



# Maryland

## Department of the Environment

**Wes Moore**, Governor  
**Aruna Miller**, Lt. Governor

**Serena McIlwain**, Secretary  
**Suzanne E. Dorsey**, Deputy Secretary  
**Adam Ortiz**, Deputy Secretary

November 5, 2025

West View Shores Civic Association  
c/o Seth McCullough  
Sustainable Science, LLC  
6636 Christy Acres Cir  
Mount Airy, MD 21771

Via email: [seth@sustainable-science.com](mailto:seth@sustainable-science.com)

Re: Agency Interest Number: 107256  
Tracking Number: 202461404  
Tidal Authorization Number: 25-WQC-0002

Dear West View Shores Civic Association,

Your project did not qualify for approval under the Maryland State Programmatic General Permit (MDSPGP); therefore a separate review and issuance of the federal permit will be required by the U.S. Army Corps of Engineers. The federal permit is not attached.

Additionally, your project required a Wetlands License to be approved and issued by the Maryland Board of Public Works (BPW). The Wetlands License will be sent to you by BPW's Wetlands Administrator.

A project that does not qualify for approval under the MDSPGP requires an individual Water Quality Certification (WQC) to be issued by the Maryland Department of the Environment, which is attached. Please take a moment to read and review your WQC to ensure that you understand the limits of the authorized work and all of the general and special conditions.

You should not begin any work until you have obtained all necessary State, local, and federal authorizations. Please contact Willem Brown at [Willem.Brown@Maryland.gov](mailto:Willem.Brown@Maryland.gov) or 410-537-3622 with any questions.

Sincerely,

Jonathan Stewart, Chief  
Tidal Wetlands Division



STATE OF MARYLAND  
DEPARTMENT OF THE ENVIRONMENT  
WATER AND SCIENCE ADMINISTRATION  
WATER QUALITY CERTIFICATION



25-WQC-0002

EFFECTIVE DATE: **November 5, 2025**  
CERTIFICATION HOLDER: **West View Shores Civic Association**  
ADDRESS: **18 Short Rd,  
Earleville, MD 21919**  
PROJECT LOCATION: **NW of Basin Rd & Bluff Rd  
Earleville, MD 21919**

**UNDER AUTHORITY OF SECTION 401 OF THE FEDERAL WATER POLLUTION CONTROL ACT AND ITS AMENDMENTS AND IN ACCORDANCE WITH § 9-313 THROUGH § 9-323, INCLUSIVE, OF THE ENVIRONMENT ARTICLE, ANNOTATED CODE OF MARYLAND, THE MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER AND SCIENCE ADMINISTRATION HAS DETERMINED THAT THE REGULATED ACTIVITIES DESCRIBED IN THE REQUEST FOR CERTIFICATION FOR THE PROPOSED BEACH NOURISHMENT, GROIN, AND BREAKWATER, AND AS DESCRIBED IN THE ATTACHED PLAN SHEETS DATED February 14, 2025, AND ANY SUBSEQUENT MODIFICATIONS APPROVED BY THE DEPARTMENT WILL NOT VIOLATE MARYLAND'S WATER QUALITY STANDARDS, IF CONDUCTED IN ACCORDANCE WITH THE CONDITIONS OF THIS CERTIFICATION.**

THIS CERTIFICATION DOES NOT RELIEVE THE APPLICANT OF RESPONSIBILITY FOR OBTAINING ANY OTHER APPROVALS, LICENSES, OR PERMITS IN ACCORDANCE WITH FEDERAL, STATE, OR LOCAL REQUIREMENTS AND DOES NOT AUTHORIZE COMMENCEMENT OF THE PROPOSED PROJECT. A COPY OF THIS REQUIRED CERTIFICATION HAS BEEN SENT TO THE CORPS OF ENGINEERS. THE CERTIFICATION HOLDER SHALL COMPLY WITH THE CONDITIONS LISTED BELOW.

*The Maryland Department of the Environment satisfied the statutory and regulatory public notice requirements by placing the WQC on Public Notice from March 15 to April 15 on Maryland Department of the Environment's Public Notice webpage and advertising in the Cecil Whig on March 21<sup>st</sup>, 2025.*

## **PROJECT DESCRIPTION**

*The project proposes 850 linear feet of beach nourishment and shoreline stabilization consisting of:*

- 1. A 90-foot long by 18-foot wide stone groin and a 50-foot long by 18-foot wide stone groin extending a maximum of 62 feet channelward of the mean high water line.*
- 2. A 190-foot long by 16-foot wide stone breakwater within a maximum of 80 feet channelward of the mean high water line.*
- 3. Filling and grading with 1,550 cubic yards of sand along the 850 feet of eroding shoreline.*

4. *Planting 6,150 square feet of Submerged Aquatic Vegetation (SAV) adjacent to the project site to mitigate for 2,050 square feet of impacts to SAV.*

## **GENERAL CONDITIONS**

1. All water quality-related performance standards and conditions required by the Department in any state issued authorization for activities in tidal wetlands, nontidal wetlands, their 100-year floodplains, nontidal wetlands buffers, or nontidal wetland expanded buffers to ensure that any discharges will not result in a failure to comply with water quality standards in COMAR 26.08.02 or any other water quality requirements of state law or regulation shall be met.
2. This Certification does not obviate the need to obtain required authorizations or approvals from other State, federal or local agencies as required by law.
3. All additional authorizations or approvals, including self-certifying General Permits issued by the Department, shall be obtained and all conditions shall be completed in compliance with such authorizations.
4. The proposed project shall be constructed in accordance with the approved final plan by the Department, or, if Department approval is not required, the plan approved by the U.S. Army Corps of Engineers, and its approved revisions.
5. All fill and construction materials not used in the project shall be removed and disposed of in a manner which will prevent their entry into waters of this State.
6. This Certification does not authorize any injury to private property, any invasion of rights, or any infringement of federal, state, or local laws or regulations.
7. The Certification Holder shall allow authorized representatives of the Department access to the site of authorized activities during normal business hours to conduct inspections and evaluations of the operations and records necessary to assure compliance with this Certification.
8. No stockpiles of any material shall be placed in Waters of the U.S. or state or private tidal wetlands.
9. Temporary construction trailers or structures, staging areas and stockpiles shall not be located within tidal wetlands, nontidal wetlands, nontidal wetlands buffers, or the 100-year floodplain unless specifically included on the Approved Plan.
10. This Certification is valid for the project identified herein and the associated U.S. Army Corps of Engineers authorization NAB-2024-61404 (West View Shores Civic Assoc, Inc.), until such time that it expires or is not administratively extended.

## **SPECIAL CONDITIONS**

1. The Certificate Holder shall comply with all Critical Area requirements and obtain all necessary authorizations from local jurisdiction. This Certificate does not constitute authorization for disturbance in the 100-foot Critical Area Buffer. "Disturbance" in the Buffer means clearing, grading, construction activities, or removal of any size of tree or vegetation. Any anticipated Buffer disturbance requires prior written approval, before commencement of land disturbing activity, from local jurisdiction in the form of a Buffer Management Plan.

2. If the authorized work is not performed by the property owner or is not otherwise exempt from the licensing requirement, all work performed under this Tidal Wetlands Permit shall be conducted by a marine contractor licensed by the Marine Contractors Licensing Board (MCLB) in accordance with Title 17 of the Environment Article of Annotated Code of Maryland and COMAR 26.30. The licensed marine contractor shall be authorized for the appropriate license category to perform or solicit to perform the activities within this authorization, if applicable. A list of licensed marine contractors and their license category may be obtained by contacting the MCLB at 410-537- 3249, by e-mail at MDE.MCLB@maryland.gov, or by accessing the Maryland Department of the Environment, Environmental Boards webpage at <https://mde.maryland.gov/programs/water/WetlandsandWaterways/Pages/LicensedMarineContractor.s.aspx>.
3. The issuance of this Certificate is not a validation or authorization by the Department for any of the existing structures depicted on the plan sheets on the subject property that is not part of the authorized work description, nor does it relieve the Certificate Holder of the obligation to resolve any existing noncompliant structures and activities within tidal wetlands.
4. The Certificate Holder shall construct the beach nourishment area in accordance with the following conditions:
  - a. The Licensee shall use clean substrate fill material, no more than 10% of which shall pass through a standard number 100 sieve.
  - b. If the fill is graded hydraulically, the licensee shall use a turbidity curtain around the perimeter of the instream work.
  - c. If the existing bank is to be cleared or graded:
    - i. The Licensee shall perform all work under and in accordance with an approved Soil Erosion and Sediment Control Plan from the applicable sediment and erosion control agency; and
    - ii. The Licensee shall perform all work under and in accordance with the Critical Area requirements of the local jurisdiction in the form of an approved Buffer Management Plan.
5. The mitigation project shall be constructed in accordance with the plans dated February 14, 2025.
6. The Certificate Holder shall follow the recommendations for seed collection, storage, dispersal, and monitoring that are published in the Chesapeake Bay Program's "SAV Mitigation and Monitoring Requirement Recommendations"
7. The Certificate Holder shall obtain authorization from the Maryland Department of Natural Resources prior to commencement of submerged aquatic vegetation (SAV) seed collection.
8. Prior to commencement of the mitigation project, the Certificate Holder shall submit a detailed plan for the storage of the collected submerged aquatic vegetation (SAV) seeds and receive approval prior to collection of the SAV seeds.
9. The Certificate Holder shall maintain the mitigation site and monitor for 5 years subsequent to the completion of seed distribution. The licensee shall submit a monitoring report to the Tidal Wetlands Division verifying that the creation of the submerged aquatic vegetation (SAV) bed has been successful no later than December 31 of each year per the required 5 years of monitoring starting in 2024. The monitoring report must include the date of inspection, percentage of aerial coverage, species observed, aerial imagery of site, and identify limiting factors for growth of the SAV bed. A project shall be considered successful if SAV plants cover 75% of the surface area of the SAV bed. At the end of the monitoring period, MDE and BPW will determine if the mitigation project will be either: 1) approved as successful and complete, or 2) defined as incomplete after full analysis and



discussion. If defined as incomplete, MDE and BPW will determine if an additional mitigation project will be required to complete the SAV mitigation requirement of this authorization. MDE will notify the Licensee of the regulatory decision.

