - Existing Conditions.dwg, 5/7/2025 4:11 PM

NOTES

1 – CONC. RETAINING WALL & STAIRS

2 – CONC. PADS & SIDEWALKS

3 – ASPHALT

4 – PREVIOUSLY DEMOLISHED BUILDING TO BE EXCAVATED AND BACKFILLED

5 – PREVIOUSLY DEMOLISHED SWIMMING POOL TO BE EXCAVATED AND BACKFILLED

TRUE NORTH

PROJECT NORTH

0' 20' 40' 60'

SCALE: 1" = 20'

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

DEMOLITION PLAN

SEAL:

CIVIL ENGINEER:

CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

DATE: 05-01-2025

SCALE: 1" = 20'

SHEET NO.: C104

PROJECT NO.: 00175013.092A

BUILDING POINT LAYOUT

POINT NO.	NORTHING	EASTING	DESCRIPTION
201	452471.8746	628936.5489	BUILDING
202	452447.4258	628968.2345	BUILDING
203	452435.2292	628984.0853	BUILDING
204	452487.4956	629024.3909	BUILDING
205	452499.7308	629008.5452	BUILDING
206	452524.1654	628976.8636	BUILDING

CONRETE POINT LAYOUT

POINT NO.	NORTHING	EASTING	DESCRIPTION
301	452471.5179	628933.7866	CONCRETE
302	452445.8660	628967.0639	CONCRETE
303	452432.4451	628984.4458	CONCRETE
304	452450.6328	628970.6851	CONCRETE
305	452453.8004	628973.1277	CONCRETE
306	452495.6757	629005.4184	CONCRETE
307	452503.6657	629011.5778	CONCRETE
308	452501.5467	629006.1737	CONCRETE
309	452505.5063	629009.2269	CONCRETE
310	452511.3171	628993.5032	CONCRETE
311	452515.2766	628996.5565	CONCRETE
312	452513.1490	628991.1275	CONCRETE
313	452515.6184	628987.9502	CONCRETE
314	452519.5499	628991.0130	CONCRETE
315	452528.0828	628979.9131	CONCRETE
316	452532.3525	628974.3998	CONCRETE
317	452528.4152	628971.3299	CONCRETE
318	452495.2275	628954.5544	CONCRETE
319	452499.4656	628949.0312	CONCRETE
320	452505.0663	628941.7533	CONCRETE
321	452501.1411	628938.7383	CONCRETE
322	452491.2576	628951.4921	CONCRETE
323	452492.4789	628949.9082	CONCRETE
501	452483.5694	628871.1015	CONCRETE
502	452476.2581	628880.5774	CONCRETE
503	452496.2106	628880.8524	CONCRETE
504	452488.9002	628890.3240	CONCRETE
505	452534.6212	628910.4839	CONCRETE
506	452525.4786	628922.3426	CONCRETE
507	452542.5375	628916.5877	CONCRETE
508	452533.3976	628928.4490	CONCRETE

ASPHALT POINT LAYOUT

POINT NO..	NORTHING	EASTING	DESCRIPTION
401	452439.9877	628987.7486	ASPHALT
402	452454.2419	628998.7403	ASPHALT
403	452435.1025	628994.0838	ASPHALT
404	452449.3568	629005.0755	ASPHALT
405	452429.6067	629001.2110	ASPHALT
406	452443.8609	629012.2026	ASPHALT
407	452399.0743	629040.8061	ASPHALT
408	452409.3691	629048.7445	ASPHALT
409	452410.2754	629055.7573	ASPHALT
410	452407.2221	629059.7168	ASPHALT
411	452416.7250	629067.0446	ASPHALT
412	452418.2738	629065.0360	ASPHALT
413	452420.8657	629063.2799	ASPHALT
414	452496.6987	629041.7158	ASPHALT
415	452502.1691	629060.9532	RADIUS: 20'
416	452514.3821	629045.1151	ASPHALT
417	452529.3473	629056.6550	ASPHALT
418	452541.5602	629040.8169	RADIUS: 20'
419	452547.2125	629060.0016	ASPHALT
420	452581.9915	629049.7548	ASPHALT
421	452590.4699	629078.5319	RADIUS: 30'
422	452608.7893	629054.7748	ASPHALT
423	452641.8909	629080.2999	ASPHALT
424	452676.0620	629035.9549	ASPHALT
425	452600.0277	628977.3369	ASPHALT
426	452597.7080	628959.0981	ASPHALT
427	452474.9800	628864.4845	ASPHALT
428	452456.5833	628893.1620	ASPHALT
429	452508.5218	628933.2120	ASPHALT
430	452567.6144	628978.7919	ASPHALT
431	452560.2694	628988.3164	RADIUS: 21'
432	452569.7943	628995.6396	ASPHALT
433	452566.5364	628999.8690	ASPHALT
434	452549.2983	628986.1651	RADIUS: 22'
435	452535.8451	629003.6005	ASPHALT

TRUE NORTH

PROJECT NORTH

0' 20' 40' 60'

SCALE: 1" = 20'

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

SITE LAYOUT

SEAL:

CIVIL ENGINEER:

CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

DATE: 05-01-2025

SCALE: 1" = 20'

SHEET NO.: C105

PROJECT NO.: 00175013.092A

G:\Projects\00175013.092A [DMEC 2017 Engineering 9Z]\175013.92 Leipsic Dock\CAD\Sheets\C105 - Site Layout.dwg, 5/1/2025 4:15 PM

NOTE:
100 YEAR FLOOD ELEVATION = 8.0'
FP-AE FP-AE

TRUE NORTH
PROJECT NORTH
0' 20' 40' 60'
SCALE: 1" = 20'

REVISIONS:
DATE: DESCRIPTION: BY:

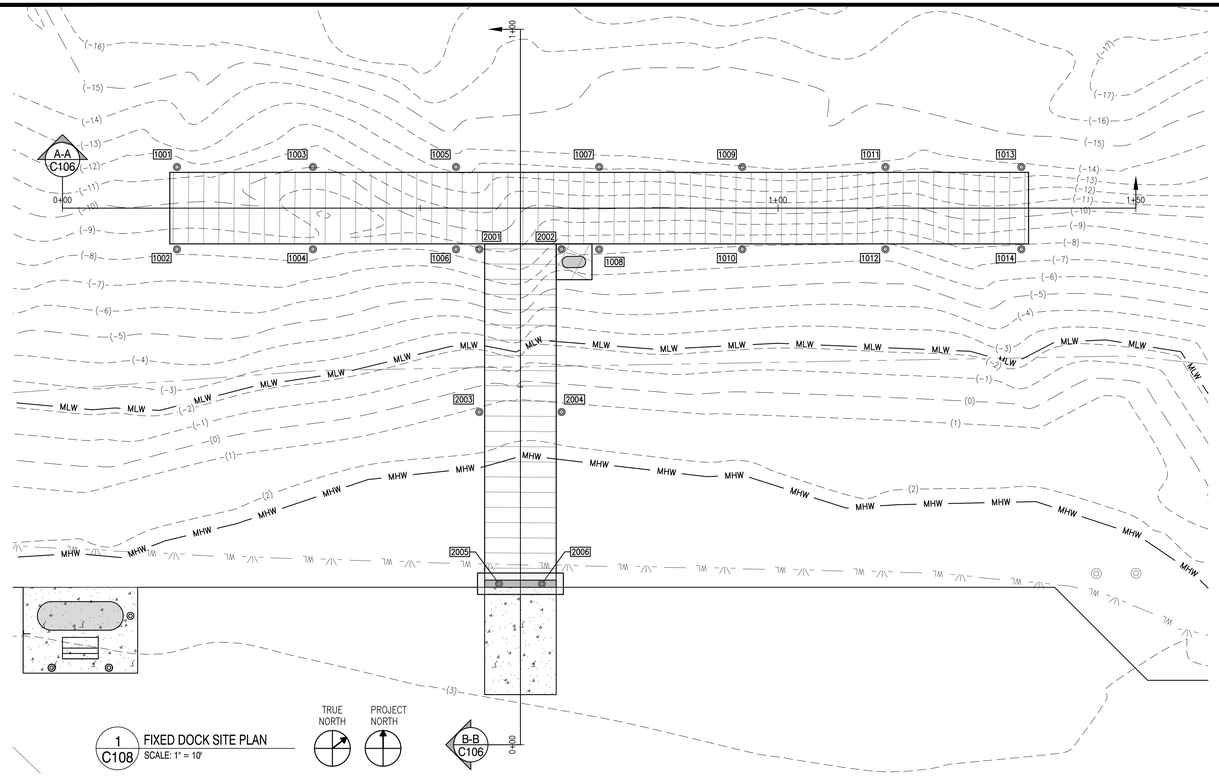
LEIPSIC RESEARCH DOCK FACILITY

GRADING

SEAL:

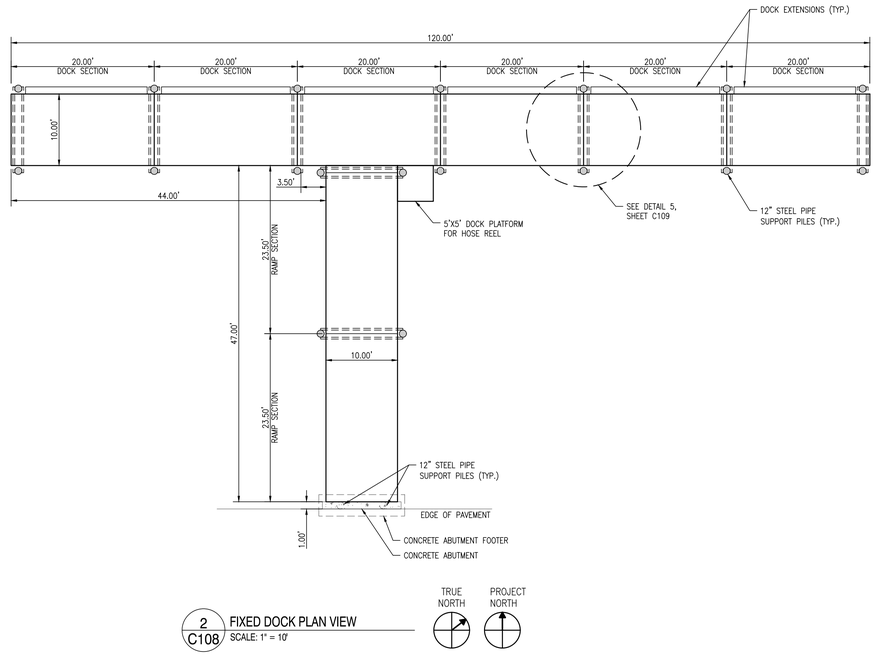
CIVIL ENGINEER:
CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW
DRAWN BY: DFS
CHECKED BY: ALW
DATE: 05-01-2025
SCALE: 1" = 20'
SHEET NO.: C106
PROJECT NO.: 00175013.092A

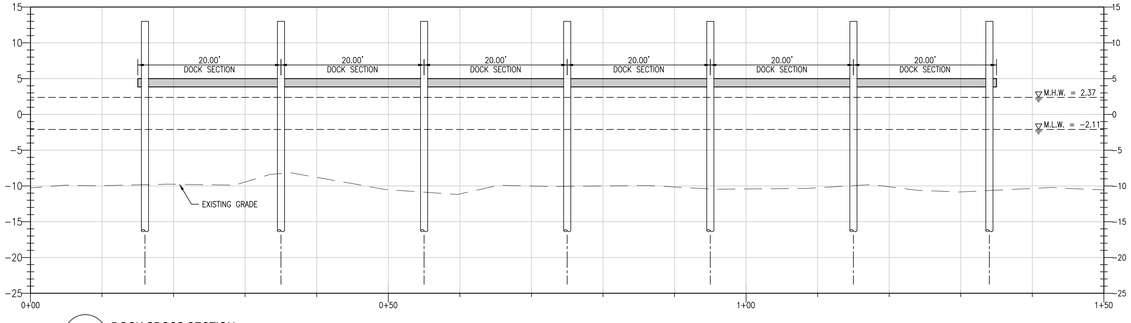


1 C108 FIXED DOCK SITE PLAN
SCALE: 1" = 10'

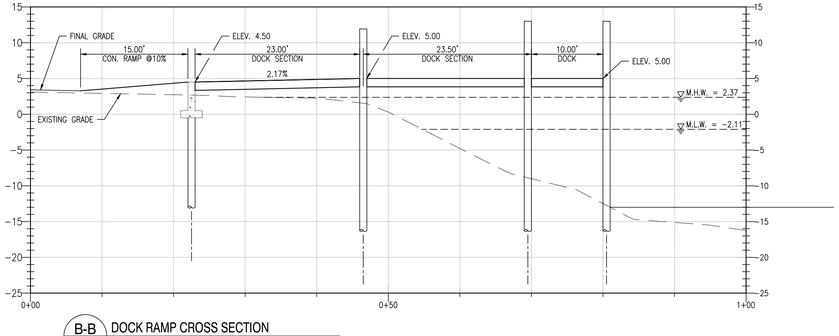
HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 10'



2 C108 FIXED DOCK PLAN VIEW
SCALE: 1" = 10'



A-A C108 DOCK CROSS SECTION
SCALE: 1"=10'



B-B C108 DOCK RAMP CROSS SECTION
SCALE: 1"=10'

PILE LAYOUT TABLE

PILE NO.	NORTHING**	EASTING**	TOP ELEV.	EST. TIP ELEV.	MIN. EMBEDMENT	PILE LENGTH* (FT)
1001	452536.4594	628837.6852	13.00	-45.00	22.00	58.00
1002	452529.4369	628846.7921	13.00	-45.00	22.00	58.00
1003	452551.5055	628849.2875	13.00	-45.00	22.00	58.00
1004	452544.4831	628858.3944	13.00	-45.00	22.00	58.00
1005	452567.3436	628861.5005	13.00	-45.00	22.00	58.00
1006	452560.3212	628870.6074	13.00	-45.00	22.00	58.00
1007	452583.1817	628873.7134	13.00	-45.00	22.00	58.00
1008	452576.1592	628882.8203	13.00	-45.00	22.00	58.00
1009	452599.0197	628885.9263	13.00	-45.00	22.00	58.00
1010	452591.9973	628895.0332	13.00	-45.00	22.00	58.00
1011	452614.8578	628898.1393	13.00	-45.00	22.00	58.00
1012	452607.8353	628907.2462	13.00	-45.00	22.00	58.00
1013	452629.9039	628909.7416	13.00	-45.00	22.00	58.00
1014	452622.8815	628918.8485	13.00	-45.00	22.00	58.00
2001	452562.8948	628872.5920	13.00	-45.00	22.00	58.00
2002	452572.0017	628879.6144	13.00	-45.00	22.00	58.00
2003	452549.0039	628890.6061	13.00	-45.00	22.00	58.00
2004	452558.1108	628897.6285	13.00	-45.00	22.00	58.00
2005	452536.5274	628911.2894	0.75	-32.00	16.00	32.75
2006	452541.2788	628914.9532	0.75	-32.00	16.00	32.75

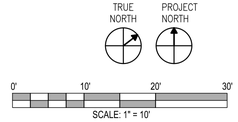
* NOTE: PILE LENGTH COLUMN INDICATES MINIMUM PILE LENGTH TO BE ORDERED BY THE CONTRACTOR. CONTRACTOR SHALL INSTALL PILE TO MEET MINIMUM EMBEDMENT REQUIREMENTS. EXCESS PILE LENGTHS SHALL BE TRIMMED AS NEEDED. IF A VIBRATORY HAMMER IS USED IN-LIEU OF AN IMPACT HAMMER, AN ADDITIONAL FIVE (5) FEET OF EMBEDMENT SHALL BE REQUIRED. ADDITIONAL PILE LENGTH MAY BE ORDERED AT THE CONTRACTORS' DISCRETION AND EXPENSE TO ENSURE EMBEDMENT CRITERIA IS SATISFIED WHEN USING A VIBRATORY HAMMER.

MINIMUM EMBEDMENT DEPTHS SHALL BE MEASURED FROM THE POINT AFTER WEIGHT OF HAMMER MOVEMENT HAS STOPPED.

** AT ELEVATION 5.0

FIXED DOCK NOTES

1. THE GATOR DOCK COMPONENTS OF THE NEW FIXED ALUMINUM DOCK SHOWN ON THESE PLANS ARE FOR GENERAL INFORMATION ONLY.
2. THE OWNER WILL PROVIDE, AND THE CONTRACTOR SHALL SCHEDULE THE DELIVERY OF, HANDLE, STORE, AND INSTALL, ALL NEW FIXED ALUMINUM DOCK COMPONENTS MANUFACTURED BY GATOR DOCK, INCLUDING DECKS, HEADERS, AND MISCELLANEOUS COMPONENTS AS INDICATED ON THE GATOR DOCK SHOP DRAWINGS SEPARATELY PROVIDED BY OWNER FOR THIS PROJECT.
3. TOP AND TIP ELEVATIONS OF STEEL PIPE PILES FOR FIXED DOCK PROVIDED ON THIS SHEET.
4. ALL ALUMINUM DOCK, HEADER CHANNELS, AND ANCILLARY ITEMS SHALL BE PROVIDED BY THE OWNER. HEADER CHANNELS WILL BE ONE (1) FOOT WIDER THAN THE PLAN LENGTH AND CUT IN THE FIELD BY THE CONTRACTOR.
5. FIXED DOCK GALVANIZED PIPE PILES SHALL BE DRIVEN TO MINIMUM EMBEDMENT REQUIREMENTS.
6. DOCK PIPE PILES SHALL BE 12-INCH DIAMETER CLOSED-END, ASTM A690, GALVANIZED IN ACCORDANCE WITH ASTM A123.
6. ABUTMENT PIPE PILES SHALL BE 12-INCH DIAMETER CLOSED-END, ASTM A690, GALVANIZED IN ACCORDANCE WITH ASTM A123.
7. SEE MANUFACTURER'S SHOP DRAWINGS FOR ADDITIONAL ALUMINUM DOCK DETAILS.
8. REFER TO STRUCTURAL DETAILS FOR PILE INSTALLATION NOTES.
9. IF PILE DRIVING IS OCCURRING DURING THE IN-WATER WORK RESTRICTIONS A SOFT START IS REQUIRED. IT IS PREFERRED THAT VIBRATORY PILE INSTALLATION METHODS ARE USED. IF VIBRATORY PILE INSTALLATION CAN NOT BE COMPLETED IMPACT PILE DRIVING IS ALLOWED.
10. FOR VIBRATORY PILE INSTALLATION: PILE DRIVING WILL BE INITIATED FOR 15 SECONDS AT REDUCED ENERGY FOLLOWED BY A ONE-MINUTE WAITING PERIOD. THIS SEQUENCE OF 15 SECONDS OF REDUCED ENERGY DRIVING AND ONE-MINUTE WAITING PERIOD WILL BE REPEATED TWO ADDITIONAL TIMES, FOLLOWED IMMEDIATELY BY PILE-DRIVING AT FULL RATE AND ENERGY.
11. FOR IMPACT PILE DRIVING: PILE DRIVING WILL COMMENCE WITH AN INITIAL SET OF THREE STRIKES BY THE HAMMER AT 40% ENERGY, FOLLOWED BY A ONE MINUTE WAIT PERIOD, THEN TWO SUBSEQUENT 3-STRIKE SETS AT 40% ENERGY, WITH ONE-MINUTE WAITING PERIODS, BEFORE INITIATING CONTINUOUS IMPACT DRIVING,
12. IN ADDITION TO USING A SOFT START AT THE BEGINNING OF THE WORK DAY FOR PILE DRIVING, ONE MUST ALSO BE USED AT ANY TIME FOLLOWING CESSATION OF PILE DRIVING FOR A PERIOD OF 30 MINUTES OR LONGER.



REVISIONS:
DATE: DESCRIPTION: BY:

LEIPSIC RESEARCH DOCK FACILITY

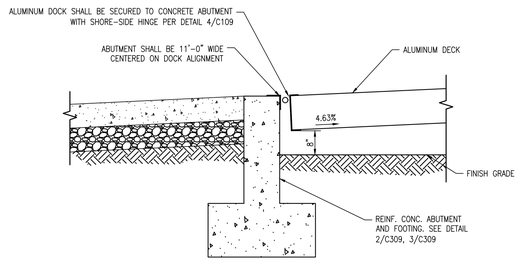
DOCK DETAILS

SEAL:

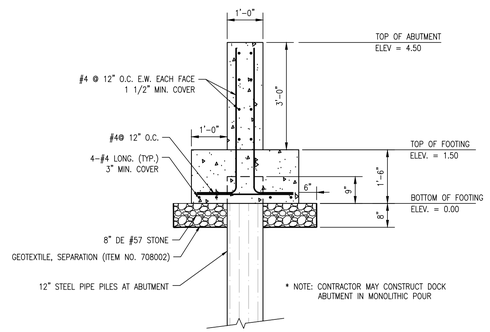
CIVIL ENGINEER:
CENTURY ENGINEERING
A KleinFelder Company

DESIGNED BY: ALW
DRAWN BY: DFS
CHECKED BY: ALW
DATE: 05-01-2025
SCALE: AS SHOWN
SHEET NO.: C108
PROJECT NO.: 00175013.092A

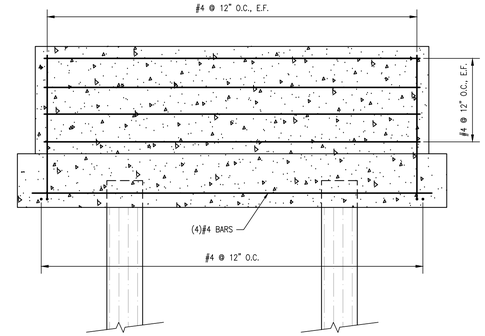
G:\Projects\00175013.001A (DHEC 2017 Engineering RZC)\175013.92 Leipsic Dock\CAD\Sheets\C108 - Dock Details 1.dwg, 5/9/2025 9:01 PM



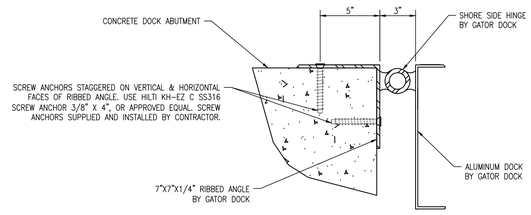
1 C109 DOCK ABUTMENT PAVEMENT INTERFACE
SCALE: 1/2" = 1'-0"



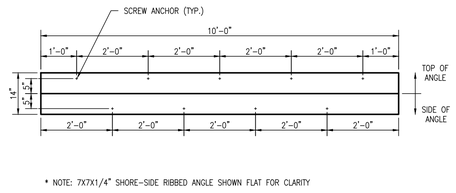
2 C109 DOCK ABUTMENT DETAIL
SCALE: 1/2" = 1'-0"



3 C109 DOCK ABUTMENT ELEVATION
SCALE: 1/2" = 1'-0"

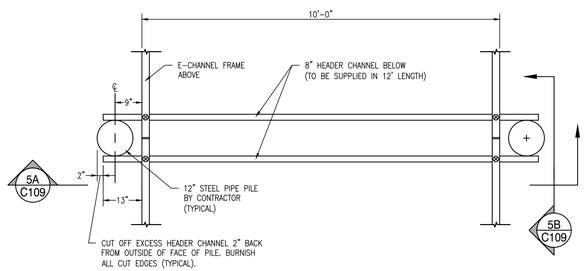


4 C106 SHORE-SIDE HINGE DETAIL
SCALE: 2" = 1'-0"



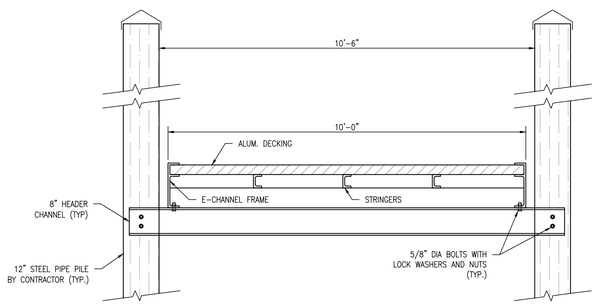
* NOTE: 7X7X1/4" SHORE-SIDE RIBBED ANGLE SHOWN FLAT FOR CLARITY

4A C109 SHORE-SIDE HINGE RIBBED ANGLE FASTENER DETAIL
SCALE: 1/2" = 1'-0"



ALL COMPONENTS SHOWN ARE PER GATOR DOCK SHOP DRAWINGS

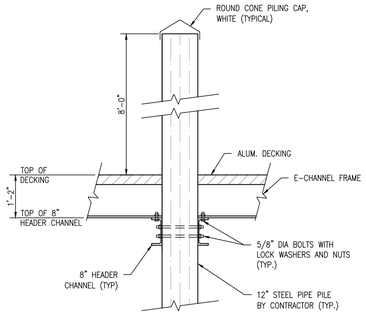
5 C109 ALUMINUM HEADER - PLAN DETAIL
SCALE: 1/2" = 1'-0"



ALUMINUM CHANNELS COATED WITH ISOLATING MATERIAL – BITUMINOUS TAPE OR PAINT

ALL COMPONENTS SHOWN ARE PER GATOR DOCK SHOP DRAWINGS

5A C109 ALUMINUM HEADER - SECTION A
SCALE: 1/2" = 1'-0"



ALUMINUM CHANNELS COATED WITH ISOLATING MATERIAL – BITUMINOUS TAPE OR PAINT

ALL COMPONENTS SHOWN ARE PER GATOR DOCK SHOP DRAWINGS

5B C109 ALUMINUM HEADER - SECTION B
SCALE: 1/2" = 1'-0"

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

DOCK DETAILS - 2

SEAL:

CIVIL ENGINEER:

CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

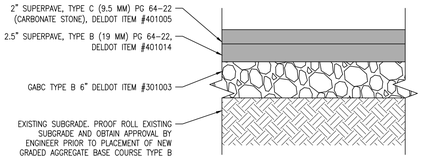
DATE: 05-01-2025

SCALE: AS SHOWN

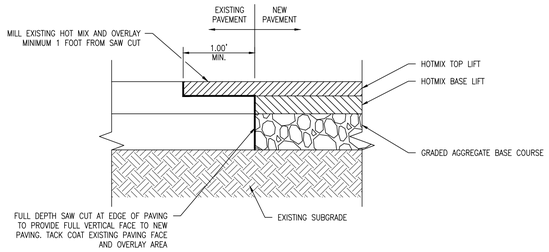
SHEET NO.: C109

PROJECT NO.: 00175013.092A

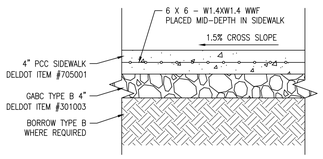
G:\Projects\00175013.001A (DNREC 2017 Engineering RQ)\175013.92 Leipsic Dock\CAD\Sheets\C108 - Dock Details 1.dwg, 5/8/2025 3:09 PM



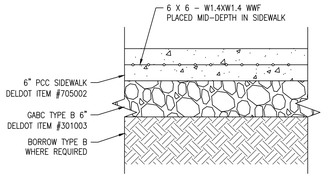
1 / C110 TYPICAL SECTION: FULL DEPTH PAVEMENT
SCALE: 1"= 1'-0"



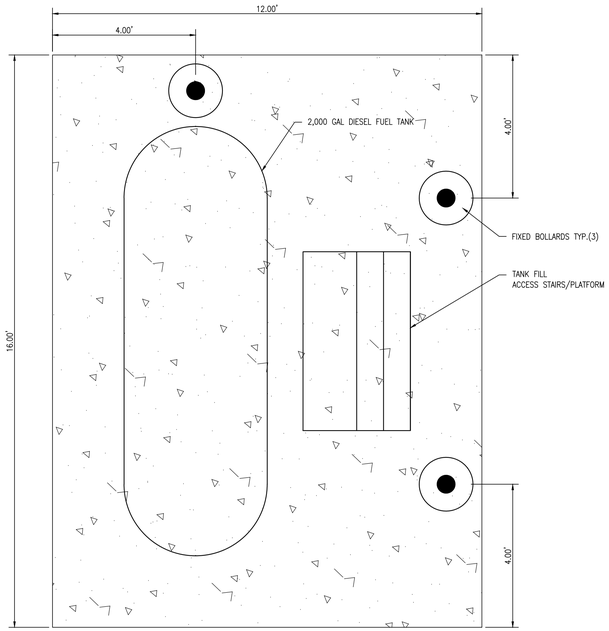
2 / C110 SAW CUT / PAVEMENT JOINT DETAIL
SCALE: 1"= 1'-0"



3 / C110 TYPICAL SECTION: SIDEWALK
SCALE: 1"= 1'-0"

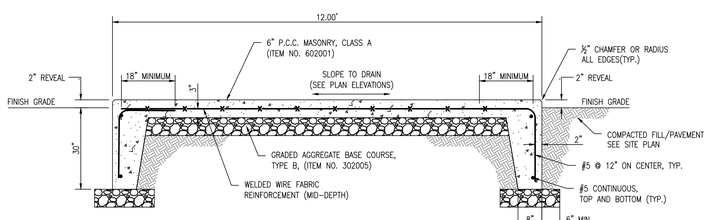


4 / C110 TYPICAL SECTION: RAMP
SCALE: 1"= 1'-0"



5 / C110 FUEL TANK FOUNDATION DETAIL PLAN
SCALE: 1/2"= 1'-0"

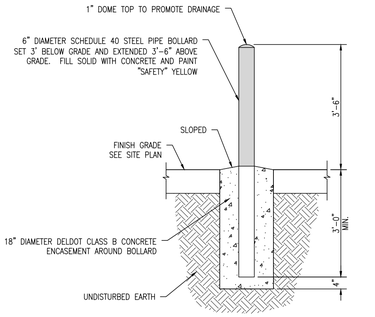
TRUE NORTH
PROJECT NORTH



NOTES

1. STAIR AND TANK ANCHORS SHALL BE DRILLED AND EPOXIED INTO SLAB. ANCHORS SHALL BE PER MANUFACTURES REQUIREMENTS.
2. EXISTING SOIL BENEATH PAD SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR PRIOR TO PLACEMENT OF GABC.

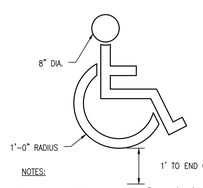
6 / C110 FUEL TANK FOUNDATION DETAIL SECTION
SCALE: 1/2"= 1'-0"



7 / C110 FIXED BOLLARD
SCALE: 1/2"= 1'-0"

8 / C110 ADA DETAIL
N.T.S.

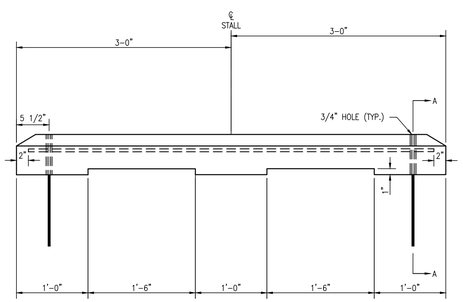
9 / C110 ADA DETAIL
N.T.S.



NOTES:

1. SYMBOL STRIPING SHALL BE 3" WIDE (MIN.) AND PAINTED ON EACH HANDICAPPED SPACE.
2. HANDICAPPED SPACE WIDTH SHALL BE PER PLAN.
3. COLOR WHITE, DELDOT ITEM NO. 817017 PREFORMED RETROREFLECTIVE THERMOPLASTIC MARKINGS, ACCESSIBILITY PARKING SPACE MARKING.

