

Innovating on Resilience and Adaptation for the Maritime Industry: Opportunities for University Collaborations

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OLD DOMINION
UNIVERSITY

What is resilience in hazards/climate change?

The “punching bag” version: resilience as the time it takes get back to a baseline from a shock or stress.

...but is that baseline the best we can be?

Is the baseline good enough for the future?



<https://commons.wikimedia.org/w/index.php?curid=23014272>





COASTAL RESILIENCE

Bouncing back & *building beyond.*

PLAN & BUILD RESILIENCE

Develop and implement plan to become more resilient.



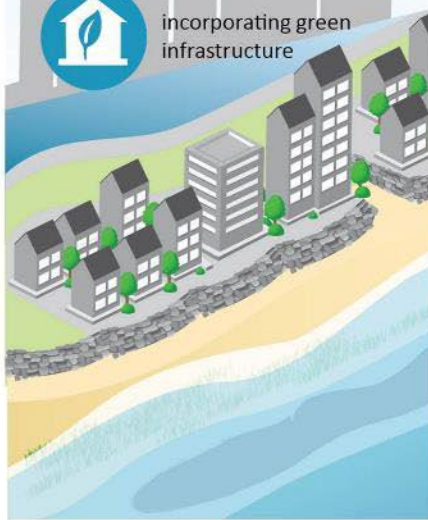
improving forecasts, observation models, computer systems



getting information to decision makers faster



incorporating green infrastructure



DISASTER STRIKES

Disasters can be imminent or strike unexpectedly.



sea level rise



tsunamis



coastal storms and hurricanes



RESPOND

Immediately take action following a disaster.



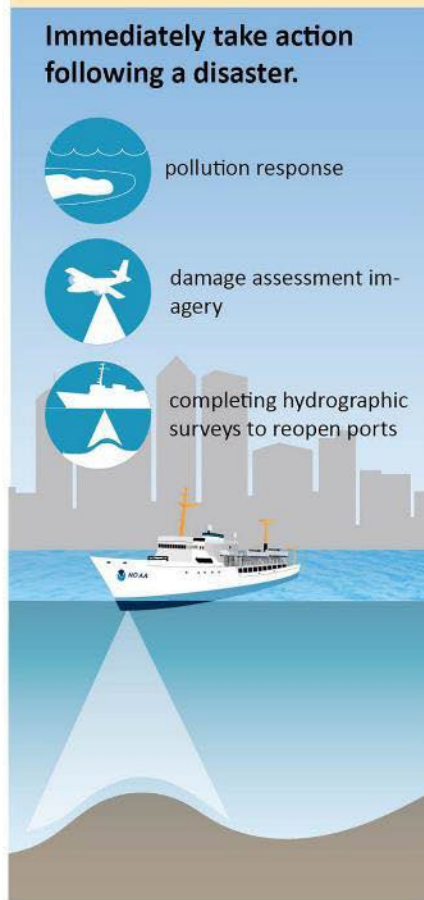
pollution response



damage assessment imagery



completing hydrographic surveys to reopen ports



RECOVER

Assess resilience and manage adaptively.



assessing damage to communities, economy, and environment



issuing grants to rebuild and restore habitat



providing data and tools for analysis



Assess resilience and begin planning for the next disaster.

Building resilience is an iterative process.

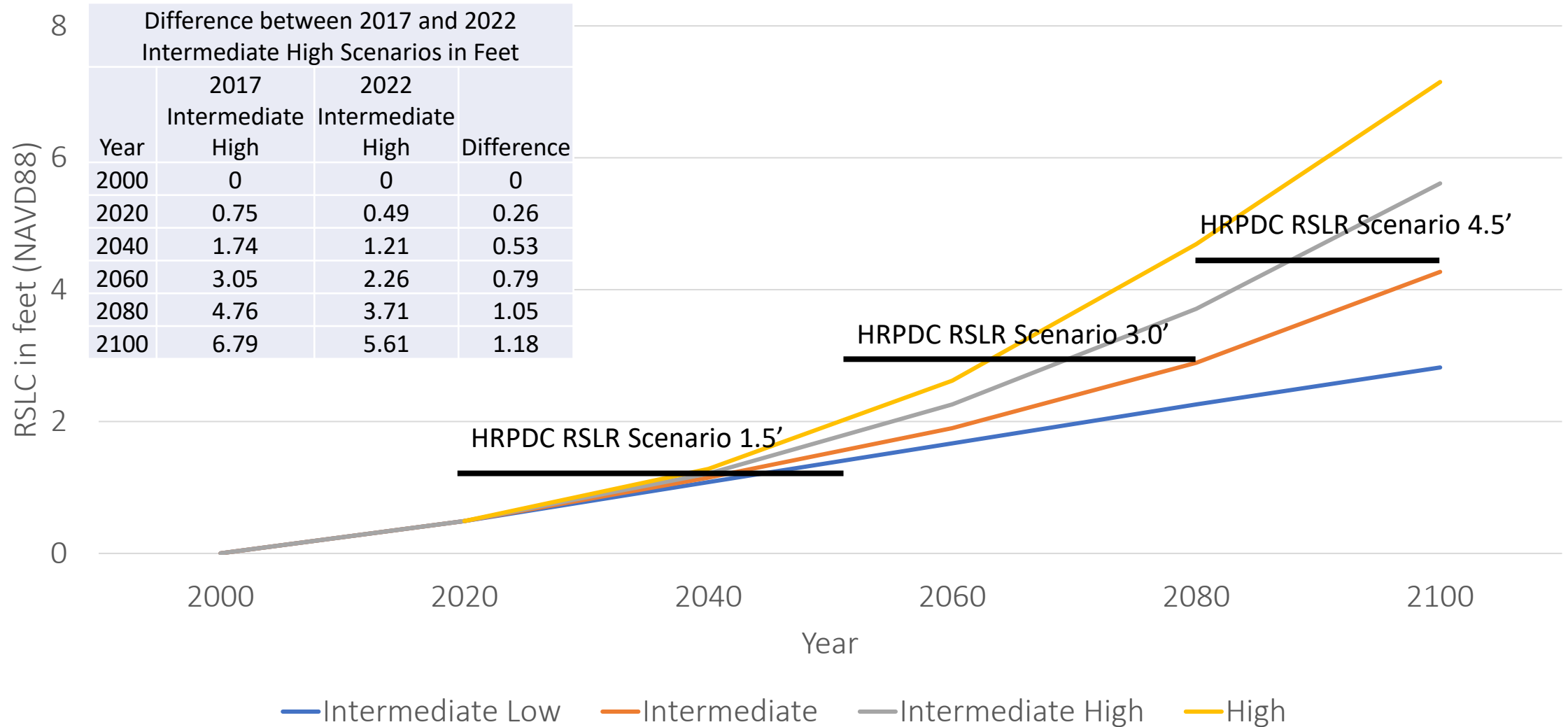


Virginia's Definitions of Resilience and Adaptation

- Resilience: “the ability of natural and built coastal environments to WITHSTAND AND recover from hazardous events such as extreme weather, storm surge, and recurrent flooding.”
- Adaptation: “the alternative to protection by fortification – as adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects.”