10. Prior to commencement of the mitigation project, the Certificate Holder shall submit a reference site in the Elk River that will be used to determine the success of the mitigation project and determine any regional changes that may affect SAV survival.
11. The Certificate Holder shall monitor a reference site in the Elk River to determine the success of the mitigation project. The Licensee shall submit a monitoring report of the reference site to the Tidal Wetlands Division no later than December 31 of each per the required 5 years of monitoring. The monitoring report must include the date of inspection, percentage of aerial coverage, species observed, aerial imagery of site, and identify limiting factors for growth of the SAV bed.
12. The Certificate Holder shall not perform any in water construction or work between April 15 and October 15 of any year due to the presence of submerged Aquatic Vegetation (SAV).

## **CITATIONS AND STATEMENTS OF NECESSITY**

1. Statement of Necessity for General Conditions 1, 2, 3, 4, and Special Conditions 1, 3: These conditions are necessary to ensure that water quality standards are met, and designated uses are maintained.

Citation: Federal and state laws which authorize this condition include but are not limited to: 33 U.S.C. § 1341(a), (b), & (d); 33 U.S.C. § 1251(b); 33 U.S.C. § 1370; Md. Ann. Code, Env. Article, Title 1, Subtitles 3 and 4; Md. Ann. Code, Env. Article, Title 5, Subtitles 5 and 9; Md. Ann. Code, Env. Article, Title 9, Subtitle 3; Md. Ann. Code, Env. Article, Title 16; COMAR 26.08; COMAR 26.08.02.10G(3); COMAR 26.23.02.06; COMAR 26.17.01; COMAR 26.23; COMAR 26.24

2. Statement of Necessity for General Conditions 5, 8, 9 and Special Condition 4: Fill or construction material within or adjacent to regulated resources may cause discharges resulting in turbidity in excess of water quality standards and interfere with designated uses of growth and propagation of fish, other aquatic life, wildlife; and other designated uses; and fail to meet general water quality criteria that waters not be polluted by substances in amounts sufficient to be unsightly or create a nuisance.

Citation: 26.08.02.03B(1)-B(2); COMAR 26.23; COMAR 26.24; COMAR 26.17.04

3. Statement of Necessity for General Condition 6: This condition is necessary to clarify the scope of this certification to ensure compliance with water quality regulations, without limiting restrictions through other requirements.

Citation: Federal and state laws which authorize this condition include but are not limited to: 33 U.S.C. § 1341(a), (b), & (d); 33 U.S.C. § 1251(b); 33 U.S.C. § 1370; Md. Ann. Code, Env. Article, Title 1, Subtitles 3 and 4; Md. Ann. Code, Env. Article, Title 5, Subtitles 5 and 9; Md. Ann. Code, Env. Article, Title 9, Subtitle 3; Md. Ann. Code, Env. Article, Title 16; COMAR 26.08, COMAR 26.08.02.10E; COMAR 26.23.02.06; COMAR 26.17.04; COMAR 26.23; COMAR 26.24

4. Statement of Necessity for General Condition 7: Conditions of certification involve precise actions to comply with water quality standards. Site inspection may be necessary to ensure that limits, methods, and other requirements are met to ensure that water quality standards are met and designated uses are maintained. These conditions are necessary to ensure that the activity was conducted, and project completed according to terms of the authorization/certification, while allowing for review of in-field modifications which may have resulted in discharges to ensure that water quality standards were met. Designated uses include support of estuarine and marine aquatic life and shellfish harvesting and for growth and propagation of fish, other aquatic life, and wildlife.

Citation: Federal and state laws that authorize this condition include but are not limited to: 33 U.S.C. § 1341(a), (b), & (d); 33 U.S.C. § 1251(b); 33 U.S.C. § 1370; Md. Ann. Code, Env. Article, Title 1, Subtitles 3 and 4; Md. Ann. Code, Env. Article, Title 5, Subtitles 5 and 9; Md. Ann. Code, Env. Article, Title 9, Subtitle 3; Md. Ann. Code, Env. Article, Title 16; COMAR 26.08; COMAR 26.08.02.03B(1)(b); COMAR 26.08.02.03B(2); COMAR 26.23.02.06; COMAR 26.23; COMAR 26.24; COMAR 26.17.04

5. Statement of Necessity for General Condition 10: This condition is necessary to qualify the period of applicability of the terms and conditions of this Certification to be protective of Maryland water quality standards.

Citation: Federal and state laws which authorize this condition include but are not limited to: 33 U.S.C. § 1341(a), (b), & (d); 33 U.S.C. § 1251(b); 33 U.S.C. § 1370; 40 C.F.R. 121, 15 C.F.R. 930, Md. Ann. Code, Env. Article, Title 1, Subtitles 3 and 4; Md. Ann. Code, Env. Article, Title 5, Subtitles 5 and 9; Md. Ann. Code, Env. Article, Title 9, Subtitle 3; Md. Ann. Code, Env. Article, Title 16; COMAR 26.08; COMAR 26.17.04; COMAR 26.23; COMAR 26.24

6. Statement of Necessity for Special Condition 2: Expertise for conducting certain activities is required to ensure that there is no violation of water quality standards nor interference with designated uses. This condition is necessary to ensure that discharges will be conducted in a manner which does not violate water quality criteria nor interfere with designated uses.

Citation: COMAR 26.08.02.02B(2)- B(4); COMAR 26.08 02.03B(2)(d) – (e ); COMAR 26.08.02.03B(1)(b); 26.08.02.03B(2); COMAR 23.02.04.04

7. Statement of Necessity for Special Conditions 5, 6, 7, 8, 9, 10, 11: Mitigation is required to ensure that waters continue to meet designated uses, as losses of wetlands or waterways result in water quality degradation. Wetlands provide essential habitat, water quality, food, and movement corridors for wildlife. Losses may result in discharges that interfere with designated uses, including the growth and propagation of fish, other aquatic life, and wildlife through loss of stream channel habitat and wetlands.

Citation: 33 U.S.C. § 1341(a), (b), & (d); 33 U.S.C. § 1251(b); 33 U.S.C. § 1370; Md. Ann. Code, Env. Article, Title 1, Subtitles 3 and 4; Md. Ann. Code, Env. Article, Title 9, Subtitle 3; Md. Ann. Code, Env. Article, Title 5, Subtitles 5 and 9; Md. Ann. Code, Env. Article, Title 9, Subtitle 3; Md. Ann. Code, Env. Article, Title 16; COMAR 26.08; COMAR 26.08.02.01; COMAR 26.08.02.02; COMAR 26.08.02.07; COMAR 26.08.02.10; COMAR 26.17.04; COMAR 26.23; COMAR 26.23.02.06; COMAR 26.24.

8. Statement of Necessity for Special Conditions 5, 6, 7, 8, 9, 10, 11: Stabilization of the site with vegetation is required to ensure that waters continue to meet designated uses. Loss of substrate fill material may result in discharges which reduce water quality and interfere with designated uses, including the support of estuarine and marine aquatic life, and the protection of shellfish harvesting, shallow water submerged aquatic vegetation, and migratory fish spawning and nurseries in tidal wetlands. Loss limits will maintain the designated use.

Citation: 1) COMAR 26.08.02.02.B.(3) 2) COMAR 26.08.02.03-3.C.(2)d.(5); 33 U.S.C. § 1341(a), (b), & (d); 33 U.S.C. § 1251(b); 33 U.S.C. § 1370; Md. Ann. Code, Env. Article, Title 1, Subtitles 3 and 4; Md. Ann. Code, Env. Article, Title 9, Subtitle 3; Md. Ann. Code, Env. Article, Title 16; COMAR 26.08; COMAR 26.24

9. Statement of Necessity for Special Condition 12: A time of year restriction condition is necessary to maintain the designated use for support of estuarine and marine aquatic life.

Citation: Federal and state laws which authorize this condition include but are not limited to: COMAR: 26.08.02.02B(1)(d); 26.08.02.02B(3); COMAR 26.08.02.02-16.

#### **CERTIFICATION APPROVED**



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Heather Nelson, Program Manager  
Wetlands and Waterways Protection Program

