# ENVIRONMENTAL

## CONSULTING SERVICES, Inc.

100 South Cass Street
Middletown, DE 19709
Phone: 302-378-9881
Fax: 302-378-9107


April 22, 2025

Department of the Army
U.S. Army Corps of Engineers, Philadelphia District
1650 Arch Street
Philadelphia, PA 19103-2004

Re: Hayes Basin Road SX – Additional Information Request NAP-2025-00099-103

Dear Mr. Colligan,

This is in regards to the application for a Department of the Army Permit to construct a single-family residence and driveway on the O Basin Road Site. Further documentation is being provided to clarify the use of Preservation as the method of mitigation, and to request a Letter of Permission, under Section 10, for minor impacts related to a proposed boardwalk to be located channelward of the mean high-water line. The enclosed documents include the following:

- Revised PCN document – inclusion of request for a Letter of Permission for minor impacts in Section 10 waters (box 23).
- Site Plan sheets – Revised Sheet #3: Overall Improvements Plan showing minor change in boardwalk location.
- Revised Monitoring and Maintenance Plan – Clarifying Preservation as the proposed mitigation method, and describing the methods of monitoring to be utilized to ensure that wetland protections are being met.

Please let us know if you have any additional questions or concerns.

Sincerely,

Douglas E. Potts
Wetlands Consultant

Cc: Michaelena Hayes, P.E., Mill Brook Engineering, LLC

Enclosure(s) PCN
Site Plan sheets
Monitoring and Maintenance Plan

U.S. Army Corps of Engineers (USACE)

# NATIONWIDE PERMIT PRE-CONSTRUCTION NOTIFICATION (PCN)

For use of this form, see 33 CFR 330; the proponent agency is CECW-COR.

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

**DATA REQUIRED BY THE PRIVACY ACT OF 1974**

| | |
|---|---|
| **Authority** | Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Program of the Corps of Engineers (Corps); Final Rule 33 CFR 320-332. |
| **Principal Purpose** | Information provided on this form will be used in evaluating the nationwide permit pre-construction notification. |
| **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 the agency coordination process. |
| **Disclosure** | Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. |

The public reporting burden for this collection of information, 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 RESPONSE TO THE ABOVE EMAIL.**

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.

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

| 1. APPLICATION NO. | 2. FIELD OFFICE CODE | 3. DATE RECEIVED | 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 - Michaelena Middle - Last - Hayes | First - Douglas Middle - Last - Potts |
| Company - | Company - Environmental Consulting Services, Inc. |
| Company Title - | E-mail Address - dpotts@ecsi-del.com |
| E-mail Address - michaelena@millbrookeng.com | |
| 6. APPLICANT'S ADDRESS | 9. AGENT'S ADDRESS |
| Address- P.O. Box 966 | Address- 100 S. Cass Street |
| City - Dover State - DE ZIP - 19903 Country - US | City - Middletown State - DE ZIP - 19709 Country - US |
| 7. APPLICANT'S PHONE NOs. with AREA CODE | 10. AGENT'S PHONE NOs. with AREA CODE |
| a. Residence b. Business 302-312-4716 c. Fax d. Mobile | a. Residence b. Business c. Fax d. Mobile 302-275-3217 |

**STATEMENT OF AUTHORIZATION**

11. I hereby authorize, Douglas Potts to act in my behalf as my agent in the processing of this nationwide permit pre-construction notification and to furnish, upon request, supplemental information in support of this nationwide permit pre-construction notification.

Michaelena Hayes — SIGNATURE OF APPLICANT

02.24.2025 — DATE

**NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY**

12. PROJECT NAME or TITLE (*see instructions*)
Basin Cove Site

**NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY**

13. NAME OF WATERBODY, IF KNOWN (*if applicable*)
Emily Gut/Indian River

14. PROPOSED ACTIVITY STREET ADDRESS (*if applicable*)
0 Basin Road

15. LOCATION OF PROPOSED ACTIVITY (*see instructions*)
Latitude °N: 38.601234°
Longitude °W: -75.170347°

City: Oak Orchard
State: DE
ZIP: 19966

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

State Tax Parcel ID
234-35.05-165.00

Municipality
Oak Orchard/Millsboro

Section

Township

Range

17. DIRECTIONS TO THE SITE
From the north: Take SR-1-S toward Milford/Beaches. Keep right onto US-113 S. toward SR-1-BR/Lewes/Rehoboth Beach. Turn left toward Wood Branch Road, then left onto Wood Branch Road, then right onto Speedway Road. Take 2nd exit onto Zoar Road, then turn right onto Morris Mill Road. Continue on Mount Joy Road for 5.5 miles to Oak Orchard, and then turn left onto Delaware St./Basin Road. Project site sits at the northern end of Basin Road.

18. IDENTIFY THE SPECIFIC NATIONWIDE PERMIT(S) YOU PROPOSE TO USE
Nationwide Permit 18 - Minor Discharges/ Nationwide Permit 14 - Linear Transportation Projects

19. DESCRIPTION OF PROPOSED NATIONWIDE PERMIT ACTIVITY (*see instructions*)
The proposed project will be the construction of a single-family residential home on pilings, with a footprint of 3,144 S.F. as well as installation of a stone driveway, totaling 3,383 S.F. that will connect to the existing Basin Road.

See attached document "Pre-Construction Notification and Project Description for the Orchard Manor Site"

20. DESCRIPTION OF PROPOSED MITIGATION MEASURES (*see instructions*)
Due to geomorphic position, development of the parcel is limited. Naturally low elevation, poorly drained soils, and tidal inundation occurs over a large portion of the parcel, which restricts development to the very southern portion of the site. The goal of the project will be to minimize impacts to estuarine wetlands by utilizing the area of higher elevation to construct the proposed home site and driveway. Wetland resources on the remainder of the site will be protected through the use of deed restrictions.

21. PURPOSE OF NATIONWIDE PERMIT ACTIVITY (*Describe the reason or purpose of the project, see instructions*)
The purpose of the activity will be to utilize approved fill material to increase the elevation within the boundaries of the proposed Limit of Disturbance, and establish a solid base for construction of the home and the driveway.

22. QUANTITY OF WETLANDS, STREAMS, OR OTHER TYPES OF WATERS DIRECTLY AFFECTED BY PROPOSED NATIONWIDE PERMIT ACTIVITY (*see instructions*)

Acres
0.15 acres permanent / 0.23 acres temporary

Linear Feet

Cubic Yards Dredged or Discharged
297 cubic yards of stone fill

**Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site.**

23. List any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. (*see instructions*)
Request for a Section 10 - Letter of Permission for installation of an elevated boardwalk from the proposed home-site to the southern bank of Emily Gut. The boardwalk will be supported above tidal wetlands via helical anchors and remain above the MHWL. The impacts associated with this activity are minor and will have limited overall impact on the environmental. Design details related to the boardwalk are provided in the plan profile sheets, included as attachments within Project Description for Orchard Manor Site document.