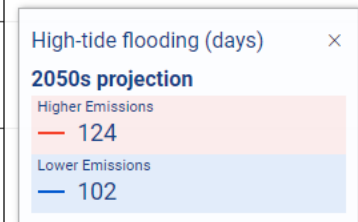


NOAA et al. 2022 Relative Sea Level Change Scenarios for Sewells Point

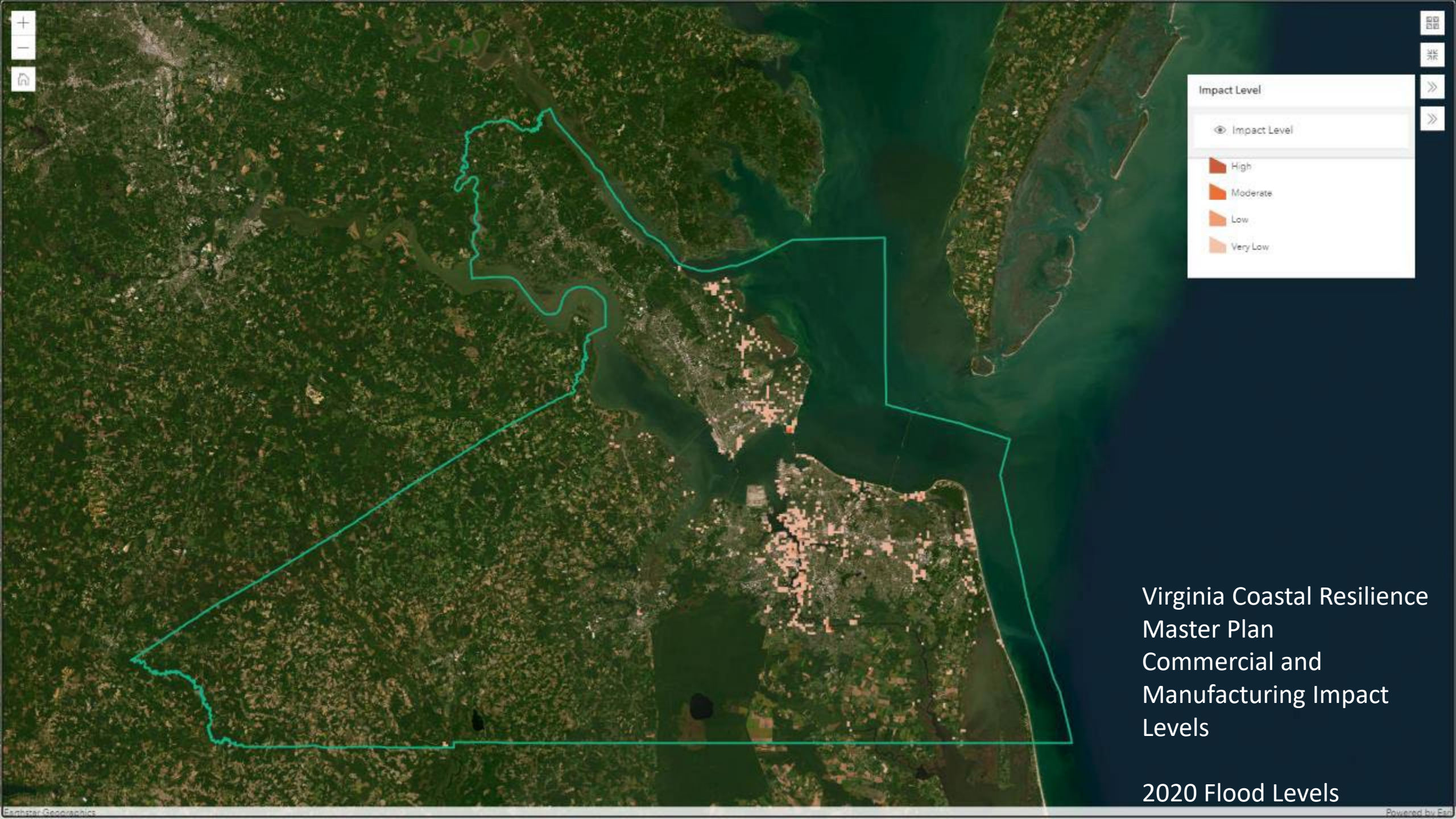


Sewells Point, VA - (8638610)

i About



2022 observed:
15 days



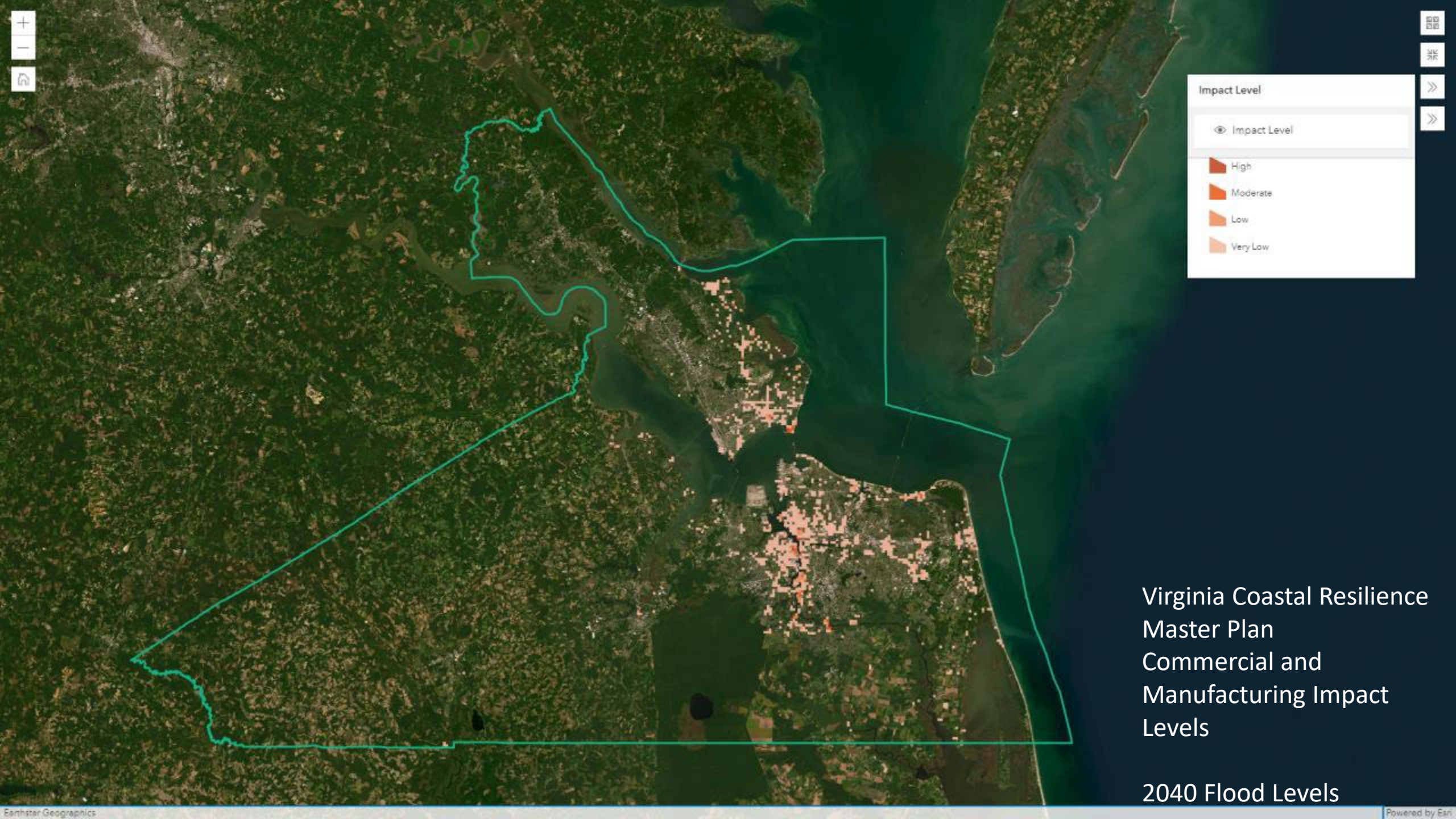
Impact Level

Impact Level

- High
- Moderate
- Low
- Very Low

Virginia Coastal Resilience
Master Plan
Commercial and
Manufacturing Impact
Levels