Tracking Number: 202461404  
Agency Interest Number: 107256

Effective Date: November 5, 2025

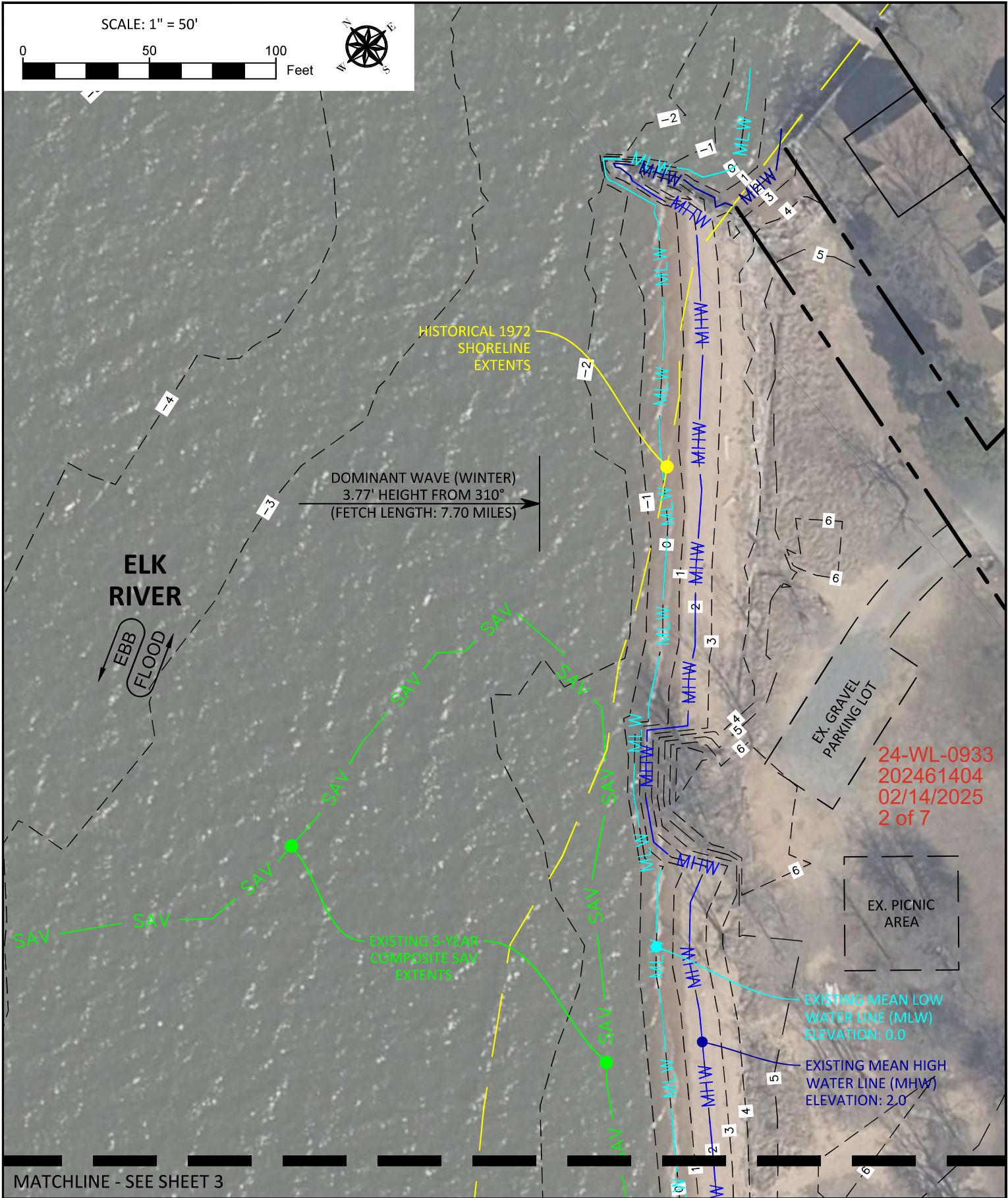
Enclosure: Plan Sheets dated: February 14, 2025

cc: WSA Inspection & Compliance Program  
Army Corps of Engineers











MATCHLINE - SEE SHEET 2

ELK RIVER



DOMINANT WAVE (WINTER)  
3.77' HEIGHT FROM 310°  
(FETCH LENGTH: 7.70 MILES)

HISTORICAL 1972  
SHORELINE  
EXTENTS

EXISTING 5-YEAR  
COMPOSITE SAV  
EXTENTS

EXISTING MEAN LOW  
WATER LINE (MLW)  
ELEVATION: 0.0  
EXISTING MEAN HIGH  
WATER LINE (MHW)  
ELEVATION: 2.0

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202461404  
02/14/2025  
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SCALE: 1" = 50'

0 50 100 Feet



## EXISTING CONDITIONS

SHEET 3 OF 7

## WEST VIEW SHORES SHORELINE

PREPARED FOR APPLICANT:  
WEST VIEW SHORES CIVIC ASSOC, INC  
18 SHORT RD  
EARLEVILLE MD, 21919

DATE  
1/21/2025

SS PROJECT #  
23016

SCALE AS SHOWN

DESIGNED BY SAM

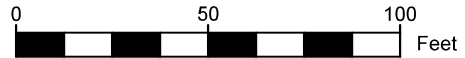
DRAWN BY SAM

CHECKED BY FAM



ENGINEERING SERVICES  
410 S. SECOND STREET  
DENTON, MARYLAND 21629

SCALE: 1" = 50'



### OUTFALL STABILIZATION

PIPE TO BE FITTED WITH STAINLESS STEEL SCREEN TO PREVENT TRASH ACCUMULATION AND DOWNSTREAM STABILIZED WITH CL-II RIPRAP OUTFALL PROTECTION AREA: 525 SF

### ELK RIVER



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### STONE GROIN A

TIDAL WATERS IMPACTS:  
1,150 SF / 95 CY  
SAV IMPACTS: 0 SF  
(REFER TO SHEET 6 FOR TYPICAL SECTION)

### BEACH NOURISHMENT A

TIDAL WATERS IMPACTS:  
5,270 SF / 485 CY  
(REFER TO SHEET 6 FOR TYPICAL SECTION)

DOMINANT WAVE (WINTER)  
3.77' HEIGHT FROM 310°  
(FETCH LENGTH: 7.70 MILES)

### NEARSHORE BREAKWATER

TIDAL WATERS IMPACTS:  
3,225 SF / 265 CY  
SAV IMPACTS: 1,615 SF  
(REFER TO SHEET 7 FOR TYPICAL SECTION)

PROPOSED MLW & MHW

EXISTING WOODEN BULKHEAD IN DISREPAIR TO BE REPLACED WITH PLANTED SAND FILL

EX. PICNIC AREA

EXISTING MEAN LOW WATER LINE (MLW)  
ELEVATION: 0.0

EXISTING MEAN HIGH WATER LINE (MHW)  
ELEVATION: 2.0

### SAV MITIGATION PLANTINGS

AREA: 6,150 SF

### BEACH NOURISHMENT B

(SEE SHEET 5 FOR IMPACTS)

HISTORICAL 1972 SHORELINE EXTENTS

EXISTING 5-YEAR COMPOSITE SAV EXTENTS

MATCHLINE - SEE SHEET 5

## PROPOSED CONDITIONS

SHEET 4 OF 7

## WEST VIEW SHORES SHORELINE

PREPARED FOR APPLICANT:  
WEST VIEW SHORES CIVIC ASSOC, INC  
18 SHORT RD  
EARLEVILLE MD, 21919



ENGINEERING SERVICES  
410 S. SECOND STREET  
DENTON, MARYLAND 21629

DATE  
1/21/2025

SS PROJECT #  
23016

SCALE AS SHOWN

DESIGNED BY SAM

DRAWN BY SAM

CHECKED BY FAM



**ELK  
RIVER**



**BEACH NOURISHMENT B**  
TIDAL WATERS IMPACTS:  
11,540 SF / 1,065 CY  
(REFER TO SHEET 6 FOR  
TYPICAL SECTION)

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202461404  
02/14/2025  
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DOMINANT WAVE (WINTER)  
3.77' HEIGHT FROM 310°  
(FETCH LENGTH: 7.70 MILES)

HISTORICAL 1972  
SHORELINE  
EXTENTS

**STONE GROIN B**  
TIDAL WATERS IMPACTS:  
715 SF / 60 CY  
SAV IMPACTS: 435 SF  
(REFER TO SHEET 6 FOR  
TYPICAL SECTION)

**PROPOSED MLW & MHW**

EXISTING 5-YEAR  
COMPOSITE SAV  
EXTENTS

EXISTING MEAN LOW  
WATER LINE (MLW)  
ELEVATION: 0.0  
  
EXISTING MEAN HIGH  
WATER LINE (MHW)  
ELEVATION: 2.0

59' MCE

SCALE: 1" = 50'

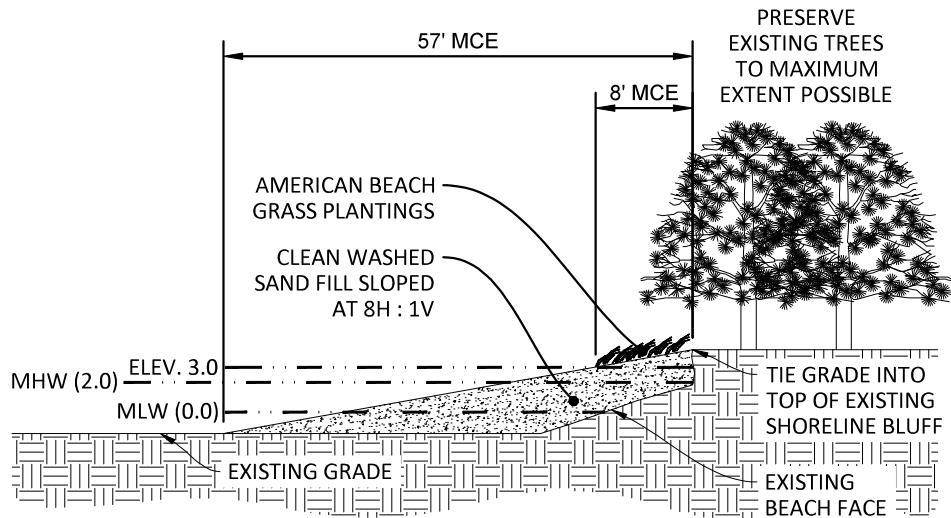


**PROPOSED  
CONDITIONS**

SHEET 5 OF 7

**WEST VIEW SHORES  
SHORELINE**

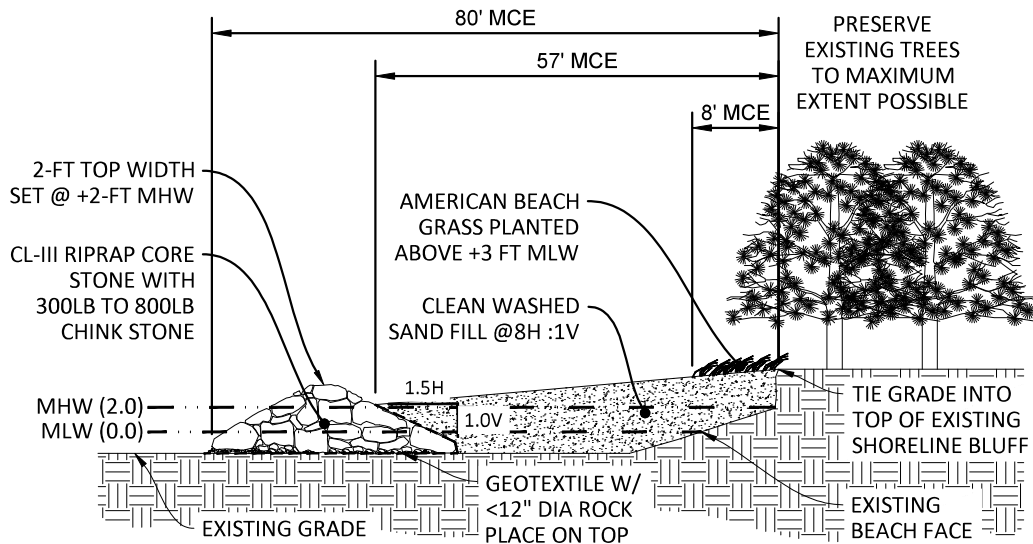
PREPARED FOR APPLICANT:  
WEST VIEW SHORES CIVIC ASSOC, INC  
18 SHORT RD  
EARLEVILLE MD, 21919



