DCR
Virginia Department of Conservation & Recreation

VIRGINIA COASTAL
RESILIENCE
MASTER PLAN

Coastal Resilience Master Plan, Phase II

Public Webinar Update | September 24, 2024

Photo: Virginia Department of Conservation & Recreation

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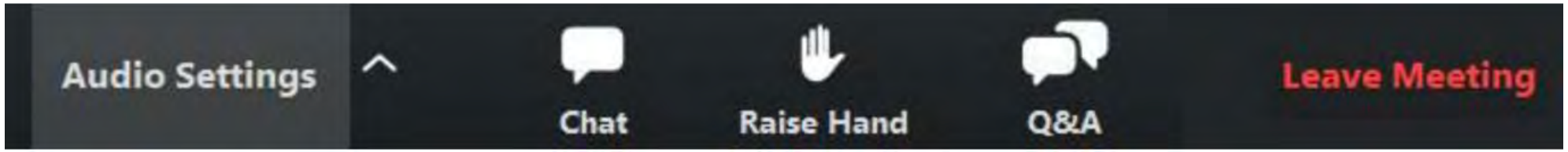


Welcome!

Our Agenda

- Flooding as a Growing Challenge in Coastal Virginia
- The Virginia Department of Conservation and Recreation's Role in Flood Resilience
- 2024 Coastal Resilience Master Plan, Phase II Update
  - Planning Process
  - Plan Components
  - Our Next Steps
- How to Get Involved
- Q&A Session
- Feedback Survey

