



2020 VIRGINIA COASTAL ZONE MANAGEMENT PROGRAM GRANT

Project Title: Hog Island Shoreline Restoration

I. LEGAL APPLICANT

Name: Lewis Lawrence

Organization: Middle Peninsula Planning District Commission

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Title: Deputy Director

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Unique Entity Identifier (UEI-SAM): LNDHN7WAJ1E1

II. PROJECT DETAILS

Geographic Area of Impact: Gloucester County, Virginia

Congressional District(s): 1

Start Date: 12/1/2022

End Date: 09/30/2023

Project continuing from previous year? No

III. PROJECT SUMMARY (4000 Character and Spaces Limit)

MPPDC staff propose to restore the shoreline of Hog Island as a 306A restoration project for \$412,229, which leverages (but is not used as match) the recently announced National Fish and Wildlife Foundation Project #76171 titled Phase I: Hog Island Restoration project funded at \$499,999.15. Although the combined funds are slightly less than the approximate \$900,000 in project restoration need, the combined funding should provide enough funding to complete the entirety or majority of the proposed restoration project. In addition, the two projects are completely separable as each project will restore a particular linear footage of shoreline and can stand alone. In 2019, the VIMS Shoreline Studies Program designed a CZM-funded nature-based flood mitigation solution for Hog Island (location map below). The plan includes constructing sills of various concrete and product design that will protect the marsh that faces the York River. On the flanks of the island, smaller oyster structures will be installed to enhance habitat and provide shore protection along the limited fetch shorelines. These techniques are proven approaches to address coastal hazards and enhance coastal habitats. The project was designed to a 15 to 25-year FEMA design storm standard. The design attenuates wave energy and storm surge. The island is surrounded by shallow water thus access will require specialized shallow water equipment.



Hog Island is an emergent estuarine marsh complex that is part of the Guinea marshes in Gloucester County, Virginia. These marshes are located at the confluence of Mobjack Bay and the York River. Hog Island is located within the new NOAA Middle Peninsula Habitat Focus Area, a targeted area for habitat restoration. The project site experiences high wave energy which has eroded the shoreline along its south face on the York River, and lower wave energy along its west and east flanks that occur on Monday Creek. Based on tidal gauge data from Virginia Institute of Marine Science (VIMS), relative sea-level rise rates ranging from 0.11-0.23 in/yr (2.9-5.8 mm/yr; period: 1976- 2007; 10 stations) within the Chesapeake Bay region, which are the highest rates reported along the U.S. Atlantic coast (Boon et. al. 2010). In addition to sea-level rise, the project location has a history of impacts from hurricanes and tropical storms. As storms pass over or near the coast, the atmospheric pressure drops, causing a large volume of seawater to build up, eventually being pushed ashore by the storm's winds causing a storm surge. In Gloucester County, strong East and Northeast winds can push water from the Chesapeake Bay into the mouth of the York River and Mobjack Bay, flooding much of the county's low-lying areas (MPPDC, 2005).

Hog island provides critical storm protection to an existing, well established Big Island Aquaculture company which relies on calm water for oyster growth. The fetch originates as a direct easterly line from Western Sahara, Africa. Its south-facing shoreline is exposed to large waves coming from the Atlantic Ocean through the mouth of Chesapeake Bay as well as Bay-generated waves coming from the east and east-southeast. It is eroding at a high rate of -4 to -5 ft per year. The east and west-facing Hog Island shorelines along Monday Creek have lower fetch exposures (0.2 to 0.5 miles) and erosion rates of about - 1 ft/yr. The proposed living shoreline project protects a total of about 3,200 ft of low marsh shoreline and consists of 15 stacked concrete oyster structures and 12 concrete oyster structures. Proposed structures will be cast by NATRX ([Natrx Nature-Based Coastal Resilience Solutions https://natrx.io/](https://natrx.io/)) using a patented Dry Forming™ technology which provides the ability to move from digital design to physical ExoForm™ structure within 1 day. Dry Forming enables the unprecedented ability to optimize and deliver ExoForms™ at scale.

- Efficiently mass manufactured with patented digital manufacturing platform
- 7x faster production than additive printing techniques and lower cost than traditional product (e.g. rock, riprap, concrete) implementations
- Void design tailored to ensure local habitat thrives
- Up to 80% reduction in carbon footprint vs. traditional products
- Using data gathered from our SatTech analysis and other location-specific research, solution design for ExoForm is custom to the project's habitat, climate, and project goals.