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202461404  
02/14/2025  
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## BEACH NOURISHMENT TYPICAL SECTION

NOT TO SCALE

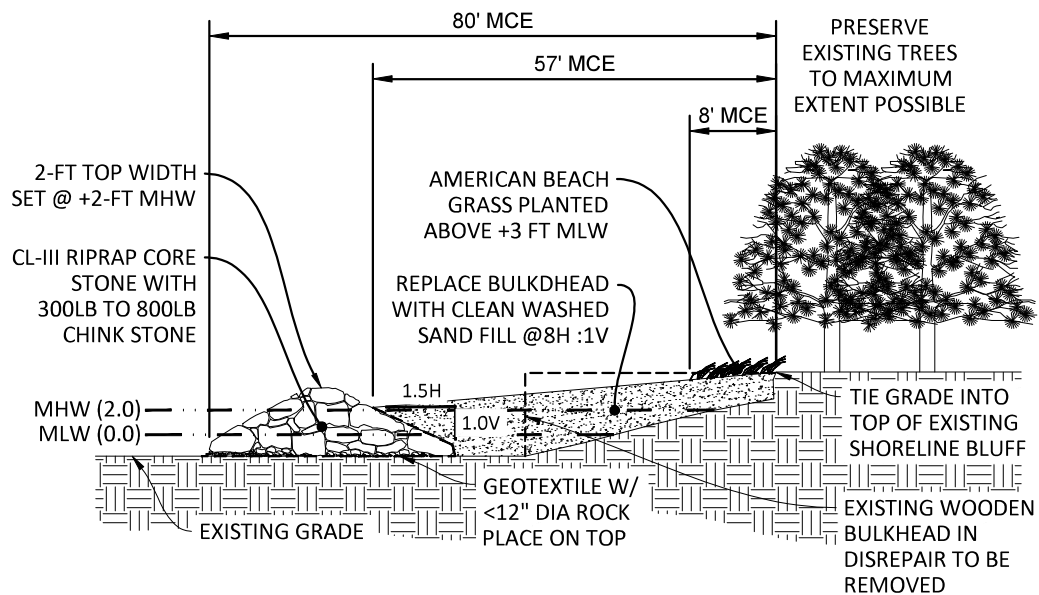


## STONE GROIN TYPICAL SECTION

NOT TO SCALE

NOTE: MCE STANDS FOR MAXIMUM CHANNELWARD ENCROACHMENT  
(FROM EXISTING MEAN HIGH WATER LINE)

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202461404  
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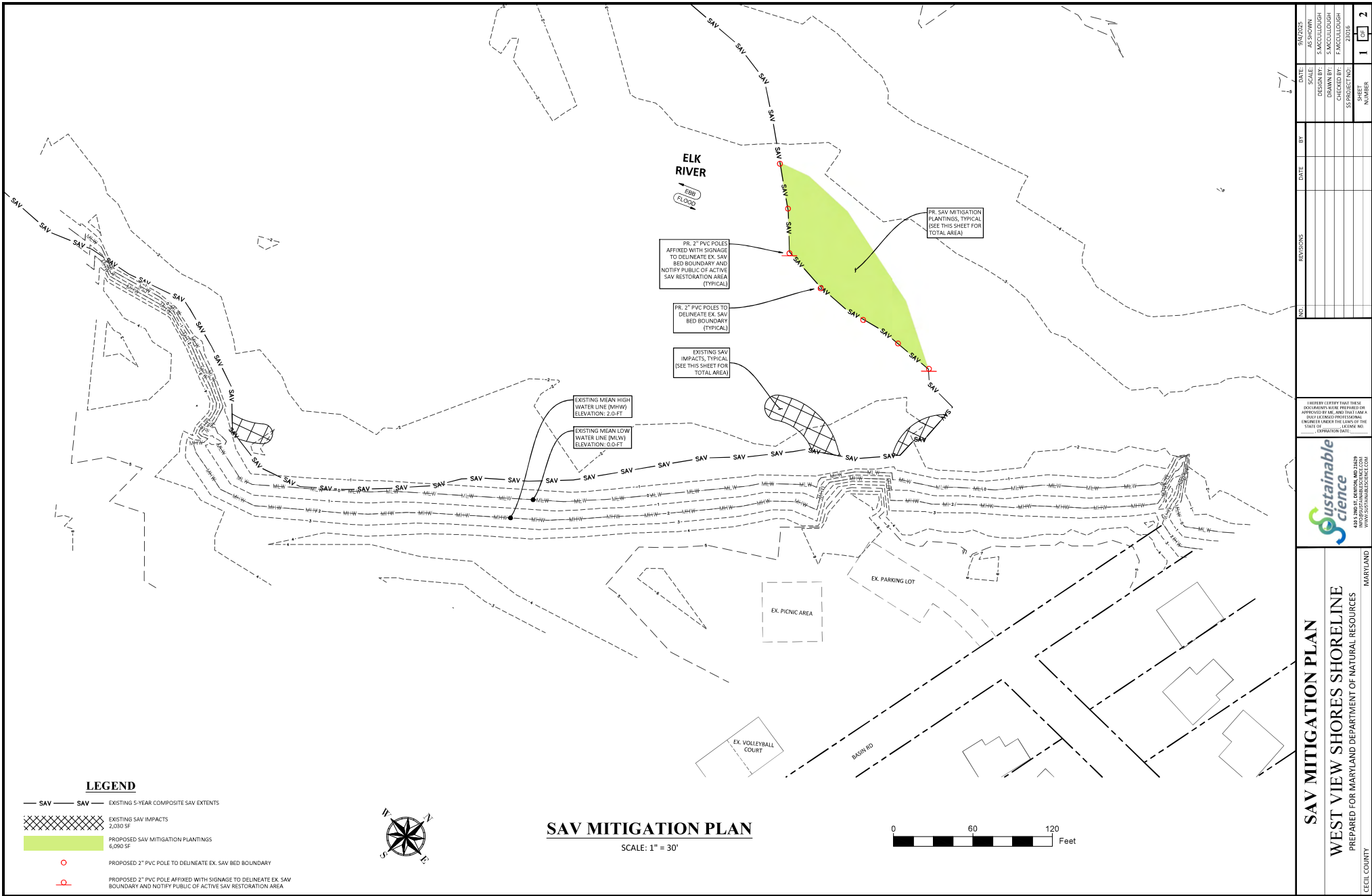
## NEARSHORE BREAKWATER TYPICAL SECTION

NOT TO SCALE

NOTE: MCE STANDS FOR MAXIMUM CHANNELWARD ENCROACHMENT  
(FROM EXISTING MEAN HIGH WATER LINE)

# Mitigation Plan

(Attachment A)



## MITIGATION OBJECTIVES

1. THE PROJECT WILL MITIGATE IMPACTS TO 2,030 SQUARE FEET OF SUBMERGED AQUATIC VEGETATION (SAV) RESOURCES RESULTING FROM CONSTRUCTION ACTIVITIES.
2. THE PROPOSED MITIGATION INVOLVES 6,090 SQUARE FEET OF SAV PLANTINGS, ACHIEVING A MITIGATION RATIO OF 3:1.
3. THE PRIMARY GOAL IS TO ESTABLISH SELF-SUSTAINING SAV BEDS THAT REPLACE ECOLOGICAL FUNCTIONS LOST, INCLUDING WATER QUALITY IMPROVEMENT, HABITAT PROVISION, AND NUTRIENT CYCLING.
4. THE MITIGATION PLAN WILL EXCLUSIVELY UTILIZE VALLISNERIA AMERICANA (WILD CELERY), A SPECIES WELL-SUITED TO THE UPPER CHEESAPEAKE BAY'S LOW TO MODERATE SALINITY AND ENVIRONMENTAL CONDITIONS.

## MITIGATION WORK PLAN

1. **SEED COLLECTION AND PROCESSING**
  - 1.1. OBTAIN ALL NECESSARY PERMITS REQUIRED FOR SEED COLLECTION PRIOR TO HARVESTING DONOR BEDS.
  - 1.2. COLLECT SEEDS EXCLUSIVELY FROM DONOR BEDS OF VALLISNERIA AMERICANA (WILD CELERY) WITH ESTABLISHED POPULATIONS MEETING A MINIMUM 85% COVERAGE AND STABILITY FOR AT LEAST FIVE YEARS.
  - 1.2.1. COORDINATE WITH BROCKE LANDRY AT DNR TO CONFIRM SITES ARE APPROPRIATE. BROCKE LANDRY@MARYLAND.GOV
  - 1.3. HARVEST REPRODUCTIVE PROPAGULES ONLY, ENSURING NO DAMAGE TO DONOR BEDS BY STAMPING OUT SEED PODS OR REPRODUCTIVE SHOOTS DURING EARLY FALL.
  - 1.4. SEED PODS SHOULD BE MANUALLY SEPARATED FROM THE PEDUNCLE, EITHER DURING COLLECTION IN THE FIELD OR UPON RETURNING TO THE STORAGE FACILITY. SEEDS CAN BE STORED IN ONE OF TWO WAYS:
    - 1.4.1. STORE WHOLE SEED PODS OVER THE WINTER IN AMBIENT WATER AT 4°C (39.1°F) IN SEALED QUART JARS OR BAGS. ALTERNATIVELY, MAINTAIN THE PODS IN AN AERATED TANK AT AMBIENT TEMPERATURE FOR 6-8 WEEKS TO ALLOW NATURAL DECOMPOSITION BEFORE MANUALLY EXTRACTING THE SEEDS.
    - 1.4.2. PURE SEEDS, ONCE EXTRACTED, SHOULD ALSO BE STORED AT 4°C (39.2°F) IN AMBIENT WATER UNDER AERATED CONDITIONS.