Introduction to our Speakers

Matt Dalon
Program Manager, DCR ORP

Ashley Hall
Senior Engineer, Stantec

Danielle Curri
Resilience Engineer, Stantec

Linda Warren
Senior Facilitator and Resilience Specialist, Launch! Consulting

Flooding as a Growing Challenge in Coastal Virginia

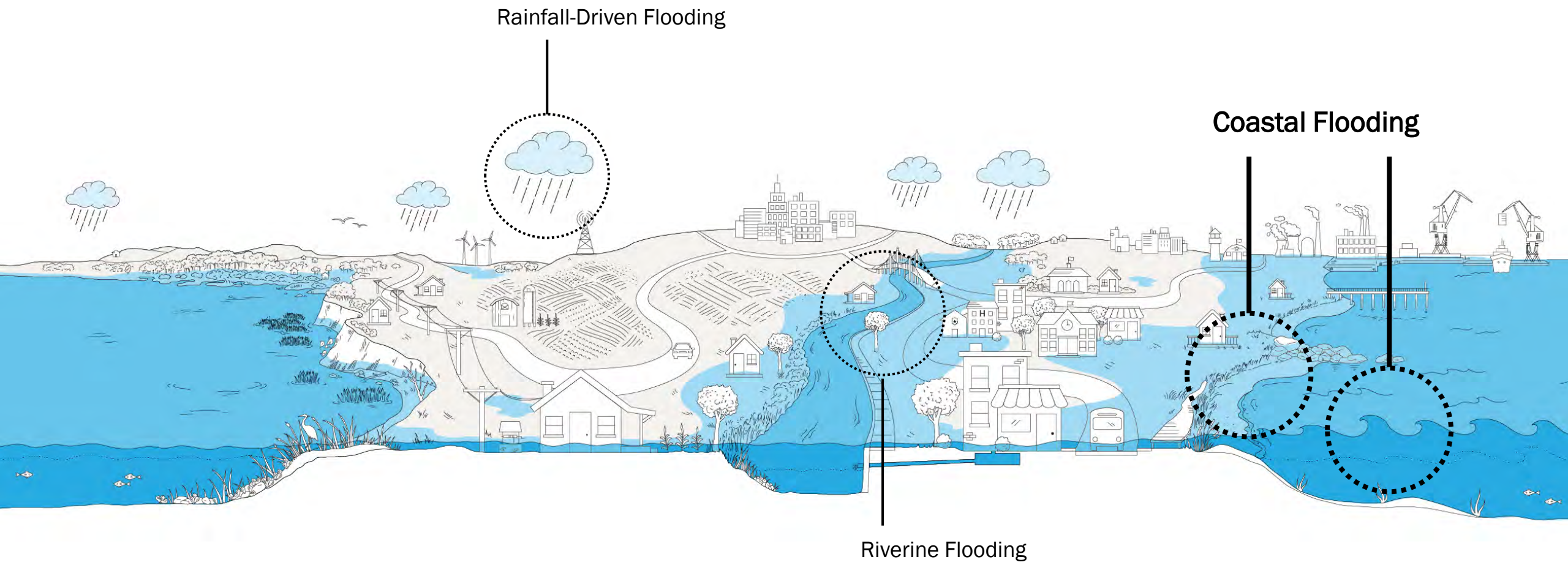


Image credit: Dewberry

Coastal Flooding

Flooding from Hurricane Isabel, September 2003, Norfolk, VA
Source: U.S. Navy, Photographer's Mate 1st Class, Michael Pendergrass

Sunny day flooding, May 2022; Hampton, VA

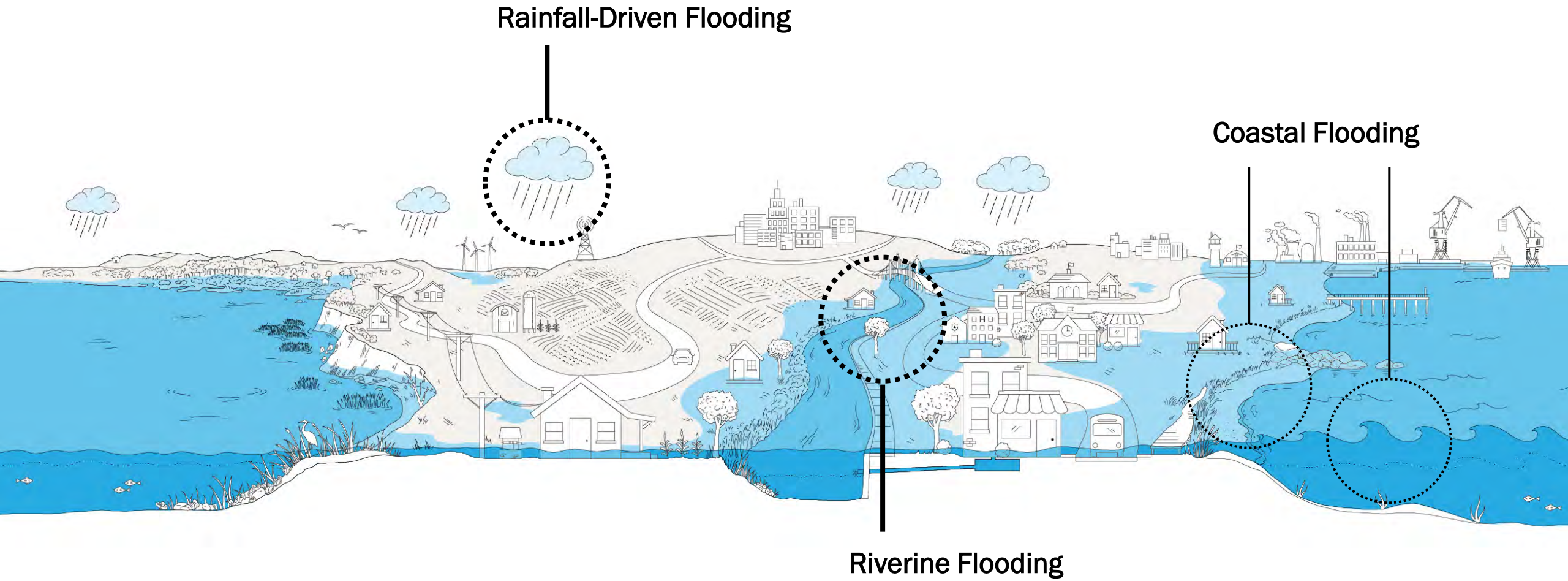


Image credit: Dewberry

Rainfall-Driven Flooding and Riverine Flooding

A car surrounded by water in Wolf Trap, Fairfax, VA, 2021
Source: Fairfax County government/Twitter via Tysons Reporter

Roadway flooding in Clifton, Virginia, 2014
Source: Fairfax County, Licensed with CC BY-NC-ND 2.0, via Flickr

Virginia DCR's Role in Flood Resilience

Virginia Department of Conservation and Recreation (DCR)

- **Who We Are:** Virginia's lead natural resource conversation agency
- **What We Do:** Enable and encourage people to enjoy and benefit from Virginia's natural and cultural resources
- **What We Value:** The diversity of nature, culture and communities to ensure a sustainable and equitable future for recreational access and a healthy environment for all Virginians to enjoy.
- **How We Do It:** DCR accomplishes its mission through funding, expertise, education, acquisition and improved access.

