TOWN RESILIENCY PLAN

Documents Compiled by the Resiliency & Sustainability Committee

May 15, 2025

To: (consultant contact name email address)
From: Town of Dewey Beach Climate Change Committee

Subject: Preliminary questions for Consultants regarding an initial study and report assessing Dewey Beach's climate change resiliency needs.

Dear (consultant contact name),

A Climate Change Committee was formed by the Town of Dewey Beach, Delaware in 2022 to identify the Town's resiliency needs and make recommendations to the Town Council for projects that would help us mitigate the damaging effects of climate change.

We are currently seeking to identify a consulting firm that has experience working with other Delaware coastal communities. Our initial action will be to commission a research study that identifies Dewey Beach's strengths and weaknesses, makes recommendations for future work, identifies projected costs and provides timeline estimates as appropriate.

We would ask that you respond to a short list of questions (attached) if you are interested in working with us going forward.

We thank you for your consideration and look forward to receiving your response by June 6, 2025.

Kindest regards,

Dewey Beach Climate Change Committee
Sub-committee work to procure a feasibility study
Progress Report
June 30, 2025

The sub-committee is working to develop a list of viable contractors with experience designing and implementing feasibility studies for Delaware coastal communities.

In May, 2025, a preliminary list of questions for potential contractors was developed. The questions were as follows:

1. Have you worked with other coastal municipalities conducting studies and/or performing work with regard to climate change resiliency?
   - Which municipalities have you worked with and when?

2. What types of information would you need in order to conduct an initial study and report on Dewey Beach's climate change/resiliency needs?

3. Can you briefly describe the process, including the sequence and steps you will take to research and complete a study as well as a final project report?

4. Using your experience with other municipalities as a guide, can you estimate the time requirements and the cost for completing an initial study?

5. If we selected your firm to do the work, will you be using the same staff members who previously did similar work with other municipalities?

6. What sources of funding are you aware of for this type of project?

We initially targeted four firms with previous experience working with other Delaware coastal communities:

GMB (architects and engineers)
Beacon Engineering
JMT Engineering
AECOM (engineering and construction)

The above list of questions was emailed to representatives at each of the companies listed above, with a request to complete the questionnaire and return it to us by June 6, 2025.

To date, GMB is the only respondent indicating a strong interest in working with us to develop a feasibility study. (Their written response to our questions is available for inspection upon request.)

Beacon Engineering responded to us via email, explaining that their expertise is on the implementation side of projects, and they would be happy to work with us once we have approved projects.

We did not initially receive a response from JMT, but are expecting a response from them this week.

We were unable to reach anyone at AECOM.

Additional updates will be provided to the committee as work continues.

Potential Funding Sources

BRIC - FEMA: officially ended 4/8/25 and awarded grants were cancelled. No further information available at this time.

US Army Corps of Engineers: Typically funds studies and small scale projects. As of 5/2/25, Milton is pursuing $200,000 in grant funds for flood damage, erosion control and waterway erosion. (Unclear as to whether or not funding is available.)

DNREC: Resilient Communities Grant Program through NOAA. DNREC is currently assisting the Town of South Bethany, to apply for $75,000 in grant funds. Despite South Bethany's grant application, a check of the website indicates "no open funding opportunities at this time".

NFWF: NFWF NCRF (National Coastal Reliency Fund) grant program is currently closed.

Delaware Sea Grant assists in identifying and procuring grant funds for **projects**.

According to the contractor GMB, they are not anticipating a federal Notice of Funding Opportunities for this fiscal year or next. They are, however, checking for additional (non-federal) sources until things open up again.

Research Collected from our Neighboring Towns, i.e., Lewes, Fenwick and South Bethany

The following is a compilation of the research collected by Kelly Baxter, April Wells and Liam McDermott on our neighboring towns re. SLR risks, resiliency "plans" and funding. It should be noted that much of the work for municipalities is currently underway, i.e., not yet approved by requisite town/city councils. Additionally, work was done to both identify and consider the case for engaging the services of consultants.

City of Lewes (information collected by Kelly Baxter)
Lewes Contact: Amy Maresco (Lewes City Council)

- Per Amy Maresco, a draft Resiliency Fund is soon to be presented to the City Council.

- Work on resiliency funding is within the purview of the Environment Planning Committee. There is a resiliency plan currently in the process of approval.

- In order to inform their current and future environmental work, Lewes has contracted with the GMB Consulting Group for data collection. Past efforts resulted in creation of a plan that included projected costs. The committee was able to present the plan to the City Council for consideration.

- Their goal (not yet approved) is to raise a total of $5 million over the next few years as follows:
- $300,000 seed money for a total of $500,000 (siphoned off from other parts of the city's budget) and ab additional $200,000 (a one-time allocation of 2% of transfer taxes.
- Once a fund is established, and if all of the money is not needed in any given year, up to $1,000,000 of the fund might be used for long-term projects related to resiliency. A super majority Council vote would be required for this.
- Additional funding would come from existing funding sources - homeowners, businesses and local public sources (i.e., parking fees, hotel taxes, etc.)

- Messaging is an important component of the resiliency plans in Lewes. "Make Way for the Bay" (borrowed from a Dutch campaign) encourages current action; environmental stewardship is promoted; and the idea of protecting residential and business investments is emphasized.

- A Resiliency Capital Plan (separate from infrastructure) is the ultimate goal. It will allow for long-term flood management strategies.

Town of Fenwick (information collected by April Wells)
Fenwick Contact: Susan Brennan (Town commissioner, actively working on Resiliancy Plans)

- Resiliency Group includes members from Infrastructure, Planning, Charter and Ordinance committees. Includes an Environmental Committee.

- A resiliency study was done in 2019, resulting in the 2023 Resiliency Draft Plan, a ten-year plan identifying projects to be addressed.

- A survey of citizens indicated that 90% considered flooding issues to be their primary concern.

- A Storm Water Management Survey was conducted (and currently needs to be updated).

- Current problems that need to be addressed include:
  - Storm Water Management Survey: survey needs to be updated and identified
  - problems remediated.
  - Bulkheads/Canals
  - Flood Protection: bulkheads and riprap
  - Storm Drainage: pipes and outfalls

- Goals - accomplished, underway, or identified for future work:
  - Work with community to determine future work (accomplished)
  - Maintain public engagement on SLR and climate change (accomplished)
  - Improve drainage (underway)
  - Engage with other DE towns and organizations (underway)
  - Beach Replenishment - Army Corp of Engineeers (accomplished)
  - Obtain grant funding (underway)
  - Consider resiliency funding (future work)
  - Review potential code changes/updates (future work)

Town of South Bethany (information collected by April Wells)
South Bethany Contact: Edie Dondero (Mayor, committee chair)

- Scope of Work:
  - Review existing plans/studies to identify projects that strengthen the town's resiliency.
  - Prioritize projects; identify potential costs; identify possible funding sources grants.
  - Recommend updates to the town code (new ordinances) to enhance resiliency.
  - Develop and make available to the public educational and informational resources on the risks and potential impacts of SLR and the town's vulnerabilities.

- Work with the Town Council and staff to develop a communication strategy and procedures that will inform the public about current and future resiliency projects.
- Review SLR projections regularly to insure that potential risks to the town are updated, i.e., kept current.

- Main problems to address:
- Bulkheads, impervious surfaces, low elevation roads, minimal public drainage
- No freeboard code
- Land surrounding canals is mostly private

- Future Goals:
- BRIC of PDM grant and other funding
- Raise bulkheads
- Revise town codes (example: freeboard)

- Implausible Solutions
- Construct a wall, berm or natural barrier around the town
- Expand the canal system

Other local municipalities are engaged in long-term planning processes. Rehoboth Beach's plan should be finalized in Spring, 2025. Additionally, Bethany Beach is working on stormwater issues, but does not appear to have a resiliency fund.

Dewey Beach: Considerations for engaging the services of a consulting firm. (information collected by Liam McDermott)

- A consultant could prove very helpful in determining the goals of a resilience fund.

- A consultant may help to convince the Town Council that a vulnerability study is necessary.

- Potential consulting firms to consider:
- AECOM
- Dewberry
- GMB
- Stantec
- EA Engineering
- Moffat & Nichol
- Arcadis
- KCI

- AECOM did the Fenwick Island Resiliency Plan and DelDot SR1 Resiliency Plan.
- DelDot SR1 Study covers the coastline from Dewey to Fenwick. The next ten years will focus on the stretch of highway between the south end of Dewey and the bridge.
- GMB is helping Lewes inform the public about the threat of SLR, as well as help them work towards developing a resiliency fund.
- The first step would be to conduct a vulnerability study.
- Once completed (and assuming satisfaction with the consultant), future projects and solutions could be developed.

Climate Change Committee

Project to Develop a Resilience Plan for Dewey Beach

At the April 25, 2025, Town Council meeting, Commissioners voted unanimously to direct the Climate Change Committee to develop a project intended to create a resilience plan for the town. The approved motion asked the Committee to:

- Draft a scope of work,
- Interview potential consultants
- Determine the approximate cost, and
- Identify any possibly sources of external funding.

Progress

At the Committee's July 2nd meeting, the members discussed the progress on developing this project and voted to bring a progress report to the Town Council for further input and guidance.

From discussions with neighboring towns and suggestions by the Town Manager, the Committee identi ed the following as possible consultants for the project:

- GMB (architects and engineers)
- Beacon Engineering
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Each consultant was asked to respond to the following questions:

1. Have you worked with other coastal municipalities conducting studies and/or performing work with regard to climate change resiliency?
    a. Which municipalities have you worked with and when?
2. What types of information would you need in order to conduct an initial study and report on Dewey Beach's climate change/resiliency needs?
3. Can you brie y describe the process, including the sequence and steps you will take to research and complete a study as well as a nal project report?
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DRAFT 3

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Proposed Outline of the Scope of Word

Only GMB has responded substantively to the Committee's request. The GMB response and Committee discussion suggests the following components for the project:

- Risk Assessment and Vulnerability Analysis
    - Document review (DelDOT SR1 Flood Mitigation Study, topographic data, FEMA ood maps, and past efforts to mitigate ood risks.
- Community and Stakeholder Engagement
    - Meet with Town stakeholders to assess tolerance for ood risk, the planning time horizon, and sea level rise projections.
    - Collect information on how stakeholders have been affected by past ooding.
- Future Action Recommendations
    - Review topographic and inundation information to determine at-risk areas of town and what strategies may be successful in such areas.
    - Short, medium, and long-term actions
    - Policy and land use recommendations
    - Potential engineered and nature-based solutions
- Recommend education strategies to enhance understanding of ood mitigation and discourage ideas that are likely not feasible for the town.
- Prepare a nal report.

GMB estimates that the project would require approximately 9 months and a total cost of $75,000. With recent reductions in Federal spending for climate-related projects, it seems unlikely that Federal funds will be a possible source of support for the project. State and other sources will be explored for possible funding opportunities.

The Committee seeks the Town Council's guidance on the appropriateness of the proposed elements for the project and next steps. The June 30 progress report on this effort and the full GMB response are attached.

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GMB Engineering

GMB
GEORGE, MILES & BUHR, LLC

ARCHITECTS
ENGINEERS

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SALISBURY
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LEWES
OCEAN VIEW

www.gmbnet.com

June 5, 2025

Attn: Kelly Baxter
Dewey Beach Climate Change Committee

Re: Preliminary Questions for Consultants Regarding an Initial Study and Report Assessing Dewey Beach's Climate Change Resiliency Needs

Dear Ms. Kelly Baxter,

I am pleased to provide you with the responses to the preliminary questions requested regarding the initial study and report assessing the Town of Dewey Beach's climate change resiliency needs.

GMB and I have recently had the opportunity of working with the Town of Dewey Beach on its new Town Hall project. This project addresses coastal resiliency efforts by increasing the elevation of the building to provide an amplified level of mitigation and resiliency with minimal fiscal investment in building costs. I am proud to have assisted the Town with this coastal resiliency effort, and I look forward to working with the Dewey Beach Climate Change Committee and further assisting the Town of Dewey Beach with mitigating the damaging effects of climate change from increased flooding caused by more intense rainfall events and sea level rise.

Should you select GMB to assist with the Town's climate change resiliency needs, you will be joining the several other communities on the Delmarva Peninsula that have trusted myself, GMB, and our team to inform and guide them through similar endeavors with great success.

Included on the following pages are the responses to the questions requested along with an overview of our firm, the resumes of the staff members who will be involved, and relevant project experience. Please do not hesitate to contact me if you have any further questions. Thank you for this opportunity.

Sincerely,

Brent R. Jett, P.E., CFM, CC-P

GMB
GEORGE, MILES & BUHR, LLC

Question 1: Have you worked with other coastal municipalities conducting studies and/or performing work with regard to climate change resiliency? Which municipalities have you worked with and when?

GMB's coastal resiliency team has worked with several coastal municipalities performing work regarding climate change resiliency. Our work with these municipalities includes:

- The Cedar Street Flood Mitigation study for the City of Lewes, Delaware. This has led to a FEMA BRIC FMA grant for the design of berms with floodgates. The study was performed around the time of the COVID pandemic, and given those circumstances, we crafted an online reporting strategy for residents to submit flooding photos and experiences without having to leave their homes. The study was completed in 2021.
    - Please visit this website for further information: https://www.ci.lewes.de.us/301/West-Cedar-St-Flood-Mitigation-Planning-
- Various consulting with the City of Lewes, Delaware which has led to their implementation of the Resiliency Fund, additional freeboard, lowered lot coverage standards, beachside stormwater study, and a wetlands ordinance for the city. This began in 2020 and is on-going.
- A flood study for the Town of St. Michaels, Maryland investigating the flood hazards and mitigation strategies on public lands around the harbor. The town has used this report to leverage various funding opportunities for five or six additional projects nearing implementation. Also, many of the Town's immediate and short-term goals have been achieved. This report is listed on the Town's website under their Climate Change/Sea Level Rise Committee subpage: https://www.stmichaelsmd.gov/climate-change-sea-level-rise-commission/page/harbor-and-stormwater-infrastructure-study. Completed in 2021.
- A flood study for the Town of South Bethany, which has encouraged Edie Dondero (the current mayor) to form a group with various coastal communities that has led to two or three other projects to be successfully funded. The Town recently kicked off their resiliency project with UDel's IPA group, which is utilizing the report provided by GMB for the discussions and approaches to resiliency. Completed in 2023.
    - Please visit this website for further information: https://southbethany.delaware.gov/files/2023/07/FINAL-Report-South-Bethany-MARCH-2023-BRJ-rev.pdf

- The Town of Oxford 2100 Visioning Plan: What will a Town that has existed since the 1600's look like in the year 2100 with 4+ feet of sea level rise? This report looks at various strategies and approaches to ensure the Town has a plan to address more flooding and higher water levels. Completed in 2023.
    - Please visit this website for further information: https://oxfordmd.net/oxford-2100/
- The Town of Oxford Flood Remediation Project. GMB has completed three phases of flood mitigation studies for the Town of Oxford. The most recent study was completed in the fall of 2024 while advising for the installation of two stormwater pump stations.
    - Please visit this website for further information: https://oxfordmd.net/wp-content/uploads/2024/04/GMB-032624-presentation.pdf

In addition, I/GMB have consulted and worked on resiliency projects for several other municipalities in Delaware including the Town of Fenwick Island, City of Seaford, Town of Laurel, and the Town of Dewey Beach.

I/GMB has also worked with several other municipalities in Maryland including the Town of Chestertown, City of Cambridge, City of Crisfield, and the Town of Ocean City.

Question 2: What types of information would you need in order to conduct an initial study and report on Dewey Beach's climate change/resiliency needs?

The types of information we would need to conduct an initial study and report would include:

- Past studies
- The existing topography and shorelines can be pulled from the State database using Lidar information. This will serve the study/report well enough and save several thousand dollars in survey fees and time.
- Re-review of the FEMA flood maps (which shows the entire town in the floodplain.)
- Infrastructure information: stormwater network and other improvements.
- Past efforts to address sea level rise and mitigate localized flooding.

- Town's level of appetite for risk. Is it ok for a few flood days a year? One a month? Only during the "big one?" How far out do you want the plan to address; 20-years, 50-years, 2100?
- Is the Town willing to buy-in that sea level rise is real and it is a threat multiplier to the Town, its infrastructure, and resident's property?
- What level of sea level rise do you wish to address, the median sea level rise projection or a higher degree? What aspects would you like to address: solely public lands or all as-risk areas in Dewey Beach?

This discussion and review will form the approach to the investigation, facilitate discussions with stakeholders, and determine the final goal that the Town is seeking for mitigation.

Question 3: Can you briefly describe the process, including the sequence and steps you will take to research and complete a study as well as a final project report?

- Meet with stakeholders including elected officials, representatives of communities that are inundated frequently, and business owners that are adversely impacted when flooding hits. DNREC and DelDOT are not likely to participate, but we will reach out to them to determine additional information and their approaches for the future. I believe Danielle Swallow of Sea Grant would be a good person to include in the kick-off because she is a familiar face with years of experience.
- Send a survey prior to the kick-off asking the respondents how they have been affected by flooding in the past. This survey will provide insight into hot spot areas and the level of participation across the community. It can also, depending on the questioning, give a glimpse into the level of understanding of flooding and how coastal areas are impacted, as well as the current state of sea level rise and how it impacts our lives.
- Review state lidar topography to understand the low-lying areas; those that will be inundated first before other areas. The flood maps and the National Wetland Inventory will be reviewed. The National Wetland Inventory (which is not 100% accurate but gives an idea of potential areas that will qualify as wetlands) will be reviewed. This topographic and inundation information will be used to determine at-risk areas to do a deeper dive in the field and see what approaches and strategies will be successful in these areas.

- Convene with Dewey Beach stakeholders to discuss the findings, proposed approaches, hot spots, potential improvement strategies, pros and cons of various strategies (including costs), areas to address in the report (only public, all areas, the 5 most at-risk), and next meeting date to present a draft report. We have enough experience to provide the best options for various flooding locations and extents to guide the discussion without having extraneous investigations.
- Educate. This is an important step in the process. The more people that understand the aspects of flood mitigation the better. And education will remove ideas that aren't feasible on the ground to address the issues and problems on a local level. There is a fine line between positive flow and drainage to flooding and impounding water at the topography present along the shore in our area. GMB understands this relationship and how it is ever changing and how the future increase in sea levels will impact this relationship and functionality of drainage/flood mitigation.
- Compile the results, provide a draft report, and meet to discuss with the public. Once the final comments have been received, the final report can be formatted and finalized for the Town to use as a playbook and guide for a more resilient future for Dewey Beach.

Question 4: Using your experience with other municipalities as a guide, can you estimate the time requirements and the cost for completing an initial study?

Working with the community, reviewing all past data, and providing strategies to be investigated over the next several decades will take approximately 9 months and $75,000.

The timing provides ample opportunity to discuss options with the stakeholders, residents, and property owners. There will be time for multiple meetings and discussions to ensure that everyone involved has a solid understanding. There will be back-and-forth communication between GMB and the Town to keep things transparent and moving along.

The study will identify the most at-risk areas: the areas that will be inundated first and the areas that will allow for flooding further inland once breached or overtopped. A list/map of these areas with potential strategies will be included in the final report. Also, strategies, both on the code and procedural front and on the infrastructure front, will be laid out in a timeframe showing what can be

achieved within certain time periods. There will be immediate, short-term, mid-term, and long-term goals. Some of these may not be possible immediately but with the proper planning and time, they can be. The survey, meeting with the stakeholders, and our experience will inform these stages and be included in the final report.

We believe this is an important document to all parties. In our experience with the Town of St. Michaels, they leveraged our report into at least six additional grants for the Town to plan and implement the strategies identified as flooding risks. The initial report can be used as a guideline as well as an appendix for the grant applications. And, in all fairness, not all councils remain static over time. It has been seen and utilized by many town managers and town commissioners: all using the same playbook.

Question 5: If we selected your firm to do the work, will you be using the same staff members who previously did similar work with other municipalities?

Yes, we will utilize the same staff members who performed similar work with other municipalities. Both staff members Karley LeCompte and Keegan Marsh assisted in the past reports, putting together the exhibits to review the topography, inundation potentials, flood maps, and potential solutions. Along with Karley and Keegan, Vice President Steve Marsh, P.E. will oversee all reports. Mr. Marsh has extensive experience and has overseen the grading and wetlands creation/management for the Bayside Community. We will all be a part of this effort, working as a team and bringing continuity to the process.

Question 6: What sources of funding are you aware of for this type of project?