2020 Flood Levels



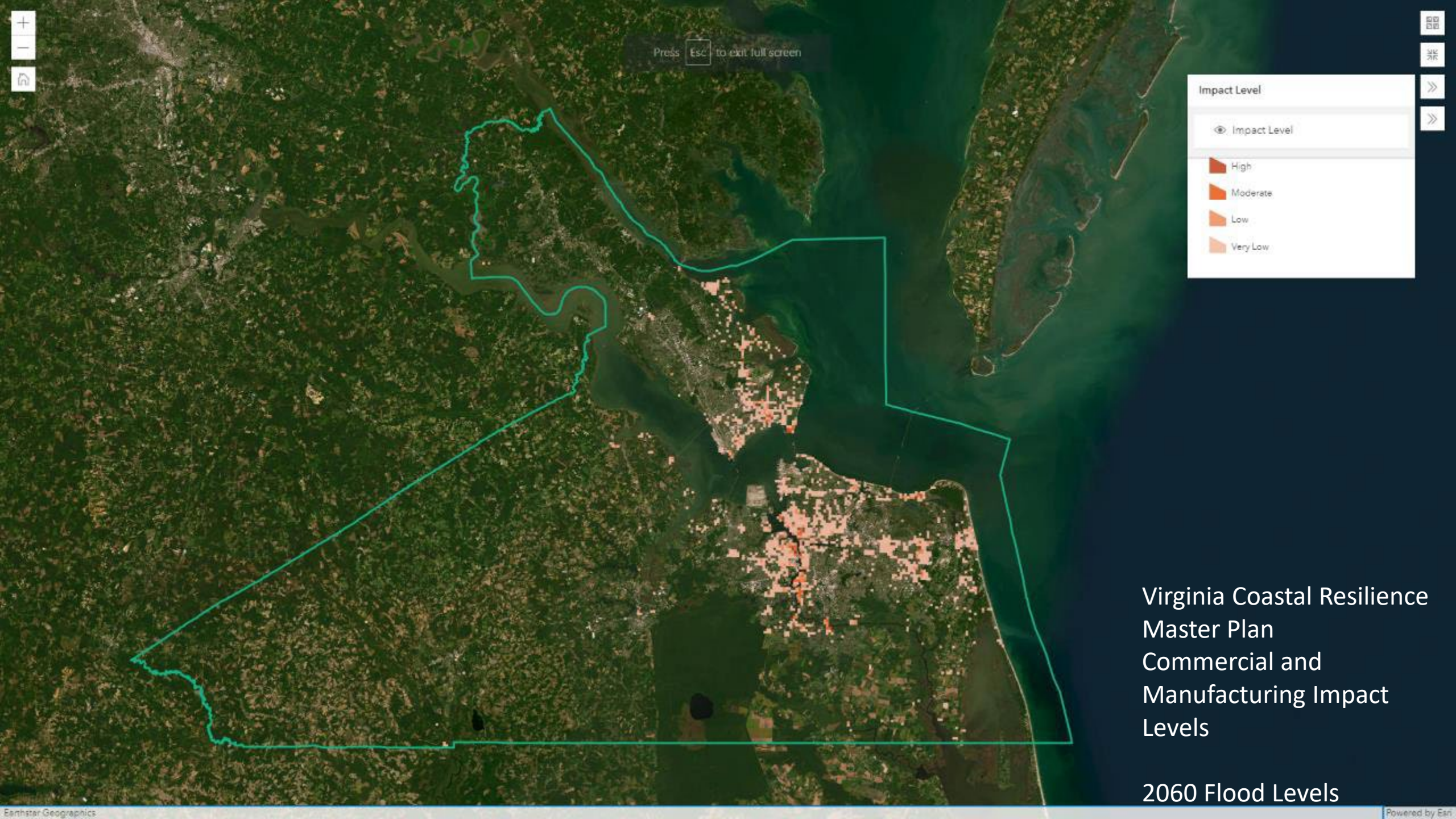
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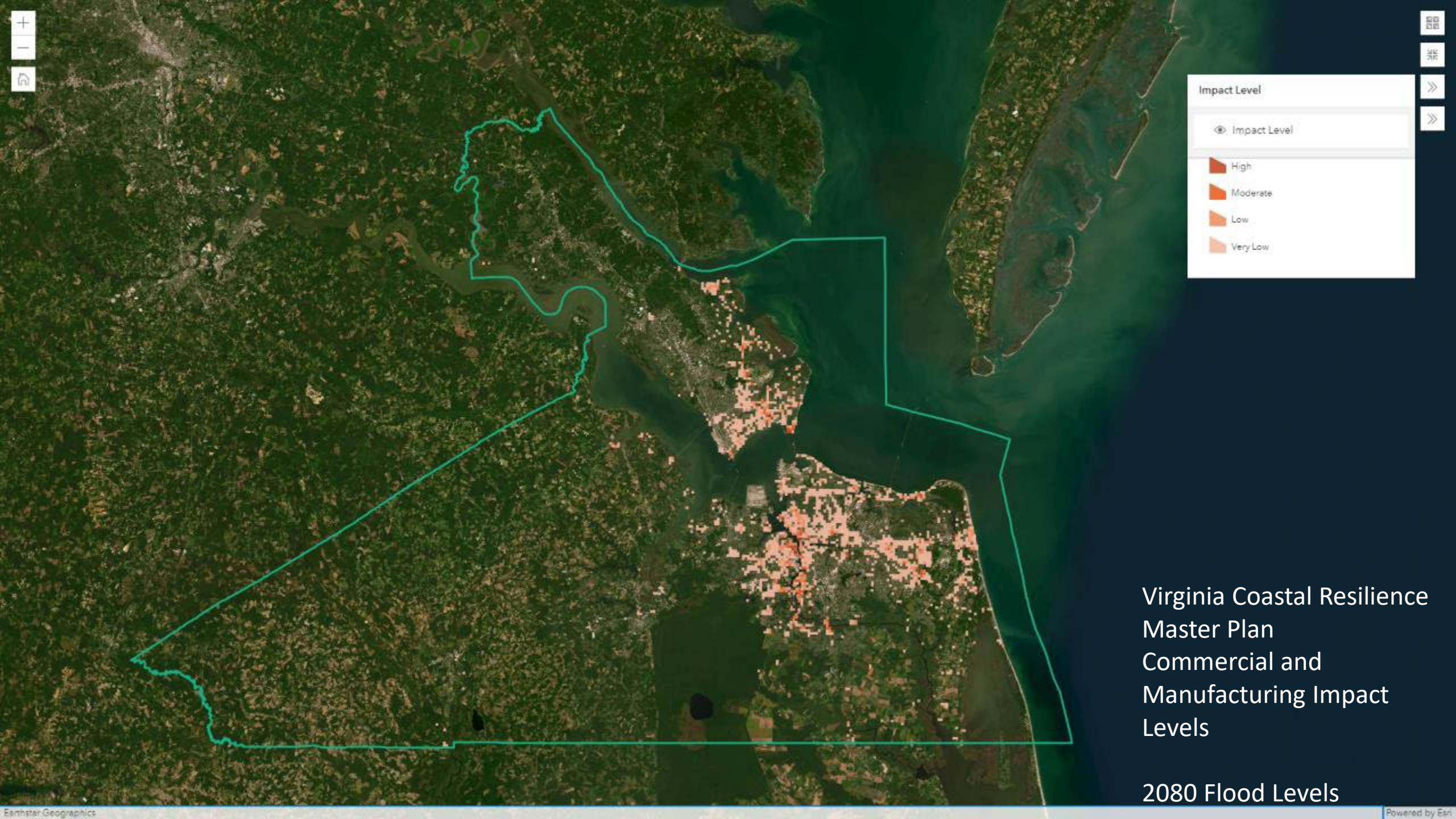
Virginia Coastal Resilience
Master Plan
Commercial and
Manufacturing Impact
Levels

2040 Flood Levels



Virginia Coastal Resilience
Master Plan
Commercial and
Manufacturing Impact
Levels