10 / C110 ACCESSIBILITY PARKING SPACE MARKING DETAIL
SCALE: 1/2" = 1'-0"



11 / C110 CONCRETE PARKING BUMPER DETAIL
SCALE: 1"= 1'-0"

0' 1' 2' 3'
SCALE: 1" = 1'

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

SITE DETAILS

SEAL:

CIVIL ENGINEER:

CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

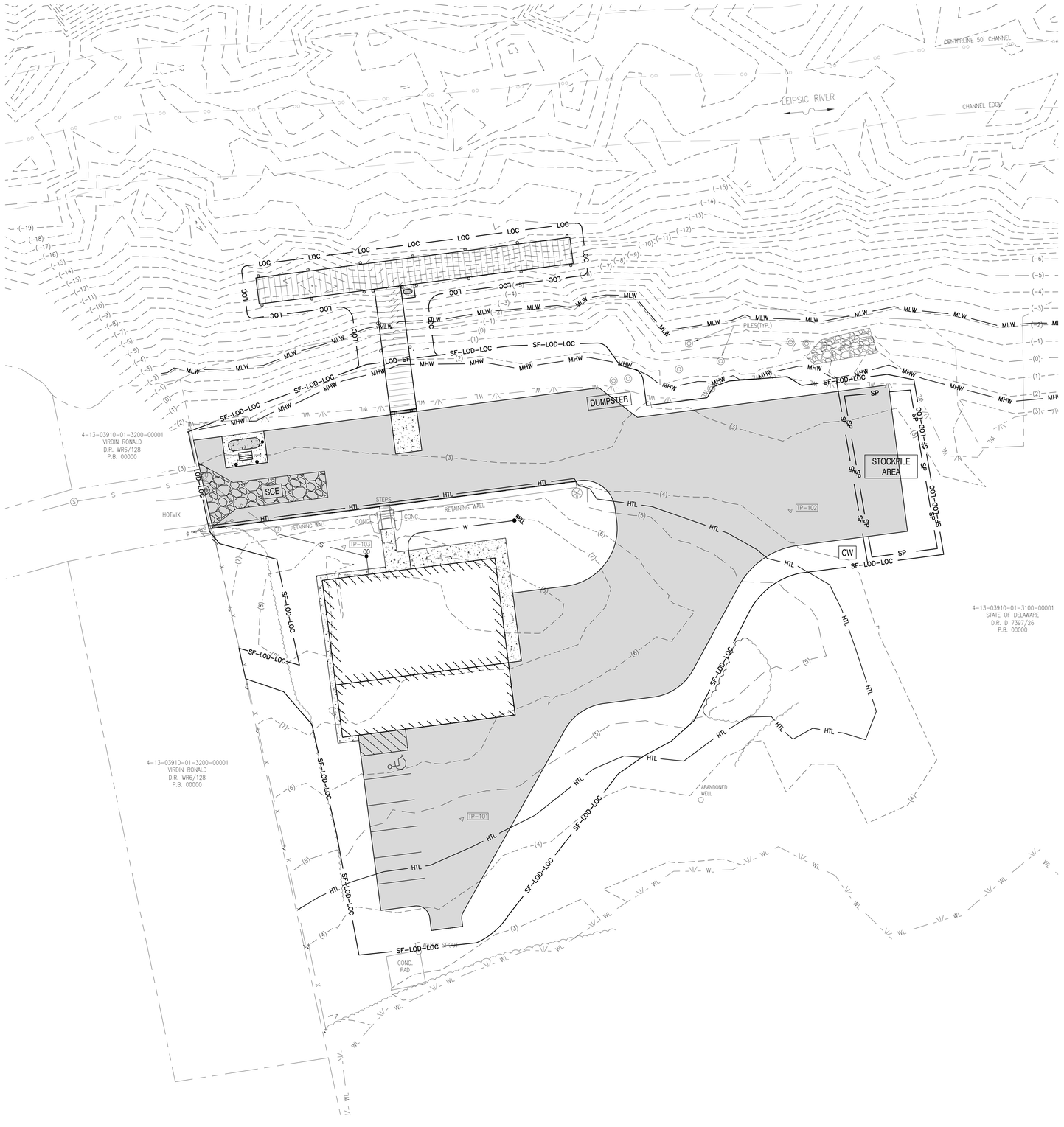
DATE: 05-01-2025

SCALE: AS SHOWN

SHEET NO.: C110

PROJECT NO.: 00175013.092A

G:\Projects\00175013.001A (DMEC 2017 Engineering OE\1750132 Leipsic Dock\CAD\Sheets\C110 - Site Details.dwg, 5/2/2025 12:31 PM



DNREC SEDIMENT & STORMWATER NOTES

1. THE DNREC SEDIMENT AND STORMWATER PROGRAM (OR DELEGATED AGENCY) SHALL BE NOTIFIED IN WRITING 5 DAYS PRIOR TO COMMENCING WITH CONSTRUCTION. FAILURE TO DO SO CONSTITUTES A VIOLATION OF THE APPROVED SEDIMENT AND STORMWATER MANAGEMENT PLAN.
2. REVIEW AND/OR APPROVAL OF THE SEDIMENT AND STORMWATER MANAGEMENT PLAN SHALL NOT RELIEVE THE CONTRACTOR FROM HIS OR HER RESPONSIBILITIES FOR COMPLIANCE WITH THE REQUIREMENTS OF THE DELAWARE SEDIMENT AND STORMWATER REGULATIONS, NOR SHALL IT RELIEVE THE CONTRACTOR FROM ERRORS OR OMISSIONS IN THE APPROVED PLAN.
3. IF THE APPROVED PLAN NEEDS TO BE MODIFIED, ADDITIONAL SEDIMENT AND STORMWATER CONTROL MEASURES MAY BE REQUIRED AS DEEMED NECESSARY BY DNREC OR THE DELEGATED AGENCY.
4. FOLLOWING SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED FOR ALL PERIMETER SEDIMENT CONTROLS, SOIL STOCKPILES, AND ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE WITHIN 14 CALENDAR DAYS UNLESS MORE RESTRICTIVE FEDERAL REQUIREMENTS APPLY.
5. ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL COMPLY WITH THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.
6. AT ANY TIME A DEWATERING OPERATION IS USED, IT SHALL BE PREVIOUSLY APPROVED BY THE AGENCY CONSTRUCTION SITE REVIEWER FOR A NON-EROSIVE POINT OF DISCHARGE, AND A DEWATERING PERMIT SHOULD BE APPROVED BY THE DNREC WELL PERMITTING BRANCH.
7. APPROVAL OF A SEDIMENT AND STORMWATER MANAGEMENT PLAN DOES NOT GRANT OR IMPLY A RIGHT TO DISCHARGE STORMWATER RUNOFF. THE OWNER/DEVELOPER IS RESPONSIBLE FOR ACQUIRING ANY AND ALL AGREEMENTS, EASEMENTS, ETC., NECESSARY TO COMPLY WITH STATE DRAINAGE AND OTHER APPLICABLE LAWS.
8. THE CONTRACTOR SHALL AT ALL TIMES PROTECT AGAINST SEDIMENT OR DEBRIS LADEN RUNOFF OR WIND FROM LEAVING THE SITE. PERIMETER CONTROLS SHALL BE CHECKED DAILY AND ADJUSTED OR REPAIRED TO FULLY CONTAIN AND CONTROL SEDIMENT FROM LEAVING THE SITE. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED HALF OF THE EFFECTIVE CAPACITY OF THE CONTROL. IN ADDITION, THE CONTRACTOR MAY NEED TO ADJUST OR ALTER MEASURES IN TIMES OF ADVERSE WEATHER CONDITIONS, OR AS DIRECTED BY THE AGENCY CONSTRUCTION SITE REVIEWER.
9. BEST AVAILABLE TECHNOLOGY (BAT) SHALL BE EMPLOYED TO MANAGE TURBID DISCHARGES IN ACCORDANCE WITH REQUIREMENTS OF 7. DEL C. CH 60, REGULATIONS GOVERNING THE CONTROL OF WATER POLLUTION, SECTION 9.1.02, KNOWN AS SPECIAL CONDITIONS FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES, AND DNREC POLICIES, PROCEDURES, AND GUIDANCE.
10. THE CONTRACTOR STOCKPILE AREA IS SHOWN ON THE DRAWINGS. IF THE CONTRACTOR INTENDS TO STAGE OR STORE MATERIALS OFF-SITE IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY FOR OBTAINING ALL THE PROPER SEDIMENT AND STORMWATER APPROVALS AND/OR PERMITS THROUGH THE DESIGNATED DELEGATED AGENCY WHICH WILL BE DETERMINED BY THE LOCATION OF THE OFF-SITE MATERIAL STOCKPILE OR STAGING AREAS. ALL COSTS ASSOCIATED WITH OFF-SITE STOCKPILE OR STAGING AREAS SHALL BE INCIDENTAL TO THE WORK.

SEQUENCE OF CONSTRUCTION

1. PRIOR TO ANY CLEARING, INSTALLATION OF SEDIMENT CONTROL MEASURES, OR GRADING, A PRE-CONSTRUCTION MEETING MUST BE SCHEDULED AND CONDUCTED. THE LANDOWNER/DEVELOPER AND CONTRACTOR ARE REQUIRED TO BE IN ATTENDANCE AT THE PRE-CONSTRUCTION MEETING; THE DESIGNER IS RECOMMENDED TO ATTEND.
2. THE CONTRACTOR SHALL AT ALL TIMES PROTECT AGAINST SEDIMENT OR DEBRIS LADEN RUNOFF OR WIND FROM LEAVING THE SITE. PERIMETER CONTROLS SHALL BE CHECKED DAILY AND ADJUSTED AND/OR REPAIRED TO FULLY CONTAIN AND CONTROL SEDIMENTATION ON THE SITE. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED HALF OF THE EFFECTIVE CAPACITY OF THE CONTROL. IN ADDITION, THE CONTRACTOR MAY NEED TO ADJUST OR REPAIR MEASURES IN TIMES OF ADVERSE WEATHER CONDITIONS, OR AS DIRECTED BY THE AGENCY CONSTRUCTION SITE REVIEWER.
3. CLEAR AND GRUB AS REQUIRED TO INSTALL SILT FENCE. INSTALL SILT FENCE PER DNREC STANDARD DETAILS & SPECIFICATIONS.
4. INSTALL SITE POLLUTION PREVENTION DEVICES PER DNREC STANDARD DETAILS & SPECIFICATIONS, INCLUDING CONCRETE WASHOUT
5. CLEAR AND GRUB AREAS AS NEEDED WITHIN THE LIMIT OF DISTURBANCE.
6. CONSTRUCT STRUCTURES, DOCK RAMP ABUTMENT AND BOAT DOCK.
7. CONSTRUCT FUEL TANK CONCRETE PAD AND FUEL SYSTEM COMPONENTS.
8. INSTALL POTABLE WATER WELL.
9. CONSTRUCT SITE UTILITIES, INCLUDING SANITARY SEWER LATERAL, WATER SERVICE LINES, AND AREA LIGHTING.
10. EXCAVATE EXISTING PAVEMENTS, EXCAVATE FOR NEW PAVEMENTS, PLACE EMBANKMENTS AND GENERAL GRADING, AND CONSTRUCT NEW PAVEMENTS AND SIDEWALKS.
11. INSTALL NEW STRIPING AND SIGNAGE.
12. PERFORM FINAL SITE GRADING, INCLUDING TOPSOILING, SEEDING AND STABILIZATION OF ALL REMAINING DISTURBED AREAS. STABILIZE ALL UNPAVED DISTURBED AREAS WITH MINIMUM 6" TOPSOIL, DNREC APPROVED SEED MIX, AND MULCHING.
13. EROSION & SEDIMENT CONTROL DEVICES SHALL BE REMOVED ONLY AFTER WORK IN AN AREA HAS BEEN COMPLETED AND STABILIZED, WITH APPROVAL FROM THE ENGINEER.

PRODUCT NOTES

1. GEOTEXTILE SHALL BE INSTALLED UNDER THE STABILIZED CONSTRUCTION ENTRANCE AND RIPRAP, AND OUTLET PROTECTION SHALL MEET DNREC TYPE GS-1 SPECIFICATIONS. CONTRACTOR SHALL USE MIRAFI 600X OR AN APPROVED EQUAL.
2. SPRINKLING SHALL BE THE STABILIZATION MEASURE INITIATED IF DUST CONTROL BECOMES A PROBLEM.
3. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO MAINTAIN AND REPAIR ALL EROSION AND SEDIMENT CONTROL PRACTICES DURING CONSTRUCTION.
4. LOCATION OF THE DUMPSTER AND CONCRETE WASHOUT ARE SHOWN ON PLANS, IF THESE LOCATIONS MUST BE MOVED, THE NEW LOCATION SHALL BE APPROVED BY THE AGENCY CONSTRUCTION SITE REVIEWER.
5. TEMPORARY SEED MIX #5 OR #6 SHALL BE USED FOR ALL TEMPORARILY STABILIZED AREAS. SEED MIX SPECIFICATIONS ARE PROVIDED ON THE EROSION AND SEDIMENT CONTROL DETAILS.
6. PERMANENT SEED MIX #9 SHALL BE USED FOR ALL PERMANENTLY STABILIZED AREAS. SEED MIX SPECIFICATIONS ARE PROVIDED ON THE EROSION AND SEDIMENT CONTROL DETAILS.
7. CHANNEL STABILZATION MATTING SHALL BE SSM-11, NORTH AMERICAN GREEN S150BN OR APPROVED EQUAL. STABILIZATION MATTING SHALL BE INSTALLED PER THE EROSION AND SEDIMENT CONTROL DETAILS.

GENERAL NOTES

[1] CONTRACTOR SHALL INSTALL SM-S MATTING (NORTH AMERICAN GREEN S75BN) OR APPROVED EQUAL TO ALL DISTURBED TURF AREAS ON SITE.

SITE SOILS

SOIL	HSG	DESCRIPTION
BA	B/D	BROADKILL-APPOQUINIMINK COMPLEX, VERY FREQUENTLY FLOODED, TIDAL
CAA	C/D	CARMICHAEL LOAM, 0 TO 2 PERCENT SLOPES
ULB	C	UNICORN LOAM, 2 TO 5 PERCENT SLOPES

TRUE NORTH | PROJECT NORTH

0' 20' 40' 60'

SCALE: 1" = 20'

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

EROSION & SEDIMENT CONTROL PLAN

SEAL:

CIVIL ENGINEER:

CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

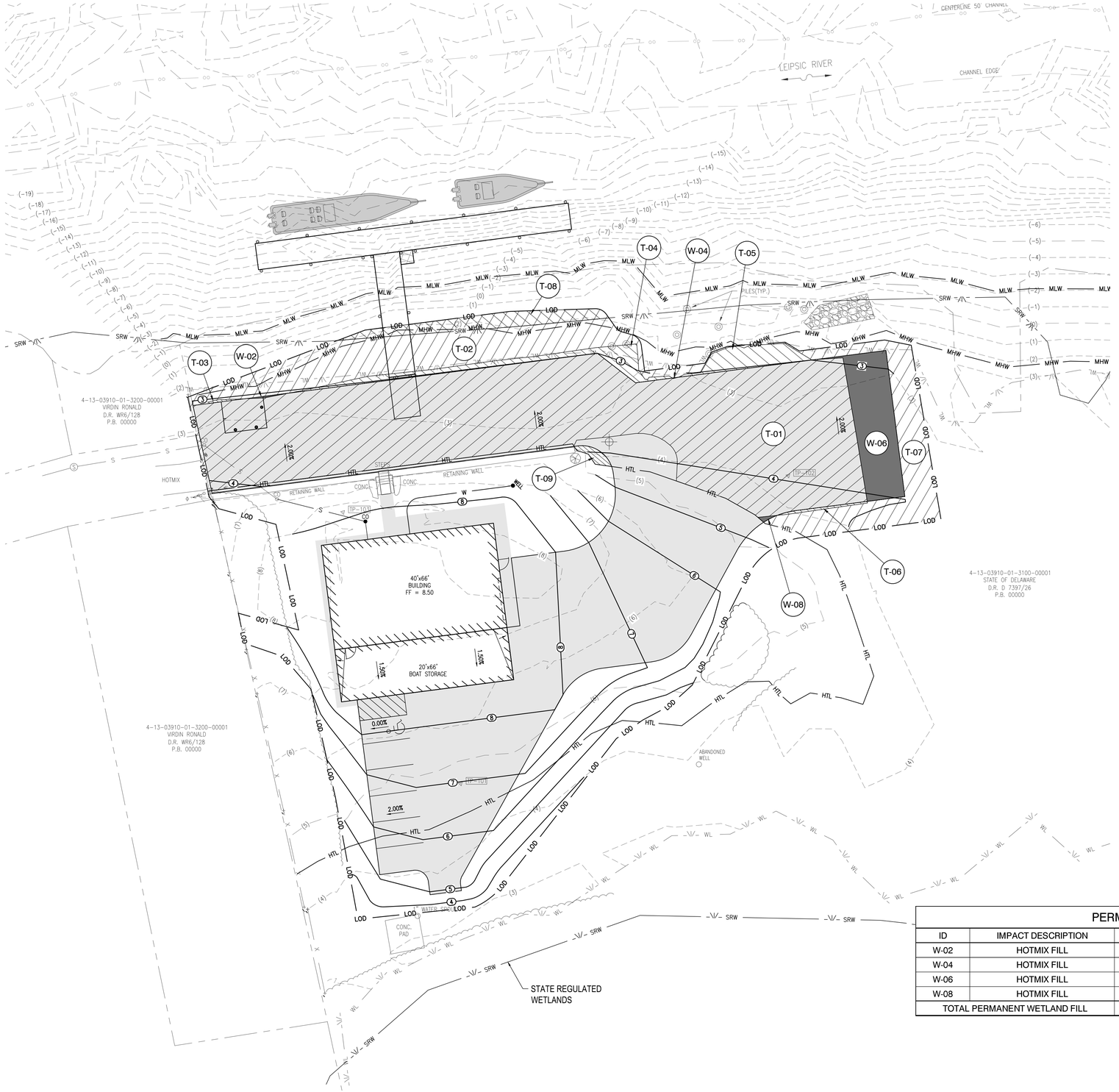
DATE: 05-01-2025

SCALE: 1" = 20'

SHEET NO.: C111

PROJECT NO.: 00175013.092A

G:\Projects\00175013.001A (DNREC 2017 Engineering RZ)\175013.92 Leipsic Dock\CAD\Sheets\C111 - Erosion & Sediment Control Plan.dwg, 5/1/2025 4:18 PM



LEGEND:

- LIMIT OF DISTURBANCE — LOD
- EXISTING HIGH TIDE LINE ELEV: 4.51 — HTL
- EXISTING MEAN HIGH WATER ELEV: 2.37 — MHW
- EXISTING MEAN LOW WATER ELEV: -2.11 — MLW
- EXISTING STATE REGULATED WETLAND — SRW
- PERMANENT IMPACTS
- TEMPORARY IMPACTS

TEMPORARY WETLAND IMPACT AREA SCHEDULE

ID	IMPACT DESCRIPTION	AREA (SF)	AREA (AC)	JURISDICTION
T-01	DEMOLITION AND REPAIR	9263.8600	0.2127	USACE
T-02	CONSTRUCTION	1354.7160	0.0311	USACE
T-03	REMOVE EXISTING FILL	8.7560	0.0002	USACE
T-04	REMOVE EXISTING FILL	360.8500	0.0083	USACE
T-05	REMOVE EXISTING FILL	290.5450	0.0067	USACE
T-06	REMOVE EXISTING FILL	26.4800	0.0006	USACE
T-07	CONSTRUCTION	2652.8040	0.0609	USACE
T-08	CONSTRUCTION	442.5696	0.0102	DNREC
T-09	CONSTRUCTION	47.6200	0.0011	USACE
TOTAL TEMPORARY WETLAND IMPACT AREAS		14,005.6310	0.3215	USACE
TOTAL TEMPORARY WETLAND IMPACT AREAS		442.5696	0.0102	DNREC

PERMANENT WETLAND IMPACT AREA SCHEDULE

ID	IMPACT DESCRIPTION	AREA (SF)	AREA (AC)	VOLUME (CY)	JURISDICTION	LOSS VS IMPACT	LOSS (AC)
W-02	HOTMIX FILL	5.4890	0.0001	0.1779	USACE-SECTION 404	LOSS	0.0001
W-04	HOTMIX FILL	0.3000	0.0000	0.0097	USACE-SECTION 404	LOSS	0.0000
W-06	HOTMIX FILL	869.2398	0.0200	28.1698	USACE-SECTION 404	LOSS	0.0200
W-08	HOTMIX FILL	7.3600	0.0002	0.2385	USACE-SECTION 404	LOSS	0.0002
TOTAL PERMANENT WETLAND FILL		882.3888	0.0203	28.5959	USACE	LOSS	0.0203

0' 20' 40' 60'
SCALE: 1" = 20'

TRUE NORTH
PROJECT NORTH

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

ENVIRONMENTAL COMPLIANCE PLAN

SEAL:

CIVIL ENGINEER:

CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

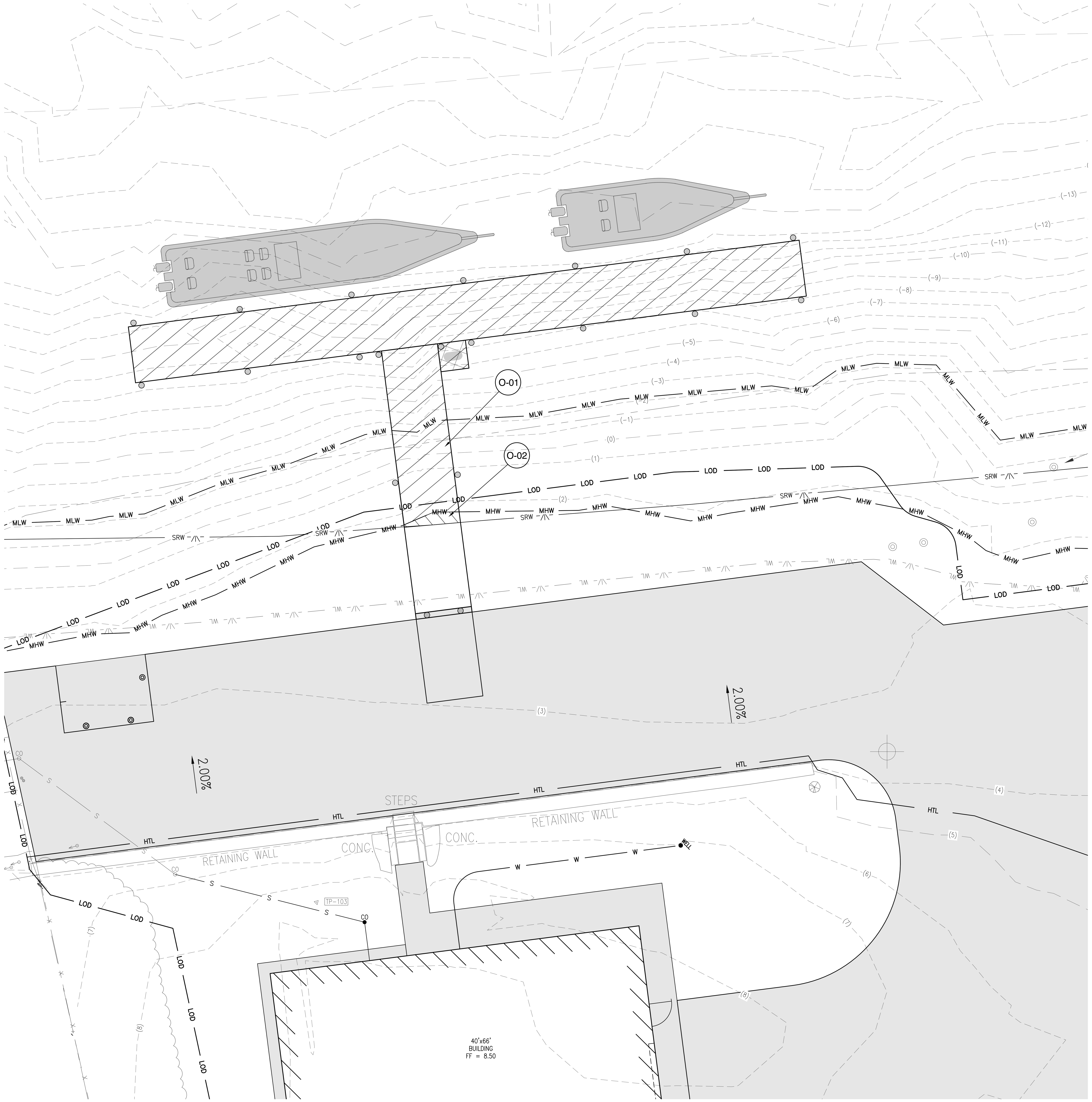
DATE: 05-01-2025

SCALE: 1" = 20'

SHEET NO.: C112

PROJECT NO.: 00175013.092A

G:\Projects\00175013.092A [DMEC 2017 Engineering 9]\175013.92 Leipsic Dock\CAD\Sheets\C112 - Environmental Compliance Plan.dwg, 5/1/2025 4:34 PM



LEGEND:

LIMIT OF DISTURBANCE	— LOD — LOD —
EXISTING HIGH TIDE LINE ELEV: 4.51	— HTL — HTL —
EXISTING MEAN HIGH WATER ELEV: 2.37	— MHW — MHW —
EXISTING MEAN LOW WATER ELEV: -2.11	— MLW — MLW —
EXISTING STATE REGULATED WETLAND	— -|/- SRW —
PERMANENT OPEN WATER IMPACTS	(hatched)

PERMANENT OPEN WATER IMPACT AREA SCHEDULE

ID	IMPACT DESCRIPTION	AREA (SF)	AREA (AC)	JURISDICTION	LOSS AREA (AC)
O-01	DOCK AND SUPPORT PILES	1,525.56	0.0350	USACE-SECTION 10	0.0000
O-02	DOCK AND SUPPORT PILES	1,541.98	0.0354	DNREC-WATER	0.0000
TOTAL PERMANENT OPEN WATER IMPACTS		1,525.56	0.0350	USACE	0.0000
TOTAL PERMANENT OPEN WATER IMPACTS		1,541.98	0.0354	DNREC	0.0000

0' 10' 20' 30'
SCALE: 1" = 10'

TRUE NORTH
PROJECT NORTH

REVISIONS:
DATE: DESCRIPTION: BY:

LEIPSIC RESEARCH DOCK FACILITY

ENVIRONMENTAL COMPLIANCE PLAN

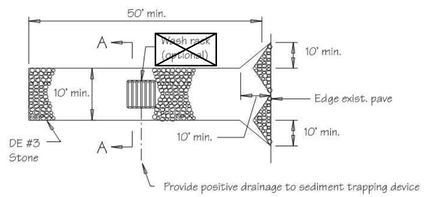
SEAL:

CIVIL ENGINEER:
CENTURY ENGINEERING
A Kleinfelder Company

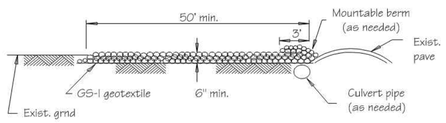
DESIGNED BY: ALW
DRAWN BY: DFS
CHECKED BY: ALW
DATE: 05-01-2025
SCALE: 1" = 10'
SHEET NO.: C113
PROJECT NO.: 00175013.092A

Standard Detail & Specifications

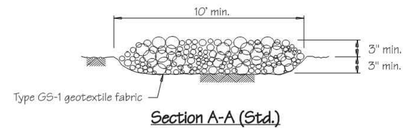
Stabilized Construction Entrance



Plan



Profile

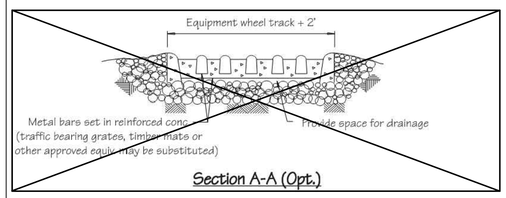


Section A-A (Std.)

Source:	Symbol:	Detail No.
Adapted from VA ESC Handbook	SCE	**DE-ESC-3.4.7** Sheet 1 of 2 Effective July 2023

Standard Detail & Specifications

Stabilized Construction Entrance



Section A-A (Opt.)

SECTION A-A (OPT.) IS NOT REQUIRED FOR THIS PROJECT

Construction Notes:

1. Stone size - Use DE #3 stone.
2. Length - As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum length would apply).
3. Thickness - Not less than size (6) inches.
4. Width - Ten (10) foot minimum, but not less than the full width at points where ingress or egress occurs.
5. Geotextile - Type GS-I; placed over the entire area prior to placing of stone.
6. Surface Water - All surface water flowing or diverted toward construction entrances shall be piped across the entrance. If piping is impractical, a mountable berm with 5:1 slopes will be permitted.
7. Maintenance - The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.
8. Washing - Vehicle wheels shall be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with stone and which drains into an approved sediment trapping device.
9. Inspection - Periodic inspection and needed maintenance shall be provided after each rain.

Source:	Symbol:	Detail No.
Adapted from VA ESC Handbook	SCE	**DE-ESC-3.4.7** Sheet 2 of 2 Effective July 2023

Standard Detail & Specifications

Topsoiling

Construction Notes:

1. **Site Preparation** (Where Topsoil is to be added)

   Note: When topsoiling, maintain needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, waterways and sediment basins.

   a. Grading - Grades on the areas to be topsoiled which have been previously established shall be maintained.

   b. Liming - Where the topsoil is either highly acid or composed of heavy clays, ground limestone shall be spread at the rate of 4-8 tons/acre (200-400 pounds per 1,000 square feet). Lime shall be distributed uniformly over designated areas and worked into the soil in conjunction with tillage operations as described in the following procedures.

   c. Tilling - After the areas to be topsoiled have been brought to grade, and immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by discing or by scarifying to a depth of a least 3 inches to permit bonding of the topsoil to the subsoil. Pack by passing a bulldozer up and down over the entire surface area of the slope to create horizontal erosion check slots to prevent topsoil from sliding down the slope.

2. **Topsoil Material and Application**

   Note:Topsoil salvaged from the existing site may often be used but it should meet the same standards as set forth in these specifications. The depth of topsoil to be salvaged shall be no more than the depth described as a representative profile for that particular soil type as described in the soil survey published by USDA-SCS in cooperation with Delaware Agricultural Experimental Station.

Source:	Symbol:	Detail No.
USDA - NRCS		**DE-ESC-3.4.1** Sheet 1 of 2 Effective July 2023

Standard Detail & Specifications

Topsoiling

Construction Notes (cont.)

a. Materials - Topsoil shall be a loam, sandy loam, clay loam, silt loam, sandy clay loam, loamy sand or other soil as approved by an agronomist or soil scientist. It shall not have a mixture of contrasting textured subsoil and contain no more than 5 percent by volume of cinders, stones, slag, coarse fragment, gravel, sticks, roots, trash or other extraneous materials larger than 1-1/2 inches in diameter. Topsoil must be free of plants or plant parts of bermudagrass, quackgrass, Johnsongrass, nutsedge, poison ivy, thistles, or others as specified. All topsoil shall be tested by a reputable laboratory for organic matter content, pH and soluble salts. A pH of 6.0 to 7.5 and an organic content of not less than 1.5 percent by weight is required. If pH value is less than 6.0 lime shall be applied and incorporated with the topsoil to adjust the pH to 6.5 or higher. Topsoil containing soluble salts greater than 500 parts per million shall not be used.

Note: No sod or seed shall be placed on soil which has been treated with soil sterilant or chemicals used for weed control until sufficient time has elapsed to permit dissipation of toxic materials.

b. Grading - The topsoil shall be uniformly distributed and compacted to a minimum of four (4) inches. Spreading shall be performed in such a manner that sodding or seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets. Topsoil shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or in a condition that may otherwise be detrimental to proper grading and seedbed preparation.

Note:Topsoil substitutes or amendments as approved by a qualified agronomist or soil scientist, may be used in lieu of natural topsoil. Compost material used to improve the percentage of organic matter shall be provided by a certified supplier.

Compost amendments that are intended to meet specific post-construction stormwater management goals shall further meet the requirements of **Appendix 3.06.2 Post Construction Stormwater Management BMP Standards and Specifications, Section 14.0 Soil Amendments.**

Source:	Symbol:	Detail No.
USDA - NRCS		**DE-ESC-3.4.1** Sheet 2 of 2 Effective July 2023

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

EROSION & SEDIMENT CONTROL DETAILS

SEAL:

CIVIL ENGINEER:

CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

DATE: 05-01-2025

SCALE: NTS

SHEET NO.: C201

PROJECT NO.: 00175013.092A

Standard Detail & Specifications
Vegetative Stabilization

REQUIRED FOR THIS PROJECT

TEMPORARY SEEDING BY RATES, DEPTHS AND DATES

Mix #	Species[5] Certified Seed	Seeding Rate lb/Ac[4]	Seeding Rate lb/1000 sq.ft.	Coastal Plain 2/1-4/30	Coastal Plain [2] 5/1-8/14	Coastal Plain 8/15-10/31	Piedmont 3/1-4/30	Piedmont [2] 5/1-7/31	Piedmont 8/1-10/31	All 10/31-2/1	Planting Depth[3]
1	Barley	125	4	O	A	O	O	A	O		1-2 inches 2-3" sandy soils
2	Oats	125	4	O	A	A	O	A	A		1-2 inches 2-3" sandy soils
3	Rye	125	4	O	A	O	O	A	O	A	1-2 inches 2-3" sandy soils
4	Perennial Ryegrass	125	4	O	A	O	O	A	O		0.5 inches 1-2" sandy soils
5	Annual Ryegrass	125	4	O	A	O	O	A	O	A	0.5 inches 1-2" sandy soils
6	Winter Wheat	125	4	O	A	O	O	A	O	A	1-2 inches 2-3" sandy soils
7	Foxtail Millet	30 PLS	0.7		O			O			0.5 inches 1-2" sandy soils
8	Pearl Millet	20 PLS	0.5		O			O			0.5 inches 1-2" sandy soils

Optimum Seeding Dates[1]: O = Optimum Planting Period; A = Acceptable Planting Period

1. Winter seeding requires 3 tons per acre of straw mulch for proper stabilization.
2. May be planted throughout summer if soil moisture is adequate or seeded area can be irrigated.
3. Applicable on slopes 3:1 or less.
4. Use varieties currently recommended for Delaware. Contact a County Extension Office for information.
5. Warm season grasses such as Millet may be used between 5/1 and 9/1 if desired. Seed at 3-5 lbs. per acre. Good on low fertility and acid areas. Seed after frost through summer at a depth of 0.5".