I am aware of the following sources of funding for this type of project:

- DNREC has the Resilient Communities Grant Program through NOAA. It is administered by Kristen Thornton at the Delaware Coastal Programs Group. They assisted the City of Lewes in 2012 and are currently assisting the Town of South Bethany in 2025, both of which I have participated as a member of the advisory group. This funding will provide $75,000 and the University of Delaware will help facilitate meetings.

- NFWF provides funding for resiliency studies. I have previously used their funding in the City of Cambridge and leveraged that funding for additional sources.
- Danielle Swallow with Delaware Sea Grant has access to several potential sources. We have utilized her depth of experience and knowledge to place the right grant application with the correct project in the City of Lewes.

Given the ever-changing landscape of federal funding currently, GMB is always checking what is available for funding projects such as this one for the Town of Dewey Beach. We had earmarked a handful of projects in Lewes to submit for FEMA BRIC or FMA (Flood Mitigation Assistance) prior to closure of the programs. Unfortunately, at this moment, the Notice Of Funding Opportunity (NOFO) is not anticipated to return for this or the next fiscal year. However, it is possible that it could return in the fall of 2026. I am in touch with Phillip Cane from DEMA on a weekly basis to see if there are other funding sources, or if Delaware will earmark additional funding for such projects that won't be funded now.

GMB
ARCHITECTS / ENGINEERS

FIRM OVERVIEW

George, Miles & Buhr, LLC (GMB) is a client-focused firm that provides comprehensive engineering, architectural, planning, and coastal resiliency services across the Mid-Atlantic region. Founded in 1960, GMB provides quality designs that enhance our communities and safeguard the environment. GMB is headquartered in Salisbury, Maryland with additional offices in Lewes, Seaford, and Ocean View, Delaware, as well as a Sparks, Maryland office serving the Baltimore area. Our team of over 100 professionals is dedicated to producing exceptional, cost-effective solutions for our clients.

COASTAL RESILIENCY:

GMB strives to be the leader in design and stewardship of sustainable communities in the Chesapeake Bay, Delaware, Maryland and Virginia coastal environments. We are committed to applying sustainable design principles to every GMB project aside from the mandate by design review agencies. We have several Leadership in Energy and Environmental Design (LEED) accredited professionals on staff, as well as a Certified Floodplain Manager (CFM) and a Certified Climate Change Professional (CC-P). GMB has served multiple clients in identifying and addressing their vulnerable infrastructure and community assets. **GMB promises to maximize the co-benefits of every dollar committed to projects, whether local or grant funded.**

Accepting the DE Governor's Conservation Award

GMB is proud of our expert reputation in the design of coastal resiliency, flood mitigation solutions, budget and maintenance friendly solutions, and producing designs that can be funded by various sources. We understand the difficulties of achieving appropriate storm surge protection and stormwater management/conveyance in low-lying, tidally influenced municipalities in the Mid-Atlantic Coastal Plain. It is our specialty to minimize and remedy localized flooding from storm events during high tides.

Elimination of "duckwalk" to solve flooding issues on Water Street, Cambridge, MD

GMB has designed projects that incorporate surge flooding solutions with both green and grey infrastructure. We believe that the key to success for all parties is to provide proper installation at the proper location for the client's needs, and the long-term lifespan of the solution. GMB has designed and installed living shoreline stabilization, structural shoreline protection, step pool conveyance systems, urban stormwater conveyance systems, and wetlands. We have also developed environmental site designs and low impact development (LID) practices for a more integrated and sustainable approach. In addition, we have created stormwater pump stations to enhance habitats and local floodplains.

Town Hall Bioretention, Betterton, MD

In our analysis, we consider multiple factors, including the goals of the client, the ability to maintain the green techniques, the ability to contribute financially, and the possibility of grant funding. Our knowledge and experience help us guide the project to success for all parties. At GMB, we believe that no project is too small when improving the quality of life and our waterways on the Delmarva Peninsula.

Wetland Restoration Bayside, Selbyville, DE

GMB
ARCHITECTS / ENGINEERS

SERVICES PROVIDED

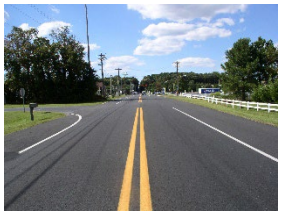
In addition to our Coastal Resiliency expertise, GMB serves as Town/City Engineers for many local municipalities; offering code review and compliance checks as well as review for engineering submissions to ensure engineering guidelines and requirements are met. GMB provides:

- **Consultation:** Capital Improvement Planning Assistance, State and Federal Loan/Grant Application and Administration Assistance, Proposed Land Development Preliminary, Final and Construction Phase Review, Trusted Advisor Relationships, Permit Acquisition Assistance, Asset Management Plans, Utility Rate Structures, Long Term Reserve Studies, Feasibility Studies, GIS Mapping, Preparation of Cost Estimates, Hydraulic Studies, Bid Assistance, and On-call Consultation
- **Civil / Municipal Services:** Site Design, Site Grading, Stormwater Management, Streetscapes, Pavement Design, ADA Compliant Sidewalks and Street Designs, Water & Sewer Extensions, Sustainable "Green" Design, Landscape Architecture
- **Water / Wastewater Services:** Wastewater Treatment Facilities & Improvements, Sewage Collection Systems, Sewage Pumping Stations, Water Treatment Facilities & Upgrades, Wells, Water Distribution & Storage, Operational Services
- **Building Services (Architectural & Structural):** Architectural Design, Programming and Concept Design, Renovations, Structural Engineering, Marine / Waterfront Engineering, Bridge Design, LEED Buildings, Building Revitalization Services
- **Contract Administration / Construction Inspection Services:** Site observation, contract preparation, resident project representative services (RPR), requisition review, change order evaluation, punch list and final inspection, closeout documentation.

Our innovative solutions, our adaptability to change, our commitment to design within budget and time restraints, and our ability to communicate project specifics to various stakeholders have produced many outstanding projects.

We are proud to have been awarded a ***2023 Engineering Excellence Conceptor Award*** from the American Council of Engineering Companies of Delaware (ACEC-DE) for our Pilottown Road Water Main & Lead Service Replacement project in Lewes, DE, as well as a ***2023 Engineering Excellence Honor Award*** from ACEC-MD for our ENR Upgrade of the Hampstead Wastewater Treatment Plant in Carroll County, MD. These awards join numerous other honors we have received in over six decades in business.

CONSULTING



CIVIL / MUNICIPAL

WATER / WASTEWATER

STRUCTURAL / MARINE

LAND DEVELOPMENT

CONSTRUCTION SERVICES

SITE / SUSTAINABLE

AEROSPACE SUPPORT

ARCHITECTURE

FLOOD MITIGATION PLANNING STUDY
WEST CEDAR STREET

Lewes, Delaware

GMB assisted the City of Lewes and the Lewes Board of Public Works in producing a flood risk-reduction study related to recurring tidal flooding at the west end of Cedar Street. This project is being funded through a Pre-Disaster Mitigation Grant provided by FEMA and administered by DEMA.

The goal of the West Cedar Street Flood Mitigation Planning Study is to identify environmental/structural stabilization and flood protection projects for future implementation. These projects are necessary since previously installed berms and tide-limiting pipe systems have deteriorated and failed over time. The purpose of the proposed projects will be to protect the West Cedar Street residences and institutions (especially the Children's Beach House) from existing flood conditions and flood conditions expected from future climate-change and sea-level rise scenarios. The Study will enable the City of Lewes Mitigation Planning Team to maintain focus on environmental/structural "brick & mortar" projects to improve the City's resiliency to existing and future flood risks.

GMB's role includes the following:

- **Data collection**: including obtaining both qualitative and quantitative information from residents, businesses, and institutions affected by the recurring.
- **Determine the level of vulnerability of the flood-prone study area** in terms of present-day tidal and storm surge effects, including a statistical representation of the chances of flooding - and the study area's vulnerability based on projected sea-level rise scenarios.
- **Evaluation of flood mitigation structure alternatives** that would allow normal tides to infiltrate the nearby tidal marsh lands but eliminate storm, and other tidal events, from reaching flood-prone areas. The study also includes an analysis of the effects any alternative might have on adjacent properties.

The final Study report was accepted by Mayor and Council as well as the Board of Public Works. It was presented to the Mitigation Planning Team, Lewes Board of Public Works, DEMA and FEMA, and local stakeholders in various public sessions.

The recommendations of an earthen berm with self-regulating tide gates along the canal-side of the focus area was submitted to the FEMA HMGP and was successful in receiving funding for final design and permitting this year. Designs to protect the over 100 residential properties from high tide flooding will be completed and utilized for implementation funding from FEMA in future rounds. The anticipated BCA for this project is well above 5.0 while protecting the City's infrastructure on the beachside for decades into the future along with the private property of the residents living and enjoying Lewes.

CLIENT
City of Lewes
114 E. 3rd Street
P.O. Box 227
Lewes, DE 19958

SERVICES
Planning Study

COMPLETION DATE
March 2022

CONTACT
Ellen Lorraine McCabe
City Manager
302.645.7777

CURRENTLY:
Design Phase utilizing BRIC funding

GMB
ARCHITECTS / ENGINEERS

TOWN OF OXFORD COASTAL RESILIENCY PROJECTS

Oxford, Maryland

CLIENT
Town of Oxford
PO Box 339
Oxford, MD 21654

SERVICES
Flood Study
Grant Applications:
NFWF and University of MD Environmental Finance Center
Shoreline Inventory
Stormwater Master Plan
Coastal Resiliency Planning

COMPLETION DATE
Flood Study: 2012/2024

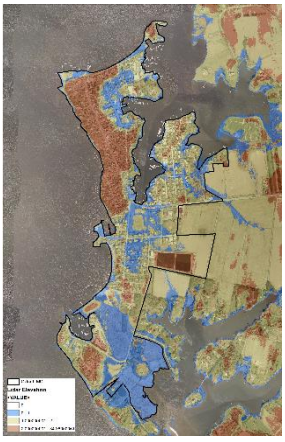
Stormwater Inventory & Master Plan: 2016

2100 Visioning Report: 2023

CONTACT
Matt Ozman, Public Works
410-924-4078

FLOOD STUDY

Oxford, Maryland is a coastal community of the Chesapeake Bay, surrounded by the waters of the Tred Avon River and its tributaries. In 2012, at the request of the Town of Oxford, the Chesapeake Bay Foundation, and the Environmental Finance Center, GMB assisted in a public meeting at the Town of Oxford to discuss existing flooding problems and begin a dialogue regarding long-term solutions. GMB evaluated LIDAR data with the help of the Eastern Shore Regional GIS Cooperative, and prepared sea level rise maps. A public discussion session on stormwater issues with a focus on the potential impact of sea level rise for dry and wet weather flooding was led by GMB.



STORMWATER INVENTORY & MASTER PLAN

In 2014, GMB developed a comprehensive inventory of stormwater and shoreline infrastructure coupled with a master plan of capital improvement projects to be implemented over the next 5 to 8 years to mitigate the impacts of flooding. The study was accomplished in two phases, 1) Stormwater Shoreline Infrastructure Inventory, and 2) Stormwater Shoreline Master Plan.

The Phase 1 Inventory was completed in 2015 and it included field survey and mapping of the Town's existing stormwater infrastructure. The Phase 2 Master Plan utilized the data collected under Phase 1 to generate computer models, which were then used to evaluate the system hydraulics and consider modifications to improve stormwater drainage and reduce flooding. The Master Plan study recommended specific solutions and provided cost estimates along with a prioritized schedule for implementation.

OXFORD 2100 VISIONING REPORT

In 2023, GMB was contracted along with Preservation Green, LLC, to produce a long-range 2100 Visioning Report. What will Oxford need to survive in 2100, and how do we get there from here? GMB reviewed student visioning designs, gathered information during public sessions, met with stakeholders and provided recommendations. Various project feasibility and strategies were developed in a 75year timeline prioritizing needs along that timeline. The final report demonstrates the visions and future Oxford with mitigation techniques along with a capital improvement plan prioritizing the infrastructure needs by cost and period of implementation, Current regulations and potential alterations of future construction roadblocks were outlined. The recommendations in the plan are not static and will be reviewed periodically to best suit the Town and lead it to a successful presence in 2100.

SOUTH BETHANY RESILIENCY IMPLEMENTATION PLAN

South Bethany Beach, Delaware

CLIENT
Town of South Bethany
402 Evergreen Rd.
South Bethany, DE 19930

SERVICES
Coastal Resiliency Planning

COMPLETION DATE
2023

CONTACT
Ms. Maureen Hartman
Town Manager
302-539-3653
townmanager@southbethany.org

In 2021, the Town of South Bethany contracted GMB to provide a Resiliency Implementation Plan, to help strategize resiliency efforts due to the effects of climate change, sea level rise, increased storm frequencies and intensities, and dense development within the Town. GMB reviewed current code, outlined several deficiencies (with our engineering expertise in coastal designs in mind), provided strategies to mitigate flooding in a coastal area surrounded by tidal waters and very vulnerable tidal fluctuations, and addressed next steps to remedy the current status that hampers the restoration efforts availed to the public and private to protect infrastructure and residences.

Components of the Plan included:

- Current Challenges
  - Bulkheads
  - Pervious/Impervious Allowances on Private Property
  - Pervious/Impervious within Public Rights-of-Way
  - Low Elevations on Town Roads
  - FEMA and Floodplain Enforcement
- Vulnerable Areas
- Goals
- Impractical Solutions
- Viable Approach to Resiliency
- Next Steps – Phased plans from present time until 2050

The inundation maps were reviewed to determine that limited options were available to the Town with the current code, state, and federal regulations, lay of the land, and constraints on budgets and capacities to move forward with large-scale alterations without disrupting the entire landscape of the Town. Bearing these limitations, some simple, low or zero-cost next steps were laid out that can allow for future assistance and mitigation techniques to make the greatest impact.

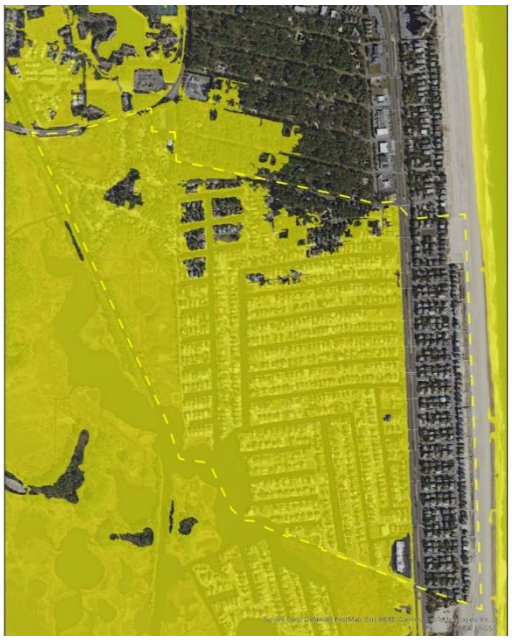


Exhibit Depicting the New MSL After Four Feet of Sea Level Rise

BRENT R. JETT, P.E., CFM, CC-P

Coastal Resiliency Group Leader

Mr. Jett joined the firm of GMB in 2019, bringing over 20 years of professional engineering experience, including extensive project design, planning and management in both the private and public sector. He is skilled in local, state, and federal land-use approvals and required processes for environmental approval. Prior to joining GMB, Mr. Jett served seven years as Assistant City Engineer for the City of Cambridge, Maryland. He has a distinguished background while working in areas with minimal elelvation change as well as along the coastal fronts along the many bodies of water present on Delmarva. This includes site design, infrastructure design, stormwater design, ADA compliance, resilient shoreline planning and design, green stormwater retrofits of existing grey infrastructure or impervous areas, and rehabilitation of eroded and deteriorated conveyance systems, just to mention a few. Mr. Jett's experience in public works affords him knowledge and understanding of key project success factors, including budgetary constraints, maintenance capacity, and public engagement.

Supplementing his Professional Engineer background, Mr. Jett is also a Certified Floodplain Manager (CFM) and a Certified Climate Change Professional (CC-P). Understanding changing rain intensities, sea level rise, longer periods of heat and drought, along with higher tidal surges allows Mr. Jett to clearly convey project needs to clients and stakeholders while keeping the constraints of public works budgets and capacities in mind. He provides projects that can be managed, maintained, and successful for years to come with proficiency.

Further, Mr. Jett is well versed in all facets of grant funding for public projects, having been successful with BRIC, HMPA, DNR, CBTrust, MDE, NFWF, G3, and various other state and federally backed grants; preparing the applications and managing the reporting and close out of said grants. He has recently served on several environmental committees with local and state stakeholders for sustainability concerns throughout the mid-Shore region of Maryland.

Relevant Project Experience Includes:

- **West Cedar Street Flood Mitigation Planning Study,** *Lewes, DE:* Assisted the City of Lewes and the Lewes Board of Public Works in producing a flood risk-reduction study related to recurring tidal flooding at the west end of Cedar Street. When the tide is high and it rains, localized flooding impacts the 80+ acre investigation area. The result of the study is the installation of an earthen berm with self-regulated tidal gates to allow for ebb and flow of tidal waters under normal levels, but automatic closure during higher tide surge events. This permits positive drainage from the residential areas in the inspection area during normal times, but protects the high value properties during storm events. When the tide subsides, the gates will open, and normal operations will return. *The report was completed January 2022. Project was successfully awarded a BRIC grant for design. Final plans are being prepared for final funding and construction.*
- **St. Michaels Harbor and Stormwater Infrastructure Flood Study,** *St. Michaels, MD:* Existing elevations, conditions, and potential for retrofits were analyzed resulting in 8 phased projects available around the harbor area to ensure flooding in St. Michaels does not go from nuisance to major problem for the residents, business operators, and the Town. Green techniques were heavily recommended in order to build resilience to the design and harbor area. *Final Report Completed January 2021.*
- **South Bethany Resiliency and Flooding Study,** *South Bethany, DE:* Currently investigating flood remediation strategies for the Town, both caused by tidal surges

RESPONSIBILITIES

Associate/
Project Manager/
Coastal Resiliency Group Leader

GROUP

Coastal Resiliency, Salisbury

EDUCATION

Virginia Tech, 1997
Bachelor of Science
Civil Engineering

REGISTRATION

Professional Engineer (P.E.)
Maryland #32889
Delaware #24213

Certified Floodplain Manager (CFM)
US-20-11646

Climate Change Professional (CC-P)
#M-0066

CONTACT INFORMATION

bjett@gmbnet.com
410.742.3115
301-628-1421
443-880-2719

and intense rainfall events. Approaches will be lowering the allotment of impervious area on individual lots, more open space when available, raised roadways to provide safe passage during flooding events, and increased measures for the flood ordinance. *Final Report presented October 2023*

- **Lewes Resilient Community Partnership,** *Lewes, DE***:** Served on the committee as a non-voting member as well as in and advisory role of the steering committee for the Partnership. Prior to this committee being formed, served in an advisory role on the wetlands committee and the sea level rise committee. Has been involved with professional engineering advice to Lewes since joining GMB.
- **Oxford Flood Mitigation Project,** *Oxford, MD***:** Awarded investigation and design of 2 hot spot areas that routinely flooded at high tide as well as during intense rainfall events. Determined the catch basins and discharge pipes for the stormwater infrastructure network were under the high tide elevation for the majority of the time. This caused hydrologic issues and thus the localized flooding until the tide could recede. Designed a stormwater pump station at each location, in-line with the existing network so it may function as a traditional drainage network or utilize the pumps when needed to draw down the flood waters in these areas. *Study and Plans completed December 2024.*
- **Oxford 2100 Visioning,** *Oxford, MD:* Completed a study of what Oxford, a coastal community near the Chesapeake Bay founding in 1683, could look like and function as with nearly 5 feet of sea level rise. What are the challenges and opportunities for thinking outside the box as we do toady, and still maintain the viability of living in Oxford in the year 2100. Various codes and regulations were challenged, money was not full considered, just the ability to continue to live in the community that has bene present for nearly 350 years. Pioneering ideas, some rebranding of old-techniques, and some true engineering innovation was the result. *Report completed and delivered to Town in January 2024.*
- **Chestertown Historic District Master Planning**, *Chestertown, Maryland* – Project involves visioning the Historic Downtown core district, while providing resilient improvements and lessening the impervious impacts while retaining the historic nature of the community. Several resiliency techniques were offered as solutions with one project moving forward with earmark funding to raise several town-owned assets along the Chester River around the Town marina to mitigate the impacts of sea level rise. *Final report delivered October 2024.*
- **Long Wharf Bulkhead Replacement,** *Cambridge, MD:* Provided new bulkhead designs for the main point of Long Wharf Park, with approximately 12-16' water depths. Submitted the permits, managed the grant funding, and provided construction inspection and management for the City during installation. Once the bulkhead was installed, the upland areas behind the top cap were improved. This included porous concrete sidewalks, stormwater infiltration basins, realignment of the parking spaces, and ADA compliance for the public areas. *Completed September 2017.*
- **Various Golf Course Remediation/Flood Mitigation projects,** been involved with several local golf courses in addressing sea level rise and providing mitigation techniques to ensure the saltwater doesn't flood the turfgrass and cause playability issues for their enterprise and members.