2060 Flood Levels



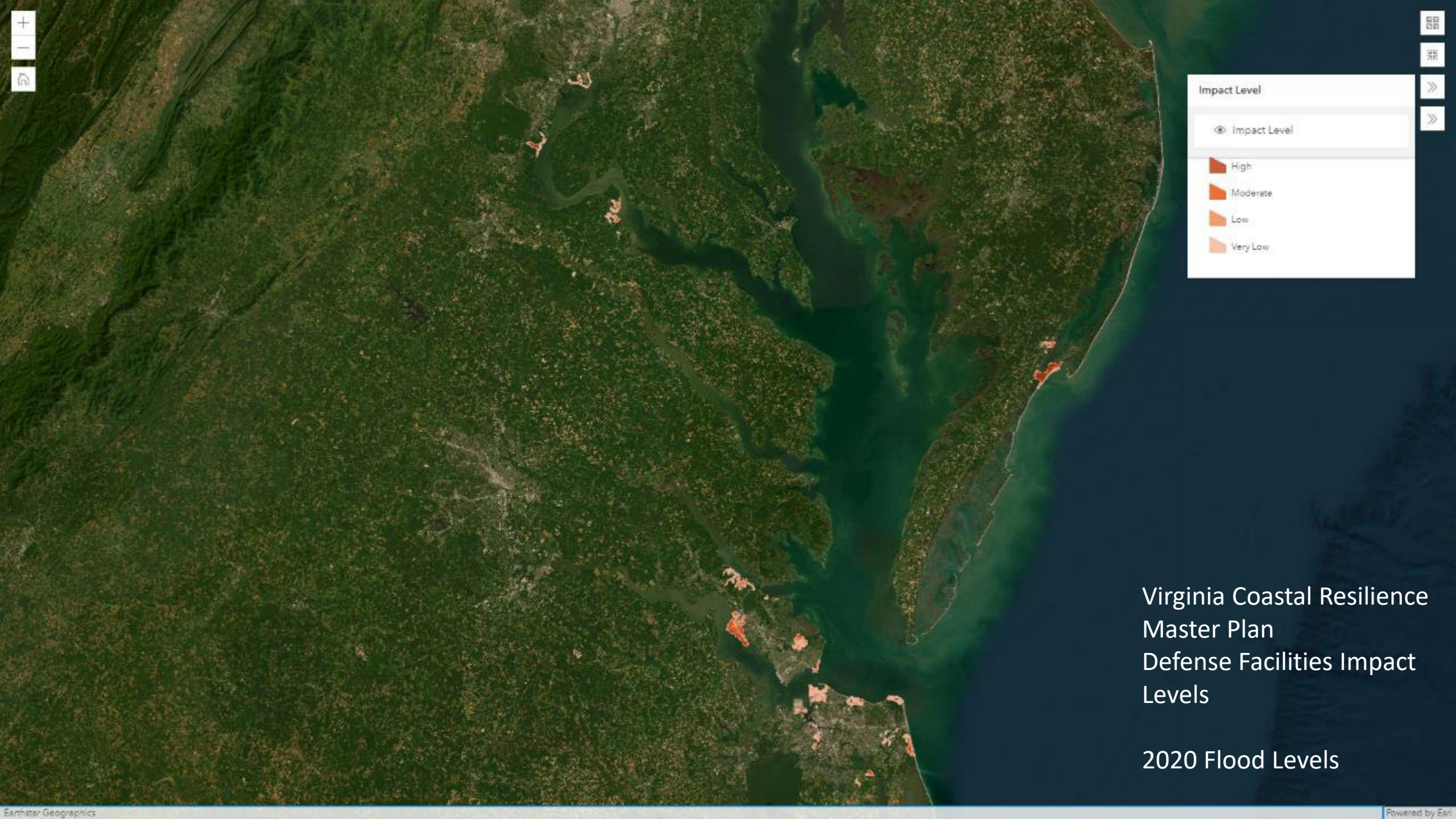
Impact Level

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Virginia Coastal Resilience
Master Plan
Commercial and
Manufacturing Impact
Levels

2080 Flood Levels



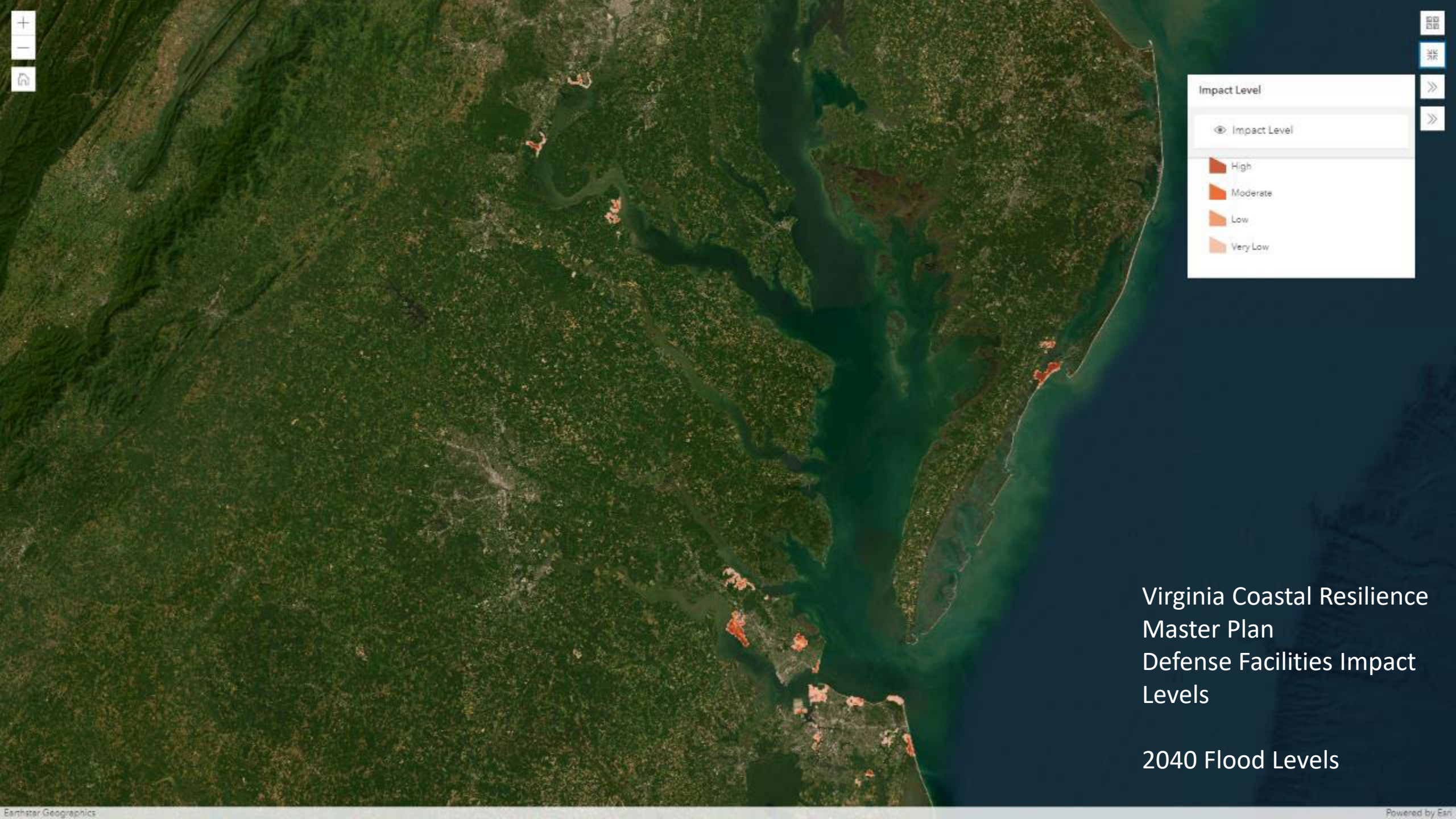
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Virginia Coastal Resilience
Master Plan
Defense Facilities Impact
Levels