24. If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and/or the loss of greater than 3/100-acre of stream bed and requires pre-construction notification, explain how the compensatory mitigation requirement in paragraph (c) and/or paragraph (d) of general condition 23 will be satisfied, or explain why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required for the proposed activity.

The mitigation method proposed for this project will be Preservation, and approximately 4.57 acres will be permanently protected under restrictive deed covenants. A monitoring and maintenance plan will be prepared to ensure that construction remains within the LOD of the area of proposed permanent impact, and areas of temporary impact will be returned to their original function and grade.

25. Is any portion of the nationwide permit activity already complete? ☐ Yes ☒ No If Yes, describe the completed work:

26. List the name(s) of any species listed as endangered or threatened under the Endangered Species Act that might be affected by the proposed NWP activity or utilize the designated critical habitat that might be affected by the proposed NWP activity. (*see instructions*)

Mammal: Tricolored bat (Perimyotis subflavus)
Birds: Eastern Black rail (Laterallus jamaicensis spp. jamaicensis)
Insects: Monarch butterfly (Danaus plexippus
No Critical Habitat exists within the project area

27. List any historic properties that have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic property or properties. (*see instructions*)

None identified

28. For a proposed NWP activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, identify the Wild and Scenic River or the "study river":

Not applicable

29. If the proposed NWP activity also requires permission from the Corps 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, have you submitted a written request for section 408 permission from the Corps district having jurisdiction over that project? ☐ Yes ☐ No

If "yes", please provide the date your request was submitted to the Corps district:

30. If the terms of the NWP(s) you want to use require additional information to be included in the PCN, please include that information in this space or provide it on an additional sheet of paper marked Block 30. (*see instructions*)

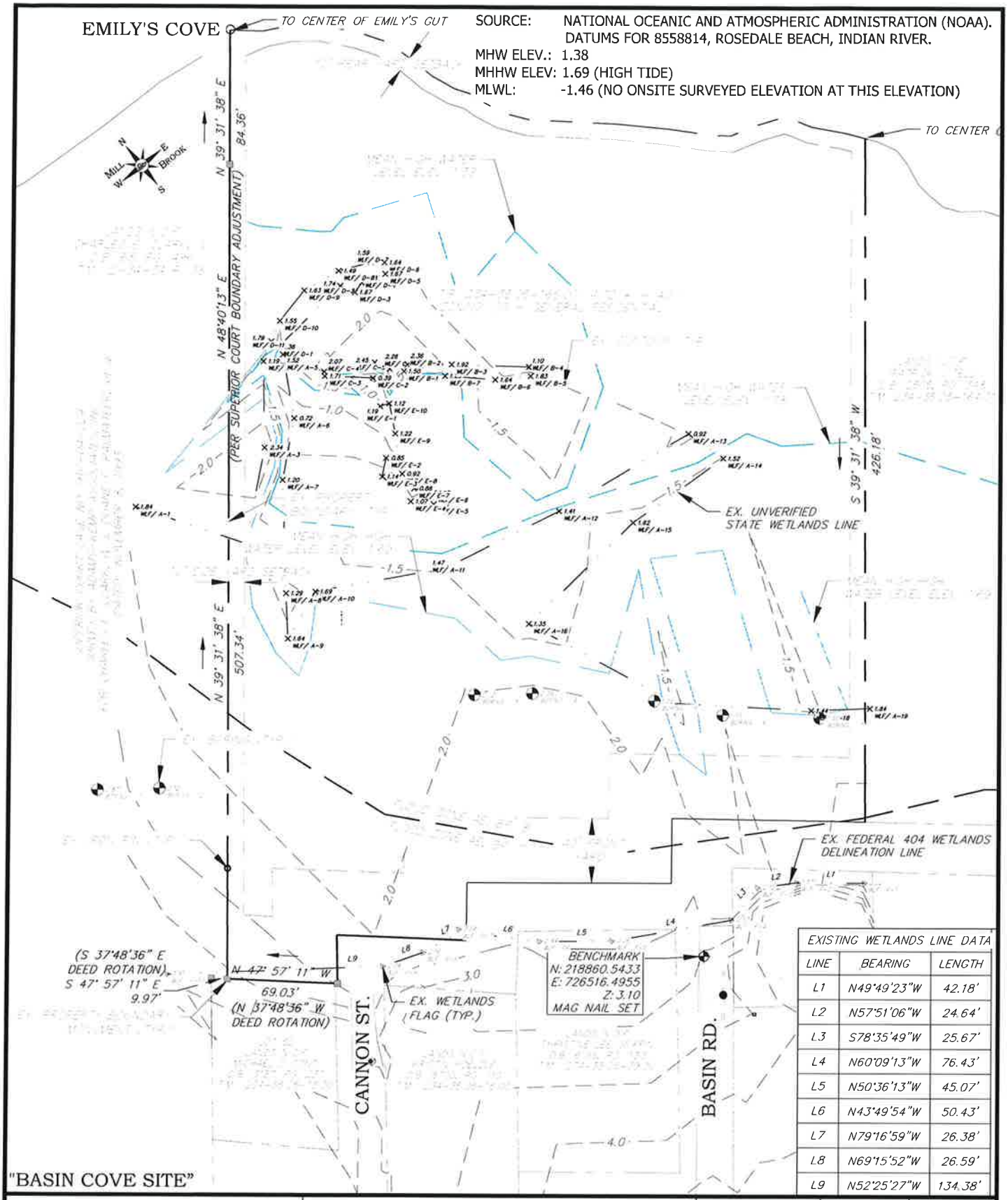
See attached document "Pre-Construction Notification and Project Description for the Basin Cove Site"

31. Pre-construction notification is hereby made for one or more nationwide permit(s) to authorize the work described in this notification. I certify that the information in this pre-construction notification 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.

| SIGNATURE OF APPLICANT | DATE | SIGNATURE OF AGENT | DATE |
|---|---|---|---|
| Michelle Mayer | 02/24/2025 | Douglas E. Potts | 04/21/2025 |

The pre-construction notification must be signed by the person who desires to undertake the proposed activity (applicant) and, if the statement in Block 11 has been filled out and signed, the authorized agent.