2. **SEED VIABILITY AND GERMINATION**
  - 2.1. SEEDS MUST EXHIBIT ≥ 50% VIABILITY THROUGH LABORATORY TESTING BEFORE PLANTING TO ENSURE QUALITY AND SUCCESS. SEED VIABILITY REFERS TO THE PROPORTION OF SEEDS CAPABLE OF GERMINATING UNDER APPROPRIATE CONDITIONS. LABORATORY TESTING METHODS INCLUDE TETRAZOLIUM ASSAYS AND CRUSH TESTS TO CONFIRM VIABILITY PERCENTAGES. IF VIABILITY IS BELOW 100%, ADJUST SEEDING RATES TO MEET RESTORATION GOALS. FOR EXAMPLE, IF THE GERMINATION RATE IS 50% AND THE TARGET DENSITY IS 10,000 VIABLE SEEDS PER ACRE, DOUBLE THE NUMBER OF SEEDS TO 20,000 PER ACRE TO COMPENSATE.
  - 2.2. MONITOR GERMINATION SUCCESS IN THE FIELD DURING THE FIRST TWO GROWING SEASONS TO ASSESS AND ADJUST MANAGEMENT PRACTICES. FIELD MONITORING ENSURES THAT PLANTED SEEDS ESTABLISH AS INTENDED. OBSERVING EMERGENCE RATES HELPS IDENTIFY ENVIRONMENTAL FACTORS OR TECHNIQUES REQUIRING ADJUSTMENT. FURTHER DETAILS ON SEED VIABILITY TESTING AND GERMINATION ADJUSTMENTS CAN BE FOUND ON PAGES 42-43 OF THE JASINSKI ET AL. 2021 RESTORATION MANUAL. (JASINSKI ET AL. 2021, SMALL SCALE SAV RESTORATION IN CHEESAPEAKE BAY: A GUIDE TO THE RESTORATION OF SAV IN CHEESAPEAKE BAY AND ITS TIDAL TRIBUTARIES).

3. **DELINEATION OF RESTORATION SITE**
  - 3.1. PERMITTING
    - 3.1.1. OBTAIN ALL NECESSARY PERMITS OR APPROVALS BEFORE INSTALLING ANY MARKERS.
  - 3.1.2. ENSURE COMPLIANCE WITH RELEVANT AGENCIES REGARDING INSTALLATION METHODS AND TIMING TO MINIMIZE ENVIRONMENTAL IMPACT.
  - 3.2. SURVEY AND DELINEATION
    - 3.2.1. PRIOR TO SEED COLLECTION OR RESTORATION ACTIVITIES, DELINEATE EXISTING SAV BEDS IN THE PROJECT AREA (EXTENT, SPECIES, AND COVERAGE). THIS SURVEY ENSURES THAT SEED COLLECTION AND PROCESSING ACCOUNT FOR CURRENT SAV DISTRIBUTION.
    - 3.2.2. MARK THE BOUNDARY OF EXISTING SAV BEDS WITH 2-INCH PVC POLES APPROXIMATELY SPACED PER THE SAV MITIGATION PLAN FOUND ON SHEET 1.
    - 3.2.3. AFFIX SIGNAGE TO SELECT PVC POLES AT REGULAR INTERVALS (FACING PUBLIC BEACH) TO INFORM THE PUBLIC THAT THIS AREA IS AN ACTIVE SAV RESTORATION AREA THAT SHOULD NOT BE TRAVERSED. SEE THIS SHEET FOR SIGNAGE DETAIL.

4. **BROADCAST PLANTING METHOD**
  - 4.1. THOROUGHLY MIX SEEDS WITH SAND PRIOR TO BROADCASTING TO LIMIT CLUMPING AND HELP ACCELERATE DESCENT SO THAT THE SEEDS STAY WITHIN THE DESIGNED PLANTING AREA.
  - 4.2. SEED DISTRIBUTION CAN BE PERFORMED USING VARIOUS METHODS DEPENDING ON THE SCALE AND RESOURCES AVAILABLE.
    - 4.2.1. MANUAL DISTRIBUTION: SEEDS CAN BE HAND-DISTRIBUTED, MAKING IT SUITABLE FOR SMALL-SCALE APPLICATIONS OR EDUCATIONAL ACTIVITIES WHERE PRECISION AND DIRECT ENGAGEMENT ARE KEY.
    - 4.2.2. SPECIALIZED EQUIPMENT: FOR LARGER-SCALE OPERATIONS, UTILIZE SEED BROADCAST SPREADERS FOR SMALL BOATS OR BARGES TO ENSURE UNIFORM SEED DISTRIBUTION.
  - 4.3. CALIBRATE EQUIPMENT OR MONITOR HAND DISTRIBUTION TO PREVENT CLUMPING OR BARE PATCHES DURING SEEDING OPERATIONS.

5. **TIMING AND CONDITIONS**
  - 5.1. CONDUCT PLANTING FROM APRIL TO MAY. THIS IS THE APPROPRIATE TIMING FOR WILD CELERY AS OUTLINED IN THE JASINSKI ET AL. RESTORATION MANUAL. (JASINSKI, D. ET AL. 2021, SMALL SCALE SAV RESTORATION IN CHEESAPEAKE BAY: A GUIDE TO THE RESTORATION OF SAV IN CHEESAPEAKE BAY AND ITS TIDAL TRIBUTARIES).
  - 5.2. AVOID PLANTING DURING HIGH TURBIDITY OR STORM EVENTS TO MINIMIZE SEED DISPERSAL OR BURIAL BY SEDIMENT.

6. **SEED DISTRIBUTION SPECIFICATIONS**
  - 6.1. ACHIEVE A TARGET PLANTING DENSITY OF 400,000 SEEDS PER ACRE FOR VALLISNERIA AMERICANA.
  - 6.2. PLANT SEEDS BY HAND IN WATER DEPTHS OF 0.5-2 METERS BELOW MEAN LOW WATER TO OPTIMIZE LIGHT PENETRATION AND GROWTH CONDITIONS.

7. **MONITORING DURING PLANTING**
  - 7.1. MONITOR WATER CURRENTS IN REAL-TIME AND ADJUST SEEDING RATES OR PATTERNS TO COUNTERACT SEED DRIFT.
  - 7.2. DISTRIBUTE SEEDS IN A GRID OR LINEAR PATTERN, ENSURING OVERLAP OF BROADCAST PATHS FOR EVEN COVERAGE.

8. **POST-PLANTING MEASURES**
  - 8.1. RESTRICT VESSEL MOVEMENT IN THE PLANTING AREA TO MINIMIZE DISTURBANCE.

## BASELINE INFORMATION

1. **DATA SOURCES FOR BASELINE INFORMATION**
  - 1.1. A FIELD RUN TOPOGRAPHIC AND BATHYMETRIC SURVEYS WERE CONDUCTED BY SUSTAINABLE SCIENCE, LLC (THE ENGINEER) IN NOVEMBER 2023 AND APRIL 2024, RESPECTIVELY.
  - 1.2. HORIZONTAL COORDINATE SYSTEM: NORTH AMERICAN DATUM OF 1983 (NAD83) US FOOT.
  - 1.3. VERTICAL COORDINATE SYSTEM: NORTH AMERICAN DATUM OF 1983 (NAD83) US FOOT.
  - 1.4. EXISTING TOPOGRAPHY OUTLINES THE PROJECT'S LIMIT OF DISTURBANCE (LOD) IS BASED ON PUBLICLY AVAILABLE MARYLAND (CECIL COUNTY) 2020 LIDAR DATA (ACCESSIBLE VIA INMAP.MARYLAND.GOV).
2. **SITE ELEVATIONS AND WATER LEVELS**
  - 2.1. MEAN LOW WATER (MLW) FOR THE REGION, AS PER NOAA VDATUM, IS 0.90 FT NAVD83.
  - 2.2. THE TIDAL RANGE FOR THE REGION, BASED ON THE TOWN POINT WHARF, MD TIDE GAUGE (STATION 8573903), IS APPROXIMATELY 2 FT.
  - 2.3. FOR PROJECT CONSISTENCY, EXISTING TOPOGRAPHY HAS BEEN ADJUSTED BY 0.90 FT TO SET MLW AT 0 FT, RESULTING IN A MEAN HIGH WATER (MHW) ELEVATION OF 2.0 FT.
3. **SITE CONDITIONS DOCUMENTATION**
  - 3.1. THE BASELINE ASSESSMENT INCLUDES:
    - 3.1.1. EXISTING SAV COVERAGE, DENSITY, AND SPECIES COMPOSITION BASED ON SURVEYS AND 5-YEAR SAV COMPOSITE MAPPING BY VIMS (2018-2022).
    - 3.1.2. WATER DEPTH MEASUREMENTS, SEDIMENT COMPOSITION, AND HYDROLOGICAL CONDITIONS CRITICAL FOR SAV GROWTH.
  - 3.2. SITE PHOTOGRAPHS AND GEOREFERENCED MAPS PROVIDE VISUAL DOCUMENTATION OF PRE-CONSTRUCTION CONDITIONS.

