



# Virginia Coastal Resilience Master Plan

Technical Advisory Committee Meeting | 4/21/2021



# Oral Presentation Agenda



## 1 Team Introduction



## 2 Approach



## 3 Question and Answer



# Team Introduction



Lead Consultant



THE WATER INSTITUTE  
OF THE GULF®

Project Advisor



Outreach Lead  
TAC Support  
VA SWaM



Technical Support  
VA SWaM  
U.S. SBA Mentor-  
Protégé Program  
with Dewberry



Outreach Support  
VA SWaM

# Today's Speakers



**Brian Batten**

Project Manager



**Mat Mampara**

Data Analytics Lead



**Dale Morris**

Project Advisor



**Deepa Srinivasan**

Outreach Lead



**Caroline Whitehead**

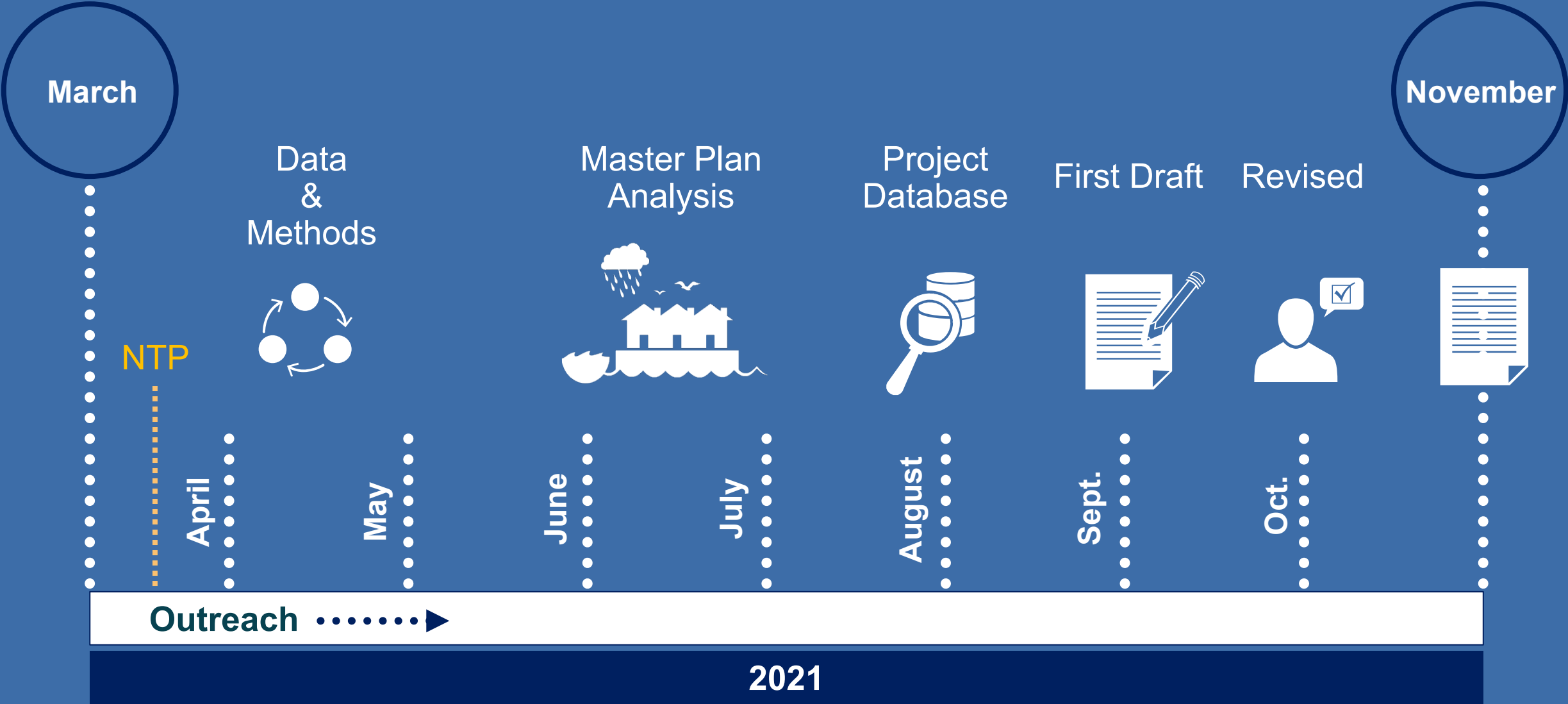
Finance Strategy



**Johanna  
Greenspan-  
Johnston**

Master Plan Lead

# The Challenge:

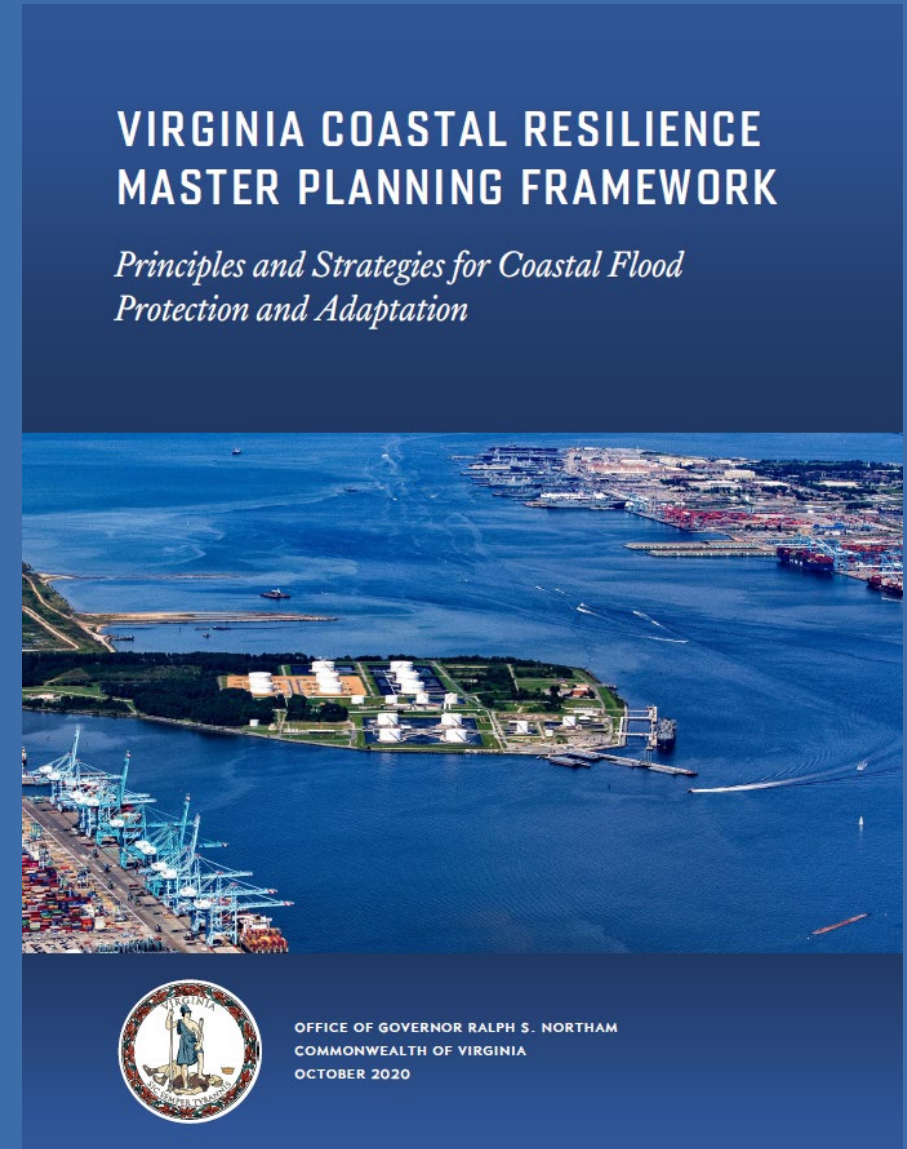


# Study Plan

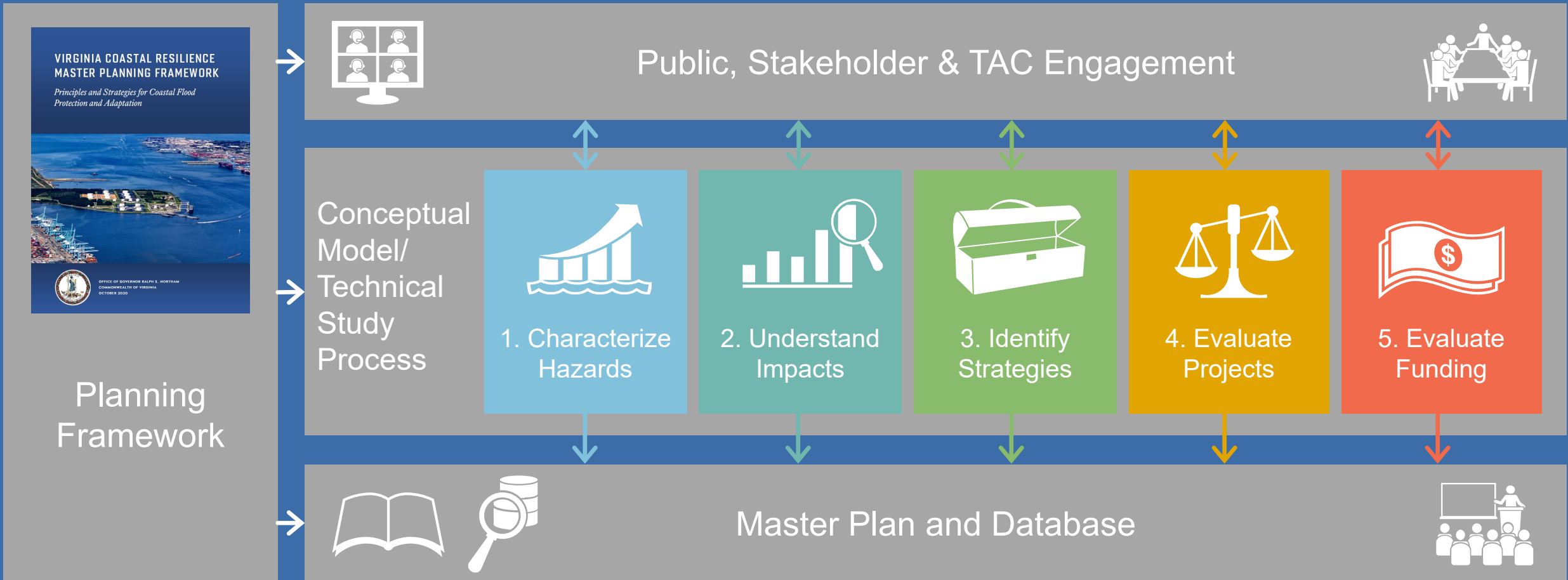
PERIOD OF PERFORMANCE	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
CMP Milestone (RFP)		Data Sources		Master Plan Analysis		Database	First Draft	Final Draft	
Study Conceptual Model		Draft Conceptual Model	Final Conceptual Model						
Coastal Flood Hazard Framework			Final Framework	Dynamic Modeling Concept					
Built and Natural Infrastructure Impact Assessment		Data Gathering	Impact Assessment	Summarization					
Adaptation Strategies and Prioritization			Draft Prioritization Framework	Final Prioritization Framework	Project Inventory/ Design Charettes	Prioritized Project List			
Funding Analysis					Database and Analysis		Final Alignments		
Master Plan Document		Initial Outline		50% Draft			Full Draft	Final Draft	Final Document
Outreach, Public Engagement	Stakeholder/Public Outreach and Engagement Will Be Sequenced Across the Study Period								

# Guiding Principles

- Acknowledge climate change and its consequences, and base decision-making on the best available science.
- Identify and address socioeconomic inequities and work to enhance equity through coastal adaptation and protection efforts.
- Recognize the importance of protecting and enhancing green infrastructure like natural coastal barriers and fish and wildlife habitat by prioritizing nature-based solutions.
- Utilize community and regional scale planning to the maximum extent possible, seeking region-specific approaches tailored to the needs of individual communities.
- Understand fiscal realities and focus on the most cost-effective solutions for protection and adaptation of our communities, businesses and critical infrastructure.