NOTE: Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.

Source: Delaware ESC Handbook | Symbol: | Detail No. **DE-ESC-3.4.3** Sheet 1 of 4 Effective July 2023

Standard Detail & Specifications
Vegetative Stabilization

PERMANENT SEEDING AND SEEDING DATES

Mix No.	Certified Seed[3] Well Drained Soils	Seeding Rate[1] lb/Ac	lb/1000 sq.ft.	Coastal Plain 2/1-4/30	Coastal Plain 5/1-8/14	Coastal Plain 8/15-10/31	Piedmont 3/1-4/30	Piedmont 5/1-7/31	Piedmont 8/1-10/31	All[4] 10/31-2/1	Remarks
1	Tall Fescue Canada Wild Rye	140 10	3.2 0.23	A	O	A	A	O	A	Add 100 lbs./ac Winter Rye	Good erosion control mix Tolerant of low fertility soils Good for droughty sites
2	Deertongue Sheep Fescue White Clover	30 30 10	0.69 0.69 0.35	A	O	A	A	O	A	Add 100 lbs./ac Winter Rye	Good erosion control mix Tolerant of low fertility soils Legume that fixes atmospheric N into soil
3	Tall Fescue (Turf-type) **or** Strong Creeping Red Fescue **or** Perennial Ryegrass **plus** Flatpea[5]	50 50 50 15	1.15 1.15 1.15 0.34	O	A[4]	O	O	A[4]	O	Add 100 lbs./ac. Winter Rye	Good erosion control mix Tall Fescue for droughty conditions. Creeping Red Fescue for heavy shade. Flatpea to suppress woody vegetation.
4	Strong Creeping Red Fescue Kentucky Bluegrass Perennial Ryegrass **or** Redtop **plus** White Clover[5]	100 70 15 5 3	2.3 1.61 0.35 0.11 0.07	O	A[4]	O	O	A[4]	O	Add 100 lbs./ac. Winter Rye	Suitable waterway mix. Canada Bluegrass more drought tolerant. Use Redtop for increased drought tolerance.
5	Switchgrass[6,7] **or** Coastal Panicgrass Big Bluestem Little Bluestem Indian Grass	10 10 5 5 5	0.23 0.23 0.11 0.11 0.1		O			O			Native warm-season mixture. Tolerant of low fertility soils. Drought tolerant. Poor shade tolerance. N fertilizer discouraged - weeds
6	Tall Fescue (turf-type) (Blend of 3 cultivars)	150	3.5	O	A[4]	O	O	A[4]	O		Managed filter strip for nutrient uptake.
7	Tall Fescue Ky. Bluegrass (Blend) Perennial Ryegrass	150 20 20	3.5 0.46 0.46	O	A[4]	O	O	A[4]	O		Three cultivars of Kentucky Bluegrass. Traffic tolerant.
8	Big Bluestem[7] Indian Grass[7] Little Bluestem[7] Creeping Red Fescue **plus one of:** Partridge Pea Bush Clover Wild Indigo Showy Tick-Trefoil	10 10 8 30 5 3 3 2	0.23 0.23 0.18 0.69 0.11 0.07 0.07 0.05	O	A[4]		O	A[4]			All species are native. Indian Grass and Bluestem have fluffy seeds. Plant with a specialized native seed drill. Creeping Red Fescue will provide erosion protection while the warm season grasses get established.

Optimum Seeding Dates[2]: O = Optimum Planting Period; A = Acceptable Planting Period

NOTE: Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.

Source: Delaware ESC Handbook | Symbol: | Detail No. **DE-ESC-3.4.3** Sheet 2 of 4 Effective July 2023

Standard Detail & Specifications
Vegetative Stabilization

REQUIRED FOR THIS PROJECT

PERMANENT SEEDING AND SEEDING DATES (cont.)

Mix No.	Certified Seed[3] Poorly Drained Soils	Seeding Rate[1] lb/Ac	lb/1000 sq.ft.	Coastal Plain 2/1-4/30	Coastal Plain 5/1-8/14	Coastal Plain 8/15-10/31	Piedmont 3/1-4/30	Piedmont 5/1-7/31	Piedmont 8/1-10/31	All[4] 10/31-2/1	Remarks
9	Redtop Creeping Bentgrass Sheep Fescue Rough Bluegrass	75 35 30 45	1.72 0.8 0.69 1	O	A[4]	O	O	A[4]	O	Add 100 lbs./ac. Winter Rye	Quick stabilization of disturbed sites and waterways
10	Switchgrass[6]	10	0.23	A		O	A		O		Good erosion control, wildlife cover and wetland revegetation.
	Residential Lawns										
11	Tall Fescue Perennial Ryegrass Kentucky Bluegrass Blend	100 25 30	2.3 0.57 0.69	O	A[4]	O	O	A[4]	O		High value, high maintenance, light traffic, irrigation necessary. Well drained soils, full sun.
12	Tall Fescue Perennial Ryegrass Sheep Fescue	100 25 25	2.3 0.57 0.57	O	A[4]	O	O	A[4]	O		Moderate value, low maintenance, traffic tolerant
13	Creeping Red Fescue Chewings Fescue Rough Bluegrass Kentucky Bluegrass	50 50 20 20	1.15 1.15 0.4 0.4	O	A[4]	O	O	A[4]	O		Shade tolerant, moderate traffic tolerance, moderate maintenance.
14	Creeping Red Fescue Rough Bluegrass **or** Chewings Fescue	50 90	1.15 2.1	O	A[4]	O	O	A[4]	O		Shade tolerant, moisture tolerant.
15	K-31 Tall Fescue	150	3.5	O	A[4]	O	O	A[4]	O		Monoculture, but performs well alone in lawns. Discouraged.

Optimum Seeding Dates[2]: O = Optimum Planting Period; A = Acceptable Planting Period

1. When hydroseeding is the chosen method of application, the total rate of seed should be increased by 25%.
2. Winter seeding requires 3 tons per acre of straw mulch. Planting dates listed above are average for Delaware. These dates may require adjustment to reflect local conditions.
3. All seed shall meet the minimum purity and minimum germination percentages recommended by the Delaware Department of Agriculture. The maximum % of weed seeds shall be in accordance with Chapter 15, Title 3 of the Delaware Code.
4. Turf-type species may be planted throughout summer if soil moisture is adequate or seeded area can be irrigated.
5. It is recommended that all leguminous seed be inoculated.
6. Warm season grass mix and Switchgrass cannot be mowed more than 4 times per year.
7. Warm season grasses require a soil temperature of at least 50 degrees in order to germinate and will remain dormant until then.

NOTE: Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.

Source: Delaware ESC Handbook | Symbol: | Detail No. **DE-ESC-3.4.3** Sheet 3 of 4 Effective July 2023

Standard Detail & Specifications
Vegetative Stabilization

Construction Notes:

1. Site Preparation
   a. Prior to seeding, install needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, grassed waterways, and sediment basins.
   b. Final grading and shaping is not necessary for temporary seedings.
2. Seedbed Preparation

   It is important to prepare a good seedbed to ensure the success of establishing vegetation. The seedbed should be well prepared, loose, uniform, and free of large clods, rocks, and other objectionable material. The soil surface should not be compacted or crusted.
3. Soil Amendments
   a. Lime - Apply liming materials based on the recommendations of a **soil test** in accordance with the approved nutrient management plan. If a nutrient management plan is not required, apply dolomitic limestone at the rate of 1 to 2 tons per acre. Apply limestone uniformly and incorporate into the top 4 to 6 inches of soil.
   b. Fertilizer - Apply fertilizer based on the recommendations of a **soil test** in accordance with the approved nutrient management plan. If a nutrient management plan is not required, apply a formulation of 10-10-10 at the rate of 600 pounds per acre. Apply fertilizer uniformly and incorporate into the top 4 to 6 inches of soils.
4. Seeding
   a. For **temporary stabilization**, select a mixture from **Sheet 1 .** For a **permanent stabilization**, select a mixture from **Sheet 2** or **Sheet 3** depending on the conditions. Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.
   b. Apply seed uniformly with a broadcast seeder, drill, cultipacker seeder or hydroseeder. All seed will be applied at the recommended rate and planting depth.
   c. Seed that has been broadcast should be covered by raking or dragging and then lightly tamped into place using a roller or cultipacker. If hydroseeding is used and the seed and fertilizer is mixed, they will be mixed on site and the seeding shall be done immediately and without interruption.
5. Mulching

   All mulching shall be done in accordance with detail **DE-ESC-3.4.5**.

Source: Delaware ESC Handbook | Symbol: | Detail No. **DE-ESC-3.4.3** Sheet 4 of 4 Effective July 2023

Standard Detail & Specifications
Mulching

1. Materials and Amounts

a. *Straw* - Straw shall be unrotted small grain straw applied at the rate of 1-1/2 to 2 tons per acre, or 70 to 90 pounds (two bales) per 1,000 square feet. Mulch materials shall be relatively free of weeds and shall be free of noxious weeds such as; thistles, Johnsongrass, and quackgrass. Spread mulch uniformly by hand or mechanically. For uniform distribution of hand spread mulch, divide area into approximately 1,000 square feet sections and place 70-90 pounds (two bales) of mulch in each section.

b. *Wood chips* - Apply at the rate of approximately 6 tons per acre or 275 pounds per 1,000 square feet when available and when feasible. These are particularly well suited for utility and road rights-of-way. If wood chips are used, increase the application rate of nitrogen fertilizer by 20 pounds of N per acre (200 pounds of 10-10-10 or 66 pounds of 30-0-0 per acre).

c. *Hydraulically applied mulch* -The following conditions apply to hydraulically applied mulch:

i. Definitions:
   a. Wood fiber mulch shall consist of specially prepared wood that has been processed to a uniform state, is packaged for sale as a hydraulic mulch for use with hydraulic seeding equipment, and consists of a minimum of 70% virgin or recycled wood fiber combined with 30% paper fiber and additives.
   b. Blended fiber mulch shall consist of any hydraulic mulch that contains greater than 30% paper fiber. The paper component must consist of specially prepared paper that has been processed to a uniform fibrous state and is packaged for sale as a hydraulic mulch for use with hydraulic seeding equipment.
   c. A bonded fiber matrix (BFM) consists of long strand, specially prepared wood fibers that have been processed to a uniform state held together by a water resistant bonding agent. BFMs shall contain no paper (cellulose) mulch but may contain small percentages of synthetic fibers to enhance performance.
   d. Refer to **Figure 3.4.5a** for conditions and limitations of use for each of the above categories of hydraulic mulch.

ii. All components of the hydraulically applied mulches shall be pre-packaged by the manufacturer to assure material performance. Field mixing of the mulch components is acceptable, but must be done per manufacturers recommendations to ensure the proper results.

iii. Hydraulic mulches shall be applied with a viable seed and at manufacturer's recommended rates. Increased rates may be necessary based on site conditions.

iv. Hydraulically applied mulches and additives shall be mixed according to manufacturers recommendations.

iv. Materials within this category shall only be used when hydraulically applied mulch has been specified for use on the approved Sediment and Stormwater Plan, or supplemental approval from the plan approval agency has been obtained in writing for a specific area.

Source: Delaware ESC Handbook & Filtrexx™ International | Symbol: | Detail No. **DE-ESC-3.4.5** Sheet 1 of 3 Effective July 2023

Standard Detail & Specifications
Mulching

v. Application:
   a. Apply product to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope.
   b. Do not apply to saturated soils, or if precipitation is anticipated within 24-48 hours.
   c. During the spring (March 1 to May 31) and fall (September 1 to November 30) seasons, hydraulic mulches may be applied in a one-step process where all components are mixed together in single-tank loads. It is recommended that the product be applied from opposing directions to achieve optimum soil coverage.
   d. During the summer (June 1 to August 31) and winter (December 1 to February 28) seasons, the following two-step process is required:
      Step One– Mix and apply seed and soil amendments with a small amount of mulch for visual metering.
      Step Two – Mix and apply mulch at manufacturers recommended rates over freshly seeded surfaces. Apply from opposing directions to achieve optimum soil coverage.
   e. Minimum curing temperature is 40° F (4° C). The best results and more rapid curing are achieved at temperatures exceeding 60° F (15° C). Curing times may be accelerated in high temperature, low humidity conditions on dry soils.

vi. Recommended application rates are for informational purposes only. Conformance with this standard and specification shall be performance-based and requires **100% soil coverage**. Any areas with bare soil showing shall be top dressed until full coverage is achieved.

d. *Compost blanket (CB)* - Loosely applied with a pneumatic blower so that a 1" compost blanket uniformly covers the **soil with 100% coverage**. This application can be used with seed to promote germination by applying the approved seed mix directly into the loosely blown compost. The compost blanket performs best on slopes less than 2:1 and requires no mulch anchoring.

2. Anchoring mulch - Mulch must be anchored immediately to minimize loss by wind or water. This may be done by one of the following methods, depending upon size of area, erosion hazard, and cost.

a. *Crimping* - A crimper is a tractor drawn implement designed to punch and anchor mulch into the top two (2) inches of soil. This practice affords maximum erosion control but is limited to flatter slopes where equipment can operate safely. On sloping land, crimping should be done on the contour whenever possible.

b. *Tracking* - Tracking is the process of cutting mulch (usually straw) into the soil using a bulldozer or other equipment that runs on cleated tracks. Tracking is used primarily on slopes 3:1 or steeper and should be done up and down the slope with cleat marks running across the slope.

c. *Liquid mulch binders* - Applications of liquid mulch binders should be heavier at edges, in valleys, and at crests of banks and other areas where the mulch will be moved by wind or water. All other areas should have a uniform application of binder. The use of synthetic binders is the preferred method of mulch binding and should be applied at the rates recommended by the manufacturer.

d. *Paper fiber* - The fiber binder shall be applied at a net dry weight of 750 lbs/ac. The wood cellulose fiber shall be mixed with water, and the mixture shall contain a maximum of 50 lbs. of wood cellulose fiber per 100 gallons.

e. *Nettings* - Biodegradable nettings may be used to secure straw mulch. Install and secure according to the manufacturer's recommendations. Photodegradable or synthetic nettings are not acceptable.

Source: Delaware ESC Handbook & Filtrexx™ International | Symbol: | Detail No. **DE-ESC-3.4.5** Sheet 2 of 3 Effective July 2023

Standard Detail & Specifications
Mulching

MULCHING MATERIAL SELECTION GUIDE

Percent Slope	Type of Mulch / App. Rate*	Dec. 1 to Feb. 28(29)	March 1 to May 31	June 1 to Aug. 31	Sept. 1 to Nov. 30
Less than 2%	Blended Fiber @ 2000 lbs/ac. minimum	xxxxxxxxxxxxxxxxx	OK (≤ 1 ac.)	xxxxxxxxxxxxxxxxx	OK (≤ 1 ac.)
	Wood Fiber @ 2000 lbs/ac. min.	xxxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxxx	OK
	BFM @ 3000 lbs/ac. min.	OK	OK	OK	OK
	Straw @ 2 Tons/ac. Min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
2% to 5.9%	Wood Fiber @ 2000 lbs/ac. min.	xxxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxxx	OK
	BFM @ 3000-3500 lbs/ac. min	OK	OK	OK	OK
	Straw @ 2 Tons/ac. min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
6% to 10.9%	Wood Fiber @ 2000-2500 lbs/ac. min.	xxxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxxx	OK
	BFM @ 3500-4000 lbs/ac. min.	OK	OK	OK	OK
	Straw @ 2 Tons/ac. min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
11% to 24.9%	Wood Fiber @ 2500-3000 lbs/ac. min.	xxxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxxx	OK
	BFM @ 3500-4000 lbs/ac. min.	OK	OK	OK	OK
	Straw @ 2 Tons/ac. min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
25% to 33%	Wood Fiber @ 2500-3000 lbs/ac. min.	xxxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxxx	OK
	BFM @ 4000 lbs/ac. min.	xxxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxxx	OK
	Straw @ 2 Tons/ac. min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
33% and up	BFM @ 4000-4500 lbs/ac. min.	xxxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxxx	OK
	Straw @ 2 Tons/ac. min.***	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	2:1 Max.	2:1 Max.	2:1 Max.	2:1 Max.

* Note: Manufacturers Recommended Rates for informational purposes only. Performance standard requires 100% soil coverage.
** Note: Stabilization Matting must be applied in accordance with Section 3.4.6 of the Delaware ESC Handbook.
***Note: Straw applied on slopes greater than 33% must be netted (this does not apply to topsoil stockpiles).
OK = Acceptable to use during this time period.
xx = Not acceptable to use during this time period.
All application rates are minimums.

Source: Delaware ESC Handbook & Filtrexx™ International | Symbol: | Detail No. **DE-ESC-3.4.5** Sheet 3 of 3 Effective July 2023

Standard Detail & Specifications
Dust Control

Temporary Methods:

1. Mulches - See **DE-ESC-3.4.5**, Standard Detail and Specifications for Mulching.
2. Vegetative cover - See **DE-ESC-3.4.3**, Std. Detail and Specifications for Vegetative Stabilization.
3. Adhesives - Use on mineral soils only (not effective on muck soils). Keep traffic off these areas. The following table may be used for general guidance.

Type of Emulsion	Water Dilution	Type of Nozzle	Apply Gal/Ac.
Latex emulsion	12.5:1	Fine spray	235
Resin-in-water emulsion	4.1	Fine spray	300
Acrylic emulsion (non-traffic)	7:1	Coarse spray	450
Acrylic emulsion (traffic)	3.5:1	Coarse spray	350

4. Tillage - For emergency temporary treatment, scarify the soil surface to prevent or reduce the amount of blowing dust until a more appropriate solution can be implemented. Begin the tillage operation on the windward side of the site using a chisel-type plow for best results.
5. Sprinkling - Sprinkle site with water until the surface is moist . Repeat as needed.
6. Calcium Chloride - Apply as flakes or granular material with a spreader at a rate that will keep the soil surface moist. Re-apply as necessary.
7. Barriers - Place barriers such as solid board fences, snow fences, hay bales, etc. at right angles to the prevailing air currents at intervals of approx. 10X their height.

Permanent Methods:

1. Vegetative cover - See **DE-ESC-3.4.3**, Std. Detail and Specifications for Vegetative Stabilization.
2. Stone - Apply layer of crushed stone or coarse gravel to protect soil surface.

Source: Adapted from VA ESC Handbook | Symbol: | Detail No. **DE-ESC-3.4.8** Sheet 1 of 1 Effective July 2023

REVISIONS: | DATE: | DESCRIPTION: | BY:

LEIPSIC RESEARCH DOCK FACILITY

EROSION & SEDIMENT CONTROL DETAILS

SEAL:

CIVIL ENGINEER: CENTURY ENGINEERING A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

DATE: 05-01-2025

SCALE: NTS

SHEET NO.: C202

PROJECT NO.: 00175013.092A

Standard Detail & Specifications

Construction Site Pollution Prevention

Delaware NPDES Discharge Permit
General Permit for Discharge of Stormwater from Construction Activities

((Project Name))

((NOI Permit Number))

((Agency Plan Approval ID))

((Contact Name & Number for Additional Site Information))

((Contact Name & Number to Obtain Copy of Approved Plan))

If you observe indicators of stormwater pollutants
in the discharge or in the receiving waterbody, call the
DNREC Spill Notification 24 HR Hotline at

1-800-662-8802

Example Construction General Permit (CGP) Signage

NOTES:
1. Minimum sign size 2' x 2'
2. Minimum text size 1"
3. Sign must be posted at a safe, publicly accessible location close to construction site
4. Sign must be visible from the public road nearest the active construction site
5. Signs posted within a DelDOT or other public road right-of-way (ROW) must be in accordance with all local and/or State requirements in regards to safety, location, orientation, etc.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.6.1** Sheet 1 of 4 Effective July 2023

Standard Detail & Specifications

Construction Site Pollution Prevention

Notes:

The Construction Site Pollution Prevention Plan includes the following elements:

1. **Material Inventory**

   Document the storage and use of the following materials:
   a. Concrete
   b. Detergents
   c. Paints (enamel and latex)
   d. Cleaning solvents
   e. Pesticides
   f. Wood scraps
   g. Fertilizers
   h. Petroleum based products
2. **Good housekeeping practices**
   a. Store only enough product required to do the job.
   b. Store all materials in a neat, orderly manner in their original labeled containers and covered.
   c. Do not mix different substances.
   d. When possible, use all of a product prior to disposal of the container.
   e. Manufacturers' instructions for disposal should be strictly adhered to.
   f. Designate someone to inspect all BMPs daily.
3. **Waste management practices**
   a. Collect and store all waste materials in securely lidded dumpsters in a location that does not drain to a waterbody.
   b. Salvage and/or recycle waste materials whenever possible.
   c. The dumpsters shall be emptied a minimum of twice per week, or more if necessary. The licensed trash hauler is responsible for cleaning out dumpsters.

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		**DE-ESC-3.6.1** Sheet 2 of 4 Effective July 2023

Standard Detail & Specifications

Construction Site Pollution Prevention

Notes (cont.)

d. Dispose of all trash in accordance with all applicable Delaware laws.
e. Littering is strictly prohibited. Trash cans should be placed at all lunch spots and recycle bins should be placed near the construction trailer.
f. If fertilizer bags can not be stored in a weather-proof location, they should be kept on a pallet and covered with plastic sheeting which is overlapped and anchored.

4. **Equipment maintenance practices**
   a. If possible, equipment should be taken to off-site commercial facilities for washing and maintenance.
   b. If performed on-site, wash vehicles with high-pressure water spray without detergents in an area contained by an impervious berm.
   c. Use drip pans for all equipment maintenance.
   d. Inspect equipment for leaks on a daily basis.
   e. Direct washout from concrete trucks into a temporary pit for hardening and proper disposal.
   f. Equip fuel nozzles with automatic shut-off valves.
   g. Dispose of all used products such as oil, antifreeze, solvents and tires in accordance with manufacturers' recommendations and local, state and federal laws and regulations.
5. **Spill prevention practices**
   a. Identify potential spill areas and contain them in covered areas with no connection to the storm drain system.
   b. Post warning signs in hazardous material storage areas.
   c. Perform preventive maintenance on all tanks, valves, pumps, pipes and other equipment as necessary.
   d. Prioritize low or non-toxic substances for use.

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		**DE-ESC-3.6.1** Sheet 3 of 4 Effective July 2023

Standard Detail & Specifications

Construction Site Pollution Prevention

Notes (cont.)

e. Prominently post contact information for reporting spills through the DNREC 24-Hour Toll Free Number.

6. **Education**
   a. Include Best Management Practices (BMPs) for construction site pollution control as part of regular progress meetings.
   b. Information regarding waste management, equipment maintenance and spill prevention should be prominently posted in the construction trailer.

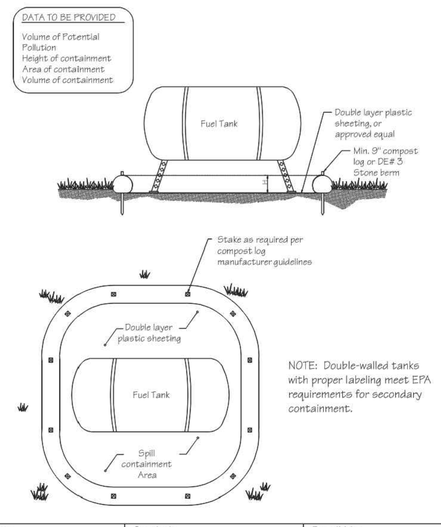
CONTACT INFORMATION

DNREC 24-Hour Toll Free Number	**800-662-8802**
DNREC Solid & Hazardous Waste Management Section	**302-739-9403**

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		**DE-ESC-3.6.1** Sheet 4 of 4 Effective July 2023

Standard Detail & Specifications

Fueling & Spill Control



NOTE: Double-walled tanks with proper labeling meet EPA requirements for secondary containment.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.6.4** Sheet 1 of 2 Effective July 2023

Standard Detail & Specifications

Fueling & Spill Control

Pollution Prevention – Fueling & Spill Control

1. Fueling should only take place in signed designated areas, away from downstream drainage facilities and watercourses.
2. Fueling must be with nozzles equipped with automatic shut-off to control drips. Do not top off.
3. Protect the areas where equipment or vehicles are being repaired, maintained, fueled or parked from storm water run-on and runoff.
4. Use barriers such as berms to prevent storm water run-on and runoff, and to contain spills.
5. Place a "Fueling Area" sign next to each fueling area.
6. Store hazardous materials such as fuel, solvents, oil and chemicals in secondary containment.
7. Inspect vehicles and equipment for leaks on each day of use. Repair fluid and oil leaks immediately.
8. Absorbent spill clean-up materials and spill kits must be available in fueling areas and on fuel trucks.
9. If fueling is to take place at night, make sure the fueling area is sufficiently illuminated.
10. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.

CLEAN UP SPILLS

1. If it is safe to do so, immediately contain and clean up any chemical and/or hazardous material spills.
2. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.
3. Do not bury spills or wash them down with water.

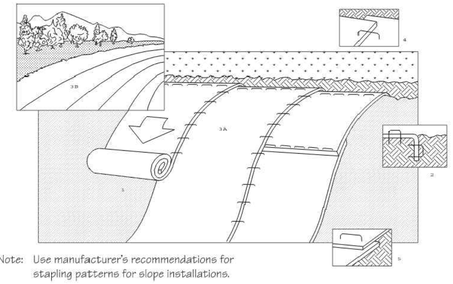
LEAKS AND DRIPS

1. Use drip pans or absorbent pads at all times. Place under and around leaky equipment.
2. Do not allow oil, grease, fuel or chemicals to drip onto the ground.
3. Have spill kits and clean up material on-site.
4. Repair leaky equipment promptly or remove problem vehicles and equipment from the site. Clean up contaminated soil immediately.
5. Store contaminated waste in sealed containers constructed of suitable material. Label these containers properly.
6. Clean up all spills and leaks. Promptly dispose of waste and spent clean up materials.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.6.4** Sheet 2 of 2 Effective July 2023

Standard Detail & Specifications

Stabilization Matting - Slope



Note: Use manufacturer's recommendations for stapling patterns for slope installations.

Perspective

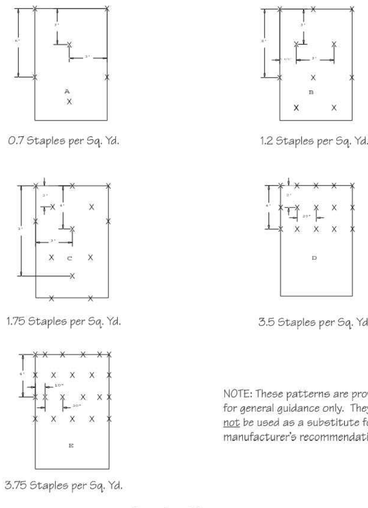
Construction Notes:

1. Prepare soil before installing matting, including application of lime, fertilizer, and seed.
2. Begin at the top of the slope by anchoring the mat in a 6" deep X 6" wide trench. Backfill and compact trench after stapling.
3. Roll the mats (A) down or (B) horizontally across the slope.
4. The edges of parrallel mats must be stapled with approx. 2" overlap.
5. When mats must be spliced down the slope, place mats end over end (shingle style) with approx. 4" overlap. Staple through overlapped area, approx. 12" apart.

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-S	**DE-ESC-3.4.6.1** Sheet 1 of 2 Effective July 2023

Standard Detail & Specifications

Stabilization Matting - Slope



NOTE: These patterns are provided for general guidance only. They shall not be used as a substitute for manufacturer's recommendations.

Stapling Patterns

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-S	**DE-ESC-3.4.6.1** Sheet 2 of 2 Effective July 2023

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

EROSION & SEDIMENT CONTROL DETAILS

SEAL:

CIVIL ENGINEER:

CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW

DRAWN BY: DFS

CHECKED BY: ALW

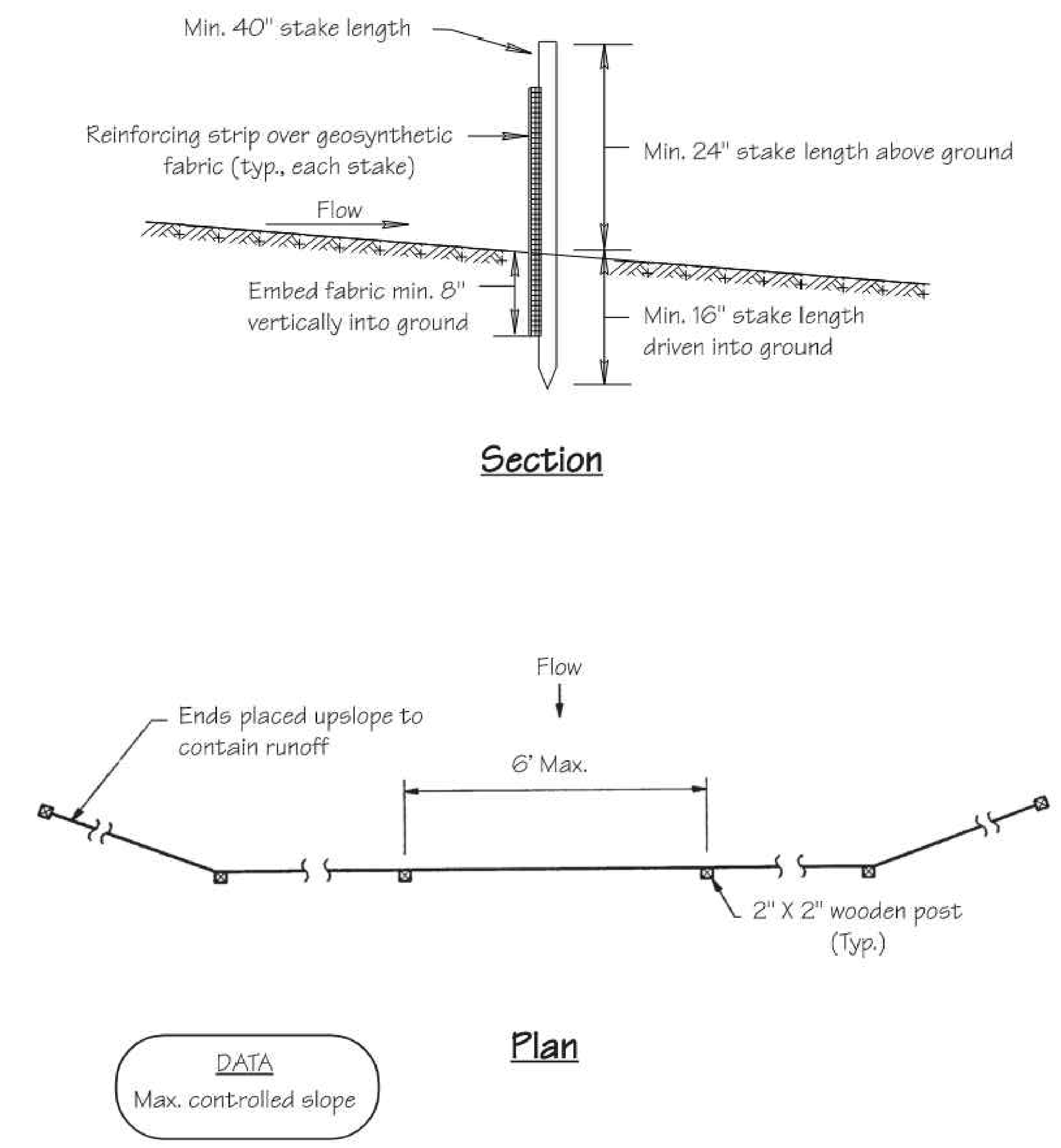
DATE: 05-01-2025

SCALE: NTS

SHEET NO.: C203

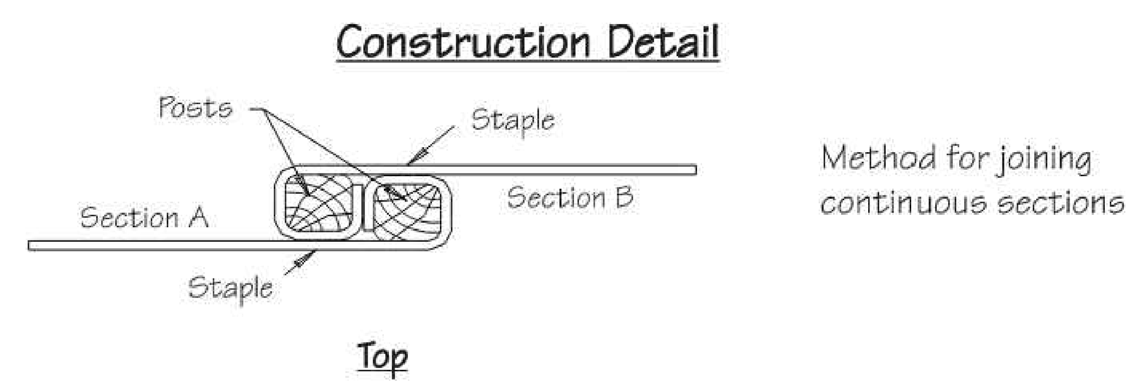
PROJECT NO.: 00175013.092A

Standard Detail & Specifications
Silt Fence



Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	SF	DE-ESC-3.1.2.1 Sheet 1 of 2 Effective July 2023

Standard Detail & Specifications
Silt Fence



Construction Notes:

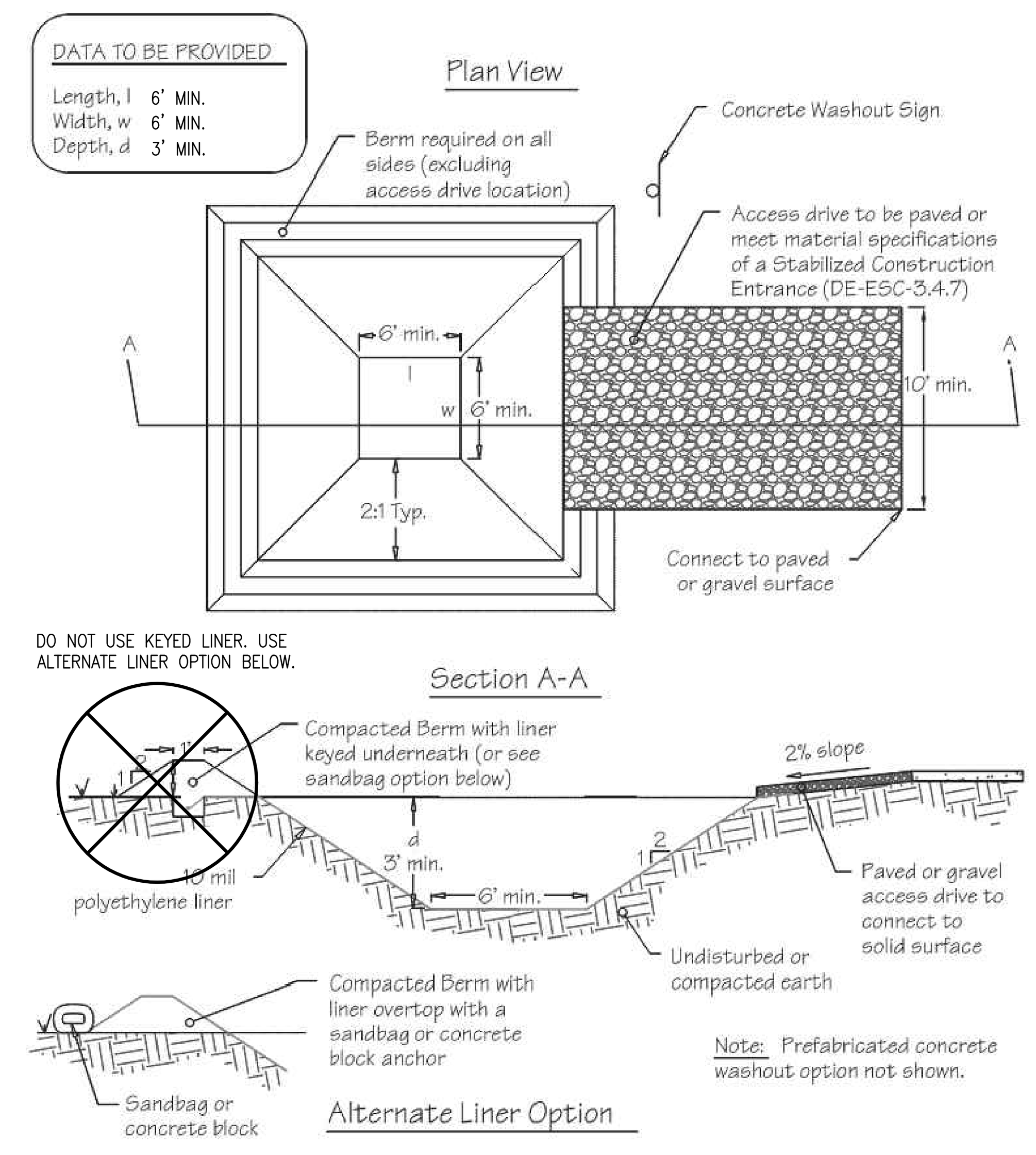
1. Geosynthetic fabric to be fastened securely to fence posts with wire ties or staples.
2. When two sections of filter cloth adjoin each other they shall be overlapped by six inches and folded.
3. Maintenance shall be performed as needed and material removed when "bulges" develop in the silt fence.