4. **TOPOGRAPHIC AND BATHYMETRIC FEATURES**
  - 4.1. THE TOPOGRAPHIC AND BATHYMETRIC DATA ARE CRITICAL FOR ESTABLISHING RELIEF AND ELEVATIONS FOR VALLISNERIA AMERICANA PLANTING, ENSURING OPTIMAL CONDITIONS FOR SAV ESTABLISHMENT.
  - 4.2. CONTOURS HAVE BEEN EVALUATED TO MAINTAIN PLANTING DEPTHS BETWEEN 0.5 AND 2 METERS BELOW MLW.
5. **BASINE HABITAT CHARACTERIZATION**
  - 5.1. DOCUMENT EXISTING AQUATIC AND TERRESTRIAL PLANT COMMUNITIES, INCLUDING INVASIVE SPECIES PRESENCE.

6. **CONTROL SITE INTEGRATION**
  - 6.1. BASELINE DATA FOR THE MITIGATION SITE WILL BE COMPARED AGAINST THE CONTROL SITE TO IDENTIFY AND PROJECT REGIONAL ENVIRONMENTAL VARIABILITY.
7. **MAPPING REQUIREMENTS**
  - 7.1. BASELINE MAPPING WILL INCLUDE THE GEOGRAPHIC LOCATION OF THE MITIGATION SITE RELATIVE TO THE PROJECT IMPACT AREA AND SIGNIFICANT SITE FEATURES.
  - 7.2. MAPPING PRODUCTS WILL REFERENCE THE ADJUSTED MLW (0 FT) AND MHW (2.0 FT) ELEVATIONS FOR ACCURATE ELEVATION CONTEXT.
  - 7.3. MAPS WILL ILLUSTRATE CONTOURS, EXISTING AQUATIC RESOURCES (E.G., SAV BEDS), AND ADJACENT RIPARIAN FEATURES.

## CONTROL SITE SELECTION

1. **PURPOSE OF THE CONTROL SITE**
  - 1.1. ESTABLISH A CONTROL SITE WITHIN THE UPPER CHEESAPEAKE BAY IN COLLABORATION WITH THE MARYLAND DEPARTMENT OF NATURAL RESOURCES (DNR) TO EVALUATE NATURAL ENVIRONMENTAL VARIABILITY.
  - 1.2. USE THE CONTROL SITE TO DIFFERENTIATE BETWEEN MITIGATION PROJECT PERFORMANCE AND REGIONAL ENVIRONMENTAL FACTORS AFFECTING SUBMERGED AQUATIC VEGETATION (SAV) GROWTH.
2. **CRITERIA FOR CONTROL SITE SELECTION**
  - 2.1. THE CONTROL SITE MUST REMAIN UNDISTURBED BY PROJECT ACTIVITIES TO PROVIDE A RELIABLE BENCHMARK.
  - 2.2. SELECT A SITE WITH PHYSICAL, CHEMICAL, AND BIOLOGICAL CONDITIONS REPRESENTATIVE OF THE MITIGATION AREA, INCLUDING:
    - 2.2.1. WATER CLARITY CONSISTENT WITH REGIONAL NORMS.
    - 2.2.2. SALINITY AND NUTRIENT LEVELS WITHIN THE RANGE OF TYPICAL SAV HABITATS IN THE UPPER CHEESAPEAKE BAY.
    - 2.2.3. DEPTHS OF 0.5-2 METERS BELOW MEAN LOW WATER, ENSURING ADEQUATE LIGHT PENETRATION FOR VALLISNERIA AMERICANA.
  - 2.3. AVOID AREAS WITH HIGH ANTHROPOGENIC INFLUENCES, SUCH AS ACTIVE BOATING CHANNELS OR AREAS WITH ONGOING SHORELINE CONSTRUCTION. CONFIRM SUITABILITY OF CONTROL SITE WITH DNR (BROCKE.LANDRY@MARYLAND.GOV).

3. **BASELINE DATA COLLECTION**
  - 3.1. PERFORM A COMPREHENSIVE ASSESSMENT OF THE CONTROL SITE TO DOCUMENT EXISTING SAV COVERAGE, DENSITY, AND SPECIES COMPOSITION.
  - 3.2. USE MAPPING TOOLS (E.G., GIS) AND AERIAL SURVEYS TO ESTABLISH SPATIAL AND TEMPORAL BENCHMARKS FOR COMPARISON WITH THE MITIGATION SITE.

4. **MONITORING AND EVALUATION**
  - 4.1. CONDUCT PERIODIC SURVEYS AT THE CONTROL SITE DURING THE SAV GROWING SEASON (JULY-SEPTEMBER) TO MEASURE NATURAL VARIATIONS IN SAV COVERAGE AND HEALTH.
  - 4.2. COMPARE DATA FROM THE CONTROL SITE WITH THE MITIGATION SITE TO ASSESS THE EFFECTIVENESS OF PLANTING TECHNIQUES AND ENVIRONMENTAL CONDITIONS AT THE MITIGATION LOCATION.
  - 4.3. UPDATE CONTROL SITE DATA IN ANNUAL MONITORING REPORTS TO DOCUMENT REGIONAL TRENDS AND GUIDE ADAPTIVE MANAGEMENT DECISIONS.

5. **SELECTION DOCUMENTATION**
  - 5.1. PROVIDE JUSTIFICATION FOR CONTROL SITE SELECTION, INCLUDING:
    - 5.1.1. GEOGRAPHIC LOCATION AND PROXIMITY TO THE MITIGATION SITE.
    - 5.1.2. SPECIFIC PHYSICAL AND ENVIRONMENTAL FEATURES THAT ALIGN WITH PROJECT GOALS.
    - 5.1.3. EVIDENCE OF STABILITY AND MINIMAL DISTURBANCE OVER THE MONITORING PERIOD.
  - 5.2. INCLUDE MAPS AND PHOTOGRAPHS OF THE CONTROL SITE IN THE MITIGATION PLAN TO ENSURE CLEAR VISUAL REPRESENTATION.

6. **COORDINATION WITH STAKEHOLDERS**
  - 6.1. COLLABORATE WITH DNR AND OTHER RELEVANT AGENCIES TO CONFIRM THE SUITABILITY OF THE CONTROL SITE FOR MONITORING PURPOSES.
  - 6.2. OBTAIN NECESSARY PERMISSIONS OR PERMITS TO CONDUCT MONITORING ACTIVITIES AT THE CONTROL SITE, IF REQUIRED.

## PERFORMANCE STANDARDS

1. **VEGETATIVE COVERAGE AND DENSITY**
  - 1.1. THE PROJECT MUST ACHIEVE A MINIMUM OF 85% SUBMERGED AQUATIC VEGETATION (SAV) COVERAGE WITHIN THE MITIGATION AREA BY THE END OF THE FIFTH GROWING SEASON.
  - 1.2. SAV DENSITY SHOULD APPROXIMATE A CHOSEN REFERENCE BED IN THE CHEESAPEAKE BAY.
  - 1.3. A MINIMUM OF 50 REPRODUCTIVE SHOOTS PER REEFER BED MUST BE DOCUMENTED TO CONFIRM BED STABILITY AND REPRODUCTIVE POTENTIAL.
2. **SPECIES COMPOSITION**
  - 2.1. TARGET SPECIES FOR PLANTING IS VALLISNERIA AMERICANA (WILD CELERY), CONSISTENT WITH SALINITY AND HYDROLOGICAL CONDITIONS OF THE SUBMERGHANNA FLATS OR NEARBY UPPER CHEESAPEAKE BAY TRIBUTARIES.
  - 2.2. PLANTED BEDS MUST REFLECT A DIVERSITY OF GENETIC STOCK SOURCED FROM DONOR BEDS WITHIN THE SUBMERGHANNA FLATS OR NEARBY UPPER CHEESAPEAKE BAY TRIBUTARIES TO ENHANCE RESILIENCE AND LONG-TERM SUSTAINABILITY.
3. **HABITAT FUNCTIONALITY**
  - 3.1. SAV BEDS MUST DEMONSTRATE MEASURABLE ECOLOGICAL FUNCTIONS, INCLUDING:
    - 3.1.1. IMPROVED WATER CLARITY, INDICATED BY REDUCED TURBIDITY LEVELS IN THE PLANTING AREA COMPARED TO PRE-CONSTRUCTION CONDITIONS.
    - 3.1.2. ENHANCED SEDIMENT STABILIZATION, WITH NO SIGNIFICANT SEDIMENT EROSION OR BURIAL OBSERVED IN THE SAV BEDS.
    - 3.1.3. EVIDENCE OF HABITAT USE BY AQUATIC SPECIES, INCLUDING FINFISH, SHELLFISH, AND INVERTEBRATES.

4. **HYDROLOGICAL AND ENVIRONMENTAL CONDITIONS**
  - 4.1. DEPTHS MUST REMAIN BETWEEN 0.5 AND 2 METERS BELOW MEAN LOW WATER (MLW) TO ENSURE OPTIMAL LIGHT PENETRATION FOR SAV GROWTH.
  - 4.2. WATER QUALITY PARAMETERS MUST MEET OR EXCEED THRESHOLDS FOR SAV GROWTH, INCLUDING:
    - 4.2.1. TURBIDITY: ≤ 15 NTU.
    - 4.2.2. SALINITY: 0 TO 10 PARTS PER THOUSAND (PPT), IDEAL FOR VALLISNERIA AMERICANA.
    - 4.2.3. DISSOLVED OXYGEN: ≥ 5 MG/L DURING THE GROWING SEASON.

5. **TEMPORAL MILESTONES**
  - 5.1. REFERENCE BED SELECTION AND MONITORING
    - 5.1.1. THE PERFORMANCE OF THE MITIGATION SITE SHALL BE MEASURED AGAINST ONE OR MORE SUITABLE REFERENCE BEDS) CHOSEN FOR THEIR SIMILARITY TO THE IMPACTED SITE (E.G., DEPTH, SEDIMENT TYPE, HYDROLOGY) IN ACCORDANCE WITH OUR GUIDANCE.
  - 5.2. BOTH THE MITIGATION SITE AND THE REFERENCE BEDS) SHALL BE MONITORED FOR A MINIMUM OF FIVE GROWING SEASONS.