The structures will consist of 3 interlocking blocks that are 3 ft long, 3 feet wide and 2 ft high and will weigh about 1,000 lbs. The small concrete oyster structures will be 1.5 ft in each dimension and will weigh about 250 lbs. Each block will be 3D printed to include crevices for flushing and fauna-use, and the tops and sides will be irregular to assist oyster recruitment. The stacked concrete oyster structures will be placed 2 on the bottom and one on top in a line along



the shore to form a nearshore reef that will extend to about +2.5 ft MLW. The crest elevation is just above mean high water to help reduce the effects of larger waves that affect the site during storms. They will be placed strategically at existing headlands and along the marsh between the headlands along the south-facing shoreline. Gaps are between 10 ft and 30 ft wide, purposefully minimized to reduce waves affecting the marsh between the structures. The structures range in length from 82 ft to 195 ft and will be placed on subaqueous bottom to maximize oyster colonization. The structures will be placed inshore of existing SAV so that no SAV will be impacted by the project. The small concrete structures will be placed along the marsh scarp at MLW on the east-facing shoreline. The oyster structures will be between 52 ft and 150 ft long with small gaps of 12 ft to 20 ft wide. Hog Island is only accessible by water. The concrete oyster structures will be brought in by barge. Installation cost for this effort is anticipated to be significantly higher when bid due to the remote location and shallow water conditions at the site. Additionally with existing supply chain problems and cost of manufacturing products changing daily, the proposed budget is based on a range of linear feet possible given the complexity of the project. **We estimate that 514 to 800 linear feet for the stacked structures (NOAA Funding) and 1,524 to 2400 linear feet for single structures (NFWF Funding) will result.** Bid process will determine final negotiated outcomes and linear feet under each grant award.



Alternative Anticipated Cost Scenarios by Linear Feet

Budget Justification Exhibit
October 21, 2022

Stacked Structures (per permit)

800 Linear feet of structure

Cost Categories	Description	Quantity	Rate	Total	Cost/LF
Fabrication	Fabrication of exoforms structures	800	\$400	\$320,000	\$400
Delivery	Delivery of exoforms and delivery to installation site.	800	\$45	\$36,000	\$45
Construction and placement	Placement of stacked exoforms	800	\$45	\$36,000	\$45
Total				\$392,000	\$490

514 Linear feet of structure

Cost Categories	Description	Quantity	Rate	Total	Cost/LF
Fabrication	Fabrication of exoforms structures	514	\$400	\$205,600	\$400
Delivery	Delivery of exoforms and delivery to installation site.	514	\$63	\$32,400	\$63
Construction and placement	Placement of stacked exoforms	514	\$315	\$162,000	\$315
Total				\$400,000	\$778

Single Structures (higher energy, but closer to shoreline)

2400 Linear feet of structure

Cost Categories	Description	Quantity	Rate	Total	Cost/LF
Fabrication	Fabrication of exoforms structures	800	\$500	\$400,000	\$167
Delivery	Delivery of exoforms and delivery to installation site.	800	\$63	\$50,400	\$21
Construction and placement	Placement of stacked exoforms	800	\$70	\$56,000	\$23
Total				\$506,400	\$211

1542 Linear feet of structure

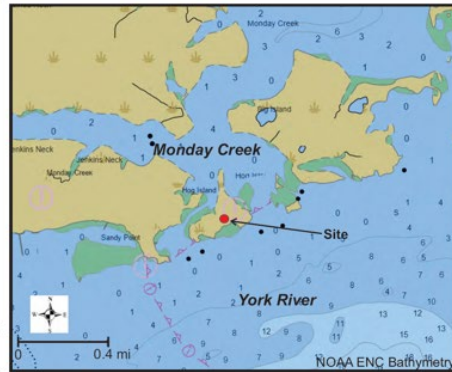
Cost Categories	Description	Quantity	Rate	Total	Cost/LF
Fabrication	Fabrication of exoforms structures	514	\$500	\$257,000	\$167
Delivery	Delivery of exoforms and delivery to installation site.	514	\$63	\$32,400	\$21
Construction and placement	Placement of stacked exoforms	514	\$425	\$218,450	\$142
Total				\$507,850	\$329