DCR Office of Resilience Planning

Planning for a flood resilient future.

Matt Dalon
Program Manager

Carolyn Heaps-Pecaro
Resilience Planner

Arthur Kay
Resilience Planner

Ellie Plisko
VCU Wilder Fellow

Our Flood Resilience Mission

Distribute knowledge and coordinate action to achieve a flood-resilient future for Virginia through informed planning and proactive, intergovernmental solutions.

Address challenges related to flooding and resiliency

Establish programs that work for all impacted parts of Virginia

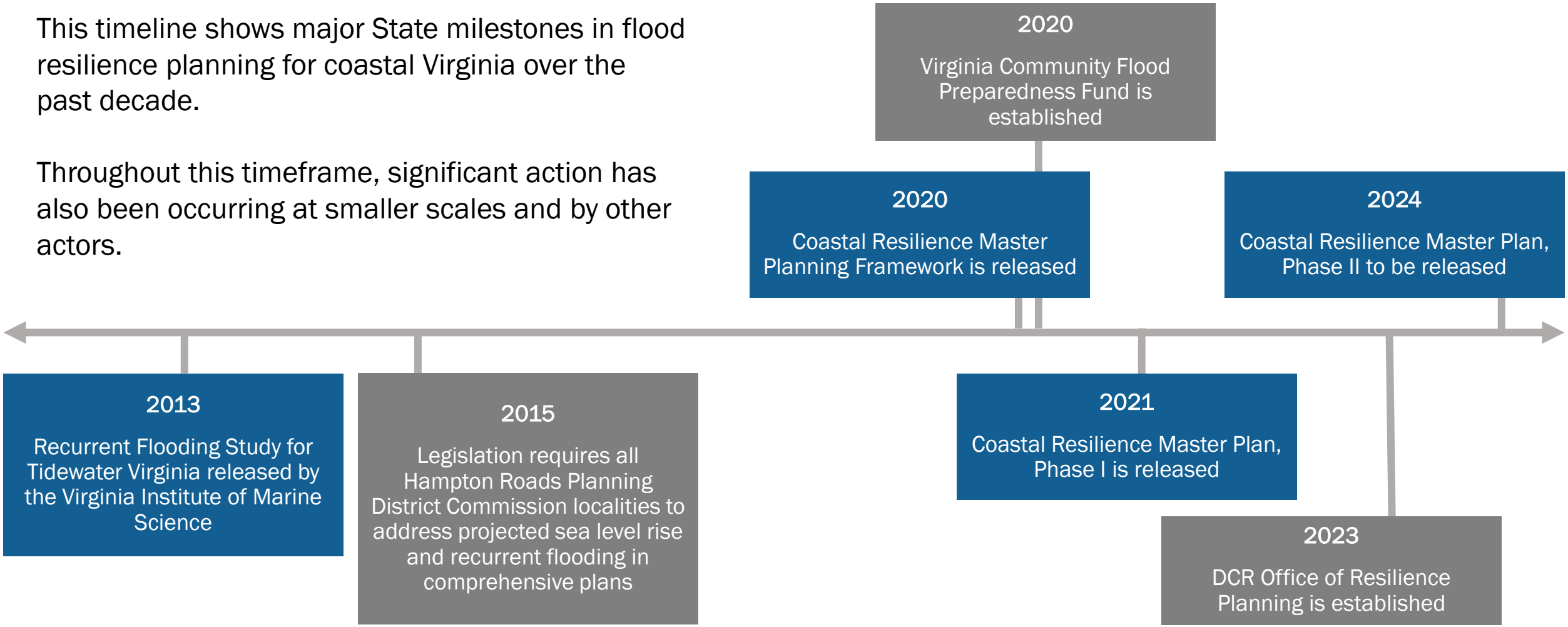
Create comprehensive, cohesive plans and ensure our programs work together

Develop and implement programs and plans with transparency and input from the public

Coastal Resilience Master Planning in Virginia

This timeline shows major State milestones in flood resilience planning for coastal Virginia over the past decade.

