



# Maryland

## Department of the Environment

Larry Hogan, Governor  
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary  
Horacio Tablada, Deputy Secretary

July 2, 2019

James and Janet Clauson and Diane Lawrence  
c/o Underwood & Associates  
901-A Commerce Road  
Annapolis, MD 21401

Re: Agency Interest Number: 105789  
Tracking Number: 201760607/19-WQC-0002

Dear Mr. and Mrs. Clauson and Ms. Lawrence:

The U.S. Army Corps of Engineers (USACE) determined that a separate review and issuance of the federal permit will be required from the USACE for the project. Since your project did not qualify for approval under the Maryland State Programmatic General Permit (MDSPGP) issued by the USACE for qualifying projects, it requires an individual Water Quality Certification (WQC) to be issued by the Maryland Department of the Environment (the "Department" or "MDE").

Attached please find a copy of the Individual Water Quality Certification, 19-WQC-0002,, 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. As noted, the USACE is conducting an individual review of your application and any correspondence or approvals will come under separate cover from USACE. The federal permit is not attached. The Wetlands License, 17-WL-0367, currently under review by MDE, is also not attached and that decision will also be mailed to you under separate cover.

This Water Quality Certification is a final agency decision. Any person aggrieved by the Department's decision to issue this WQC may appeal such decision in accordance with COMAR 26.08.02.10F(4). A request for appeal shall be filed with the Department within 30 days of publication of the final decision, and specify in writing the reason why the final decision should be reconsidered. A request for appeal shall be submitted to: Secretary of the Environment, Maryland Department of the Environment, 1800 Washington Boulevard, Baltimore, MD 21230. Any request for an appeal does not stay the effectiveness of this WQC.

You should not begin any work until you have obtained all necessary State, local, and federal authorizations. Please contact Heather Hepburn at heather.hepburn1@maryland.gov or 410-537-3789 with any questions.

Sincerely,

Jonathan Stewart, Chief  
Eastern Region  
Tidal Wetlands Division

Attachments: 19-WQC-0002 & Attachments

cc: Rich Kibby, USACE  
Bill Morgante, BPW



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



for  
19-WQC-0002

WATER QUALITY CERTIFICATION NUMBER: **19-WQC-0002**

EFFECTIVE DATE: **July 2, 2019**

EXPIRATION DATE: **July 1, 2025**

CERTIFICATION HOLDER: **James and Janet Clauson and Diane  
Lawrence**

ADDRESS: **301 and 300 Kyle Road  
Crownsville, MD 21032**

PROJECT LOCATION: **300, 301, and 303 Kyle Road  
Crownsville, MD 21032  
Severn River in Anne Arundel County**

**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 WATER AND SCIENCE ADMINISTRATION (“ADMINISTRATION”) HAS DETERMINED THAT THE REGULATED ACTIVITY DESCRIBED IN THE ATTACHED PLAN SHEETS DATED APRIL 29, 2019 WILL NOT VIOLATE MARYLAND’S WATER QUALITY STANDARDS, IF CONDUCTED IN ACCORDANCE WITH THE CONDITIONS OF THIS CERTIFICATION. A COPY OF THE PROJECT DRAWINGS DATED APRIL 29, 2019 AND OTHER ATTACHMENTS, IS ATTACHED HERETO AND IS HEREBY INCORPORATED BY REFERENCE.**

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.

**PROJECT DESCRIPTION**

The Baltimore District of the United States Army Corps of Engineers (USACE) received an application for a Department of Army permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 and/or Section 404 of the Clean Water Act (33 U.S.C. 1344) to construct the following:

The purpose of the project is to provide shoreline stabilization and restore existing marsh to create and enhance aquatic habitat and contribute to improvements in water quality.

1. To cut and bury an existing bulkhead, and remove or bury an existing revetment;

2. Enhance existing marsh by eradicating Phragmites, covering and filling marsh enhancement area with approximately 4 inches of well graded mix, and planting with approximately 5,434 square feet of marsh vegetation.
3. Construct four segmented breakwaters and one hooked containment groin with cobble toes and erratic headland boulders, all associated with a tombolo style living shoreline with the segmented breakwaters extending 65 to 75 feet channelward of the mean high water line and the hooked containment groin extending 140 feet channelward of the mean high water line; fill and grade with approximately 3,692.8 cubic yards of sand, gravel, cobbles and boulders along 454 feet of eroding shoreline and 457 feet of shoreline with existing revetment or bulkhead to be removed or buried; emplace coarse woody debris to function as sand containment groins; emplace approximately 80 linear feet of boulder outcrops channelward of the mean high water line; and plant with approximately 35,211 square feet of marsh vegetation and approximately 1,000 square feet of transitional plantings.
4. Install a buried outfall pipe bedded with pea gravel to exfiltrate stormwater.

In a Public Notice issued on July 9, 2018, the USACE requested a Maryland Water Quality Certification for the project and that a decision is issued within one year from the date of the public notice.

### **APPLICABLE MARYLAND WATER QUALITY STANDARDS AND REQUIREMENTS**

In order to protect surface water quality in Maryland, the State has enacted water quality standards pursuant to §§ 9-313 through 9-323, Environment Article, Annotated Code of Maryland, and COMAR 26.08.02. These standards help to assure that the waterways of Maryland are useable for drinking water, swimming, fishing, industry, and agriculture. Water quality standards in Maryland include designated uses. The designated use helps to define the intended goals, objectives, and uses of each waterway. The Severn River and Chesapeake Bay have been designated as Class II waterways. The designated uses for Class II waterways include fishing, water contact sports, agricultural and industrial water supply, growth and propagation of fish, other aquatic life and wildlife, shellfish harvesting, and open-water fish and shellfish use. In the Chesapeake Bay, there are additional uses including seasonal uses for migratory fish spawning and nurseries, shallow water submerged aquatic vegetation, deep-water fish and shellfish, and deep-channel refuge.

Shoreline erosion control measures in State tidal waters, including the Severn River, are subject to the Living Shoreline Protection Act of 2008. This law mandates the use of non-structural stabilization measures (e.g. living shoreline) for erosion control wherever such measures are technically feasible (§16-201(c)), because of their co-benefits with regard to water quality and enhancement of near shore habitat. The Maryland General Assembly in enacting the Living Shoreline Protection Act of 2008 determined that living shorelines are required wherever feasible because of their resilience to climate change, their benefits in creation of shoreline marsh habitat, and their contribution to sediment and nutrient pollution reduction in waters of the State.

When non-structural stabilization is not feasible, a person may apply for a waiver to construct structural stabilization measures (e.g., revetment). COMAR 26.24.04.01-2 establishes specific site characteristics that must be evaluated to determine whether a site is suitable to support a non-structural shoreline stabilization measure, including: the width of the waterway, the bottom elevation and slope at mean low water, the bottom substrate, the bank elevation and orientation, the degree of erosion, the height and regularity of tides, other physical constraints or potential impacts to relevant environmental resources. The Department considers the cumulative weight of these characteristics rather than making a determination based on one site characteristic alone. During the course of the project review, a determination will be made as to whether a site qualifies for a waiver from compliance with the statute.

## SUMMARY OF FINDINGS

- A. The existing shoreline at the southern end of the project area is eroding. The applicant submits that this erosion is occurring at a rate of 0.52 feet per year.
- B. The only existing tidal marsh within the project area is sand spit at the southern point of the project area dominated by the invasive plant, *Phragmites*. The applicant seeks to enhance existing marsh by eradicating *Phragmites*, covering and filling the marsh enhancement area with approximately 4 inches of well graded mix, and planting with approximately 5,434 square feet of native marsh vegetation.
- C. The applicant seeks to stabilize the shorelines and protect from erosion through a 100 year storm event and provide ecological uplift at the site and create and enhance habitat. This includes the cutting and burying of an existing bulkhead as well as removing or burying an existing revetment and constructing a non-structural shore erosion control structure (i.e. living shoreline) in place.
- D. MDE finds that the project, as recommended by MDE in its Report and Recommendation, dated May 30, 2019, for licensing by the Maryland Board of Public Works (BPW) and attached hereto, meets the project purpose and need with regard to protection of the shoreline through a 100 year storm event, ecological uplift, and water quality-related benefits.
- E. MDE finds that the various components of the project design as recommended by MDE for licensing by the BPW are necessary to meet the project goals. Additionally, alternative designs may not meet the project purpose and need with regard to protection of the shoreline through a 100 year storm event, ecological uplift, and water quality-related benefits.
- F. Based on available information and specific site conditions, the Department has determined that construction of a living shoreline is feasible at this site. The proposed site has shallow water depths, suitable sunlight, a wide waterway, adequate separation from the navigable main portion of the waterway, and access to the shoreline from uplands, all of which are factors that support the use of nonstructural stabilization measures.

## CERTIFICATION STATEMENTS AND CONDITIONS

MDE certifies that the project as proposed by MDE for licensing by the Board of Public Works (BPW) complies with applicable water quality standards and requirements (COMAR 26.08.02), including the Living Shoreline Protection Act of 2008, provided that the Licensee complies with all of the provisions, requirements, and conditions of the Maryland Wetlands License when issued and as follows:

- A. The project shall include the cutting and burying of the existing bulkhead and the removal or burial of the existing revetment in accordance with the State Wetlands License.
- B. The project shall include the enhancement of existing marsh by eradicating *Phragmites*, covering and filling the marsh enhancement area with approximately 4 inches of well-graded mix, and planting with approximately 5,434 square feet of marsh vegetation in accordance with the State Wetlands License.
- C. The project shall consist of the construction of 4 segmented breakwaters and one hooked containment groin with cobble toes and erratic headland boulders, all associated with a tombolo style living shoreline with the segmented breakwaters extending 65 to 75 feet channelward of the mean high water line and the hooked containment groin extending 140 feet channelward of the mean high water line; the filling and grading with approximately 3,692.8 cubic yards of sand, gravel, cobbles and boulders along 454

feet of eroding shoreline and 457 feet of shoreline with existing revetment or bulkhead to be removed or buried; the emplacement of coarse woody debris to function as sand containment groins; the emplacement of approximately 80 linear feet of boulder outcrops channelward of the mean high water line and the planting with approximately 35,211 square feet of marsh vegetation and approximately 1,000 square feet of transitional plantings in accordance with the State Wetlands License.

- D. The project shall include the installation of a buried outfall pipe bedded with pea gravel to exfiltrate stormwater in accordance with the State Wetlands License.
- E. The Certification does not relieve the Certificate Holder from the responsibility of obtaining all necessary federal, State, and local government authorizations. The Certificate Holder shall obtain Wetlands License 17-0367 prior to the commencement of construction.
- F. The Certificate Holder shall construct the marsh establishment area in accordance with the following conditions:
  - 1) The Certificate Holder shall use clean substrate fill material, no more than 10% of which shall pass through a standard number 100 sieve.
  - 2) The marsh establishment area shall be planted within one year following completion of the filling operation.
  - 3) The marsh establishment project shall be maintained as a wetland, with non-nuisance species' aerial coverage of at least 85% for three consecutive years. If 85% coverage is not attained, the reasons for failure shall be determined, corrective measures shall be taken, and the area shall be replanted.
  - 4) If the fill is graded hydraulically, the Certificate Holder shall use a turbidity curtain around the perimeter of the in stream work.
  - 5) If the existing bank is to be cleared or graded:
    - a) The Certificate Holder 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
    - b) The Certificate Holder 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.
- G. The Certificate Holder shall accept the terms of the attached marsh maintenance plan and Phragmites Control Plan by signing and returning the standard plan to the Water and Science Administration, Tidal Wetlands Division prior to commencement of any work authorized under this Water Quality Certification. If the Certificate Holder wishes to propose an alternative marsh maintenance plan and Phragmites Control Plan, the alternative plan must be submitted to and approved by the Tidal Wetlands Division, Water and Science Administration, prior to commencement of any work authorized under this Water Quality Certification. Any alternative plan must provide assurances of success that are at least equivalent to those of the standard plan, in terms of the extent of native marsh plant coverage, elimination of invasive species, and timeframe for plant establishment.
- H. The Certificate Holder shall not stockpile any material in State or private tidal wetlands.
- I. The Certificate Holder shall submit photographs on an annual basis for the first five growing seasons to the Tidal Wetlands Division, Water and Science Administration in order to document the success of the project in terms of the extent of native marsh plant coverage. Photographs shall be taken from at least two directions, as necessary to fully depict the living shoreline.
- J. The Certificate Holder shall obtain a Toxic Material Permit from MDE (contact MDE at 410-537-3619) prior to the application of any herbicide to eradicate Phragmites. Toxic materials use permits are

required for any homeowner, farmer, local government, or other person who wants to control aquatic life in ponds, ditches, or waterways by the deliberate use of chemicals.

- K. The Certificate Holder shall plant the existing Phragmites area depicted on the existing plans dated April 29, 2019 with native high and low marsh vegetation.
- L. The Certificate Holder shall securely anchor the woody debris depicted on the plan sheets, dated April 29, 2019. Prior to the commencement of any work authorized under this Water Quality Certification, the Certificate Holder shall submit an action plan to MDE and the BPW Wetlands Administrator providing assurances that the woody debris is properly anchored and actions that will be taken if the woody debris becomes unanchored and/or becomes a navigation hazard.
- M. The Certificate Holder shall use the well graded mix within the project area as depicted on the attached plans dated April 29, 2019.
- N. The Certificate Holder shall deploy and maintain a turbidity curtain tightly around and channelward of the project area prior to any excavation and backfilling along the shoreline through completion of any excavation and backfilling along the shoreline.
- O. The Certificate Holder shall clearly mark or illuminate the outermost extent of the terminal hook groin according to United States Coast Guard regulations.
- P. The Certificate Holder shall, prior to installation, register the marker and/or illumination with the "Local Notice to Mariners" published by the U.S. Coast Guard's Fifth Coast Guard District, Federal Building, 431 Crawford Street, Portsmouth, Virginia 23705, 757-398-6486.
- Q. Prior to the start of construction, the Certificate Holder shall retain a qualified full-time Independent Environmental Monitor (IEM) that is independent from the Certificate Holder, design consultants, and construction contractors working on the project. The Certificate Holder shall retain an IEM to assess compliances with all conditions of this and other applicable permits, licenses, and environmental regulations. The Certificate Holder shall develop a project-specific IEM Manual detailing all IEM responsibilities and procedures and submit the manual to MDE for review and approval prior to implementation. MDE and the BPW Wetlands Administrator shall be provided with the opportunity to review the qualifications of the IEM proposed by the Certificate Holder and shall provide concurrence that the candidate is qualified to perform the IEM role. The IEM shall:
  - 1) Review design submittals and construction activities for compliance with all conditions of this Water Quality Certification and other applicable permits and environmental regulations;
  - 2) Report findings directly and concurrently to MDE's Tidal Wetlands Division, the Army Corps of Engineers (the Corps), and BPW Wetlands Administrator, notifying them and the Certificate Holder immediately of any reported or observed violations or non-compliance issues within the terms or conditions of the Wetlands License, the Water Quality Certification, or approved plans and specifications;
  - 3) Document impacts to regulated resources by developing and maintaining a detailed tracking list of impacted resources; and
  - 4) Assist with identification of ongoing opportunities for further avoidance and minimization of impacts to regulated environmental resources and protection of water quality.
- R. A pre-construction meeting shall be held with MDE, the Corps, BPW Wetlands Administrator, the IEM, other agency stakeholders, and the Certificate Holder's primary contractors and subcontractors, to provide the opportunity for all to review and discuss the construction plans and Water Quality

Certification conditions. All meeting participants shall be notified of this meeting a minimum of 14 days prior to the date of the meeting.