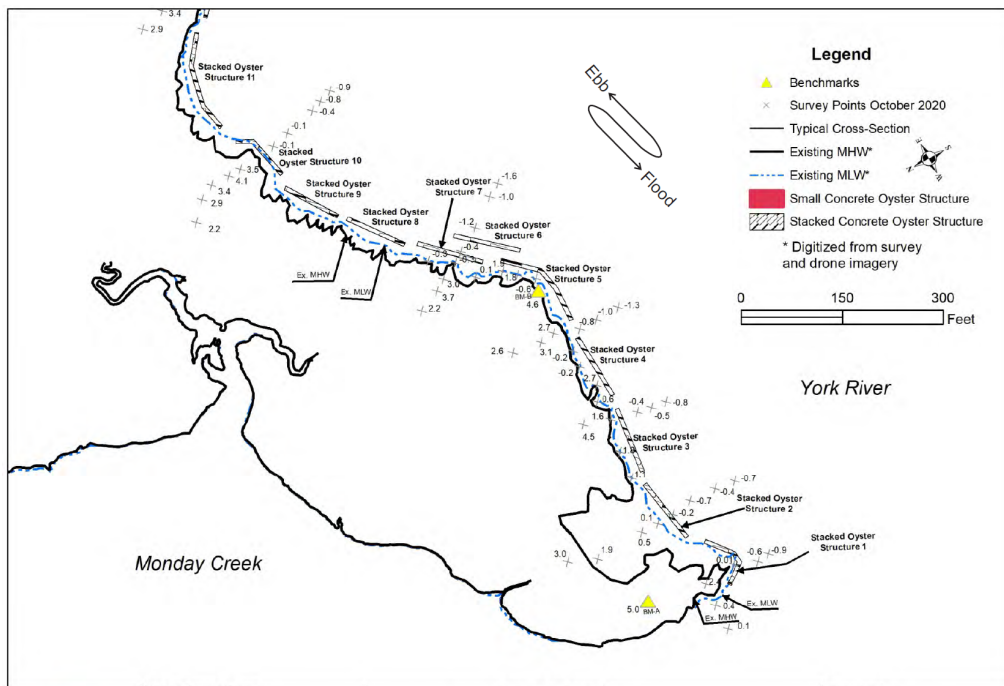
The design when implemented will include protection of 18 acres of habitat restoration. The proposed living shoreline project protects a total of about 3,200 ft of low marsh shoreline and consists of 15 stacked oyster structures and 12 small oyster structures. Concrete oyster structures that will be 3D printed to specifications developed for the site as noted below. The total structure length is 2,900 ft. The stacked oyster structures will be 6 ft wide and extend to +2.5 ft MLW. The crest elevation is just above mean high water to help reduce the effects of larger waves that impact the site during storms. They will be placed strategically along the south-facing shoreline, and the length of each structure is listed in the drawings. They will cover about 0.24 acres of subaqueous bottom to maximize oyster recruitment. The small oyster structures are 1.5 ft in each dimension and will be placed adjacent to the marsh scarp at MLW. They will cover about 0.04 acres of non-vegetated wetland. No sand fill is proposed (see restoration site plan).