Throughout this timeframe, significant action has also been occurring at smaller scales and by other actors.



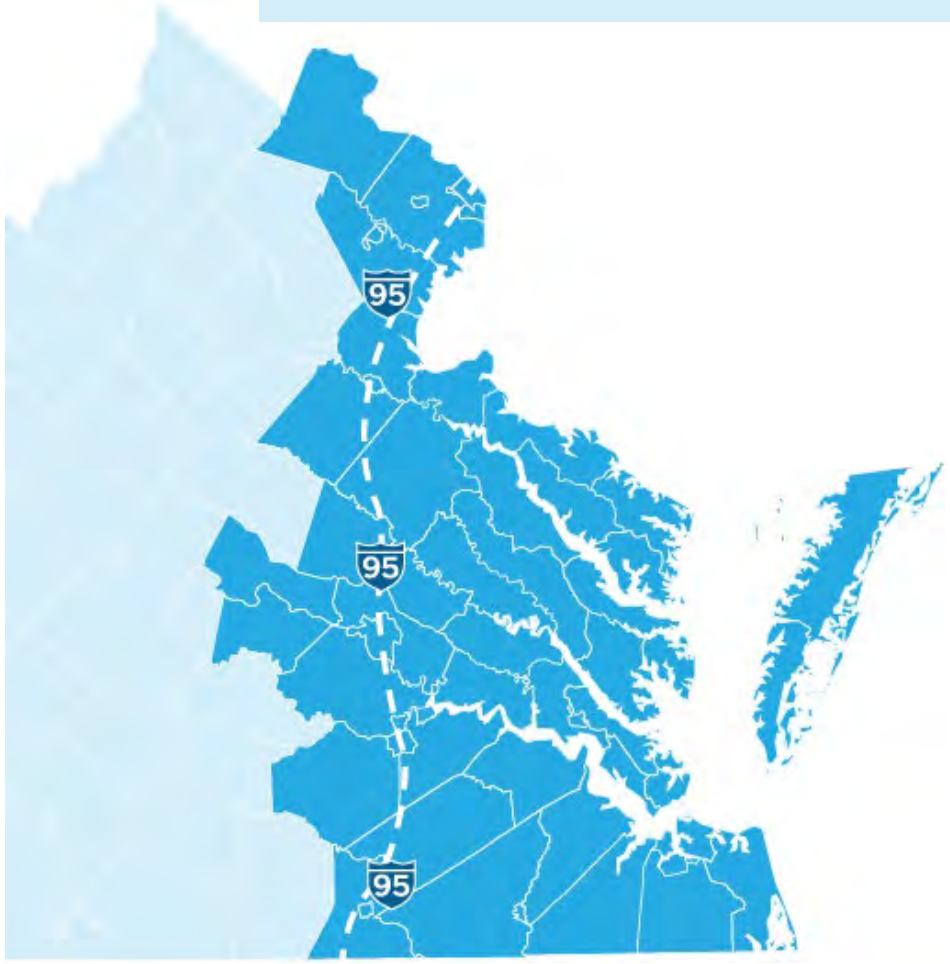
VIRGINIA COASTAL RESILIENCE MASTER PLAN

The Virginia Coastal Resilience Master Plan

A **trusted resource** to assist government entities in making evidence-based decisions to mitigate severe and repetitive flooding.

- Provides a **unified baseline analysis** of the threat of increasing flood exposure and impacts.
- **Identifies opportunities** to prioritize impactful flood resilience solutions.