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.




| EXISTING WETLANDS LINE DATA | | |
|---|---|---|
| LINE | BEARING | LENGTH |
| L1 | N49°49'23"W | 42.18' |
| L2 | N57°51'06"W | 24.64' |
| L3 | S78°35'49"W | 25.67' |
| L4 | N60°09'13"W | 76.43' |
| L5 | N50°36'13"W | 45.07' |
| L6 | N43°49'54"W | 50.43' |
| L7 | N79°16'59"W | 26.38' |
| L8 | N69°15'52"W | 26.59' |
| L9 | N52°25'27"W | 134.38' |

MILL BROOK ENGINEERING, LLC

# WETLANDS PLAN

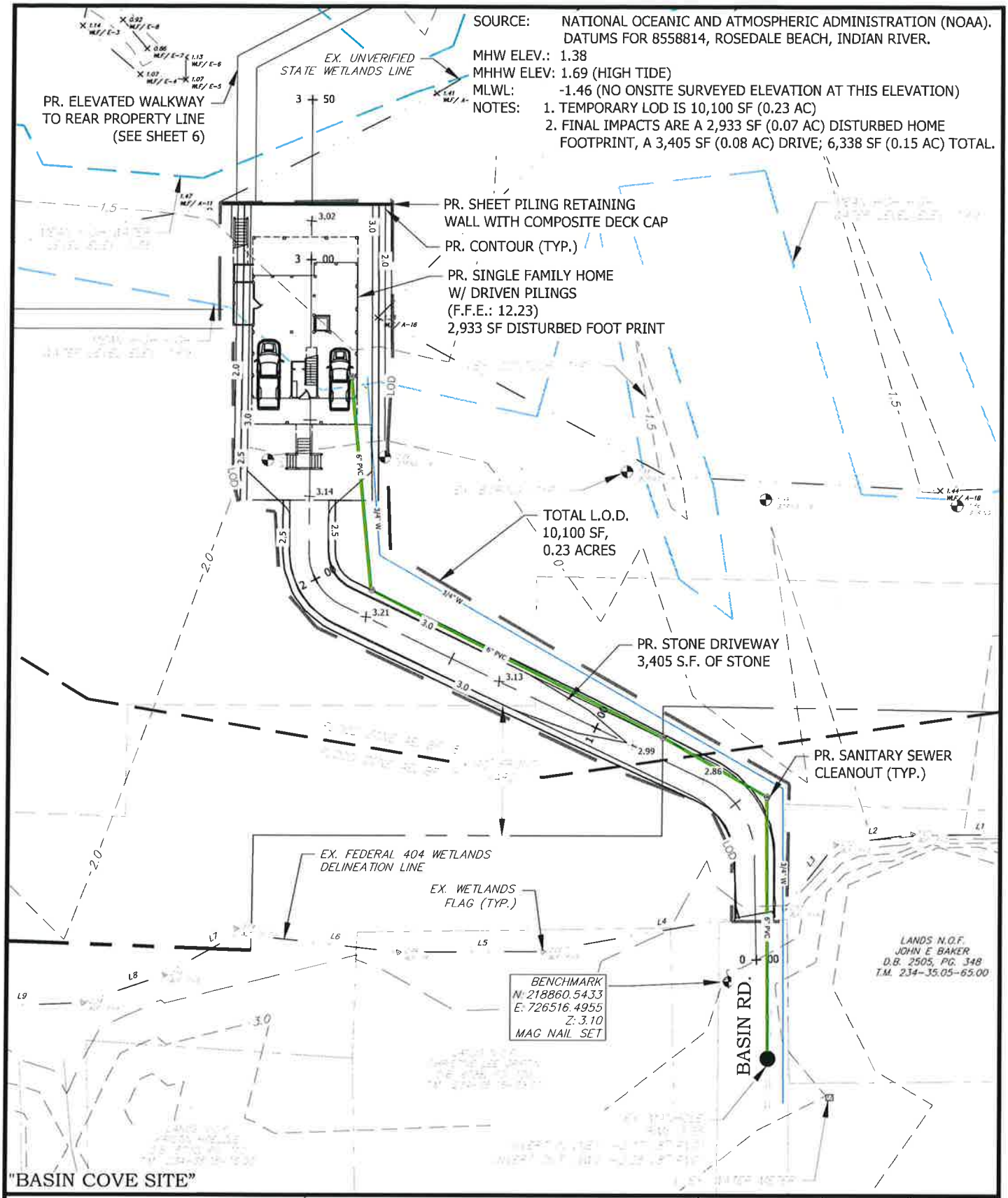
TAX PARCEL
234-35.05-165.00
MILLSBORO SUSSEX COUNTY DELAWARE

DATE: MARCH 2025
PROJECT #: HAYES-007

SHEET 1

0 80'
SCALE: 1" = 80'