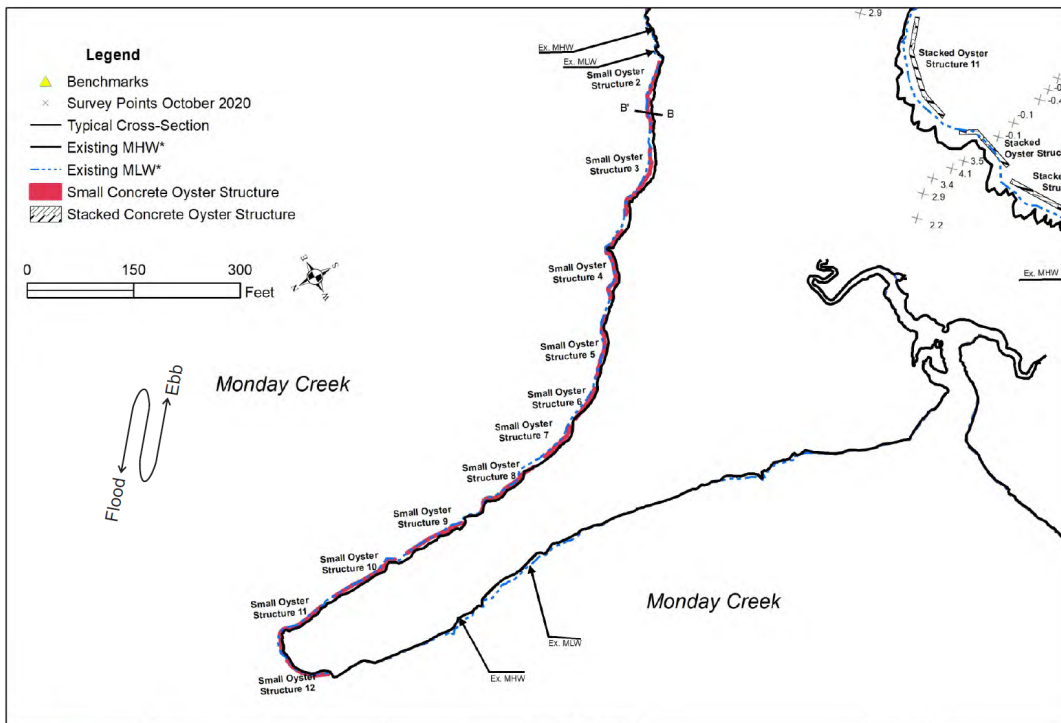
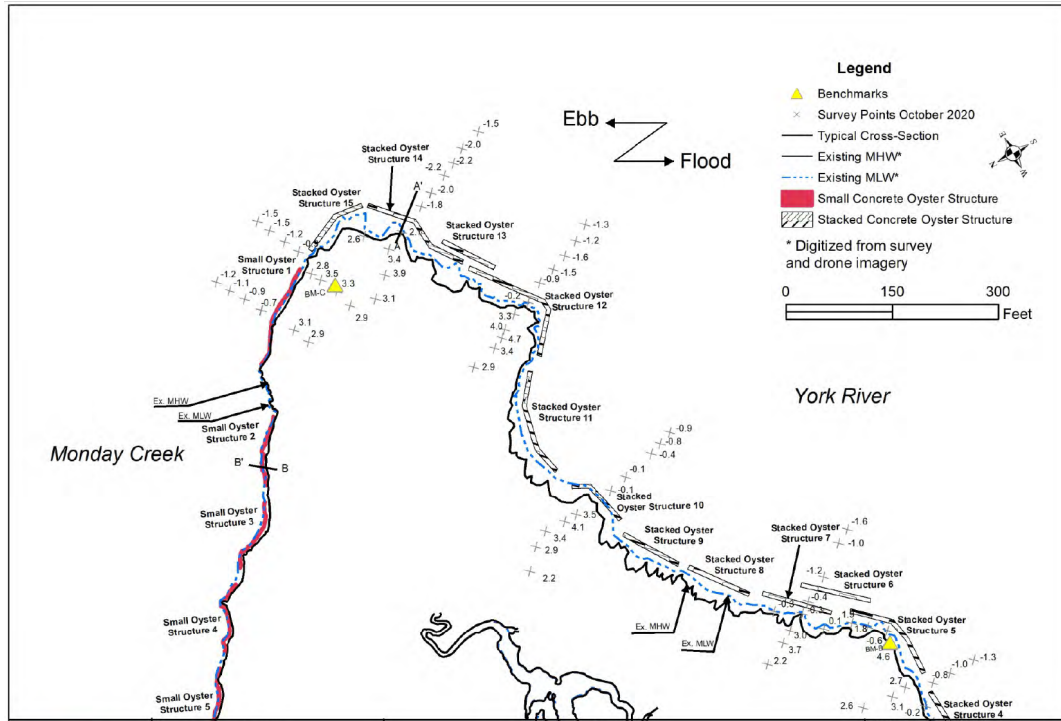


Project Location and Restoration Design by VIMS Shoreline Studies Program

	Adjacent Property Owners		Hog Island Living Shoreline		Application By:	
	Datum: MLW	At: In:	Purpose: Marsh protection & oyster reef creation		Date: 16 Aug 2022	Sheet: 1 of 8