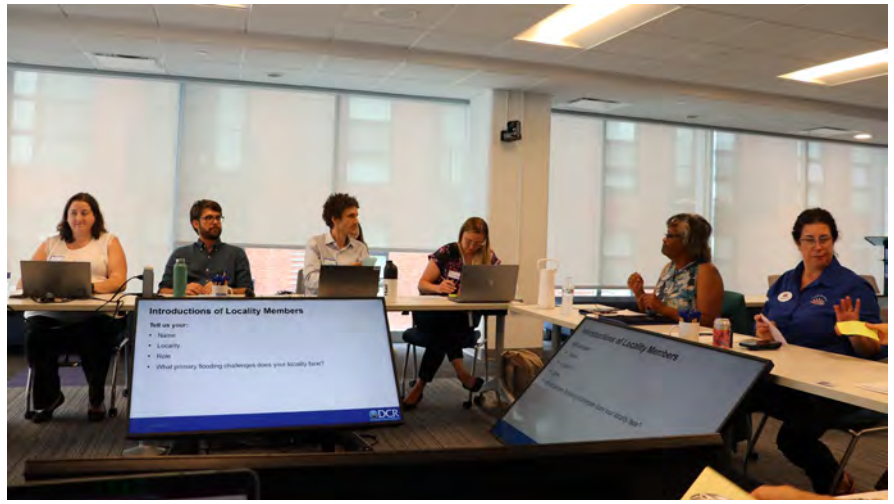
Despite being called “coastal” the plan addresses all forms of flooding in this region. Nearly six million people, or 70% of the state’s population, call coastal Virginia home.

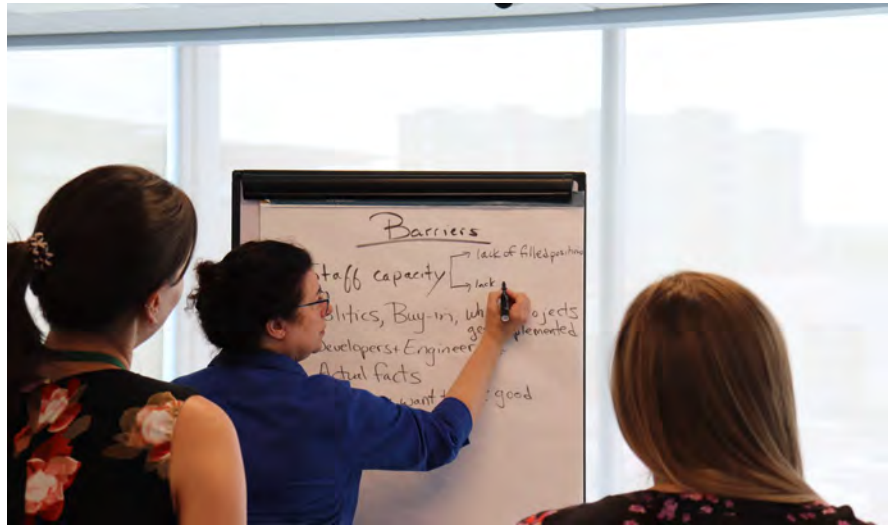


Outreach and Engagement for a Better Plan

OUR GOALS FOR CONNECTING WITH STAKEHOLDERS

- Understand how our end-users would like to use the plan and associated products.
- Understand on-the-ground experiences with flooding to be able to present them alongside our modeled findings.
- Understand solutions to address flood risk and present them in the plan.
- Drive awareness of coastal flooding and encourage **whole community** action toward coastal flood resilience.