ENGINEER: MMH
DESIGN BY: MMH
DRAWN BY: EMB
CHECKED BY: MB




MILL BROOK ENGINEERING, LLC

# WETLANDS DISTURBANCE PLAN

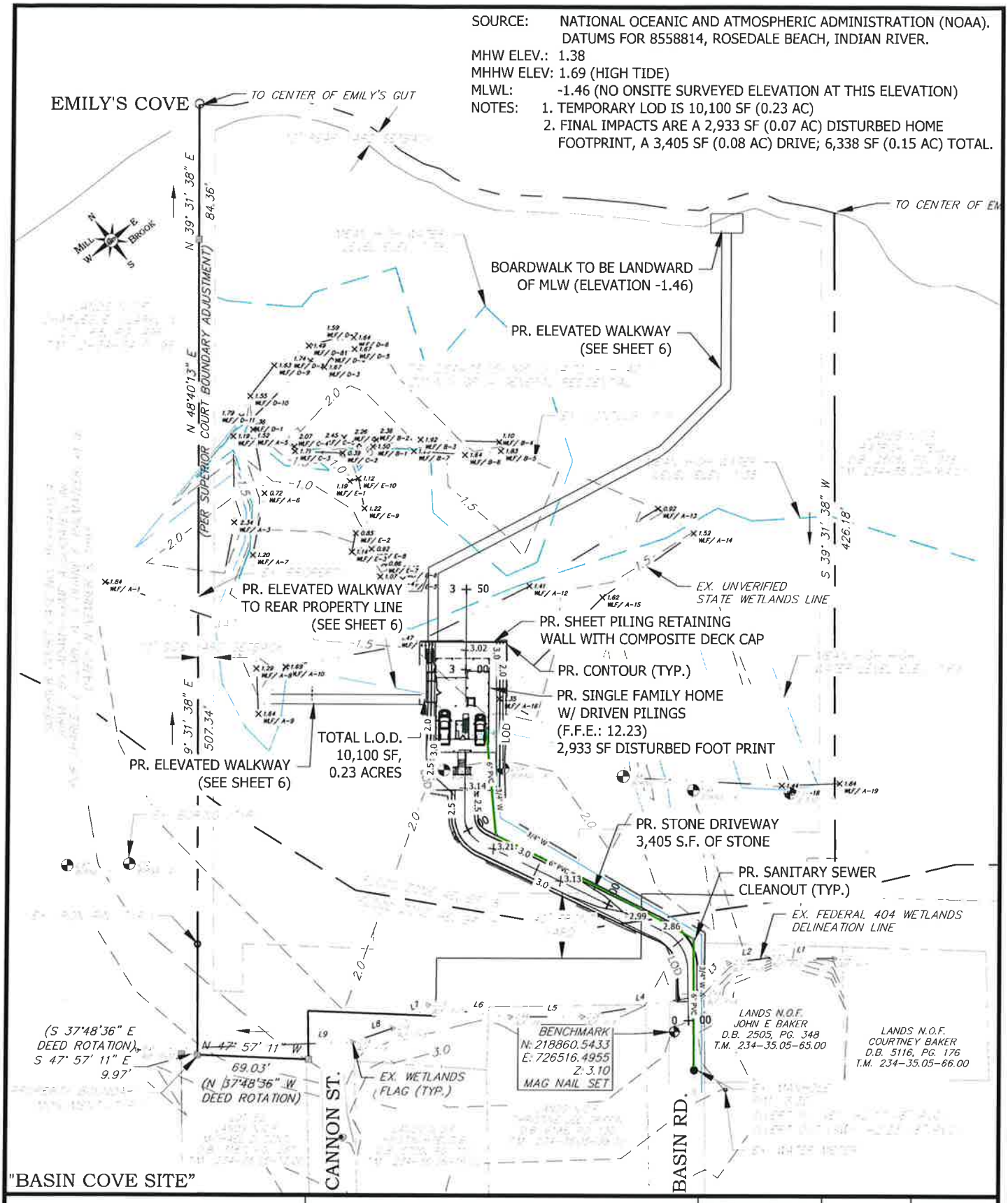
TAX PARCEL
234-35.05-165.00
MILLSBORO SUSSEX COUNTY DELAWARE

DATE: MARCH 2025
PROJECT #: HAYES-007

SHEET 2

0 40'
SCALE: 1" = 40'

ENGINEER: MMH
DESIGN BY: MMH
DRAWN BY: EMB
CHECKED BY: MB




MILL BROOK ENGINEERING, LLC

# OVERALL IMPROVEMENTS PLAN

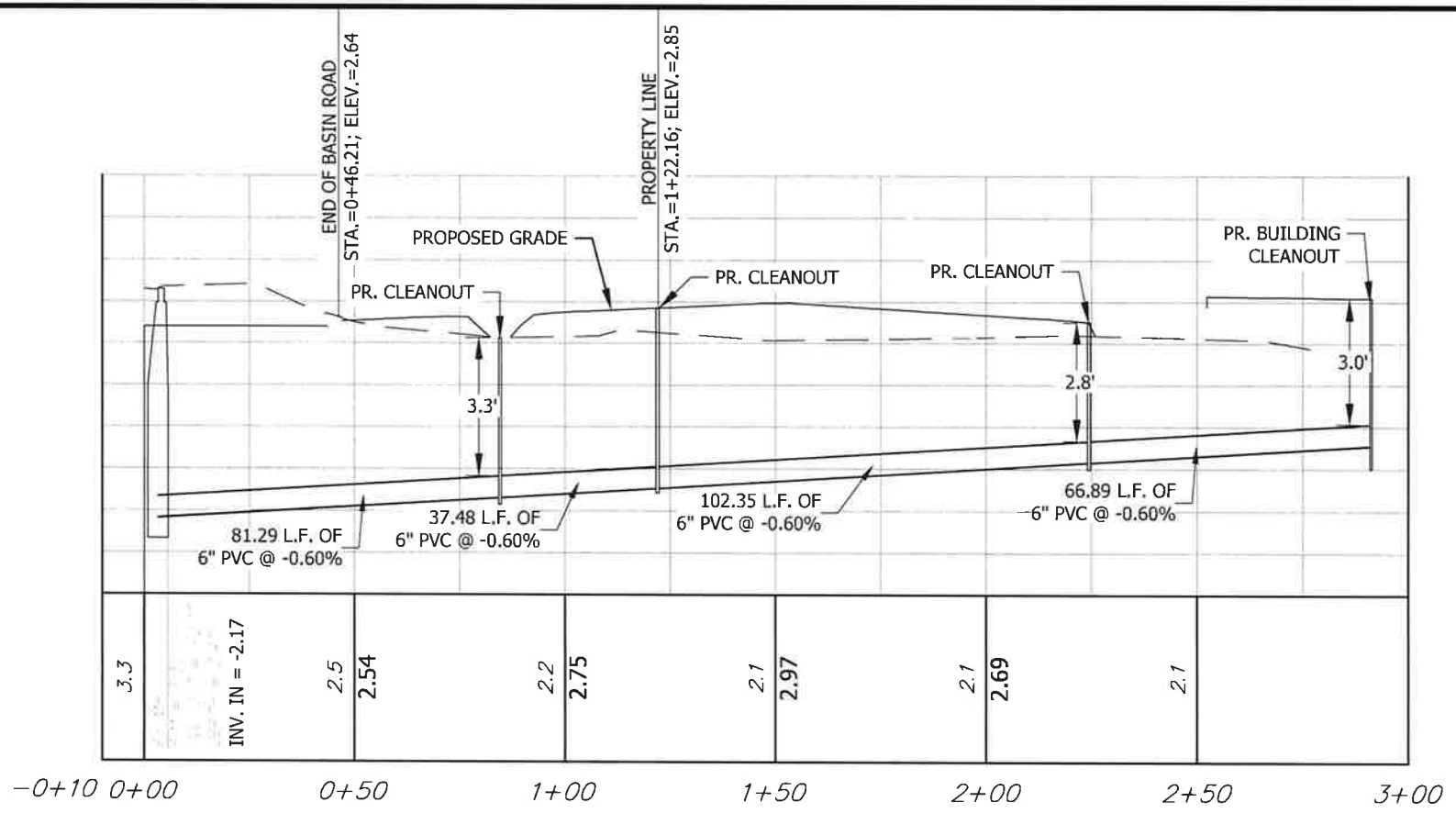
TAX PARCEL
234-35.05-165.00
MILLSBORO SUSSEX COUNTY DELAWARE

DATE: MARCH 2025
PROJECT #: HAYES-007

SHEET 3

0 80'
SCALE: 1" = 80'

ENGINEER: MMH
DESIGN BY: MMH
DRAWN BY: EMB
CHECKED BY: MB




## PROFILE VIEW: SANITARY SEWER

HORZ. SCALE: 1"=40'

VERT. SCALE: 1"= 4'

PIPING TRENCH NOTES:

1. TRENCHES SHALL BE A MINIMUM WIDTH OF 36" FOR THE 6" SANITARY SEWER PIPE AND 14" FOR THE ¾" WATER PIPE.
2. PIPES SHALL BE PLACED ON A MINIMUM 4" DEPTH OF DEL #57 STONE BEDDING TO SPRING LINE OF PIPE. PIPE IS TO HAVE CONTINUOUS SUPPORT ON BEDDING. DO NOT BRIDGE ACROSS VOIDS.
3. MAINS AND SERVICES SHALL BE INSTALLED WITH A TRACER WIRE CONTINUOUSLY ALONG AND DIRECTLY ADHERED TO THE TOP OF PIPE.
4. PLACE LINE GUARD TYPE 3 DETECTABLE LOCATING TAPE TO READ "CAUTION WATER/SEWER LINE BELOW", PLACED 1' ABOVE PIPE.
5. PLACE CLEAN NATIVE BACKFILL.