KARLEY N. LECOMPTE

Environmental Scientist

Karley LeCompte joined George, Miles & Buhr in early 2021 as a Sr. Technician specializing in geography and has served as an Environmental Scientist and Geospatial Analyst. She holds a Bachelor of Science from Salisbury University majoring in Earth Science and Geography. She also holds a Master of Science degree from East Carolina University with a Geography major. Karley is skilled with ArcGIS Pro, ArcGIS Desktop, CloudCompare, Pix4D, Autodesk programs including CAD, Infraworks, and Recap, Agisoft Metashape, HEC-RAS, and SketchUp. She is a certified sUAS Pilot with experience using Terrestrial Laser Scanners, Unmanned Aerial Vehicles, and GNSSrtk for drone services. In 2019, Karley was the recipient of NASA NC Space Grant to develop a real-time camera system to monitor overwash along the Carolina coastline.

Well-versed in technical writing, Karley's master's thesis entitled "Washover Fan Evolution, Assateague Island National Seashore, MD (2012-2019) was written on the change in characteristics of washover fans and rising sea levels. She understands environmental concerns, the changing morphology along the water's edge, and techniques to address these issues. Technical writing is one of her specialties as she has written grants to different agencies such as USGS and NASA NC Space Grant.

Relevant Project Experience Includes:

- **Living Shoreline Design**, *Laurel, Delaware* – Project involves nearly 2,000 linear feet of living shoreline design for an eroding water's edge along a public park in Laurel, DE. Providing flood resiliency and protection of the new walking path funded by DelDOT are the key metrics for the design.
- **Chestertown Historic District Master Planning**, *Chestertown, Maryland* – Project involves visioning the Historic Downtown core district, while providing resilient improvements and lessening the impervious impacts while retaining the historic nature of the community. The GIS base is serving as the background for all discussions and mapping.
- **West Cedar Ave. Flood Mitigation**, *Lewes, Delaware* – Project involves improving recurring tidal flooding issues at the west end of Cedar Avenue generally due to increasing tide events and the damaged berm/corrugated metal culvert pipe system, while maintaining the health of the wetlands between the berm and Cedar Avenue.
- **St. Michaels West Harbor Road/East Chew Avenue Flood Mitigation Feasibility Assessment and Conceptual Design**, *St. Michaels, Maryland* – Project involves GIS referencing existing conditions and stormwater analysis for future flood mitigation.
- **Oxford 2100 Visioning**, *Oxford, Maryland* – Provided future improvements, including implementation timelines and techniques, to ensure Oxford is resilient and thriving in the year 2100 in the face of 3 feet of sea level rise. Inundation mapping identified the hot spots and needs analysis for the team.
- **Tiger Branch Stream Rehabilitation,** *Millsboro, Delaware* – Provided area grading analysis and stormwater assessment for design of new channel to provide nutrient reduction and slowed flowrates to minimize erosive velocities.
- **Baer Property Sea Level Rise Analysis**, *Cambridge, Maryland* – Evaluated options to optimize protection from coastal storms and tidal surges for the short term (10-15 years) use of the existing house and property at 880 Hills Point Road in Cambridge, MD.
- **Parsons Cemetery Shoreline Evaluation**, *Salisbury, Maryland* – Project involves the evaluation of options to optimize protection from shoreline erosion for the short term (10-15 years) as well as options to reinforce the shoreline for the long term at Parsons Cemetery 912 N. Division St., Salisbury, MD.

RESPONSIBILITIES
Environmental Scientist
Geospatial Analyst

GROUP
Site / Sustainable Design & Coastal Resiliency
Salisbury

EDUCATION
East Carolina University
Master of Science in Geography
2021

Salisbury University
Bachelor of Science in Earth Science & Geography
2014

GMB
ARCHITECTS / ENGINEERS

KEEGAN M. MARSH

Environmental Scientist

Keegan Marsh joined GMB in 2020 as a seasonal Intern and was hired full-time in 2021 as a Sr. Technician in the Site / Sustainable Design Group. She was promoted to Environmental Scientist in 2022. Prior to joining GMB, Ms. Marsh was an Intern at the Eastern Shore Regional GIS Cooperative (ESRGC), where she was responsible for collecting and analyzing data using ArcGIS to assess the vulnerability of coastal homes for flooding events on Maryland's Eastern Shore. While obtaining her master's degree in Environmental Science, Ms. Marsh studied advanced GIS, estuarine ecology, estuary and ocean dynamics, geomorphology, and hydro transport processes. Her software skills include ArcMap, ArcPro, Whitebox, QGIS, Grass, R, and Civil3D.

Relevant Project Experience Includes:

- **Janosik Park Living Shoreline Improvements,** *Laurel, DE*: Completed design of over 500l.f. of living shoreline design for the Town where erosion has compromised the shoreline, exposed 100 year-old tree roots, and adversely impacted the walking path in the public park. The new shoreline will provide habitat, erosion protection, and mitigate flooding impacts at a higher elevation with increased berming at the landward side. The plans have been submitted for grant funding for implementation and should be secured soon to construct the shoreline.
- **Ocean City Northside Park Kayak Launch and Living Shoreline Improvements,** *Ocean City, MD*: Awarded design and permitting of living shoreline improvements at the Northside Park Kayak launch area where the shoreline is constantly battered with heavy wind driven fetch and previous attempts of soft shoreline stabilization have failed. Approximately 150l.f. of living shoreline will be secured with a combination of stone breakwater and elevated sand-filled living shoreline to protect the uplands and soon to be installed public kayak launch facility.
- **Garden of Eapen***, Bel Air, MD,* – Assisted with the development of a Concept Stormwater Management (SWM) Plan and Report, a Preliminary Plan, a Forest Conservation Plan and Report, and a Landscaping Plan for a proposed 22-lot residential development to be named "Garden of Eapen" in Bel Air, Maryland.
- **Cobb Property Due Diligence***, Selbyville, DE* – Assisted Beazer Homes with due diligence for the Cobb property in Sussex County, DE. Scope of work includes developing an existing conditions base plan, perform a preliminary hydrologic and hydraulic (H&H) analysis, perform a preliminary topsoil/fill analysis and prepare a project rendering.
- **Tuxents Branch Stormwater Management Culvert Upgrades Phase 1***, Fruitland, MD* – Assisted the City of Fruitland with the design of upgrades to two (2) major culverts along Covered Bridge and Camden Avenue in order to handle larger storm events and minimize existing flood concerns. Also assisting with stream restoration projects along the Tuxents Branch drainage area to improve water quality and enhance the natural treatment areas of this drainage branch.
- **Harford County Airport Wetland Mitigation Revisions***, Harford County, MD* – Assisting Harford County Airport with a report in accordance with the Maryland Dept. of the Environment (MDE) Monitoring Protocol for Wetland Mitigation Projects and the US Army Corps of Engineers Compensatory Mitigation Special Conditions included with the issued Authorization for Unavoidable Impacts to Waters of the US.

RESPONSIBILITIES
Environmental Scientist

GROUP
Site / Sustainable Design & Coastal Resiliency

EDUCATION
University of Virginia
Master of Arts in Environmental Science
2021

Columbia University
Bachelor of Arts in Sustainable Development
2019

STEPHEN L. MARSH, P.E., LEED® AP, CPSWQ

Principal-in-Charge

Steve Marsh joined the firm of George, Miles & Buhr in August of 1994. He has served as a Project Engineer and Project Manager on a variety of projects including studies, design and contract administration. Engineering projects include storm sewer and stormwater management studies and design, sanitary sewer systems and wastewater treatment. Hydraulic and hydrologic modeling capabilities include TR-55, TR-20, HEC-RAS, HydroCAD and StormCAD, among others. In 2008 Mr. Marsh acquired his LEED® AP certification, which provides a thorough understanding of green building practices and principles. In 2013, he became a **Certified Professional in Storm Water Quality (CPSWQ)**. As a CPSWQ, he is recognized by his peers as a specialist in computing, analyzing, and evaluating storm water quality.

Mr. Marsh is a frequent guest lecturer at both Salisbury University and Morgan State University where he lectures about water quality in the Chesapeake Bay.

Relevant Project Experience Includes:

- **SWM Best Management Practices (BMP) Feasibility Study**, *Ocean City, MD.* The primary focus of the study was to provide the Town of Ocean City with cost-effective BMP retrofit recommendations aimed at reducing primary pollutants such as trash, nutrients, metals, sediment and oils from entering the Town's receiving waters through existing storm drain networks.
- **Betterton Stormwater Management Retrofit,** *Betterton, MD:* Main Street Outfall Phase 1 - Includes a bio-retention area in front of Betterton Town Hall, a stormwater step pool conveyance and a parking lot of permeable pavers that will serve as the cover for an engineered subsurface reservoir with recharge or infiltration beds for the surrounding urban watershed. This project focuses on the sub-watershed that impacts Betterton's public beach and will treat runoff from 13 acres. This project is being funded by a grant from the National Fish and Wildlife Foundation.
- **Oxford Flood Study,** *Oxford, Maryland:* Part of a team to address flooding problems within the Town. GMB evaluated LiDAR data with the help of the Eastern Shore Regional GIS Cooperative, and prepared sea level rise maps. GMB presented a discussion on stormwater issues with a focus on the potential impact of sea level rise for dry and wet weather flooding. GMB assisted the Environmental Finance Center with the final report, which evaluated drainage and flood control project alternatives, with special consideration to potential sea level rise, and prepared cost estimates. Assisted with grant applications to NFWF and the University of Maryland Environmental Finance Center.
- **UMES Hazard Mitigation Plan,** *Princess Anne, Maryland*. Evaluated the likelihood of threat to the University from hazards and devised an action plan to reduce the impact of those threats. A significant portion of the consulting effort was a HEC-RAS analysis to evaluate the limits of flooding during severe rainfall events. Proposed revisions to the BFE and FIRM maps were presented. LiDAR data was used in conjunction with the HAZUS model and HEC-RAS results to map flood depths.
- **Washington Street Flood Control & Stormwater Management Retrofits**, *Seaford, Delaware:* Project Manager for a new storm drain system consisting of approximately 3,549 LF of new stormwater piping ranging in sizes from 15" to 36". In conjunction with the new stormwater piping system, GMB designed several "green infrastructure" improvements to improve the water quality in stormwater runoff to the Nanticoke River.

RESPONSIBILITIES

Sr. Vice President
Director of Operations – East Region

GROUP

Site / Sustainable Design, Salisbury

EDUCATION

University of Virginia, 1992
Bachelor of Science
Civil Engineering

University of Virginia, 1996
Master of Science
Civil Engineering
Concentration in Hydrology/ Stormwater Management

Virginia Tech
Post Graduate Course Work – Analysis of Water Resources Systems

REGISTRATION

Professional Engineer
MD-22749. DE-11490.
VA-032841

Certified Professional in Stormwater Quality, 2012

LEED® AP Certification, 2008

Straughn Environmental

Initial Questions for Consultants

We ask that you respond to the following questions in writing and return your responses by **June 6, 2025**.

1. Have you worked with other coastal municipalities conducting studies and/or performing work with regard to climate change resiliency?

- Which municipalities have you worked with and when?
  - *Town of Dewey Beach/DE Center for Inland Bays (ongoing project at Sunset Park)*
  - *Town of Fenwick Island (ongoing Resilience Study)*
  - *Thompson Island Shoreline Stabilization/DNREC Parks/DE CIB (ongoing shoreline stabilization project)*
  - *City of Wilmington/Delaware Nature Society/FWS (ongoing rain gardens project along Brandywine River)*
  - *Maryland Coastal Communities including Crisfield, Cambridge, Princess Anne, Annapolis, Fells Point, Chestertown, Havre de Grace, Port Towns, Highland Beach (ongoing resilience plan development supporting UMD Environmental Finance Center)*
  - *Under-engaged community-based organizations in Baltimore, Annapolis and Salisbury Areas (ongoing technical assistance services through Chesapeake Bay Trust)*
  - *Dover Air Force Base (ongoing research study supporting University of Delaware to prepare hydrologic/hydraulic model to determine impact of climate change on stormwater, water, wastewater, and hazardous material)*
  - *Towns of South Bethany and Middlesex Beach (Larry Trout previous experience with multiple projects starting with development of Pollution and Stormwater Control Strategy and continuing with implementation of most of the projects identified in the plan from 2010 to 2020)*
  - *District of Columbia/Prince Georges County (ongoing planning project to address flooding concerns and increase resilience using regional blue-green infrastructure practices)*
  - *City of Baltimore (ongoing) support to Johns Hopkins coastal resilience vulnerability and design options for nature-based solutions. Grant funding through NFWF NCRF pending.*
  - *City of Aberdeen (2020) staff member developed climate adaptation plan for the City through MD DNR grant funding.*

2. What types of information would you need in order to conduct an initial study and report on Dewey Beach's climate change/resiliency needs?

- *Goals of community*
- *GIS/topographic survey of stormwater and other assets (already exists from Cotten Engineering Survey)*
- *Stormwater infrastructure inspection reports (I believe that it was performed by Remington & Vernick Engineers)*

- *Additional available GIS data including LiDAR, soils, depth to groundwater, impervious surfaces, etc.*
- *Tide data (already have this from our Sunset Park project)*
- *Previous studies (DE CIB Town of Dewey Stormwater Plans Ph 1 (Cotten Engineering) and Ph 2 (Larry Trout prepared) , DelDOT SR 1 Coastal Green Infrastructure Plan (Larry Trout prepared), DelDOT SR 1 Coastal Corridor Resilience Study (AECOM)*
- *Previous implemented projects (Larry Trout designed permitted and built Read Ave Bioretention, Read Ave Living Shoreline, and consulted to DelDOT/WRA for SR 1 Median Concrete Removal and Pedestrian Safety Projects)*
- *Climate change projections for the area - DE State information and NOAA Intergovernmental Report information will be used to provide a range of options and risk profiles for solutions.*

3. Can you briefly describe the process, including the sequence and steps you will take to research and complete a study as well as a final project report?

- *Phase 1: Data Collection/Review and Stakeholder Engagement:*
  - *Compile/Review Data*
  - *Review/Communicate with Partners Previous Work*
  - *Meetings and Presentations with Town's Resilience and Sustainability Committee to Discuss Previous Work and Study Objectives*
  - *Review Existing GIS to ID/Screen Potential Projects*
- *Phase 2: Data Analysis and Prioritization of Mitigation Measures and BMPs:*
  - *Hydrologic/Hydraulic Modeling*
  - *Analyze Data to Develop Screening Criteria Matrix (Multi Criteria Decision Analysis)*
  - *Develop Roster of Prioritized Mitigation/BMP Opportunities*
- *Phase 3: Property Owner Contact and Field Assessments:*
  - *Assist with Outreach to Property Owners and Field Assessments*
- *Phase 4: Concept Design and Report:*
  - *Develop Report and Concept Level (15%) Designs*

4. Using your experience with other municipalities as a guide, can you estimate the time requirements and the cost for completing an initial study?

Based on past experience as well as similar work that we are currently doing for Town of Fenwick Island, we estimate that we could perform this work within 6 months of notice to proceed. The approximate cost to prepare this initial study would be $100-$120K. This estimate is slightly lower as is typical for this type of study since we have so much familiarity with the Town of Dewey Beach and the work that has been done to date already and also because we are currently doing a similar study for Town of Fenwick Island. We could also offer an initial study similar to what we are doing for nine (9)Maryland Coastal Communities through our work with UMD EFC NFWF National

Coastal Resiliency Grant. This study includes Phase 1 listed above as preparing a list of potential solutions. The cost for this study would be approximately $10-15K.

5. If we selected your firm to do the work, will you be using the same staff members who previously did similar work with other municipalities?
Yes, staff that have worked and are currently working on similar work with other municipalities in Delaware/Maryland/District of Columbia would continue to work on this project including:

- *Larry Trout, Jr., PE*
- *Chris Overcash, PE*
- *Shellie DeMoss, PE*
- *Rebecca Adamo PE*
- *Haley Morgan EIT*
- *Erin Gavin, EIT*
- *Elizabeth O'Keefe Markham, GISP*

6. What sources of funding are you aware of for this type of project?

- *Delaware Water Infrastructure Advisory Council (DWIC) Surface Water Matching Planning Grant-Town of Dewey Beach (Larry Trout)*
- *Delaware Department of Natural Resources and Environmental Control (DNREC) Community Water Quality Improvement Program (CWQIP) – City of Wilmington (Straughan), Towns of South Bethany and Middlesex Beach (Larry Trout), Town of Dewey (Larry Trout)*
- *DNREC Nonpoint Source Section 319 Grant – City of Wilmington (Straughan)*
- *DNREC Watershed Improvement Projects Implementation Initiative (WIPII)-Stockley Center (Larry Trout), Dewey Beach (Larry Trout)*
- *National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund-UMD Environmental Finance Center (Straughan), Dewey Beach (Larry Trout), MD 249 (Larry Trout)*
- *NFWF Delaware Watershed Conservation Fund – Delaware Wildlands Milford Neck (Straughan)*
- *National Oceanic and Atmospheric Administration (NOAA) Grants (Chris Overcash)*

Experience with other similar grants:

- *Federal Highway Administration (FHWA) Green Infrastructure Techniques for Coastal Highway Resilience Research Grant-SR 1 (Larry Trout)*
- *FEMA BRIC Grants-MD 249, Point of Rocks (Straughan)*
- *United States Department of Agriculture (USDA) Rural Development Loans and Grants-Port Deposit (Larry Trout)*
- *Maryland Department of Natural Resources (DNR) Shoreline Conservation Service Grants/Loans Program, Resiliency through Resiliency Initiative (RRI), Chesapeake and Atlantic Coastal Bays Trust Fund-Narrows Pointe (Larry Trout), CBT CBO-CBI(Straughan), Croppers and Starks Property Marsh Restoration (Straughan)*

St. Michaels Infrastructure Study

HARBOR AND STORMWATER INFRASTRUCTURE STUDY

Town of St. Michaels, Maryland

December 2020

The Town of St. Michaels, MD received a Department of Natural Resources (DNR) Grant through the State of Maryland Community Resilience Program to perform an analysis of the St. Michaels harbor and stormwater infrastructure, while considering projected sea level rise over the next thirty years, and develop viable, cost efficient strategies to increase the town's resiliency relative to both rainfall and tidal induced flooding. Six (6) areas of study were determined, and six (6) flooding and sea-level rise projection maps were created as part of the study scope of work. The critical study areas were evaluated within each flooding and sea-level rise scenario to evaluate risk and prioritize future City mitigation and adaptation efforts. The report was prepared by George, Miles & Buhr, LLC.

George, Miles & Buhr, LLC
206 West Main Street
Salisbury, MD 21801

GMB File No. R200112

This report was prepared by The Town of St. Michaels, Maryland using Federal funds under award number NA19NOS4190162 from NOAA, U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of NOAA or the U.S. Department of Commerce

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Background

The Town of St. Michaels (Town) was founded in the mid-1600s and served as a trading post for area tobacco farmers. Formally incorporated in 1804, the Town earned its name as "the town that fooled the British" during the War of 1812. During the 1800s and early 1900s the economy revolved around shipbuilding and the seafood industry. However, in the past 30+ years St. Michaels has shifted to a tourism economy. With the Chesapeake Bay Maritime Museum located in St. Michaels, the town honors the past with this treasure. The Town is situated on a narrow neck of land between the Miles River and Broad Creek, and is composed of only 1.15 square miles of upland area. St. Michaels is connected to the Chesapeake Bay by both bodies of water. Low lying land, mostly below elevation 10 feet, prevails in the Town and the water's edge is protected mainly by hard-edge (bulkhead) shorelines. According to the Surging Seas Risk Finder[1] 86 acres in Town are currently below elevation 5.0 feet which are at risk of rising sea levels and surges in the near future. This is comprised of both residential, commercial, and municipal properties and constitutes over 10% of the total 1.15 square mile Town. Nearly 50% of the St. Michaels Historic District also falls into the category of being below elevation 5.0 feet. Because of its low-lying terrain, the Town is vulnerable to flooding from both storm events and sea level rise.