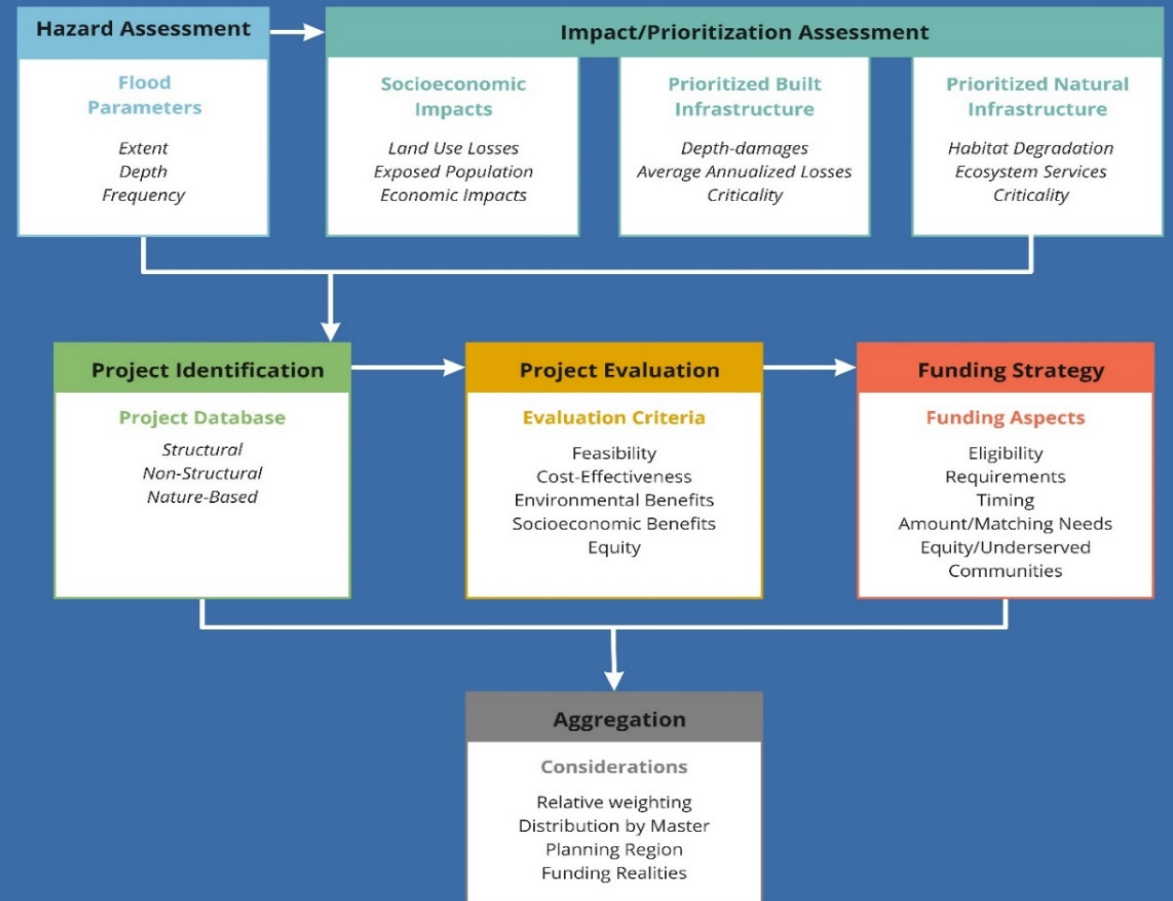


# Our Approach:





# Conceptual Model



# Hazard Assessment

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# Coastal Hazard Data

- Time horizons:
  - Current conditions (2020), 2040, 2060, 2080
- Range of Flood Conditions
  - Tidal, Nuisance, Storm Surge
- Key Data:
  - CCRFR/NOAA
  - FEMA Region 3 Storm Surge Study
  - USACE North Atlantic Coast Comprehensive Study (NACCS)

# Incorporation of Sea Level Rise

- Align with existing state guidance
- Coordinating Approach:
  - VIMS
  - NOAA

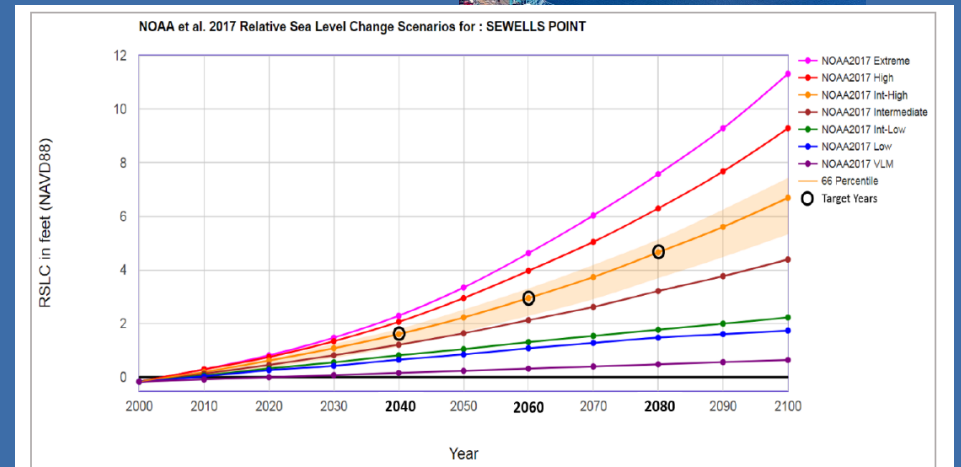
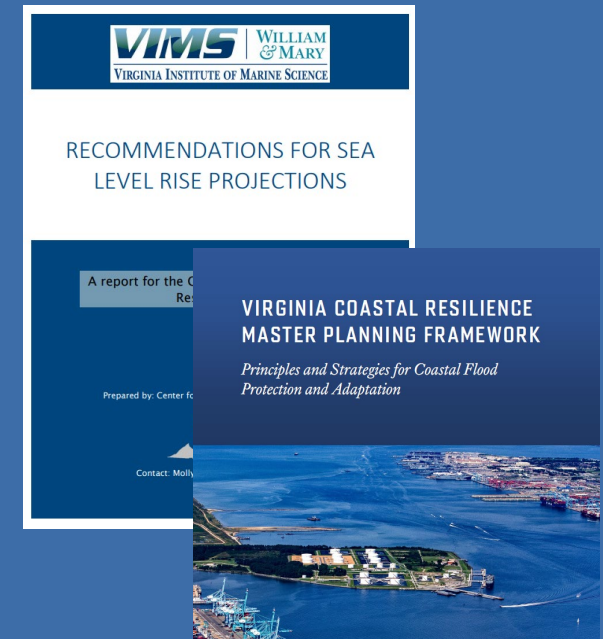