UTILITY CONSTRUCTION NOTES:

1. SANITARY SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MOST RECENT SUSSEX COUNTY DEPARTMENT OF PUBLIC WORKS (SCPWD) STANDARD SPECIFICATIONS FOR CONSTRUCTION, SPECIAL PROVISIONS, SUPPLEMENTAL SPECIFICATIONS, STANDARD DETAILS, AND THE RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES, OR STRICTER STANDARDS IDENTIFIED BY THE ENGINEER.
2. SEPARATION FROM WATER MAINS TO BE PROVIDED PER RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES (A.K.A. TEN STATE STANDARDS). MINIMUM SEPARATION BETWEEN SANITARY SEWER AND WATER (10' HORIZONTAL AND 18" VERTICAL). MINIMUM SEPARATION BETWEEN SANITARY SEWER AND STORM DRAINS (5' HORIZONTAL AND 12" VERTICAL).
3. ALL CLEANOUTS SHALL BE BUILT IN ACCORDANCE WITH SUSSEX COUNTY DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS FOR CONSTRUCTION AND AMENDMENTS.

ENGINEER: MMH | DESIGN BY: MMH | DRAWN BY: EMB | CHECKED BY: MB

SHEET 4

DATE: MARCH 2025
PROJECT #: HAYES-007

0 1"

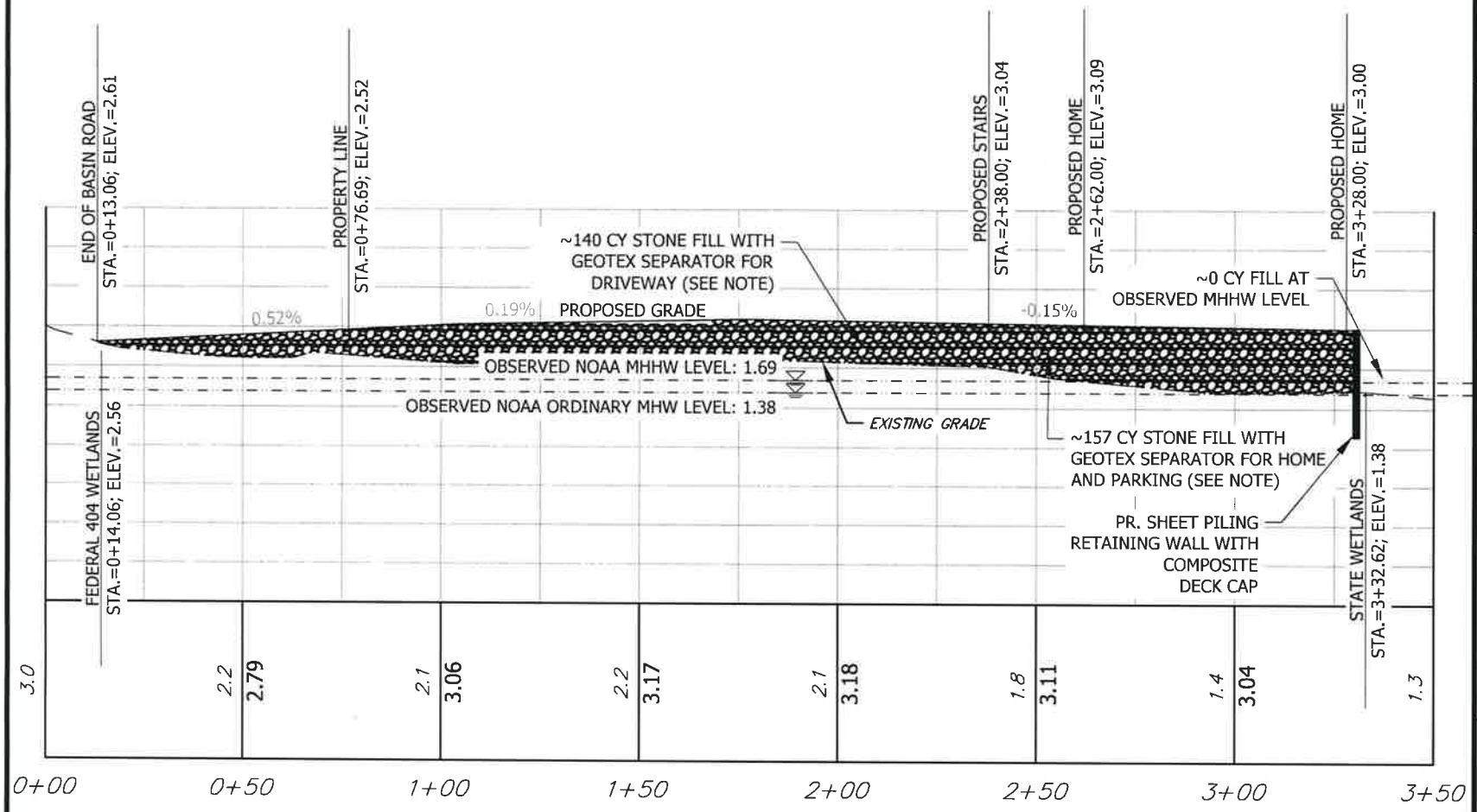
SCALE: AS SHOWN

# SANITARY SEWER PROFILE

TAX PARCEL
234-35.05-165.00
SUSSEX COUNTY DELAWARE
MILLSBORO

MILL BROOK ENGINEERING, LLC

THIS PROJECT SITE IS LOCATED WITHIN A FLOOD ZONE AREA AS IDENTIFIED BY FEMA. ALL PERMANENT ABOVE-GRADE FILL IN WATERS OF THE U.S. WITHIN THE 100-YEAR FLOOD PLAIN ARE PROPOSED TO COMPLY WITH FEMA AND FEMA-APPROVED LOCAL FLOOD PLAIN DEVELOPMENT REQUIREMENTS. SPECIFICALLY, THIS PROJECT DEMONSTRATES ADHERENCE TO SECTIONS 115-141.4 AND 115-141.5 OF ARTICLE XVIII FLOOD-PRONE DISTRICTS WITHIN THE CODE OF SUSSEX COUNTY. DOCUMENTATION OF COMPLIANCE WITH THESE REQUIREMENTS IS INCLUDED AS PART OF THIS PERMIT APPLICATION.