In 2019, the Town received a Community Resilience Grant from the Maryland Department of Natural Resources to plan and assess the town's harbor and stormwater infrastructure as it relates to projected sea level rise in 2050, as outlined in the Sea-Level Rise Projections for Maryland 2018 report created by University of Maryland Center for Environmental Science (UMCES.) The goal of the study is to develop the topography of tidal flooding areas around the harbor as the sea level rises in the next 30 years, and together with stormwater infrastructure assessment and projected impacts, complete a detailed analysis to develop viable, cost efficient strategies and projects to prepare for sea level rise over the next 35 years. This study should be considered the first phase in a multi-year initiative by the Town of St. Michaels to prepare for the consequences of sea level rise. The additional phases will be implementation projects to be done within the next 15 years to prepare for 2050 projections.

The focus area of the study is bound by East Chew Ave on the southern end, South Talbot St (MD Rt 33) on the west, Perry Cabin Dr on the north, and the Miles River on the east. (See map below.) The study scope of technical work consisted of the following:

- Prepare a GIS layer of stormwater and harbor infrastructure.
- Identify Sea Level Rise for 2030, 2040, & 2050 utilizing data for Maryland utilizing the UMCES 2018 report.
- Identify priority areas for project implementation.

[1]Climate Central (2016) Sea level rise and coastal flood exposure: Summary for St. Michaels, MD. Surging Seas Risk Finder file created July 21, 2016. Retrieved from http://ssrf.climatecentral.org.s3-website-us-east-1.amazonaws.com/Buffer2/states/MD/downloads/pdf reports/Town/MD_St._Michaelsreport.pdf.

- Categorize deficiencies in the current system and network.
- Recommend updates to the Town's code and regulations.

Focus Area of Study

As additional background, it is noted that the Town of St. Michaels Hazard Mitigation planning is incorporated into Talbot County's as a county-wide effort. The Town has its own Floodplain Management Ordinance that was updated in July 2016 with the revised FIRM maps.

Community Outreach

Community outreach and participation is a vital part of any study. Under normal circumstances a "Town Hall" style meeting would have been conducted to get input from the citizens of St. Michaels. Due to the Coronavirus Pandemic and associated State of Maryland protocols limiting the number of people in group settings for indoor spaces, virtual outreach was the best option. Environmental Systems Research Institute (ESRI) is the leader in geographic information systems (GIS) and location intelligence. They offer out of the box solutions for local business and governments such as the Citizen Problem Reporter, a map-based crowd sourced survey. We deployed this application (app) as the "St. Michaels Citizen Flood Reporter" and tailored it to fit the needs of the study and of the community. The application is compatible with smartphones, computers, or any other internet connected device. Once the Citizen Flood Reporter went live, an email was distributed to residents and business owners around the harbor area and posted publicly on the Town's website.

In the application citizen users were prompted to add a point on the map correlated to their own property or a general flooding problem spot. These options and the wide accessibility of the Citizen Flood Reporter allowed residents, business owners, stakeholders, and others affected by flooding in the study area to report their experiences. The My Property survey prompted input including the type of property, the submitter's residential status, the type of flooding, the frequency of flooding, property details and flooding history, comments, and the option to attach photographs and videos. The Flooding Problem Spot survey prompted input including the type of flooding, flooding frequency, flooding details, and the option to attach photographs or videos. Types of flooding reported for both surveys included sunny day flooding with a higher than usual tide, heavy rainfall event where the streets were flooded from runoff and storm surges from hurricanes and from nor'easters. The geospatially correlated surveys and photographs reinforced the severity and extent of the flooding that the citizens of St. Michaels experience. Due to the usefulness of the data gathered, the Citizen Flood Reporter remains live for additional input. An exhibit of the data points gathered can be found in Appendix B and the comments and photos can be accessed through the app itself.

View towards Harbor from residence on Water St after Hurricane Isaias – July 2020

Honeymoon Bridge at end of Cherry St – October 2020

Vulnerability Study

A kickoff meeting was held on Tuesday, July 14, 2020 with the St. Michaels Waterways Advisory Board via Zoom due to the Coronavirus restrictions. The 2018 University of Maryland Center for Environmental Science Sea-Level Rise Projections for Maryland 2018[2] report was agreed upon to be utilized in anticipating the amount of projected sea level rise by 2050 as follows:

- The 50% central estimate probability that it meets or exceeds 1.3'.
- Upper end of the 67% likely range probability that it meets or exceeds 1.7'.
- The 1% probability that it meets or exceeds 2.4'.

Table 2. Projected sea-level rise estimates above 2000 levels for Maryland based on the Baltimore tide-gauge station. Columns correspond to different projection probabilities and rows represent to time horizons and emissions pathways. See caveat in the text concerning potentially greater sea-level rise late this century under higher emissions pathways.

Year	Emissions Pathway	Central Estimate 50% probability SLR meets or exceeds:	Likely Range 67% probability SLR is between:	1 in 20 Chance 5% probability SLR meets or exceeds:	1 in 100 Chance 1% probability SLR meets or exceeds:
2030		0.6 ft	0.4 – 0.9 ft	1.1 ft	1.3 ft
2050		1.2 ft	0.8 – 1.6 ft	2.0 ft	2.3 ft
2080	Growing	2.3 ft	1.6 – 3.1 ft	3.7 ft	4.7 ft
	Stabilized	1.9 ft	1.3 – 2.6 ft	3.2 ft	4.1 ft
	Paris Agreement	1.7 ft	1.1 – 2.4 ft	3.0 ft	3.2 ft
2100	Growing	3.0 ft	2.0 – 4.2 ft	5.2 ft	6.9 ft
	Stabilized	2.4 ft	1.6 – 3.4 ft	4.2 ft	5.6 ft
	Paris Agreement	2.0 ft	1.2 – 3.0 ft	3.7 ft	5.4 ft
2150	Growing	4.8 ft	3.4 – 6.6 ft	8.5 ft	12.4 ft
	Stabilized	3.5 ft	2.1 – 5.3 ft	7.1 ft	10.6 ft
	Paris Agreement	2.9 ft	1.8 – 4.2 ft	5.9 ft	9.4 ft

Table 3. Adjustments to the Baltimore sea-level projection for other Maryland locations.

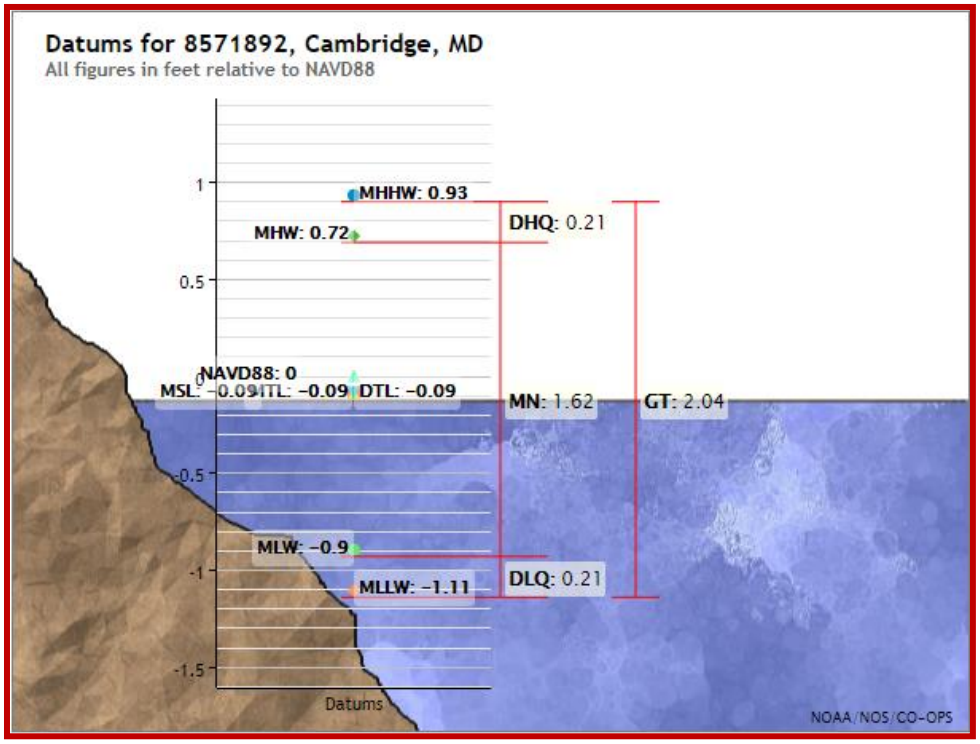
Location	2050	2080	2100
Annapolis	-	-	0.1 ft
Solomons	-	0.1 ft	0.2 ft
Cambridge	0.1 ft	0.1 ft	0.2 ft
Ocean City	0.1 ft	0.1 ft	0.3 ft

Sea Level Rise Projections for Maryland 2018, *Sea-Level Rise Projections for Maryland 2018*[2]

There are other projections that are of note for the Chesapeake region, however the UMCES study is widely accepted and utilized throughout the state. It is advisable to utilize the future revisions to the study as published by UMCES to guide future decisions.

[2]Boesch, D.F., W.C. Boicourt, R.I. Cullather, T. Ezer, G.E. Galloway, Jr., Z.P. Johnson, K.H. Kilbourne, M.L. Kirwan, R.E. Kopp, S. Land, M. Li, W. Nardin, C.K. Sommerfield, W.V. Sweet. 2018. *Sea-level Rise: Projections for Maryland 2018*, 27 pp. University of Maryland Center for Environmental Science, Cambridge, MD.

The nearest NOAA Tide Gauge Station is based in Cambridge, Maryland, approximately 16 miles to the south-southeast of St. Michaels. The station is situated on the same eastern side of the Chesapeake with nearly identical tide situations. Basing the elevations on NAVD88, the following are the datums for the station and the study:



NOAA Datum Listing for Cambridge Station

- MHHW = 0.93
- MHW = 0.72
- NAVD88 = 0
- MSL = -0.09
- MLW = -0.90
- MLLW = -1.11

The Mean Higher High Water (MHHW) is the average of the higher high water height of each tidal day observation over the National Tidal Datum Epoch[3]. There is a difference of 1.02' between Mean Sea Level (MSL) and MHHW. This represents the average elevation potential of the tide each day on top of the projected Sea Level Rise. While the rise of sea level may not inundate areas constantly, the 1.02' of tidal surge every day (on average) could affect a much broader area and network of infrastructure. This amount (1.02') was utilized and added to each SLR projection in the investigation to depict a typical high tide scenario each day and determine what areas would be affected and to what degree.

[3]The specific 19-year period adopted by the National Ocean Service as the official time segment over which tide observations are taken and reduced to obtain mean values (e.g., mean lower low water, etc.) for tidal datums.

Vulnerable Areas

It is important to note that both flooding from rainfall events and "sunny day", or tidally induced, flooding was considered in the vulnerability analysis. Drainage infrastructure in the town is old and has been modified over the years, most likely by adding drainage to the existing system. Severe rainfall events cause temporary flooding in streets, yards and drainageways. As climate change further impacts rainfall distribution in the mid-Atlantic, it is anticipated that although total annual rainfall may not increase significantly, there may be more frequent shorter duration, greater intensity events that will result in increases in wet weather flooding. Furthermore, as sea level rises, less severe rainfall events will cause wet weather flooding, as there will be less available "head" pressure to "push" runoff through the drainage system and out to the harbor before the system surcharges and overflows back into the street.

Restaurant Sign at Head of Mulberry St at Entrance to Harbor

To assist in determining the future vulnerability of the areas of study noted above, it was necessary to compile and synthesize data to create existing conditions maps to project sea level rise and flooding scenarios maps. Available data compiled and synthesized included the following:

- Flood Insurance Rate Maps (FIRM)

- UMCES Sea Level Rise Projections
- Field topographic survey of the bulkheads and streets in investigation area
- State of Maryland LIDAR Survey Data
- Field survey and observation of drainage system network

Entrance to Muskrat Park with standing water from rainfall – July 2020

Areas flooded due to rain events include:

- The flooding issues at the harbor near Chew Ave.
- The flooding experienced on Church St and Willow Green St.
- The inundation on Mill St.

Areas flooded due to the River and surges that will be exacerbated with SLR include:

- The flooding issues along West Harbor Rd.
- The flooding on the private properties on Water St.
- The flooding at the head of Mulberry St.
- The inundation at the head of Cherry St.
- Frequent events on Mill St.
- The inundation in the area of Burn St.

Based on the criteria noted above, review of the topography around the Miles River shoreline in the investigation area, the input from the online Citizen Survey Flood Reporter, and personal "boots-on-the-ground" observations during high tide surge events, the areas of interest include, but are not conditionally limited to:

1. The harbor on East Chew Ave and West Harbor Rd. - affected by SLR, high tides, and runoff to the area.
2. The end of Mulberry St. -affected by SLR, high tides, and the runoff to the area.
3. The upper end of Muskrat Park; the entrance, Church St, and Willow Green St vicinity - affected by heavy rain events and potentially by SLR.
4. The end of Cherry St and Honeymoon Bridge as well as the other side of the bridge at the head of Burns St - affected by SLR, high tides, and heavy rains.
5. The parking lot for the Maritime Museum off Mill St. - affected by high tides and heavy rains.
6. The area at the head of the small gut off the harbor on Mill St - affected by storm surges and heavy rains.

Individual maps are included in the Strategies and Next Steps section showing these areas.

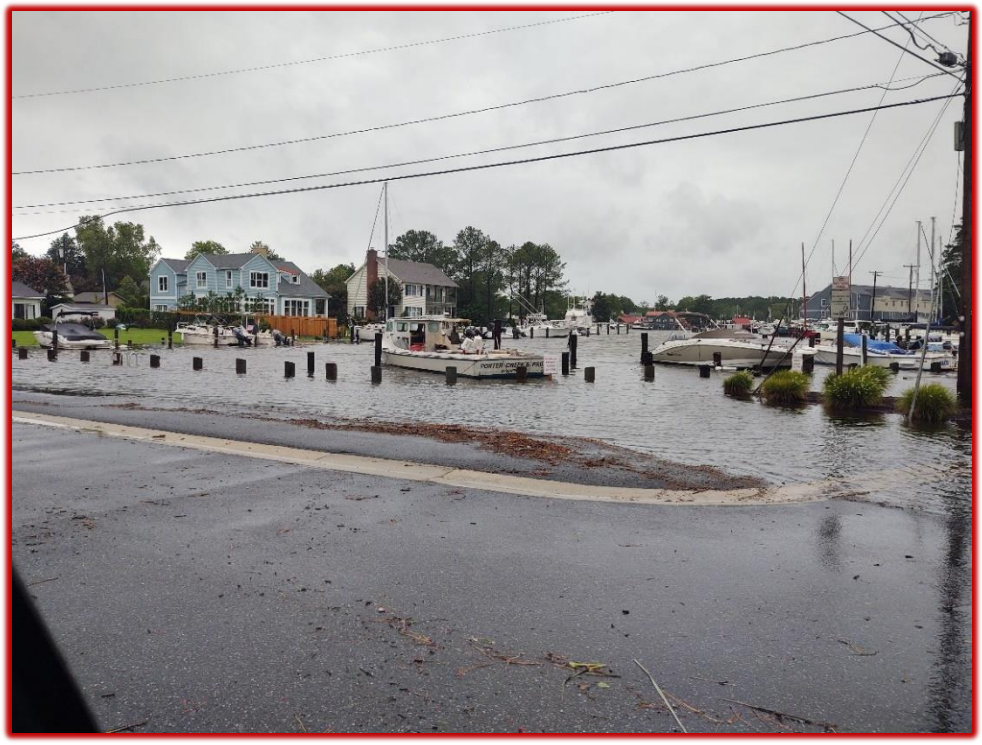
Mill St with water on roadway after rainfall and catch basin inundated at high tide – Aug 2020

Listed below are the inundation scenarios chosen for assessment and development. Upon comparison of the inundation scenarios with the areas of study described above, the most

vulnerable areas were determined and enlarged maps of these locations were created in addition to citywide maps for each scenario. The maps are included in Appendix A.

- 50% SLR projections by 2050 plus 1.02' for MHHW to depict a "normal" high tide with 1.3' of SLR with a 1.02' high tide, resulting in a top elevation of 2.32.
- 1% SLR projection by 2050 plus 1.02' for MHHW to depict a "normal" high tide with 2.4' of SLR with a 1.02' high tide, resulting in a top elevation of 3.42.
- Elevation 4.0, which depicts the 67% SLR projection of 1.7' plus 1.02' for the high tide plus +/-1.3' for storm surge for a total water column addition of 4.0'.
- Current FEMA Map showing the 1% annual chance flood elevation of 6.0.

Depicted Event	**SLR**	**Tide**	**Surge**	**Top Elev**
50% SLR projection	1.3'	1.02'	-	2.32'
1% SLR projection	2.4'	1.02'	-	3.42'
Elevation 4.0	1.7'	1.02'	1.28'	4.0'
FEMA Elevation 6.0	-	-	6.0'	6.0'



St. Michaels Harbor during Hurricane Isaias – July 2020

Final Analysis

In addition to the Waterways Advisory Board meetings, a presentation was made to the Town Manager and Commissioners to show the preliminary inundation maps. The purpose of the presentation was to present background information on sea level rise, outline the 2050 scenarios for sea level rise, understand the level of Risk the Town Manager and the Commissioners are willing to take in the future, discuss future capital investments regarding mitigation and adaptation measures, and guide planning scenarios to present to the Town of St. Michaels for their approval. The meeting also gave the Town Manager, Commissioners, and community members a first opportunity to ask questions and voice concerns about sea level rise and flooding beyond the citizen survey app. Maps showing the 50% and 1% chance of SLR in 2050 were presented and discussed at the meeting. The importance of the Harbor and Harbor Drive, Muskrat Park, Honeymoon Bridge, the head of Mulberry St, and Mill St were voiced again, echoing the findings in the existing elevations, reports from the citizen survey, and in-person experiences in the Town.

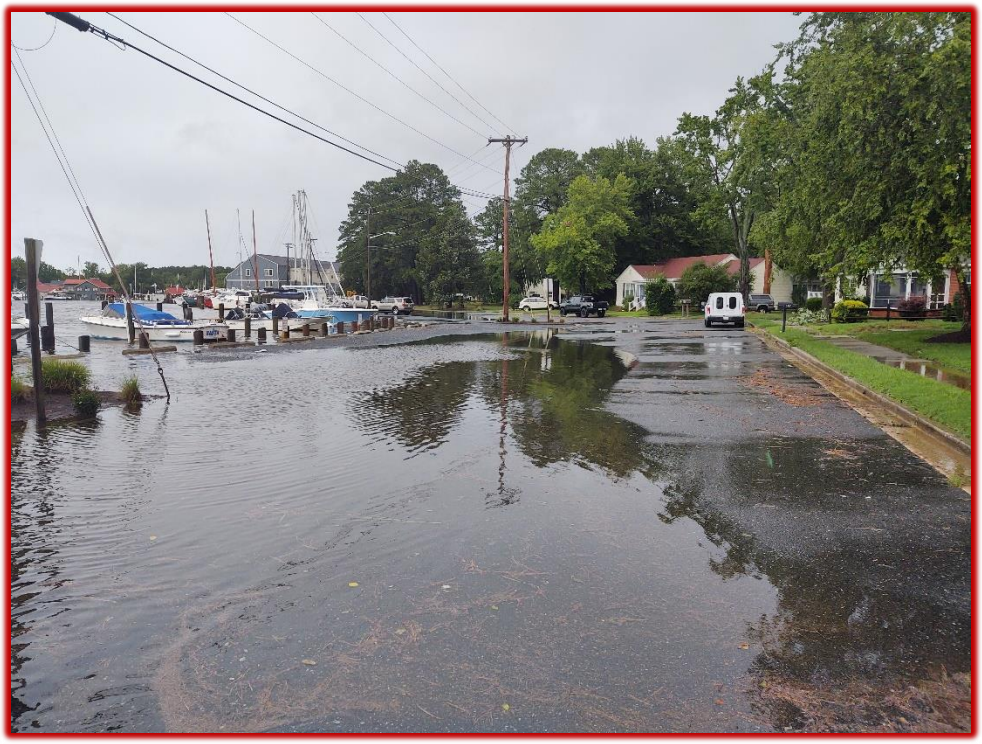
Bulkhead under water from sunny day flooding at head of Cherry St – July 2020

This discussion led to the realization that selected mitigation efforts will vary in recommended elevations that will be ultimately chosen based on life expectancy, cost, budgetary constraints, and ability for project to fit properly in each specific location. It was advised that the higher the level of protections are obviously better, realize this may not always be feasible. The amount of

Risk the Town of St. Michaels is willing to take versus the capital cost of the project and maintenance will ultimately inform the final decision.