Materials:

1. Stakes: Steel (either T or U) or 2" x 2" hardwood
2. Geosynthetic Fabric: Type GD-I
3. Reinforcing strip: Wooden lath or plastic strip

Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	SF	DE-ESC-3.1.2.1 Sheet 2 of 2 Effective July 2023

Standard Detail & Specifications
Concrete Washout



Source:	Symbol:	Detail No.
Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3	CW	DE-ESC-3.6.2 Sheet 1 of 2 Effective July 2023

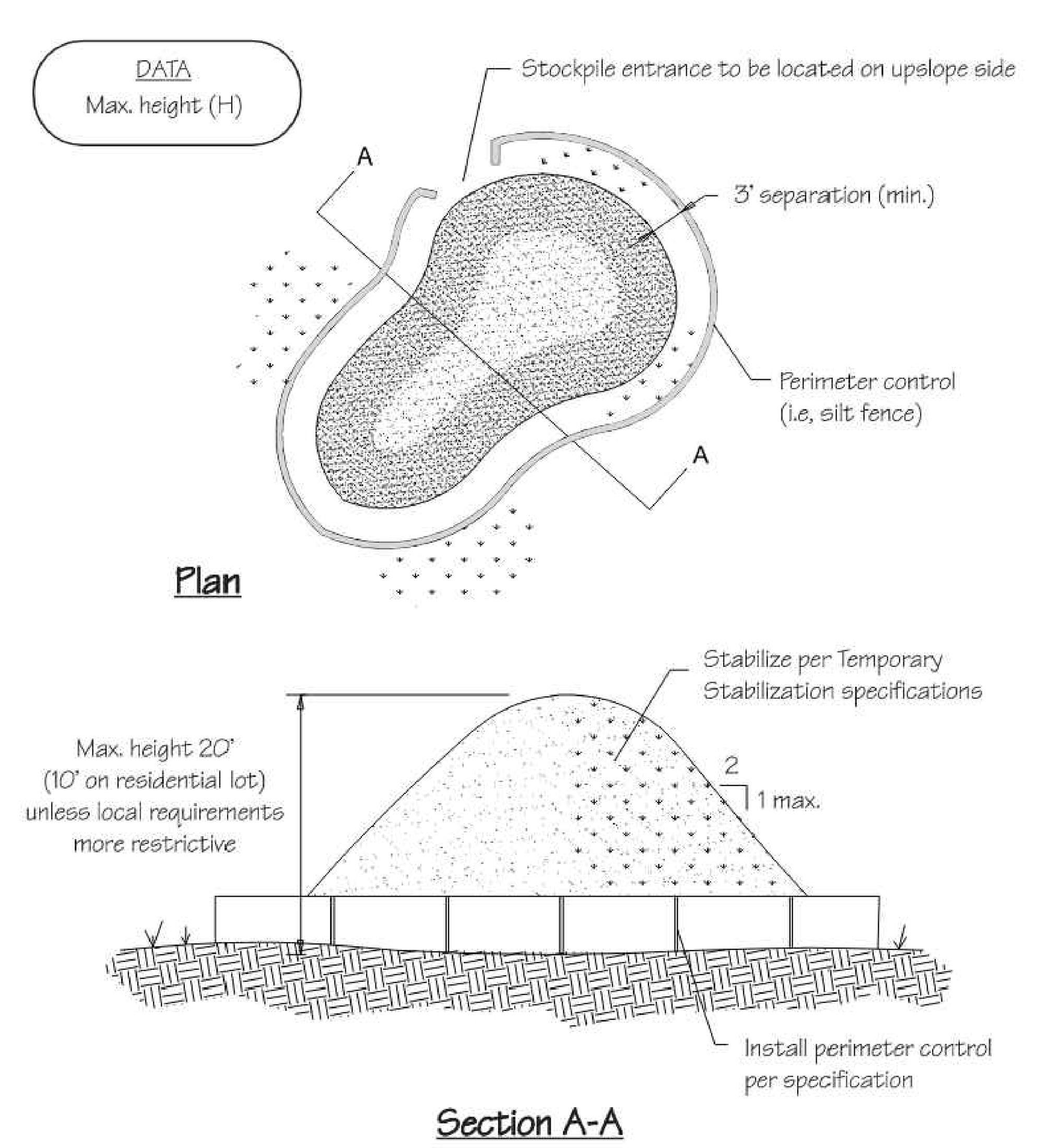
Standard Detail & Specifications
Concrete Washout

Construction Notes:

1. Locate washout area a minimum of 50 feet from open channels, stormdrain inlets, wetlands or waterbodies.
2. Locate washout area so that it is accessible to concrete equipment (service with a minimum 10 foot wide gravel accessway), but so it is not in a highly active construction area causing accidental damage.
3. Minimum dimensions for prefabricated units are 4 feet by 4 feet by 1 foot deep with a minimum 4mil polyethylene plastic liner. Minimum dimensions for constructed concrete washout areas are 6 feet by 6 feet by 3 feet deep, with a minimum 10mil polyethylene liner, 2:1 side slopes, and a 1 foot high by 1 foot wide compacted fill berm.
4. The liner must be free of tears or holes and placed over smooth surfaces to prevent puncturing. For excavated washouts, anchor the liner underneath the berm or overtop with sandbags or concrete blocks to hold in place.
5. Provide a sign designating the washout area, and for large construction sites, provide signs throughout directing traffic to its location.
6. Allow washed out concrete mixture to harden through evaporation of the wastewater. Once the facility has reached 75 percent of its capacity, remove the hardened concrete by reusing the broken aggregate onsite, recycling, or disposing of offsite. The hardened material can be buried on site with minimum of 1 foot of clean, compacted fill.
7. Apply a new liner before reusing the station for additional washouts after maintenance has occurred.

Source:	Symbol:	Detail No.
Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3	CW	DE-ESC-3.6.2 Sheet 2 of 2 Effective July 2023

Standard Detail & Specifications
Soil Stockpile



Source:	Symbol:	Detail No.
Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3	SP	DE-ESC-3.7.3 Sheet 1 of 2 Effective July 2023

Standard Detail & Specifications
Soil Stockpile

Construction Notes:

1. Locate stockpiles so that they are 50 feet from any storm drain inlet, open channel, wetland or waterbody. Redirect any concentrated flow around the stockpile using an approved erosion and sediment control measure.
2. Secure the perimeter of the stockpile with an approved erosion and sediment control perimeter device.
3. If stockpile is to remain inactive for more than 14 calendar days, the stockpile must be vegetated. Follow the temporary vegetation specifications. The vegetation chosen shall last the duration of the stockpile; the stockpile shall be restabilized if the temporary vegetation dies or erosion results.

Source:	Symbol:	Detail No.
Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3	SP	DE-ESC-3.7.3 Sheet 2 of 2 Effective July 2023

REVISIONS:

DATE:	DESCRIPTION:	BY:

LEIPSIC RESEARCH DOCK FACILITY

EROSION & SEDIMENT CONTROL DETAILS

SEAL:

CIVIL ENGINEER:
CENTURY ENGINEERING
A Kleinfelder Company

DESIGNED BY: ALW
DRAWN BY: DFS
CHECKED BY: ALW
DATE: 05-01-2025
SCALE: NTS
SHEET NO.: C204
PROJECT NO.: 00175013.092A

Leipsic Research Dock Facility Site Photos

April 22, 2022. Above: View of Leipsic River and paved area facing south.
Below: View of Leipsic River and paved area facing northwest.

Leipsic Research Dock Facility Site Photos

April 22, 2022. Above: View of site facing south.

Below: View of site facing north.

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

*** 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
		Atlantic Butterfish	Adult, Larvae	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
		Atlantic Herring	Adult, Juvenile	New England	Amendment 3 to the Atlantic Herring FMP
		Black Sea Bass	Adult, Juvenile	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Bluefish	Adult, Juvenile	Mid-Atlantic	Bluefish
		Clearnose Skate	Adult, Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP
		Little 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
		Red Hake	Adult	New England	Amendment 14 to the Northeast Multispecies FMP
		Scup	Adult, Juvenile	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Summer Flounder	Adult, Juvenile	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Windowpane Flounder	Adult, Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Winter Skate	Adult, Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP

Pacific Salmon EFH

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

Atlantic Salmon

No Atlantic Salmon were identified at the report location.

HAPCs

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

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 EFH species have been mapped for the Greater Atlantic region,
Atlantic Highly Migratory Species EFH,
Bigeye Sand Tiger Shark,
Bigeye Sixgill Shark,
Caribbean Sharpnose Shark,
Galapagos Shark,
Narrowtooth Shark,
Sevengill Shark,
Sixgill Shark,
Smooth Hammerhead Shark,
Smalltail Shark

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. 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.

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: Leipsic Research Dock and Storage Facility

Project Sponsor/Applicant: DNREC-Division of Fish and Wildlife

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

Fast-41: Yes ☐ No ☑

Action Agency Contact Name: Mike Yost

Contact Phone: 302-736-9763 Contact Email: michael.d.yost@usace.army.mil

Address, City/Town, State:

1203 College Park Drive
Suite 103
Dover, Delaware 19904

2. Project Description

[2]Latitude: 39.242671 Longitude: -75.512844

Body of Water (e.g., HUC 6 name): Leipsic River (020402)

Project Purpose:

The purpose of the project is to have a place for DNREC Fish and Wildlife to dock a research vessel, and establish a fueling facility and storage building.

Project Description:

This project is located on the Whedbee Property at the eastern terminus of Lombard Street, in Leipsic, Delaware. The purpose of the project is to construct a new research vessel dock (supporting one vessel), fueling facility, and storage building. The proposed aluminum, fixed dock is 120' long x 10' wide with a 5' x 5' platform holding a hose reel at the end of a 10' wide walkway. The structure extends approximately 26.3 feet channelward of MLW. The dock and walkway will require 18 steel pipe support pilings and will have water and electric service. The building will be 60' x 66' with a portion (20' x 66') dedicated to boat storage. The building will be uninhabited and equipped with electric and plumbing.The proposed location of the dock piles is close enough to the shoreline that the contractor will drive piles from the shore and not from a barge.

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

Construction is anticipated to start after July 31, 2025 and end by March 1, 2026. If additional construction time is needed, it will occur after July 31, 2026. In-water TOYR will be in place March 1 - July 31 (to avoid impacts to marsh nesting birds, young eels, and fish spawning season)

[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): 13.07 sq. ft.

Total area of impact to HAPC (indicate sq ft or acres): 13.07 sq. ft.

Current range of water depths at MLW	Salinity range (PPT):	Water temperature range (°F):
0-19.9 ft	4.52 - 24.3	42.7 - 75.7

[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/ft²/ft³)	Temporary impacts (lf/ft²/ft³)	Permanent impacts (lf/ft²/ft³)	Restored to pre-existing conditions?*
Estuarine	Wetland (emergent)*	2,556.97 ft2	2,195.42 ft2	204.73 ft2	Yes
Estuarine	Substrate (silt/mud)	13.07 ft2	0	13.07 ft2	No
Estuarine	Water column	insignificant	insignificant	insignificant	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.

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	100
Sand (0.063-2mm)	No	
Rocky: Pebble/Gravel /Cobble(2-256mm)**	No	
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.

Two soil borings were taken in the water at the project site:
Boring 1 - top 8" clayey silt (ML): dark gray, moist, some shell fragments

Boring 2 - silty clay with sand (CL): black, moist, soft, some shells

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	
Atlantic butterfish	☐	☑	☐	☑	EFH Mapper o
Atlantic herring	☐	☐	☑	☑	EFH Mapper o
Black sea bass	☐	☐	☑	☑	EFH Mapper o
bluefish	☐	☐	☑	☑	EFH Mapper o
clearnose skate	☐	☐	☑	☑	EFH Mapper o
little skate	☐	☐	☑	☑	EFH Mapper o
long-finned squid	☑	☐	☐	☐	EFH Mapper o
red hake	☐	☐	☐	☑	EFH Mapper o
scup	☐	☐	☑	☑	EFH Mapper o
summer flounder	☐	☐	☑	☑	EFH Mapper o
windowpane flounder	☐	☐	☑	☑	EFH Mapper o
winter skate			C	C	EFH mapper

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 fixed aluminum dock and walkway
☐	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	Select all that apply and if temporary[9] or permanent		Habitat alterations caused by the activity
☑	Underwater noise	Temp	Perm	
☐	Water quality/turbidity/ contaminant release	☐	☐	Water depth change
☑	Vessel traffic/barge grounding	☐	☐	Tidal flow change
☐	Impingement/entrainment	☐	☐	Fill
☐	Prevent fish passage/spawning	☐	☐	Habitat type conversion
☑	Benthic community disturbance	☐	☐	Other:
☐	Impacts to prey species	☐	☐	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.

`

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.

Noise generated from construction activities may cause behavioral or physiological changes in aquatic organisms. Behavioral changes often include avoidance of the action area, disruption of foraging attempts, or interruption of reproduction. It is expected that EFH species will make minor movements to avoid pile installation. Therefore, underwater construction sounds are not expected to cause physical harm to finfish.

The proposed dock will slightly increase vessel traffic in the area because of the research vessel being docked there. Vessel traffic generated by the proposed construction activities is not expected to have a significant effect on EFH and EFH species.

Installation of the piles will result in displacement of substrate but is not considered a loss of habitat. The benthic community may be slightly disturbed during construction.

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?

No in-water work will occur from March 1 through July 31 to adhere to all RTE guidance. Installation of steel piles will follow Project Design Criteria outlined in the GARFO ESA Section 7: NLAA Program Verification Form to minimize underwater noise impacts. All work will follow Delaware Erosion and Sediment Control guidelines. The research vessel will operate in adequate depths to avoid propeller scour and ground.

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.

Mitigation is not proposed because the impacts to EFH are anticipated to be insignificant.

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:

Sea level rise could occur in the Leipsic River. The proposed dock does not span the river so it would not impeded flow or aquatic organism passage if it was to become submerged.

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

Yes, the dock and walkway are designed with materials to last longer than 10 years.

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:

Climate change is likely affecting all vulnerable species and habitats throughout their ranges. The proposed action will not be amplified by climate change.

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:

No

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:

No, the shoreline will remain intact and the dock will not alter flood capacity of the river.

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	Use the Leipsic River for spawning, nursery, and adult habitats. In-water work activities will be restricted from March 15th – June 30th to avoid impacts during the spawning season. While individuals will likely avoid the area of the river during pile driving, they are expected to return following completion of in-water construction.
American eel	The Leipsic River is used by large numbers of American eel (Anguilla rostrata). In-stream work not take place from March 1st to May 15 th to allow upstream passage of elvers (young eels). While individuals will likely avoid the area of the river during pile driving, they are expected to return following completion of in-water construction.
American shad	Use the Leipsic River for spawning, nursery, and adult habitats. In-water work activities will be restricted from March 15th – June 30th to avoid impacts during the spawning season. While individuals will likely avoid the area of the river during pile driving, they are expected to return following completion of in-water construction.
Atlantic menhaden	No spawning habitat in the project area. While individuals will likely avoid the area of the river during pile driving, they are expected to return following completion of in-water construction.
blue crab	Blue crabs are motile and are not expected to be adversely impacted by installation activities. While individuals will likely avoid the area of the river during pile driving, they are expected to return following completion of in-water construction.
blue mussel	While they are unlikely to be present in the generally soft substrate in the installation site, any blue mussels within the footprint of the piles will be lost. Blue mussels may colonize the vertical surfaces of the piles
blueback herring	Use the Leipsic River for spawning, nursery, and adult habitats. In-water work activities will be restricted from March 15th – June 30th to avoid impacts during the spawning season. While individuals will likely avoid the area of the river during pile driving, they are expected to return following completion of in-water construction.
Eastern oyster	While they are unlikely to be present in the generally soft substrate in the installation site, any oysters within the footprint of the piles will be lost.
horseshoe crab	No habitat in the project area, no impacts anticipated
quahog	While they are unlikely to be present in the generally silty substrate in the installation site, any quahogs within the footprint of the piles will be lost.
soft-shell clams	While they are unlikely to be present in the silty substrate in the installation site, any soft-shell clams within the footprint of the piles will be lost.
striped bass	Could use the Leipsic River for spawning habitat. In-water work activities will be restricted from March 15th – June 30th to avoid impacts during the spawning season. While individuals will likely avoid the area of the river during pile driving, they are expected to return following completion of in-water construction.
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

NOAA FISHERIES
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Greater Atlantic Region

US Army Corps of Engineers ®

GARFO ESA Section 7: NLAA Program Verification Form

(Please submit a signed version of this form, together with any project plans, maps, supporting analyses, etc., to nmfs.gar.esa.section7@noaa.gov with "**USACE NLAA Program: [Application Number]**" in the subject line)

Section 1: General Project Details

Application Number:	
Reinitiation:	No
Applicant(s):	DNREC Division of Fish and Wildlife
Permit Type:	IP
Anticipated project start date (e.g., 10/1/2020)	After 7/31/2025
Anticipated project end date (e.g., 12/31/2022 – if there is no permit expiration date, write "N/A")	2/28/2026, to resume after 7/31/2026 if needed

Project Type/Category (check all that apply to entire action):

☐	Aquaculture (shellfish) and artificial reef creation	☐	Mitigation (fish/wildlife enhancement or restoration)
☐	Dredging and disposal/beach nourishment	☐	Bank stabilization
☐	Piers, ramps, floats, and other structures	☐	If other, describe project type category:

Town/City:	Leipsic	Zip:	19901
State:	Delaware	Water body:	Leipsic River

Project/Action Description **and** Purpose (*include relevant permit conditions that are not captured elsewhere on form*):
The project area is comprised of mainly marshland, open water, a residence, and outbuildings. Current structures on the property are limited to one residence, sheds, and a wooden dock. Project activities involve construction of a new research vessel dock, fueling facility, and a storage building. The proposed aluminum dock is 120' x 10' at the end of a 10' x 27' walkway with a 5' x 5' platform holding a hose reel and will have water and electric service. The structure extends approximately 27.5 feet channelward of MLW and approximately 45 feet channelward of MHW. The dock and walkway will be supported on 18 galvanized steel piles. The building will be 60' x 66' with a portion (20' x 66') being dedicated to boat storage. The storage building will be uninhabited and equipped with electric and plumbing. The proposed location of the dock piles is close enough to the shoreline that the contractor will drive piles from the shore and not from a barge. Impacts to bottom habitat from support piles are insignificant = 0.0003 acres. The purpose of the project is to build a dock that DNREC Division of Fish and Wildlife can use for a research vessel. The proposed work will be authorized under a DNREC Wetlands and Subaqueous Lands Permit and USACE Individual Permit (requiring and Coastal Zone Federal Consistency).

Type of Bottom Habitat Modified:	Permanent/Temporary:	Area (acres):
Silt/Mud/Clay (saline)	Permanent	0.00
Select Type of Bottom Habitat	Select Permanent or Temporary	
Select Type of Bottom Habitat	Select Permanent or Temporary	
Project Latitude (e.g., 42.625884)	39.242671	
Project Longitude (e.g., -70.646114)	-75.512844	
Mean Low Water (MLW)(m)	-0.64	
Mean High Water (MHW)(m)	0.72	

Width (m) of water body in action area:	Stressor Category (stressor that extends furthest distance into water body – e.g., turbidity plume; sound pressure wave):	Max extent (m) of stressor into the water body:
55.00	Sound pressure wave	10,000.00

Section 2: ESA-listed species and/or critical habitat in the action area:

☐	Atlantic sturgeon (all DPSs)	☐	Kemp's ridley sea turtle
☑	Atlantic sturgeon critical habitat Indicate which DPS : NYB	☐	Loggerhead sea turtle (NW Atlantic DPS)
☑	Shortnose sturgeon	☐	Leatherback sea turtle
☐	Atlantic salmon (GOM DPS)	☐	North Atlantic right whale
☐	Atlantic salmon critical habitat (GOM DPS)	☐	North Atlantic right whale critical habitat
☐	Green sea turtle (N. Atlantic DPS)	☐	Fin whale

* Please consult GARFO PRD's ESA Section 7 Mapper for ESA-listed species and critical habitat information for your action area at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-species-critical-habitat-information-maps-greater.

Section 3: NLAA Determination (check all applicable fields):
If the Project Design Criteria (PDC) is met, select Yes. If the PDC is not applicable (N/A) for your project (e.g., the stressor category is not included for your project activity, or for PDC 2, your project does not occur within the range of the GOM DPS of Atlantic salmon), select N/A. If the PDC is applicable, but is not met, leave both boxes blank and provide a justification for that PDC in Section 4.

a) GENERAL PDC			
Yes	N/A	PDC #	PDC Description
☑	☐	1.	No portion of the proposed action will individually or cumulatively have an adverse effect on ESA-listed species or designated critical habitat.
☐	☑	2.	No portion of the proposed action will occur in the tidally influenced portion of rivers/streams where Atlantic salmon presence is possible from April 10–November 7. **Note**: If the project will occur within the geographic range of the GOM DPS Atlantic salmon but their presence is not expected following the best available commercial scientific data, the work window does not need to be applied (include reference in project description).
☑	☐	3.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as spawning grounds as follows: i. Gulf of Maine: April 1–Aug. 31 ii. Southern New England/New York Bight: Mar. 15–Aug. 31 iii. Chesapeake Bay: March 15–July 1 and Sept. 15–Nov. 1 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval (include reference in project description).
☐	☐	4.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as overwintering grounds, where dense aggregations are known to occur, as follows: i. Gulf of Maine: Oct. 15–April 30 ii. Southern New England/ New York Bight: Nov. 1–Mar. 15 iii. Chesapeake Bay: Nov. 1–Mar. 15 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval (include reference in project description).
☐	☑	5.	Within designated Atlantic salmon critical habitat, no portion of the proposed action will affect spawning and rearing areas (PBFs 1-7).
☐	☑	6.	Within designated Atlantic sturgeon critical habitat, no work will affect hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand) (PBF 1).

Yes	N/A	PDC #	PDC Description
☑	☐	7.	Work will result in no or only temporary/short-term changes in water temperature, water flow, salinity, or dissolved oxygen levels.
☑	☐	8.	If ESA-listed species are (a) likely to pass through the action area at the time of year when project activities occur; and/or (b) the project will create an obstruction to passage when in-water work is completed, then a zone of passage (~50% of water body) with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained (i.e., physical or biological stressors such as turbidity and sound pressure must not create barrier to passage).
☐	☑	9.	Any work in designated North Atlantic right whale critical habitat must have no effect on the physical and biological features (PBFs).
☑	☐	10.	The project will not adversely impact any submerged aquatic vegetation (SAV).
☑	☐	11.	No blasting or use of explosives will occur.

b) The following stressors are applicable to the action (check all that apply – use Stressor Category Table for guidance):

☑	Sound Pressure
☐	Impingement/Entrapment/Capture
☑	Turbidity/Water Quality
☐	Entanglement (Aquaculture)
☑	Habitat Modification
☑	Vessel Traffic

	Stressor Category					
Activity Category	Sound Pressure	Impingement/ Entrapment/ Capture	Turbidity/ Water Quality	Entanglement	Habitat Mod.	Vessel Traffic
Aquaculture (shellfish) and artificial reef creation	N	N	Y	Y	Y	Y
Dredging and disposal/beach nourishment	N	Y	Y	N	Y	Y

	Stressor Category					
Activity Category	Sound Pressure	Impingement/ Entrapment/ Capture	Turbidity/ Water Quality	Entanglement	Habitat Mod.	Vessel Traffic
Piers, ramps, floats, and other structures	Y	N	Y	N	Y	Y
Transportation and development (e.g., culvert construction, bridge repair)	Y	N	Y	N	Y	Y
Mitigation (fish/wildlife enhancement or restoration)	N	N	Y	N	Y	Y
Bank stabilization and dam maintenance	Y	N	Y	N	Y	Y

c) SOUND PRESSURE PDC

Information for Pile Driving:
If your project includes non-timber piles*, please attach your calculation to this verification form showing that the noise is below the injury thresholds of ESA-listed species in the action area. The GARFO Acoustic Tool is available as one source, should you not have other information:

https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultation-technical-guidance-greater-atlantic

*Sound pressure effects from timber and steel sheet piles were analyzed in the NLAA programmatic consultation, so no additional acoustic information is necessary.

	Pile material	Pile diameter/width (inches)	Number of piles	Installation method
a)	Steel Pipe	12	18	Vibratory hammer
b)	Select pile material			Select installation method
c)	Select pile material			Select installation method
d)	Select pile material			Select installation method

Yes	N/A	PDC #	PDC Description
☑	☐	12.	If pile driving is occurring during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold, a "soft start" is required to allow animals an opportunity to leave the project vicinity before sound pressure levels increase. *In addition to using a soft start at the beginning of the work day for pile driving, one must also be used at any time following cessation of pile driving for a period of 30 minutes or longer.* For impact pile driving: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one minute wait period, then two subsequent 3-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving. For vibratory pile installation: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.
☑	☐	13.	Any new pile supported structure must involve the installation of ≤ 50 piles (below MHW).
☐	☐	14.	All underwater noise (pressure) is below (<) the physiological/injury noise threshold for ESA-species in the action area.

d) IMPINGEMENT/ENTRAINMENT/CAPTURE PDC

Information for Dredging/Disposal:			
Type of dredge:	Select type of dredge		
Maintenance dredging?:	Select Yes or No	If "Yes", how many acres?	
If maintenance, when was the last dredge cycle?			
New dredging:	Select Yes or No	If "Yes", how many acres?	
Estimated number of dredging events covered by permit:			
ESA-species exclusion measures required (e.g., cofferdam, turbidity curtain):	Select Yes or No		
If no exclusion measures required, explain why:	Select reason why no exclusion measures are required		
Information for Intake Structures:			
Mesh screen size (mm) for temporary intake:			

Yes	N/A	PDC #	PDC Description
☐	☑	15.	Only mechanical, cutterhead, and low volume hopper (e.g., CURRITUCK, ~300 cubic yard maximum bin capacity) dredges may be used.
☐	☑	16.	No new dredging in Atlantic sturgeon or Atlantic salmon critical habitat (maintenance dredging still must meet all other PDCs). New dredging outside Atlantic sturgeon or salmon critical habitat is limited to one time dredge events (e.g., burying a utility line) and minor (≤ 2 acres) expansions of areas already subject to maintenance dredging (e.g., marina/harbor expansion).
☐	☑	17.	Work behind cofferdams, turbidity curtains, or other methods to block access of animals to dredge footprint is required when operationally feasible or beneficial and ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, exclusion methods are not necessary).
☐	☑	18.	Temporary intakes related to construction must be equipped with appropriate sized mesh screening (as determined by GARFO section 7 biologist and/or according to Chapter 11 of the NOAA Fisheries Anadromous Salmonid Passage Facility Design) and must not have greater than 0.5 fps intake velocities, to prevent impingement or entrainment of any ESA-listed species life stage.
☐	☑	19.	No new permanent intake structures related to cooling water, or any other inflow at facilities (e.g. water treatment plants, power plants, etc.).

e) TURBIDITY/WATER QUALITY PDC

Information for Turbidity Producing Activity (excluding disposal):	
ESA-species turbidity control measures required (e.g., turbidity curtain):	No
If no turbidity control measures required, explain why:	Presence of ESA-listed species limited to rare, transient individuals

Information for Dredged Material Disposal: No dredge disposal proposed	
Disposal site:	Select disposal site
Estimated number of trips to disposal site:	
Relevant disposal site permit/special conditions required (NAE: for offshore disposal, include Group A, B, C, or relevant Long Island Sound consultation):	

Yes	N/A	PDC #	PDC Description
☐	☑	20.	Work behind cofferdams, turbidity curtains, or other methods to control turbidity is required when operationally feasible or beneficial and ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, turbidity control methods are not necessary).
☐	☑	21.	In-water offshore disposal may only occur at designated disposal sites that have been the subject of ESA section 7 consultation with NMFS, where a valid consultation is in place and appropriate permit/special conditions are included.

Yes	N/A	PDC #	PDC Description
☐	☑	22.	Any temporary discharges must meet state water quality standards (e.g., no discharges of substances in concentrations that may cause acute or chronic adverse reactions, as defined by EPA water quality standards criteria).
☐	☑	23.	Only repair, upgrades, relocations and improvements of existing discharge pipes or replacement in-kind are allowed; no new construction of untreated discharges.
	f) ENTANGLEMENT PDC		

Information for Aquaculture Projects:

Approximate distance from shore (MHW)(m):	
Grow season begins (approximate):	
Grow season ends (approximate):	
Total number of vertical lines:	
Total number of horizontal lines:	
Is any gear seasonally removed from the water? If yes, which parts and when?	