2020 Flood Levels



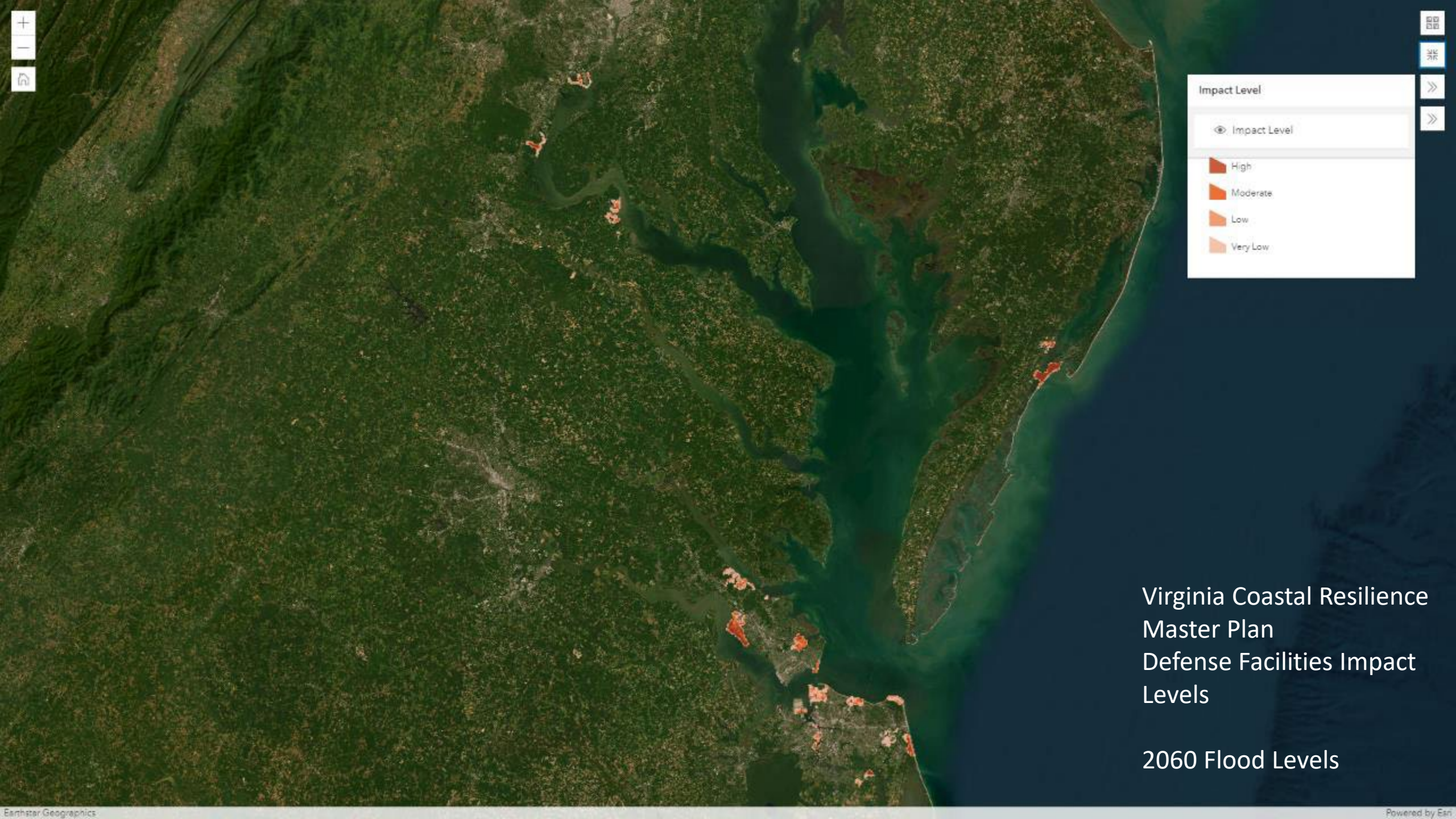
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Virginia Coastal Resilience
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2040 Flood Levels



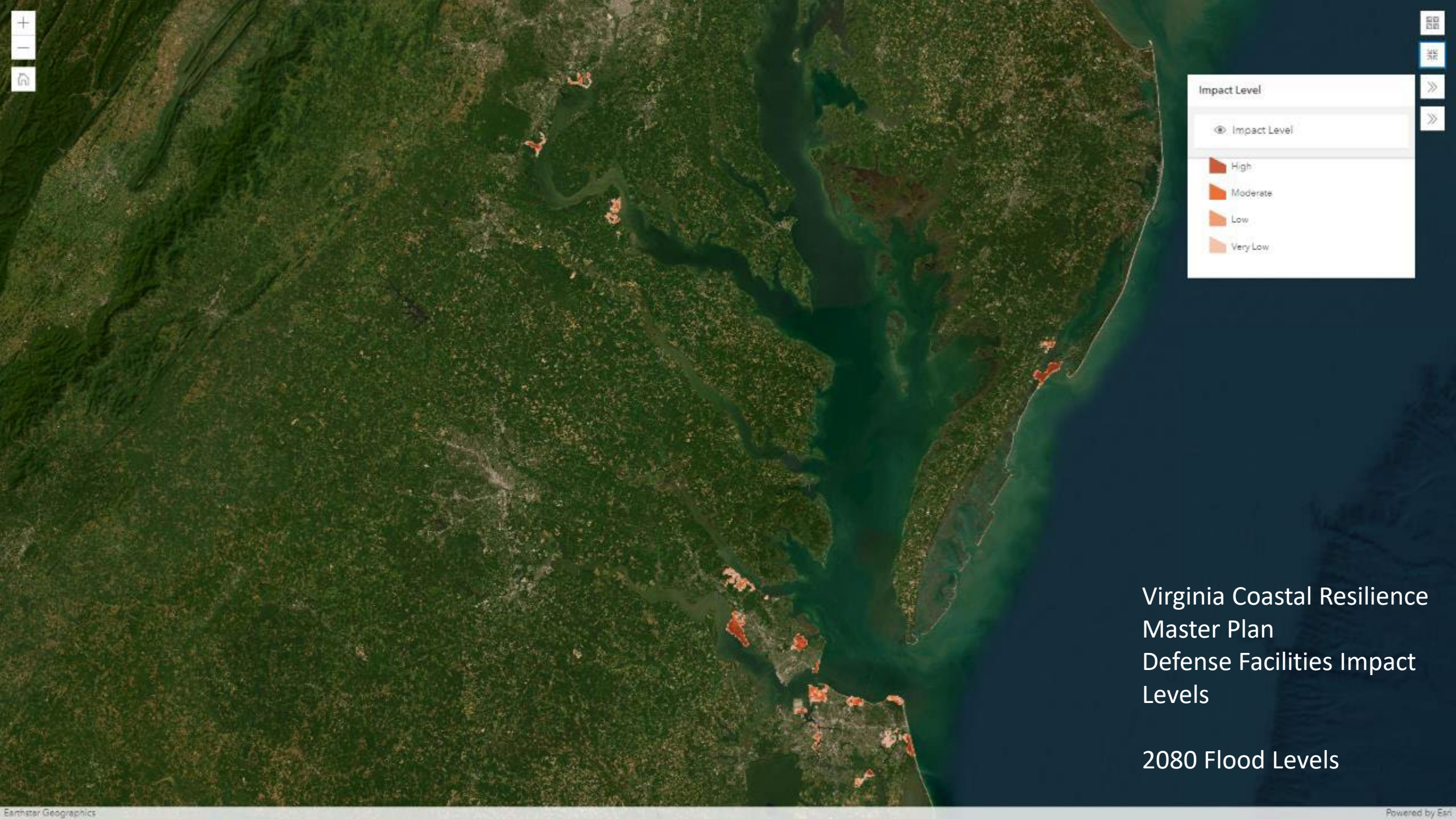
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Virginia Coastal Resilience
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Virginia Coastal Resilience
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Defense Facilities Impact
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2080 Flood Levels



Projected Intensity-Duration-Frequency (IDF) Curve Data Tool for the Chesapeake Bay Watershed and Virginia