- 5.2.1. SUCCESS EACH YEAR WILL BE ASSESSED USING A "THRESHOLD VALUE" AND/OR "QUALITY RATIO" APPROACH (SEE GAMBLE ET AL. 2021), ENSURING THAT THE REFERENCE BED EXPERIENCES A DOWN YEAR (E.G., REDUCED COVERAGE DUE TO BROADER ENVIRONMENTAL CONDITIONS). THE MITIGATION SITE IS NOT REALIZED UNFAIRLY.

- 5.2.2. YEAR 1 MILESTONE
  - 5.2.2.1. AT THE END OF YEAR 1, THE MITIGATION SITE SHOULD ATTAIN A MINIMUM OF THIRTY PERCENT (30%) OF THE TARGET COVERAGE (RELATIVE TO THE REFERENCE BED) ESTABLISHED BASELINE.
- 5.2.3. YEAR 2 MILESTONE
  - 5.2.3.1. EARLY INDICATORS OF SAV ESTABLISHMENT (E.G., SPROUTING, ROOTING) SHOULD BE EVIDENT.
- 5.2.4. YEAR 3 MILESTONE
  - 5.2.4.1. BY THE END OF YEAR 3, COVERAGE SHOULD REACH AT LEAST FIFTY PERCENT (50%) OF THE FINAL TARGET (AGAIN, MEASURED RELATIVE TO THE REFERENCE BEDS) PERFORMANCE DURING THE SAME PERIOD.
- 5.2.5. SAV DENSITY SHOULD BE SUFFICIENT TO INDICATE STABILITY AND SHOW INITIAL SIGNS OF REPRODUCTIVE SUCCESS (E.G., FLOWERING, SEED SET).

- 5.2.6. YEAR 5 MILESTONE
  - 5.2.6.1. BY THE END OF YEAR 5, THE MITIGATION SITE SHOULD ACHIEVE THE FULL REFERENCE BED STANDARD OF SEVENTY PERCENT (70%) COVERAGE, MEASURED RELATIVE TO THE REFERENCE BEDS.
  - 5.2.6.2. SAV DENSITY SHOULD BE STABLE, AND THE HABITAT SHOULD DEMONSTRATE FUNCTIONALITY COMPARABLE TO THE REFERENCE BEDS.
  - 5.2.6.3. IF THE RATIO OR OTHER SUCCESS METRICS REMAIN BELOW THE THRESHOLD VALUE AT YEAR 5, CONTINGENCY MEASURES (E.G., ADDITIONAL PLANTING) MAY BE REQUIRED.
- 5.2.7. ADAPTIVE MANAGEMENT PROVISIONS
  - 5.2.7.1. SHOULD MONITORING INDICATE THAT COVERAGE OR DENSITY AT THE MITIGATION SITE IS BELOW THE ACCEPTABLE RATIO (PER THE THRESHOLD VALUE APPROACH) BY YEAR 2, THE MONITORING SHALL RE-EVALUATE OR RESEED IN THE SUBSEQUENT GROWING SEASON.
  - 5.2.7.2. IF THE RATIO MEETS OR EXCEEDS THE THRESHOLD AFTER FIVE (5) YEARS, THE SITE WILL BE DEEMED SUCCESSFUL, AND NO FURTHER MONITORING WILL BE REQUIRED.

6. **INVASIVE SPECIES MANAGEMENT**
  - 6.1. INDENTIFIED INVASIVE SPECIES MUST CONSTITUTE LESS THAN 5% OF THE TOTAL COVERAGE WITHIN THE MITIGATION AREA.
  - 6.2. CONTROL MEASURES FOR EMERGENT INVASIVES MUST AVOID THE USE OF HERBICIDES AND RELY ON ENVIRONMENTALLY SUSTAINABLE REMEDIAL TECHNIQUES ONLY (E.G., REMOVAL BY HAND).

7. **MONITORING REQUIREMENTS**
  - 7.1. VEGETATION MONITORING MUST BE CONDUCTED ANNUALLY DURING THE PEAK BIOMASS SEASON (AUGUST) AND INCLUDE:
    - 7.1.1. QUANTITATIVE ASSESSMENTS OF SAV COVERAGE, DENSITY, AND SPECIES COMPOSITION.
    - 7.1.2. PHOTOGRAPHIC DOCUMENTATION MUST ACCOMPANY EACH MONITORING REPORT, AND OTHER GEOREFERENCED IMAGES SHOWING SITE CONDITIONS AND PROGRESS.
  - 7.2. COMPARATIVE DATA FROM CONTROL SITES MUST BE INCLUDED TO CONTEXTUALIZE PERFORMANCE RELATIVE TO NATURAL SAV BEDS.

8. **ADAPTIVE MANAGEMENT**
  - 8.1. IF PERFORMANCE STANDARDS ARE NOT MET, CORRECTIVE ACTIONS SUCH AS SUPPLEMENTAL SEEDING OR REPLANTING MUST BE IMPLEMENTED.
  - 8.2. ANNUAL MONITORING REPORTS MUST PROVIDE DETAILED PLANS FOR CORRECTIVE ACTIONS FOR ADDRESSING DEFICIENCIES.
  - 8.3. REMEDIAL MEASURES MUST BE COMPLETED WITHIN ONE GROWING SEASON OF IDENTIFYING PERFORMANCE ISSUES.

## MONITORING REQUIREMENTS

1. **MONITORING OBJECTIVES**
  - 1.1. ENSURE THE MITIGATION SITE ACHIEVES THE PERFORMANCE STANDARDS SET FOR SUBMERGED AQUATIC VEGETATION (SAV) ESTABLISHMENT, COVERAGE, DENSITY, AND ECOLOGICAL FUNCTION.
  - 1.2. EVALUATE THE EFFECTIVENESS OF PLANTING AND MANAGEMENT TECHNIQUES AND GUIDE ADAPTIVE MANAGEMENT MEASURES AS NEEDED.
  - 1.3. DOCUMENT ENVIRONMENTAL CONDITIONS AND THEIR INFLUENCE ON SAV SUCCESS TO PROVIDE DATA FOR LONG-TERM PROJECT EVALUATION AND REGIONAL TRENDS.

2. **MONITORING SCHEDULE**
  - 2.1. MONITORING WILL OCCUR ANNUALLY FOR A MINIMUM OF FIVE GROWING SEASONS, BEGINNING THE YEAR OF INITIAL PLANTING.
  - 2.2. IF PLANTING OCCURS AFTER APRIL 15 OF ANY YEAR, THE FIRST MONITORING REPORT WILL BE DUE AT THE END OF THAT YEAR TO ENSURE THE SEEDS GERMINATED AND THERE IS A FLEDGLING POPULATION.
  - 2.3. VEGETATIVE MONITORING SHALL OCCUR DURING THE PEAK BIOMASS SEASON (AUGUST) UNDER NORMAL HYDROLOGICAL CONDITIONS.

3. **MONITORING METHODOLOGIES**
  - 3.1. VEGETATIVE SURVEYS:
    - 3.1.1. QUANTITATIVE ASSESSMENTS OF SAV COVERAGE, DENSITY, AND SPECIES COMPOSITION USING A COMBINATION OF AERIAL IMAGERY OBTAINED BY DRONE FLIGHTS AND IN-WATER ASSESSMENTS.
    - 3.1.2. SYSTEMATIC RANDOM SAMPLING WITHIN GRID CELLS OVER THE MITIGATION SITE WILL BE USED TO ENSURE THAT SAV GROWING IN AREAS BEYOND THE TRANSECTS IS INCLUDED IN THE MONITORING EFFORT.
  - 3.2. TWO MONITORING EVENTS TO OCCUR DURING THE SAV GROWING SEASON TO MAP COVERAGE, ESTIMATE PERCENT COVER, AND RECORD THE NUMBER OF SHOOTS PER GRID UNIT.
    - 3.2.1. RECORD THE AREA OF SAV COVERAGE AND NOTE THE PRESENCE OF EMERGENT INVASIVE SPECIES.
    - 3.2.2. COMPARATIVE ANALYSIS:
      - 3.2.2.1. INCLUDE DATA FROM THE CONTROL SITE TO ASSESS NATURAL ENVIRONMENTAL FLUCTUATIONS VERSUS SITE-SPECIFIC CONDITIONS.

4. **MONITORING REPORTS**
  - 4.1. SUBMIT DETAILED MONITORING REPORTS ANNUALLY TO THE MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE), MARYLAND DEPARTMENT OF NATURAL RESOURCES (DNR), UNITED STATES ARMY CORPS OF ENGINEERS (USACE), AND NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) FISHERIES. EACH REPORT MUST INCLUDE:
    - 4.1.1. A NARRATIVE OVERVIEW OF THE MITIGATION SITE CONDITIONS, MONITORING ACTIVITIES, AND PROGRESS TOWARDS PERFORMANCE STANDARDS.
    - 4.1.2. QUANTITATIVE DATA SUMMARIZING SAV COVERAGE, DENSITY, AND SPECIES COMPOSITION.
    - 4.1.3. PHOTOGRAPHS AND GEOREFERENCED MAPS SHOWING SAV BED PROGRESS AND SITE CONDITIONS.
  - 4.2. COMPARATIVE ANALYSIS OF MITIGATION AND CONTROL SITE DATA. REPORTS MUST OUTLINE ANY DEVIATIONS FROM PERFORMANCE STANDARDS AND RECOMMEND CORRECTIVE ACTIONS OR ADAPTIVE MANAGEMENT MEASURES.

5. **DOCUMENTATION AND SUPPORTING DATA**
  - 5.1. EACH MONITORING REPORT MUST INCLUDE:
    - 5.1.1. SUMMARY TABLES AND RAW DATA FOR ALL MONITORING PARAMETERS.
    - 5.1.2. GEOREFERENCED MAPS SHOWING SAV BED BOUNDARIES, MONITORING LOCATIONS, AND DEPTH CONTOURS.
    - 5.1.3. PHOTOGRAPHIC DOCUMENTATION, INCLUDING BOTH WIDE-ANGLE AND CLOSE-UP IMAGES, ILLUSTRATING SAV GROWTH AND SITE CONDITIONS.
  - 5.2. INCLUDE "AS-BUILT" DRAWINGS OF THE MITIGATION SITE TO COMPARE AGAINST BASELINE CONDITIONS.