	Aquaculture Gear	Acreage (total permit footprint)	Type of Shellfish Cultivated
a)	Select aquaculture gear		Select type of shellfish cultivated
b)	Select aquaculture gear		Select type of shellfish cultivated
c)	Select aquaculture gear		Select type of shellfish cultivated

Yes	N/A	PDC #	PDC Description
☐	☑	24.	Shell on bottom <50 acres with maximum of 4 corner marker buoys;
☐	☑	25.	Cage on bottom with no loose floating lines <5 acres and minimal vertical lines (1 per string of cages, 4 corner marker buoys);
☐	☑	26.	Floating cages in <3 acres in waters and shallower than -10 feet MLLW with no loose lines and minimal vertical lines (1 per string of cages, 4 corner marker buoys);
☐	☑	27.	Floating upweller docks in >10 feet MLLW.
☐	☑	28.	Any in-water lines, ropes, or chains must be made of materials and installed in a manner to minimize or avoid the risk of entanglement by using thick, heavy, and taut lines that do not loop or entangle. Lines can be enclosed in a rigid sleeve.
	g) HABITAT MODIFICATION PDC		
Yes	N/A	PDC #	PDC Description
☐	☑	29.	No conversion of habitat type (soft bottom to hard, or vice versa) for aquaculture or reef creation.

	h) VESSEL TRAFFIC PDC

Information for Vessel Traffic:

	Temporary Project Vessel Type	Number of Vessels
a)	Select temporary vessel type	
b)	Select temporary vessel type	
c)	Select temporary vessel type	
	Type of Non-Commercial or Aquaculture Vessels Added *– only include if there is a net increase directly/indirectly resulting from project*)	Number of Vessels (*if sum > 2, PDC 33 is not met and justification required in Section 4*)
a)	Aquaculture/Fishing vessel	1
b)	Select type of non-commercial or aquaculture vessels	
	Type of Commercial Vessels Added (*only include if there is a net increase directly/indirectly resulting from project*)	Number of Vessels (*if > 0, PDC 33 is not met and justification required in Section 4*)
a)		
b)		

If no temporary/permanent vessel traffic, briefly explain (e.g., all land-based work, no net increase in vessel traffic)	

Yes	N/A	PDC #	PDC Description
☐	☑	30.	Maintain project vessels operating within the action area to speed limits below 10 knots and dredge vessel speeds of 4 knots maximum, while dredging.
☐	☑	31.	Maintain a 1,500-foot buffer between project vessels and ESA-listed whales and a 150-foot buffer between project vessels and sea turtles unless the vessel is navigating to an in-water disposal site/activity. If the vessel is navigating to an in-water disposal site/activity, refer to and include the conditions contained in the appropriate GARFO-USACE/EPA consultation for the disposal site.
☐	☑	32.	The number of project vessels must be limited to the greatest extent possible, as appropriate to size and scale of project.
☑	☐	33.	The permanent net increase in vessels resulting from a project (e.g., dock/float/pier/boating facility) must not exceed two non-commercial vessels. A project must not result in the permanent net increase of any commercial vessels (e.g., a ferry terminal).

Section 4: Justification for Review under the NLAA Program

If the action is not in compliance with all of the General PDC and appropriate stressor PDC, but you can provide justification and/or special conditions to demonstrate why the project still meets the NLAA determination and is consistent with the aggregate effects considered in the programmatic consultation, you may still certify your project through the NLAA program using

this verification form. Please identify which PDC your project does not meet (e.g., PDC 9, PDC 15, PDC 22, etc.) and provide your rationale and justification for why the project is still eligible for the verification form.

To demonstrate that the project is still NLAA, you must explain why the effects on ESA-listed species or critical habitat are **insignificant** (i.e., too small to be meaningfully measured or detected) or **discountable** (i.e., extremely unlikely to occur). **Please use this language in your justification.**

PDC#	Justification
4	Salinity range in 2023 at this location during overwintering (Nov. - March) was 4.52 ppt - 13.7 ppt, median = 9.05 which is higher than the preferred salinity range for overwintering shortnose sturgeon (low salinity preferred), and the contour depth at the project location is lower than the depth preferred by overwintering Atlantic sturgeon (~50 m.). Impacts to overwintering sturgeon are expected to be discountable.
14	Steel and timber piles were evaluated for this project. Due to the tidal influence and height of the dock, timber piles would not suffice due to the total length required. It is anticipated that the amount and length of vibratory hammering required will be at a minimum as the underlying soils are very soft, silty sand with organics for about 20'. The soil borings have a very low blow count indicating that this portion of the pile driving will take minimal effort. The final 10 feet will be into stiffer soils that include sand and gravel where embedment will occur, and pile driving will be complete. We used the NOAA Acoustic Analysis tool with proxy sound levels for proposed pile driving (12" steel pipes, vibratory hammer, <5 m water depth, and 10 m distance from pile) for a 155 RMS (dB). Given our estimated 5 piles per day at approximately 30 minutes per pile, the distance to the peak cumulative SEL 195 is 21.5 meters. Those levels are not expected to cause direct permanent injury, but may cause temporary behavioral changes. In addition, it is expected that soft starts would prevent any sturgeon from experiencing the peak noise levels for injury.Therefore, impacts from underwater sound pressure are anticipated to be insignificant.
PDC #	

PDC #	

Section 5: USACE Verification of Determination

☐	In accordance with the NLAA Program, USACE has determined that the action complies with all applicable PDC and is not likely to adversely affect listed species.
☐	In accordance with the NLAA Program, the USACE has determined that the action is not likely to adversely affect listed species per the justification and/or special conditions provided in Section 4.

USACE Signature:	Date:

Section 6: GARFO Concurrence

☐	In accordance with the NLAA Program, GARFO PRD concurs with USACE's determination that the action complies with all applicable PDC and is not likely to adversely affect listed species or critical habitat.
☐	In accordance with the NLAA Program, GARFO PRD concurs with USACE's determination that the action is not likely to adversely affect listed species or critical habitat per the justification and/or special conditions provided in Section 4.
☐	GARFO PRD does not concur with USACE's determination that the action complies with the applicable PDC (with or without justification), and recommends an individual Section 7 consultation to be completed independent from the NLAA Program.

GARFO Signature:	Date:

Drawn Action Area & Overlapping S7 Consultation Areas

Area of Interest (AOI) Information

Area : 2,210.39 acres

Apr 17 2024 8:26:08 Eastern Daylight Time

1:2,257

0 0.01 0.03 0.05 mi

0 0.02 0.04 0.09 km

Summary

Name	Count	Area(acres)	Length(mi)
LIMITS OF INVESTIGATION	1	5.73	N/A
Atlantic Sturgeon	3	259.90	N/A
Shortnose Sturgeon	1	86.63	N/A
Atlantic Salmon	0	0	N/A
Sea Turtles	0	0	N/A
Atlantic Large Whales	0	0	N/A
In or Near Critical Habitat	0	0	N/A

LIMITS OF INVESTIGATION

#	FID	Id	area	Area(acres)
1	0	0	5.72999626747	5.73

Atlantic Sturgeon

#	Feature ID	Species	Lifestage	Behavior	Zone
1	ANS_DEB_ADU_MAF	Atlantic sturgeon	Adult	Migrating & Foraging	Delaware Bay
2	ANS_DEB_JUV_MAF	Atlantic sturgeon	Juvenile	Migrating & Foraging	Delaware Bay
3	ANS_DEB_SUB_MAF	Atlantic sturgeon	Subadult	Migrating & Foraging	Delaware Bay

#	From	Until	From (2)	Until (2)	Area(acres)
1	01/01	12/31	N/A	N/A	86.63
2	01/01	12/31	N/A	N/A	86.63
3	01/01	12/31	N/A	N/A	86.63

Shortnose Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone
1	SNS_DEB_ADU_MAF	Shortnose sturgeon	Adult	Migrating & Foraging	Delaware Bay

#	From	Until	From (2)	Until (2)	Area(acres)
1	04/01	11/30	N/A	N/A	86.63

VIBRATORY PILE DRIVING REPORT

PRINT IN **LANDSCAPE** TO CAPTURE ENTIRE SCREEN

VERSION 2.0-Multi-Species: 2024

(if OTHER INFO or NOTES get cut-off, please include information elsewhere)

Leipsic Research Vessel Dock and Storage Building

PROJECT INFORMATION	RMS
Sound pressure level (dB)	155
Distance associated with sound pressure level (meters)	10
Transmission loss constant	15
Number of piles per day	5
Duration to drive pile (minutes)	30
Duration of sound production in day	9000
Cumulative SEL at measured distance	195

OTHER INFO 0

NOTES Used proxy sound levels, higher end of estimate for number of piles per day and length of time to drive pile

Attenuation 0

RESULTANT ISOPLETHS

(Range to Effects)

FISHES

	BEHAVIOR
Fishes present	RMS Isopleth
ISOPLETHS (meters)	21.5
ISOPLETHS (feet)	70.7

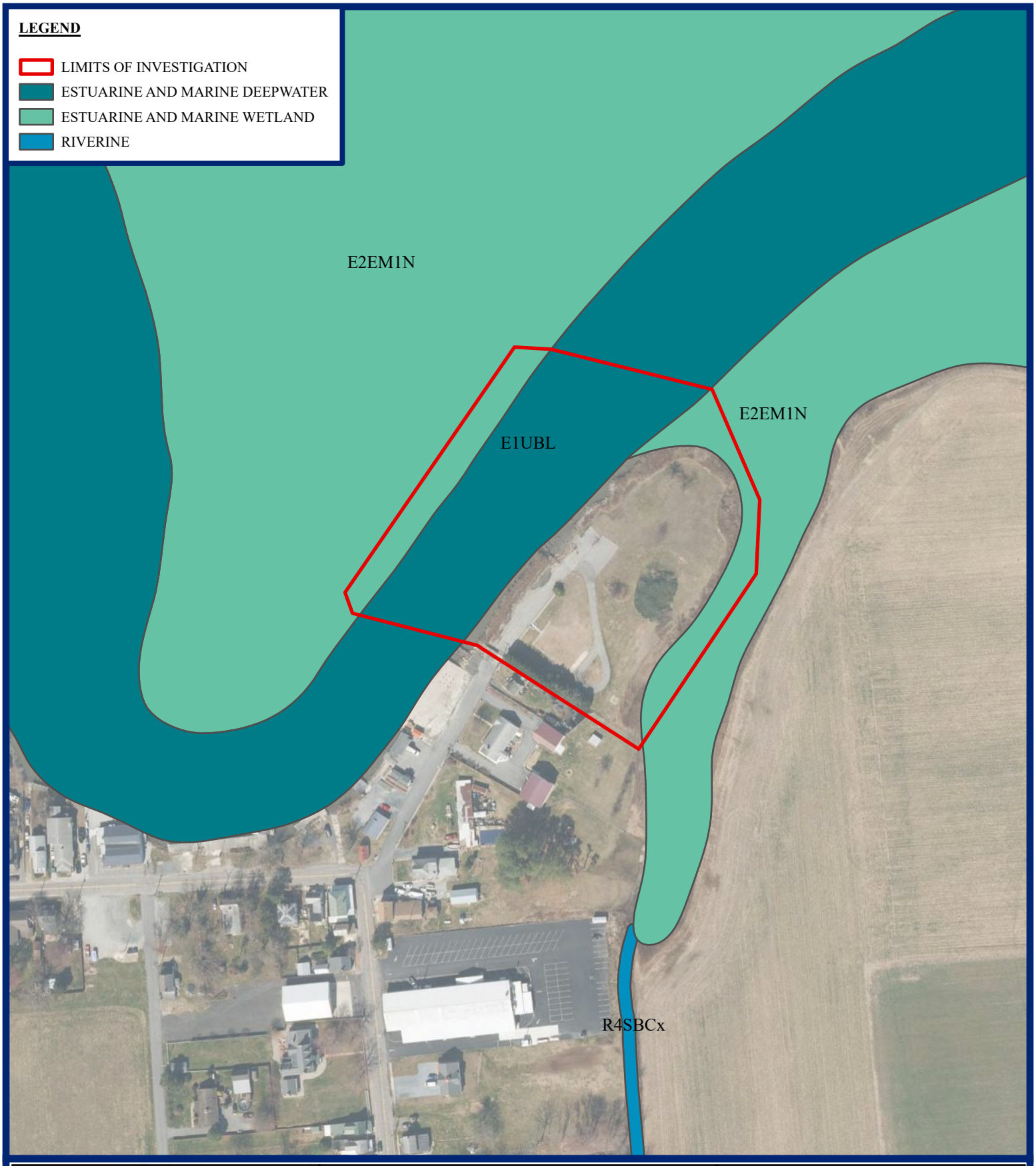
SEA TURTLES

NO SEA TURTLES

	PTS ONSET	BEHAVIOR
	SEL_{cum} Isopleth	RMS Isopleth
ISOPLETHS (meters)	0.2	0.5
ISOPLETHS (feet)	0.7	1.5

MARINE MAMMALS

	LF Cetacean	MF Cetaceans	HF Cetaceans	PW Pinniped	OW Pinnipeds
AUD INJ ONSET (SELcum isopleth, meters)	6.8	2.6	5.5	8.7	2.9
AUD INJ ONSET (SELcum isopleth, feet)	22.2	8.5	18.1	28.6	9.6
	ALL MM	NO MF CET.	NO HF CET.	NO PHOCIDS	NO OTARIIDS
Behavior (RMS isopleth, meters)	2,154.4	NO LF CET.			
Behavior (RMS isopleth, feet)	7,068.4				



CENTURY ENGINEERING
A Kleinfelder Company
550 Bay Road
Dover, DE 19901
P: 302.734.9188

NATIONAL WETLANDS INVENTORY

LEIPSIC RESEARCH DOCK FACILITY

KENT COUNTY, DELAWARE

Basemap Source: FirstMap (2022)
NWI Inventory Source: USFWS (2022)
ArcGIS Online

N

1 inch = 200 feet

Parcel ID	Last Name	First Name	Mailing Address	Town	State	Zip Code
4-00-03900-01-2800-00001	State of Delaware		89 Kings Highway	Dover	DE	19901
4-13-03914-02-3700-00001	Pugh	Craig	168 Main Street	Leipsic	DE	19901
4-13-03910-01-3200-00001	Virdin	Ronald & Marie	1087 Hay Point Landing Road	Smyrna	DE	19977
4-13-03910-01-3300-00001	Wood	Douglas C. & Katherine	1065 Simms Woods RD	Dover	DE	19901
4-00-03900-01-2101-00001	Carey	Sonja M Trust	3684 Savannah RD	Dover	DE	19901
4-13-03910-01-3000-00001	Wood	Douglas C. & Katherine	1065 Simms Woods RD	Dover	DE	19901
1-13-03900-01-0300-00001	Pugh	Craig	168 Main Street	Leipsic	DE	19901

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF FISH & WILDLIFE
RICHARDSON & ROBBINS BUILDING
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

DIRECTOR'S OFFICE

PHONE
(302) 739-9910

May 12, 2025

Missy Kalb
Century Engineering, LLC
550 Bay Road
Dover, DE 19901

Re: CENTURY 2025 DNREC-DFW Leipsic Research Dock Tax Parcel #4-13-03910-01-3100-00001

Dear Missy:

Thank you for contacting the Division of Fish and Wildlife (DFW) Species Conservation and Research Program about information on rare, threatened and endangered species, unique natural communities, and other significant natural resources as they relate to the above referenced project.

State Natural Heritage Site
A review of our database indicates that there are currently no records of state-rare or federally-listed plants, animals or natural communities at this project site. As a result, at present, this project does not lie within a State Natural Heritage Site, nor does it lie within a Delaware National Estuarine Research Reserve which are two criteria used to identify "Designated Critical Resource Waters" in the U.S. Army Corps of Engineers (USACE) Nationwide Permit General Condition No. 22. A copy of this letter shall be included in any permit application or pre-construction notification submitted to the USACE for activities on this property.

Low Marsh
Currently, there are no records of state-rare or federally-listed marsh bird species at this site. However, aerial imagery and wetland habitat maps indicate that low marsh habitat (i.e., dominated by *Spartina alterniflora*) is present. Several state-rare species of conservation concern frequently nest in low marsh habitat, including the seaside sparrow (*Ammospiza maritimus*), clapper rail (*Rallus longirostris*), and willet (*Tringa semipalmata*). We recommend a time of year restriction of **April 1st to July 31st** to avoid impacts to marsh nesting birds.

Delaware Ecological Network
Habitat on this parcel has been identified as ecologically important by the Delaware Ecological Network (DEN) and is classified as a core area and a hub. The DEN, although non-regulatory, is a statewide conservation network developed using GIS and field collected datasets that help to identify and prioritize ecologically important areas for natural resource protection. The DEN includes ecologically important areas such as forests, wetlands, streams, habitat that supports rare species and areas of especially high quality. The DEN includes the following key elements: 1) Core areas – which contain relatively intact natural ecosystems, and provide high-quality habitat for native plants and animals, 2) Hubs – which are slightly fragmented aggregations of core areas with contiguous natural cover and 3) Corridors – which link core areas together, allowing wildlife movement and seed and pollen transfer between them. The DEN can be accessed through First Map: Delaware Ecological Network 2.0 | Delaware Ecological Network 2.0 | State of Delaware (arcgis.com). We recommend that this DEN designated area be protected to the fullest extent possible.

Fisheries

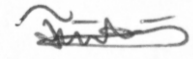
American Eel
The Leipsic River is used by large numbers of American eel (*Anguilla rostrata)*. We request that in-stream work not take place from **March 1st to May 15th** to allow upstream passage of elvers (young eels).

Anadromous Species
The Leipsic River is utilized by American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), and alewife (*Alosa pseudoharengus*) for spawning, nursery, and adult habitats. Alewife and blueback herring, also known as 'river herring', are listed by the National Marine Fisheries Service as a Species of Concern. These species are important to both commercial and recreational fisheries and support a critical forage base for other fish, mammal, and bird species. The protection of spawning and nursery habitats and migratory corridors during the spawning season is important in maintaining these fisheries resources. We request a time of year restriction on in-water work activities from **March 15th – June 30th** to avoid impacts to these species during the spawning season.

We are continually updating our records on Delaware's rare, threatened and endangered species, unique natural communities and other significant natural resources. If the start of the project is delayed more than a year past the date of this letter, please contact us again for the latest information.

Please feel free to contact me with any questions or if you require additional information.

Sincerely,



Faith Garcia
Environmental Review Coordinator
Phone: (302) 735-8665

Cell: (302) 443-3812
Email: christinefaith.garcia@delaware.gov
89 Kings Highway
Dover, DE 19901

DIVISION OF FISH AND WILDLIFE
ENVIRONMENTAL REVIEW REQUEST FORM

State of Delaware
Department of Natural Resources and Environmental Control

N/A for State Agency

DATE: 05/05/2025 ☐ I acknowledge the $35/hr cost recovery fee

PROJECT TITLE: Leipsic Research Vessel Dock and Storage Building

CONTACT INFORMATION:

Applicant Name: Jeremey Ashe
Consulting Company: Century Engineering, LLC

Consultant Name: Missy Kalb
Consultant Email: mkalb@kleinfelder.com

Mailing Address: Consultant Address: 550 S Bay Road, Dover, DE 19901

PROJECT DETAILS:

Description

Project Type: Development - Institutional
Consultation Needed For: State Wetlands Permit

Detailed Project Description:

This project is located at the eastern terminus of Lombard Street, in Leipsic, Delaware. The purpose of the project is to construct a new dock, fueling facility, and storage building. The proposed fixed dock is 120' long x 10' wide with a 5' x 5' hose platform at the end of a 10' wide walkway. The structure extends approximately 25.2 feet channelward of MLW. The dock and walkway will require 18 support piles and will have water and electric service. The building will be 60' x 66' with a portion (20' x 66') dedicated to boat storage. The building will be uninhabited and equipped with electric and plumbing. This project will be submitted to the Philadelphia USACE-Dover Field Office for impacts to federally regulated waters/wetlands through an IP and a Nationwide Permit (NWP) 3. Impacts to State regulated subaqueous lands will be permitted by the applicable DNREC-Wetlands and Subaqueous Lands Permit (WSLS) application and Water Quality Certification.

Location

Parcel Number(s): 4-13-03910-01-3100-00001

GPS Coordinates of Project: 39.242573, -75.512770

Address: Lombard Street, Leipsic, DE 19901

County: Kent

Shapefile of LOD Enclosed? Yes
Image of LOD Enclosed? Yes

Environmental Impacts

Forest: Forest Removal? No
Acres of Forest Removal: 0

Wetlands: Wetland Impacts? Yes
Acres of Impacts (Temporary/Permanent): Temp. 0.01 ac.

Open Water: Water Impacts? Yes
Acres of Impacts (Temporary/Permanent): Perm. 0.0354 ac.

Please email completed form and associated documents to DNREC_EnvReview@delaware.gov

National Register-listed Properties (Basemap - Imagery)

April 17, 2024

1:2,257

0 0.01 0.03 0.05 mi

0 0.02 0.04 0.09 km

Maxar, Microsoft

Other Historic Properties

- National Register-listed
- other surveyed, assigned CRS inventory #

DE_Boundaries - Municipalities

State Parcels

Rachel Owrutsky

From: Perash, Rachel M. (DNREC) <rachel.perash@delaware.gov>
Sent: Friday, August 16, 2024 3:14 PM
To: Rachel Owrutsky
Cc: Ashe, Jeremey (DNREC); Reynolds, Taylor L. (DNREC)
Subject: RE: Leipsic Research Dock Facility query

External Email

Hey Rachel!

No comments from SHPO so you are good to go! The only comment from the county is any building permits needed for the project will need to be submitted through the Kent County Division of Inspections and Enforcement.

Rachel M. Perash, M.S., RPA
She/her/hers
Senior Archaeologist, Cultural Resources Unit

302-739-9188 302-535-4199
rachel.perash@delaware.gov
89 Kings Highway, Dover, DE 19901
destateparks.com

From: Rachel Owrutsky <ROwrutsky@kleinfelder.com>
Sent: Thursday, August 15, 2024 3:41 PM
To: Perash, Rachel M. (DNREC) <rachel.perash@delaware.gov>
Subject: RE: Leipsic Research Dock Facility query

Hi Rachel,

Are there any updates in terms of an historical and archaeological review for this project?

Thank you,

Rachel Owrutsky (she/her)
Environmental Scientist

550 S Bay Road
Dover, DE 19901
d| 301.364.7012
o| 302.450.3408

From: Rachel Owrutsky
Sent: Wednesday, April 17, 2024 12:18 PM
To: Perash, Rachel M. (DNREC) <rachel.perash@delaware.gov>
Cc: TJ Austin <tjaustin@kleinfelder.com>
Subject: Leipsic Research Dock Facility query

Hi Rachel,

DNREC Division of Fish and Wildlife is planning to build a new research vessel dock and boat storage building including a parking lot and a diesel fuel tank in Leipsic, DE. The work is anticipated to require a permit from the USACE and DNREC-WSLS. We are requesting information on historical and archaeological resources that may be affected by the project.

Please see attached plans and mapping. Let me know if you have any questions.
Coordinates: 39°14'33.8"N 75°30'46.1"W

Thank you!

Rachel Owrutsky (she/her)
Environmental Scientist

550 S Bay Road
Dover, DE 19901
d| 301.364.7012
o| 302.450.3408

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.

This project is located on the Whedbee Property at the eastern terminus of Lombard Street, in Leipsic, Kent County, Delaware. The project site is on the Leipsic River approximately 7.5 miles upstream of the mouth of the River.

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

The project site is along the Leipsic River on Parcel Map Number 4 13 03910 01 3100 000, Tax Account ID 22946, Deed BVP D 7397/26. Site coordinates are 39.242671, -75.512844.

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 proposed aluminum dock is 120' x 10' at the end of a 10' walkway with a 5' x 5' platform holding a hose reel and will have water and electric service. The walkway will begin at the parking area and extend northwest to the dock. The dock and walkway will be supported on 19 galvanized steel piles.The building will be 60' x 66' with a portion of the building (20' x 66') dedicated to boat storage. The storage building will be uninhabited and equipped with electric and plumbing. The proposed location of the dock piles is close enough to the shoreline that the contractor may choose to drive piles from there and not from a barge.

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 provide a location for DNREC Fish and Wildlife to dock a research vessel and establish associated fueling facility and storage building.

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 attached photolog.

PART II – ENVIRONMENTAL IMPACT CHECKLIST			
ENVIRONMENTAL IMPACT	**YES**	**NO**	**QUALIFYING REMARKS**
A. Physical			
1. Topography	☐	☑	No impacts anticipated.
2. Geological Elements and Leaching	☐	☑	No impacts anticipated.
3. Air	☐	☑	No impacts anticipated.
4. Transportation	☐	☑	No impacts anticipated.
5. Handling of Hazardous Materials	☐	☑	No impacts anticipated.
6. Spoil Disposal	☐	☑	No impacts anticipated.
7. Sewage and Solid Wastes	☐	☑	No impacts anticipated.
8. Water Resources			
a. Water Quality	☐	☑	No impacts anticipated. The proposed activities will not reduce water quality levels.
b. Hydrography, Circulation, Littoral Drift.	☐	☑	No impacts anticipated.
c. Ground Water	☐	☑	No impacts anticipated.
B. Biological			
1. Vegetation			
a. Terrestrial	☑	☐	Temporary impacts to surrounding land during construction. Pre-existing conditions will be restored.
b. Aquatic	☐	☑	No impacts anticipated.
2. Fish and Wildlife			
a. Mammals	☐	☑	No impacts anticipated.
b. Birds	☐	☑	No impacts anticipated. Work will avoid nesting season of marsh nesting birds
c. Amphibians	☑	☐	Minor disruption during construction.
d. Reptiles	☑	☐	Minor disruption during construction.
e. Fish	☑	☐	Minor disruption during construction. Work will avoid spawning season of local fish.
f. Shellfish	☑	☐	Minor disruption during construction.
g. Invertebrates	☑	☐	Minor disruption during construction.
3. Rare or Endangered Species	☐	☑	Time of year restrictions will be followed to avoid impacts to any rare or endangered species.

ENVIRONMENTAL IMPACT	YES	NO	QUALIFYING REMARKS
C. Cultural			
1. Land Use	☑	☐	The dock and facilities will increase the use of the property by researchers.
2. Population Density and Trends	☐	☑	No impacts anticipated.
3. Regional Development	☐	☑	No impacts anticipated.
4. Historic Places	☐	☑	No impacts anticipated. See attached documentation from SHPO.
5. Archaeological Sites	☐	☑	No impacts anticipated. See attached documentation from SHPO.
6. Aesthetics	☑	☐	The dock will alter the aesthetics of the river in the location of the project by reducing the unimpeded view of the river.
7. Utilities	☐	☑	No impacts anticipated.
8. Transportation Systems	☐	☑	No impacts anticipated.
9. Recreation	☐	☑	No impacts anticipated.
10. Public Health	☐	☑	No impacts anticipated.
D. Other Factors			
1. Secondary Effects	☐	☑	No secondary effects anticipated.
2. Controversiality	☐	☑	No impacts anticipated. The project was discussed with the Town of Lewes Planning Commission and they have not indicated any issues with the project.
3. Is significant dredging involved?	☐	☑	No dredging is involved.
4. Is significant filling involved?	☐	☑	No fill is involved.

Part III

Considerations of a Dredging Proposal: N/A - No dredging proposed

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

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

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.

   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.

   3. Dewatering properties of the material to be disposed.

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

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

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).

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

3. What type of leachates will be produced from the spoil material and what is planned for protection of the groundwater?

4. Methods to insure that spoil water does not adversely affect water quality, both during construction and after completion of the project.

5. Provisions for monitoring during discharge: water quality, sediment transport, and precautions to prevent "short-circuiting" dumping.

F. Consider and discuss the following for water disposal:
   1. Describe methods to be used for water disposal, including volumes and site selection.

   2. Describe the existing water characteristics at the site, including chemical analysis for water quality.

G. Discuss the frequency and amount of maintenance dredging which will be required; discuss the resulting impacts.

H. Alternatives.
   1. Discuss all alternatives to the project, including the "no action" alternative.

   2. Discuss alternative types and methods of dredging and disposal, such as pipeline discharge, barging, or hopper method.

   3. Discuss alternatives to dredging.

   4. Discuss alternative areas of sites for spoil disposal.

   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?

   6. Support alternative means of construction that would prevent or minimize water quality degradation using EPA standards for guidance.

   7. State in detail impacts resulting in alternative locations for the proposed project.

Part IV

CONSIDERATIONS OF A FILLING PROPOSAL: No fill is anticipated for this project.

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.

B. Give the following information in regard to the project size:
   1. Total area to be filled.

   2. Size of underwater area to be filled.

   3. Area of intertidal zone to be filled.

   4. Area of wetlands to be filled.

   5. Proposed height of fill.

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

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.

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

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

D. Carefully describe the method of fill, including the following:
   1. Method of fill placement, including equipment used in deposition and grading.

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

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

4. Length of time needed for completion of the project. State if filling will be continuous, intermittent, etc.

5. Method of controlling turbidity when filling an underwater area.

E. Purpose of the Project:
   1. What is the intended use of the filled area?

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

   3. What benefits would you gain from the proposed fill?

F. Alternatives
   1. Discuss the "no action" alternative and how this would affect your present and future plans for the development of the area.

   2. Discuss alternative locations for the proposed fill.

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

   4. Discuss any other alternatives you have considered prior to formulating the presently submitted proposal.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
Phone: (410) 573-4599 Fax: (410) 266-9127

In Reply Refer To: 02/10/2025 15:51:42 UTC
Project code: 2024-0078158
Project Name: Leipsic Research Dock Facility

Federal Nexus: yes
Federal Action Agency (if applicable): Delaware Department of Natural Resources and Environmental Control

Subject: Record of project representative's no effect determination for 'Leipsic Research Dock Facility'

Dear Missy Kalb:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on February 10, 2025, for 'Leipsic Research Dock Facility' (here forward, Project). This project has been assigned Project Code 2024-0078158 and all future correspondence should clearly reference this number. **Please carefully review this letter.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the **Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key (Dkey)**, invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

Determination for the Northern Long-Eared Bat and/or Tricolored Bat

Based upon your IPaC submission and a standing analysis, your project has reached the following effect determinations:

Species	Listing Status	Determination

Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	No effect

Federal agencies must consult with U.S. Fish and Wildlife Service under section 7(a)(2) of the Endangered Species Act (ESA) when an action *may affect* a listed species. Tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can *confer* under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if and when the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a NE or NLAA determination from the key to confirm that the determination is still accurate.

To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17).

Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no consultation with the Service is required (ESA §7). If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13].

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination key for the northern long-eared bat and tricolored bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* Threatened
- Monarch Butterfly *Danaus plexippus* Proposed Threatened

You may coordinate with our Office to determine whether the Action may affect the animal species listed above and, if so, how they may be affected.

Next Steps

If there are no updates on listed species, no further consultation/coordination for this project is required with respect to the species covered by this key. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals

the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the Service should take place to ensure compliance with the Act.

If you have any questions regarding this letter or need further assistance, please contact the Chesapeake Bay Ecological Services Field Office and reference Project Code 2024-0078158 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Leipsic Research Dock Facility

2. Description

The following description was provided for the project 'Leipsic Research Dock Facility':

> Excavation and backfill of previously demolished buildings, construction of a new research vessel dock in the Leipsic River, and new vessel storage building on land.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@39.242767099999995,-75.51262000611919,14z

DETERMINATION KEY RESULT

Based on the information you provided, you have determined that the Proposed Action will have no effect on the species covered by this determination key. Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for those species.

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed bats or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. Is the action area wholly within Zone 2 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

3. Does the action area intersect Zone 1 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

4. Does any component of the action involve leasing, construction or operation of wind turbines? Answer 'yes' if the activities considered are conducted with the intention of gathering survey information to inform the leasing, construction, or operation of wind turbines.

   Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

   No

5. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   Yes

6. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) funding or authorizing the proposed action, in whole or in part?

   No

7. Are you an employee of the federal action agency or have you been officially designated in writing by the agency as its designated non-federal representative for the purposes of Endangered Species Act Section 7 informal consultation per 50 CFR § 402.08?

   Note: This key may be used for federal actions and for non-federal actions to facilitate section 7 consultation and to help determine whether an incidental take permit may be needed, respectively. This question is for information purposes only.

   Yes

8. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)? Is the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC) funding or authorizing the proposed action, in whole or in part?

   No

9. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   No

10. [Semantic] Is the action area located within 0.5 miles of a known bat hibernaculum?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

11. Does the action area contain any winter roosts or caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, or tunnels that could provide habitat for hibernating bats?

    No

12. Will the action cause effects to a bridge?

    Note: Covered bridges should be considered as bridges in this question.