The hot spot areas were further investigated on a case-by-case basis, taking the surroundings and available area into account for the recommendations. Outlined below are several potential projects with scenarios to help protect against coastal stressors and sea level rise. While there is not a one-size approach in the recommendations, all projects proposed increase resiliency for the Town of St. Michaels.

As a result of shifting weather patterns, more intense rainfalls are occurring throughout the region. While similar yearly totals are typically reached, the total is achieved in fewer events. The result is fewer events that are more intense in nature with higher individual amounts during each event in shorter periods of time. These intense deluges generally heighten peak flows rates and can inundate older stormwater network systems that were sized for drawn out events with lower intensities. Upsizing pipes for higher capacities, both in total rainfall and in intensity, can alleviate surface flooding and ponding for extended times.



West Harbor Rd during Hurricane Isaias – Aug 2020

Recommendations

Regarding planning for future resiliency and mitigation projects around the St. Michaels Harbor area we recommend the following specific criteria be considered:

A. Use the 1.3' 50% SLR projections by 2050 plus 1.02' for MHHW to depict a "normal" high tide, resulting in a top elevation of 2.32' projection as a bare minimum for any project. A minimum elevation of 2.32 feet should be achieved on bulkheads and water-front structures to minimize the average daily (nuisance) tides that may be felt in the Town by 2050. A higher elevation would alleviate further flooding occurrence days from tidal waters and surges.
B. Use the 1% SLR projection by 2050 plus 1.02' for MHWW to depict a "normal" high tide with 2.4' of SLR with a 1.02' high tide, resulting in a top elevation of 3.42' if the space and budget allows to set top elevations for new structures along the waterfront. This will need to be reviewed on an instance for each project.
C. Utilize a more intense rainfall event for sizing stormwater infrastructure. Upsize the pipes to safely convey the 50- or 100-year rainfall event. When new intensity models for rainfall are adopted for Maryland, utilizing that data should become standard for pipe sizing. This will provide additional storage volume, remove runoff from the surface, and minimize standing water due to rainfall events.

Regarding overall planning efforts around the St. Michaels Harbor, we recommend the following general principles be considered:

D. Provide green space along the water-land interface around the harbor and inside the study area with a set-back where minimal impervious area is allowed. This will minimize the effects of landward surges when higher water levels are experienced. Require a green space with limited impervious area to be constructed right up to the water's edge or back of bulkhead for future projects.
    - If a walkway or boardwalk is desired to be constructed adjacent to the water's edge, it should be constructed above elevation 3.42' at a minimum. Further, it should be constructed of porous concrete or a wooden boardwalk with the minimum spacing requirements to constitute a pervious surface by MDE.
E. Where able, a system of berms should be constructed along the shoreline, behind the bulkhead. This will provide the green space suggested in the previous point adding resilience to the system, lessening the reflective energy off a hard surface bulkhead, and slowing runoff and nutrients loads from entering directly into the Miles River. (This is expanded below with a few specific locations.)
F. Convert impervious area to pervious/green space. Removing pervious areas for green space will assist in meeting Watershed Implementation Goals (WIP) goals as well as lessening the amount of rainfall runoff that is causing some of the flooding in St. Michaels.

This is even more critical within 20' of the Miles River and harbor area, and in downtown areas that currently flood during net weather events.

G. Integrate strategies across adjacent properties to continue protections for a network solution instead of just a singular case for a singular property. This will avoid a one-and-done scenario, leaving gaps on either end, adversely affecting the neighboring properties, while also being ineffective in controlling flood levels.
H. Increase stormwater pipe sizes to accommodate increased runoff from more intense rains that are more frequently inundating the current system.
I. Investigate stormwater holding tanks (cisterns) with tide gates on the discharges or a pumping network to an appropriate discharge location. There is a section of spoil ponds near the little league park that could serve as a pump station discharge point for stormwater when it inundates the harbor area.
J. Elevation of habitable structures should be considered as an alternative, where appropriate. Due to the age of many of the homes in St. Michaels, and the status on historic registers, elevating structures to comply with future sea level rise may be problematic in some cases. It is advised that the Town investigate working with the State of Maryland Historic Trust to provide guidance on such issues. The current Town guidelines provide the following about elevating structures: *"This can be achieved by minimizing the added height, raising the finish grade around the new foundation, or other measures."* It appears this could be achieved, but an approach that has the backing of the State would alleviate concerns on a case-by-case basis, allowing for a solution to be implemented for the homeowner to protect their historic property and the historic property to be protected.
    - The current Floodplain ordinance requires a freeboard amount of 2' above the flood elevation. However, this is only in place for structures within the current 1% annual chance flood hazard area on the most recent FEMA flood maps. This freeboard requirement could be extended outside the 1% chance to additional areas within Town limits; for those within the 0.2% annual chance of flood hazard or a distance (say 1,000 feet) within/adjacent to the 1% annual chance. This would encompass additional lots and potentially require more structures to be elevated to meet the standard if greater than 50% of value improvements were completed on the property. This would potentially result in a greater number of homes elevated to survive the rising water levels that will be experienced in the future.
    - There is an updated version of the FEMA model ordinance available. It is advisable to utilize this model when the new FIRM maps are published, and it is time for adopting them. If the Community Rating System (CRS) is desired for St. Michaels, it would be advisable to adopt the newer ordinance sooner, prior to application to receive rating.
K. Maintain dredging protocols for the harbor and other areas of open water.
L. Ensure ditches and stormwater pipes are clean and free of debris, blockages, and growth that could reduce holding capacities and affect the drainage network. Aging pipes tends

to have root growth, joint displacement allowing for buildup within the pipes, and a roughness to them that adversely impacts the flow. Enacting a routine protocol for cleaning and maintaining the drainage ways in Town will keep the network functioning as desired.

M. For homes and structures that cannot be raised, flood doors should be considered. Even with appropriate resiliency planning, at some point an event will occur that will overtop protections and inundate inland areas. Flood doors should be considered where appropriate, on a case-by-case basis, to at least prevent flooding into living spaces.

N. The Fogg Cove area is in good condition currently. The inundation maps from projected SLR in 250 show the water creeping towards the building structures, but not reaching the foundations. The green area and landscape distance from water's edge to the buildings allows for the tide to reach landward while scrubbing the energy from the surge. If SLR is faster and higher than anticipated, future options should be reviewed. However, at the moment, these areas appear to be sustainable for the foreseeable future.

House with plastic taped over the door and sandbags to prevent flood waters from entering the house – July 2020

Strategies

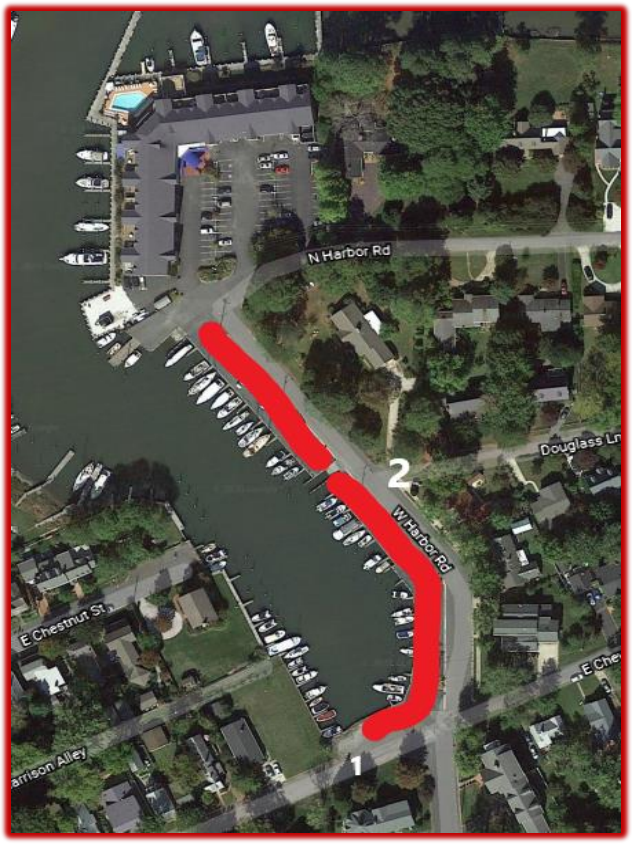
Regarding specific improvements to existing conditions and infrastructure, we recommend the following Strategies:

1. The most extensive storm drain network entering the head of the Harbor crosses East Chew Ave and comes from the streets to the south of Chew. This area suffers from flooding during rainfall events, and even more extensive during intense rain during high tides. The parking lot at the head of the harbor along East Chew typically takes the brunt of the impact becoming inundated more frequently recently.
    - Increase the size of the pipes within the network; both in Chew and the network coming from Meadow St when those roads are due for maintenance or repaving.
    - Provide a cistern box with the parking lot along East Chew Ave. The discharge to the harbor can be controlled internally with a tide gate, not allowing the river water to adversely affect the stormwater drainage system. The runoff from the rain can be stored in the cistern and the pipe network, then discharged to the harbor when the tide recedes. Getting the standing water off the roadway will minimize adverse effects on the Town's roadways and private property. In addition, it will minimize standing water affecting vehicular traffic in the area. In the case of emergency vehicles or Town employees needing access, detours will not be needed.

    Approximate budget for cistern box design: $50,000
    Possible funding sources: Chesapeake and Coastal Grants Gateway (CoastSmart) or G3 for design. WAG for design if there were additional green elements in the overall drainage project.

2. West Harbor Road would be appropriate for elevating; however, the street was recently reconstructed including the infrastructure underground. In lieu of elevating the recently completed street, a berm along the back of the bulkhead could be installed. The road could remain as one-way with parallel parking on the harbor side of West Harbor Road. This would maintain the access to the existing neighborhood homes and the hotel. The existing parking lot would be converted to an earthen berm, reducing the amount of impervious area, adding green infrastructure, and reducing the amount of rain runoff directly entering the River without treatment. The top of the berm can be elevated to protect the residences and Town infrastructure and be linked with the cistern element discussed above. While it is not critical that these elements be constructed at the same time, furthering their development and implementation should be linked as phases of the same flood mitigation project for that area.

Approximate budget for earthen berm and West Harbor Road design: $25,000
Possible funding sources: Chesapeake and Coastal Grants Gateway (CoastSmart) or G3 for design. WAG for design if there were additional green elements in the overall drainage project.



Area for Strategy 1 and 2

3. Some of the impervious area at the head of Mulberry St should be converted to a raingarden area. Reduction of impervious surfaces will provide a buffer between the paved and roofed areas and the River. This will capture and reduce the amount of nutrients entering the River. While the raingarden will be frequently inundated, planting the proper species that will endure times of saltwater inundation will allow for them to thrive and survive. Ultimately, this area will most likely be under water in the future due to sea level rise. Alternate areas should be investigated for relocation, or the ability to elevate the structure. Once accomplished, the area should be surrounded and converted to pervious area to lessen the impacts of the rising water.
    - A conversation with the property owner(s) of the affected properties is imperative. A partnership between public and private entities would ensure that any flood mitigation strategies do not stop at property lines. Including other Non-Governmental Organizations (NGO's) to the discussion such as Shore Rivers and

the Chamber of Commerce would also ensure that interests are covered and potentially open additional funding sources.

Approximate budget for earthen berm design: $30,000
Possible funding sources: Community Legacy, WAG, G3 for design.

Area for Strategy 3

4. For the private homes along Water St, an earthen berm along the waterfront should be investigated. The berm should be constructed with a top elevation above 4 (or even higher) to minimize the projected daily high tides that will occur in 2050 with SLR projections. A sump system (either just low spots or a cistern system) on the house-side of the berm should be designed to collect the stormwater runoff and pump overboard to the harbor. Ensuring the berm is tied into existing grades at either end, or the flood prevention measure is expanded to ensure that River water simply does not flow around the structure will be key for success of the berm.
    - This will require partnerships with all homeowners in the affected area. Since all properties will be involved and require buy-in and participation for this project, this could take some time. The conversation should start as soon as possible to begin the conversation and ensure the project moves forward to protect the properties prior to the 2050 goal.

Approximate budget for earthen berm design: $37,000

Possible funding sources: MWQFA for low interest loan or a potential partnership for financing between public/private entities.

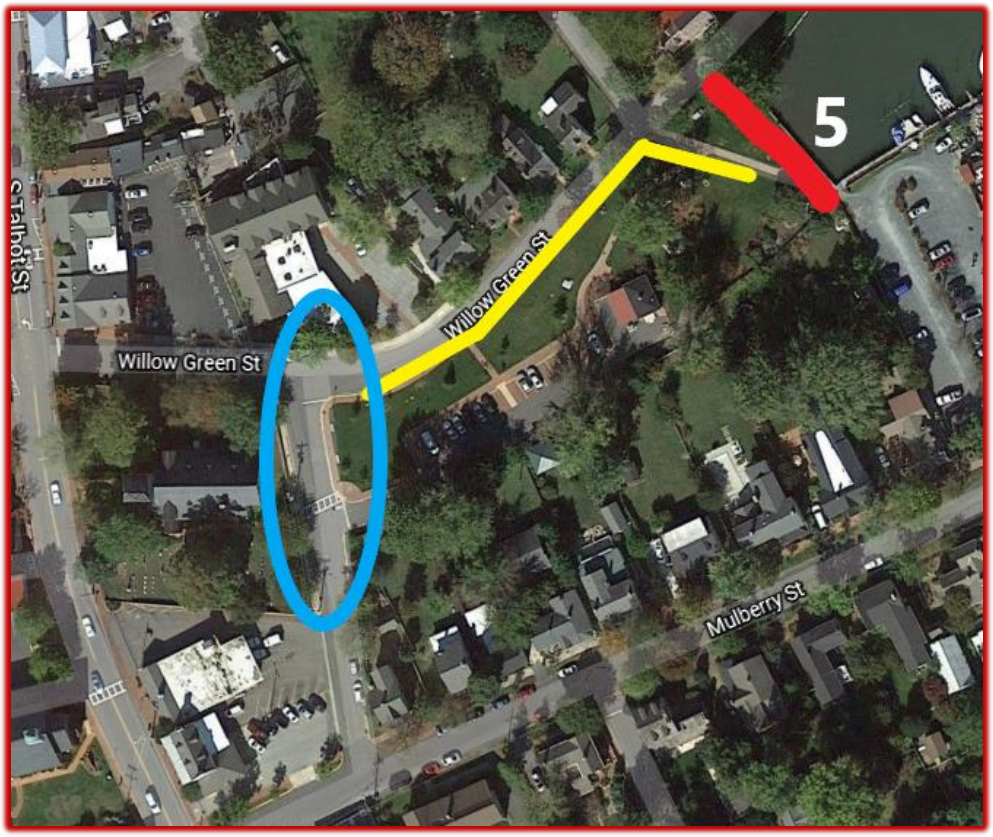
Area for Strategy 4

5. It appears that Muskrat Park it will be inundated in the future due to sea level rise. Given that it has minimal impervious area, the surge would be allowed to inundate the park for a brief period and then recede. To minimize this occurrence, raising of the bulkhead should be investigated. The grassed area behind can be raised to meet the top of the bulkhead. At the toe of the new slope, a large cistern with holding capacity for runoff from rainfall events could be installed, which would release the rainwater to the River through a tide gate when the water level recedes or pumped overboard to draw down the boxes holding volume.

   In the Muskrat Park area, it appears that the stormwater pipes draining Church St and Willow Green St are minimal. This network becomes overwhelmed during heavy rainfall events, which is exacerbated when the tide is up. Based on our investigation, it appears the system has been extended and added to over the years causing a larger drainage area than originally accommodated. These streets are frequently closed to traffic during rainfall events because of standing water. Given SLR and the frequency of heavier rains in the future, the system should be upsized with larger pipes. Another option would be a

network for Willow Green St itself, with new pipes installed in the roadway that could be tied into the singular discharge point at the head of the bulkhead. In addition, the cistern box could be used as a holding tank for the drainage off these roads. Like the system on Chew St, a tide gate could be installed to manage the draw down, or a pump could be utilized to pump the water overboard. If a Town-wide system is desired for pumping down rainwater runoff, the dredge spoil sites by the little league fields could be investigated as a destination.

Approximate budget for Muskrat Park Improvements design: $28,000
Possible funding sources: MWQFA for low interest loan, G3, DNR Parks and Rec, WAG.

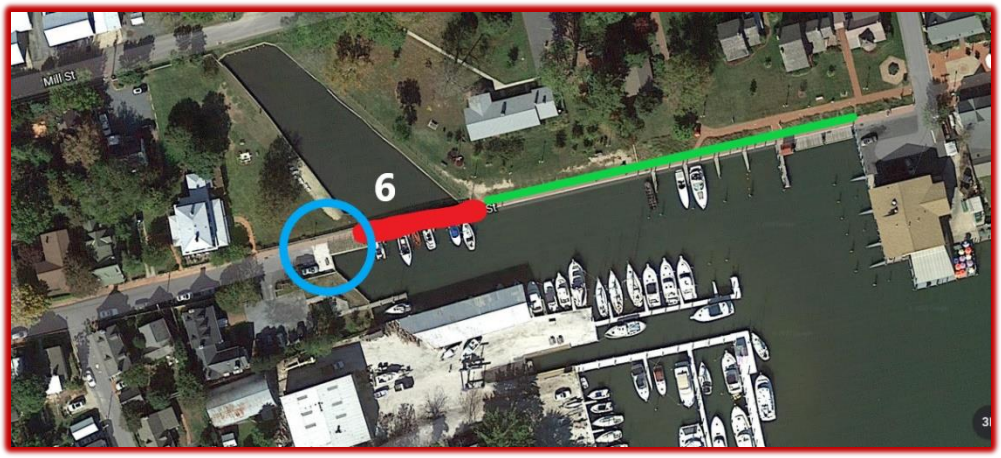


Area for Strategy 5

6. Raising the head of Cherry Street, Honeymoon Bridge, and the landing on the north east side of the bridge should be investigated. It appears that a small raingarden area was previously installed around the foot of the bridge. Due to current elevations, the practice is frequently inundated with tidal waters, minimizing the effectiveness for nutrient reduction from rainfall runoff. The runoff then simply enters the open waters because the raingarden is under the open waters. Items to investigate would be elevating the head of the street and adjacent areas to minimize the frequent inundation that currently occurs, reconstructing the raingarden at the new low spot in the street closer to Talbot St and at

a higher elevation to treat rainwater runoff from the street, and elevate the walkway on the northwest side of Honeymoon Bridge to make the pedestrian path usable on most days, even into the future. The pathway should be moved further away from the water's edge. The new walk should be constructed of porous concrete or a boardwalk material to minimize the impervious area adjacent to the water as well as meeting ADA requirements.

Approximate budget for Cherry St and Honeymoon Bridge area design: $33,000
Possible funding sources: CoastSmart, Community Legacy, G3, WAG.



Area for Strategy 6

7. Mill Street access to the waterfront should be discussed and investigated. Currently, Town offices are located on Mill St, however, there have been discussions of a potential move. If desired to keep the offices at their current location with minimal interruptions to services, access, or adverse effects in the future, Mill St should be reconstructed. If the offices will be moved, then another option can be discussed.

   The ditch that runs from behind the real estate office (Benson and Mangold) down to Mill St is impaired and cleaning should be accomplished. During Hurricane Isaias, the banks of the ditch were overtopped, and a large amount of water was flowing though the ditch to the gut off the Harbor. From accounts by Town residents and representatives, this occurs often. The flooding affects the business on Mill St and minimizes direct access to the Town office and the businesses and Museum at the head of the street. Frequent inundation and overloading leads to quicker degradation of the Town's infrastructure and adds to the pollutant load to the River. What is draining to this system upstream should be investigated to see if there is an option of diverting some of the volume of runoff, slowing the runoff, or another alternative to reduce the adverse effects when intense rainfalls occur. Further, there may be an option for a larger control structure located within Mill Street itself.

Currently it appears that the ditch enters a culvert, flows under Mill St to a catch basin, and is discharged to the harbor through a pipe that has a tide gate attached. Moving the tide gate to the interior of the box would provide better maintenance access and minimize the opportunity for the gate to be blocked with debris. Raising the roadway along the water's edge will minimize the flooding experienced on the road surface that currently caused disruptions. If the road is raised, there is an opportunity to construct a larger open culvert or even a bridge that will connect the ditch to the harbor, allowing for the tide a greater reach and improving the conditions of access along Mill St.