FIGURE 7. RELATIVE SEA LEVEL RISE SCENARIO PROJECTIONS FOR SEWELL'S POINT, VIRGINIA, WITH RANGE AND TARGET YEARS.<sup>70</sup>

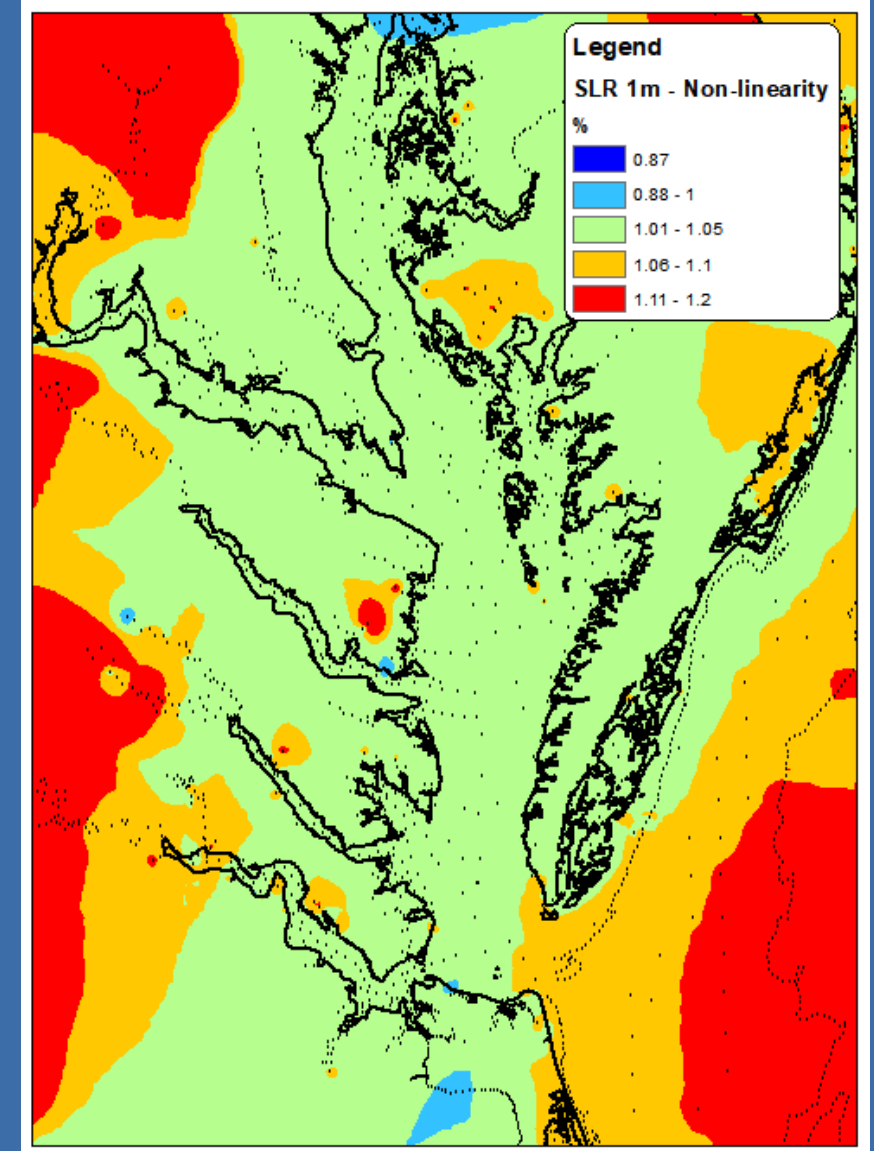
# Flood Amplification due to SLR

For 2040:

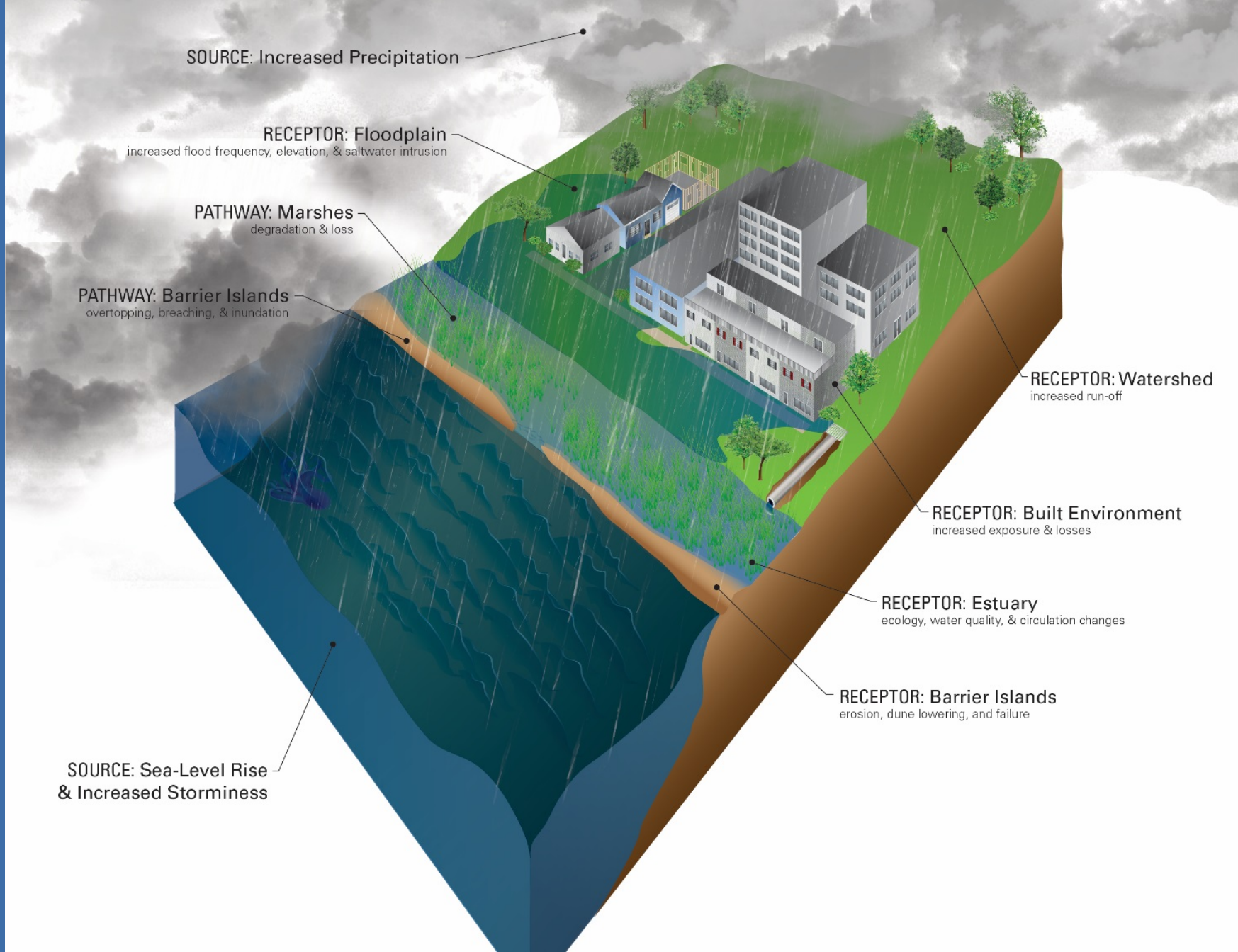
- All changes are linear
- Wave effects – will scale with depth

For 2060, 2080

- Assume tidal, nuisance flooding linear
- Storm surge – capture from NACCS
- Wave effects – will scale with depth



# Dynamic Future Conditions Modeling Concept



# Understand Impacts

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# Impact Assessment

## Multiple Flood Hazard Types



Tidal/Nuisance



Storm Surge



Precipitation

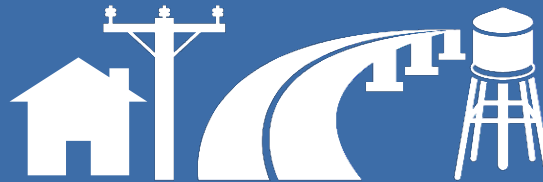
## Range of Conditions



## Impact Types



People  
(Social Environment)



Structures  
(Built Infrastructure)



Ecological Systems  
(Natural Infrastructure)



# Overview

- Data Gathering
- Impact Assessment (CISA)
- Risk Summarization

# Data Gathering

- Enshrine FAIR Principles
  - Findable
  - Accessible
  - Interoperable
  - Reusable

**Contents**

- 1 AOI Location Map
- 2 Mapping, Data Visualization, and Insight
  - 2.1 HUC Watersheds
  - 2.2 NHD Medium Resolution Flowlines
  - 2.3 USGS Rain Gages
  - 2.4 Virginia Regional Storm Surge
- 3 Data Extraction Through Text Searches
  - 3.1 Natural Environment
    - 3.1.1 Authoritative Sources
    - 3.1.2 AGOL Datasets
  - 3.2 Atmospheric
    - 3.2.1 Authoritative Sources
    - 3.2.2 AGOL Datasets
  - 3.3 Natural Hazards
    - 3.3.1 Authoritative Sources
    - 3.3.2 AGOL Datasets
  - 3.4 Built Environment
    - 3.4.1 Authoritative Sources
    - 3.4.2 AGOL Datasets
  - 3.5 Regional Demographics
    - 3.5.1 Authoritative Sources
    - 3.5.2 AGOL Datasets

Service	Title	Collection	Owner	Description
	<a href="#">Waterlevel_Active_Stations</a>	CO_OPS_Stations	noaa	Layer represents the geographic locations at which water level observations are presently being collected. "Water level" is defined as the height of the water surface relative to a specific datum (base elevation). Most stations with water level observations provide readings every 6 minutes. CO-OPS measures water levels at over 200 tidal and non-tidal stations along the coast of the United States and its territories and around the Great Lakes. "Tide" is defined as the periodic rise and fall of a body of water resulting from gravitational interactions between Sun, Moon, and Earth. The time series on the CO-OPS website that are associated with these point locations contain both verified and unverified data. Unverified, or raw, data have not been subjected to the National Ocean Service's quality control or quality assurance procedures and do not meet the criteria and standards of official National Ocean Service data. They are released for limited public use as preliminary data to be used only with appropriate caution. This file also contains air gap stations which measure clearance between a bridge and the water surface. Air gap measurements are updated every 6 minutes to account for changes in water level and bridge height, due to bridge traffic, air temperature, and other factors. Data from air gap sensors along with real-time data on water conditions like tides, currents, and winds, help ships safely navigate U.S. ports. More information can be found at <a href="http://tidesandcurrents.noaa.gov/stations.html?type=Water+Levels">http://tidesandcurrents.noaa.gov/stations.html?type=Water+Levels</a>
	<a href="#">Currents_Prediction_Stations</a>	CO_OPS_Products	noaa	Layer represents the geographic location of stations at which tidal current predictions can be generated from historic and active stations. Tidal current predictions are a calculation of what the current direction and speed will be based on the analysis of data collected at these locations. Harmonic stations generate predictions from harmonic constituents from the data analysis. Subordinate stations generate predictions using time and speed adjustment applied to the predictions for a specific harmonic station. CO-OPS offers predicted time and speed of maximum flood/ebb and timing of slack water (no current) and at regular intervals for all stations in NOAA's annually published tidal current tables and in NOAA Current Predictions service of the CO-OPS Tides & Currents website. The CO-OPS site is updated every quarter, during the first two weeks of January, April, July and October. The quarterly updates may include the addition of new stations, updating subordinate and harmonic stations, and removal of superseded stations. More information can be found at <a href="http://tidesandcurrents.noaa.gov/noaacurrents/Help">http://tidesandcurrents.noaa.gov/noaacurrents/Help</a>
	<a href="#">CCAP_national_riparian_final</a>	Riparian_Land_Cover	noaa	
	<a href="#">CCAP_national_riparian_final</a>	Riparian_Land_Cover	noaa	