    No

13. Will the action result in effects to a culvert or tunnel at any time of year?

    No

14. Are trees present within 1000 feet of the action area?

    Note: If there are trees within the action area that are of a sufficient size to be potential roosts for bats answer "Yes". If unsure, additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

15. Does the action include the intentional exclusion of bats from a building or structure?

    Note: Exclusion is conducted to deny bats' entry or reentry into a building. To be effective and to avoid harming bats, it should be done according to established standards. If your action includes bat exclusion and you are unsure whether northern long-eared bats or tricolored bats are present, answer "Yes." Answer "No" if there are no signs of bat use in the building/structure. If unsure, contact your local Ecological Services Field Office to help assess whether northern long-eared bats or tricolored bats may be present. Contact a Nuisance Wildlife Control Operator (NWCO) for help in how to exclude bats from a structure safely without causing harm to the bats (to find a NWCO certified in bat standards, search the Internet using the search term "National Wildlife Control Operators Association bats"). Also see the White-Nose Syndrome Response Team's guide for bat control in structures.

    No

16. Does the action involve removal, modification, or maintenance of a human-made structure (barn, house, or other building) **known or suspected to contain roosting bats?**

    No

17. Will the action cause construction of one or more new roads open to the public?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

18. Will the action include or cause any construction or other activity that is reasonably certain to increase average daily traffic permanently or temporarily on one or more existing roads?

    Note: For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.). .

    No

19. Will the action include or cause any construction or other activity that is reasonably certain to increase the number of travel lanes on an existing thoroughfare?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

20. Will the proposed Action involve the creation of a new water-borne contaminant source (e.g., leachate pond, pits containing chemicals that are not NSF/ANSI 60 compliant)?

    Note: For information regarding NSF/ANSI 60 please visit https://www.nsf.org/knowledge-library/nsf-ansi-standard-60-drinking-water-treatment-chemicals-health-effects

    No

21. Will the proposed action involve the creation of a new point source discharge from a facility other than a water treatment plant or storm water system?

    No

22. Will the action include drilling or blasting?

    No

23. Will the action involve military training (e.g., smoke operations, obscurant operations, exploding munitions, artillery fire, range use, helicopter or fixed wing aircraft use)?

    No

24. Will the proposed action involve the use of herbicides or other pesticides other than herbicides (e.g., fungicides, insecticides, or rodenticides)?

    No

25. Will the action include or cause activities that are reasonably certain to cause chronic or intense nighttime noise (above current levels of ambient noise in the area) in suitable summer habitat for the northern long-eared bat or tricolored bat during the active season?

    Chronic noise is noise that is continuous or occurs repeatedly again and again for a long time. Sources of chronic or intense noise that could cause adverse effects to bats may include, but are not limited to: road traffic; trains; aircraft; industrial activities; gas compressor stations; loud music; crowds; oil and gas extraction; construction; and mining.

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    No

26. Does the action include, or is it reasonably certain to cause, the use of permanent or temporary artificial lighting within 1000 feet of suitable northern long-eared bat or tricolored bat roosting habitat?

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    No

27. Will the action include tree cutting or other means of knocking down or bringing down trees, tree topping, or tree trimming?

    No

28. Will the proposed action result in the use of prescribed fire?

    Note: If the prescribed fire action includes other activities than application of fire (e.g., tree cutting, fire line preparation) please consider impacts from those activities within the previous representative questions in the key. This set of questions only considers impacts from flame and smoke.

    No

29. Does the action area intersect the tricolored bat species list area?

    Automatically answered
    Yes

30. [Semantic] Is the action area located within 0.25 miles of a culvert that is known to be occupied by northern long-eared or tricolored bats?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

31. Has a presence/probable absence bat survey targeting the tricolored bat and following the Service's Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines been conducted within the project area?

    No

32. Is suitable summer habitat for the tricolored bat present within 1000 feet of project activities?
    (If unsure, answer ""Yes."")

    Note: If there are trees within the action area that may provide potential roosts for tricolored bats (e.g., clusters of leaves in live and dead deciduous trees, Spanish moss (Tillandsia usneoides), clusters of dead pine needles of large live pines) answer ""Yes."" For a complete definition of suitable summer habitat for the tricolored bat, please see Appendix A in the Service's Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines.

    Yes

33. Do you have any documents that you want to include with this submission?

    No

PROJECT QUESTIONNAIRE

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Missy Kalb
Address: 550 Bay Street
City: Dover
State: DE
Zip: 19901
Email mkalb@kleinfelder.com
Phone: 4107396007

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Delaware Department of Natural Resources and Environmental Control

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
Phone: (410) 573-4599 Fax: (410) 266-9127

In Reply Refer To: 02/10/2025 15:49:15 UTC
Project code: 2024-0078158
Project Name: Leipsic Research Dock Facility

Federal Nexus: yes
Federal Action Agency (if applicable): Delaware Department of Natural Resources and Environmental Control

Subject: Federal agency coordination under the Endangered Species Act, Section 7 for 'Leipsic Research Dock Facility'

Dear Missy Kalb:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on February 10, 2025, for “Leipsic Research Dock Facility” (here forward, Project). This project has been assigned Project Code 2024-0078158 and all future correspondence should clearly reference this number.

The Service developed the IPaC system and associated species’ determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northeast Determination Key (DKey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative effect(s)), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17). Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no further consultation with, or concurrence from, the Service is

required (ESA §7). If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect (NLAA)" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13]).

The IPaC results indicated the following species is (are) potentially present in your project area and, based on your responses to the Service's Northeast DKey, you determined the proposed Project will have the following effect determinations:

Species	Listing Status	Determination
Eastern Black Rail (*Laterallus jamaicensis ssp. jamaicensis*)	Threatened	NLAA

Conclusion
The Service concurs to the above-mentioned determination(s) of may affect, not likely to adversely affect. This concurrence confirms receipt of your agencies coordination required under Section 7(a)(2) of the ESA.

In addition to the species listed above, the following species and/or critical habitats may also occur in your project area and are not covered by this conclusion:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered

If no changes occur with the Project or there are no updates on listed species, no further consultation/coordination for this project is required for the species identified above. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project implements any changes which are final or commits additional resources.

Please Note: If the Action may impact bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) by the prospective permittee may be required. Please contact the Migratory Birds Permit Office, (413) 253-8643, or PermitsR5MB@fws.gov, with any questions regarding potential impacts to Eagles.

If you have any questions regarding this letter or need further assistance, please contact the Chesapeake Bay Ecological Services Field Office and reference the Project Code associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Leipsic Research Dock Facility

2. Description

The following description was provided for the project 'Leipsic Research Dock Facility':

> Excavation and backfill of previously demolished buildings, construction of a new research vessel dock in the Leipsic River, and new vessel storage building on land.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@39.242767099999995,-75.51262000611919,14z

QUALIFICATION INTERVIEW

1. As a representative of this project, do you agree that all items submitted represent the complete scope of the project details and you will answer questions truthfully?

   Yes

2. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed species?

   Note: This question could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered, or proposed species.

   No

3. Is the action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   Yes

4. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) the lead agency for this project?

   No

5. Are you including in this analysis all impacts to federally listed species that may result from the entirety of the project (not just the activities under federal jurisdiction)?

   Note: If there are project activities that will impact listed species that are considered to be outside of the jurisdiction of the federal action agency submitting this key, contact your local Ecological Services Field Office to determine whether it is appropriate to use this key. If your Ecological Services Field Office agrees that impacts to listed species that are outside the federal action agency's jurisdiction will be addressed through a separate process, you can answer yes to this question and continue through the key.

   Yes

6. Are you the lead federal action agency or designated non-federal representative requesting concurrence on behalf of the lead Federal Action Agency?

   Yes

7. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)?

   No

8. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   No

9. Is the lead federal action agency the Natural Resources Conservation Service?

   No

10. Will the proposed project involve the use of herbicide where listed species are present?

    No

11. Are there any caves or anthropogenic features suitable for hibernating or roosting bats within the area expected to be impacted by the project?

    No

12. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **birds** (e.g., plane-based surveys, land-based or offshore wind turbines, communication towers, high voltage transmission lines, any type of towers with or without guy wires)?

    Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

    No

13. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **bats** (e.g., plane-based surveys, land-based or offshore wind turbines)?

    Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

    No

14. Will the proposed project result in permanent changes to water quantity in a stream or temporary changes that would be sufficient to result in impacts to listed species?

    For example, will the proposed project include any activities that would alter stream flow, such as water withdrawal, hydropower energy production, impoundments, intake structures, diversion structures, and/or turbines? Projects that include temporary and limited water reductions that will not displace listed species or appreciably change water availability for listed species (e.g. listed species will experience no changes to feeding, breeding or sheltering) can answer "No". Note: This question refers only to the amount of water present in a stream, other water quality factors, including sedimentation and turbidity, will be addressed in following questions.

    No

15. Will the proposed project affect wetlands where listed species are present?

    This includes, for example, project activities within wetlands, project activities within 300 feet of wetlands that may have impacts on wetlands, water withdrawals and/or discharge of contaminants (even with a NPDES).

    Yes

16. Will the proposed project activities (including upland project activities) occur within 0.125 miles of the water's edge of a stream or tributary of a stream where listed species may be present?

    No

17. Will the proposed project directly affect a streambed (below ordinary high water mark (OHWM)) of the stream or tributary where listed species may be present?

    No

18. Will the proposed project bore underneath (directional bore or horizontal directional drill) a stream where listed species may be present?

    No

19. Will the proposed project involve a new point source discharge into a stream or change an existing point source discharge (e.g., outfalls; leachate ponds) where listed species may be present?

    No

20. Will the proposed project involve the removal of excess sediment or debris, dredging or in-stream gravel mining where listed species may be present?

    No

21. Will the proposed project involve the creation of a new water-borne contaminant source where listed species may be present?

    Note New water-borne contaminant sources occur through improper storage, usage, or creation of chemicals. For example: leachate ponds and pits containing chemicals that are not NSF/ANSI 60 compliant have contaminated waterways. Sedimentation will be addressed in a separate question.

    No

22. Will the proposed project involve perennial stream loss, in a stream of tributary of a stream where listed species may be present, that would require an individual permit under 404 of the Clean Water Act?

    No

23. Will the proposed project involve blasting where listed species may be present?

    No

24. Will the proposed project include activities that could negatively affect fish movement temporarily or permanently (including fish stocking, harvesting, or creation of barriers to fish passage).

    No

25. Will the proposed project involve earth moving that could cause erosion and sedimentation, and/or contamination along a stream or tributary of a stream where listed species may be present?

    Note: Answer "Yes" to this question if erosion and sediment control measures will be used to protect the stream.

    No

26. Will the proposed project impact streams or tributaries of streams where listed species may be present through activities such as, but not limited to, valley fills, large-scale vegetation removal, and/or change in site topography?

    No

27. Will the proposed project involve vegetation removal within 200 feet of a perennial stream bank where aquatic listed species may be present?

    No

28. Will erosion and sedimentation control Best Management Practices (BMPs) associated with applicable state and/or Federal permits, be applied to the project? If BMPs have been provided by and/or coordinated with and approved by the appropriate Ecological Services Field Office, answer "Yes" to this question.

    Yes

29. Is the project being funded, lead, or managed in whole or in part by U.S Fish and Wildlife Restoration and Recovery Program (e.g., Partners, Coastal, Fisheries, Wildlife and Sport Fish Restoration, Refuges)?

    No

30. [Semantic] Does the project intersect the Virginia big-eared bat critical habitat?

    Automatically answered
    No

31. [Semantic] Does the project intersect the Indiana bat critical habitat?

    Automatically answered
    No

32. [Semantic] Does the project intersect the candy darter critical habitat?

    Automatically answered
    No

33. [Semantic] Does the project intersect the diamond darter critical habitat?

    Automatically answered
    No

34. [Semantic] Does the project intersect the Big Sandy crayfish critical habitat?

    Automatically answered
    No

35. [Hidden Semantic] Does the project intersect the Guyandotte River crayfish critical habitat?

    Automatically answered
    No

36. [Hidden Semantic] Does the project intersect the Eastern black rail AOI?

    Automatically answered
    Yes

37. Does the action area include persistent emergent wetlands (salt, brackish, or freshwater)?

    Yes

38. Have black rails or black rail habitat been identified in sufficient detail in available surveys or records from within the last 2 years to assume presence at the site? (If unsure, select "No".)

    No

39. Will the proposed project involve activities conducted in persistent emergent wetlands (salt, brackish or freshwater) that may result in permanent or long-term (greater than 1 month) modifications to hydrology (flood frequency or depth)?

    No

40. Will the proposed project involve activities conducted in persistent emergent wetlands (salt, brackish or freshwater) that may result in permanent or long-term (longer than 1 growing season) modifications to vegetation type?

    No

41. Will the proposed project involve activities conducted in persistent emergent wetlands (salt, brackish or freshwater) that may result in permanent or long-term (longer than 1 growing season) reduction of dense overhead cover of persistent emergent wetland vegetation to less than 50% of habitat, in any given calendar year?

    No

42. Does the proposed project include prescribed burns in marshy or flooded open field habitat?

    No

43. Does the project include mowing, haying, and/or other mechanical treatment activities in marshy or flooded open field habitat?

    No

44. Does the project include grazing activities on public lands containing marshy or flooded open field habitat?

    No

45. Will the project cause long-term or permanent damage, fragmentation, or conversion of eastern black rail habitat?

    No

46. Will the project cause long-term or permanent damage, fragmentation, or conversion of the contiguous wetland-upland transition zone to other habitat types or land uses (e.g., between upland habitat and wetland habitat) for eastern black rail?

    No

47. Will any part of the project take place between March 15 and May 15 OR between July 15 and October 1?

    No

48. Do you have any other documents that you want to include with this submission?

    No

PROJECT QUESTIONNAIRE

1. Approximately how many acres of trees would the proposed project remove?

   0.01

2. Approximately how many total acres of disturbance are within the disturbance/ construction limits of the proposed project?

   0.9

3. Briefly describe the habitat within the construction/disturbance limits of the project site.

   This area of the Leipsic river is bordered by EEM wetlands dominated by Phragmites. Upland area is found in the center of the project area, surrounded by these EEM wetlands.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Missy Kalb
Address: 550 Bay Street
City: Dover
State: DE
Zip: 19901
Email mkalb@kleinfelder.com
Phone: 4107396007

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Delaware Department of Natural Resources and Environmental Control

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
Phone: (410) 573-4599 Fax: (410) 266-9127

In Reply Refer To: 02/07/2025 17:20:23 UTC
Project Code: 2024-0078158
Project Name: Leipsic Research Dock Facility

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
(410) 573-4599

PROJECT SUMMARY

Project Code: 2024-0078158
Project Name: Leipsic Research Dock Facility
Project Type: Boatlift/Boathouse/Dock/Pier/Piles - New Construction
Project Description: Excavation and backfill of previously demolished buildings, construction of a new research vessel dock in the Leipsic River, and new vessel storage building on land.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@39.242767099999995,-75.51262000611919,14z

Counties: Kent County, Delaware

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: ▪ Potential habitat for Black Rail exists in this area. Species profile: https://ecos.fws.gov/ecp/species/10477	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

ESTUARINE AND MARINE WETLAND

- E2EM1N

ESTUARINE AND MARINE DEEPWATER

- E1UBL

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Rachel Owrutsky
Address: 550 S Bay Road
City: Dover
State: DE
Zip: 19901
Email rowrutsky@kleinfelder.com
Phone: 3024503408

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Delaware Department of Natural Resources and Environmental Control

Rachel Owrutsky

From: CBFO Project Review, FW5 <cbfoprojectreview@fws.gov>
Sent: Friday, May 17, 2024 12:16 PM
To: Rachel Owrutsky
Subject: Re: [EXTERNAL] Leipsic Research Dock Facility RTE query

External Email

Hi Rachel,

Thank you for sending this project for review. Due to the location away from known occurrence records, this project is **not likely to adversely affect** Eastern Black Rail. The project is also expected to have **no effect** on Northern Long-eared Bat or Tricolored Bat. The Monarch Butterfly is a candidate species and no Section 7 consultation is required at this time. No further Section 7 consultation is required for this project unless project plans change. Please let me know if you have any questions.

Raquel Wetzell
US Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Dr.
Annapolis, MD 21401

From: Rachel Owrutsky <ROwrutsky@kleinfelder.com>
Sent: Wednesday, April 17, 2024 12:00 PM
To: DNREC_EnvReview@delaware.gov <DNREC_EnvReview@delaware.gov>; CBFO Project Review, FW5 <cbfoprojectreview@fws.gov>
Cc: TJ Austin <tjaustin@kleinfelder.com>
Subject: [EXTERNAL] Leipsic Research Dock Facility RTE query

DNREC-SCRP and USFWS,

On behalf of the DNREC Division of Fish and Wildlife, we are pleased to inform you of the Leipsic Research Dock Facility project. The project is located in Leipsic, DE. The project area (site) is located approximately in the northeast section of the area known as Leipsic in Kent County, Delaware. Site coordinates are approximately 39°14'33.8"N 75°30'46.1"W. This project involves the excavation and backfill of previously demolished buildings and pavement, the construction of a new research vessel dock in the Leipsic River, and the construction of a vessel storage building on land. The dock will be roughly 57’x120’. The dock will be made of timber piles and aluminum decking with a concrete dock abutment that has a stone base. Construction surrounding the vessel storage building includes paved areas, a parking lot, and a concrete pad with a 2,000-gallon diesel fuel tank.

The USFWS has indicated: Northern Long-eared Bat (*Myotis septentrionalis*), Tricolored Bat (*Perimyotis subflavus*), Eastern Black Rail (*Laterallus jamaicensis ssp. jamaicensis*) and Monarch Butterfly (*Danaus plexippus*) be considered in an effects analysis for this project.

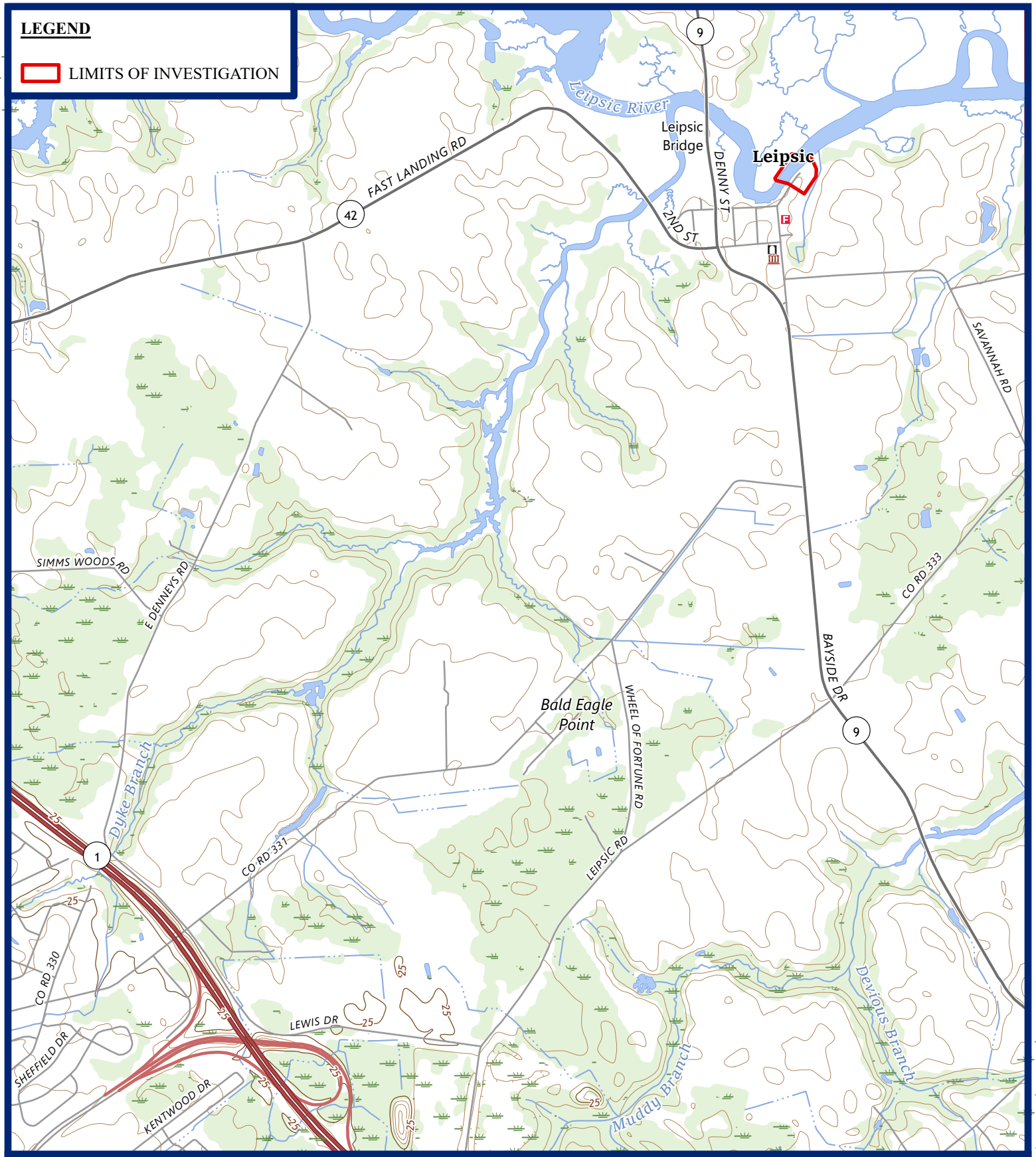
On behalf of the DNREC Division of Fish and Wildlife, Century Engineering, LLC is requesting your review and response with any information or records that you may have regarding the presence of rare, threatened, or endangered species within the project area to the above location. In addition, please forward any information that you may have regarding State Natural Heritage Sites, Delaware Natural Estuarine Research Reserves, and Fisheries within the project area.

Thank you,

Rachel Owrutsky (she/her)
Environmental Scientist

550 S Bay Road
Dover, DE 19901
d| 301.364.7012
o| 302.450.3408

CENTURY ENGINEERING
A Kleinfelder Company



CENTURY ENGINEERING
A Kleinfelder Company
550 Bay Road
Dover, DE 19901
P: 302.734.9188

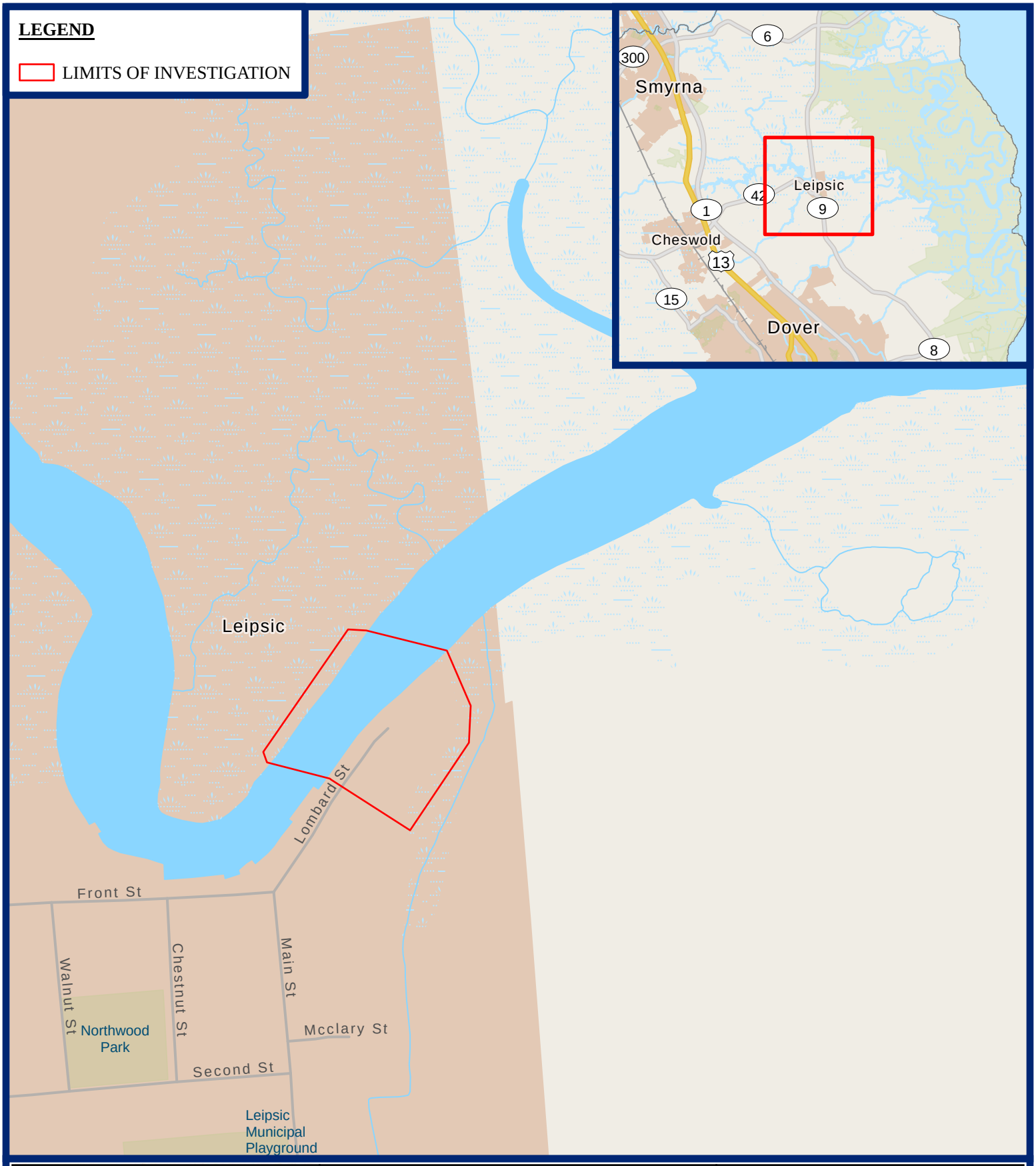
USGS TOPOGRRAPHIC QUADRANGLE MAP

LEIPSIC RESEARCH DOCK FACILITY

KENT COUNTY, DELAWARE

USGS Topo Quads:
DOVER (DE)

Area: 5.73 +/- AC
Latitude: 39°14'33.0"N
Longitude: 75°30'45.8"W
Elevation: ~0-10 feet
Scale: 1:24,000



CENTURY ENGINEERING
A Kleinfelder Company
550 Bay Road
Dover, DE 19901
P: 302.734.9188

VICINITY MAP

LEIPSIC RESEARCH DOCK FACILITY

KENT COUNTY, DELAWARE

Basemap Source: FirstMap (2022)
ArcGIS Online

3

1 inch = 400 feet

Waters of the U.S. Delineation
Whedbee Research Vessel Dock & Storage Building

Prepared for:
DNREC-Division of Fish and Wildlife
89 Kings Highway
Dover, DE 19901

Prepared by:
Century Engineering, LLC
550 S Bay Road
Dover, DE 19901

April 2024

Table of Contents

List of Tables

Appendices

Project Summary Sheet for USACE Confirmation Site Visit

General Information

Project/Site Name	Whedbee Research Vessel Dock & Storage Building
Applicant/Owner	DNREC-Division of Fish & Wildlife 89 Kings Highway Dover, DE 19901
Authorized Agent	Century Engineering, LLC. Attn: TJ Austin, PWS
Project/Site Size	5.7 ac. +/-
Parcel I.D.	22946

General Information

Locality	Kent County, Delaware
USGS Quad. Map(s)	Dover (DE)
Approximate Latitude	39° 14’ 34.242" N
Approximate Longitude	-75° 30' 45.2592" W
Approximate Elevation	~0-10 feet
Nearest Tributary	Leipsic River
HUC 12	020402070202 (Lower Leipsic River)

Location Description

The 5.7 +/- acre project area (Site) is located within the town limits of Leipsic, Delaware. The project area contains mainly marshland, open water, a residence, and outbuildings. The parcel is generally bound to the north and west by the Leipsic River, to the east by marsh, and to the south by residences. Current structures on the property are limited to one residence, sheds, and a wooden dock.

Inventory

Classification	Square Feet (SF)	Acres (Ac)
Estuarine Wetland (E1UBL)	**223,201.44**	**5.124-ac.**
Estuarine Emergent Wetland (EEM)	**63,976.572**	**1.4687-ac.**
Total Waters*	**223,201.44**	**5.124-ac.**

Calculations are based off survey located flags performed by Century Engineering, LLC.

Project Report

Executive Summary

Century Engineering, LLC. (Century) was retained by DNREC-Division of Fish & Wildlife and completed a Waters of the U.S. delineation in April 2022 in accordance with the *Corps of Engineers' Wetlands Delineation Manual* (Environmental Laboratory, 1987), as well as the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)* (U.S. Army Corps of Engineers, 2012) to identify those areas that are most likely within the regulatory purview of the U.S. Army Corps of Engineers. In addition to Federal Regulations, wetlands and waterways investigations were conducted in accordance with Delaware's "Wetland Act" (1973) and subsequent regulations adopted three (3) years later, as well as the Subaqueous Lands Act (1969). The 5.7 +/- acre project area (Site) is located within the town limits of Leipsic, Delaware. The project area contains mainly marshland, open water, and residences. The parcel is generally bound to the north and west by the Leipsic River, to the east by marsh, and to the south by residences. Current structures on the property are limited to one residence, sheds, and a wooden dock. Based on the onsite field investigation of the approximately 5.7 +/- acre project area, Century has identified potentially jurisdictional Waters of the U.S. consisting of 1.4687 +/- acres of Estuarine Emergent Wetlands and 5.124 +/- acres of E1UBL waters. All waters for the site cover 5.124 +/- acres and have overlapping features. The waters and tidal wetlands components may be jurisdictional to the State of Delaware.

Methodology

Century conducted the Routine Determination for Areas Larger than Five Acres, as described in the *Corps of Engineers' Wetlands Delineation Manual* (Environmental Laboratory, 1987), herein referred to as the 1987 Manual, which follows a three-parameter approach to identifying wetlands based on the presence of hydrophytic vegetation, hydric soils, and wetland hydrology. All three parameters must be present for an area to be considered a jurisdictional wetland in accordance with Section 404 of the Clean Water Act. The specific procedures and criteria for determining the presence or absence of these parameters are presented in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)* (U.S. Army Corps of Engineers. 2012), herein referred to as the AGCP Regional Supplement. Other Waters of the U.S. are identified based on the presence of a high tide line (HTL) or an ordinary high water mark (OHWM), pursuant to the definition of "Waters of the U.S."

under Title 33 Code of Federal Regulation Part 328. Century additionally assesses geomorphic, hydrologic, and biological factors when identifying other waters of the U.S.

Wetlands and other waters of the U.S. found onsite are classified according to the Cowardin system, as described in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979). This is a hierarchical system, which aids resource managers and others by providing uniformity of concepts and terms used to define wetlands according to hydrological, geomorphologic, chemical, and biological factors (Appendix F).

Analysis

Resource Review:

Prior to the field investigation, Century performed a preliminary evaluation of the project area by obtaining and reviewing available natural resource information for the project area, including the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Map included as Appendix D, the Dover (DE) USGS Quadrangle Map, included as Appendix B, aerial imagery of the project area, included as Appendix C, information from the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Soil Survey Information, included as Appendix E, and any available GIS information. According to the USGS Quadrangle Map provided with this report, perennial stream channel, intermittent stream channel, and wetlands are characterized within the project limits. The NRCS Soil Survey Information provided shows the project area to contain soils listed as hydric, non-hydric, and containing hydric inclusions. The NWI Map provided shows Estuarine and Marine Deepwater (E1UBL) and Estuarine and Marine Wetlands (E2EM1N) polygons within the project limits. The reference information was verified by an onsite inspection to characterize vegetation, soils, and hydrology, and to define the boundaries of waters of the U.S., including wetlands, that may be present within the project limits.

Overall Site Conditions:

As observed on the Dover (DE) USGS Quadrangle Map, potentially jurisdictional features can generally be found along the Leipsic River. The vegetative communities for the project area can be classified as: coastal marshes, maintained lawn around the residence, and agricultural fields, and *Vicinity, USGS Topographic Quadrangle,* and *Aerial Imagery* are included for reference in Appendices A, B, and C.

Vegetation:

Using the most recent available aerial imagery, a preliminary characterization of the vegetative communities was performed for the project area. Additional data was collected during the onsite investigation to verify the aerial extent and species composition within these communities. Plant species observed onsite were identified by using the *Gleason and Cronquist Manual of Vascular Plants of Northeastern United States and Adjacent Canada, Second Edition* (1991) taxonomic classification of species. The wetland indicator status for each species was determined from the *United States Army Corps of Engineers National Wetland Plant List* (USACE, 2020). The indicator status of a species indicates the probability that the species will occur in a wetland of the United States and is defined in Table 1 below.

Table 1: Plant Indicator Status per the *National Wetland Plant List Indicator Rating Definitions* (Lichvar et al. 2012).

Wetland Indicator Status	Definition
Obligate Wetland (OBL)	Almost always occur in wetlands
Facultative Wetland (FACW)	Usually occur in wetlands, but may occur in non-wetlands
Facultative (FAC)	Occur in wetlands or non-wetlands
Facultative Upland (FACU)	Usually occur in non-wetlands, but may occur in wetlands
Obligate Upland (UPL)	Almost never occur in wetlands

The vegetative communities for the project area can be classified as: coastal salt marshes, maintained lawn around the residence, and agricultural fields. Table 2 lists the dominant species within the sampled onsite vegetative communities. The vegetation information presented in this table is correlated with data provided by *The PLANTS Database* (USDA, 2022).