Approximate budget for Cherry St and Honeymoon Bridge area design: $72,000
Possible funding sources: CoastSmart, Community Legacy, G3, WAG.

Area for Strategy 7

8. In conjunction with the above recommendation, a new committee should be formed to discuss the future of the Burn St area. With the Chesapeake Bay Maritime Museum located off Burn St, access to one of the major tourists draws to the Town should be paramount. Beyond access to the Museum and the surrounding properties, the longevity of these structures is important to the lifeblood of St. Michaels. The committee should be comprised of public officials, private business owners, and board members of the Museum. Ensuring representation of all parties/entities/businesses affected by any future endeavors for Burn St are informed at every step of the process is key. A grant to investigate the tourism, financial aspects, accessibility, public service, and longevity aspects of the area can be pursued. There is more at stake than just resiliency from Sea Level Rise in this area which warrants a deeper dive on many levels to craft the vision of the future for St. Michaels.

Approximate budget for grant for visioning study: $60,000
Possible funding sources: CoastSmart, Community Legacy, Public/Private funding.

Next Steps

Phase 1: January 2021-December 2023

- Within the next year, a committee should be formed as discussed above in Strategy #8. This is a zero to minimal cost effort and will allow those affected parties to have a seat at the table to craft the future of the Burn St area. The internal discussion of priorities, deficiencies, opportunities, and needs should be discussed. Once completed, a grant to fund a future visioning exercise for the area should be sought. This will enable a land planning firm to be hired to provide a schematic plan for the future of Burn St. While that is taking place, the committee could be expanded to the study area with additional business owners and stake holders that will ultimately be adversely affected by future flooding events. Maryland's Environmental Finance Center could be a good partner for the group, along with other area NGO's such as ESLC, Shore Rivers, or the County Tourism Board. Graduate Students at the University of Maryland or Morgan State University could be invited for a design Charrette.
- The Town Manager and Commissioners should consider addressing the flooding issues within their annual Capital Improvement Plan and budgeting. While preparing for the future with funds reserved each year, any funding requirements including a local match can be met easily and quickly. One reason why other communities struggle with grant applications or project completion is the lack of ability to provide capital for fund matching. With a reserve strictly for this purpose, St. Michaels will be prepared for grant opportunities and quicker implementation of said projects.
- When performing regular roadway maintenance, the current condition and size of the stormwater pipes should be investigated. Jet cleaning should be performed on routine schedule, potentially splitting the town into four quadrants. A quadrant should be cleaned each year on a four-year cycle. When repaving the road, the ability to upsize the storm pipes should be considered. This will help address the flooding due to rainfall events.
- Review the current Floodplain Ordinance and determine if additional, more restrictive measures are desired. Currently St. Michaels is in line with most Chesapeake Bay waterfront communities. However, if the requirement of the freeboard is desired to be extended beyond the FEMA 1% chance of annual flood line, a discussion with Kevin Wagner of Maryland Emergency Management Agency should be had. There are minimal vacant lots that are buildable in the future that this would affect. However, it could affect the substantial improvement qualifications for houses that lie within the 0.2% chance of annual flood zone. It is believed that the flood plain line on future FEMA maps will move further away from the water's edge, encompassing additional structures in the future. Expanding the regulatory area under the Floodplain Ordinance would hopefully ensure these structures that are mapped-into the floodplain in the future have a head start to meet FEMA requirements, if needed.

- The Waterways Advisory Board should discuss, review, and decide if a minimum height for new bulkheads should be instituted. Another option would be to craft a set of standards depicting the interface with the water's edge for various lot uses and sizes. Even if this is not accomplished immediately, making it a 5-year goal should be the minimum course of action.
- This document as well as the above activities will prepare the Town for the next Hazard Mitigation update. Creating a Capital Plan, a 2050 resilience vision for the Town, and having the open discussions all are important for the plan.
- Start a capital account for future projects. These funds can be utilized to fund small projects themselves, as matching funds for grant applications, or to cover design fees for desired projects.
- Begin the conversation with the private homeowners along Water St about their issues, experiences, potential resolutions, and their desired outcome for the future of their home. This will not be a quick process due to the number of parties involved, but the start should not be delayed.

Phase 2: March 2021-December 2023

- Pursue a grant for the design of the berm along West Harbor Road. The infrastructure under the roadway was just upgraded and completed. This project can be leveraged as the start to the resiliency of the Harbor area, and potentially be utilized as a match for future grant funding. (Different sources allow for matches to be shown in different manners, so the money spent on infrastructure upgrades could be a future planning tool.)
- Along with the berm design, a grant for the design of the cistern/stormwater network upgrades along Chew Ave should be pursued. Given the scope/scale/visibility/available land these two projects could be accomplished prior to 2025. Lessons learned, and positive momentum can be utilized for the remaining projects in the next phases.

Phase 3: June 2022-December 2030

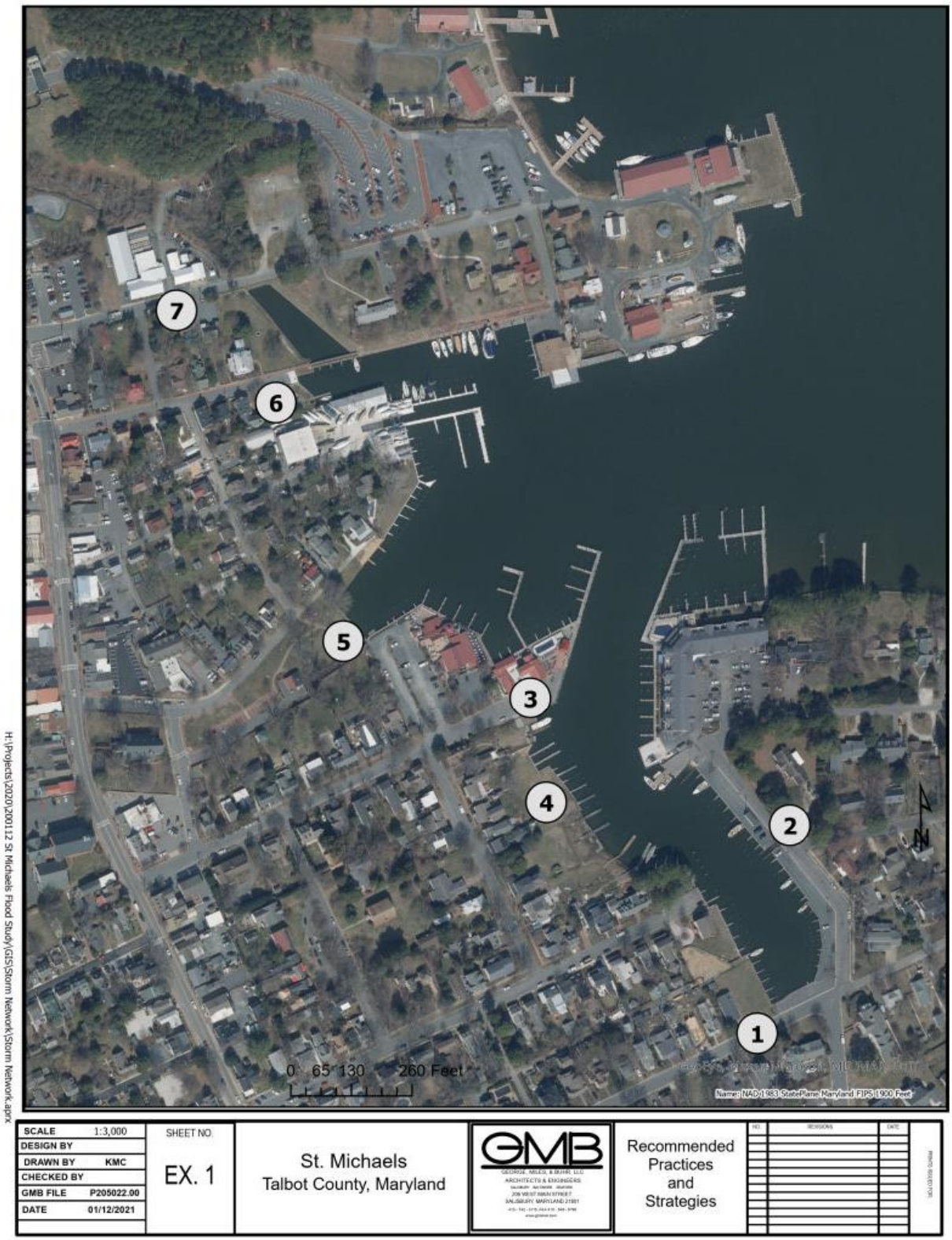
- Upgrade the stormwater capacity around Muskrat Park. Minimizing the flooding from rainfall events which affect access to that part of Town should be a short-term priority. At the same time, complete the tidal protection along the water's edge for the park. Keeping the space open and able to be enjoyed is a goal of the Town of St. Michaels as understood from the discussions.
- Complete a plan for the Burn St area, including timelines and schematics of any alterations that will need to take place for the longevity of the businesses and Museums in that area.
- Complete a reconstruction of Mill St to limit the effects of flooding on the Town's infrastructure and to keep access to Burn St and Town offices open.
- Have engineering plans for the Honeymoon Bridge area on Cherry St to be shovel-ready when funding becomes available.

- Ensure a plan is in place for the low-lying properties along Water St. Without a plan by 2030, the area will most likely not have a cohesive approach to flood mitigation.
- Ensure the businesses on Mulberry St, Carpenter St, and Mill St are involved in discussions of potential risk, mitigation techniques, and future expectations for their property and flood risk. These areas will be negatively impacted by SLR and will need a strategy in conjunction with the Town to facilitate future projects.

Phase 4: January 2031-December 2050

- Ensure all water's edge areas have sufficient flood mitigation techniques and structures installed to minimize the negative effects of tidal flooding.
- Ensure that the stormwater networks in Town are sufficiently sized and increased if deemed deficient.
- Ensure maintenance for any new infrastructure installed, either grey or green, has a budget item listed on the yearly budget. And a routine maintenance schedule is planned out. Once the technique is constructed, money is needed in the future to maintain the integrity and efficiency into the future.

Appendix A



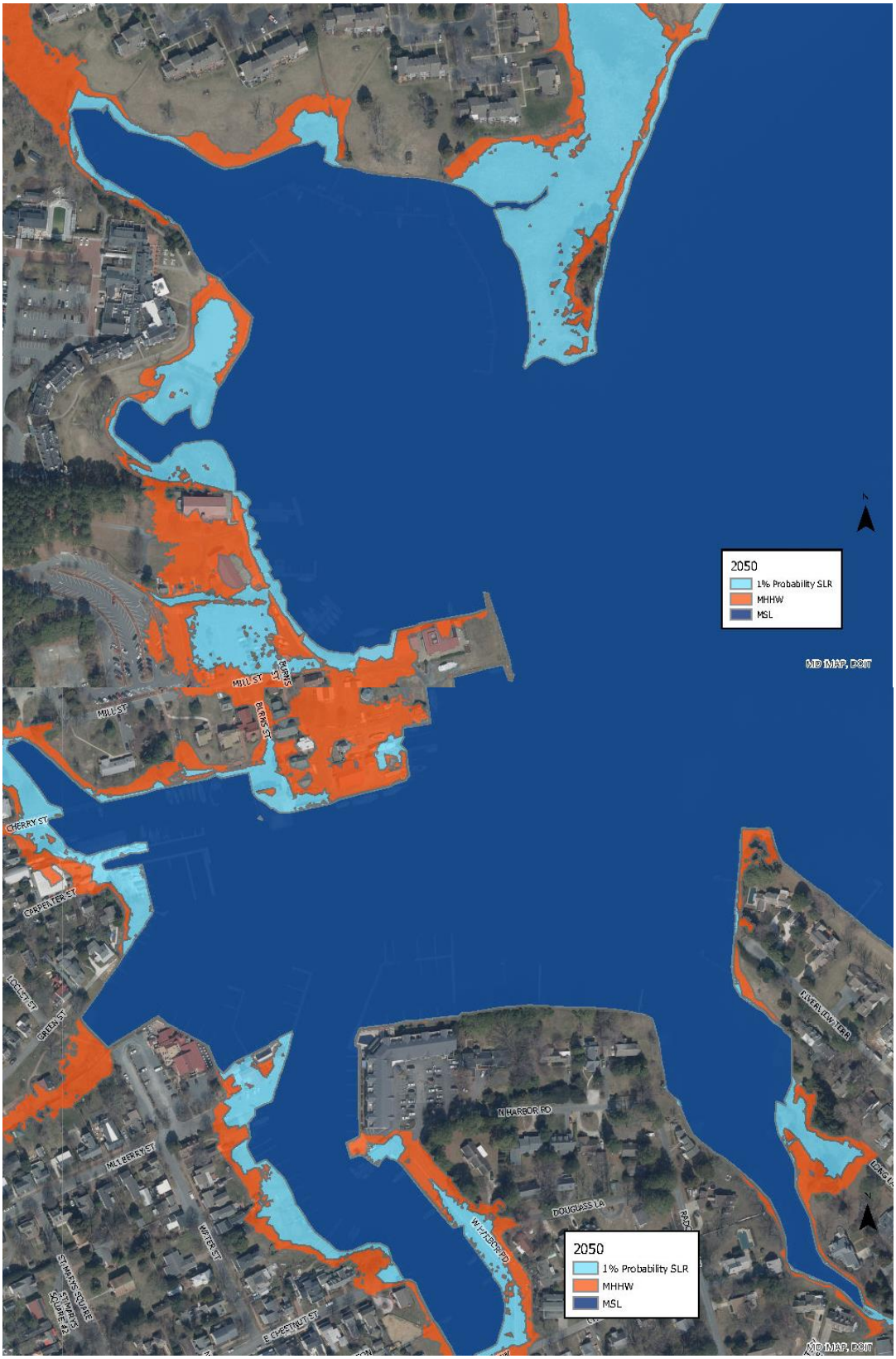
Location map of Strategies

SCALE 1:4,500 DESIGN BY DRAWN BY KMC CHECKED BY GMB FILE P2050222.00 DATE 10/16/2020	St. Michaels Talbot County, Maryland	GMB	PROJECTED SEA LEVEL RISE		SHEET NO EX. 1

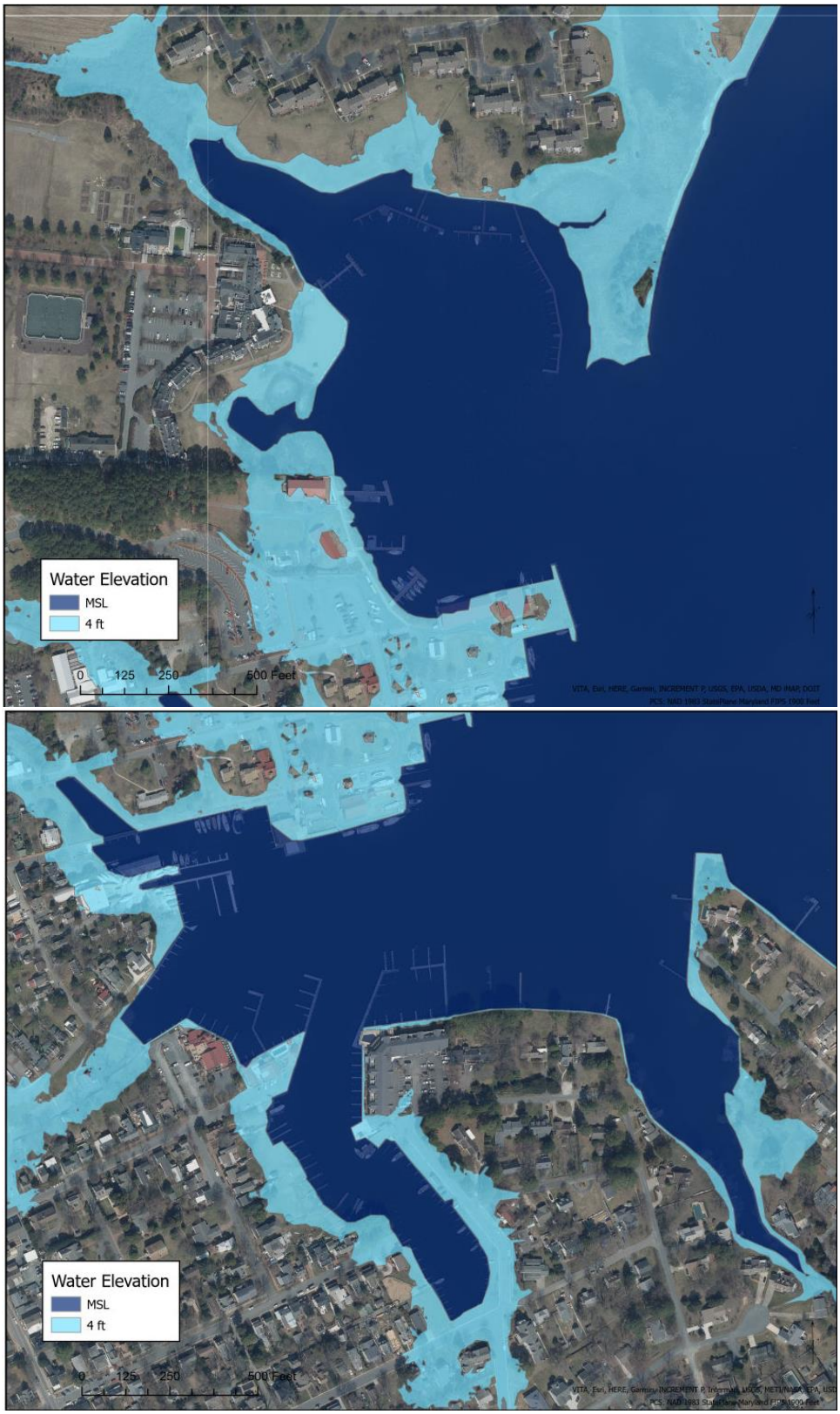
H:\Projects\2020\2001122 St Michaels Flood Study\GIS\HEC-RAS\St. Michaels Hec Ras\St.aprx

Projected sea level rise inundation from the 50% chance sea level rise in 2030, 2040, & 2050

2050 scenario showing inundation from the 50% chance sea level rise of 1.3' with 1.02' of tide