PROFILE VIEW: DRIVEWAY
HORZ. SCALE: 1"=40'
VERT. SCALE: 1"= 4'

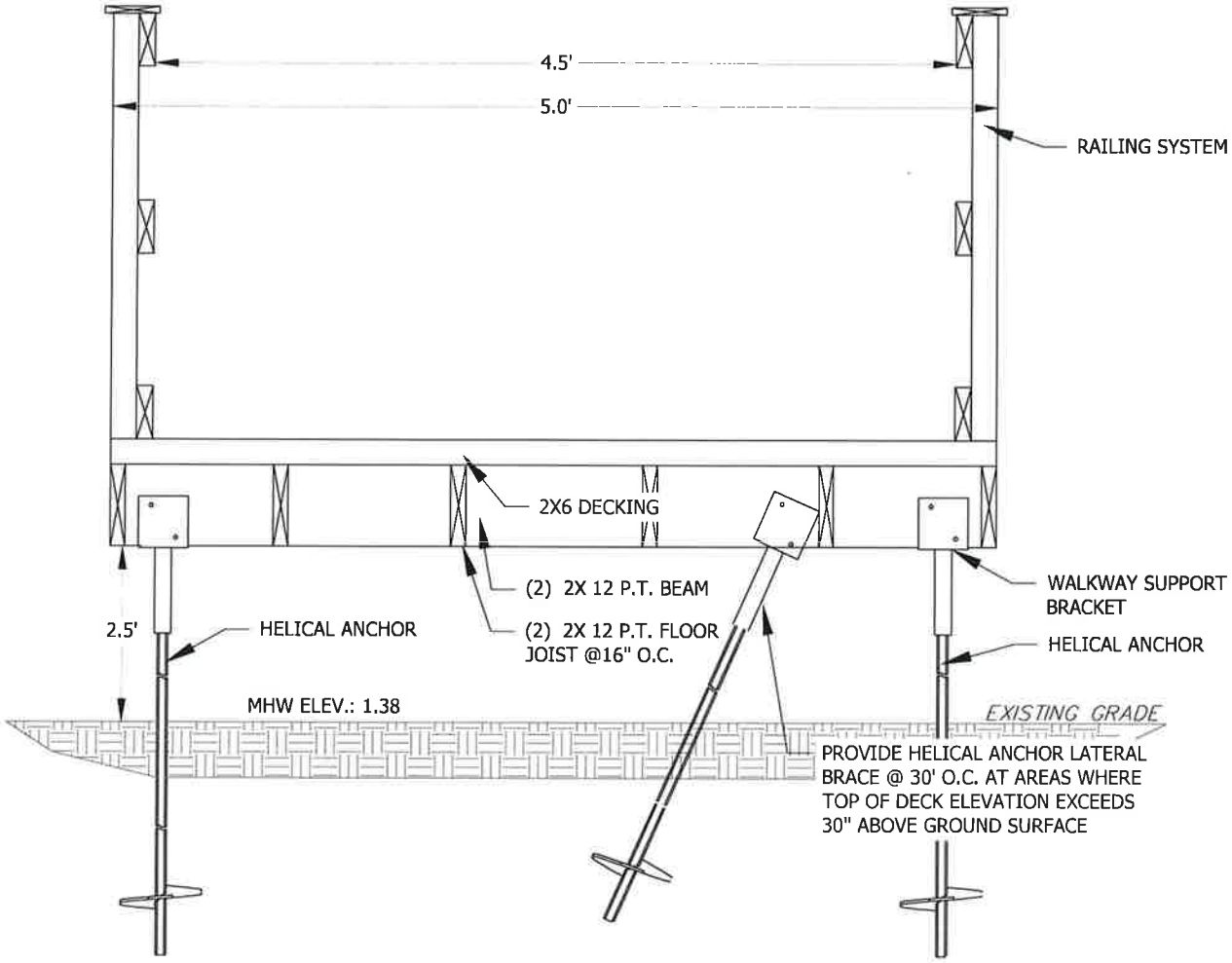
MATERIAL: DE 57 CRUSHED STONE RANGES IN SIZE FROM 1 INCH TO 1/4 INCH AND CR-6 (DGA) IS GENERALLY 3/4" USED FOR SUB BASE.
QUALITY: THE STONE MUST BE CLEAN, WASHED, AND FREE OF FINES AND CONTAMINANTS TO ENSURE PROPER DRAINAGE AND STABILITY.
PLACEMENT:
BASE LAYER: PLACE A GEOTEXTILE FABRIC ON THE WETLAND SOIL TO SEPARATE THE FILL MATERIAL FROM THE NATIVE SOIL.
FILL LAYER: SPREAD 6 INCHES OF CR-6 OVER THE GEOTEXTILE FABRIC THEN SPREAD THE DE 57 STONE EVENLY OVER THE CR-6.
THE THICKNESS OF THE FILL LAYER SHOULD BE SUFFICIENT TO SUPPORT THE DRIVEWAY LOAD, 12 INCHES TOTAL

ENGINEER: MMH
DESIGN BY: MMH
DRAWN BY: EMB
CHECKED BY: MB
SHEET 5
DATE: MARCH 2025
PROJECT #: HAYES-007
1" 0
SCALE: AS SHOWN

STREET PROFILE

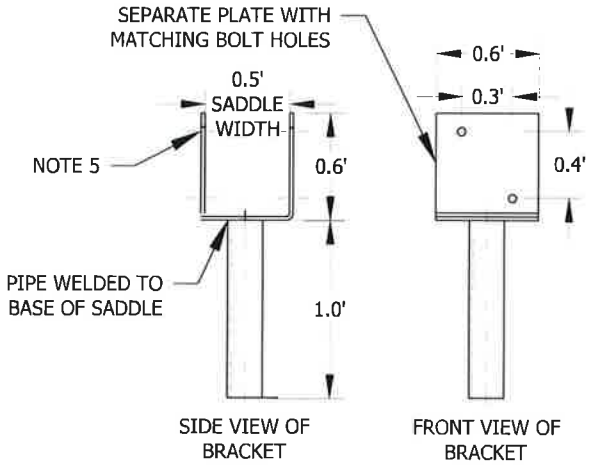
TAX PARCEL
234-35.05-165.00
SUSSEX COUNTY DELAWARE
MILLSBORO

MILL BROOK ENGINEERING, LLC




NOTES:

1. HELICAL PIERS CAN BE EITHER SINGLE OR MULTI-HELIX. THE NUMBER AND SIZE OF HELIX PLATES VARY DEPENDING ON PIER LOAD AND SOIL CONDITIONS.
2. HELICAL PIERS ARE INSTALLED (SCREWED) TO A MINIMUM DEPTH AND TORQUE AS REQUIRED ON THE CONSTRUCTION PLANS.
3. HOT DIPPED GALVANIZED PER ASTM A-153.
4. MATERIAL FOR SADDLE: 1/2" THICK HOT ROLLED STEEL
5. BOLTS: 1/2" DIA. HEX HEAD, 7.5" LONG WITH NUT AND LOCKWASHER
6. 10,000 LB MAX LOAD COMPRESSION ONLY.
7. HELICAL ANCHORS PROVIDE
   a. MINIMAL GROUND DISTURBANCE: HELICAL ANCHORS CAUSE MINIMAL DISRUPTION TO THE WETLAND SOIL, PRESERVING THE NATURAL HABITAT
   b. CAN BE INSTALLED WITH HANDHELD EQUIPMENT, MAKING THEM SUITABLE FOR AREAS WITH LIMITED ACCESS.
   c. NO SOIL EXCAVATION OR DRILL SPOILS, REDUCING THE IMPACT ON THE WETLAND ECOSYSTEM
   d. HELICAL ANCHORS PROVIDE A STABLE FOUNDATION THAT CAN WITHSTAND VARYING WETLAND CONDITIONS
   e. ELEVATED WALKWAYS PREVENT TRAMPLING OF VEGETATION, ALLOWING PLANTS TO THRIVE.
   f. PROPERLY SPACED DECKING PLANKS ENHANCE WATER FLOW AND REDUCE SURFACE RUNOFF IMPACT.