Table 2: Dominant vegetation observed for sampled vegetative communities within the project limits.

Scientific Name	Common Name	Stratum	Indicator Status (AGCP)
Dominant vegetation for the upland components.			
Erigeron annuus	Eastern daisy fleabane	Herbaceous	FACU
Taraxacum officinale	Common dandelion	Herbaceous	FACU
Lamium purpureum	Purple deadnettle	Herbaceous	UPL
Lolium perenne	Perennial ryegrass	Herbaceous	FACU
Cardamine hirsuta	Hairy Bittercress	Herbaceous	FACU
Cynodon dactylon	Bermudagrass	Herbaceous	FACU
Dominant vegetation for the wetland components.			
Distichlis spicata	Saltgrass	Herbaceous	OBL
Phragmites australis	Common reed	Herbaceous	FACW
Baccharis Halimifolia	Eastern Baccharis	Herbaceous	FAC
Rumex crispus	Curly dock	Herbaceous	FAC

Soils:

A hydric soil is defined as "a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (Federal Register, 1994). Indicators of hydric soil conditions are predominantly formed by the reduction, translocation, and accumulation of iron or manganese, the reduction of sulfate, and/or the accumulation of organic material. The criteria used to identify hydric soils outlined in the AGCP Regional Supplement follows the NRCS *Field Indicators of Hydric Soils in the United States* (NRCS, 2010) and are primarily focused on the evaluation of the presence of organic material (e.g., muck or peat) or redoximorphic features (e.g., iron/manganese concentrations or depletions) within the soil profile.

Unless local government guidance dictates otherwise, current soil information, when available, is utilized prior to utilizing federally provided soil information. Based on soil survey information obtained from NRCS, the following table summarizes the mapped soils onsite, as well as the status on the most recent National and County Hydric Soils List (Refer to Soils Description in Appendix E). More in-depth descriptions of these soil types are listed in Table 3 below.

Table 3: Soil descriptions as taken from the NRCS Official Soil Series Description (OSD) and Soil Data Mart.

Unit	Common Name	Taxonomic Name	Drainage Class	Hydric Status	Minor Components
UIB	Unicorn Loam	Mesic Typic Hapludults	Well drained	Non-Hydric	Greenwich, Pineyneck, Downer
Ba	Broadkill-Appoquinimink complex	Mesic Typic Sulfaquents	Very poorly drained	Hydric	Mispillion, Transquaking, Sunken
CaA	Carmichael loam	Mesic Typic Endoaquults	Poorly drained	Hydric	Pineyneck, Corsica-undrained, Fallsington-drained

Based on soil survey information obtained from NRCS, the following soil types are mapped within the project area (Refer to Appendix E):

- **Unicorn Loam (UIB) 2-5%.** Soils in the Unicorn series are very deep, well drained soils that are formed in loamy eolian deposits over fluviomarine sediments. They are found on flats, knolls, and terraces of the Coastal Plain uplands. Depth to seasonal high water table is 40 to 72 inches.
- **Broadkill-Appoquinimink Complex (Ba).** Soils in the Broadkill series are very deep, very poorly drained soils that are formed in loamy marine sediments, high in silt. They are found in Estuarine tidal salt marshes--flooded twice daily by tides and occasionally by storm surges in the Coastal Plain marshes. Depth to seasonal high-water table is +12 to 0 inches. Soils in the Appoquinimink series are very deep, very poorly drained soils that are formed in Loamy fluvial sediments, high in silt, overlying organic materials dominantly from herbaceous plants. They are found in salt-water tidal marshes in estuaries which are continuously saturated and flooded twice daily by tidal waters in Costal Plains. Depth to seasonal high-water table is 0 inches.
- **Carmichael (CaA) 0-2%.** Soils in the Carmichael series are very deep, poorly drained soils that are formed in loamy eolian and/or fluviomarine sediments. They are found on flats and depressions terraces of the Coastal Plain uplands. Depth to seasonal high-water table is 0 to 10 inches.

During the field investigation, soil cores were taken to a depth of at least 18 inches to describe soil morphological characteristics in the upper part, also known as the solum. Soil characteristics including texture and color (hue, chroma, and value) were inspected for each sample. *Munsell Soil Color Charts* were used for determining the soil color. The results can be found within the data sheets in Appendix H.

Hydrology:

Indicators of wetland hydrology are used in conjunction with hydric soils and hydrophytic vegetation indicators to define the limits of wetlands according to the 1987 Manual and AGCP Regional Supplement. However, while indicators of hydrophytic vegetation and hydric soils typically provide evidence that soil saturation or inundation occurs with a frequency and duration sufficient to develop hydric soils and a wetland plant community, indicators of wetland hydrology provide evidence that these hydrologic conditions are continuing at that location, and that the hydric soils and hydrophytic vegetation are not reflective of a previous hydrologic regime. The 1987 Manual states that wetland hydrology encompasses all hydrologic characteristics of areas that are periodically inundated or have soils that are saturated to the surface at some time during the growing season. The evaluation of hydrology conditions during the growing season is important, since the hydrology regime present during that time will exert a controlling influence on the plant species present in a particular area.

The AGCP Regional Supplement divides wetland hydrology indicators into four categories; observation of soil saturation/inundation (Group A), evidence of recent inundation (Group B), evidence of recent soil saturation (Group C), and evidence from other site conditions or data (Group D). These indicators are also categorized as primary or secondary indicators, based on the estimated reliability of each within the region. The AGCP Regional Supplement requires the presence of at least one primary or two secondary indicators of wetland hydrology for the wetland hydrology parameter to be met. Primary hydrologic indicators include visual inundation, visual soil saturation near the surface, the presence of oxidized root channels, water-stained leaves, sediment deposits, drift lines, and water marks on rocks and vegetation. Secondary hydrologic indicators include, but are not limited to, a positive FAC-neutral test, the presence of wetland drainage patterns, and local soil survey data. Evidence of most of these indicators can be present during dry periods, and therefore are useful indicators of the presence of wetland hydrology conditions.

Hydrology observed during the investigation is associated with the Leipsic River and tidal fluctuation in the surrounding marsh.

Results

During the investigation, potentially jurisdictional features are identified onsite, and the boundaries are marked using pink wetland delineation tape. Appendix G contains a *Waters of the U.S. Delineation Map* which depicts the aerial extent of the potentially jurisdictional features identified during the investigation. Additionally, data was collected onsite to characterize representative community types within the project limits. Data point locations can be viewed within Appendix H.

Potentially Jurisdictional Features Discussion:
Based on the onsite field investigation of the approximately 5.7 +/- acre project area, Century has identified potentially jurisdictional Waters of the U.S. consisting of 1.4687+/- acres of Estuarine Emergent Wetlands and 5.124+/- acres of E1UBL waters. All waters for the site total 5.124+/- acres. The waters and tidal wetlands components may be jurisdictional to the State of Delaware.

Leipsic River and Adjacent Tidal Wetlands:
The Leipsic River, a tidal river, is indicated on USGS Quadrangle Maps. As such, the Leipsic River exists within the limits of the wetlands, commonly classified as a tidal marsh. It is identified by its HTL indicators.

Emergent estuarine wetlands (EEM) border the mean high water (MHW) mark of the Leipsic River to the north and south. The EEM wetlands are situated between MHW and HTL. Wetlands W-1, W-2, and W-3 showed primary and secondary hydrology indicators of: (A1) Surface Water, (A2) High Water Table, (A3) Saturation, (A4) Hydrogen Sulfide (B7) Inundation Visible on Aerial Imagery, (C1) Hydrogen Sulfide Odor, (D2) Geomorphic Position (D5) FAC-Neutral Test, (F3) Depleted Matrix, (F6) Redox Dark Surface, and (F13) Umbric Surface.

Hydrophytic vegetation was predominantly *Distichlis spicata* (FACW), *Phragmites australis* (FACW), and *Baccharis halimifolia* (FAC) in the herbaceous stratum. DP2, DP3, and DP4 are representative of the sampled community and found in Appendix H.

Table 4 below summarizes the data points collected during the investigation.

Table 4: Data Point Summary Table

Data Point	Mapped Soil Unit	Hydrophytic Vegetation	Hydric Soil	Wetland Hydrology	Community ID
DP 1	UIB	No	No	No	Upland
DP 2	UIB	Yes	Yes	Yes	Upland
DP 3	UIB	Yes	Yes	Yes	Wetland
DP 4	UIB	Yes	Yes	Yes	Upland
DP 5	UIB	No	No	Yes	Upland

The location of the data points collected are shown on the Waters of the U.S. Delineation Map included as Appendix G. The data sheets for each data point, including representative photographs, are included as Appendix H.

References

Cowardin, L. M., et al., 1979. Classification of Wetlands and Deep Water Habitats of the United States, U.S. Department of the Interior, Fish and Wildlife Service.

Environmental Laboratory. (1987). "Corps of Engineers Wetland Delineation Manual," Technical Report Y-87-1. January, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Gleason, Henry A. and Cronquist, Arthur. (1991). *Manual of Vascular Plants of Northeastern United States and Adjacent Canada, 2nd edition.* New York, New York Botanical Garden.

Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. The National Wetland Plant List: 2018 Update of Wetland Ratings. Phytoneuron 2014-41: 1-42.

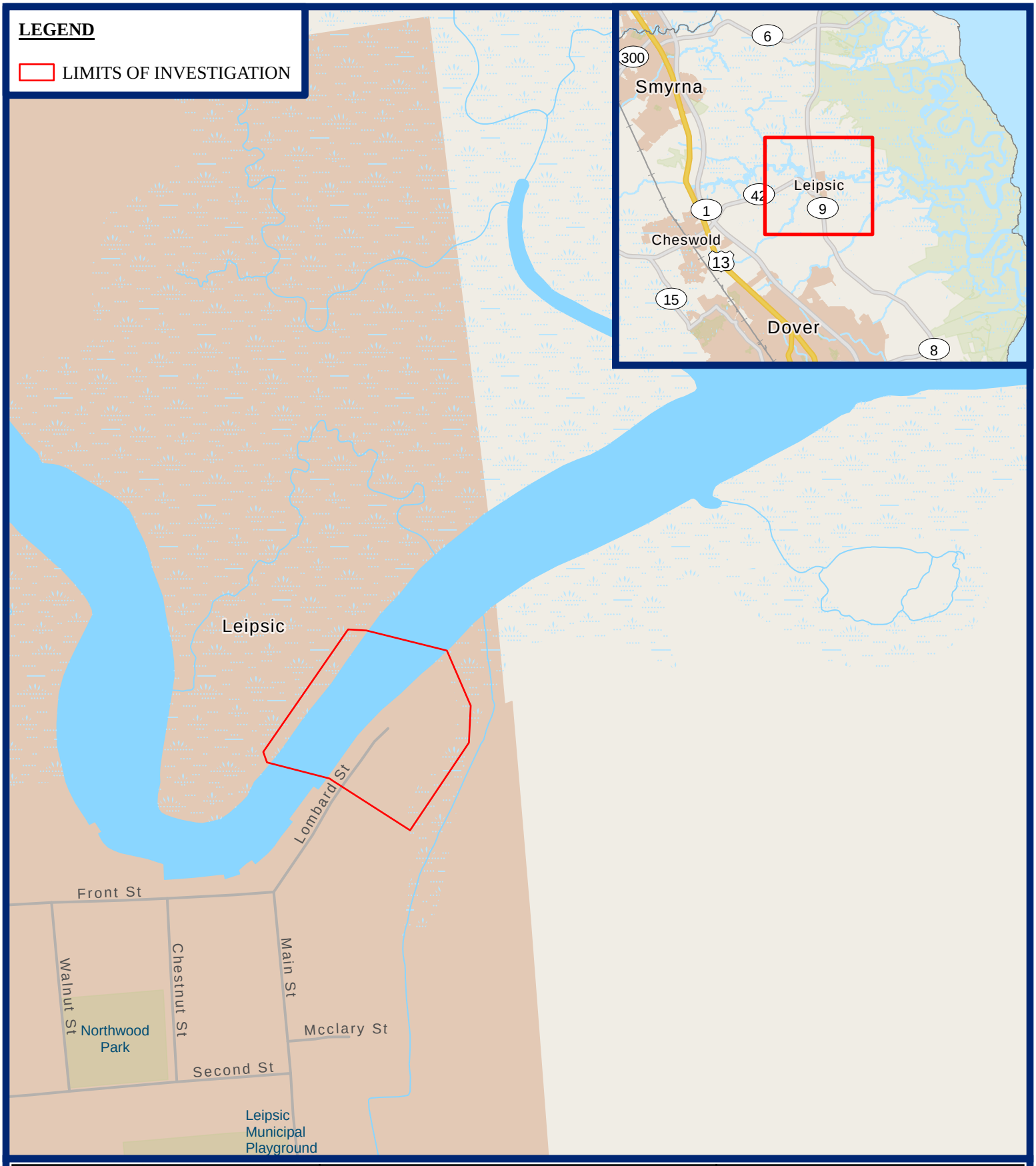
Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed [May 2022].

U.S. Army Corps of Engineers. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-20. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Army Corps of Engineers 2020. National Wetland Plant List, version 3.4. http://wetland_plants.usace.army.mil/. U.S. Army Corps of Engineers Engineer Research and Development Center Cold Regions Research and Engineering Laboratory, Hanover, NH.

USDA, NRCS. 2022. The PLANTS Database (http://plants.usda.gov, April 2024). National Plant Data Team, Greensboro, NC 27401-4901 USA.

Appendix A:
Vicinity Map



CENTURY ENGINEERING
A Kleinfelder Company
550 Bay Road
Dover, DE 19901
P: 302.734.9188

VICINITY MAP

LEIPSIC RESEARCH DOCK FACILITY

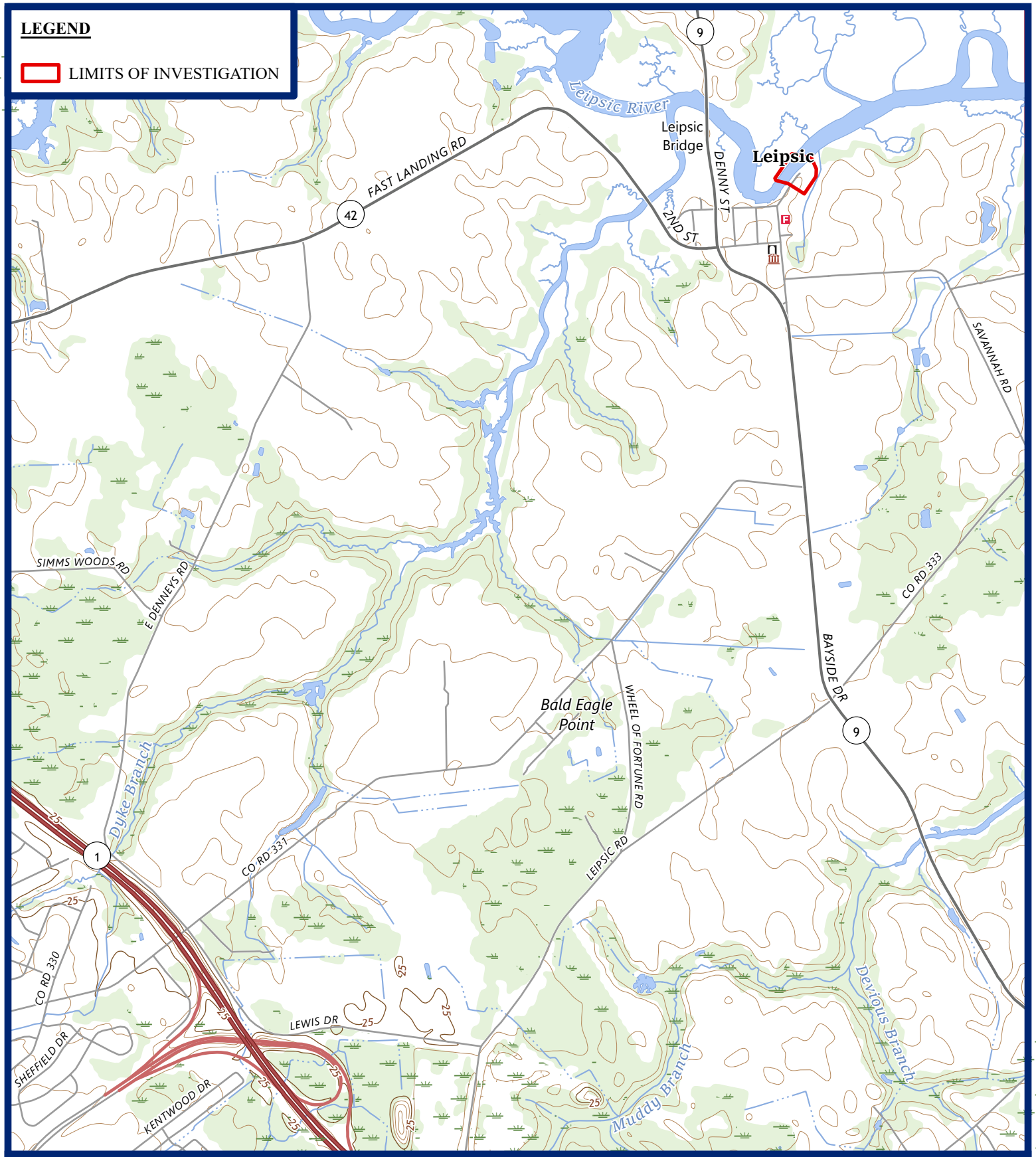
KENT COUNTY, DELAWARE

Basemap Source: FirstMap (2022)
ArcGIS Online

3

1 inch = 400 feet

Appendix B:
USGS Topographic Quadrangle Map



CENTURY ENGINEERING
A Kleinfelder Company
550 Bay Road
Dover, DE 19901
P: 302.734.9188

USGS TOPOGRRAPHIC QUADRANGLE MAP

LEIPSIC RESEARCH DOCK FACILITY

KENT COUNTY, DELAWARE

USGS Topo Quads:
DOVER (DE)

Area: 5.73 +/- AC
Latitude: 39°14'33.0"N
Longitude: 75°30'45.8"W
Elevation: ~0-10 feet
Scale: 1:24,000

Appendix C:
Aerial Imagery Map

CENTURY ENGINEERING
A Kleinfelder Company
550 Bay Road
Dover, DE 19901
P: 302.734.9188

AERIAL IMAGERY

LEIPSIC RESEARCH DOCK FACILITY

KENT COUNTY, DELAWARE

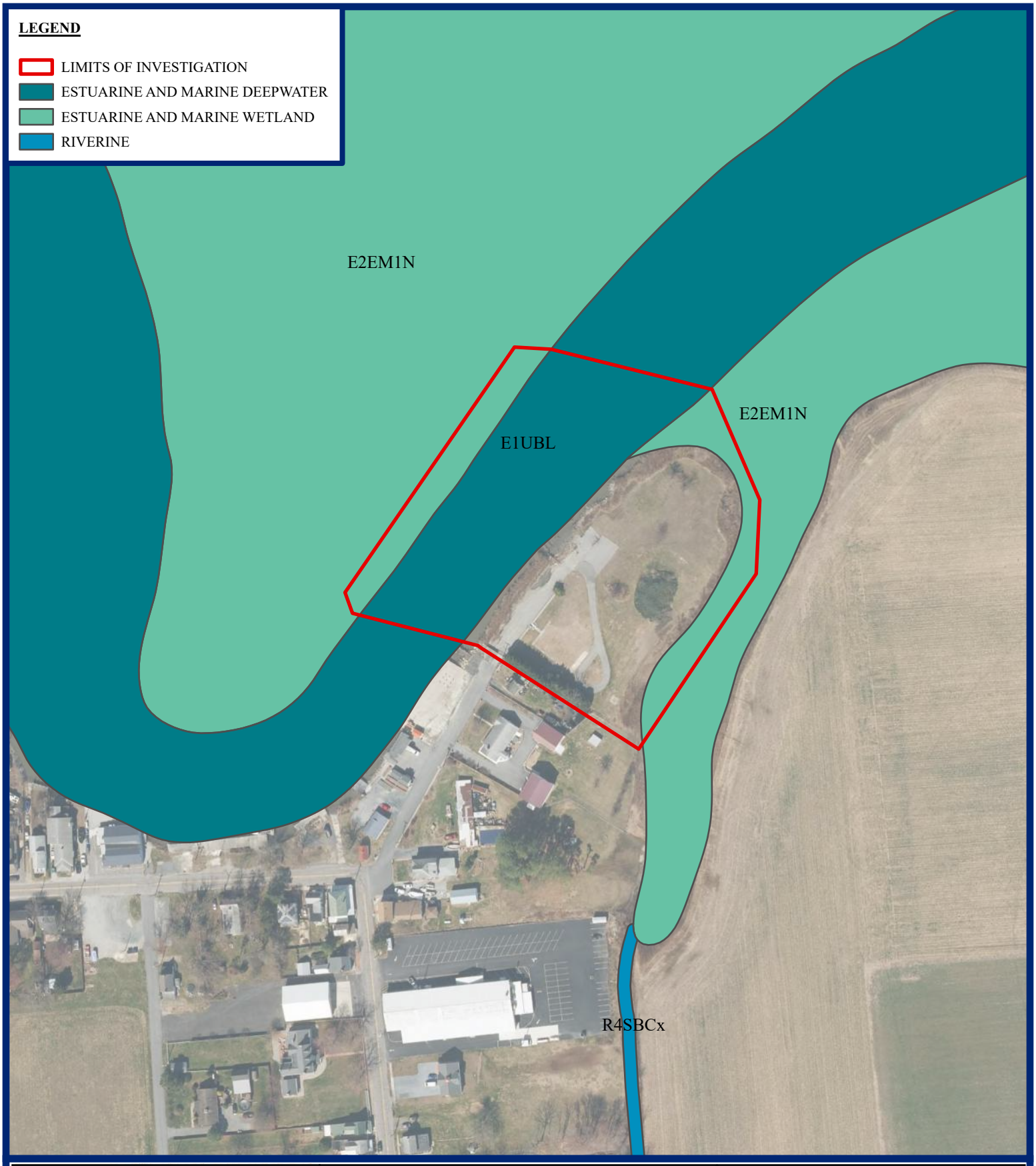
Aerial Imagery Source: FirstMap (2022)
ArcGIS Online

N

1 inch = 200 feet

Appendix D:
National Wetlands Inventory Map

Appendix E:
Custom Soil Resource Report



CENTURY ENGINEERING
A Kleinfelder Company
550 Bay Road
Dover, DE 19901
P: 302.734.9188

NATIONAL WETLANDS INVENTORY

LEIPSIC RESEARCH DOCK FACILITY

KENT COUNTY, DELAWARE

Basemap Source: FirstMap (2022)
NWI Inventory Source: USFWS (2022)
ArcGIS Online

N

1 inch = 200 feet

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Kent County, Delaware

Whedbee Property-DNREC

May 6, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,620 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kent County, Delaware
Survey Area Data: Version 18, Aug 26, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2020—Jun 13, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ba	Broadkill-Appoquinimink complex, very frequently flooded, tidal	1.0	16.9%
CaA	Carmichael loam, 0 to 2 percent slopes	0.3	5.6%
UlB	Unicorn loam, 2 to 5 percent slopes	2.3	40.6%
W	Water	2.1	36.9%
Totals for Area of Interest		**5.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Kent County, Delaware

Ba—Broadkill-Appoquinimink complex, very frequently flooded, tidal

Map Unit Setting

National map unit symbol: 1qx5x
Elevation: 0 to 30 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Broadkill, very frequently flooded, tidal, and similar soils: 55 percent
Appoquinimink, very frequently flooded, tidal, and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Broadkill, Very Frequently Flooded, Tidal

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy marine sediments, high in silt

Typical profile

Oe - 0 to 6 inches: mucky peat
Ag - 6 to 13 inches: silty clay loam
Cg1 - 13 to 38 inches: silty clay loam
Cg2 - 38 to 72 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: Frequent
Maximum salinity: Strongly saline (16.0 to 35.0 mmhos/cm)
Sodium adsorption ratio, maximum: 90.0
Available water supply, 0 to 60 inches: Very high (about 18.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Description of Appoquinimink, Very Frequently Flooded, Tidal

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium over herbaceous organic material

Typical profile

Ag - 0 to 6 inches: mucky silt loam
Cg1 - 6 to 21 inches: silt loam
Cg2 - 21 to 32 inches: silty clay loam
Oa - 32 to 43 inches: muck
Oe - 43 to 80 inches: mucky peat

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: Frequent
Maximum salinity: Strongly saline (16.0 to 32.0 mmhos/cm)
Sodium adsorption ratio, maximum: 14.0
Available water supply, 0 to 60 inches: Very high (about 18.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Mispillion

Percent of map unit: 5 percent
Landform: Tidal marshes
Hydric soil rating: Yes

Transquaking

Percent of map unit: 5 percent
Landform: Tidal marshes
Hydric soil rating: Yes

Sunken

Percent of map unit: 5 percent
Landform: Submerged upland tidal marshes
Hydric soil rating: Yes

CaA—Carmichael loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1qx5y
Elevation: 0 to 130 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Carmichael, drained, and similar soils: 45 percent
Carmichael, undrained, and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carmichael, Drained

Setting

Landform: Flats, depressions, swales
Landform position (three-dimensional): Talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Loamy eolian deposits over fluviomarine sediments

Typical profile

Ap - 0 to 9 inches: loam
BEg - 9 to 15 inches: loam
Btg1 - 15 to 19 inches: loam
Btg2 - 19 to 33 inches: silt loam
Cg - 33 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 10 to 20 inches
Frequency of flooding: None
Frequency of ponding: Rare
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Description of Carmichael, Undrained

Setting

Landform: Flats, depressions, swales
Landform position (three-dimensional): Talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Loamy eolian deposits over fluviomarine sediments

Typical profile

Oi - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loam
Eg,BEg - 3 to 15 inches: loam
Btg1 - 15 to 19 inches: loam
Btg2 - 19 to 33 inches: silt loam
Cg - 33 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 10 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Pineyneck

Percent of map unit: 10 percent
Landform: Flats, terraces, swales
Landform position (three-dimensional): Rise
Down-slope shape: Linear, concave
Across-slope shape: Linear
Hydric soil rating: No

Corsica, undrained

Percent of map unit: 5 percent
Landform: Depressions, flats, swales, drainageways
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Fallsington, drained

Percent of map unit: 5 percent
Landform: Flats, depressions, swales
Landform position (three-dimensional): Talf

Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

UlB—Unicorn loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1qxcr
Elevation: 10 to 390 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Unicorn and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Unicorn

Setting

Landform: Flats, terraces, knolls
Landform position (three-dimensional): Dip, rise, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Silty eolian deposits over fluviomarine deposits

Typical profile

Ap - 0 to 11 inches: loam
Bt - 11 to 24 inches: loam
2Bt - 24 to 35 inches: sandy loam
2C - 35 to 51 inches: loamy sand
3C,4C - 51 to 80 inches: stratified loamy sand to silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: About 40 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Greenwich
Percent of map unit: 5 percent
Landform: Knolls
Hydric soil rating: No

Pineyneck
Percent of map unit: 5 percent
Landform: Swales
Hydric soil rating: No

Downer
Percent of map unit: 5 percent
Landform: Knolls
Hydric soil rating: No

W—Water

Map Unit Setting
National map unit symbol: 1qxcv
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Rating by Map Unit

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

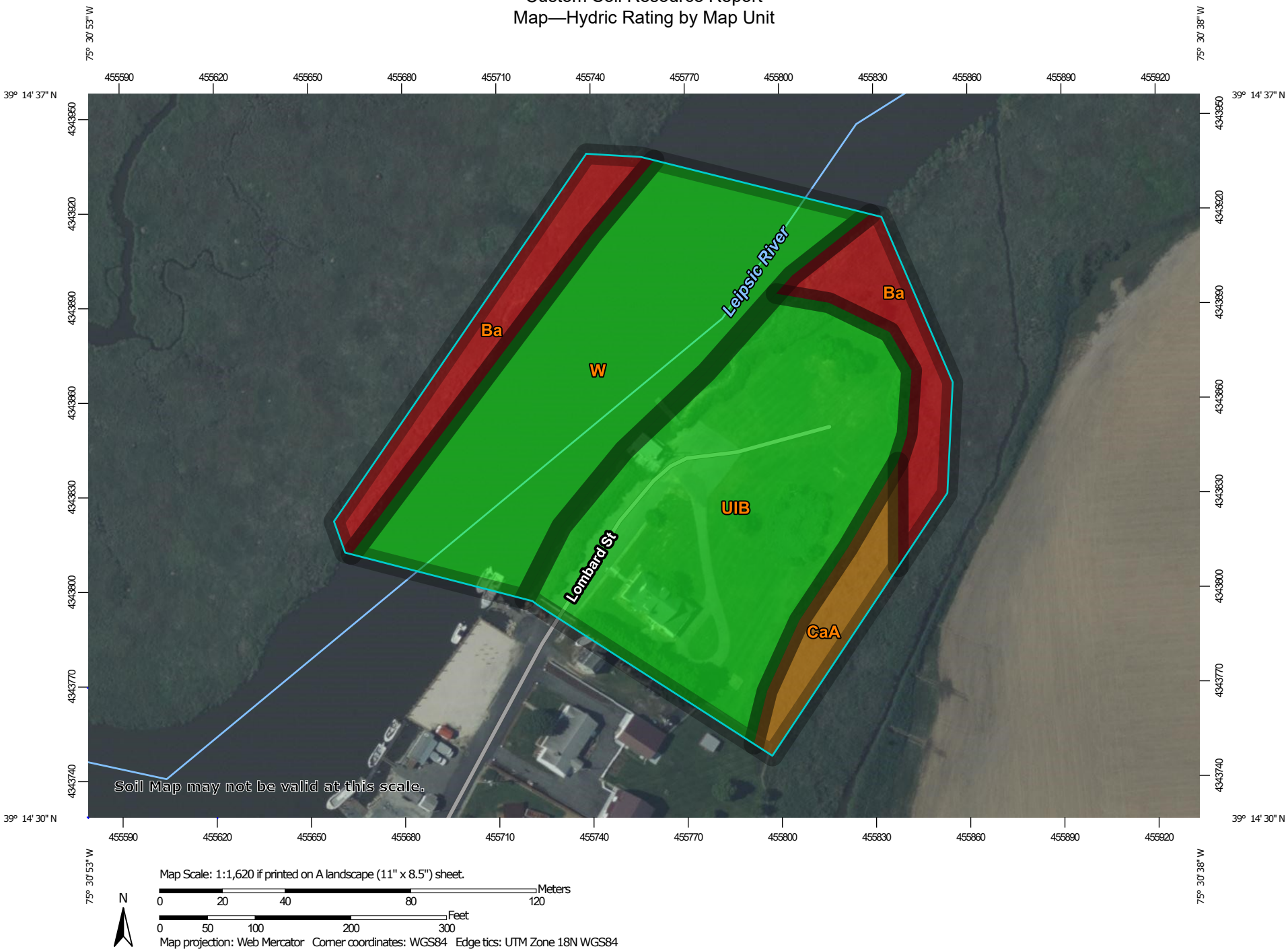
Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Custom Soil Resource Report
Map—Hydric Rating by Map Unit



Map Scale: 1:1,620 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kent County, Delaware
Survey Area Data: Version 18, Aug 26, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2020—Jun 13, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ba	Broadkill-Appoquinimink complex, very frequently flooded, tidal	100	1.0	16.9%
CaA	Carmichael loam, 0 to 2 percent slopes	90	0.3	5.6%
UlB	Unicorn loam, 2 to 5 percent slopes	0	2.3	40.6%
W	Water	0	2.1	36.9%
Totals for Area of Interest			**5.7**	**100.0%**

Rating Options—Hydric Rating by Map Unit

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

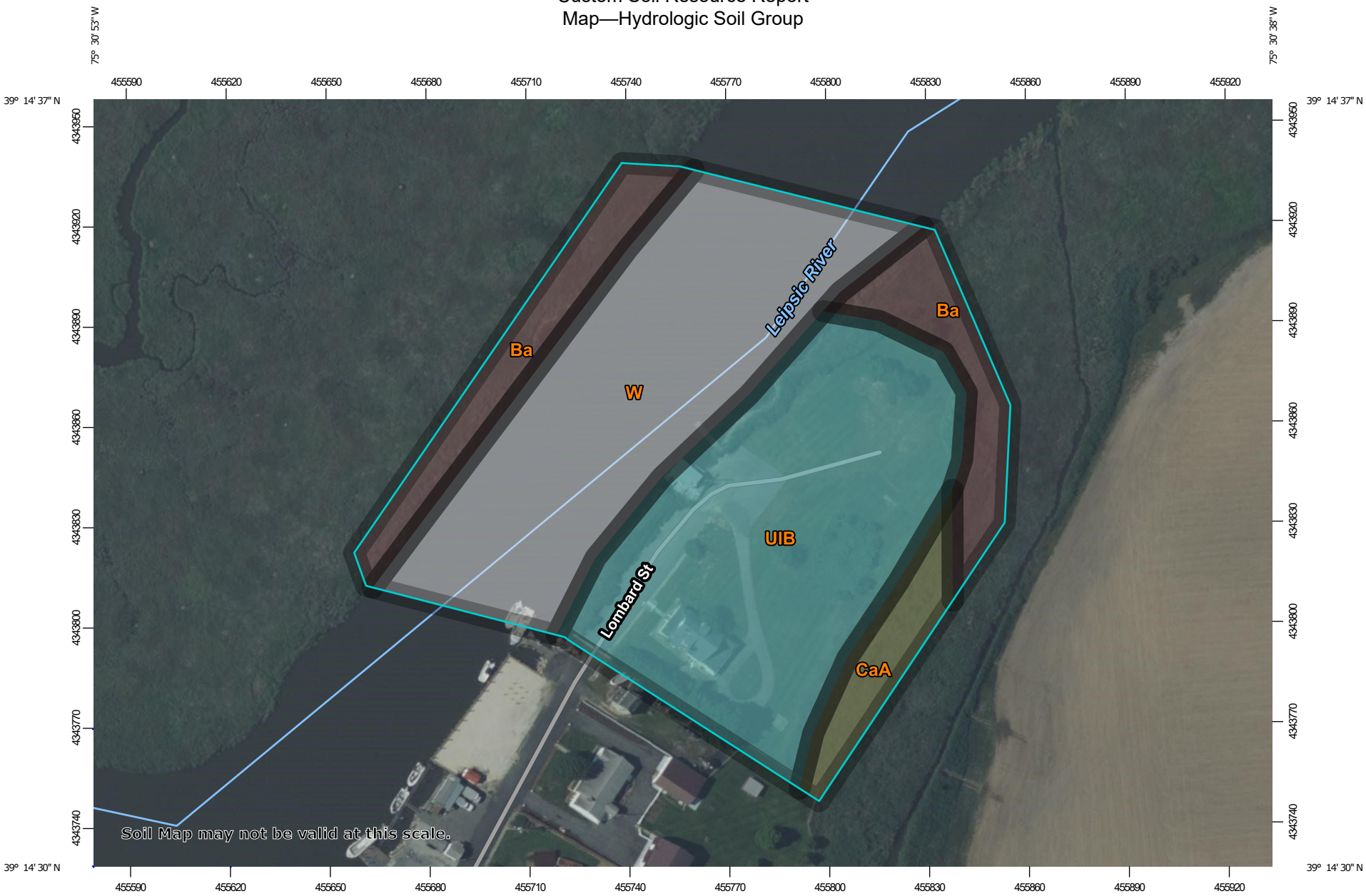
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at

or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.