- S. Should the final design result in necessary impacts greater than those approved in this Water Quality Certification, a Joint Permit Application to modify the Tidal Wetlands License shall be required prior to initiation of work. The Certificate Holder shall submit any required documentation for review by MDE as part of the request for modification. Should unplanned impacts occur (such as failure of sediment and erosion control or equipment exceeding the limits of disturbance); the affected area shall be restored to their pre-existing contours and elevations and monitored. Additional public notice may be required for impacts and/or a scope of work in excess of those included in this Water Quality Certification.
- T. The Certificate Holder shall conduct bathymetric surveys of the Fox Creek dredged channel as authorized in Wetlands License 15-0142, and forward to the Tidal Wetlands Division, Water and Science Administration and the BPW Wetlands Administrator within 45 days of the completion of the bathymetric survey. These surveys shall be conducted prior to the start of construction, one month after the completion of construction, and six months after the completion of construction.
- U. If MDE and the BPW Wetlands Administrator, taking into account the bathymetric surveys set forth in Special Condition R, determine that the project has adversely impacted navigation of the dredged channel at the inlet of Fox Creek, then MDE may direct the Certificate Holder to develop a remedial action plan. The plan must include a timetable to take appropriate corrective action. If the Certificate Holder does not submit the remedial action plan within 45 days of being directed to do so or if the Certificate Holder has not initiated the remedial action within 45 days of MDE, MDE may take necessary enforcement action.
- V. At the direction of MDE the Certificate Holder shall undertake and complete the remedial actions set forth in the plan. If the remedial action is required, MDE may extend the monitoring period and require additional bathymetric surveys.
- W. Following the completion of construction, the Certificate Holder shall provide MDE with as-built plans of the project authorized by this Water Quality Certification.

#### **GENERAL CONDITIONS**

- A. The proposed project shall be constructed in a manner which will not violate Maryland's water quality standards as set forth in COMAR 26.08.02. The applicant is to notify this Department ten (10) days prior to commencing work. Verbal notification is to be followed by written notice within ten (10) days.
- B. MDE has determined that the proposed activities comply with, and will be conducted in a manner consistent with the State's Coastal Zone Management Program, as required by Section 307 of the Federal Coastal Zone Management Act of 1972, as amended.
- C. If the authorized work is not performed by the property owner, all work performed under this Water Quality Certification 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. A list of licensed marine contractors may be obtained by contacting the MCLB at 410-537-3249, by e-mail at [MDE.MCLB@maryland.gov](mailto:MDE.MCLB@maryland.gov) or by accessing the Maryland Department of the Environment, Environmental Boards webpage.
- D. The Certificate Holder shall ensure the proposed project is constructed in accordance with the authorized plan and any authorized revisions.

- E. The Certificate Holder shall ensure that 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 the State.
- F. The Certificate Holder shall notify the Tidal Wetlands Division, Water and Science Administration in writing, upon transferring property ownership or responsibility for compliance with these conditions to another person. The new owner/operator shall request, in writing, transfer of this Water Quality Certification to his/her name.
- G. The Certificate Holder shall allow representatives of MDE to inspect the authorized activities at reasonable times and cooperate with those inspections.
- H. The Certificate Holder shall ensure that a copy of this Certification, including all approved plans, is available at the site until the authorized work is complete.
- I. The Certification does not relieve the Certificate Holder from the responsibility of obtaining all necessary federal, State, and local government authorizations.
- J. The Certificate Holder shall conduct the authorized work in accordance with the plans and drawings dated April 29, 2019 which are hereby incorporated into this Water Quality Certification. Until this authorized work is complete, the Certificate Holder shall have available at this site a copy of this Water Quality Certification including the plans and drawings.
- K. This Certificate Holder constitutes Maryland's authorization to conduct the authorized work under the State Water Quality Certification Law.. This Water Quality Certification does not bestow any other federal, State, or local government authorization.
- L. The Certificate Holder shall have all proposed work above Mean High Water reviewed and authorized by the local county Department of Planning and Zoning or applicable agency.
- M. The Certificate Holder shall notify MDE's Inspection and Compliance Program by phone (410-537-3510) AND in writing (MDE, Inspection and Compliance Program, 1800 Washington Boulevard, Baltimore, MD 21230) of the following:
  - 1) Start date at least five business days before beginning work; and
  - 2) Completion data no more than five business days after project completion.
- N. The Certificate Holder shall conduct the authorized work in accordance with Critical Area Commission requirements. This Water Quality Certification does not authorize disturbance in the Buffer. If authorized work will disturb the Buffer, the Certificate Holder shall have a Commission-approved or locally-approved Buffer Management Plan before beginning the authorized work. "Buffer" means the 100-foot Critical Area Buffer and any expanded area that is immediately landward of the mean high water line of the tidal waters or is immediately landward of tidal wetlands. The Buffer includes expanded contiguous area if the contiguous area includes steep slopes, hydric soil, or highly erodible soil, or otherwise meets the criteria of COMAR 27.01.09.01E (7). "Disturbance" means any alteration or change to the land including any amount of clearing. Clearing includes vegetation removal, grading, and construction activity.
- O. The Certificate Holder may not fill, dredge, or otherwise alter or destroy tidal marsh or its vegetation unless this Water Quality Certification specifically authorizes the activity.
- P. The Certificate Holder shall allow unfettered public use of State wetlands and State tidal waters of the U.S.
- Q. This Water Quality Certification does not transfer a property interest of the State.



- R. The Certificate Holder shall file a Miss Utility ticket for the proposed work at least 10 days before beginning work. Miss Utility: 800-257-7777
- S. The Certificate Holder shall ensure that structures (for example, piers and piles) removed from the site are taken to an approved upland disposal facility. If the authorized work impacts more than 5,000 square feet or includes 100 or more cubic yards of fill, the Certificate Holder shall conduct the authorized work in accordance with a locally-approved Soil Erosion and Sediment Control Plan.
- T. This Water Quality Certification is granted only to the Certificate Holder. The Certificate Holder may transfer the Water Quality Certification only with written approval from MDE. If MDE approves the transfer, the transferee is subject to all Certification terms and conditions.
- U. The Water Quality Certification shall indemnify, defend, and save harmless the State of Maryland, its officials, officers, and employees from and against any and all liability, suits, claims, and actions of whatever kind, caused by or arising from, the work this Water Quality Certification authorizes.
- V. The Maryland Department of the Environment may modify, suspend, or revoke this Water Quality Certification in its reasonable discretion.
- W. This Water Quality Certification expires July 1, 2025. If the authorized work is not completed by the expiration date, all activity must stop.
- X. A Water Quality Certification may be extended prior to the expiration of the term. The Certificate Holder must request an extension in writing from MDE 14 days prior to the expiration of the term
- Y. Failure to comply with these conditions shall constitute reason for suspension or revocation of the Water Quality Certification, and legal proceedings may be instituted against the Certificate Holder in accordance with the Annotated Code of Maryland.

**CERTIFICATION APPROVED**



\_\_\_\_\_  
 Lee Currey, Director  
 Water and Science Administration

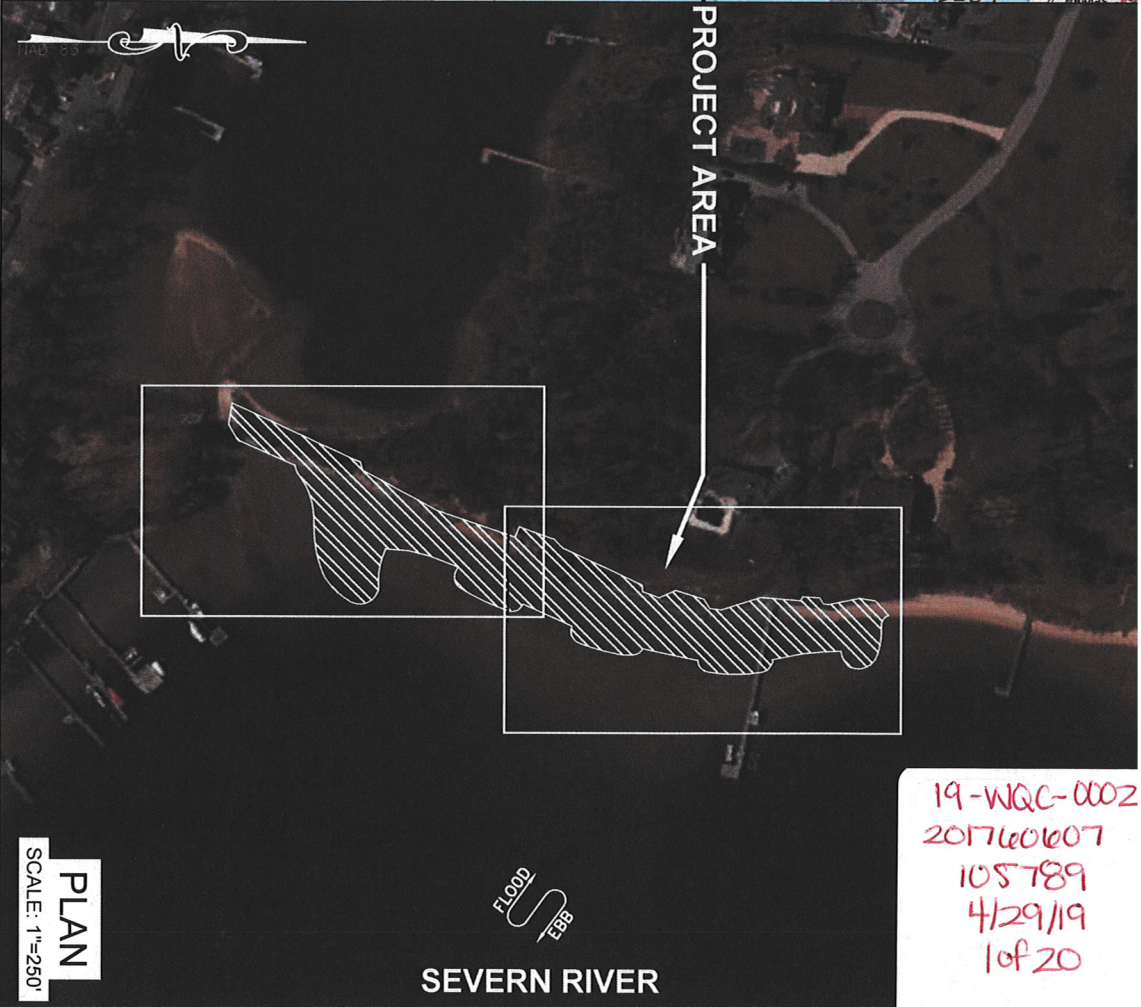
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 Date

Tracking Number: 201760607  
 Agency Interest Number: 105789  
 Water Quality Certification Number: 19-WQC-0002

Effective Date: July 2, 2019

Enclosure:  
 Plan sheets dated April 29, 2019 with all attachments.  
 Report and Recommendation to BPW  
 Marsh Maintenance Plan

cc: WMA Inspection & Compliance Program  
 Rich Kibby, USACE  
 Bill Morgante, BPW



19-WQC-002  
201760607  
105789  
4/29/19  
1 of 20

PLAN  
SCALE: 1"=250'

SHEET 1 OF 20  
APRIL 29<sup>TH</sup>, 2019

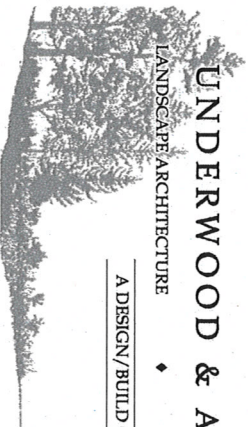
VICINITY MAP AND AERIAL PHOTO

LIVING SHORELINE

AH# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
DIANE LAWRENCE - 300 KYLE ROAD  
CROWNSVILLE, MARYLAND, 21032  
MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

DESCRIPTION SHEET

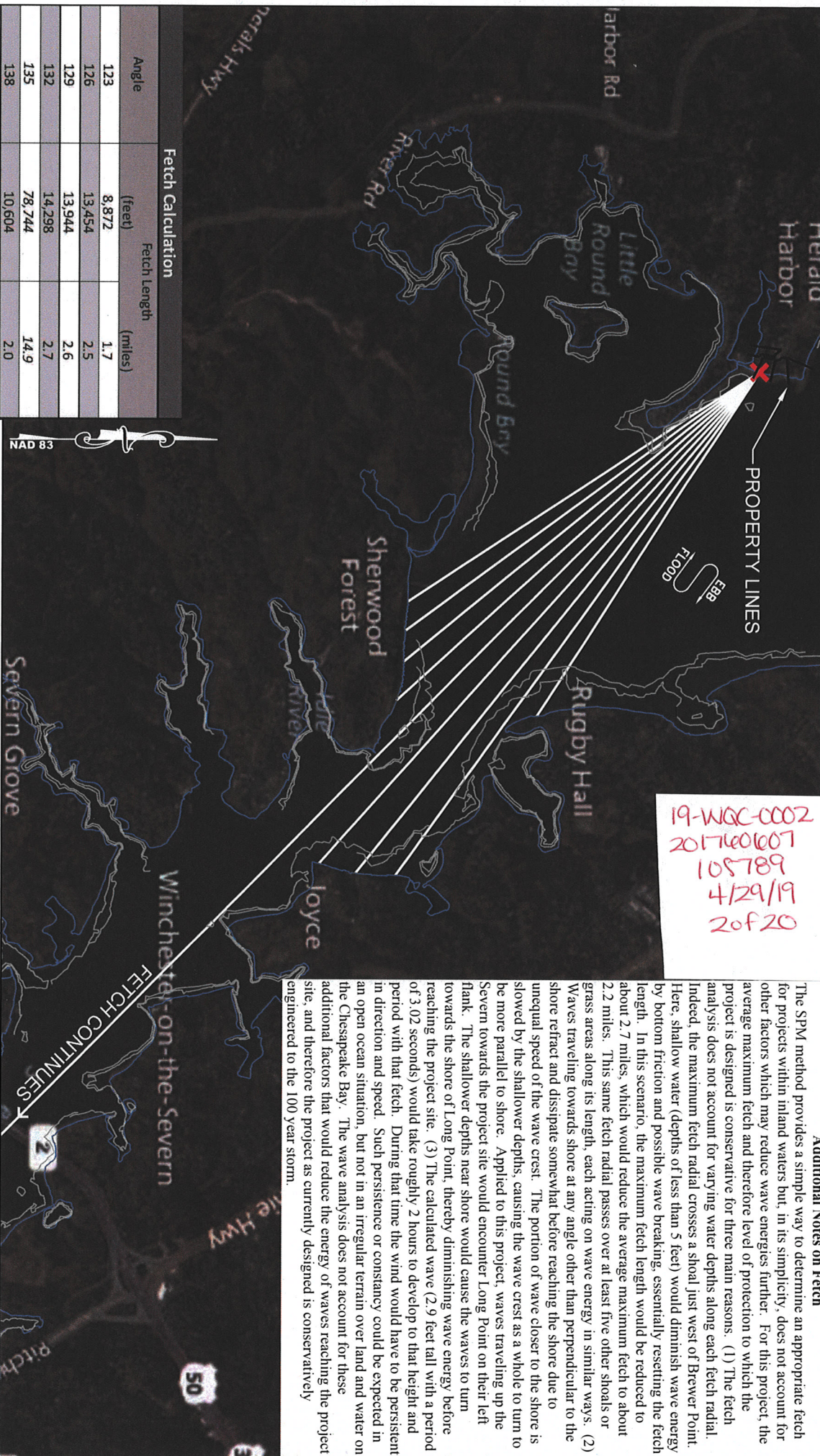
- VICINITY MAP AND AERIAL PHOTO.....1
- PROJECT VICINITY CONDITIONS.....2
- EXISTING CONDITIONS.....3-4
- PROPOSED CONDITIONS.....5-6
- PROJECT CROSS SECTIONS.....7-17
- PROJECT DETAILS.....18-19
- PROJECT DATA TABLES.....20



1753 EBLING TRAIL • ANNAPOLIS, MD 21401  
tel. 410-849-3211 fax. 410-849-2136

The SPM method provides a simple way to determine an appropriate fetch for projects within inland waters but, in its simplicity, does not account for other factors which may reduce wave energies further. For this project, the average maximum fetch and therefore level of protection to which the project is designed is conservative for three main reasons: (1) The fetch analysis does not account for varying water depths along each fetch radial. Indeed, the maximum fetch radial crosses a shoal just west of Brewer Point. Here, shallow water (depths of less than 5 feet) would diminish wave energy by bottom friction and possible wave breaking, essentially resetting the fetch length. In this scenario, the maximum fetch length would be reduced to about 2.7 miles, which would reduce the average maximum fetch to about 2.2 miles. This same fetch radial passes over at least five other shoals or grass areas along its length, each acting on wave energy in similar ways. (2) Waves traveling towards shore at any angle other than perpendicular to the shore retract and dissipate somewhat before reaching the shore due to unequal speed of the wave crest. The portion of wave closer to the shore is slowed by the shallower depths, causing the wave crest as a whole to turn to be more parallel to shore. Applied to this project, waves traveling up the Severn towards the project site would encounter Long Point on their left flank. The shallower depths near shore would cause the waves to turn towards the shore of Long Point, thereby diminishing wave energy before reaching the project site. (3) The calculated wave (2.9 feet tall with a period of 3.02 seconds) would take roughly 2 hours to develop to that height and period with that fetch. During that time the wind would have to be persistent in direction and speed. Such persistence or constancy could be expected in an open ocean situation, but not in an irregular terrain over land and water on the Chesapeake Bay. The wave analysis does not account for these additional factors that would reduce the energy of waves reaching the project site, and therefore the project as currently designed is conservatively engineered to the 100 year storm.