6. **MONITORING PARTIES**
  - 6.1. QUALIFIED ENVIRONMENTAL PROFESSIONALS WILL CONDUCT ALL MONITORING ACTIVITIES TO ENSURE ACCURACY AND CONSISTENCY WITH PROJECT GOALS.
  - 6.2. THE MITIGATION PROJECT SPONSOR IS RESPONSIBLE FOR COORDINATING AND FUNDING ALL MONITORING EFFORTS AND SUBMITTING TIMELY REPORTS TO MDE.

7. **SUCCESS CRITERIA MONITORING**
  - 7.1. SUCCESS OF THE MITIGATION SITE SHALL BE DETERMINED BY COMPARING SUBMERGED AQUATIC VEGETATION (SAV) DENSITY AND COVERAGE TO THAT OF THE REFERENCE BED. "PERFORMANCE" WILL BE EVALUATED USING A "THRESHOLD VALUE" AND/OR "QUALITY RATIO" APPROACH, ENSURING THAT VARIABILITY IN ENVIRONMENTAL CONDITIONS IS ACCOUNTED FOR (SEE GAMBLE ET AL. 2021).
  - 7.2. THE MITIGATION SITE WILL BE DEEMED SUCCESSFUL IF, BY YEAR FIVE, ITS COVERAGE AND DENSITY MEET OR EXCEED THE ACCEPTABLE RATIO COMPARED TO THE REFERENCE BED. INTERIM ASSESSMENTS (YEARS 1-3) WILL DOCUMENT TRENDS TOWARD MEETING THESE THRESHOLDS, AND ADAPTIVE MANAGEMENT ACTIONS (E.G., REPLANTING OR RESEEDING) SHALL BE IMPLEMENTED IF THE MITIGATION SITE FALLS BELOW THE ACCEPTABLE RATIO BY YEAR 2.
  - 7.3. EVIDENCE OF ECOLOGICAL FUNCTIONALITY MUST ALSO BE DOCUMENTED, INCLUDING HABITAT USE BY AQUATIC SPECIES, SEDIMENT STABILIZATION, AND OTHER INDICATORS OF FUNCTIONAL PERFORMANCE RELATIVE TO THE REFERENCE BED.
  - 7.4. IF THE MITIGATION SITE MEETS OR EXCEEDS THE THRESHOLD VALUE OR QUALITY RATIO AFTER FIVE (5) YEARS, THE SITE WILL BE DEEMED SUCCESSFUL, AND NO FURTHER MONITORING WILL BE REQUIRED.

8. **ADAPTIVE MANAGEMENT INTEGRATION**
  - 8.1. MONITORING REPORTS MUST IDENTIFY AREAS WHERE PERFORMANCE STANDARDS ARE NOT MET AND PROVIDE DETAILED PLANS FOR CORRECTIVE MEASURES.
  - 8.2. REMEDIAL ACTIONS, SUCH AS SUPPLEMENTAL SEEDING, REPLANTING, OR NON-NATIVE SPECIES REMOVAL, MUST BE DOCUMENTED AND IMPLEMENTED PROMPTLY. REMOVAL OF NON-NATIVE SUBMERGED AQUATIC VEGETATION (E.G., MILFOIL) WITHIN THE PROJECT PLANTING AREA REQUIRES COORDINATION WITH REGULATORY AGENCIES PRIOR TO IMPLEMENTATION, AS THESE SPECIES MAY CONTRIBUTE TO HABITAT CONDITIONS THAT SUPPORT NATIVE SPECIES RECOGNITION.
  - 8.3. REASSES AND UPDATE MONITORING PROTOCOLS AS NECESSARY BASED ON PROJECT OUTCOMES AND SITE-SPECIFIC CHALLENGES.

## ADAPTIVE MANAGEMENT

1. **PURPOSE OF ADAPTIVE MANAGEMENT**
  - 1.1. ENSURE THE SUCCESS OF THE SUBMERGED AQUATIC VEGETATION (SAV) MITIGATION EFFORT BY ADDRESSING UNFORESEEN CHALLENGES AND DEVIATIONS FROM PERFORMANCE STANDARDS.
  - 1.2. PROVIDE A FRAMEWORK FOR PROACTIVE AND CORRECTIVE ACTIONS TO MAINTAIN ALIGNMENT WITH ECOLOGICAL AND REGULATORY GOALS.
2. **ADAPTIVE MANAGEMENT TRIGGERS**
  - 2.1. TRIGGERS FOR IMPLEMENTING ADAPTIVE MANAGEMENT INCLUDE:
    - 2.1.1. FAILURE TO MEET ANNUAL VEGETATIVE COVERAGE MILESTONES (E.G., 30% BY YEAR 1, 50% BY YEAR 3, AND 70% BY YEAR 5).
    - 2.1.2. DEVIATION FROM TARGET SAV DENSITY, SUCH AS EMERGENT INVASIVE SPECIES EXCEEDING 5% COVERAGE.
    - 2.1.3. EVIDENCE OF INADEQUATE SEED GERMINATION OR POOR SEEDLING SURVIVAL.

3. **CORRECTIVE ACTIONS**
  - 3.1. VEGETATIVE ADJUSTMENTS:
    - 3.1.1. CONDUCT SUPPLEMENTAL SEEDING OR REPLANTING IN UNDERPERFORMING AREAS USING VALLISNERIA AMERICANA SEEDS FROM APPROVED DONOR BEDS.
    - 3.1.2. INCREASE SEEDING DENSITY OR ADJUST PLANTING TECHNIQUES TO IMPROVE COVERAGE AND SUCCESS RATES.
  - 3.2. INVASIVE SPECIES CONTROL:
    - 3.2.1. REMOVE INVASIVE VEGETATION THROUGH MANUAL METHODS WITHOUT THE USE OF ANY HERBICIDES.
    - 3.2.2. REPLANT CLEARED AREAS WITH NATIVE VALLISNERIA AMERICANA TO PREVENT RECOLONIZATION.

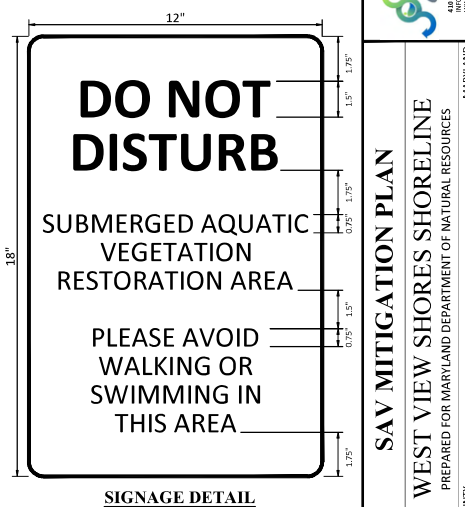
4. **MONITORING AND ASSESSMENT POST-CORRECTION**
  - 4.1. CONDUCT FOLLOW-UP MONITORING AFTER CORRECTIVE ACTIONS TO EVALUATE THEIR EFFECTIVENESS AND ENSURE PROGRESS TOWARD PERFORMANCE STANDARDS.
  - 4.2. DOCUMENT IMPROVEMENTS IN SAV COVERAGE, DENSITY, AND ECOLOGICAL FUNCTIONALITY IN SUBSEQUENT MONITORING REPORTS.
  - 4.3. COMPARE POST-CORRECTION DATA WITH CONTROL SITE BENCHMARKS TO ASSESS RELATIVE SUCCESS.

5. **STAKEHOLDER COORDINATION**
  - 5.1. COLLABORATE WITH REGULATORY AGENCIES, INCLUDING THE MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE) AND DEPARTMENT OF NATURAL RESOURCES (DNR), TO REVIEW AND APPROVE ADAPTIVE MANAGEMENT MEASURES.
  - 5.2. ENGAGE WITH STAKEHOLDERS TO ENSURE COMPLIANCE WITH MITIGATION GOALS AND ADDRESS POTENTIAL CONCERNS PROMPTLY.

6. **TIMING AND IMPLEMENTATION**
  - 6.1. ADAPTIVE MEASURES MUST BE INITIATED WITHIN ONE GROWING SEASON OF IDENTIFYING A PERFORMANCE DEFICIENCY.
  - 6.2. REMEDIATION PLANS WILL INCLUDE A TIMELINE FOR IMPLEMENTATION, ANTICIPATED OUTCOMES, AND SPECIFIC RESPONSIBILITIES FOR PROJECT TEAM MEMBERS.

7. **DOCUMENTATION AND REPORTING**
  - 7.1. INCLUDE ALL ADAPTIVE MANAGEMENT ACTIONS IN ANNUAL MONITORING REPORTS, SPECIFICALLY:
    - 7.1.1. THE IDENTIFIED ISSUE AND ITS IMPACT ON PERFORMANCE STANDARDS.
    - 7.1.2. DETAILS OF CORRECTIVE MEASURES TAKEN, INCLUDING METHODS, LOCATIONS, AND TIMING.
    - 7.1.3. POST-CORRECTION MONITORING RESULTS AND ANY FURTHER RECOMMENDATIONS.
  - 7.2. MAINTAIN DETAILED RECORDS OF ALL ADAPTIVE MANAGEMENT ACTIONS, INCLUDING PHOTOGRAPHS, MAPS, AND MONITORING DATA, FOR SUBMISSION TO MDE.

8. **LONG-TERM CONSIDERATIONS**
  - 8.1. PERIODICALLY REASSESS ADAPTIVE MANAGEMENT PROTOCOLS TO INCORPORATE LESSONS LEARNED AND ADVANCES IN SAV RESTORATION TECHNIQUES.



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Sustainable science

SAV MITIGATION PLAN  
WEST VIEW SHORES SHORELINE  
PREPARED FOR MARYLAND DEPARTMENT OF NATURAL RESOURCES

CECIL COUNTY