Technical Resources

Using the Data

Using the Tool



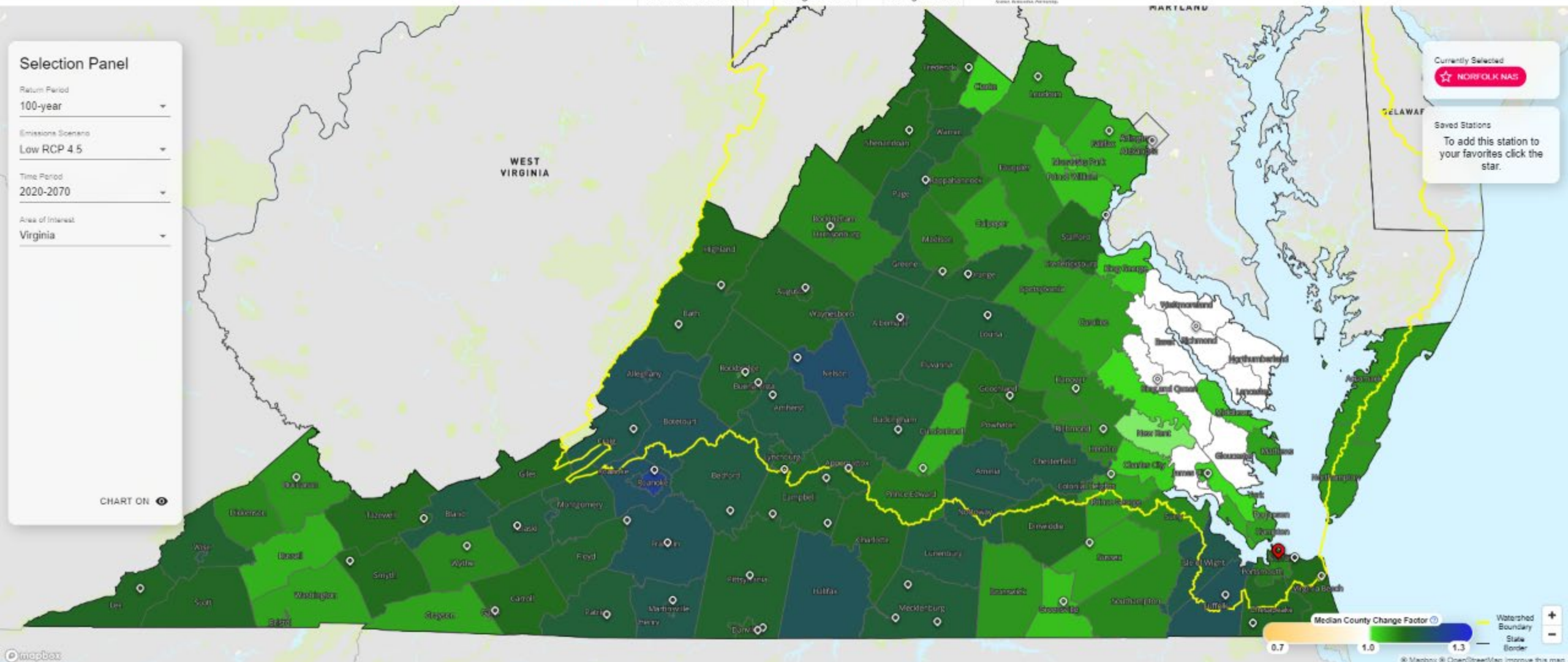
Selection Panel

Return Period
100-year

Emissions Scenario
Low RCP 4.5

Time Period
2020-2070

Area of Interest
Virginia



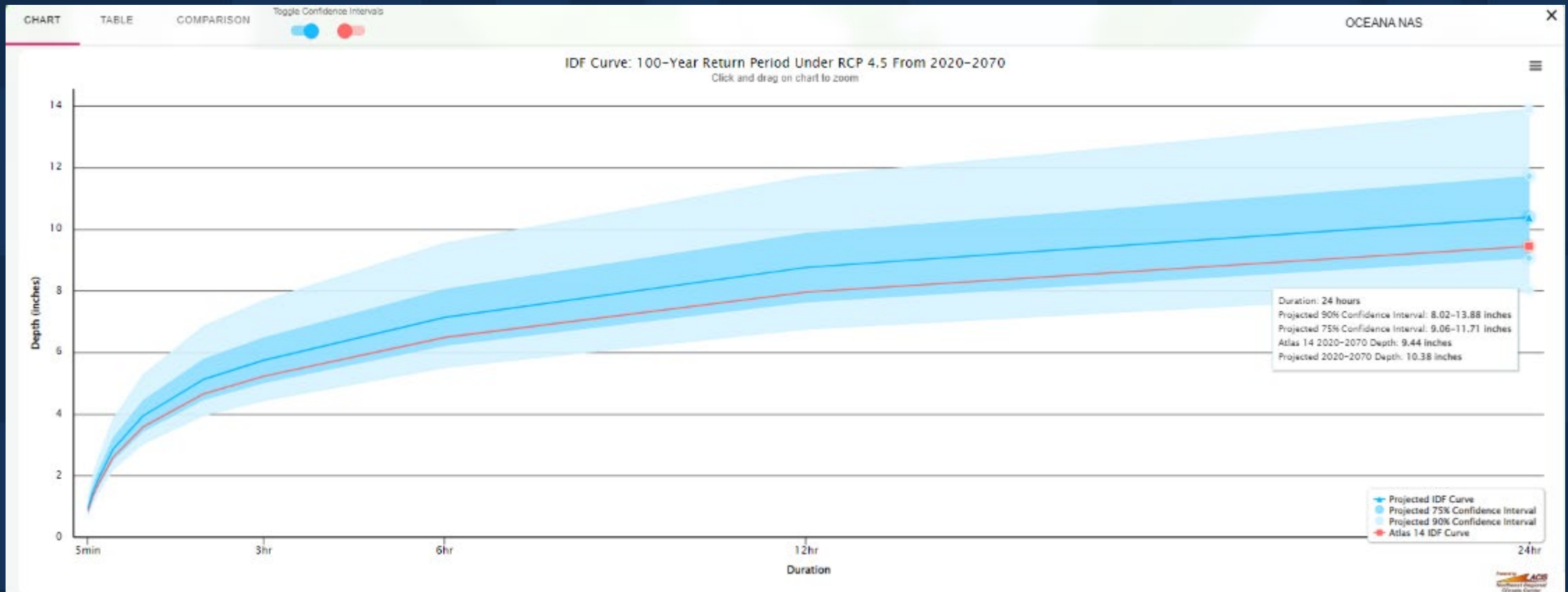
Currently Selected

NORFOLK NAS

Saved Stations

To add this station to your favorites click the star.

Change in Intensity, Duration, Frequency of rainfall at Oceana NAS through 2070



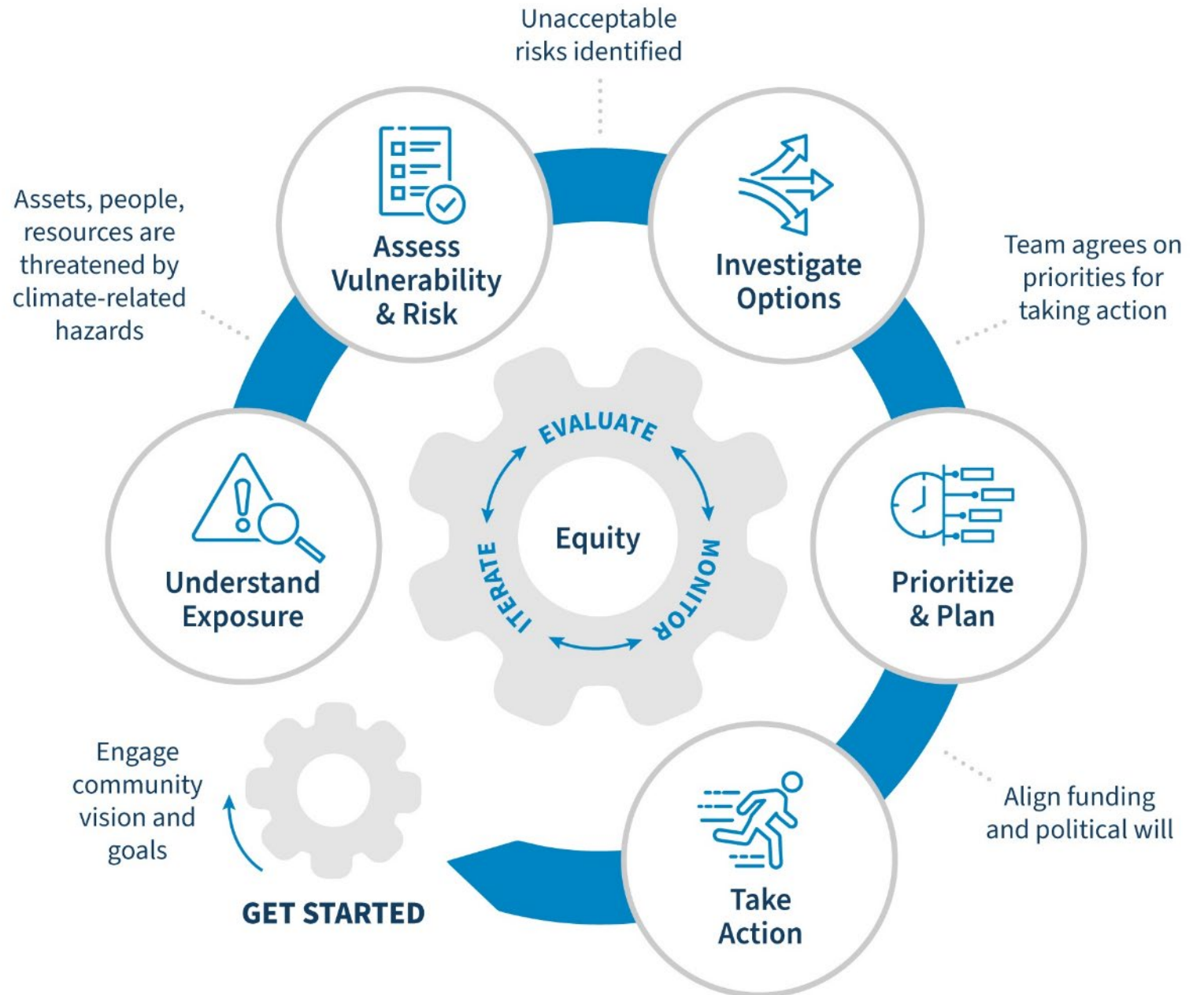
Miro, M., DeGaetano, A., Samaras, C., Romita Grocholski, K., López-Cantú, T., Webber, M., Eck, B. (2021). "Projected Intensity-Duration-Frequency (IDF) Curve Tool for the Chesapeake Bay Watershed and Virginia". Northeast Regional Climate Center.
<https://midatlantic-idf.rcc-acis.org/>



What are the steps to resilience planning?