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4/29/19  
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**Fetch Calculation**

Angle	Fetch Length (feet)	Fetch Length (miles)
123	8,872	1.7
126	13,454	2.5
129	13,944	2.6
132	14,298	2.7
135	78,744	14.9
138	10,604	2.0
141	9,947	1.9
144	9,507	1.8
147	9,106	1.7
<b>Average</b>	<b>18,720</b>	<b>3.5</b>

Note: The fetch is defined as the region in which the wind speed and direction are reasonably constant. In river settings, the fetch is limited by surrounding landforms. Under these circumstances, the USACE Shoreline Protection Manual recommends determining the fetch length by extending 9 radials from the point of interest at 3-degree intervals (centered on the maximum wind direction) until they intercept the opposite shoreline. The average of the 9 radial lengths represents the fetch length for a given wind direction. The angles shown above are based on north being equal to 0 and 360 degrees, east being equal to 90 degrees, and progressing so forth.

PLAN SCALE: 1"=3000'

**UNDERWOOD & ASSOCIATES**

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION  
A DESIGN/BUILD CO.



1753 EBLING TRAIL • ANNAPOLIS, MD 21401  
tel. 410-849-3211 fax. 410-849-2136

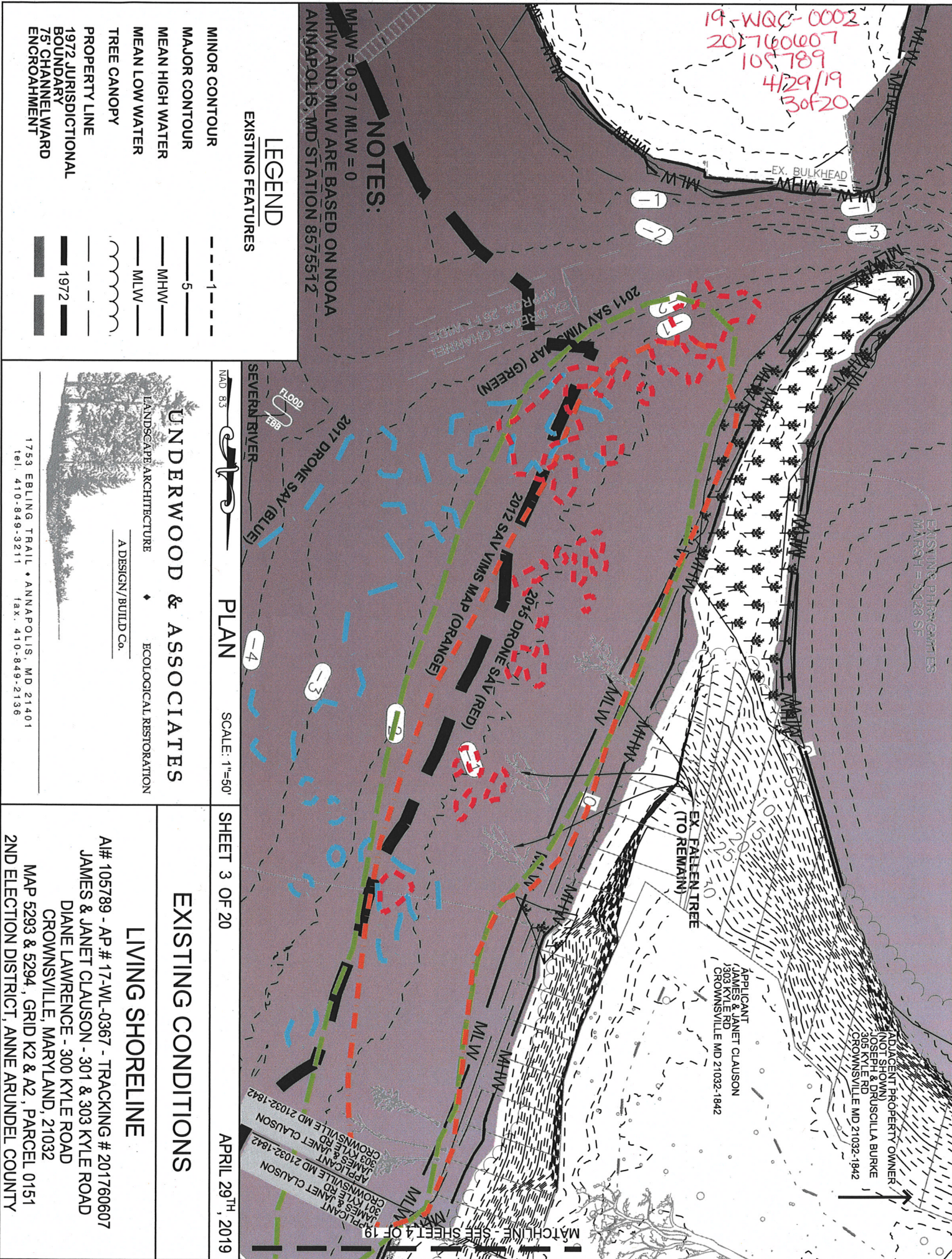
SHEET 2 OF 20

APRIL 29<sup>TH</sup>, 2019

**PROJECT VICINITY CONDITIONS**

**LIVING SHORELINE**

A# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
DIANE LAWRENCE - 300 KYLE ROAD  
CROWNSVILLE, MARYLAND, 21032  
MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY



**NOTES:**

MHW = 0.97 / MLW = 0  
 MHW AND MLW ARE BASED ON NOAA  
 ANNAPOLIS, MD STATION 8575512

**LEGEND**  
 EXISTING FEATURES

- MINOR CONTOUR
- MAJOR CONTOUR
- MEAN HIGH WATER
- MEAN LOW WATER
- TREE CANOPY
- PROPERTY LINE
- 1972 JURISDICTIONAL BOUNDARY
- 75' CHANNELWARD ENCROACHMENT

NAD 83 PLAN

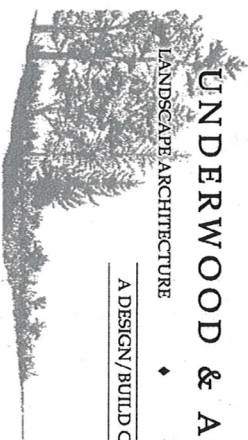
SCALE: 1"=50'

SHEET 3 OF 20

APRIL 29<sup>TH</sup>, 2019

**UNDERWOOD & ASSOCIATES**

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION  
 A DESIGN/ BUILD CO.

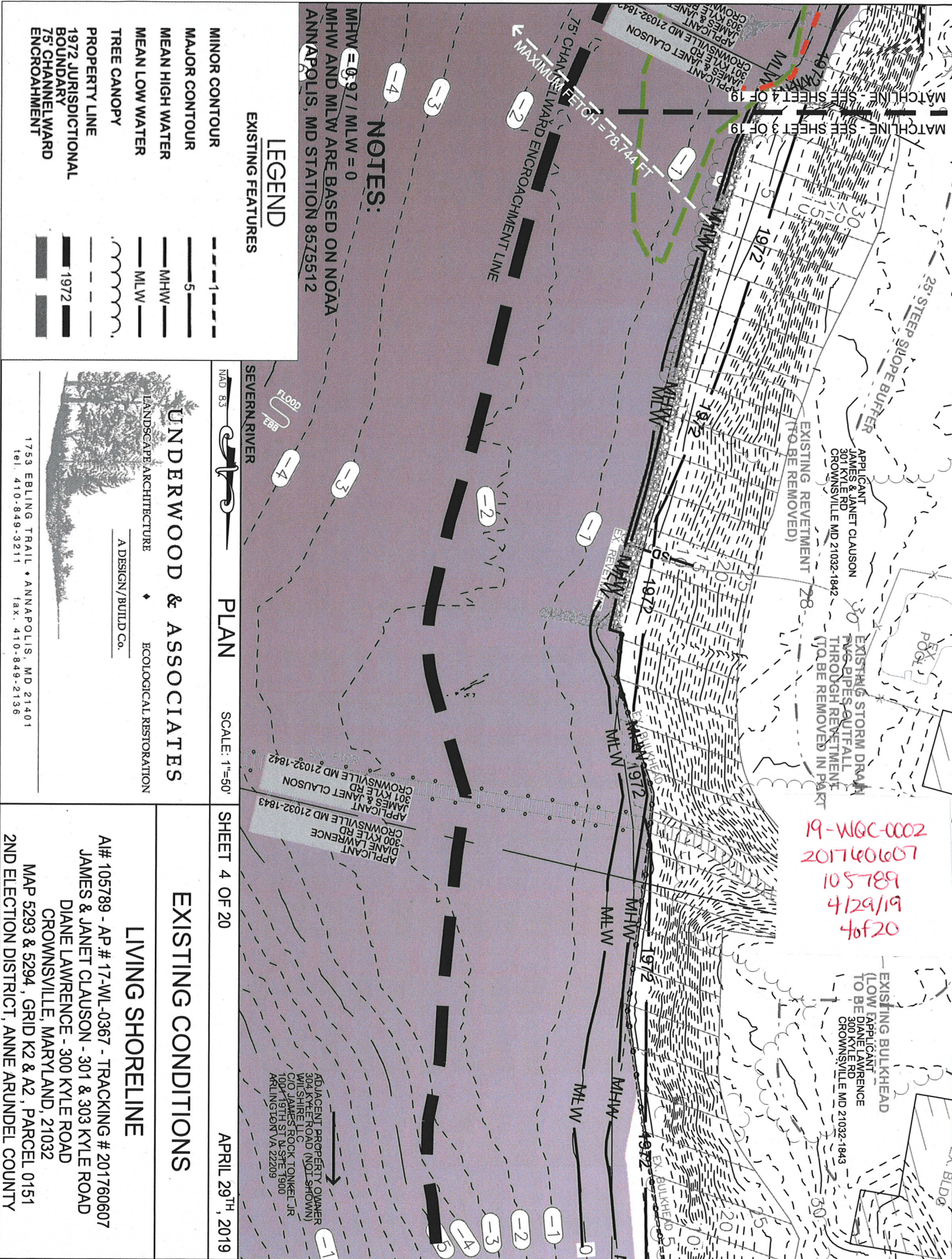


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 tel. 410-849-3211 fax. 410-849-2138

**EXISTING CONDITIONS**

**LIVING SHORELINE**

AH# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY



**NOTES:**  
 MHW = 0.97 / MLW = 0  
 MHW AND MLW ARE BASED ON NOAA ANNAPOLIS, MD STATION 8575512

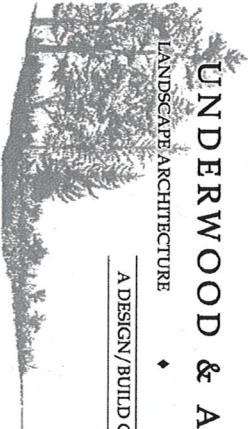
**LEGEND**  
 EXISTING FEATURES

- MINOR CONTOUR -1-
- MAJOR CONTOUR -5-
- MEAN HIGH WATER -MHW-
- MEAN LOW WATER -MLW-
- TREE CANOPY
- PROPERTY LINE
- 1972 JURISDICTIONAL BOUNDARY
- 75' CHANNEL WARD ENCROACHMENT

SEVERN RIVER  
 NAD 83  
 PLAN  
 SCALE: 1"=50'

**UNDERWOOD & ASSOCIATES**

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION  
 A DESIGN/BUILD CO.



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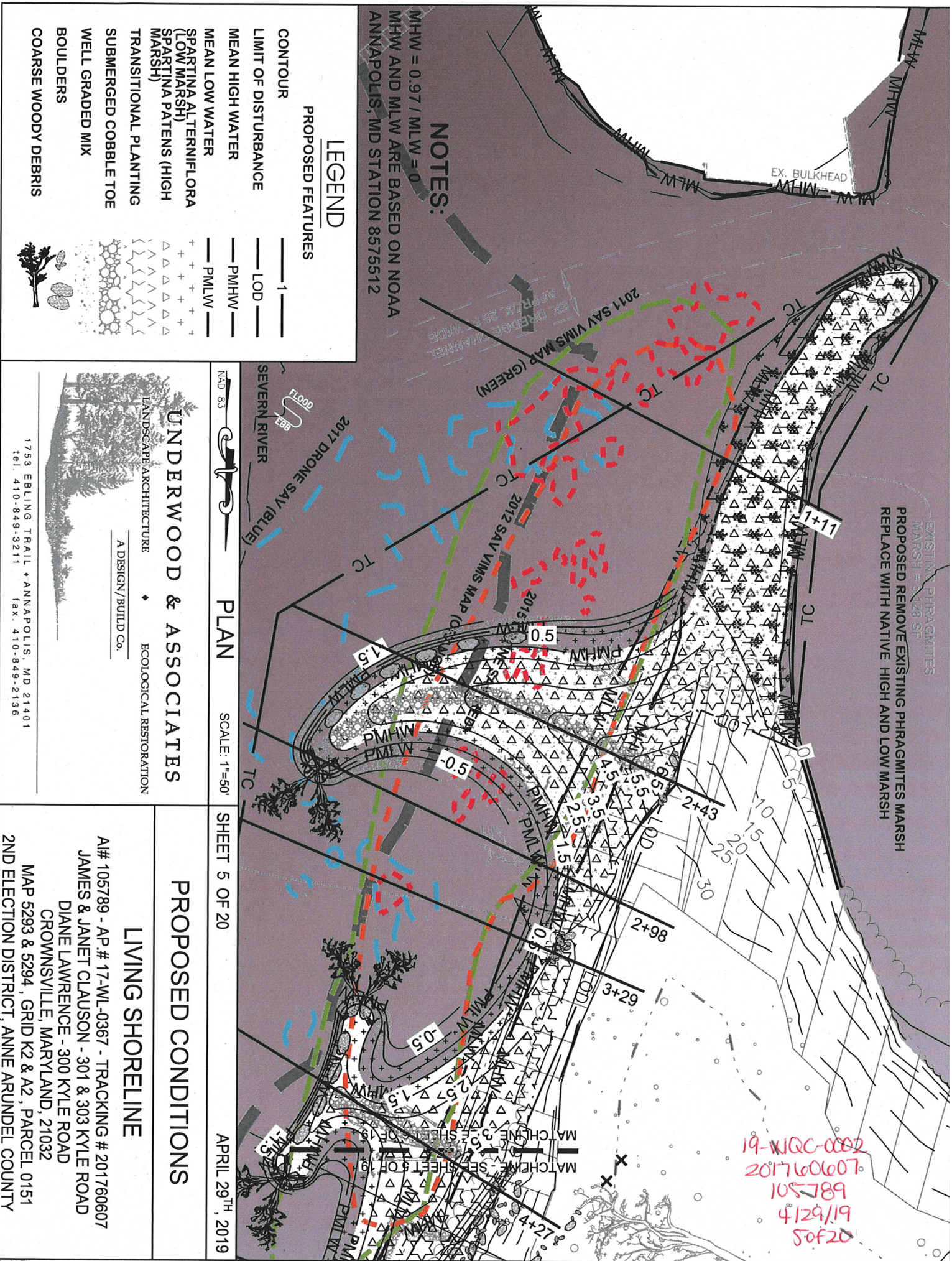
SHEET 4 OF 20  
 APRIL 29<sup>TH</sup>, 2019