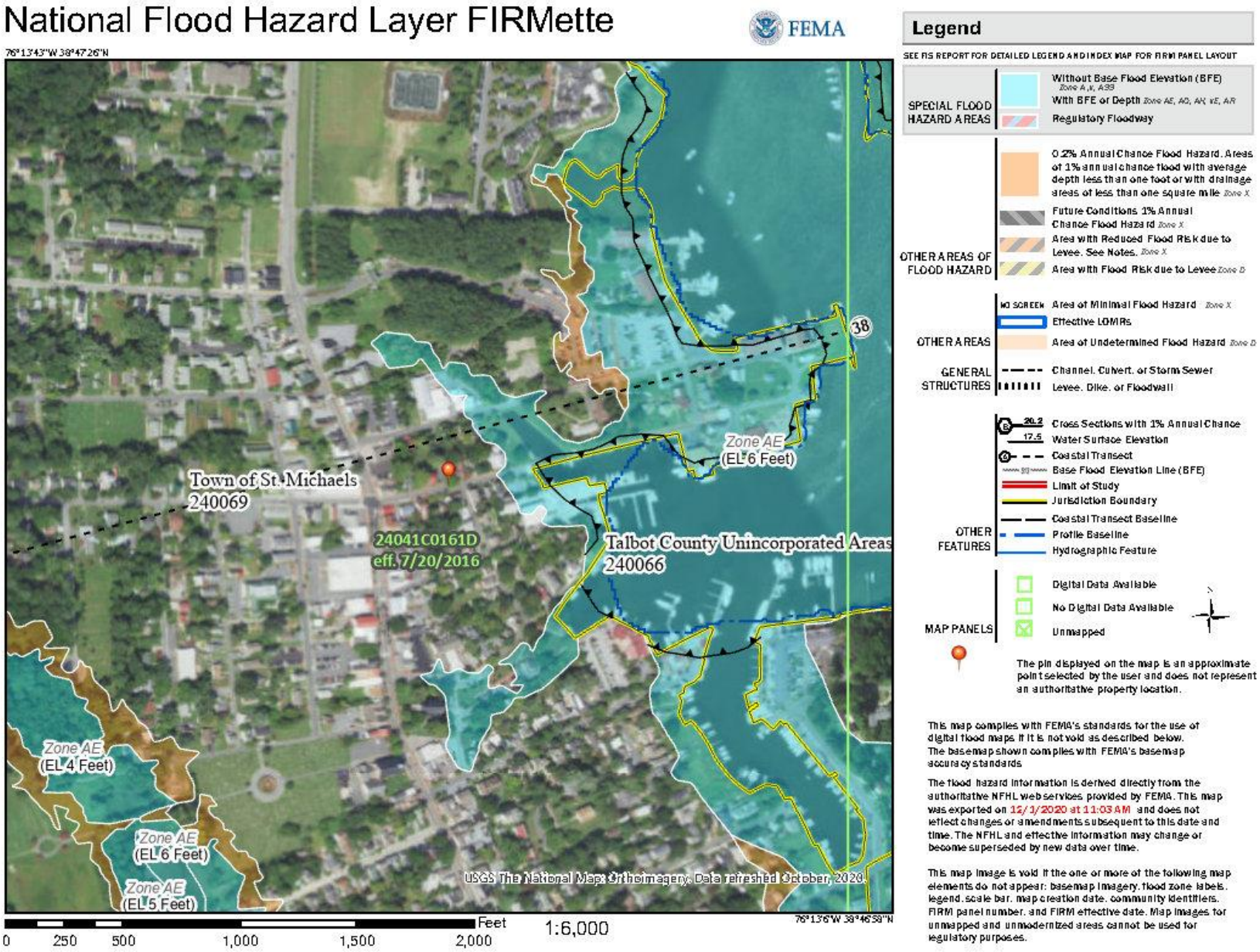


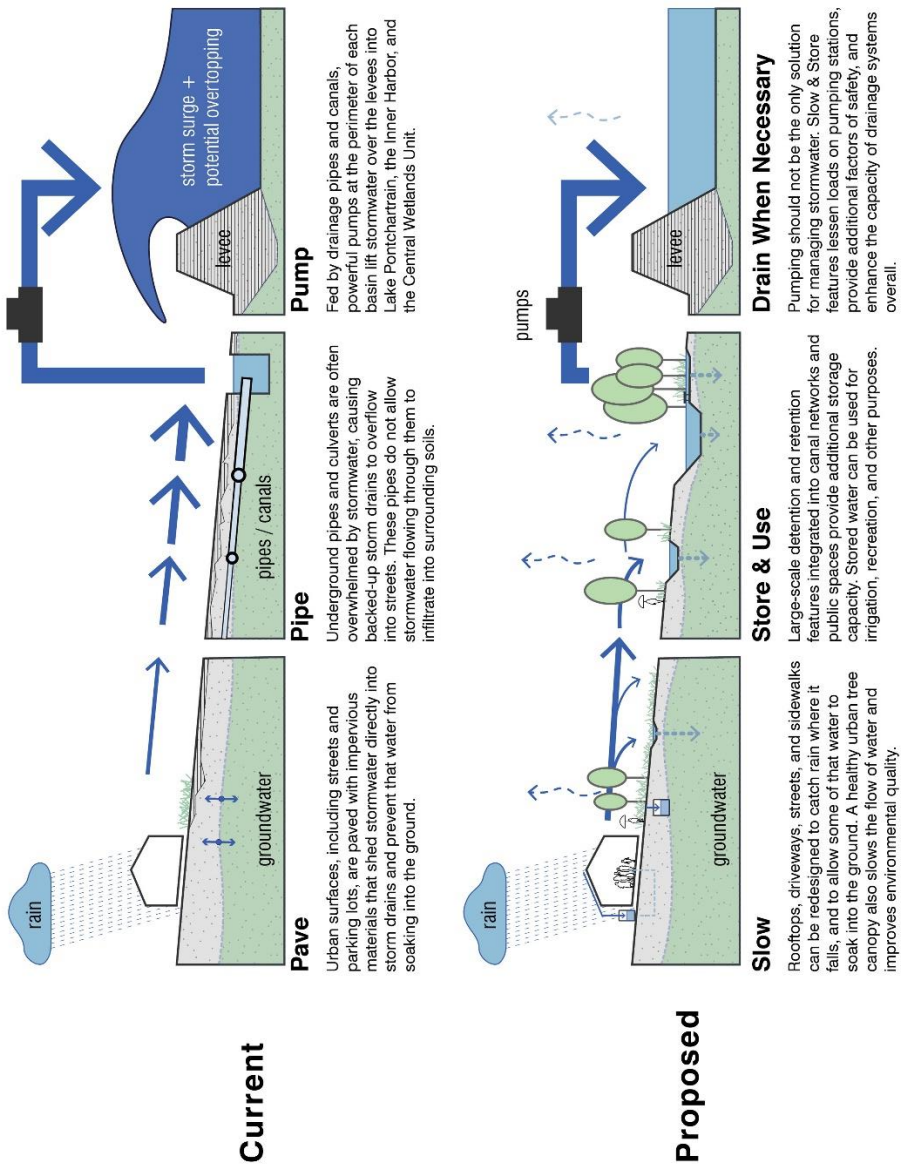
2050 scenario showing inundation from the 1% chance sea level rise of 2.4' with 1.02' of tide



2050 scenario showing inundation from 4' of water, representing the 5% chance sea level rise of 2.1' with a tidal surge of 1.9'. This elevation is similar to the top elevation experienced past hurricane and extreme tidal surge events

Existing 2016 FEMA flood map for the Harbor area





Schematic of earthen berm as discussed in various Strategies

Appendix B

Citizen Flood Reporter Summary of Data

37 responses were received from the Citizen Flood reporter

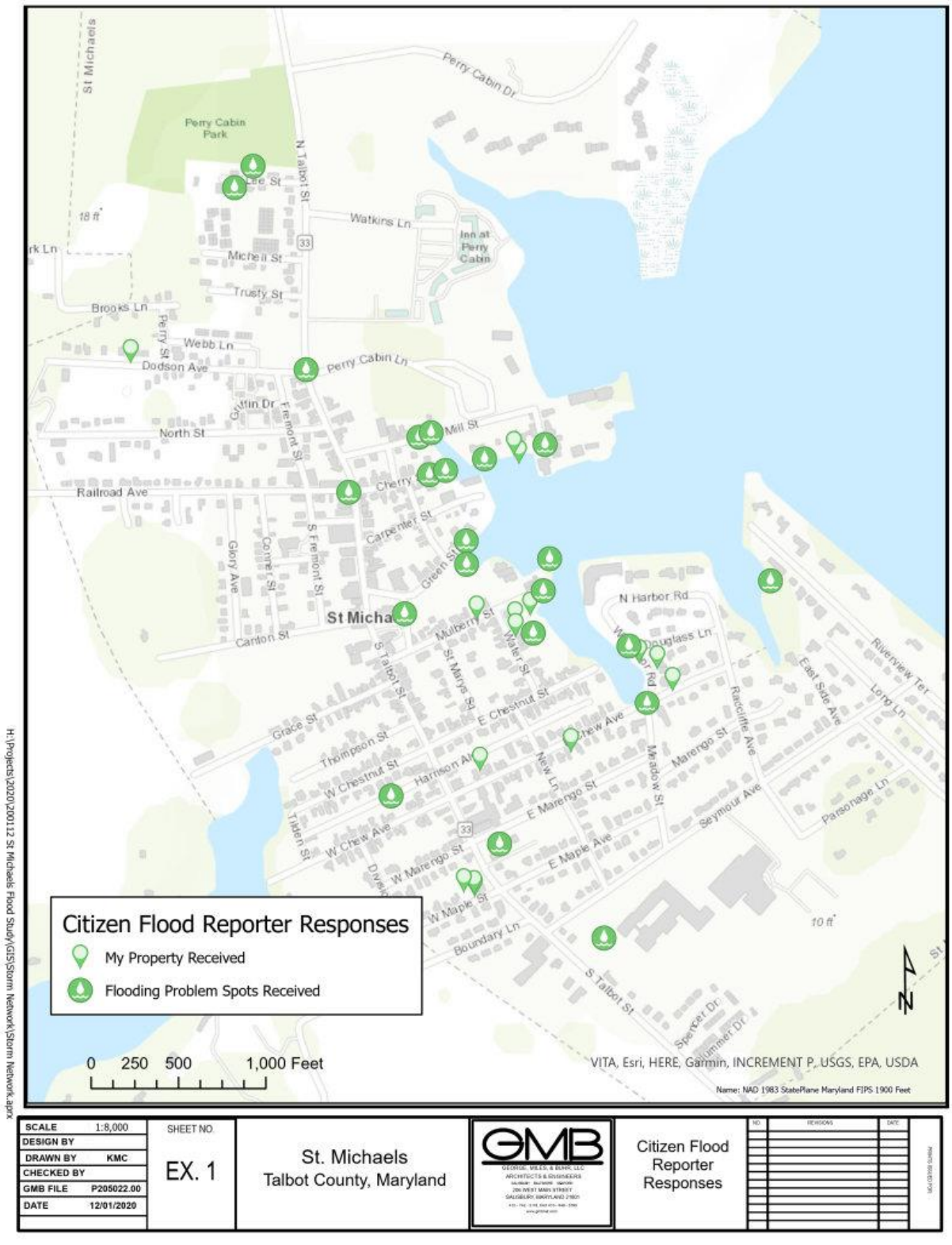
- 15 were My Property Surveys
- 22 Flooding Problem Spot surveys

Of the 15 My Property Survey responses:

- 13 were single family homeowners
    - 8 were property owners and full-time residents
    - 4 were property owners and part-time residents
- 2 were business owners
- Flood frequencies reported varied from occasionally to very frequently

Of the 22 Flooding Problem Surveys

- 9 reported flooding from heavy rain
- 13 reported tidal flooding
- Flood frequencies varied from occasionally to very frequently



Citizen Flood Reporter Map of Responses

Citizen Flood Reporter Responses

Category	Type of Problem	Details about the problem	Location	Submitted On	Flooding Frequency:	Residential Status:
Flooding Problem Spots	Rain		200-298 Green St, Saint Michaels, Maryland, 21663	10/17/2020	During hurricanes and major rain storms	
Flooding Problem Spots	Rain		Church St, Saint Michaels, Maryland, 21663	10/17/2020	During hurricanes	
Flooding Problem Spots	Rain	Standing water 4-6 inches deep following a rain. Occurs at the back of our property and into the alley and remains for days.	Harrison Aly, Saint Michaels, Maryland, 21663	10/19/2020	Nearly every rain	
Flooding Problem Spots	Rain	Large standing puddle that won't drain for several days.	100-198 Railroad Ave, Saint Michaels, Maryland, 21663	10/19/2020	Every rain	
Flooding Problem Spots	Rain	Storm water from apartment complex parking lot drains directly into property back yard.	106 Lee St, Saint Michaels, Maryland, 21663	10/19/2020	Every rain	
Flooding Problem Spots	Rain	After heavy rains, the parking lot/kid dropoff area pools water deep enough for small feet to get soaked without boots.	901-927 S Talbot St, Saint Michaels, Maryland, 21663	10/19/2020	occasional	
Flooding Problem Spots	Rain	Flooding seems to occur during heavy rains in the following locations.... Behind the post office... Foot of Mulberry... Intersection of E. Chew and Meadow Foot of Cherry	200-298 E Chew Ave, Saint Michaels, Maryland, 21663	10/19/2020	Monthly from April to November	
Flooding Problem Spots	Rain	When tidal flow at Mill Street is backed up, it affects this portion of N. Talbot	300-388 N Talbot St, Saint Michaels, Maryland, 21663	10/20/2020	Twice Per Year	
Flooding Problem Spots	Rain	storm drains cannot handle all the rain water so it backs up around my house from the swales and main street(S. Talbot St.)	701 S Talbot St, Saint Michaels, Maryland, 21663	10/29/2020	always	
Flooding Problem Spots	Tidal	The sidewalk and entrance to honeymoon bridge floods limiting access to the CBMM, The Patriot and the town slips and transient dockage in front of the town offices.	200-398 Mill St, Saint Michaels, Maryland, 21663	10/13/2020	40+ Days a year	
Flooding Problem Spots	Tidal		200-298 Green St, Saint Michaels, Maryland, 21663	10/16/2020		
Flooding Problem Spots	Tidal	High tides and surge always flood St. Michael's Marina and St. Michael's Steak and Crab Restaurant.	305 Mulberry St, Saint Michaels, Maryland, 21663	10/16/2020	Often	
Flooding Problem Spots	Tidal		St Michaels Marina	10/17/2020	Almost every high tide	

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Flood Reporter Data Table

Flooding Problem Spots	Tidal	1 - water is eroding a swath behind the houses on Riverview Terrace up towards Long Lane 2 - High tide can bring the water over the rip rap at 704 Riverview	704 Riverview Ter, Saint Michaels, Maryland, 21663	10/19/2020	High tide	
Flooding Problem Spots	Tidal	Mill Street floods in the area of the culvert under the street between Cedar Street and the Town Hall.		10/19/2020	Half dozen times per year	
Flooding Problem Spots	Tidal	Drainage ditch frequently backs up into adjacent yards during large high tides.	103 Lee St, Saint Michaels, Maryland, 21663	10/19/2020	Often	
Flooding Problem Spots	Tidal	Near the small boat ramp on W. Harbor Road, flooding sometimes comes totally across the W. Harbor, making it almost impassable. It also floods near the larger boat ramp near the Harbor Inn, but with less impact on the street.	W Harbor Rd, Saint Michaels, Maryland, 21663	10/19/2020	Several times per year	
Flooding Problem Spots	Tidal	Floods Burns Street	Burns St, Saint Michaels, Maryland, 21663	10/19/2020	46 times a year	
Flooding Problem Spots	Tidal	The foot of Cherry Street floods blocking access to honeymoon bridge.	203-299 Cherry St, Saint Michaels, Maryland, 21663	10/19/2020	46 ,times a tear	
Flooding Problem Spots	Tidal	Flooding preventsbpublic use of the docking facilities in front of the town office.	200-398 Mill St, Saint Michaels, Maryland, 21663	10/19/2020	45 times a year	
Flooding Problem Spots	Tidal	flooding of Mill Street prevents access to town hall and the Crab Claw Restaurant.	300 Mill St, Saint Michaels, Maryland, 21663	10/19/2020	20 days a year	
Flooding Problem Spots	Tidal	high tides over bulkhead into the yard. House on Water St	Church Cove Park	10/29/2020	higher high tides	
My Property	Business	Sidewalk in front of Patriot Cruises	Burns St, Saint Michaels, Maryland, 21663	10/19/2020	50 times a year	Other
My Property	Business	The Crab Claw Restaurant's flooding problems continue to increase. Depending on time of year, phase of the moon, winds and tides, you cannot walk from our parking lot down Burns Street to the entrance due to high water.	Burns St, Saint Michaels, Maryland, 21663	10/19/2020	Several times a month	
My Property	Single Family	Our home is located at 207 Mulberry St. When there are heavy rains or very high tides, the back 20 feet of our property is under, sometimes a foot deep. We also have about 3 to 4 inches of water in our front yard/sidewalks when it rains. Our property backs to Muskrat Park.	207 Mulberry St, Saint Michaels, Maryland, 21663	10/16/2020	Backyard approx. 6 times per year. Front yard, very often.	I am a property owner and part-time resident.

My Property	Single Family	There is standing water and completely submerged after a rain fall that stands for days. I am convinced there is a vain going through the property.	307 Dodson Ave, Saint Michaels, Maryland, 21663	10/16/2020	Every time it rains, days after. Never drains.	I am a property owner and full-time resident.
My Property	Single Family	205 E Chew. Every time we have good rain, our property floods,especially side and back yard	200-298 E Chew Ave, Saint Michaels, Maryland, 21663	10/19/2020	medium to heavy rain	I am a property owner and full-time resident.
My Property	Single Family	303E E CHEW AVE HEAVY RAIN AND MY YARD IS A SWAMP.	507 W Harbor Rd, Saint Michaels, Maryland, 21663	10/20/2020	EVERY RAIN	I am a property owner and full-time resident.
My Property	Single Family	My property, and several of my neighbors, suffer from poor general drainage. After any major rainfall, pools of water persist for up to several days. The large clay content in the soil, and the high water table, do not facilitate good drainage. Conveyance is also a problem, as drainage ditches and swales may have been compromised over the years.	102 Douglass Ln, Saint Michaels, Maryland, 21663	10/22/2020	Every major downpour or extended rainfall.	I am a property owner and part-time resident.
My Property	Single Family	The backyard floods regularly during storms and during a large high tide. Flooding usually starts as an overflow from the parking lot on Mulberry Street, but will flood directly from the docks at times.	401 Water St, Saint Michaels, Maryland, 21663	10/26/2020	Once a month	I am a property owner and part-time resident.
My Property	Single Family	In the past, the property flooded during very high tides. This is not a problem, at the moment, as the property was raised 18 inches.		10/28/2020	Occasional	I am a property owner and full-time resident.

My Property	Single Family	We are one of several homes in the 100 block of E Chew Avenue with properties backing onto Harrison Alley. All of us have flooding constantly, even after just a few hours of rain. There is a drainage ditch that is not maintained by the town, thus is useless. We moved here in the summer of 2019 which was considered a drought period. Spring of this year we paid over $6000 for landscaping. In less than two months it has all died because of "root rot," even the sodded grass. Contractor says it isn't his fault, no compensation for us. We are now facing over $9000 in engineering fees to try to remediate our flooding problem which we can't afford after the loss on the landscaping. Come on St. Michaels, we shouldn't have to pay for this as owners of a modest home in town. Where is the help for us?	103 E Chew Ave, Saint Michaels, Maryland, 21663	10/28/2020	Always, even after a few hours rain	I am a property owner and full-time resident.
My Property	Single Family	Home built in 1890. Stewart family has lived there since 1950. Flooding has gotten worse. Culvert use to route storm water through opening under sidewalk out to Talbot Street. Each new layer of road has blocked opening so it no longer drains.		10/30/2020	With heavy rains	I am a property owner and full-time resident.
My Property	Single Family	Home built in 1890. Stewart family has lived there since 1950. Flooding has gotten worse. Culvert use to drain storm water through an opening to Talbot Street. Each new layer of road has blocked opening.		10/30/2020	With every heavy rain	I am a property owner and full-time resident.
My Property	Single Family	2 empty lots on W. Maple Street belonging to the owners of 706 S Talbot St. Back lot would flood some with heavy rains prior to 2016. It has gotten much worse and was addressed with the zoning officer at that time.		10/30/2020	Every time it rains	I am a property owner and full-time resident.