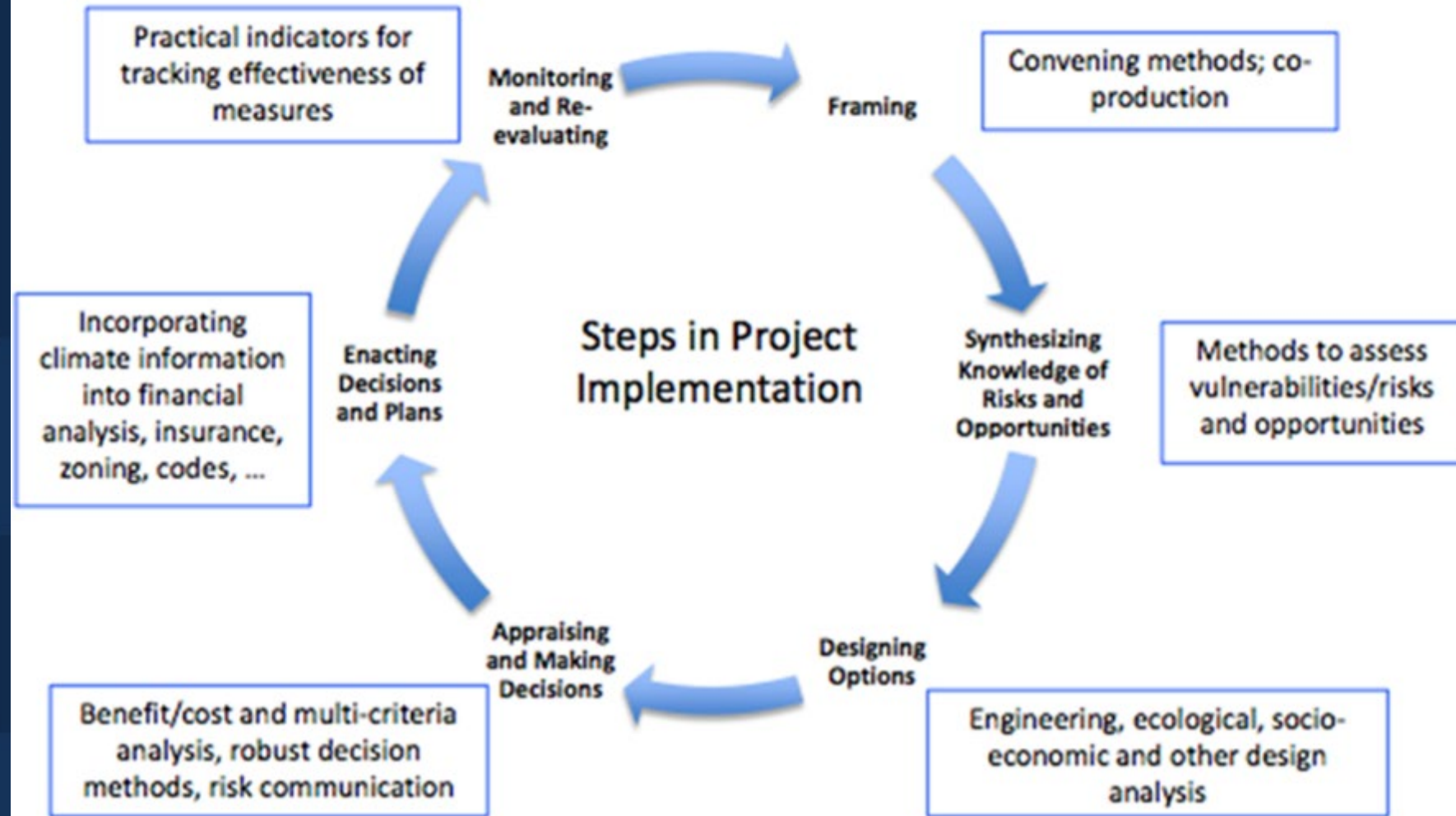
NOTE: There is now a private climate services industry that does this.

The Steps to Resilience



What are the steps to becoming resilient?

Sustaining this over time falls on the client.



Moss et al. 2019: Evaluating Knowledge to Support Climate Action: A Framework for Sustained Assessment; Report of an Independent Advisory Committee on Applied Climate Assessment
(<https://journals.ametsoc.org/doi/pdf/10.1175/WCAS-D-18-0134.1>)



Solving implementation challenges provides competitive advantage

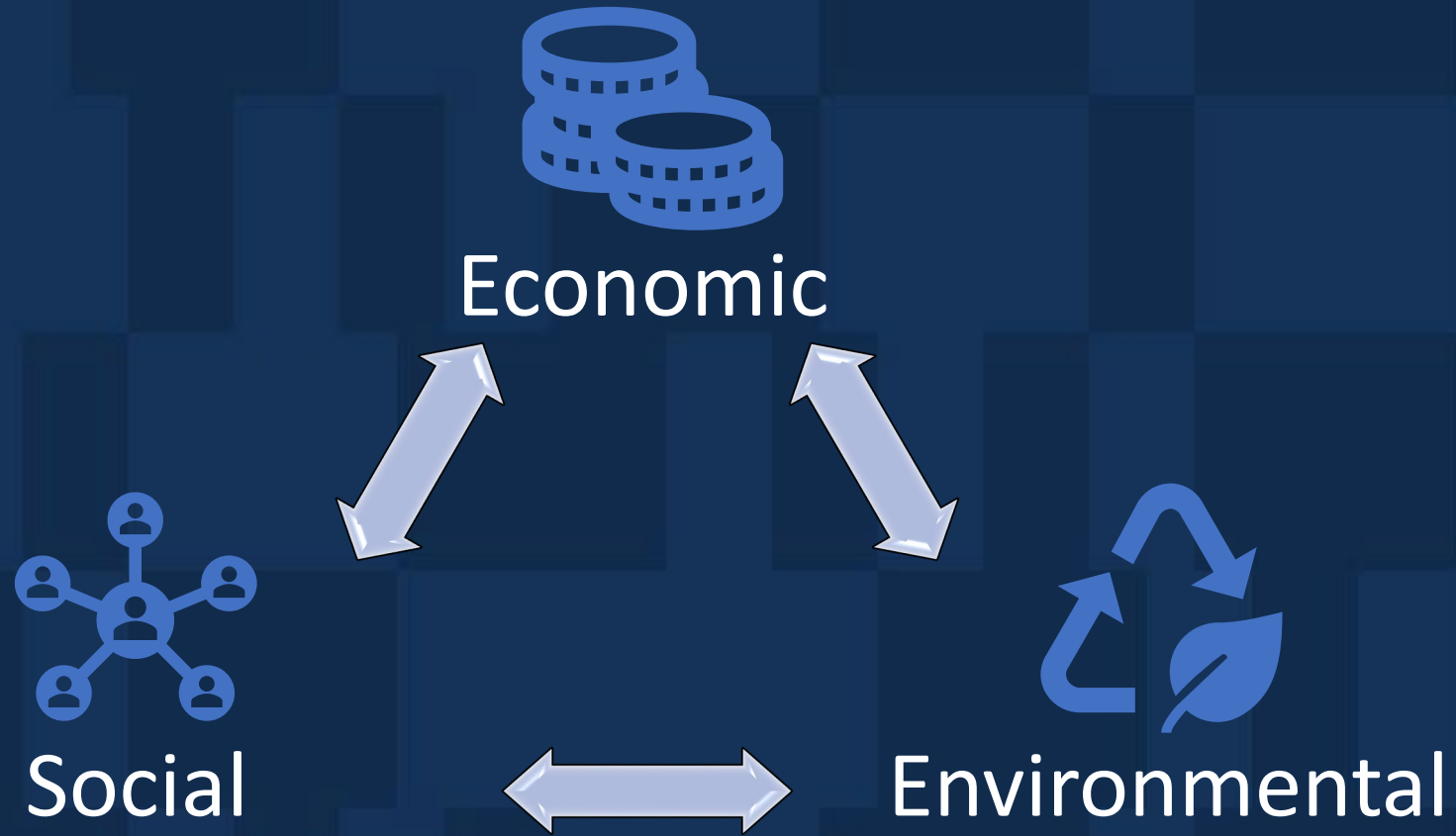
- Enabling and constraining law and policy
- Viable solutions within the fenceline
- Costs and challenges in moving the fenceline to retreat
- Benefits and costs of action versus profit margin
- Operational and management procedures around risks
- Facilities' dependence upon community action
- Global supply chain risks