**EXISTING CONDITIONS**

**LIVING SHORELINE**

AH# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

19-WQC-0002  
 1070761707  
 105789  
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EXISTING PHRAGMITES MARSH = 429 SF  
 PROPOSED REMOVE EXISTING PHRAGMITES MARSH  
 REPLACE WITH NATIVE HIGH AND LOW MARSH

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 201760607  
 105789  
 4/29/19  
 5 of 20

**NOTES:**  
 MHW = 0.97 / MLW = 0  
 MHW AND MLW ARE BASED ON NOAA ANNAPOLIS, MD STATION 8575512

**LEGEND**

**PROPOSED FEATURES**

- CONTOUR ——— 1 ———
- LIMIT OF DISTURBANCE ——— LOD ———
- MEAN HIGH WATER ——— MHW ———
- MEAN LOW WATER ——— MLW ———
- SPARTINA ALTERNIFLORA (LOW MARSH) + + + + +
- SPARTINA PATENS (HIGH MARSH) Δ Δ Δ Δ Δ
- TRANSITIONAL PLANTING ☆ ☆ ☆ ☆ ☆
- SUBMERGED COBBLE TOE [Cobble symbol]
- WELL GRADED MIX [Graded mix symbol]
- BOULDERS [Boulder symbol]
- COARSE WOODY DEBRIS [Woody debris symbol]

NAD 83 PLAN SCALE: 1"=50'

**UNDERWOOD & ASSOCIATES**

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION  
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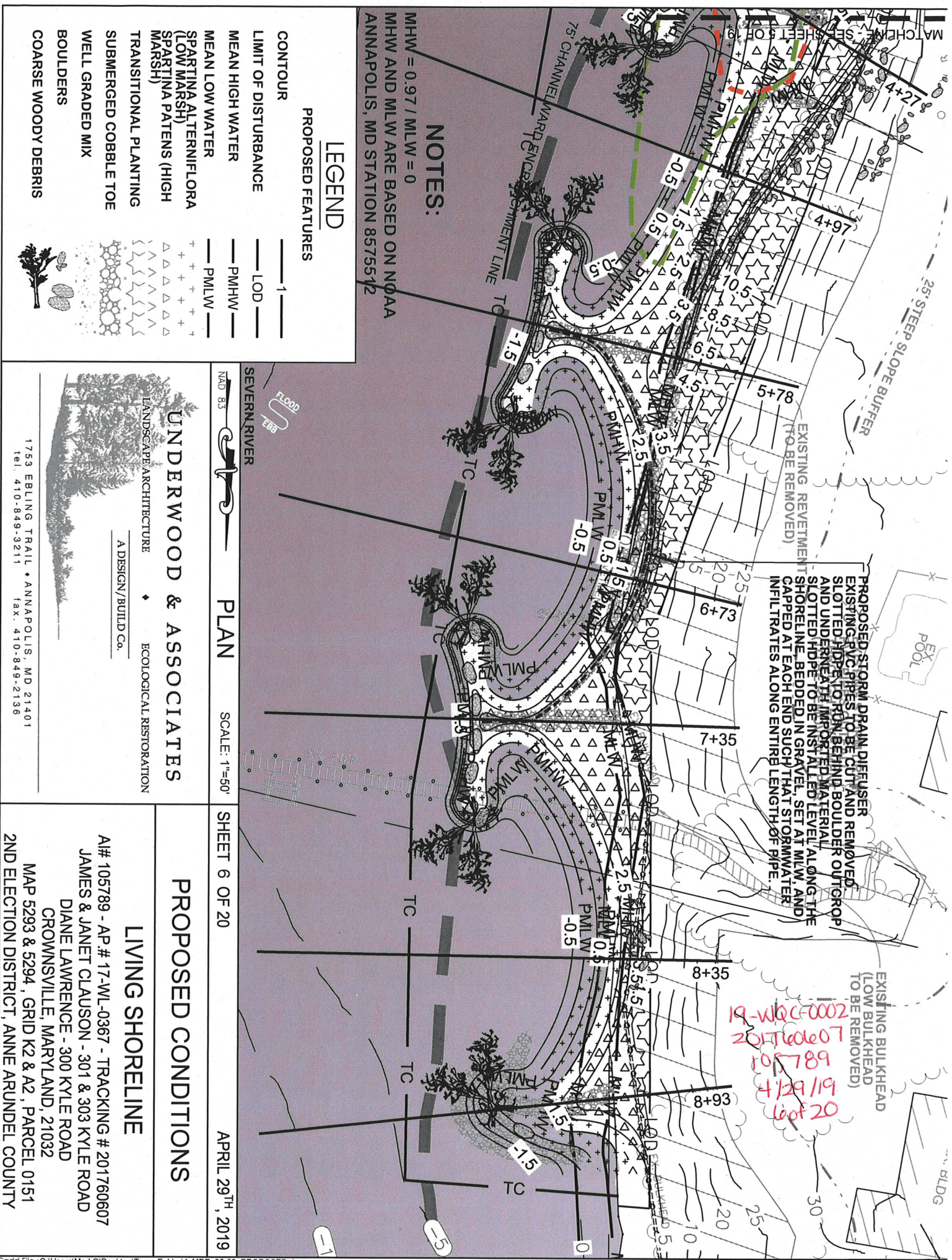
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SHEET 5 OF 20 APRIL 29<sup>TH</sup>, 2019

**PROPOSED CONDITIONS**

**LIVING SHORELINE**

A# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY



PROPOSED STORM DRAIN DIFUSER EXISTING PVC PIPES TO BE CUT AND REMOVED. SLOTTED HDPE TO RUN BEHIND BOULDER OUTCROP AND UNDERNEATH IMPORTED MATERIAL. SLOTTED HDPE TO BE INSTALLED LEVEL ALONG THE SHORELINE, BEDED IN GRAVEL, SET AT MLW AND CAPPED AT EACH END SUCH THAT STORMWATER INFILTRATES ALONG ENTIRE LENGTH OF PIPE.

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leaf 20

EXISTING BULKHEAD (LOW BULKHEAD TO BE REMOVED)

**NOTES:**

MHW = 0.97 / MLW = 0  
MHW AND MLW ARE BASED ON NOAA ANNAPOLIS, MD STATION 8575512

**LEGEND**

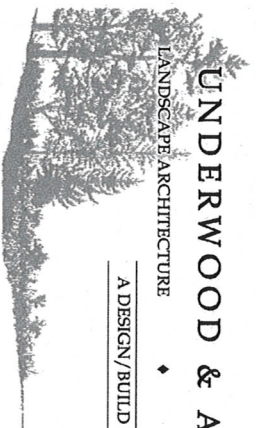
**PROPOSED FEATURES**

- 1 — CONTOUR
- — — LIMIT OF DISTURBANCE
- — — MEAN HIGH WATER
- — — MEAN LOW WATER
- — — SPARTINA ALTERNIFLORA (LOW MARSH)
- — — SPARTINA PATENS (HIGH MARSH)
- — — TRANSITIONAL PLANTING
- — — SUBMERGED COBBLE TOE
- — — WELL GRADED MIX
- — — BOULDERS
- — — COARSE WOODY DEBRIS

SEVERN RIVER  
NAD 83  
PLAN  
SCALE: 1"=50'

**UNDERWOOD & ASSOCIATES**

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION  
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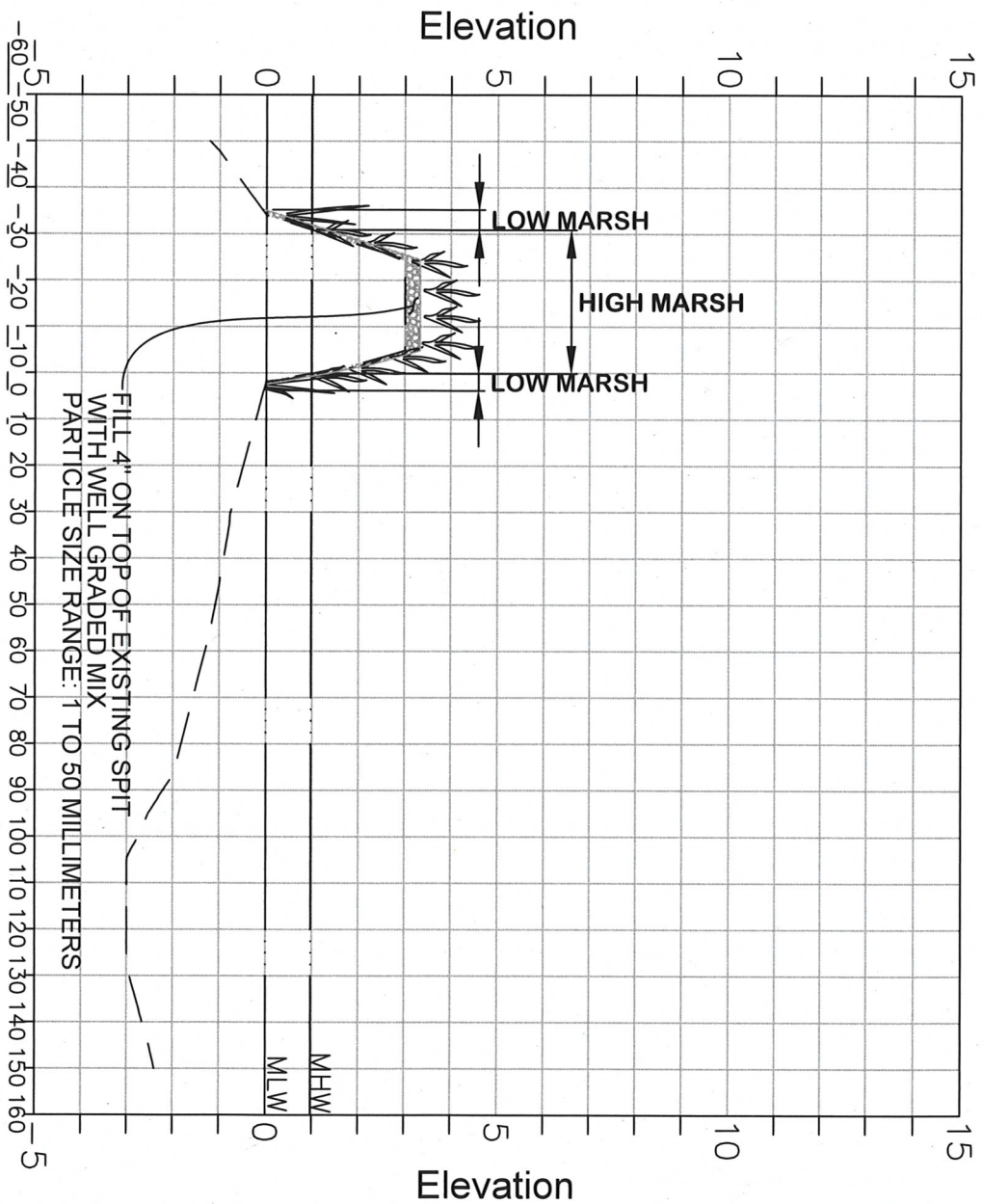
SHEET 6 OF 20  
APRIL 29<sup>TH</sup>, 2019

**PROPOSED CONDITIONS**

**LIVING SHORELINE**

A# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
DIANE LAWRENCE - 300 KYLE ROAD  
CROWNSVILLE, MARYLAND, 21032  
MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

# Phragmites Removal Section - 1+11



19-WQC-0002  
 20170607  
 182501  
 4/29/19  
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## LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SAND/WOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA

## CROSS SECTIONS

SCALE: HORI. 1"=40', VERT. 1"=4'

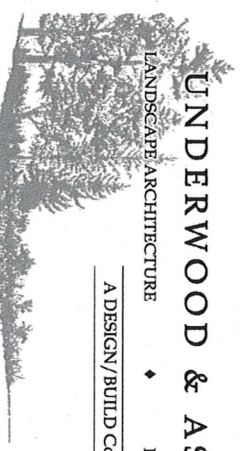
SHEET 7 OF 20

APRIL 29<sup>TH</sup>, 2019

## UNDERWOOD & ASSOCIATES

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION

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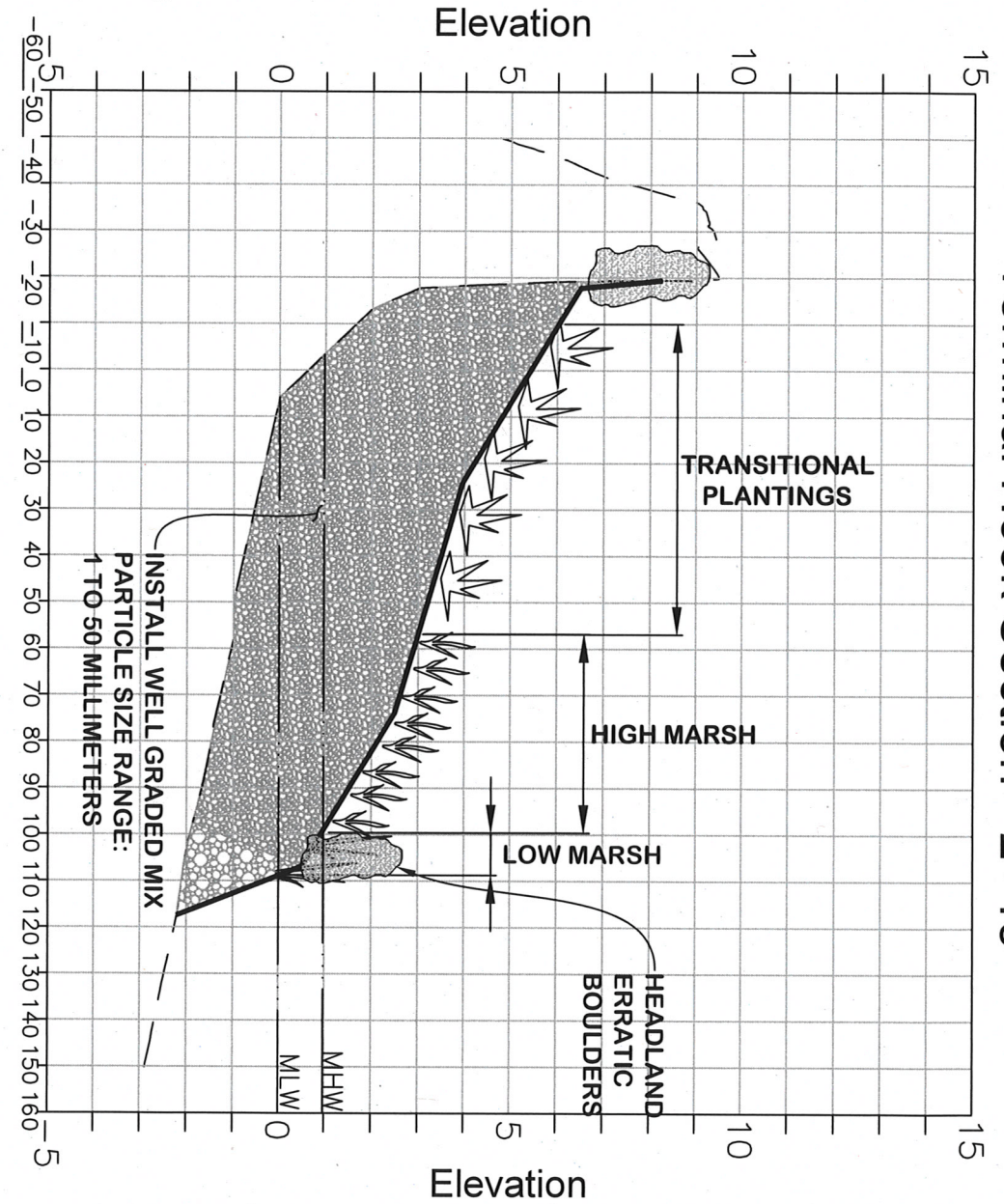
## PROJECT CROSS SECTION

### LIVING SHORELINE

AI# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY



# Terminal Hook Section - 2+43



**NOTE:**  
 COARSE WOODY DEBRIS AND ANCHOR BOULDERS NOT TO SCALE. GRAPHICAL REPRESENTATION ONLY. REFER TO SHEET 17 & 18 FOR COARSE WOODY DEBRIS ANCHORING DETAILS.  
 BOULDER OUTCROPS NOT TO SCALE. GRAPHICAL REPRESENTATION ONLY. EXISTING ERODING CLIFF WILL NOT BE EXCAVATED, ONLY REINFORCED.

## LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SAND/WOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA

## CROSS SECTIONS

SCALE: HORI. 1"=40', VERT. 1"=4'

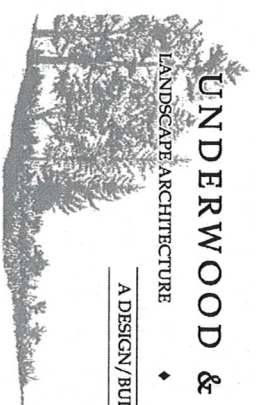
SHEET 8 OF 20

APRIL 29<sup>TH</sup>, 2019

## UNDERWOOD & ASSOCIATES

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION

A DESIGN/ BUILD Co.



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 tel. 410-849-3211 fax. 410-849-2136

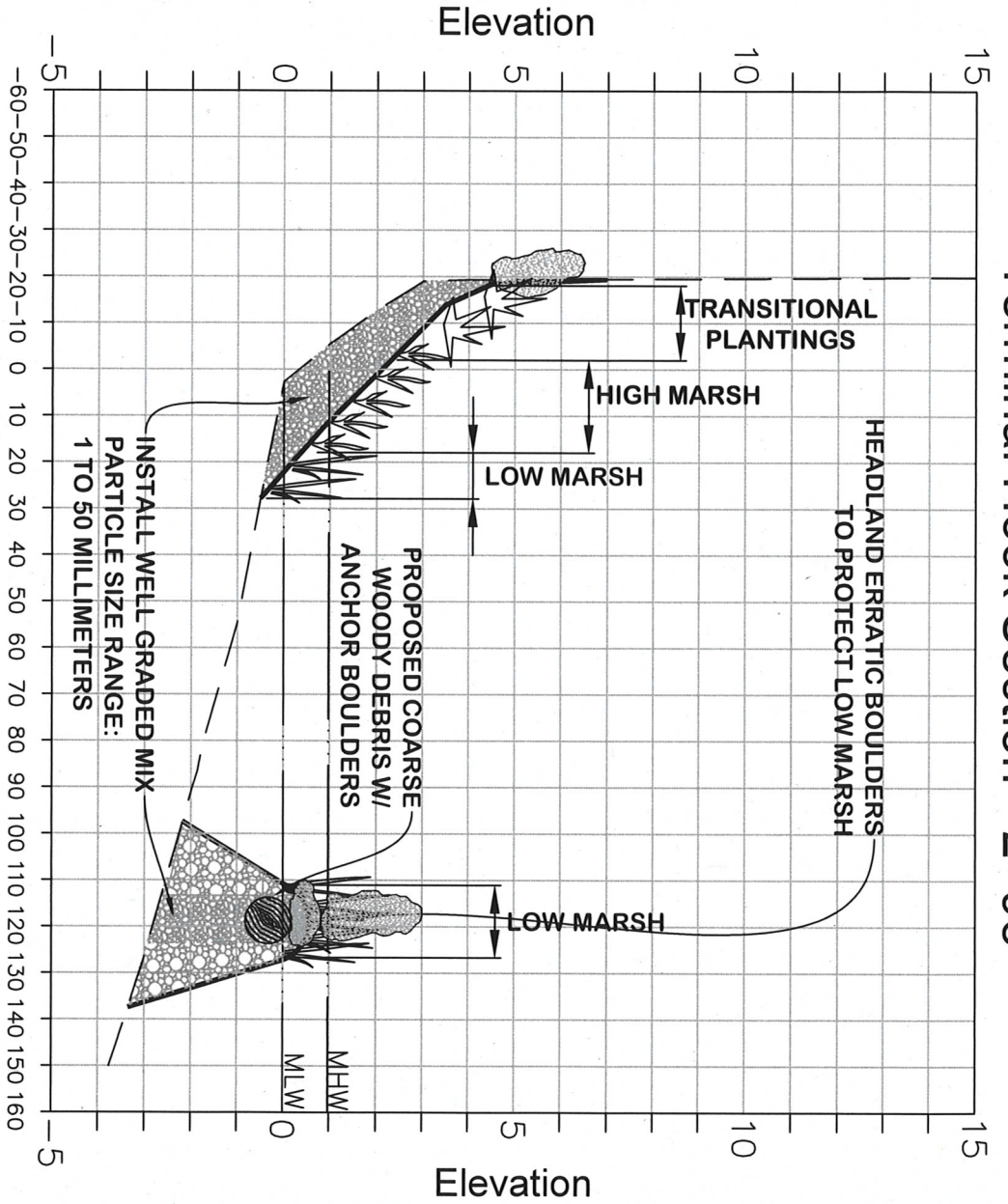
## PROJECT CROSS SECTION

### LIVING SHORELINE

A# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

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 201760607  
 105789  
 4/29/19  
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# Terminal Hook Section - 2+98

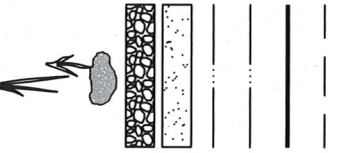


**NOTE:**  
 COARSE WOODY DEBRIS AND ANCHOR BOULDERS NOT TO SCALE. GRAPHICAL REPRESENTATION ONLY. REFER TO SHEET 17 & 18 FOR COARSE WOODY DEBRIS ANCHORING DETAILS.

BOULDER OUTCROPS NOT TO SCALE. GRAPHICAL REPRESENTATION ONLY. EXISTING ERODING CLIFF WILL NOT BE EXCAVATED, ONLY REINFORCED.

## LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SAND/WOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA



## CROSS SECTIONS

SCALE: HOR. 1"=40', VERT. 1"=4'

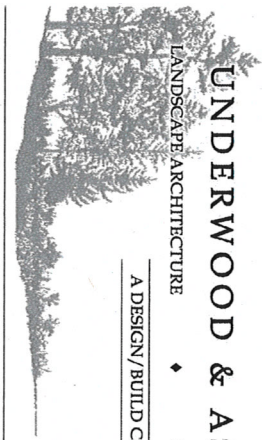
SHEET 9 OF 20

APRIL 29<sup>TH</sup>, 2019

## UNDERWOOD & ASSOCIATES

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION

A DESIGN/BUILD Co.



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 TEL: 410-849-3211 FAX: 410-849-2136

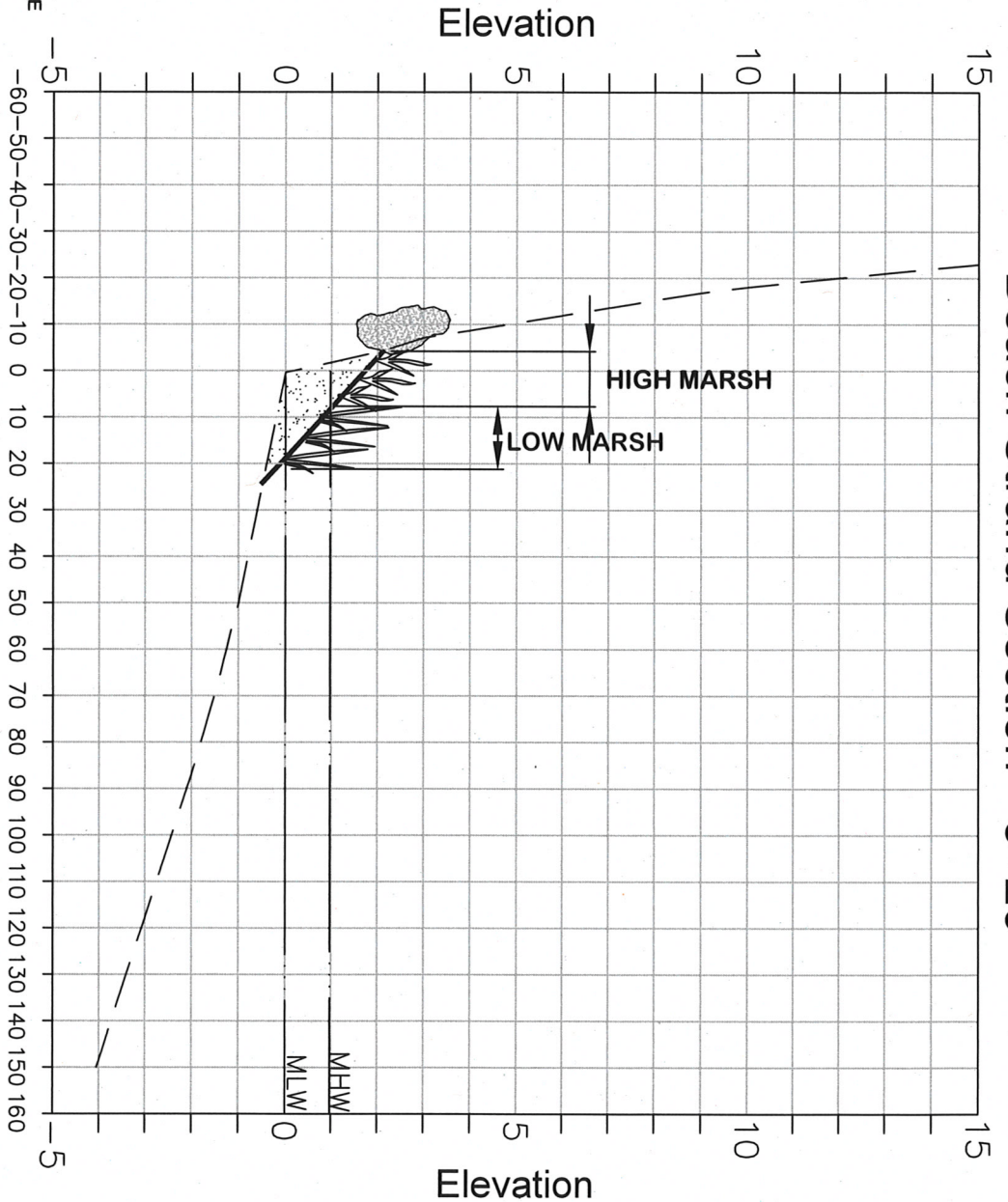
## PROJECT CROSS SECTION

### LIVING SHORELINE

A# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

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 105789  
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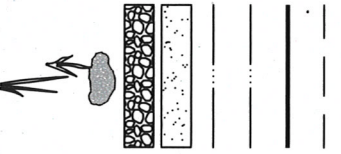
# Beach Strand Section - 3+29



**NOTE:**  
BOULDER OUTCROPS NOT TO SCALE.  
GRAPHICAL REPRESENTATION ONLY.  
EXISTING ERODING CLIFF WILL NOT BE  
EXCAVATED, ONLY REINFORCED.

## LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SAND/WOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA



## Channelward Distance

### CROSS SECTIONS

SCALE: HORIZ. 1"=40', VERT. 1"=4'

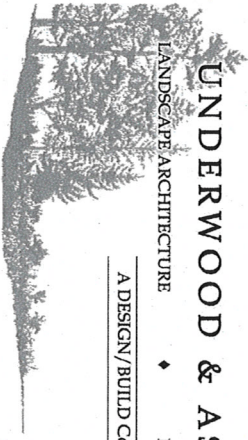
SHEET 10 OF 20

APRIL 29<sup>TH</sup>, 2019

## UNDERWOOD & ASSOCIATES

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION

A DESIGN/BUILD Co.



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tel. 410-849-8211 fax. 410-849-2136

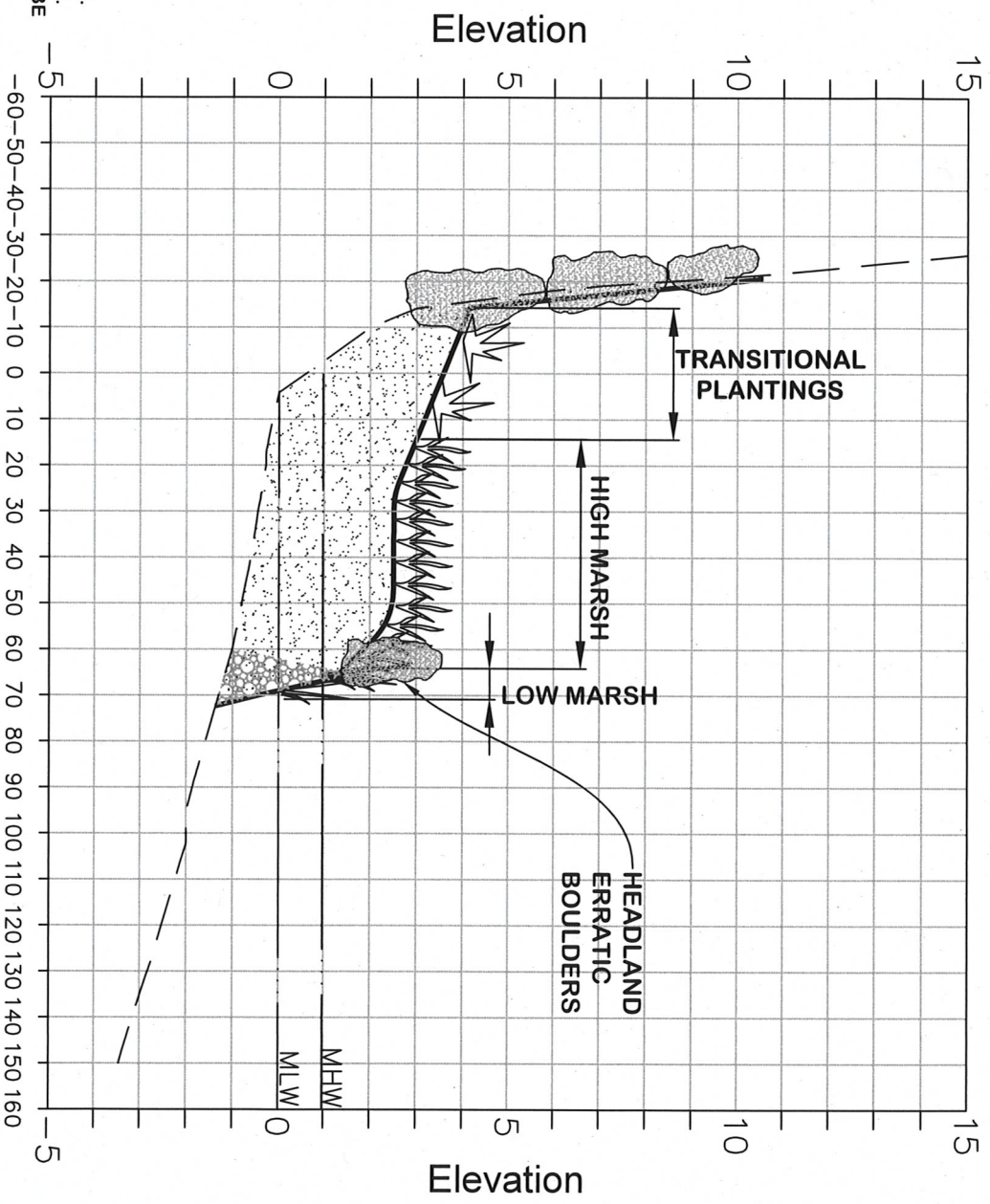
## PROJECT CROSS SECTION

### LIVING SHORELINE

AI# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
DIANE LAWRENCE - 300 KYLE ROAD  
CROWNSVILLE, MARYLAND, 21032  
MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

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201760607  
105789  
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# Tombolo Section - 4+27



**NOTE:**  
BOULDER OUTCROPS NOT TO SCALE.  
GRAPHICAL REPRESENTATION ONLY.  
EXISTING ERODING CLIFF WILL NOT BE  
EXCAVATED, ONLY REINFORCED.

### LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SAND/WOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA

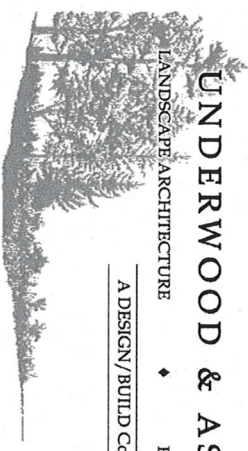
### CROSS SECTIONS

SCALE: HORI. 1"=40', VERT. 1"=4'

### Channelward Distance

## UNDERWOOD & ASSOCIATES

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION  
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SHEET 11 OF 20

APRIL 29<sup>TH</sup>, 2019

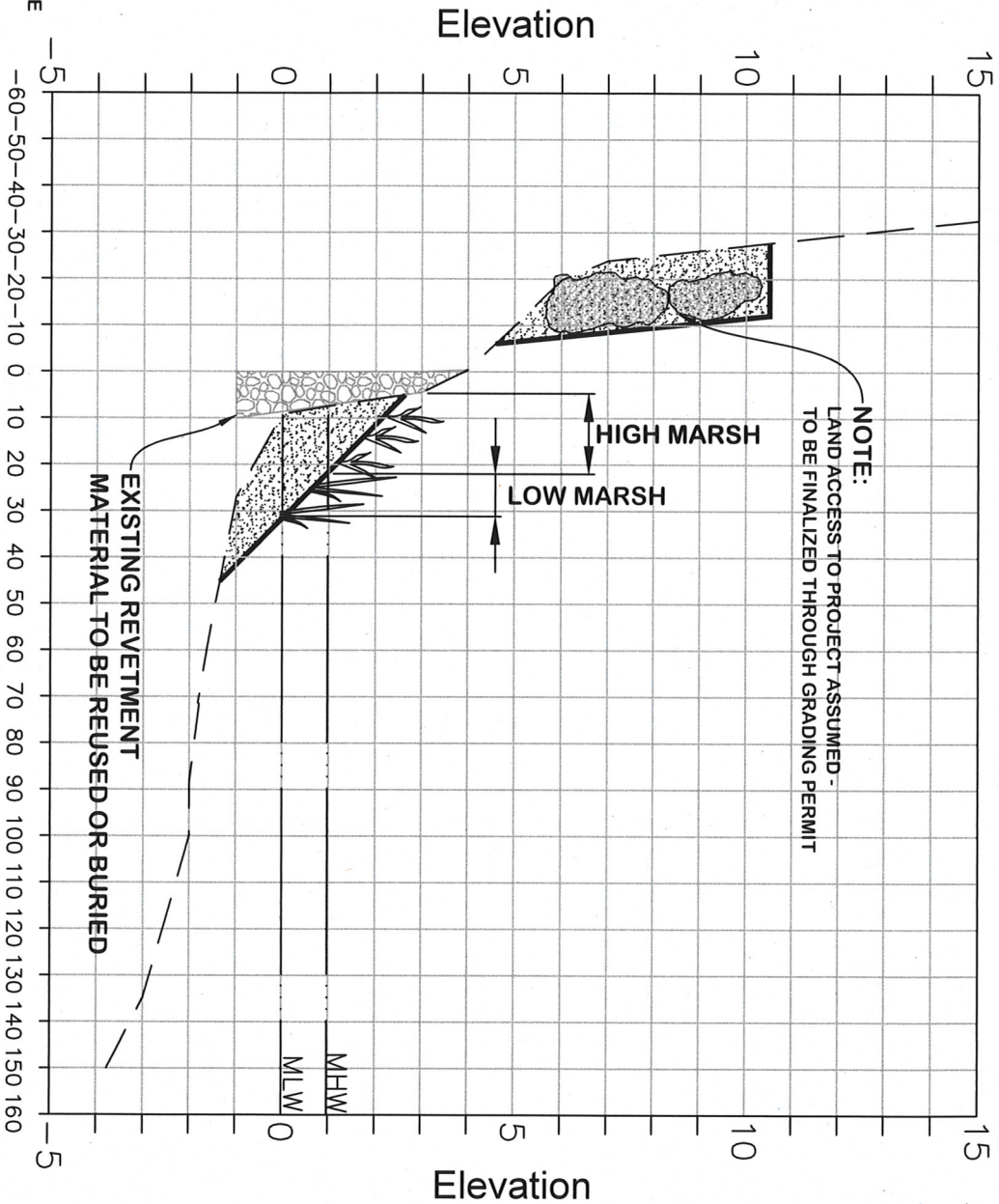
### PROJECT CROSS SECTION

### LIVING SHORELINE

AH# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
DIANE LAWRENCE - 300 KYLE ROAD  
CROWNSVILLE, MARYLAND, 21032  
MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

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201760607  
105789  
4/29/19  
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# Beach Strand Section - 4+97

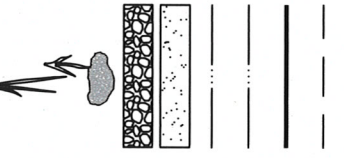


19-WQC-0002  
 201760607  
 105789  
 4/29/19  
 12 of 20

**NOTE:**  
 BOULDER OUTCROPS NOT TO SCALE.  
 GRAPHICAL REPRESENTATION ONLY.  
 EXISTING ERODING CLIFF WILL NOT BE  
 EXCAVATED, ONLY REINFORCED.

## LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SANDWOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA



## CROSS SECTIONS

SCALE: HORI. 1"=40', VERT. 1"=4'

SHEET 12 OF 20

APRIL 29<sup>TH</sup>, 2019

## UNDERWOOD & ASSOCIATES

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION

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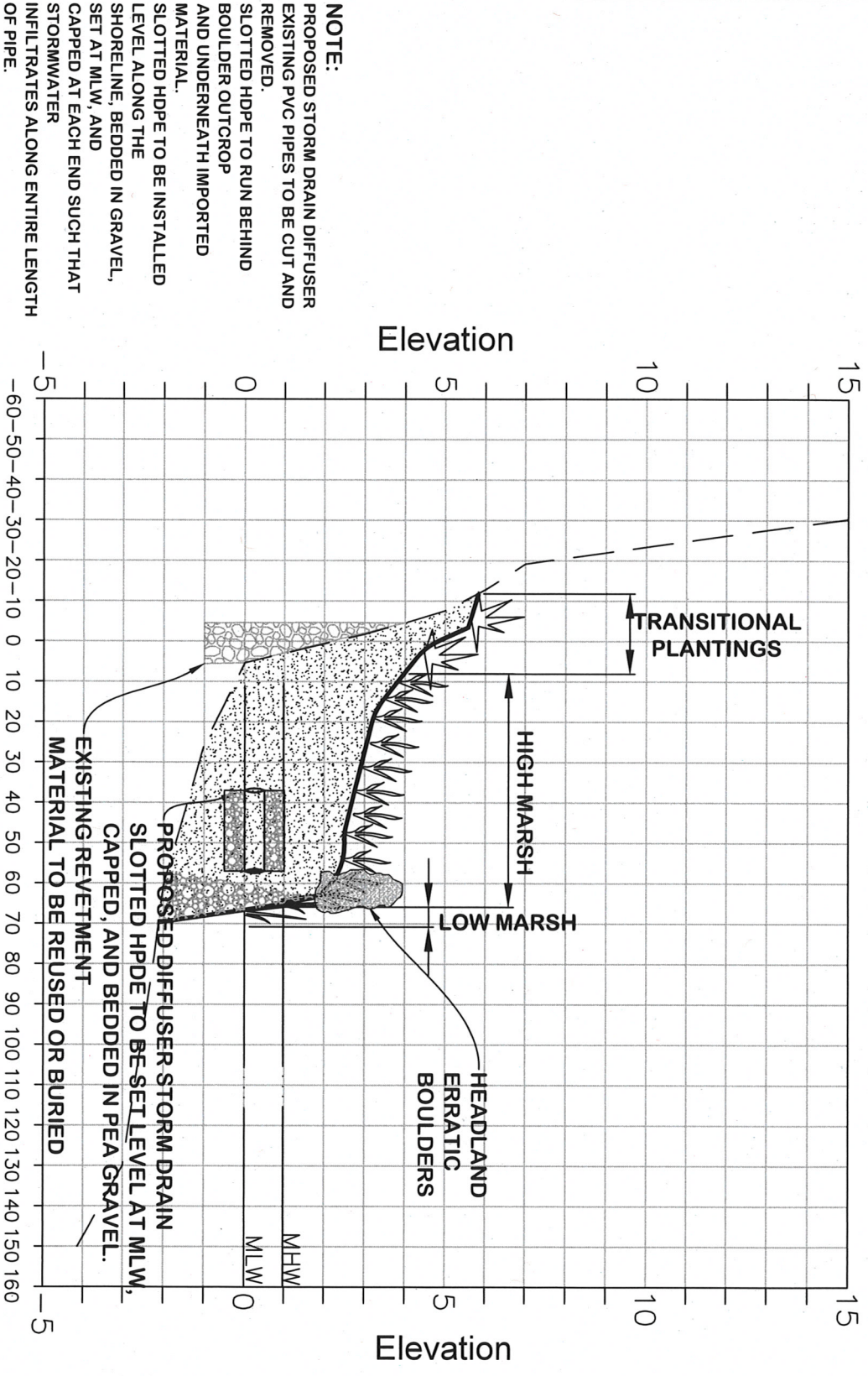
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 tel. 410-849-3211 fax. 410-849-2136

## PROJECT CROSS SECTION

### LIVING SHORELINE

AI# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

# Tombolo Section - 5+78



19-WQC-0002  
 201760607  
 105789  
 4/29/19  
 13 of 20

**NOTE:**  
 PROPOSED STORM DRAIN DIFFUSER EXISTING PVC PIPES TO BE CUT AND REMOVED.  
 SLOTTED HDPE TO RUN BEHIND BOULDER OUTCROP AND UNDERNEATH IMPORTED MATERIAL.  
 SLOTTED HDPE TO BE INSTALLED LEVEL ALONG THE SHOULDER, BEDDED IN GRAVEL, SET AT MLW, AND CAPPED AT EACH END SUCH THAT STORMWATER INFILTRATES ALONG ENTIRE LENGTH OF PIPE.

## LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SAND/WOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA

## CROSS SECTIONS

SCALE: HORI. 1"=40', VERT. 1"=4'

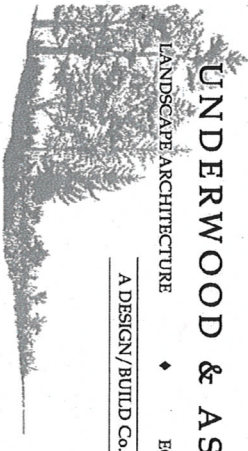
SHEET 13 OF 20

APRIL 29<sup>TH</sup>, 2019

## UNDERWOOD & ASSOCIATES

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION

A DESIGN/BUILD Co.



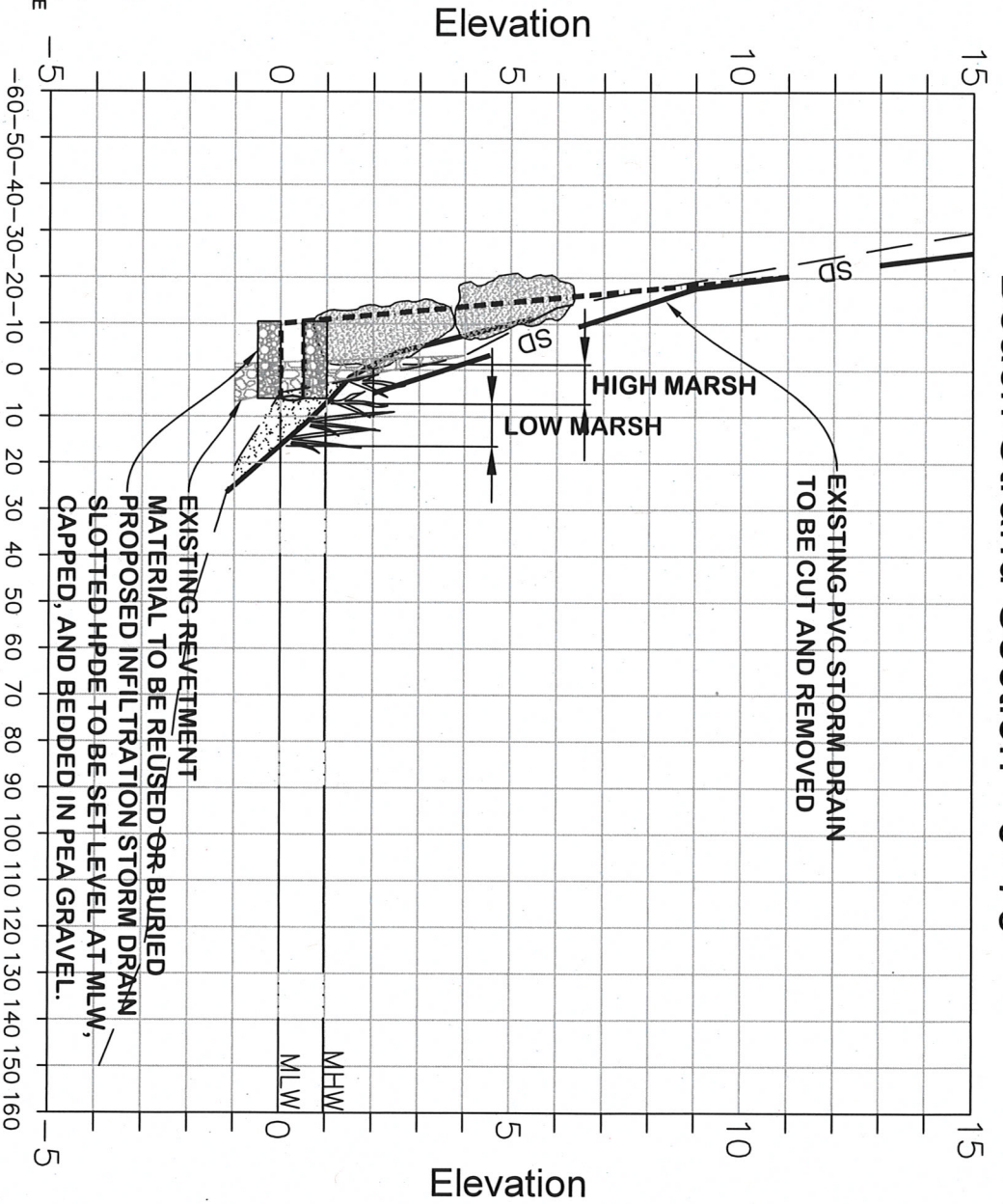
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 Tel. 410-849-3211 Fax. 410-849-2136

## PROJECT CROSS SECTION

### LIVING SHORELINE

A# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

# Beach Strand Section - 6+73



19-WQC-0002  
 201760607  
 105789  
 4/29/19  
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**NOTE:**  
 PROPOSED STORM DRAIN DIFFUSER EXISTING PVC PIPES TO BE CUT AND REMOVED.  
 SLOTTED HDPE TO RUN BEHIND BOULDER OUTCROP AND UNDERNEATH IMPORTED MATERIAL.  
 SLOTTED HDPE TO BE INSTALLED LEVEL ALONG THE SHORELINE, BEDDED IN GRAVEL, SET AT MLW, AND CAPPED AT EACH END SUCH THAT STORMWATER INFILTRATES ALONG ENTIRE LENGTH OF PIPE.  
 BOULDER OUTCROPS NOT TO SCALE. GRAPHICAL REPRESENTATION ONLY. EXISTING ERODING CLIFF WILL NOT BE EXCAVATED, ONLY REINFORCED.

## LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SANDWOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA

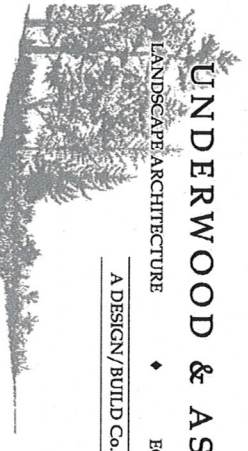
## CROSS SECTIONS

SCALE: HORI. 1"=40', VERT. 1"=4'

## UNDERWOOD & ASSOCIATES

LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION

A DESIGN/BUILD Co.



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SHEET 14 OF 20

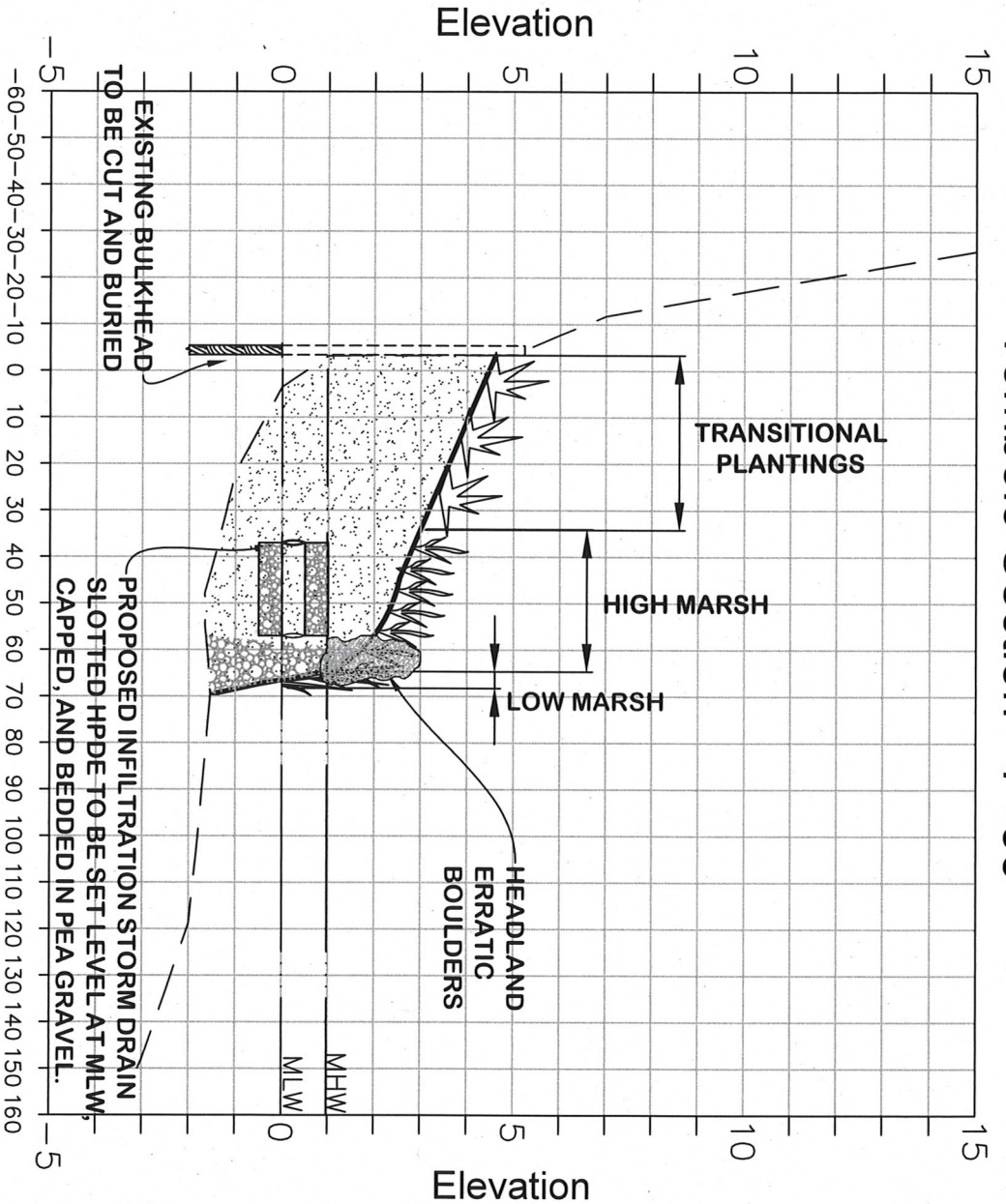
APRIL 29<sup>TH</sup>, 2019

## PROJECT CROSS SECTION

### LIVING SHORELINE

A# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

# Tombolo Section - 7+35



**NOTE:**

PROPOSED STORM DRAIN DIFFUSER EXISTING PVC PIPES TO BE CUT AND REMOVED. SLOTTED HDPE TO RUN BEHIND BOULDER OUTCROP AND UNDERNEATH IMPORTED MATERIAL. SLOTTED HDPE TO BE INSTALLED LEVEL ALONG THE SHOULDERLINE, BEDDED IN GRAVEL, SET AT MLW, AND CAPPED AT EACH END SUCH THAT STORMWATER INFILTRATES ALONG ENTIRE LENGTH OF PIPE.

**LEGEND**

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SAND/WOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA

**CROSS SECTIONS**

SCALE: HORI. 1"=40', VERT. 1"=4'

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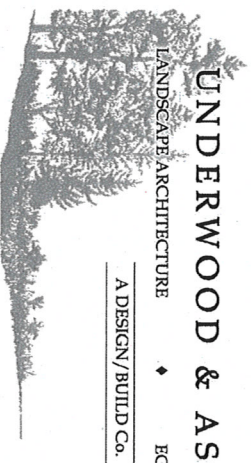
APRIL 29<sup>TH</sup>, 2019

**UNDERWOOD & ASSOCIATES**

LANDSCAPE ARCHITECTURE

ECOLOGICAL RESTORATION

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**PROJECT CROSS SECTION**

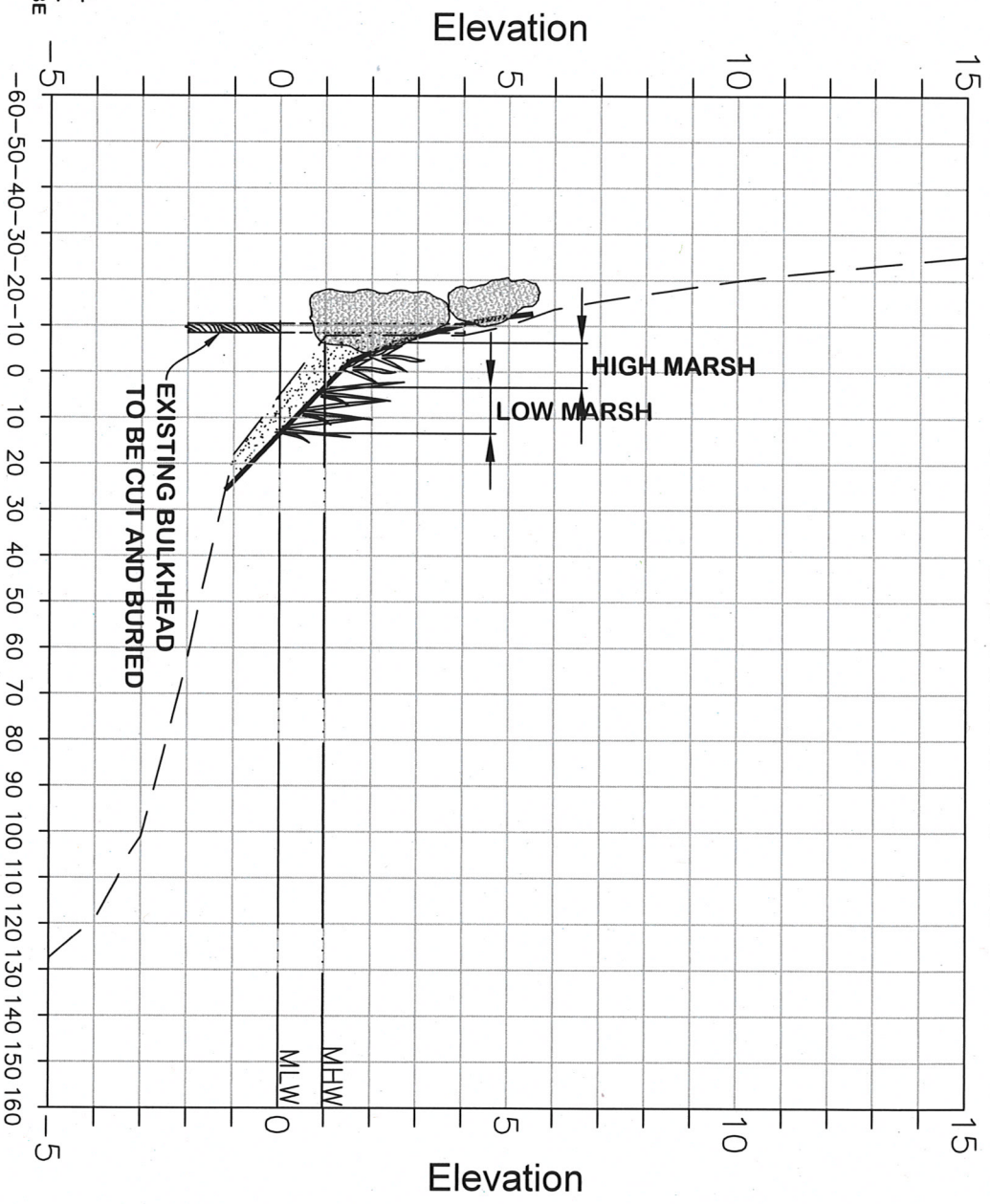
**LIVING SHORELINE**

AH# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
DIANE LAWRENCE - 300 KYLE ROAD  
CROWNSVILLE, MARYLAND, 21032  
MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

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# Beach Strand Section - 8+35



**NOTE:**  
BOULDER OUTCROPS NOT TO SCALE.  
GRAPHICAL REPRESENTATION ONLY.  
EXISTING ERODING CLIFF WILL NOT BE  
EXCAVATED, ONLY REINFORCED.

## LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- SAND/WOOD CHIP MIX
- SUBMERGED COBBLE
- BOULDER OUTCROP
- SPARTINA PATENS
- SPARTINA ALTERNIFLORA

**CROSS SECTIONS** SCALE: HOR. 1"=40', VERT. 1"=4'

**Channelward Distance**

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**PROJECT CROSS SECTION**

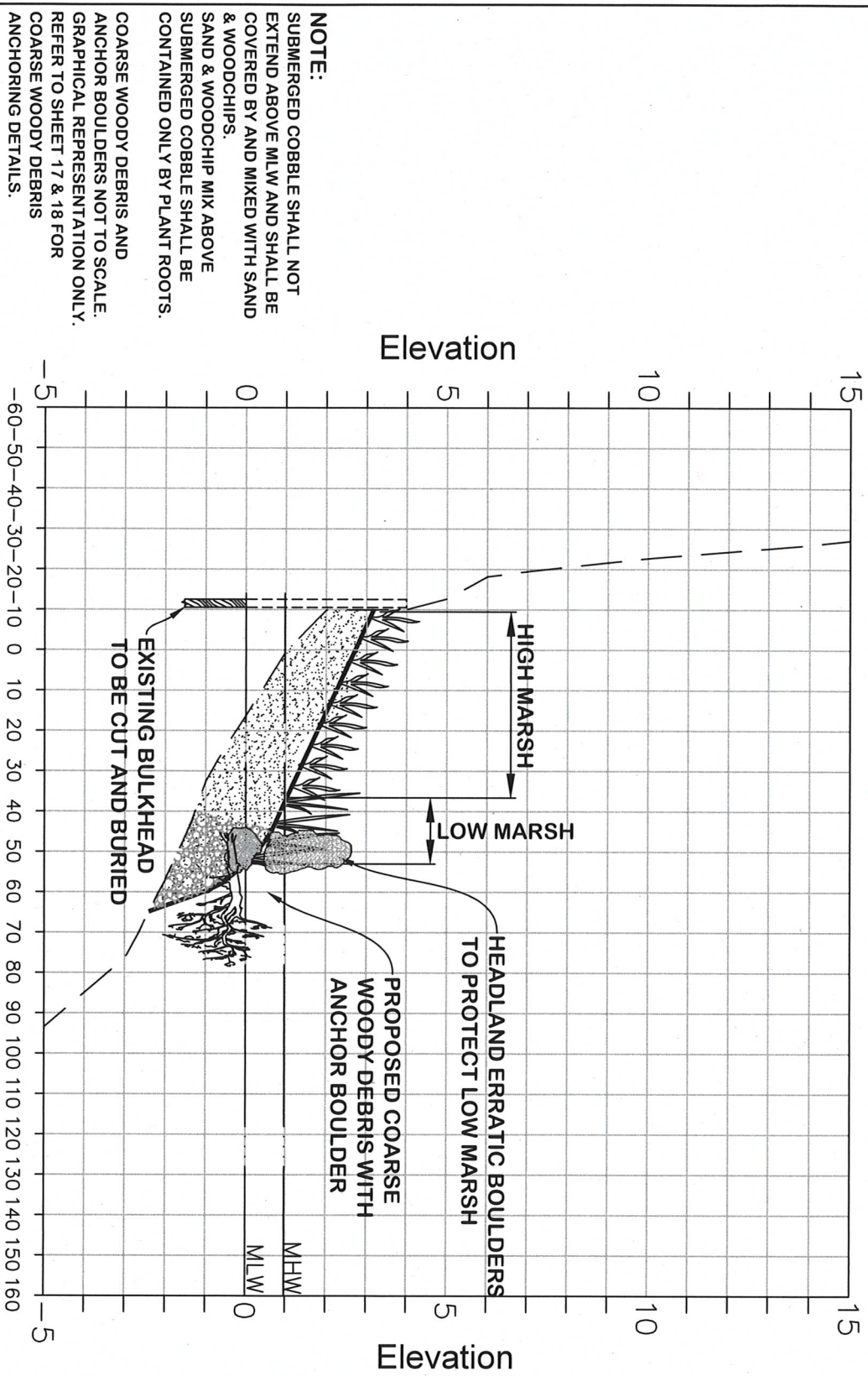
**LIVING SHORELINE**

AI# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
DIANE LAWRENCE - 300 KYLE ROAD  
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MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

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# Headland Control Section - 8+93



**LEGEND**

EXISTING GRADE	(Solid line)
PROPOSED GRADE	(Dashed line)
MEAN HIGH WATER (MHW)	(Dotted line)
MEAN LOW WATER (MLW)	(Long dashed line)
SAND/WOOD CHIP MIX	(Stippled pattern)
SUBMERGED COBBLE	(Cross-hatched pattern)
BOULDER OUTCROP	(Large irregular shape)
SPARTINA PATENS	(Grass symbol)
SPARTINA ALTERNIFLORA	(Taller grass symbol)