## Jupyter Notebook Documenting Authoritative Data Sources

# Impact Assessment



## Ecological Systems (Natural Infrastructure)



## Critical Infrastructure (Built Infrastructure)



### Chemical Sector

The Department of Homeland Security is designated as the Sector-Specific Agency for the Chemical Sector.



### Commercial Facilities Sector

The Department of Homeland Security is designated as the Sector-Specific Agency for the Commercial Facilities Sector, which includes a diverse range of sites that draw large crowds of people for shopping, business, entertainment, or lodging.



### Communications Sector

The Communications Sector is an integral component of the U.S. economy, underlying the operations of all businesses, public safety organizations, and government. The Department of Homeland Security is the Sector-Specific Agency for the Communications Sector.



### Critical Manufacturing Sector

The Department of Homeland Security is designated as the Sector-Specific Agency for the Critical Manufacturing Sector.



### Dams Sector

The Department of Homeland Security is designated as the Sector-Specific Agency for the Dams Sector. The Dams Sector comprises dam projects, navigation locks, levees, hurricane barriers, mine tailings impoundments, and other similar water retention and/or control facilities.



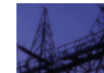
### Defense Industrial Base Sector

The U.S. Department of Defense is the Sector-Specific Agency for the Defense Industrial Base Sector. The Defense Industrial Base Sector enables research, development, design, production, delivery, and maintenance of military weapons systems, subsystems, and components or parts to meet U.S. military requirements.



### Emergency Services Sector

The Department of Homeland Security is designated as the Sector-Specific Agency for the Emergency Services Sector. The sector provides a wide range of prevention, preparedness, response, and recovery services during both day-to-day operations and incident response.



### Energy Sector

The U.S. energy infrastructure fuels the economy of the 21st century. The Department of Energy is the Sector-Specific Agency for the Energy Sector.



### Financial Services Sector

The Department of the Treasury is designated as the Sector-Specific Agency for the Financial Services Sector.



### Food and Agriculture Sector

The Department of Agriculture and the Department of Health and Human Services are designated as the Co-Sector-Specific Agencies for the Food and Agriculture Sector.



### Government Facilities Sector

The Department of Homeland Security and the General Services Administration are designated as the Co-Sector-Specific Agencies for the Government Facilities Sector.



### Healthcare and Public Health Sector

The Department of Health and Human Services is designated as the Sector-Specific Agency for the Healthcare and Public Health Sector.



### Information Technology Sector

The Department of Homeland Security is designated as the Sector-Specific Agency for the Information Technology Sector.



### Nuclear Reactors, Materials, and Waste Sector

The Department of Homeland Security is designated as the Sector-Specific Agency for the Nuclear Reactors, Materials, and Waste Sector.



### Transportation Systems Sector

The Department of Homeland Security and the Department of Transportation are designated as the Co-Sector-Specific Agencies for the Transportation Systems Sector.



### Water and Wastewater Systems Sector

The Environmental Protection Agency is designated as the Sector-Specific Agency for the Water and Wastewater Systems Sector.

# Risk Summarization

- Nested Geographic Aggregation



# Identify Strategies

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# Project Identification

- Project Definition:
  - Define: “project”, needed attributes
  - Populate: Leverage existing databases of projects
- Initial Screening:
  - Filter: duplicative projects, outside of CRMP scope, data availability, project status
- Alignment of projects:
  - Align: filter projects not meeting criteria
  - Improve: key project characteristics sufficient to describe project