Map Scale: 1:1,620 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kent County, Delaware
Survey Area Data: Version 18, Aug 26, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2020—Jun 13, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ba	Broadkill-Appoquinimink complex, very frequently flooded, tidal	B/D	1.0	16.9%
CaA	Carmichael loam, 0 to 2 percent slopes	C/D	0.3	5.6%
UlB	Unicorn loam, 2 to 5 percent slopes	C	2.3	40.6%
W	Water		2.1	36.9%
Totals for Area of Interest			**5.7**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Drainage Class

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

Custom Soil Resource Report
Map—Drainage Class

Map Scale: 1:1,620 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Lines

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Points

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kent County, Delaware
Survey Area Data: Version 18, Aug 26, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2020—Jun 13, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Drainage Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ba	Broadkill-Appoquinimink complex, very frequently flooded, tidal	Very poorly drained	1.0	16.9%
CaA	Carmichael loam, 0 to 2 percent slopes	Poorly drained	0.3	5.6%
UlB	Unicorn loam, 2 to 5 percent slopes	Well drained	2.3	40.6%
W	Water		2.1	36.9%
Totals for Area of Interest			**5.7**	**100.0%**

Rating Options—Drainage Class

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water Features

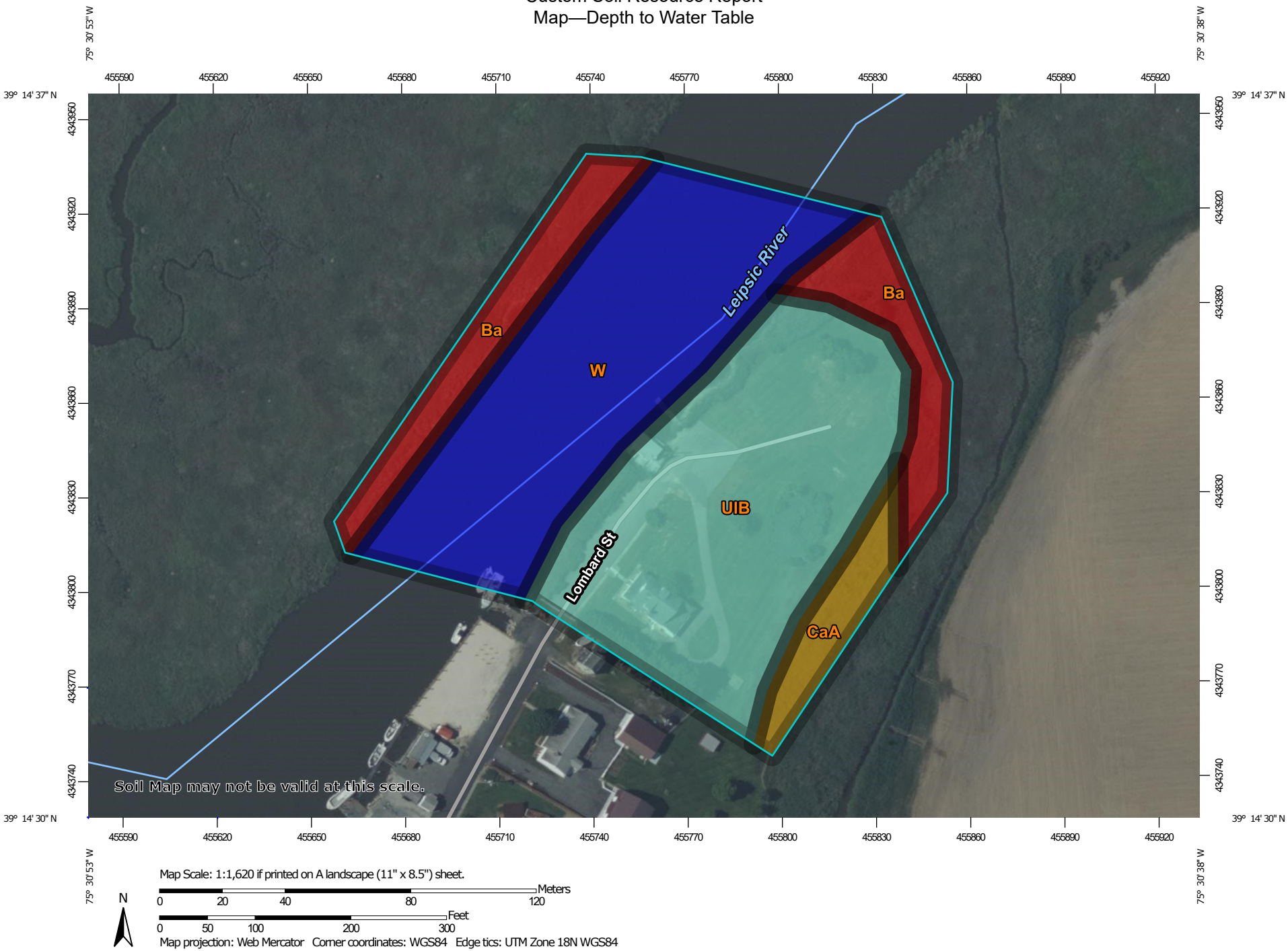
Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report
Map—Depth to Water Table



Map Scale: 1:1,620 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kent County, Delaware
Survey Area Data: Version 18, Aug 26, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2020—Jun 13, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
Ba	Broadkill-Appoquinimink complex, very frequently flooded, tidal	0	1.0	16.9%
CaA	Carmichael loam, 0 to 2 percent slopes	36	0.3	5.6%
UlB	Unicorn loam, 2 to 5 percent slopes	114	2.3	40.6%
W	Water	>200	2.1	36.9%
Totals for Area of Interest			**5.7**	**100.0%**

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Soil List - All Components

This table lists the map unit components and their hydric status in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties

that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2). Definitions for the codes are as follows:

1. All Histels except for Folistels, and Histosols except for Folists.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
    A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    B. Show evidence that the soil meets the definition of a hydric soil;
3. Soils that are frequently ponded for long or very long duration during the growing season.
    A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    B. Show evidence that the soil meets the definition of a hydric soil;
4. Map unit components that are frequently flooded for long duration or very long duration during the growing season that:
    A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    B. Show evidence that the soil meets the definition of a hydric soil;

Hydric Condition: Food Security Act information regarding the ability to grow a commodity crop without removing woody vegetation or manipulating hydrology.

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. Doc. 2012-4733 Filed 2-28-12. February, 28, 2012. Hydric soils of the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Vasilas, L.M., G.W. Hurt, and C.V. Noble, editors. Version 7.0, 2010. Field indicators of hydric soils in the United States.

Report—Hydric Soil List - All Components

Hydric Soil List - All Components–DE001-Kent County, Delaware					
Map symbol and map unit name	**Component/Local Phase**	**Comp. pct.**	**Landform**	**Hydric status**	**Hydric criteria met (code)**
Ba: Broadkill-Appoquinimink complex, very frequently flooded, tidal	Broadkill-Very frequently flooded, tidal	30-70	Tidal marshes	Yes	2
	Appoquinimink-Very frequently flooded, tidal	20-40	Tidal marshes	Yes	2
	Mispillion	2-10	Tidal marshes	Yes	1
	Transquaking	2-10	Tidal marshes	Yes	1
	Sunken	2-10	Submerged upland tidal marshes	Yes	2
CaA: Carmichael loam, 0 to 2 percent slopes	Carmichael-Drained	30-70	Flats,depressions,swales	Yes	2
	Carmichael-Undrained	30-60	Flats,depressions,swales	Yes	2
	Pineyneck	5-15	Flats,terraces,swales	No	—
	Corsica-Undrained	0-10	Depressions,flats,swales,drainageways	Yes	2,3
	Fallsington-Drained	0-10	Flats,depressions,swales	Yes	2
UlB: Unicorn loam, 2 to 5 percent slopes	Unicorn	75-95	Flats,terraces,knolls	No	—
	Greenwich	2-25	Knolls	No	—
	Pineyneck	2-15	Swales	No	—
	Downer	0-15	Knolls	No	—
W: Water	Water	100-100	—	Unranked	—

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

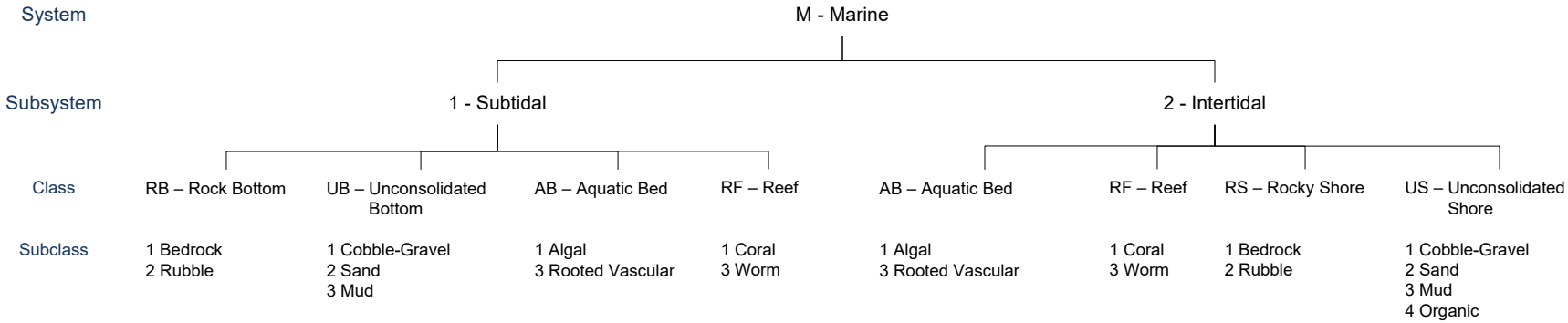
United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

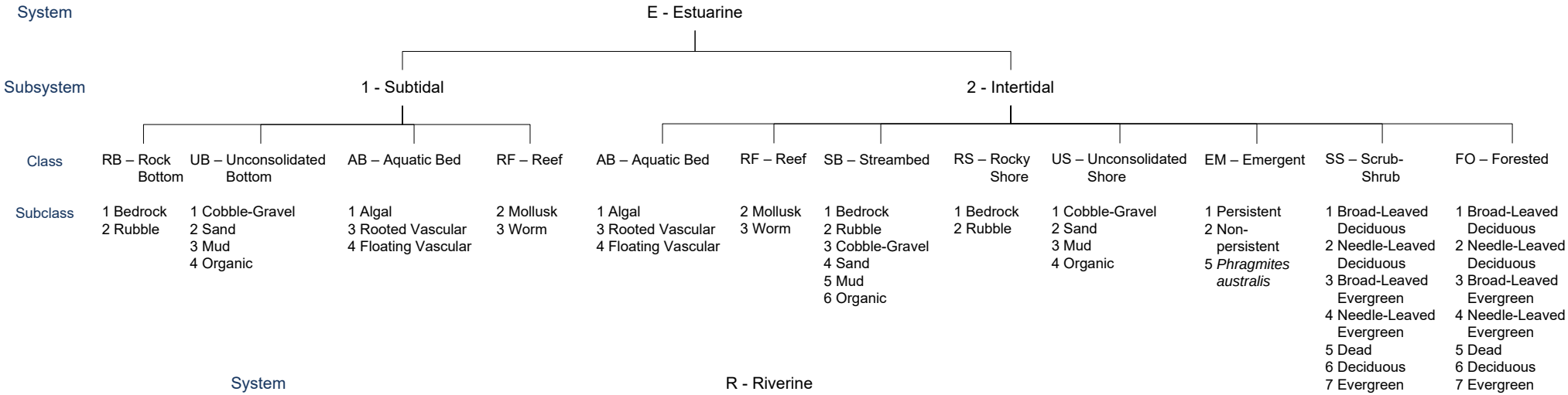
United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

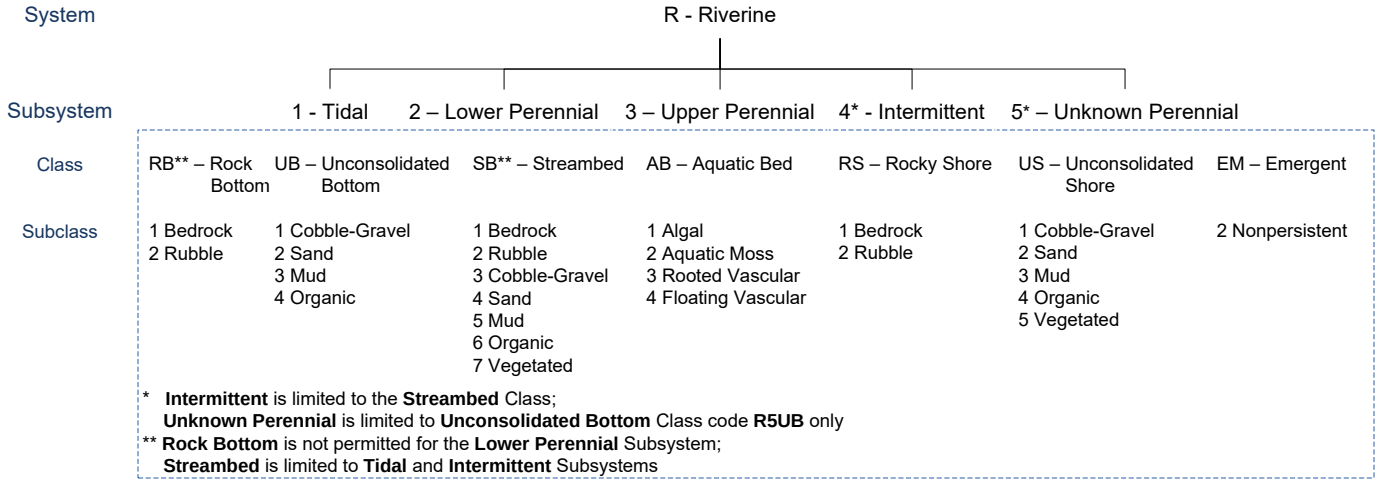
Appendix F:

Cowardians's System of Wetlands and Deepwater Habitats Classification

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION



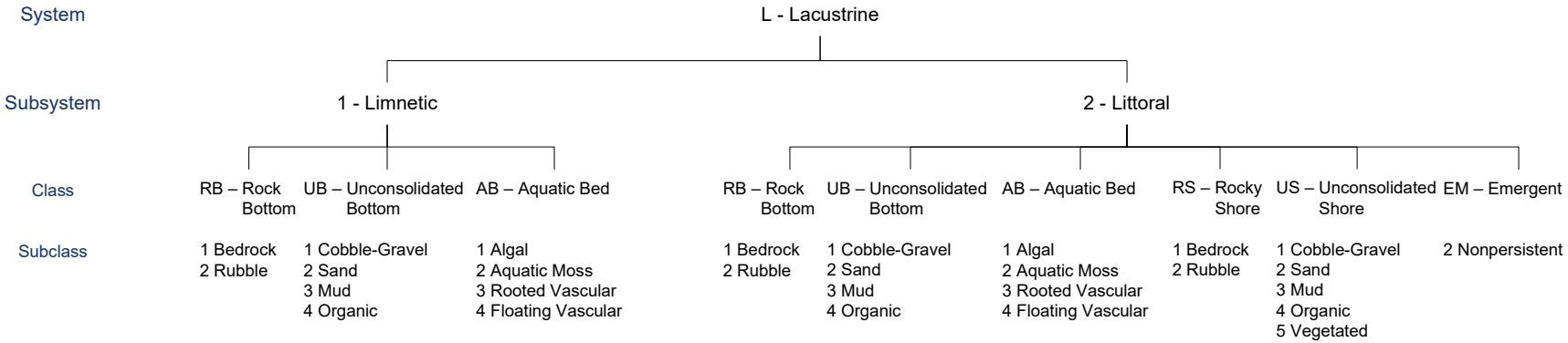


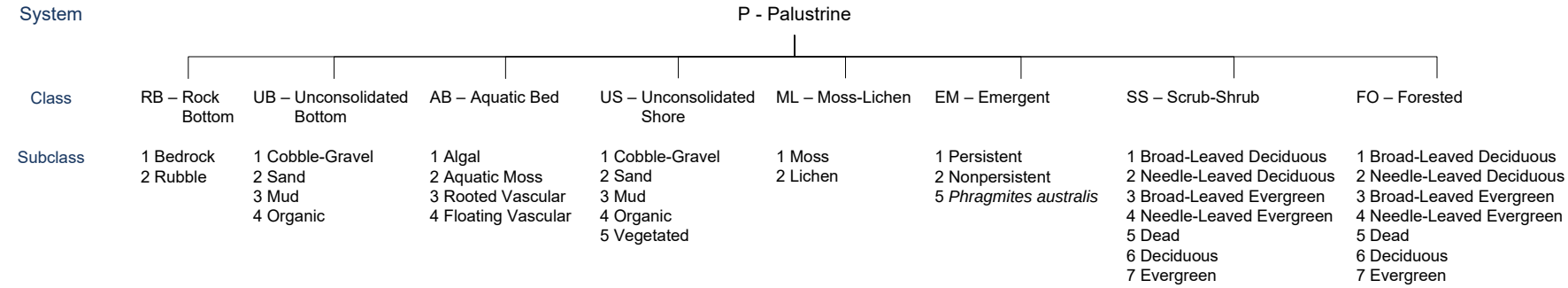


* **Intermittent** is limited to the **Streambed** Class;
Unknown Perennial is limited to **Unconsolidated Bottom** Class code **R5UB** only
** **Rock Bottom** is not permitted for the **Lower Perennial** Subsystem;
Streambed is limited to **Tidal** and **Intermittent** Subsystems

Classification of Wetlands and Deepwater Habitats of the United States, Cowardin *et al*. 1979

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION



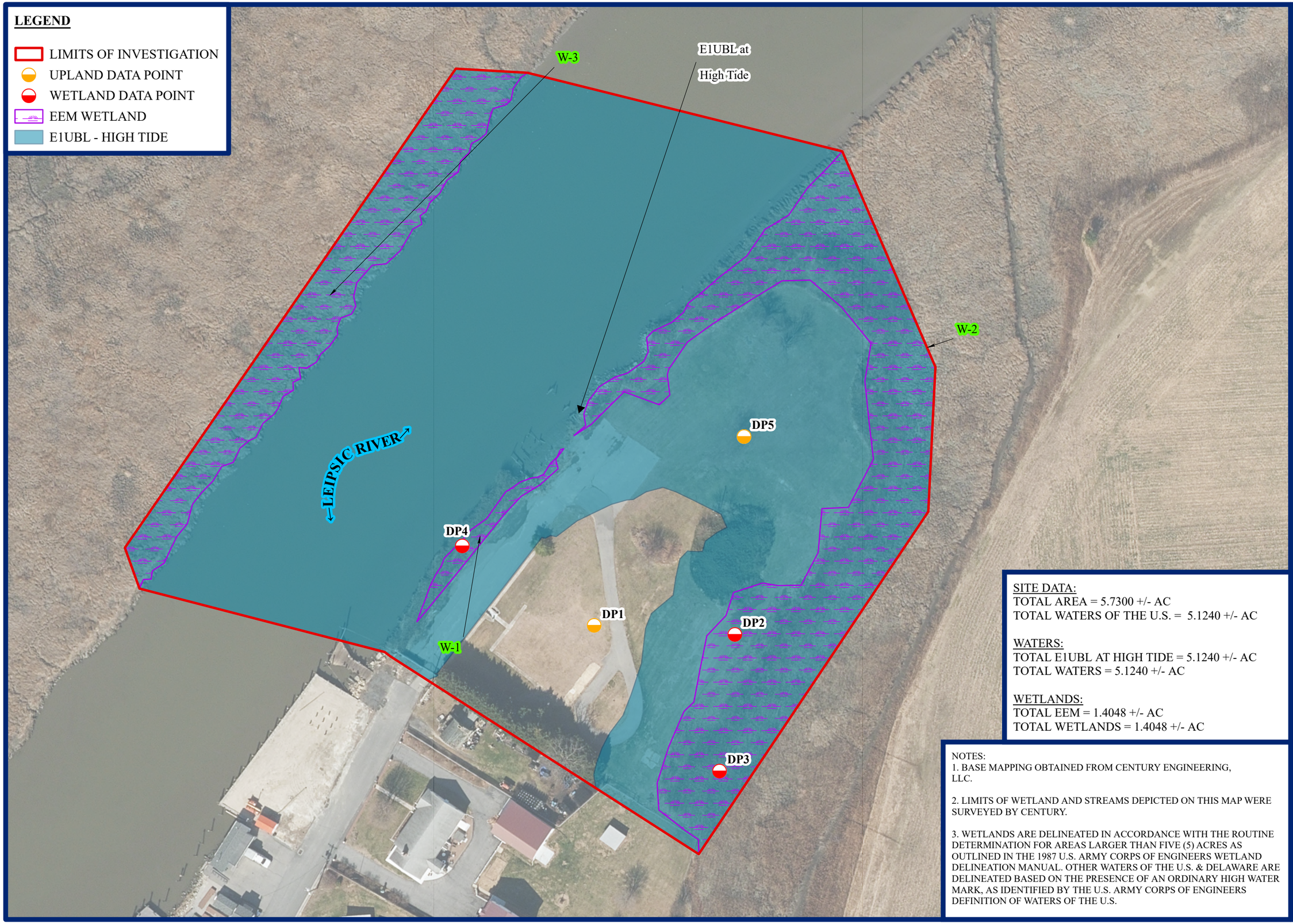


MODIFIERS

In order to more adequately describe the wetland and deepwater habitats, one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

Water Regime			Special Modifiers	Water Chemistry			Soil
Nontidal	**Saltwater Tidal**	**Freshwater Tidal**		**Coastal Halinity**	**Inland Salinity**	**pH Modifiers for all Fresh Water**	
A Temporarily Flooded	L Subtidal	S Temporarily Flooded-Tidal	b Beaver	1 Hyperhaline	7 Hypersaline	a Acid	g Organic
B Saturated	M Irregularly Exposed	R Seasonally Flooded-Tidal	d Partly Drained/Ditched	2 Euhaline	8 Eusaline	t Circumneutral	n Mineral
C Seasonally Flooded	N Regularly Flooded	T Semipermanently Flooded-Tidal	f Farmed	3 Mixohaline (Brackish)	9 Mixosaline	i Alkaline	
E Seasonally Flooded/ Saturated	P Irregularly Flooded	V Permanently Flooded-Tidal	h Diked/Impounded	4 Polyhaline	0 Fresh		
F Semipermanently Flooded			r Artificial	5 Mesohaline			
G Intermittently Exposed			s Spoil	6 Oligohaline			
H Permanently Flooded			x Excavated	0 Fresh			
J Intermittently Flooded							
K Artificially Flooded							

Appendix G:
Waters of the U.S. Delineation Map



SITE DATA:
TOTAL AREA = 5.7300 +/- AC
TOTAL WATERS OF THE U.S. = 5.1240 +/- AC

WATERS:
TOTAL E1UBL AT HIGH TIDE = 5.1240 +/- AC
TOTAL WATERS = 5.1240 +/- AC

WETLANDS:
TOTAL EEM = 1.4048 +/- AC
TOTAL WETLANDS = 1.4048 +/- AC

NOTES:
1. BASE MAPPING OBTAINED FROM CENTURY ENGINEERING, LLC.

2. LIMITS OF WETLAND AND STREAMS DEPICTED ON THIS MAP WERE SURVEYED BY CENTURY.

3. WETLANDS ARE DELINEATED IN ACCORDANCE WITH THE ROUTINE DETERMINATION FOR AREAS LARGER THAN FIVE (5) ACRES AS OUTLINED IN THE 1987 U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL. OTHER WATERS OF THE U.S. & DELAWARE ARE DELINEATED BASED ON THE PRESENCE OF AN ORDINARY HIGH WATER MARK, AS IDENTIFIED BY THE U.S. ARMY CORPS OF ENGINEERS DEFINITION OF WATERS OF THE U.S.

CENTURY ENGINEERING
A Kleinfelder Company
550 Bay Road | Dover, DE 19901 | P: 302.734.9188

LEIPSIC RESEARCH DOCK FACILITY
WATERS OF THE U.S. DELINEATION
KENT COUNTY, DELAWARE

N
W E
S

1 inch = 70 feet

Project Manager:	AS
Drawn:	MK
Job Number:	20233502.008A
Revisions:	Edited E1UBL area to include high tide 5/12/25.

Appendix H:
Data Points

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Whedbee Research Vessel Dock & Storage Building City/County: Kent Sampling Date: 4/21/2022
Applicant/Owner: DNREC-FW State: DE Sampling Point: DP-1
Investigator(s): M.Fetters Section, Township, Range:
Landform (hillside, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): <1%
Subregion (LRR or MLRA): LRR T, MLRA 153C Lat: Long: Datum:
Soil Map Unit Name: UlB-Unicorn Loam 2-5% Slopes NWI classification: Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No** X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15) **(LRR U)**
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP-1

Tree Stratum (Plot size: 30x30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30x30)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30x30)			
1. *Erigeron annuus*	10	Yes	FACU
2. *Taraxacum officinale*	10	Yes	FACU
3. *Lamium purpureum*	10	Yes	UPL
4. *Lolium perenne*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35 =Total Cover		
50% of total cover: 18	20% of total cover: 7		
Woody Vine Stratum (Plot size: 30x30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	25	x 4 =	100
UPL species	10	x 5 =	50
Column Totals:	35 (A)		150 (B)
Prevalence Index = B/A =			4.29

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (If observed, list morphological adaptations below.)

SOIL

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 4/4	100						
5-18	10YR 3/3	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

DP 1-Soil

DP 1-Vicinity

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Whedbee Research Vessel Dock & Storage Building City/County: Kent Sampling Date: 4/21/2022
Applicant/Owner: DNREC-Fish & Wildlife State: DE Sampling Point: DP-2
Investigator(s): M.Fetters Section, Township, Range:
Landform (hillside, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): <1%
Subregion (LRR or MLRA): LRR T, MLRA 153C Lat: Long: Datum:
Soil Map Unit Name: UlB-Unicorn Loam 2-5% Slopes NWI classification: Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15) **(LRR U)**
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No	Depth (inches):
Water Table Present?	Yes X	No	Depth (inches): 8
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 8

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP-2

Tree Stratum (Plot size: 30x30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30x30)			
1. *Juniperus virginiana*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	5 =Total Cover		
50% of total cover: 3	20% of total cover:		1
Herb Stratum (Plot size: 30x30)			
1. *Distichlis spicata*	90	Yes	OBL
2. *Phragmites australis*	10	No	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover:		20
Woody Vine Stratum (Plot size: 30x30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90	x 1 =	90
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	105 (A)		130 (B)
Prevalence Index = B/A =			1.24

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)

SOIL

Sampling Point: DP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/2	90	10YR 5/8	10	C	PL	Loamy/Clayey	Prominent redox concentrations
2-5	10YR 5/2	85	10YR 5/8	15	C	M	Loamy/Clayey	Prominent redox concentrations
5-16	10YR 5/1	80	10YR 5/8	20	C	M	Loamy/Clayey	Prominent redox concentrations
16-18	10YR 6/1	80	10YR 5/8	20	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

DP 2-Soil

DP 2-Vicinity

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Whedbee Research Vessel Dock & Storage Building City/County: Kent Sampling Date: 4/21/2022
Applicant/Owner: DNREC-Fish & Wildlife State: DE Sampling Point: DP-3
Investigator(s): M.Fetters Section, Township, Range:
Landform (hillside, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): <1%
Subregion (LRR or MLRA): LRR T, MLRA 153C Lat: Long: Datum:
Soil Map Unit Name: UlB-Unicorn Loam 2-5% Slopes NWI classification: E2EM1N
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- X Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes X	No	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 4

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP-3

Tree Stratum (Plot size: 30x30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30x30)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30x30)			
1. *Phragmites australis*	90	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 =Total Cover		
50% of total cover: 45	20% of total cover: 18		
Woody Vine Stratum (Plot size: 30x30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	90	x 2 =	180
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		180 (B)
Prevalence Index = B/A =			2.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)

SOIL

Sampling Point: DP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	95	10YR 5/8	5	C	PL	Loamy/Clayey	Prominent redox concentrations
16-18	10YR 5/1	90	10YR 5/8	5	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- X Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

DP 3-Soil

DP 3-Vicinity

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Whedbee Research Vessel Dock & Storage Building City/County: Kent Sampling Date: 4/21/2022
Applicant/Owner: DNREC-FW State: DE Sampling Point: DP-4
Investigator(s): M.Fetters Section, Township, Range:
Landform (hillside, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): <1%
Subregion (LRR or MLRA): LRR T, MLRA 153C Lat: Long: Datum:
Soil Map Unit Name: UlB-Unicorn Loam 2-5% Slopes NWI classification: Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15) **(LRR U)**
- X Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP-4

Tree Stratum (Plot size: 30x30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30x30)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30x30)			
1. *Phragmites australis*	75	Yes	FACW
2. *Baccharis halimifolia*	25	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30x30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	25	x 3 =	75
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		225 (B)
Prevalence Index = B/A =			2.25

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)

SOIL

Sampling Point: DP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 4/1	95	10YR 4/6	5	C	PL	Mucky Loam/Clay	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- X 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

DP 4-Soil

DP 4-Vicinity

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Whedbee Research Vessel Dock & Storage Building City/County: Kent Sampling Date: 4/21/2022
Applicant/Owner: DNREC-Fish & Wildlife State: DE Sampling Point: DP-5
Investigator(s): M.Fetters Section, Township, Range:
Landform (hillside, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): <1%
Subregion (LRR or MLRA): LRR T, MLRA 153C Lat: Long: Datum:
Soil Map Unit Name: UlB-Unicorn Loam 2-5% Slopes NWI classification: Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes X	No	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15) **(LRR U)**
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No	Depth (inches):
Water Table Present?	Yes X	No	Depth (inches): 2
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 2

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP-5

Tree Stratum (Plot size: 30x30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30x30)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30x30)			
1. *Cardamine hirsuta*	15	Yes	FACU
2. *Rumex crispus*	2	No	FAC
3. *Cynodon dactylon*	15	Yes	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	32 =Total Cover		
50% of total cover: 16	20% of total cover: 7		
Woody Vine Stratum (Plot size: 30x30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	2	x 3 =	6
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column Totals:	32 (A)		126 (B)
Prevalence Index = B/A =			3.94

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (If observed, list morphological adaptations below.)

SOIL

Sampling Point: DP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 3/2							
1-4	10YR 5/3							gravel present
								Point of Refusal at 4"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

DP 5-Soil

DP 5-Vicinity