**CROSS SECTIONS** SCALE: HORI. 1"=40', VERT. 1"=4'

**Channelward Distance**

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**PROJECT CROSS SECTION**

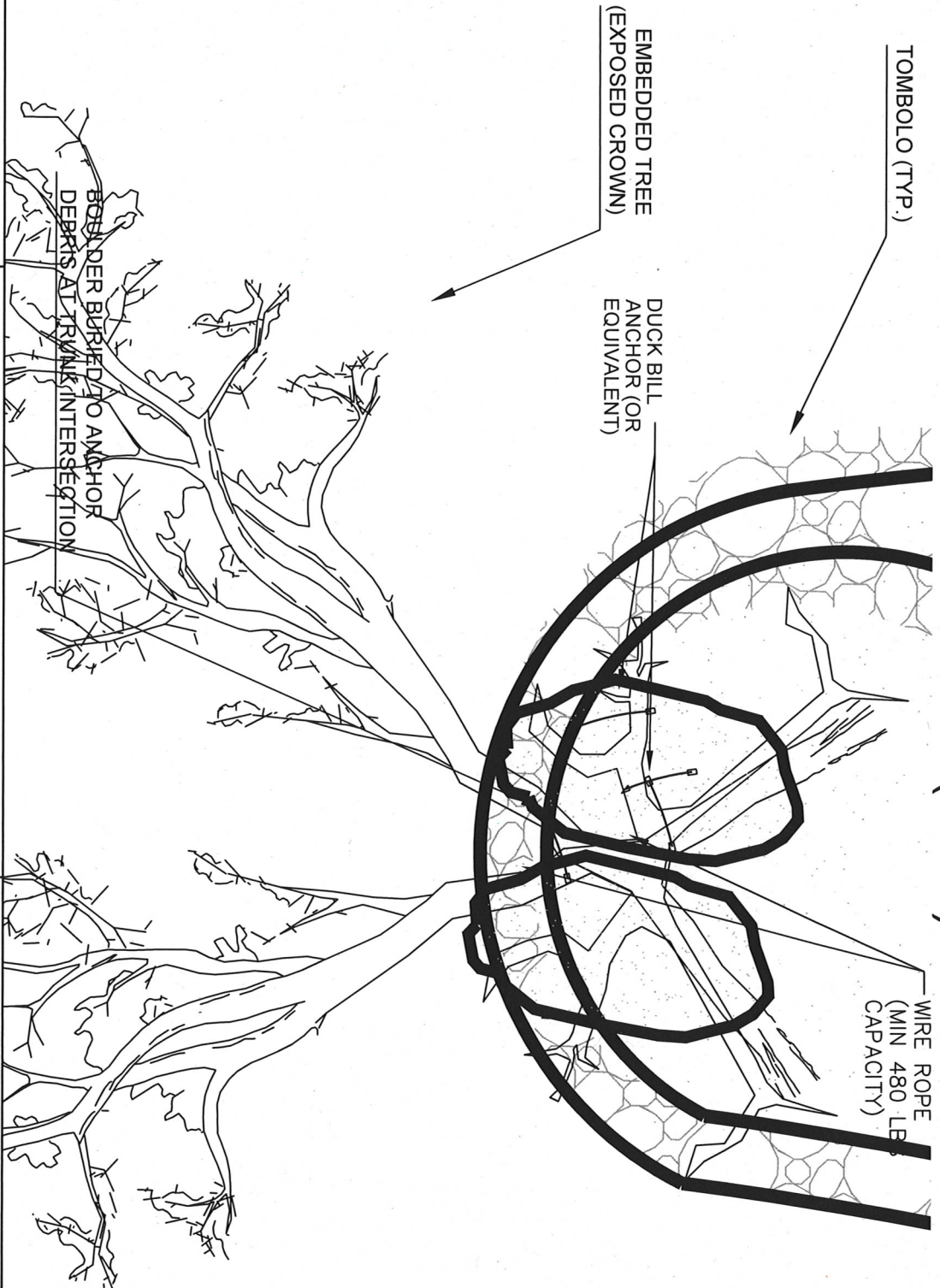
**LIVING SHORELINE**

APRIL 29<sup>TH</sup>, 2019

AI# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
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 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

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# WOODY DEBRIS ANCHORING (1 Y.P.) - PLAN VIEW



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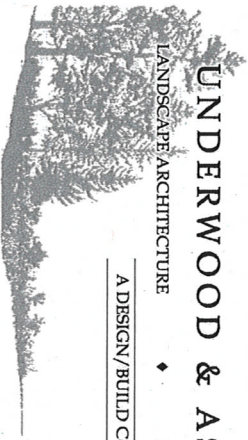
## PROJECT DETAILS

### LIVING SHORELINE

AN# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
 CROWNSVILLE, MARYLAND, 21032  
 MAP 5293 & 5294, GRID K2 & A2, PARCEL 0151  
 2ND ELECTION DISTRICT, ANNE ARUNDEL COUNTY

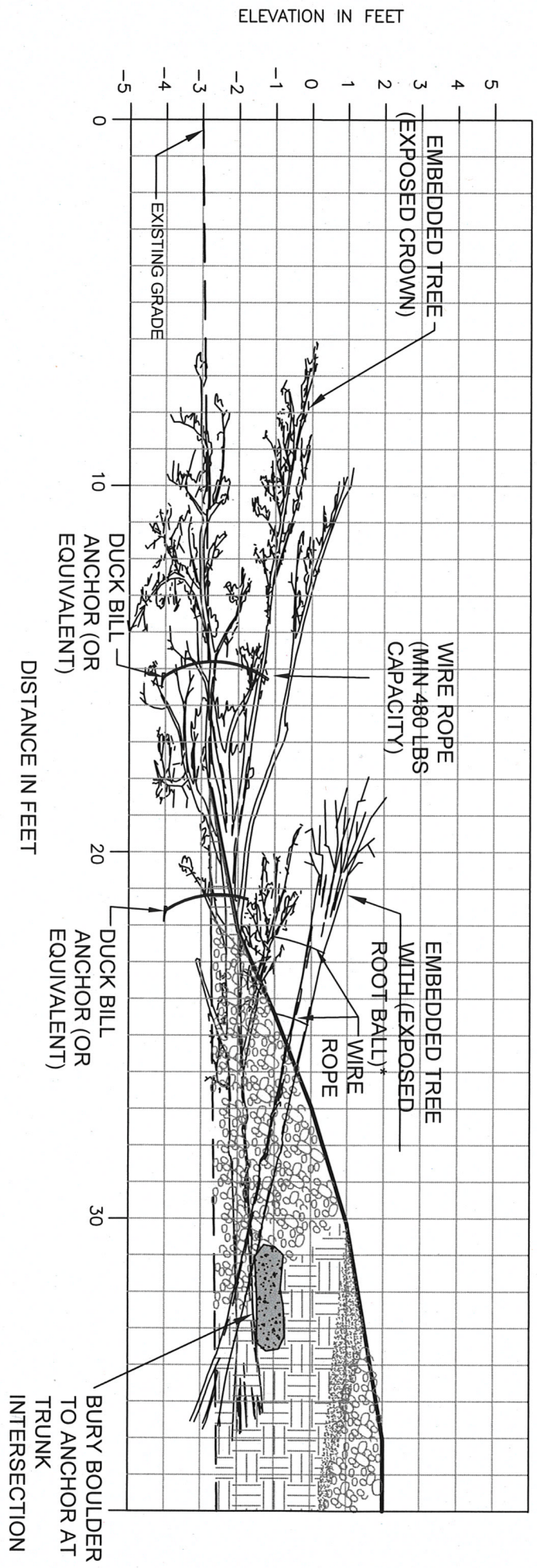
## UNDERWOOD & ASSOCIATES

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# WOODY DEBRIS ANCHORING (TYP.) - PROFILE VIEW



\*NOTE: THE EMBEDDED TREE WITH EXPOSED ROOT BALL IS SET AT THE EXISTING GRADE. THIS DETAIL SHOWS THE ROOT BALL SLIGHTLY ELEVATED IN ORDER TO DISPLAY BOTH TREES. SEE PLAN VIEW FOR ALIGNMENT.

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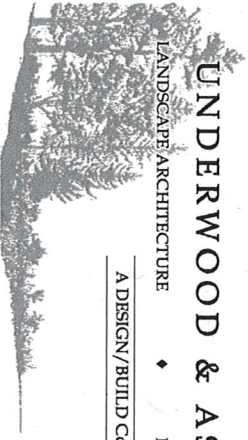
## PROJECT DETAILS

### LIVING SHORELINE

AI# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
 JAMES & JANET CLAUSON - 301 & 303 KYLE ROAD  
 DIANE LAWRENCE - 300 KYLE ROAD  
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# CLAUSON LIVING SHORELINE - PROJECT DATA TABLES

Feature	Existing	Proposed	Difference	Tidal Disturbance
<i>Spartina Patens</i> - High Marsh (SF)	0	21,353	+21,353	Total Limit of Disturbance (LOD)
<i>Spartina Alterniflora</i> - Low Marsh (SF)	0	18,986	+18,986	LOD upland of existing MHW
Total Tidal Wetlands (SF)	5,434	40,339	+34,905	LOD within existing MHW
Transitional Planting	0	11,572	+11,572	Material Volumes
Bulkhead (LF)	205	0	-205	Sand
Revetment (LF)	252	0	-252	Gravel
Shoreline at MHW (LF)	911	1,367	+456	Cobble
				Boulders
				Total Fill
				3,692.8 CY
				2,456.4 CY
				819.7 CY
				308.9 CY
				107.8 CY

Year/Date	Data Source	Permanent Impact* (SF)	% of Onsite SAV Bed Permanently Impacted	Temporary Impact** (SF)	Cobble Fill Impact*** (SF)
2011	VIMS SAV	15,615.7	50.1%	12,233.3	332.3
2012	VIMS SAV	11,551.5	50.0%	9,582.2	132.2
2013	VIMS SAV	0	-	0	0
2014	VIMS SAV	0	-	0	0
2015	VIMS SAV	0	-	0	0
2015-09-29	Drone Survey	346	12.1%	297	14
2016	VIMS SAV	0	-	0	0
2017	VIMS SAV	0	-	0	0
2017-05-18	Drone Survey	0	-	0	0
2017-06-07	Drone Survey	0	-	0	0
2017-10-06	Drone Survey	158	1.9%	1,607	109
2018	VIMS SAV (prelim.)	0	-	0	0
2018-07-03	Drone Survey	0	-	0	0
2019-02-04	Drone Survey	0	-	0	0

**Notes on SAV impacts:**

SAV bed trends since 2011 reflect a degrading condition. Preliminary data of mapped SAV released by VIMS for 2018 shows no SAV in the project area. VIMS has not mapped SAV in the project area since 2012 - 6 years ago.

Images from aerial surveys are available upon request.

\*Permanent impact - proposed clean sand, gravel, cobble, and boulder overlaps SAV

\*\*Temporary impact - construction access and turbidity curtain overlap SAV

\*\*\*Cobble fill impact - proposed submerged cobble overlaps SAV

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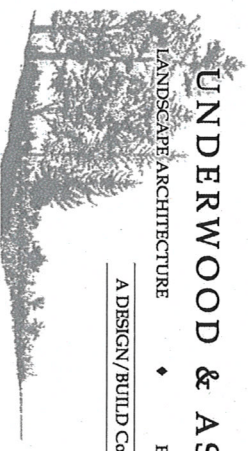
APRIL 29<sup>TH</sup>, 2019

## PROJECT DATA TABLES

### LIVING SHORELINE

AI# 105789 - AP # 17-WL-0367 - TRACKING # 201760607  
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# Maryland

## Department of the Environment

Larry Hogan, Governor  
Boyd Rutherford, Lt. Governor

Ben Grumbles, Secretary  
Horacio Tablada, Deputy Secretary

### MARSH MAINTENANCE PLAN

Agency Interest Number: 105789

Water Quality Certification Number: 19-WQC-0002

Tracking Number: 201760607

Licensee Name: James and Janet Clauson and Diane Lawrence

300, 301, 303 Kyle Road

Crownsville, MD 21032

Anne Arundel County

**\*Please sign and date this Marsh Maintenance Plan and return to the address below no later than September 2, 2019.\***

**Preparation:** All areas that are to be planted shall be cleaned of rough grass, weeds, and debris and the ground surface filled and graded to the elevations specified on the plans.

**Planting:** The living shoreline will be planted during the planting season for wetland sprigging which is between April 1 and June 30 or between September 1 and October 30. The mean high water (MHW) lines will be marked on the ground and the plantings shall be made in rows parallel to the MHW line extending to the limits on the construction plans. Rows shall be 18 inches apart and plants 18 inches apart. Plantings shall be made by hand with dibble, spade or shovel by opening a hole at the planting site, placing the fertilizer and then the plant in the hole, closing the hole and firming the soil around the plant so that the surface soil level is .5 to 1 inch above the top of the planting pot root mass. If the soil at the planting site is not wet or damp, the plants shall be sufficiently watered within 4 hours after planting.

**Protection:** Immediately upon completion of the planting operation, the planting area shall be protected against wildlife, traffic or other use by erecting goose exclusion fencing and Blaze Orange Fence (BOF) at the top of the slope and along the sides of the planted area.

**Plant Establishment:** A healthy stand of wetland vegetation is defined as 85% aerial coverage of the original planted area by native wetland vegetation (e.g., planted species and volunteer native species). A healthy stand of wetland vegetation shall be established within 1 year of planting and shall be maintained for at least 3 consecutive years. The licensee is responsible for making sure the planted area is maintained by eradicating invasive species (e.g., Phragmites), and protecting areas from human traffic and wildlife predators. If a healthy stand of wetland vegetation is not established within one year after planting, the limiting factors will be identified and addressed and the area will be replanted as necessary.

**Marsh Monitoring Reports:** Brief, annual Marsh Monitoring Reports will be submitted to the address below for 5 years by the dates below, *regardless of the whether or not the project is completed or a healthy stand of wetland vegetation is obtained.* The Marsh Monitoring Report may be brief and include the following information, at a minimum:

- State Agency Interest number, Tidal Wetlands License number, and site address (listed above)
- Date of inspections
- Project completion date. If the project has not yet been completed, please indicate the current status of the project and disregard the remaining requirements.
- Estimation of percent plant coverage by the dominant species.  
*This should show the percent coverage of native and non-native wetland plant species. If 85% coverage by native species is not obtained, please indicate the limiting factors to plant growth, and what steps will be taken to meet the 85% coverage requirement.*
- Identification of factors limiting establishment or maintenance of a healthy stand of wetland vegetation and identify the maintenance activities necessary to mitigate the resulting stress. *For example, if non-native, invasive species (such as Phragmites) have emerged and begun to crowd out the planted or volunteer native species, the invasive species should be physically removed or chemically controlled. If geese are predated the plants, goose exclusion fence should be erected.*
- Photographs showing the current condition of the project

If by the 5<sup>th</sup> anniversary of the license effective date a healthy stand of wetland vegetation has not been maintained for at least 3 consecutive years, MDE may request that additional annual reports are provided.

**The annual Marsh Monitoring Report should be submitted to the address below on or before the following dates:**

- 1-Year Report: July 2, 2020
- 2-Year Report: July 2, 2021
- 3-Year Report: July 2, 2022
- 4-Year Report: July 2, 2023
- 5-Year Report: July 2, 2024

#### ACCEPTANCE OF MARSH MAINTENANCE PLAN

The applicant acknowledges that he/she has read and understands this Marsh Maintenance Plan and agrees to submit annual Marsh Monitoring Reports on or before the above due dates.

\_\_\_\_\_  
**Signature of Licensee**

\_\_\_\_\_  
**Date**

PLEASE SIGN, DATE AND RETURN THIS COPY OF THE MARSH MAINTENANCE PLAN TO:

MARYLAND DEPARTMENT OF THE ENVIRONMENT  
WATER AND SCIENCE ADMINISTRATION  
WETLANDS AND WATERWAYS PROGRAM  
**TIDAL WETLANDS DIVISION**  
(Signed Marsh Maintenance Plan) C/O Heather Hepburn  
(Annual Marsh Monitoring Reports) C/O Megan Spindler  
1800 WASHINGTON BLVD.  
BALTIMORE, MD 21230-1708