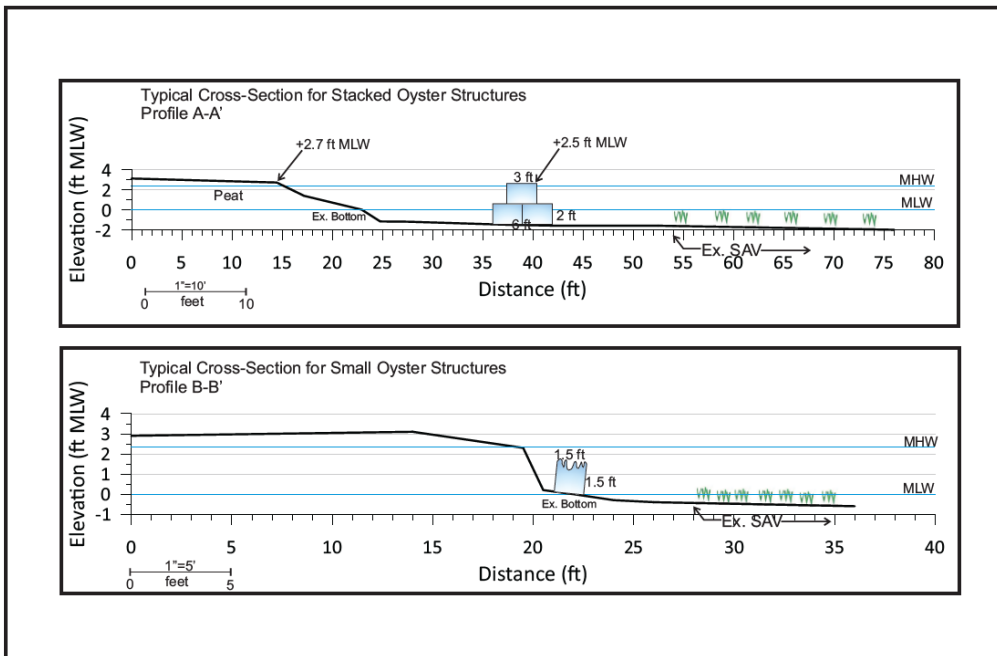


This project will incorporate the use of proprietary 3D concrete oyster structures specifically designed to meet the wave conditions expected. NATRX is the manufacture ([NatrX Nature-Based Coastal Resilience Solutions https://natrx.io/](https://natrx.io/))

Stacked Concrete Oyster Structure				Small Concrete Oyster Structure			
End Points				End Points			
Structure #	Latitude	Longitude	Length (ft)	Structure #	Latitude	Longitude	Length (ft)
1	37.2646350	-76.3876235	100	1	37.2663362	-76.3834278	150
	37.2646332	-76.3878766			37.2660208	-76.3831129	
2	37.2647354	-76.3872208	100	2	37.2665511	-76.3839506	105
	37.2646904	-76.3875605			37.2663910	-76.3836778	
3	37.2646841	-76.3868146	100	3	37.2667937	-76.3842410	110
	37.2647182	-76.3871562			37.2665831	-76.3840196	
4	37.2646870	-76.3863998	100	4	37.2670050	-76.3845611	117
	37.2646721	-76.3867436			37.2668351	-76.3843011	
5	37.2648039	-76.3858655	150	5	37.2672017	-76.3848607	92
	37.2646729	-76.3863049			37.2670498	-76.3846186	
6	37.2649224	-76.3856398	100	6	37.2673462	-76.3849841	52
	37.2647169	-76.3858687			37.2672233	-76.3848986	
7	37.2650675	-76.3855848	100	7	37.2675220	-76.3850724	58
	37.2648731	-76.3858283			37.2673763	-76.3850020	
8	37.2652680	-76.3852999	90	8	37.2678398	-76.3851528	105
	37.2651159	-76.3855569			37.2675780	-76.3850879	
9	37.2654287	-76.3850053	90	9	37.2681666	-76.3851506	90
	37.2652973	-76.3852638			37.2679222	-76.3851556	
10	37.2655115	-76.3846801	90	10	37.2684932	-76.3851616	105
	37.2654132	-76.3849365			37.2682175	-76.3851481	
11	37.2655344	-76.3845761	155	11	37.2687747	-76.3852840	105
	37.2654483	-76.3835103			37.2685475	-76.3851739	
12	37.2653747	-76.3840471	195	12	37.2686560	-76.3854773	65
	37.2654882	-76.3833348			37.2687713	-76.3853209	
13	37.2653620	-76.3835697	82	Benchmarks			
	37.2656726	-76.3830064		UTM, NAD83, Zone 18N, ft			
14	37.2654588	-76.3834690	160	Name	Northing	Easting	Elev. ftMLW
	37.2659542	-76.3830601		A	13,534,020.75	1,236,709.96	5.0
15	37.2656939	-76.3829907	100	B	13,533,931.76	1,237,190.50	4.6
				C	13,534,358.11	1,238,020.14	5.1