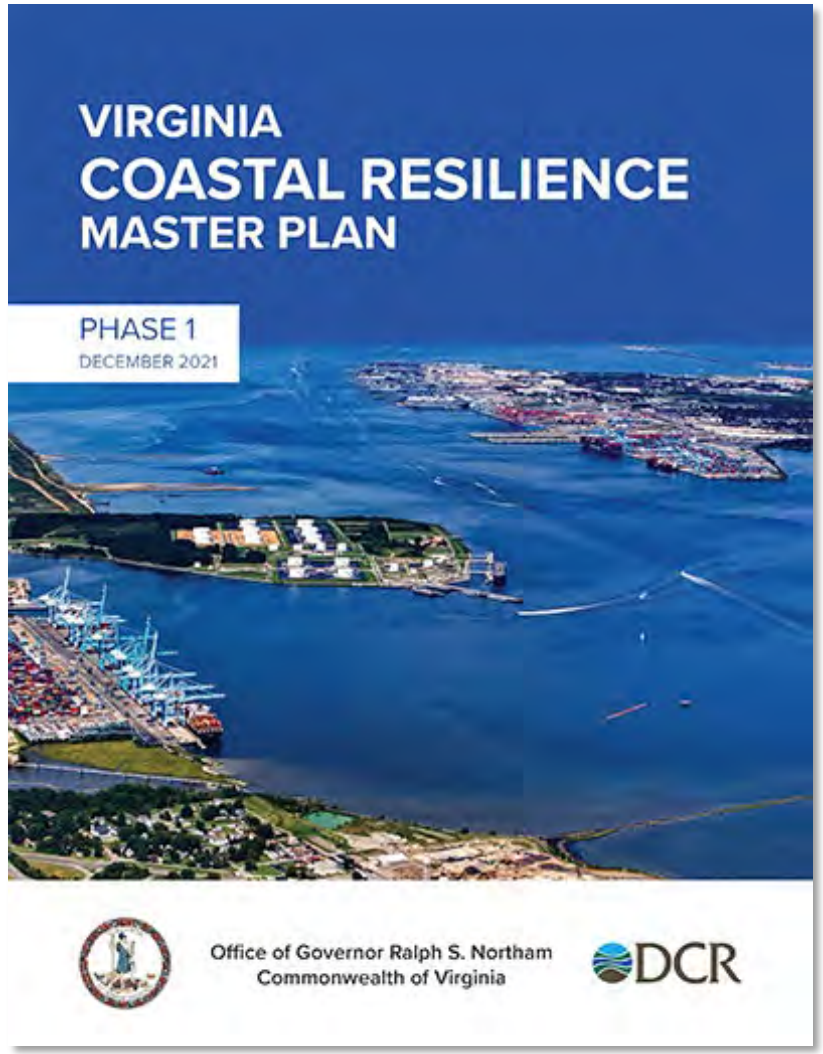


The Coastal Resilience Master Plan, Phase I

- Developed and released by the Commonwealth in 2021.
- Served as a call to action for coastal Virginia.
- Shows that, without action, rising sea levels and increasingly severe weather threaten our cherished coastal regions' economic, cultural, and environmental resources.
- Developed in a collaborative process with many organizations and stakeholders.

KEY ELEMENTS OF THE PLAN

- Current and future land exposure to coastal flooding hazards.
- Impacts of flooding on people and social, natural, and built assets.
- Inventory of locally-driven projects and initiatives that address flood resilience challenges.
- Inventory of grant and loan to assist regions and localities with securing financial resources.