MILL BROOK ENGINEERING, LLC

# WALKWAY CROSS SECTION

TAX PARCEL
234-35.05-165.00
MILLSBORO SUSSEX COUNTY DELAWARE

DATE: MARCH 2025
PROJECT #: HAYES-007

SHEET 6

0 1'
SCALE: 1" = 1'

ENGINEER: MMH
DESIGN BY: MMH
DRAWN BY: EMB
CHECKED BY: MB

# Monitoring and Maintenance Plan

# For

# The Basin Cove Site

## 0 Basin Road, Oak Orchard, DE19966

Prepared For:
Ms. Michaelena Hayes
P.O. Box 966
Dover, DE 19903

And

Submission to:

Department of the Army
U.S. Army Corps of Engineers, Philadelphia District
Regulatory Branch
1203 College Park Drive
Suite 103
Dover, DE 19904

CENAP-2025-00099-103

Prepare By:

Environmental Consulting Services, Inc.
100 S. Cass Street
Middletown, DE 19709

April 21, 2025
(Revision 1)

ECSI Project No. 2024-335

# Table of Contents



# List of Tables

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## 1. Project Description

0 Basin Road, Oak Orchard, DE – Monitoring and Maintenance Plan.

U.S. Army Corps of Engineers, Philadelphia District
CENAP-2025-00099-103

The owner of the 0 Basin Road property site proposes construction of a single-family residential home and driveway, to be located within the southern portion of the 4.72-acre parcel. The proposed project will have permanent wetland impacts of 6,338 SF (0.15 acres), as well as temporary impacts, within the LOD, of 10,100 S.F. (0.23 acres). The Nationwide Permit Application document entitled, *PCN and Project Description for the Basin Cove Site*, prepared by Environmental Consulting Services, Inc, provides a project site description, and revised site plan sheets, prepared by Mill Brooke Engineering, LLC, depict the siting and layout of the home, driveway, as well as locations of two elevated walkways, one leading from the home to Emily Gut, and another leading to a point just west of the proposed home location.

## 2. Plan Purpose

This Monitoring and Maintenance Plan has been prepared in order to fulfill the mitigation requirements for unavoidable, permanent wetland impacts resulting from the construction of the home and driveway. The chosen method of mitigation will be preservation, with the goal of the Plan being the improvement of the overall quality of estuarine habitat on the parcel, in both impacted and non-impacted wetland locations.

Preliminary vegetation monitoring on the site will be conducted in order to obtain information on current conditions, and will be utilized to identify areas where improvements can be made to maintain existing wetland functions. Monitoring during construction will be conducted to ensure that impacts remain within the established Limit of Disturbance, and additional monitoring, conducted during the post construction period, will track the progress of invasive plant removal, and the survival of native volunteer plants and reestablishment plantings. Maintenance activities described within this plan will be conducted as necessary to correct any observed deficiencies. Restrictive covenants, established as a site protection instrument for the entire site, will ensure the preservation of both upland and wetland habitats in perpetuity. Under preservation, the impact:mitigation ratio is 1:27. The permanent impact of 0.15 acres requires the preservation of 4.05 acres. The area of preservation on the project site will be in excess of that amount, and total 4.57 acres.

## 3. Objective

The objective of this plan will be to identify the existing estuarine plant communities on the site through vegetation mapping. Observations made during the initial site inspection and summarized in the Wetlands Investigation and Delineation document for the site, identified areas with a predominance of invasive herbaceous vegetation. Additional mapping will be utilized to divide the site into specific monitoring units, specifically those areas that show existing poor plant diversity and areas where temporary impacts allow for reestablishment of native plantings. Reestablishment in areas of temporary impact, in the vicinity of the home and driveway, will be necessary in order to prevent the growth of invasive plants and to prevent potential erosion of disturbed soils. Habitats with an overabundance of invasive or nonnative vegetation will utilize control measures for removal. Continued monitoring will be conducted

to track the progress of invasive plant control measures and the reestablishment of native vegetation.

## 4. Contingency Measures

Plant mortality can occur due to a combination of factors. Where control measures for invasive plants are successful, and where conditions become favorable for native plant reestablishment, such factors as insufficient knowledge of plant tolerances and plant growth requirements, poor planting technique, weather events such as strong storms or late freeze, damage from wildlife, and competition from other herbaceous vegetation can impact project success. Corrective measures related to the cause will be implemented as necessary.

## 5. Monitoring

The post-construction monitoring and maintenance activities include, but are not limited to the following:

1. Following construction activities, the site will be inspected during the growing season (early April – early November) to identify dead or missing plants, any reemergence of invasive species, or other factors that may limit establishment of the desired vegetation.
2. Remove all surface accumulated debris (leaves, sticks, and branches) that could inhibit the growth and/or survival of plantings. Minor trimming of canopy trees may be necessary to insure adequate sun exposure (a minimum of six hours per day).
3. Utilize protection devices as necessary (waterfowl exclusion fencing) to prevent destruction of the planted areas.
4. Administer invasive vegetation controls*
5. Replanting with native species as a corrective action for dead or missing plants.

*Controls for *Phragmites australis* are discussed under the *Phragmites* Controls section of this Plan.

Monitoring of areas receiving wetland reestablishment will begin immediately after final installation of native plantings. Plants specifically adapted to the high marsh, such as Saltmeadow cordgrass (*Spartina patens*) and Salt grass (*Distichlis spicata)*, currently predominate in areas where temporary impacts will occur.

Reestablishing marsh vegetation on impacted areas may require several years to develop characteristics suitable to support the required cover amount.

High marsh should develop uniform aerial coverage within two years of construction, with saltmarsh vegetation such as Saltmeadow cordgrass (*Spartina patens*) and/or Salt grass (*Distichlis spicata*) being the predominate species naturally occurring in estuarine wetlands of the area.

Weed control utilizing mechanical cutting or application of herbicides is often necessary until the plants have overgrown their competition.

## 6. Phragmites Control Plan

Phragmites australis, due to its specific growth habits, can be very difficult to control, particularly when it occurs in large, established stands. Few control methods have been found

to be effective when used alone, and successful eradication may require utilization of a combination of methods, in multiple treatments. The specific methods include herbicide treatment, prescribed fire, mechanical treatment, and water level management. The effect of combining methods is meant to expose targeted plants with enough stressors that its ability to out compete native wetland plants is substantially weakened.