Example of a small concrete oyster structure and placement at a site.

	Adjacent Property Owners	Hog Island Living Shoreline	Application By:
Datum:	At:	Purpose: Marsh protection & oyster reef creation	Date: 16 Aug 2022 Sheet: 8 of 8





The project when complete will have multiple direct benefits to the adjacent ecosystem including: (a.) water quality improvements to adjacent tributaries. According to DEQ estimates, a non-structural living shoreline or plant marsh with sill can prevent 42 lbs of sediment per linear foot, as well as 0.755 pounds of nitrogen per foot per year and .068 pounds of phosphorous per foot per year. (b.) creating natural coastal habitat to enhance current habitats; (c.) enhancing of oyster populations through constructed oyster castles and installation of oyster bags. (D) providing storm surge protection for businesses and homes located south westerly of Hog Island.

IV. DELIVERABLES/PRODUCTS

Product #1:

Title (80 character and spaces limit): Finalized JPA and Permits

Percent total project budget: 1%

Description (4000 character and spaces limit): MPPDC staff submitted a joint permit application to the Virginia Marine Resource Commission on June 28, 2022 and then resubmitted on September 27, 2022 at the request of VMRC/VIMS to ensure Submerged Aquatic Vegetation avoidance. Virginia Institute of Marine Science (VIMS) Shoreline Studies Program provided permitting agencies with additional information and technical guidance.

Product Format: Digital copy of the approved Joint Permit and approved design for the restoration project

Timeframe: Start: 6/28/2022 (at PDC's expense)

End: 12/1/2022

Product #2:

Title (80 character and spaces limit): Final Report on Procurement of Construction Firm and Construction of Habitat

Percent total project budget: 99%

Description (4000 character and spaces limit): Funds will be used for bidding, purchase and installation of stacked concrete oyster structures and small concrete oyster structures described in the approved permit and described as:



Stacked Concrete Oyster Structure				Small Concrete Oyster Structure				Example of a small concrete oyster structure and placement at a site.
Structure #	Latitude	Longitude	Length (ft)	Structure #	Latitude	Longitude	Length (ft)	
1	37.2646350	-76.3876235	100	1	37.2663362	-76.3834278	150	
	37.2646332	-76.3878766		2	37.2660208	-76.3831129	105	
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	37.2647169	-76.3858687		7	37.2672233	-76.3848986	58	
7	37.2650675	-76.3855848	100	7	37.2675220	-76.3850724	105	
	37.2648731	-76.3858283		8	37.2673763	-76.3850020	105	
8	37.2652680	-76.3852999	90	8	37.2678398	-76.3851528	90	
	37.2651159	-76.3855569		9	37.2675780	-76.3850879	90	
9	37.2654287	-76.3850053	90	9	37.2681666	-76.3851506	105	
	37.2652973	-76.3852638		10	37.2679222	-76.3851556	105	
10	37.2655115	-76.3846801	90	10	37.2684932	-76.3851616	105	
	37.2654132	-76.3849365		11	37.2682175	-76.3851481	105	
11	37.2654353	-76.3840937	155	11	37.2687747	-76.3852840	65	
	37.2655344	-76.3845761		12	37.2685475	-76.3851739		
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	37.2653620	-76.3835697		UTM, NAD83, Zone 18N, ft				
14	37.2656726	-76.3830064	160	Name	Northing	Eastng	Elev ftMLW	
	37.2654588	-76.3834690		A	15,534,020.75	1,236,709.96	5.0	
15	37.2659542	-76.3830601	100	B	15,533,931.76	1,237,190.50	4.6	
	37.2656939	-76.3829907		C	15,534,358.11	1,236,020.14	5.1	

Product Format: A final digital report documenting the installation and completion of the permitted project. Final report will contain photos of the project at various states as well CZM/NOAA acknowledgement signage.