What do resilience and adaptation plans that get implemented contain?

Principle	Definition	Components of Principle
Goals	Future desired conditions	Plan purpose, vision, goals, and objectives
Fact Base	Empirical foundation that identifies and prioritizes issues to ensure that strategies are well informed	Data sources; analysis of current conditions; climate change exposure; vulnerability and risk assessment
Strategies	Guide to decision making to assure plan goals are achieved	Capacity building, land use, green infrastructure etc.; cost and co-benefits of strategy options; prioritization of strategies
Public Participation	Recognition of actors engaged in preparing the plan	Description of planning process and techniques to engage stakeholders; Identify individuals involved in preparation of the plan
Coordination	Recognition of the interdependent actions of multiple organizations and the need for coordination	Engagement of local universities, state agencies, businesses, neighboring jurisdictions, etc. in the planning process
Implementation and Monitoring	Guidance to translate plan strategies into action and track progress towards goals	Organizational responsibilities, timelines, and funds for implementation and monitoring
Uncertainty	Plans recognition of and approaches to overcome uncertainty in future climate projections	Recognize sources of uncertainty; consider multiple future scenarios; flexible, robust, or no-regret strategies





Moving beyond resilient projects to
resilient *systems*



Mission

The Institute for Coastal Adaptation and Resilience advances the practice of coastal resilience and adaptation by engaging with communities, organizations, and businesses to develop and deploy solutions based on integrated, innovative, and applied research.

Vision

ICAR catalyzes the action needed to build vibrant communities, strong economies, and healthy ecosystems across the Commonwealth of Virginia despite natural hazards and climate change.



Resilience Leadership at ODU



Innovating Solutions in our Natural Testbed on Flooding and the Built Environment

- Connecting the Innovation/Commercialization components to Resilience Research, Outreach, Education, Adaptation
- Educating the Green Collar and Professional Workforce
- ODU Maritime Consortium
- Open Seas Technology Hub
- Role in Commonwealth progress
 - Coastal Resilience Master Plan Technical Advisory Committee Member
 - Funding DCR Resilience Working Group to recommend Commonwealth-wide strategies for governance, funding mechanisms



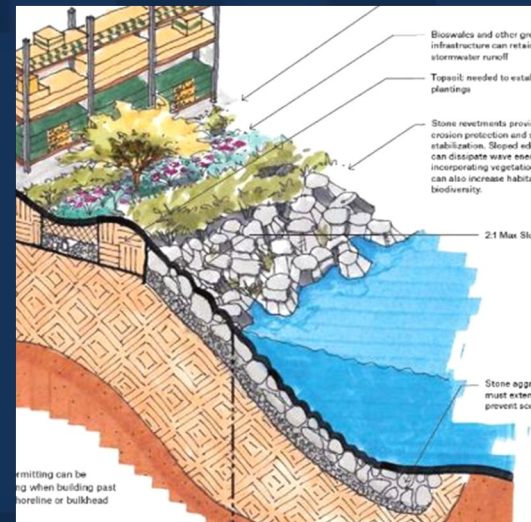
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CoVA Adaptation & Resilience Consortium

- Engaging the **broader business** communities
- Providing opportunities for growth and diversification of the coastal adaptation & resilience sector
- Preparing businesses for a future with water thru **education and best practices**
- Catalyzing growth in new and existing firms.

CoVA Participation Across Industry Sectors



Shoreline protection



Elevate electrical systems

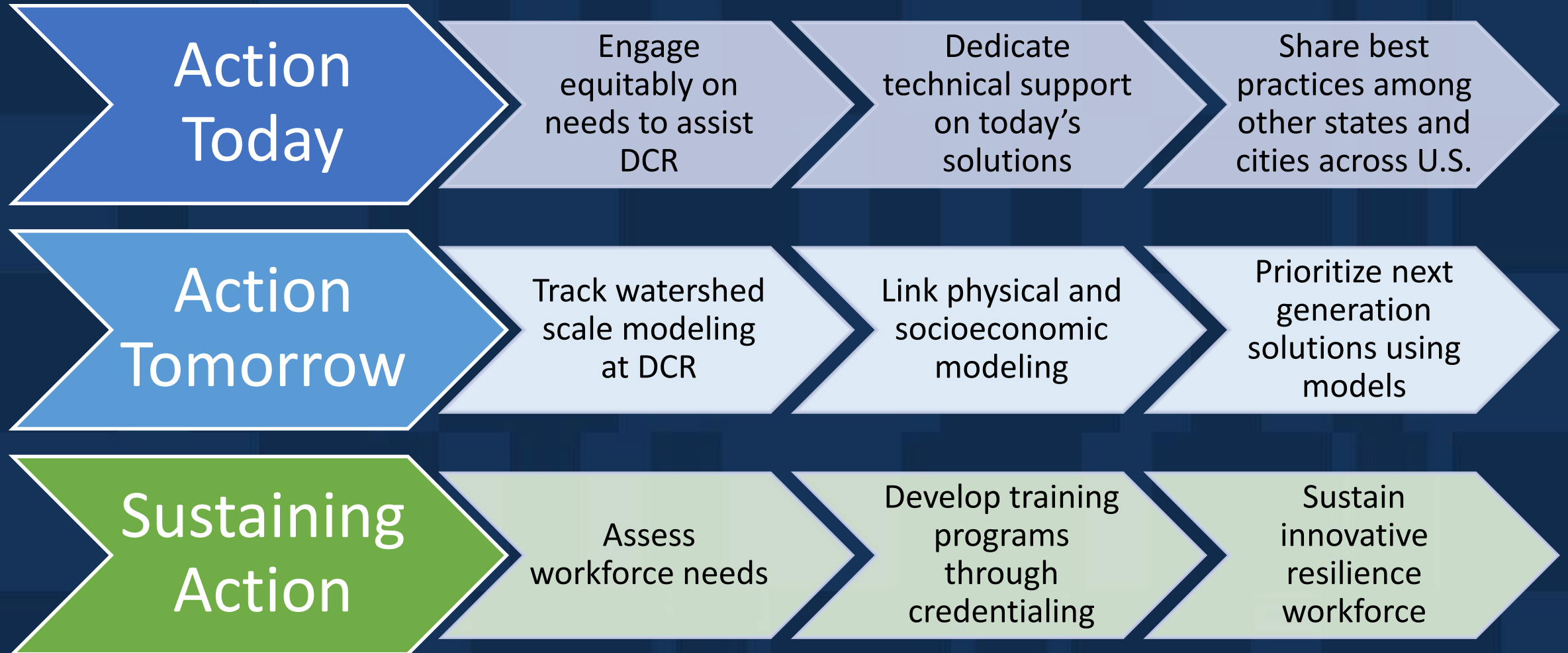


Building capacity for a Resilient Commonwealth - Resilient and Adaptable Communities Partnership

- Catalyzing action today through building capacity for projects that balance people and the Bay
- Visioning the action of the future through innovation and prioritization
- Sustaining action through building resilience capacity of existing workforce and tomorrow's resilience professionals



ICAR-CBF pathways to success





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