# Evaluate Projects

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# Prioritization Process

## Guiding CRMP principles

Acknowledge  
climate  
change

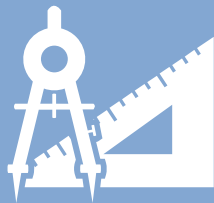
Reduce  
socioeconomic  
inequities

Prioritize  
natural  
infrastructure

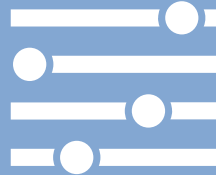
Maximize  
regional-scale  
planning

Prioritize  
cost-effective  
projects

## Approaches:



Quantitative  
Assessment



Qualitative  
Assessment



Expert  
Evaluation



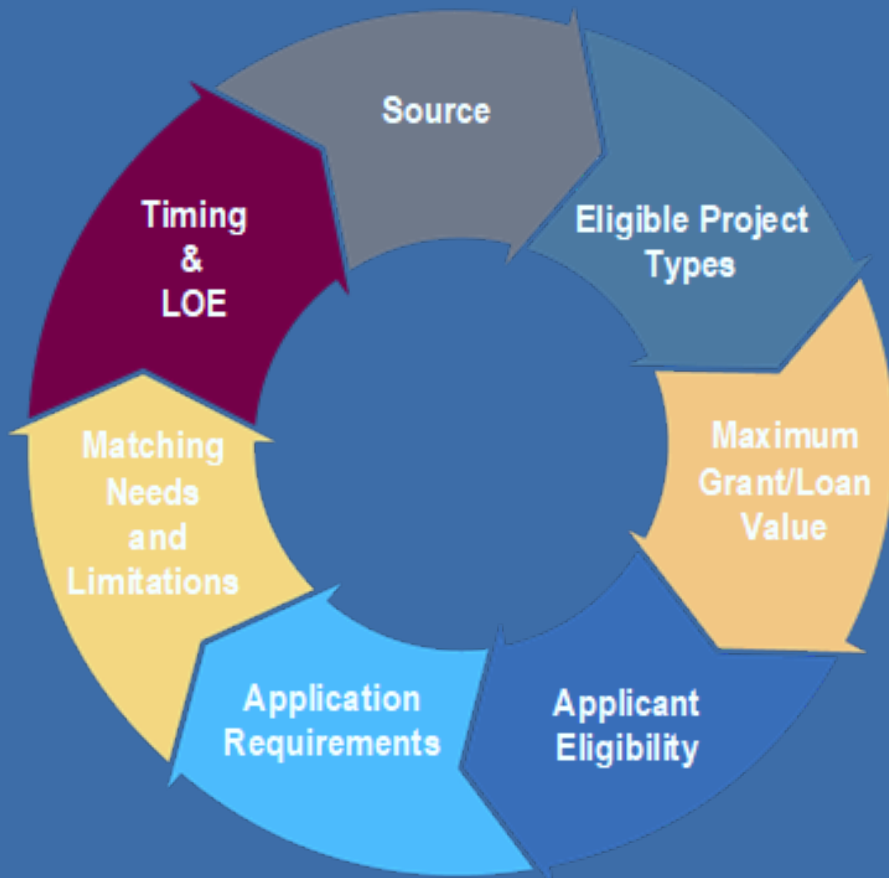
Participatory  
Scoring



# Evaluate Funding

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# Funding Analyses



Gap Analysis

Enhance Database

Equity Considerations

Projects Funding and Financing Alignment

Finance Mechanisms

TAC and Subcommittee Engagement

Funding Database											
Grid view Hide fields Filter Group Sort											
Name	Funding Source	Projects Funded	RFPs & Fact Sheets	Implementation Phase	Funding Maximum (per ...	Non-Federal Cost S...	Pre-Pr...	Full Proposal Dea...	Contact	Funding Type	
1	Restoration Fund Grants	Chesapeake Bay Restoration Fund	Habitat Restoration/Enhancement Environmental Education Water Quality Improvements		Project Implementation			9/25/2021	<a href="mailto:gfoley@dls.virginia.gov">gfoley@dls.virginia.gov</a>	State/Federal	
2	Green Streets, Green Towns, Green Jobs	Chesapeake Bay Trust	Green Infrastructure Stormwater Management		Project Implementation Preliminary Design and Sit... Research	\$100,000	Preferred	3/4/2021	<a href="mailto:jppopp@cbtrust.org">jppopp@cbtrust.org</a>	Private Foundati...	
3	Middle Peninsula Nearshore Habitat Restoration Design	Chesapeake Research Consortium	Habitat Restoration/Enhancement		Preliminary Design and Sit...	\$40,000	N/A	1/31/2020	<a href="mailto:trommatter@chesapeake.org">trommatter@chesapeake.org</a>	State/Federal	
4	Coordination and Collaboration in the Resilience Ecosystem	Climate Resilience Fund	Climate Resilience Community Engagement		Planning	\$50,000	None	7/17/2020	<a href="mailto:info@climateresiliencefund.org">info@climateresiliencefund.org</a>	Private Foundati...	
5	Virginia Coastal & Estuarine Land Conservation Program	CZM	Land Acquisition		Final Design and Permitting Project Implementation	Currently Unfunded			<a href="mailto:Laura.McKay@deq.virginia.gov">Laura.McKay@deq.virginia.gov</a>	State/Federal	
6	Dam Safety and Floodplain Management Grants	DCR	Flood Mitigation Dam Safety		Planning Preliminary Design and Sit... Project Implementation	Varies	50%	2/26/2021	<a href="mailto:dam@dcr.virginia.gov">dam@dcr.virginia.gov</a>	State/Federal	
7	Land & Water Conservation Fund	DCR	Land Acquisition Habitat Restoration/Enhancement		Project Implementation	\$500,000	50%	12/15/2020	<a href="mailto:kristal.mckelvey@dcr.virginia.gov">kristal.mckelvey@dcr.virginia.gov</a>	State/Federal	
8	Stormwater Local Assistance Fund	DEQ	Stormwater Management Habitat Restoration/Enhancement		Planning Preliminary Design and Sit... Final Design and Permitting	\$5,000,000	50%		<a href="mailto:kelly.ward@deq.virginia.gov">kelly.ward@deq.virginia.gov</a>	State/Federal	
9	Clean Water Revolving Loan	DEQ	Stormwater Management		Final Design and Permitting	No maximum	N/A	7/10/2021	<a href="mailto:Karen.Doran@deq.virginia.gov">Karen.Doran@deq.virginia.gov</a>	State/Federal	