My Property	Single Family	401 Water Street which the corner of Water Street and Mulberry St. I am adjacent to the marina and the St. Michaels Steak and Crab House. I get frequent flooding from the base of Mulberry Street street into my yard. I also get backyard flooding from over my docks on a very high tide.	401 Water St, Saint Michaels, Maryland, 21663	10/30/2020	weekly	I am a property owner and part-time resident.
My Property	Single Family	These photos are of a neighboring property to mine. The owners were not around to observe the rain on Sunday, November 1, 2020. The address is indicated in the "problem located field".	503 W Harbor Rd, Saint Michaels, Maryland, 21663	11/3/2020	Frequent, with high inch/hour or extended duration rains	Other

Appendix C

Grant Program Name	Contact/Managing Entity	Eligible Activities	Cost Share Breakdown	Other Program Characteristics	Past Application Due Times
Capital Project Financial Assistance / Water Quality Improvement Projects (Maryland Water Quality Financing Administration, MWQFA)	Maryland Department of the Environment (MDE) For assistance, please contact Elaine Dietz at elaine.dietz@maryland.gov	Water Quality State Revolving Loan Fund – Low interest rate loan and loan principal forgiveness (if eligible) for publicly-owned treatment works projects and publicly or privately-owned non-treatment works projects. Drinking Water State Revolving Fund – Low interest rate loan and loan principal forgiveness (if eligible) for public or privately-owned drinking water projects. Bay Restoration Fund Wastewater Program - Grant funds for · ENR upgrade at major or minor wastewater treatment plants · Improvements to existing wastewater conveyance systems · Sewer extension to connect homes on septic systems to a BNR/ENR wastewater treatment plant	No information provided; N/A for loans	If your project will be ready-to-proceed to construction by December 2022, please complete a separate application for each capital project for which you are seeking financial assistance and submit to MDE per instructions provided in the application. If you previously applied for financial assistance and your project was only partially or not funded, a new/updated application is required. (Applicants with stormwater projects to meet MS4 permits may (and are strongly encouraged to) submit multiple BMP projects that will start construction within 12 – 18 months of notification of	End of January

		· Nitrogen reducing BAT upgrade at shared community septic systems · Stormwater (MS4) projects by local governments with a system of charges Water Supply Financial Assistance - Grant funds not to exceed $1.5 million for drinking projects at publicly-owned facilities, based on system size, compliance, and affordability.		funding as a "program" of projects using a single funding application, as opposed to submitting individual BMP projects in separate applications.) Projects in construction prior to MDE's verification of competitive procurement and compliance with all programmatic requirements will not be funded. Do not submit applications for projects in construction that have not already have had these reviews completed by MDE.	
Climate Change Strategy Grant	Oak Foundation USA http://oakfnd.org/application-process.html	Climate Change Strategy Grant - Projects that: increase energy efficiency and integrate clean energy solutions into poverty-reduction programs; develop energy-efficient mobility systems in urban areas; promote cleaner transport methods; encourage financing and regulations to improve public transit systems safe for women, children, and	Oak Foundation - 50% Grant Recipient - 50%	International organization focused on human-rights and gender-equity mainly in the EU, Africa, and India. Climate Change Strategy Grants do not appear to be tied to a location. Unsolicited proposals from nonprofits through	N/A - Accepts unsolicited proposals via Letter of Enquiry

		the elderly; and collect and monitor data to measure improvements or assess deficits in air quality.		a letter of inquiry. Marine Conservation Grant only available to projects that benefit communities in the EU, the Arctic, East Asia, and Africa. Wildlife Conservation Grants only protects rhinoceros and elephant populations from illegal wildlife trade.	
Chesapeake and Coastal Grants Gateway	Maryland Department of Natural Resources	Maryland's Chesapeake and Coastal Grants Gateway (Grants Gateway) was created to streamline the grant application process for government and non-governmental organizations as well as academic institutions. Grants Gateway provides a one-stop location for partners seeking technical and financial support for projects that foster healthy ecosystems, communities, and economies that are resilient in the face of change. Maryland's communities are faced with a future of higher intensity storms, increased populations and development, changing		• **Outcome 1** – Accelerate recovery and restoration of natural resources by implementing non-point source pollution reduction projects. • **Outcome 2** – Enhance capacity to understand and effectively plan to	Outcome 5 in Oct, Remaining in December

		sea levels and flooding, and a growing demand for healthy places for tourism and recreation. These trends make the already challenging task of restoring the Chesapeake Bay, safeguarding people and infrastructure and managing natural resources even more complex.		address flood risks associated with a changing climate. • **Outcome 3** – Utilize natural and nature-based infrastructure to enhance resilience to climate change. • **Outcome 4** – Improve student ability to take action benefiting Chesapeake and coastal ecosystems through outdoor learning and stewardship. • **Outcome 5** – Foster sustainable development and use of Maryland waterways	

				with projects that benefit the general boating public.	
Community Legacy	Contacts vary by region. Contact list available here:	A flexible source of grant and loan funding, providing local governments and community development organizations with support for essential projects such as: mixed-use development consisting of residential, commercial and/or open space; business retention, expansion and attraction initiatives; streetscape improvements; increasing homeownership and home rehabilitation among residents; residential and commercial façade improvement programs; real estate acquisition, including land banking, and strategic demolition, and; establishing funds to provide loan guarantees and credit enhancement to leverage other public or private financing.	State - 100%	Projects must be located in a one of Maryland's designated Sustainable Communities. Eligible applicants are local governments, community development organizations (county councils, community development corporations, main street organizations, downtown partnerships), and groups of local governments sharing a common purpose or goal.	Varies - once per State Fiscal Year
Comprehensive Flood	Maryland Department of the	The grant funds the development of local flood management plans,	When federal funds	Only county and municipal governments are	August 1

Management Grant Program (CFMGP)	Environment, 1800 Washington Blvd, Baltimore, MD 21230	studies of watersheds, and supports capital projects for flood control and watershed management. This program also provides grants to Maryland counties and municipalities after flood events to implement flood control projects, and for acquisition of flood-damaged owner-occupied dwellings. Elevation and relocation of homes are also eligible for funding. Acquired land is converted to open space in perpetuity.	do not participate in the cost of a project, the CFMGP may fund up to 75% of the cost of the project and the local share would be 25%	eligible to receive grants. During the 2019 Session of the Maryland General Assembly HB 428/SB 269 was passed, which requires at least $3 million in both fiscal year 2021 and fiscal year 2022, and for fiscal year 2023 at least $2 million be appropriated.	
Continuing Authorities Program (CAP)	USACE 441 G Street, NW, Washington DC 20314; 202- 761-0011	Initiates a short reconnaissance effort to determine Federal interest in proceeding. If there is interest, a feasibility study is performed.	Federal - 65% Local- 35%	A local sponsor must identify the problem and request assistance. Small flood control projects are also available.	Anytime
Emergency Advance Measures for Flood Prevention	USACE 441 G Street, NW, Washington DC 20314; 202- 761-0011	To perform activities prior to flooding or flood fight that would assist in protecting against loss of life and damages to property due to flooding.	No information	There must be an immediate threat of unusual flooding present before advance measures can be considered. Any work performed under this program will be temporary in nature and must	Governor of State must request assistance

				have a favorable benefit cost ratio.	
Emergency Management Assistance (EMA)	Maryland Emergency Management Agency 5401Rue Saint Lo Drive Reisterstown, MD 21136	Funds may be used for salaries, travel expenses, and other administrative cost essential to the day-today operations of State and Local emergency management agencies. Program also includes management processes that ensure coordinated planning, accountability for progress, and trained qualified staffing.	Federal - 50%	EMA funded activities may include specific mitigation management efforts not otherwise eligible for Federal funding. Management Assistance program funds may not be used for construction, repairs, equipment, materials or physical operations required for damage mitigation projects for public or private buildings, roads, bridges, or other facilities.	Anytime
Emergency Streambank and Shoreline Protection	USACE 441 G Street, NW, Washington DC 20314; 202- 761-0011	Authorizes the construction of emergency streambank protection measures to prevent damage to highways, bridge approaches, municipal water supply systems, sewage disposal plants, and other essential public works facilities endangered by floods or storms due to bank erosion.	No information	Churches, hospitals, schools, and other nonprofit service facilities may also be protected under this program. This authority does not apply to privately-owned property or structures.	TBD

Emergency Watershed Protection Program	Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	Implementing emergency recovery measures for runoff retardation and erosion prevention to relieve imminent hazards to life and property created by a natural disaster that causes a sudden impairment of a watershed.	Federal - 75% Local - 25%	It cannot fund operation and maintenance work or repair private or public transportation facilities or utilities. The work cannot adversely affect downstream water rights and funds cannot be used to install measures not essential to the reduction of hazards.	TBD
Federal Emergency Management Agency, Flood Mitigation Assistance Program (FMA)	Maryland Emergency Management Agency 5401Rue Saint Lo Drive Reisterstown, MD 21136	Assist States and communities to implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program.	RL: Federal - 90% Non Federal - 10% SRL: Federal - 100% Non Federal - 0%	Available once a Flood Mitigation Plan has been developed and approved by FEMA.	Annual - Spring/ Summer
Federal Emergency Management Agency, Hazard Mitigation Grant Program (HGMP)	Maryland Emergency Management Agency 5401 Rue Saint Lo Drive Reisterstown, MD 21136	All Hazards Mitigation Planning. Acquisition, relocation, elevation and flood-proofing of floodprone insured properties, flood mitigation planning, wind retrofit, stormwater improvements, education and awareness.	Federal - 75% Non Federal - 12.5%	Local government must be in compliance with the National Flood Insurance Program to be eligible. Projects must be cost effective, environmentally sound and solve a problem. Repetitive	After a Presidential Disaster Declaration

				loss properties are a high priority.	
Federal Emergency Management Agency, Pre Disaster Mitigation Grant Program (PDM)	Maryland Emergency Management Agency 5401 Rue Saint Lo Drive Reisterstown, MD 21136	Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations.	Federal - 75% Non Federal - 25%	PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.	Annual - Spring/ Summer
Five Star and Urban Waters Restoration Grant Program	National Fish & Wildlife Foundation (NFWF) Carrie Clingan, Program Director, Community Stewardship and Youth Carrie.Clingan@nfwf.org Chloe Elberty, Coordinator, Community Stewardship Programs Chloe.Elberty@nfwf.org https://www.nfwf.org/fivestar/Pages/home.aspx	Projects must involve five or more partners (public and private entities, including the applicant). Eligible activities include, but are not limited to: restoration or creation of wetlands, coastal or riparian areas; outreach, education, and/or training involving the restoration or creation activities that advance local watershed and conservation goals. Eligible applicants include: nonprofit organizations, state government agencies, local governments, municipal governments, Indian tribes and educational institutions.	1:1 match (Federal / Non-Federal) at a minimum (in-kind staff contributions, volunteer time, work performed, materials and services donated, cash or other	Under this grant program, three sub-programs are applicable to areas in Maryland: US EPA Five Star Restoration Training Program - available to all communities. The Urban Waters Federal Partnership, US EPA/USDA Forest Service Funding has two eligible locations: the Anacostia Watershed and the Patapsco Watershed (Baltimore Region). The US FWS Urban Partner Funding is available to locations in	January

			tangible contributions are allowed for the non-federal match)	Maryland within +/- 25 miles of the Service lands or nearby offices in Baltimore City and Washington, D.C. Grant awards under the entire Five Star and Urban Waters Restoration Grant Program range from $20,000 to $50,000, with roughly 40-50 grants award per year.	
Flood: Emergency Advance Measures for Flood Prevention	USACE 441 G Street, NW, Washington DC 20314; 202- 761-0011	To mitigate, before an event, the potential loss of life and damages to property due to floods.	No information	Assistance may consist of temporary levees, channel cleaning, preparation for abnormal snowpacks, etc.	Governor of State must request assistance
Historic Preservation: Repair and Restoration of Disaster-Damaged Historic Properties	Infrastructure Division, Response and Recovery Directorate, FEMA, 500 C Street SW., Washington DC 20024 ; 202- 646-4621.	To evaluate the effects of repairs to, restoration of, or mitigation hazards to disaster-damaged historic structures working in concert with the requirements of the Stafford Act.	Federal - 75% Local - 25%	Eligible to State and local governments, and any political subdivision of a State. Also, eligible are private non-profit organizations that operate educational, utility, emergency, or medical facilities.	After a Presidential Disaster Declaration
Local Government	Charles Day, Program Manager	The program provides Maryland's local governments an efficient	State - 100%	All Maryland counties, municipalities	Applications accept

Infrastructure Financing Program	7800 Harkins Road Lanham, MD 20706 301-429-7891	and economical means of access to the capital markets in order to finance critical, public purpose infrastructure projects such as: roadway and sidewalk improvements; street lighting, landscaping and public space improvements; public safety vehicles and equipment; water production, treatment, storage and distribution systems; storm water control and sewer collection and treatment facilities; government office and meeting facilities; property acquisition; police, fire, transportation, education, health, recreation, maintenance and other service related facilities, and refinancing of existing debt.		and/or their agencies are eligible, provided they have legal authority necessary for: constructing, operating and maintaining the proposed project; pledging security for and repaying the proposed loan, and; pledging income tax payments and various other shared revenue from the state. Local governments must secure local legislative approval(s) to incur the debt, certify the capacity to inspect the project's construction progress, and agree to submit periodic status reports. Additionally, they must ensure adequacy and sufficiency in the project's design and construction, and they must meet credit requirements sufficient to satisfy rating agencies and secure a favorable credit rating.	ed on an ongoing basis

Maryland Business Recovery Loan Program	Michael Haloskey, Director, Neighborhood BusinessWorks Program 7800 Harkins Road Lanham, MD 20706 301-429-7523	An emergency loan program to assist small businesses affected by disaster or emergency events for: renovations; repairs and replacement of furniture, fixtures and equipment; inventory replacement, and; certain other costs associated with recovery of a small business, including working capital.	State - 100%	Offers assistance up to $50,000 (amount based on damage assessment) at an interest rate of zero percent (0%). Higher amounts will be considered on a case-by-case basis. Financing may be used in conjunction with other financing, insurance proceeds, etc., and the target loan term is 1-5 years, depending on loan size and affordability.	Available when activated after state declaration of emergency.
Maryland Disaster Housing Assistance Program	Gregory Hare, Deputy Director, Multifamily Housing 7800 Harkins Road Lanham, MD 20706 301-429-7775	This program is a resource for short-term, emergency rental assistance for families or individuals displaced by a natural disaster as identified by the Maryland Emergency Management Agency or the Maryland Department of Human Services. The program will pay the owner the advertised rent or 100% of the fair market, whichever is less.		The term of the voucher is 90 days, extensions will be considered if the home is not ready for occupancy at the end of 90 days.	Available when activated after state declaration of emergency.
Maryland Disaster Relief Housing Program	Jack Daniels, Deputy Director, Special Loan Programs	This program provides financial assistance in a declared emergency area to a family whose primary residence was damaged or		The disaster relief financing is based upon the total cost to rebuild or rehabilitate the	Available when activated

	7800 Harkins Road Lanham, MD 20706 301-429-7802	destroyed by the disaster. The program will allow 20 year loans at a 0% deferred interest rate to affected and eligible homeowners.		home, less any Federal Emergency Management Agency recoveries and less any insurance proceeds.	after state declaration of emergency.
Maryland Sea Grant (NOAA)	NOAA, Sea Grant Maryland Fredrika Moser, Director moser@mdsg.umd.edu Michael Allen, Associate Director for Research and Administration mallen@mdsg.umd.edu 301-405-7500	Eligible activities are research proposals that provide scientific and socioeconomic information that can inform policy decisions for fisheries management and sustainable aquaculture, climate change adaptation, coastal community resilience, and ecosystem restoration in coastal systems in Maryland. Projects must demonstrate a connection between the proposed research and the focus areas and strategies (one or more) highlighted in the RFP. A proposal must demonstrate integration among its scientific approaches, research outcomes, and outreach plan. Eligible applicants: Principal Investigators (PIs) must be affiliated with an academic institution or research laboratory in Maryland or the District of Columbia. Co-Principal Investigators	Federal - 50% Non-Federal - 50% ($1 match for every $2 of Sea Grant funding)	Award amount is about $70,000 per year per award. Research projects within Maryland's coasts and watersheds focused in three areas will be considered: 1) healthy coastal ecosystems; 2) sustainable fisheries and aquaculture; and 3) resilient communities and economies. Both small-scale pilot studies and large interdisciplinary research projects will be considered. Principal investigators should focus on outcomes that can be achieved in a 24-month period. Maryland Sea Grant is particularly interested in proposals that have a clear connection to the needs of	Pre-proposal in January, Full in June

		(Co-PIs) on projects can be from institutions outside of Maryland or the District of Columbia. Single investigators and multiple investigator research teams from different institutions are encouraged to apply. Maryland Sea Grant extension personnel are welcome to serve as Co-PIs or senior personnel but are restricted from requesting salary support.		management and policy and include a clear outreach plan for disseminating that information to targeted audiences.	
National Coastal Resilience Fund	National Fish & Wildlife Foundation (NFWF) Erika Feller, Director, Marine and Coastal Conservation Ericka.Feller@nfwf.org Michelle Pico, Program Director, Marine Conservation Pico@nfwf.org Mandy Chesnutt, Director, Program Operations Mandy.Chesnutt@nfwf.org Kaity Goldsmith,	Projects that create, expand, and restore natural system in areas that will both increase protection for communities from coastal storms, sea level rise, flood, and coastal erosion, while improving habitat for fish and wildlife species. The grant supports three focus areas: project preliminary design and site assessment; project final design and permitting; and project restoration and monitoring. Eligible applicants include: nonprofit organizations; state and territorial government agencies, local governments, municipal governments, Native Tribal governments, educational institutions, and	1:1 match (Federal / Non-Federal) Non-Federal match = cash and/or in kind services	Eligible project areas include all coastal Hydrologic Unit Code (HUC) 8 watersheds that drain to the sea and any adjacent HUC 8 Watersheds that are particularly low-lying or tidally influenced. Project awards (in 2019) expected to range from $125,000 to $3,000,000.	Pre-Proposal due April Proposal due May

	Manager, Marine Conservation, Kaitlin.Goldsmith@nfwf.org https://www.nfwf.org/coastalresilience/Pages/home.aspx	commercial (for-profit) organizations.			
National Flood Insurance Program (NFIP)	Maryland Department of the Environment, 1800 Washington Blvd, Baltimore, MD 21230	Provides financial protection by enabling persons to purchase insurance against floods, mudslide or flood related erosion.	Varies	Includes Federally backed insurance against flooding, available to individuals and businesses that participate in the NFIP	Anytime
Green Streets, Green Jobs, Green Towns (G3) Grant Program	Chesapeake Bay Trust https://cbtrust.org/grants/ Non-Tidal Wetland Program Grants Manager: Sarah Koser, skoser@cbtrust.org, 410-974-2941, ext. 106	Activities include, but are not limited to: green street project design, implementation of green street projects, white papers on innovative ideas for green infrastructure, charrettes to vision/plan a green street project with key stakeholders (incl. citizens). Eligible applicants: nonprofit organizations, local governments, neighborhood/community associations	Not required, but cash or in-kind services match is strongly encouraged	Applicants applying for implementation/construction and greening of vacant lots must use the G3 Implementation Project Calculator. Grant funding can be applied anywhere in the Chesapeake Bay watershed portion of EPA Region 3. Program goals: reduce stormwater runoff, increase number and amount of green spaces in urban areas, improve the	Spring

				health of local streams and the Chesapeake Bay, enhance quality of life and community livability. Award amounts of up to $15,000 for conceptual plans; up to $30,000 for engineered designs, up to $100,000 for implementation projects, up to $50,000 for greening communities and urban vacant lots, up to $20,000 for white papers.	
Small Business Administration (SBA) Predisaster Mitigation Loan Program	James Rivera, Office of Disaster Assistance, Small Business Administration, 409 3rd Street, SW, STE 6050 Washington, DC 20416;202-205- 6734	Activities done for the purpose of protecting real and personal property against disaster related damage.	No information	The mitigation measures must protect property or contents from damage that may be caused by future disasters and must conform to the priorities and goals of the state or local government's mitigation plan.	
Small Flood Control Projects	USACE 441 G Street, NW, Washington DC 20314; 202- 761-0011	Authorizes the construction of small flood control projects that have not already been specifically authorized by Congress.	No information	There are two general categories of projects: structural and nonstructural. Structural projects may include levees,	TBD

				floodwalls, diversion channels, pumping plants, and bridge modifications. Nonstructural projects have little or no effect on water surface elevations, and may include flood proofing, the relocation of structures, and flood warning systems.	
Watershed Assistance Grant (WAG)	Chesapeake Bay Trust https://cbtrust.org/grants/watershed-assistance/ Questions & Technical Support: Emily Stransky, estransky@cbtrust.org, 410-974-2941, ext. 101	Project design for watershed restoration projects identified in WIP milestones, which may include, but are not limited to: bioretention cells, large-scale rain gardens, other low impact development stormwater techniques, environmental site designs, stream restoration, wetland and marsh creation, and agricultural water quality best management practices. Watershed Planning and Program Development projects identified in the existing programmatic milestones submitted to MDE by local governments, including, but not limited to watershed characterization, survey,	Not required, but cash or in-kind services match is strongly encouraged	Projects must support implementation of local milestones developed to advance the Watershed Implementation Plan (WIP) strategies. For project design, funding requests will be less than $75,000, but stream restoration design projects may request up to $200,000. Watershed planning and program development funding requests will be less than $75,000.	Late Summer/Early Fall

		and stakeholder engagement; creation of watershed action plans; policy development or enhancement to support watershed action plans (e.g. development/enhancement of ordinances or other tools); and development for new programs, enhancement of existing programs, or establishing new institutional frameworks that promote internal and external stakeholder coordination. Eligible applicants; nonprofits, local governments			
Watershed Protection and Flood Prevention Program	Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	To provide technical and financial assistance in carrying out works of improvement to protect, develop, and utilize the land and water resources in watersheds.	Varies due to project type.	Watershed area must not exceed 250,000 acres. Capacity of a single structure is limited to 25,000 acre-feet of total capacity and 12,500 acrefeet of floodwater detention capacity.	TBD
Watershed Surveys and Planning	Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	To provide planning assistance to Federal, State, and local agencies for the development of coordinated water and related programs in watersheds and river basins. Emphasis is on flood damage reduction,	No information	These watershed plans form the basis for installing needed works of improvement and include estimated benefits and costs, cost-sharing, operation and	Anytime

		erosion control, water conservation, preservation of wetlands and water quality improvements.		maintenance arrangements, and other information necessary to justify the need for Federal assistance in carrying out the plan.	