Timeframe: Start: 1/1/2023
End: 9/30/2023

V. PROJECT TIMELINE.

- December 2023 under contract
- December 2023 finalize procurement and select contractor
- January-July 2024 Construction
- August 2024 project close out.

VI. BUDGET

Budget Summary Worksheet			
Category	Federal Request	Non-Federal Match	Total
A. Personnel	\$7,500	\$12,499	\$19,999
B. Fringe	\$2,082	\$3,470	\$5,552
F. Contractual	\$400,227	\$0	\$400,227
Total Direct Costs	\$409,809	\$15,969	\$425,778
I. Indirect Costs	\$2,420	\$4,032	\$6,452
Total	\$412,229	\$20,001	\$432,230

**A. Personnel**

Personnel Worksheet - Federal Costs				
Title	Name (or Vacant)	Annual Salary	Level of Effort (%)	Total Personnel Cost
Resiliency Planner	PJ LeBel	\$50,000	15.00%	\$7,500
Total				\$7,500

JUSTIFICATION: Resiliency Planner will oversee and coordinate project implementation with contractor.

Personnel Worksheet - Non-Federal Costs				
Title	Name (or Vacant)	Annual Salary	Level of Effort (%)	Total Personnel Cost
Resiliency Planner	PJ LeBel	\$50,000	15.00%	\$7,500
Executive Director	Lewis Lawrence	\$160,075	3.1230%	\$4,999
Total				\$12,499

JUSTIFICATION: Resiliency Planner will oversee and coordinate project implementation with contractor. Executive Director will provide supervisory and strategic project management services associated with the project. Executive Director will also coordinate with the Middle Peninsula Chesapeake Bay Public Access Authority, owner of Hogg Island.

B. Fringe

Name/Title (If Using Individual Fringe Rates)	Component	Rate (%)	Salary (amount carried down from the Total Personnel Cost from the Personnel)	Total Fringe Cost
	Health Insurance	14.12%	\$7,500	\$1,059
	Retirement	4.79%	\$7,500	\$359
	Workers Comp	0.16%	\$7,500	\$12
	Social Security	7.50%	\$7,500	\$563
	Life Insurance	1.18%	\$7,500	\$89
	Unemployment	0.01%	\$7,500	\$1
Total				\$2,082

JUSTIFICATION: MPPDC Agencywide Fringe pool for FT employees includes health insurance, retirement, group life insurance, workers comp and unemployment insurance. MPPDC FT employee planned fringe rate for FY23 is 27.76% comprised of: Health Insurance – 14.12%, Retirement – 4.79%, Workers Comp – 0.16%, Social Security – 7.50%, Life Insurance – 1.18%, Unemployment – 0.01%. MPPDC Fringe pool for PT employees includes Workers Comp, Social Security, and Unemployment Insurance.



Name/Title (If Using Individual Fringe Rates)	Component	Rate (%)	Salary (amount carried down from the Total Personnel Cost from the Personnel)	Total Fringe Cost
	Health Insurance	14.12%	\$12,499	\$1,765
	Retirement	4.79%	\$12,499	\$599
	Workers Comp	0.16%	\$12,499	\$20
	Social Security	7.50%	\$12,499	\$937
	Life Insurance	1.18%	\$12,499	\$147
	Unemployment	0.01%	\$12,499	\$1
Total				\$3,470

JUSTIFICATION: MPPDC Agencywide Fringe pool for FT employees includes health insurance, retirement, group life insurance, workers comp and unemployment insurance. MPPDC FT employee planned fringe rate for FY23 is 27.76% comprised of: Health Insurance – 14.12%, Retirement – 4.79%, Workers Comp – 0.16%, Social Security –7.50%, Life Insurance – 1.18%, Unemployment – 0.01%. MPPDC Fringe pool for PT employees includes Workers Comp, Social Security, and Unemployment Insurance.

F.Contractual: The contractual category includes consultant services and subcontracts. A consultant is a non-employee who provides advice and expertise in a specific program area. A subcontract is for a product or a service. Please detail out any costs from the Contractual Worksheet in the Contractual tables located below this Contractual Worksheet table.