# Master Plan

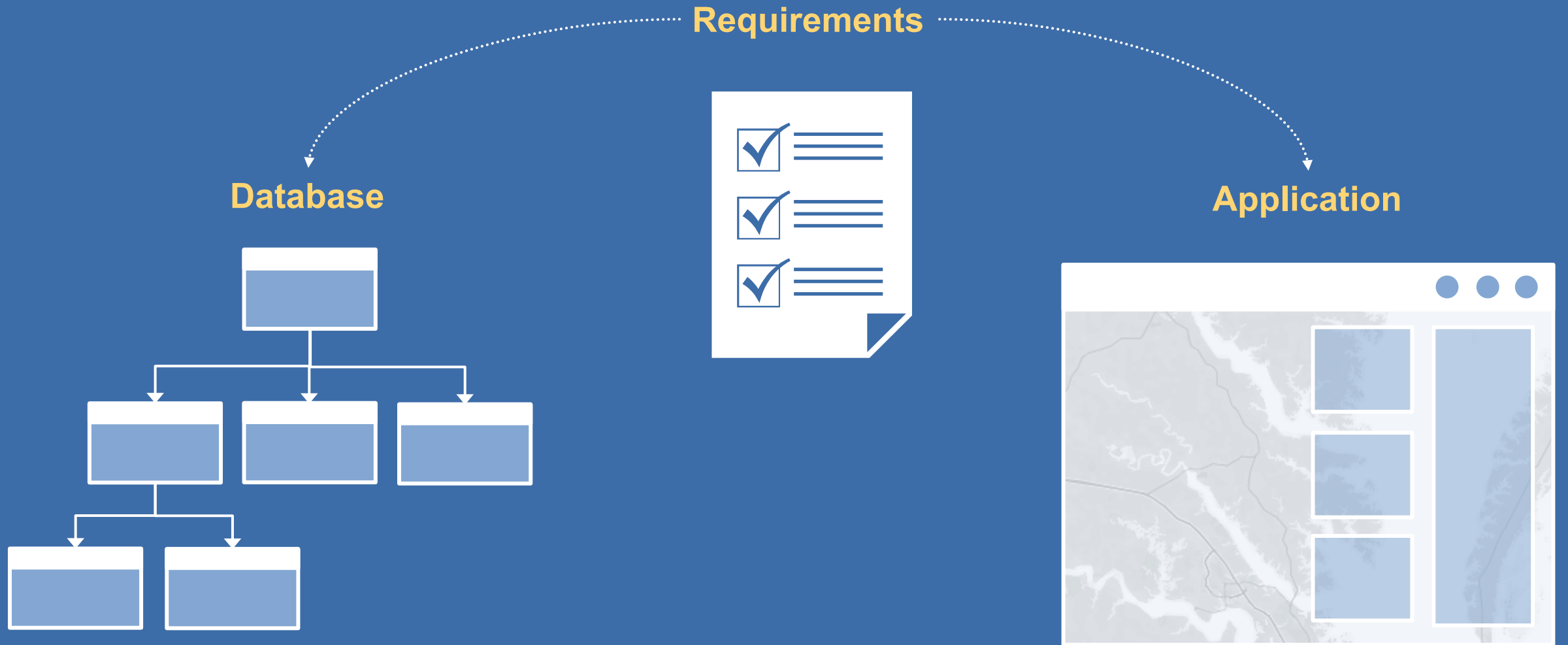
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# Master Plan and Outputs

- Anticipated Outputs:
  - Plan Document
  - Technical Appendices
  - Database/Web Application



# Database and Application



# Outreach Plan

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# Outreach and Engagement Processes/Tools



## Target Audiences

- CRO, TAC, and SACAP
- Coastal Planning Districts
- Coastal Planning Regions - local governments
- Local businesses/industries  
Universities/Schools
- Underserved Populations
- General Public (residents  
seasonal/tourist populations)
- Military Stakeholders



## Outreach Goals

- Provide an education component incorporated into all outreach.
- Introduce the Commonwealth's efforts regarding sea level rise and climate change
- Identify Stakeholder's biggest hurdles and most pressing needs



# Outreach and Engagement Processes/Tools



## Available / Preferred Outlets

- Traditional Media (Newspapers, Websites, etc.)
- Social Media (Facebook, Twitter)
- Virtual or In-Person Events (meetings, open houses)
- Information Gathering Tools (Surveys)



## Frequency of Engagement

- Monthly (Twitter, Facebook)
- Bi-Monthly (Newsletters, Blogs, etc.)
- Quarterly (Press Releases)
- Ad Hoc (Meetings, Surveys)

# TAC Support/Engagement

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# TAC Engagement

- Refine approach elements
- Data access/understanding
- Project identification
- Prioritization factors
- Iterative review of products/plan



# Progress and Activities



- Completed:
  - Introductions to TA subcommittees
  - Draft conceptual model
  - Initial master plan outline
  - Data gathering, inventory, additional needs assessment
  - Draft outreach strategy
- In progress:
  - Coastal hazard framework
  - Draft prioritization approach
  - Project identification criteria
  - Database requirements
  - Stakeholder points of contact
  - TAC integration

# Questions?

# Subcommittee Report

## Studies, Research and Best Practices

- Working Groups:

- Relocation Handbook, Natural and Nature-based Solutions, and Socioeconomic Equity.
- Most of the interactions among working group will be through FOIA-compliant email interaction.
- Public meetings of all working groups are scheduled for the end of April/beginning of May.
- Thanks to the academic institutions and other entities, there is a group of 3-5 students/interns (lead by Shurui Zhang) to do research-related legwork for the working group.

- Expert and Advisor Database:

- Help us to identify the folks with the right expertise and interest to help answer questions from the contractor.
- Advisors will provide key support and input to working groups.
- Started out with the membership of the SRBP Subcommittee, but need to go beyond.
- Please email Robert Weiss ([weisrz@vt.edu](mailto:weisrz@vt.edu)) if you want self-nominate or nominate someone you know!!

- Subcommittee Meetings:

- Last meeting: April 12 from 11:00 am - 12:30 PM with talk by Dr. Anamaria Bukvic (Virginia Tech) about her research on relocation.
- Monthly meetings (next on May 10, 11:00 - 12:30 PM)

# Federal Installations Partnerships

## *Purpose Statement*

Build an understanding of federal coastal resilience needs, find common ground and leverage expertise, human capital, and financial assets across local, tribal, state, private, and federal stakeholders to establish a repeatable governance model that achieves shared goals.

# Lines of Effort

- Awareness
- Alignment
- Action



# Lines of Effort

## *Awareness*

- Identify and engage all federal partners
- Understand federal adaptation strategies
- Understand federal priority projects
- Understand Federal investment strategies
- Understand Federal tools used to inform adaptation and feasibility strategies (e.g. CUP, REPI, RAFT, etc)
- Understand federal storm water management programs
- Conduct federal resilience round tables

# Lines of Effort *Alignment*

- Identify existing local and federal coordination models
- Identify local and federal shared studies and plans
- Identify existing state and federal coordination
- Identify existing state and federal shared studies and plans
- Identify state governance role
- Identify investment sources
- Identify existing federal/local projects; determine gaps
- Identify existing authorities and gaps that facilitate or limit coordination

# Lines of Effort *Action*

- Recommend state governance role
- Deliver a prioritized list of existing shared projects
- Target a pilot project
- Develop a model that delivers collective local, tribal, state, private, and federal strategy and investment to execute a pilot project