Based on aerial imagery and prior site investigations, the project parcel includes areas with established stands of phragmites, and it appears as a dominate herbaceous plant growing in portions of the intertidal zone and along upland/wetland boundaries. Due to the size of these stands, the primary management method to be used for control of the species will be herbicide application. Prescribed fire would not be a suitable control method at the site due primarily to its proximity to nearby residential structures. Control using water level management would not be a practical alternative due to exposure to normal tidal fluctuations.

Mechanical cutting can be implemented as a follow-up control method, and is determined by the success of the initial herbicide application. Early in the year, during its dormant stage of growth, string trimmers can be utilized to cut dead phragmites down to ground level.

## A. Preferred Control Methods

### 1. Herbicide Control

There are two commercially available broad-spectrum herbicides that are typically used in phragmites control, specifically Glyphosate and Imazapyr. Since both herbicides are non-selective, and they enter through leaves and stems, they can be used individually or as a combined treatment. Care must be taken during application so that native plants are not impacted. Application of both products can be for either aquatic or terrestrial locations, depending upon the formula used. In aquatic habitats, only the aquatic formulation may be used. General Application Information for both herbicides are provided in *Table 1*.

Application methods include those for low volume treatments and those for high volume treatments. Typical high-volume treatments use boom sprayers, gun sprayers, and aerial applications, while typical low-volume treatments, the preferred methods for small stands of phragmites, include stem injection, hand wiping, wicks, and backpack spraying. A comparison of application methods is provided in *Table 2*. Application rates for low volume applications are calculated by percent of solution. An approved non-ionic surfactant must also be used in conjunction with the herbicide at the recommended rate, and is applied to the leaves and to flower plumes when present. Over application should be avoided due to the potential for excess material dripping onto non-target plants. Application should also be completed later in the growing season, well before a killing frost, so that treatment effectiveness can be determined.

Commercial application of herbicide can only be administered by trained individuals, certified in the State of Delaware.

### 2. Mechanical Control

Mechanical controls are most effective when used in conjunction with herbicide treatments, and the methods used are dependent upon the size and wetness of the site, and the density of the vegetation stand. Methods for large areas, that remain dry and can support heavy equipment, typically use small mowers, brush hogs, and flail mowers. For smaller sites, and

for sites that are inaccessible to heavy equipment, the use of weed whips or string trimmers, and hand cutting of stems and seed heads are the commonly used.

Mechanical treatment methods must be conducted at least two weeks after treatment with herbicide so that adequate absorption into the plant can occur. In most cases, timing of herbicide application and mechanical treatment is critical. In dry sites, mechanical cutting occurs after herbicide treatment, prior to spring green-up, and again during the late summer or fall and when disruption to nesting birds is least likely. On wet sites, mechanical treatment should occur when the ground is frozen to avoid soil disruption. In either case, all cut material must be bagged and disposed of in an appropriate location to avoid seed spread.

## 7. Long Term Management

Regardless of which control method is utilized, Phragmites has been shown to recover after a successful initial treatment, and can potentially recolonize a site within a period of three years due to regrowth from remnant rhizome material below the surface, seed dispersal from neighboring stands, and from any seed remaining in the soil. Therefore, long term management should include annual monitoring of the site, with spot treatments conducted as necessary.

## 8. Plan Certification

Upon approval, I will abide by this Mitigation Document, and will provide the required preservation and maintenance measures as noted. This plan will be considered an evolving document, and open to adaptation as required. If alterations to the plan are proposed, a revised plan will be prepared and submitted to the Army Corps of Engineers for review and approval.

I certify that the information in this document is true and accurate to the best of my knowledge and belief.

Property Owner Signature _____ Date _____

# Table 1

## General Herbicide Application Information

| | | Imazapyr | Glyphosate | Combination |
|---|---|---|---|---|
| Treatment Timing | | Apply to actively growing green foliage after full leaf elongation and up to first killing frost (i.e., June up to first killing frost) | Apply after plants are in full bloom in late summer up to the first killing frost (i.e., late August up to first killing frost) | Apply after plants are in full bloom in late summer up to the first killing frost (i.e., late August up to first killing frost) |
| Herbicide Rate | High Volume | Six pints per acre | Six pints per acre | Three pints glyphosate and three pints imazapyr per acre |
| | Low Volume | 1 - 1.5% solution | 1 - 1.5% solution | No recommended rate is available |
| Cost | | High | Low | Medium |
| Effectiveness | | High<br>Allows treatment earlier in the growing season | Medium<br>Good results where water level management is available | High<br>Recommended for most sites |

*A Guide to the Control and Management of Invasive Phragmites*. Michigan Department of Natural Resources (MDNR), Wildlife Division/U.S. Fish and Wildlife Service.

# Table 2

## Herbicide Application Methods

| Method | Phragmites Stand Characteristics | Site Conditions | Treatment Technique | Precautions |
|---|---|---|---|---|
| Injecting Stems | Scattered or isolated | Effective in areas where impacts to desirable, native plant species must be avoided. | Cut plants to waist height. Add one drop of herbicide to hollow stems with a squirt bottle or syringe. | Seed heads should be removed from the site after cutting to prevent seed spread. |
| Hand Swiping | Scattered or isolated | Effective in areas where impacts to desirable, native plant species must be avoided. | Cover (wipe) each individual stem using a cotton wicking glove worn over a chemical resistant glove. | Use care not to over-saturate or drip herbicides on native vegetation. |
| Backpack Sprayer | Scattered to moderately dense stands | Use on low-wind days to prevent drift outside the treatment area. Use carefully to avoid native plants. | Spray close to leaves using low pressure. | Utilize flat fan nozzles to minimize non-target exposure. |
| Wick or Dauber | Moderately dense to dense stands greater than 1 acre | Targets phragmites without impacting shorter plant species. Useful when complete eradication of all plants is not desired. | Saturate absorbent material with low pressure sprayers attached to an ATV or tractor. The area must be covered twice, in opposite directions. | Herbicide will not be effective on stems broken or damaged by the equipment. |
| Boom Sprayer | Dense stands greater than 1 acre | Use on low-wind days to prevent drift outside the treatment area. Use carefully to avoid native plants. | Attach low pressure boom sprayers to an ATV or tractor. | Herbicide will not be effective on stems broken or damaged by the equipment. |
| Aerial Application | Dense stands greater than 5 acres | Use on low-wind days to prevent drift outside the treatment area. Use carefully to avoid native plants. | Spray area from helicopter booms using proper droplet size, boom length and nozzle type. | Large scale application may affect adjacent plant communities. Using a skilled pilot is imperative. |

*A Guide to the Control and Management of Invasive Phragmites*. Michigan Department of Natural Resources (MDNR), Wildlife Division/U.S. Fish and Wildlife Service.