Category	Contractual Worksheet			Budget Narrative
	Federal	Match	Total	
Construction	\$400,227	\$0	\$400,227	Principal balance for construction, transportation and manufacturing. Up to \$10,000 for legal bid packet development may be required
Total Direct Costs	\$400,227	\$0	\$400,227	
Indirect Costs	\$0	\$0	\$0	
Total	\$400,227	\$0	\$400,227	

If Contractual expense is included in the project budget, a justification must be provided for each contract. To comply with the NOAA Budget Guidance, the following information must be provided.

For each contract:

- Name of Contractor (if unknown, state “To be selected.”) To Be selected
- Method of selection- Virginia procurement Act
- Scope of Work and necessity / relevance to the project: As described.

Period of Performance for each task - January-July 2024 Construction

- Criteria for measuring accountability. Number of units placed as per funding.



- Detail for each expense in the Contractual Worksheet (Contractor / Vendor budget)

JUSTIFICATION: The RFP will request a manufacturer and installer. The contractor/manufacturer Natrx is anticipated to be the proposed product manufacturer and installer for the grant award but there will be a bidding process. Natrx is the proprietary manufacturer using a 3D concrete printer. A second contractor (MPPDC’s attorney who is on retainer) will be used to develop the appropriate bid process.

If the title and name of the contractor are not known at the time the proposal is submitted, include a generic title under the Title column and under the Name column - “To be selected.” If only a total cost is known for the amount to be paid in Personnel costs instead of Annual Salary and Level of Effort, put in the cost to be paid and “Total Cost to be paid” or “Rate to be paid” under the Annual Salary column and nothing under Level of Effort. Then carry that total amount over to the Total Personnel Cost column.

Please detail the Construction costs for the contractual portion of the grant. For a description of what serves as Construction costs, please refer to the language above the overall budget “Construction” tables and in the Proposal Budget Guidance.

Contractual Construction Subworksheet - Federal Costs		
Item(s)	Rate x Quantity	Total Cost
Natrx manufacture and install and bid process		\$400,227
Total		\$400,227

I. Indirect Cost Rate

“Total Base Amount” is the total of the budget categories (e.g. personnel only, personnel plus fringe, total direct costs, or modified total direct costs, etc.) included in the indirect cost calculation.

Indirect Costs Worksheet			
Indirect Cost Rate (%)	Total Base Amount (Fed + Match)	Maximum Allowed Indirect Cost (Rate x Total Base)	Total Indirect Cost Included in Budget
25.25%	\$25,551	\$6,452	\$6,452

Federal Indirect Cost	Non-Federal Match Indirect Cost	Total Indirect Cost Included in Budget
\$2,420	\$4,032	\$6,452

If Indirect Costs are included in the project budget, a justification must be provided. This justification should include the following information.

- Type of Indirect Cost rate applying (federally approved, negotiated, de minimis)
- Components of the Cost Base to which the rate is applied (e.g., Personnel only, Personnel and Fringe, Modified Total Direct Costs and what comprises it, etc.)



- Whether Indirect Costs are capped and, if so, a statement as to whether capping was a voluntary election.

JUSTIFICATION: MPPDC prepares an indirect cost plan annually per 2 CFR 200 Appendix VII. Following annual audit, the plan is submitted to our Cognizant Federal Agency (US Dept. of Commerce) for acceptance. MPPDC's IDC rate has a basis of Modified Total Direct Costs, with a FY23 planned rate of 25.25%. Modified Total Direct Costs include personnel and fringe. Contractual/Construction costs are excluded.

Data Sharing Plan

1. Types of environmental data and information to be created during the course of the project and geographic extent: GIS shape files of the restored area will be created.
2. The type of collection method (e.g flight lines): Hand held GPS trimble units will be used to create the polygons.
3. Tentative date by which data will be shared: Fall 2023.
4. Standards to be used for data/metadata format and content: Regular state/federal standards will be followed to create metadata.
5. Policies addressing data stewardship and preservation: Data will be maintained indefinitely.
6. Procedures for providing access to data and prior experience in publishing such data: We will provide access via the CZM Coastal GEMS portal to store and display the data. Nick Meade, CZM GIS Coordinator has over 13 years of experience in publishing GIS data.

Signature of Project Manager: _____ Lewie to sign _____ Date: _____