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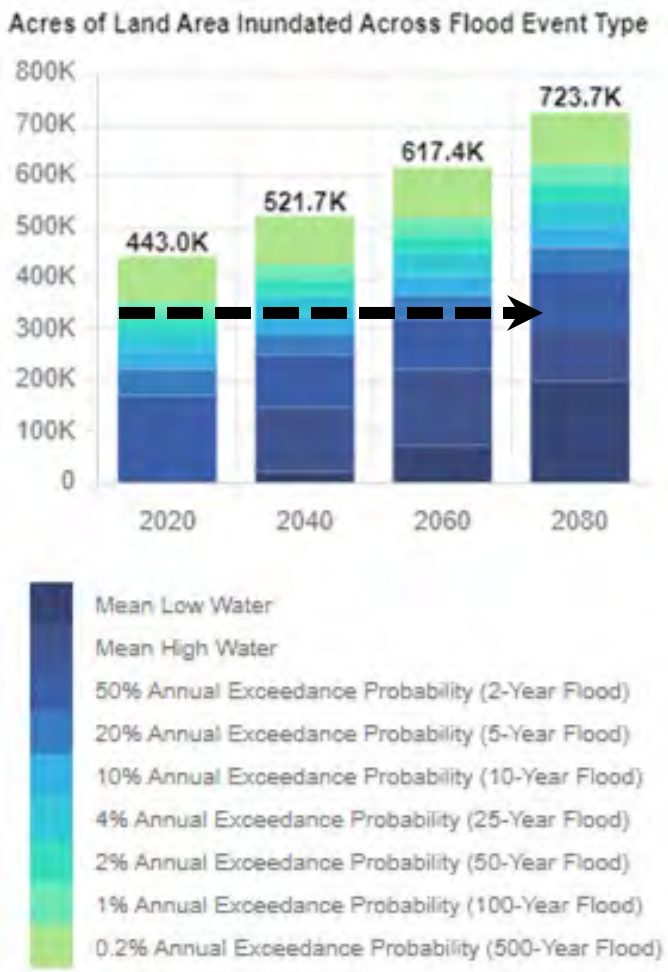
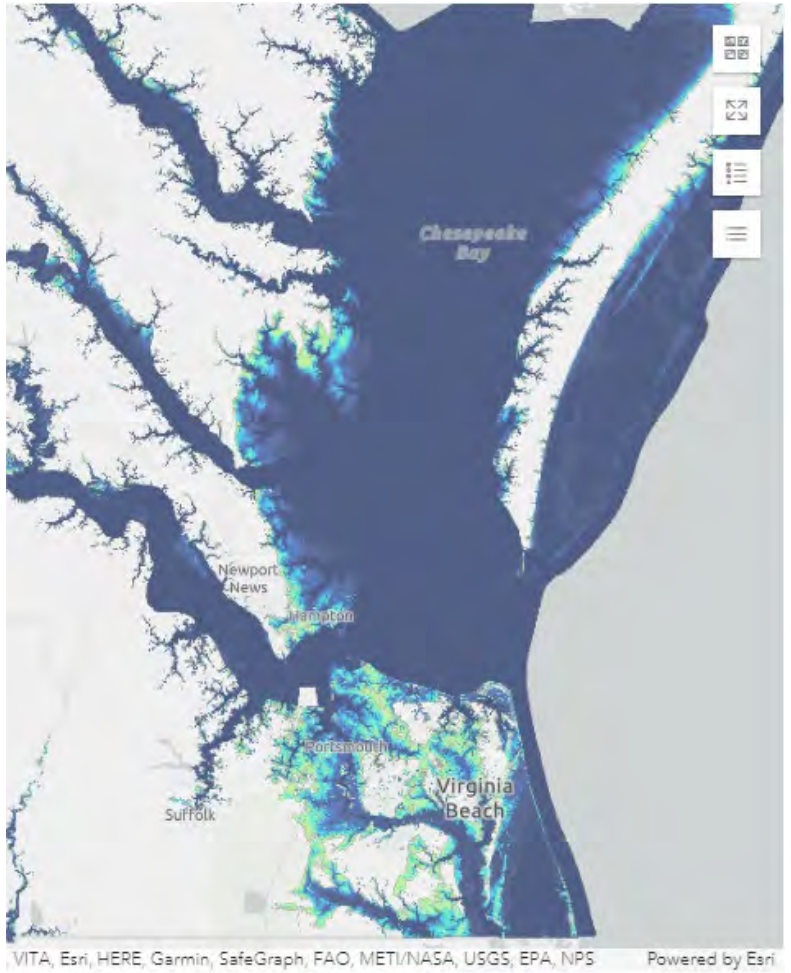
VIRGINIA COASTAL RESILIENCE MASTER PLAN

VIRGINIA COASTAL RESILIENCE WEB EXPLORER Ver 1.0

Findings of the Coastal Resilience Master Plan, Phase I



2020



2080

VIRGINIA COASTAL RESILIENCE MASTER PLAN

Findings of the Coastal Resilience Master Plan, Phase I

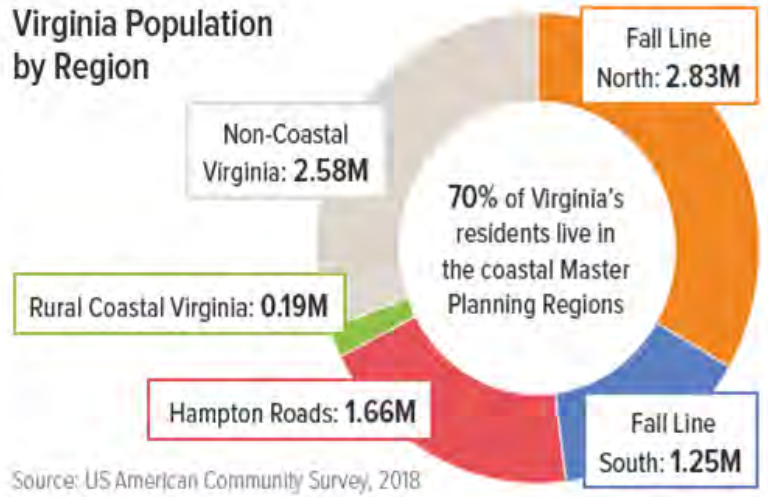
Between 2020 and 2080...

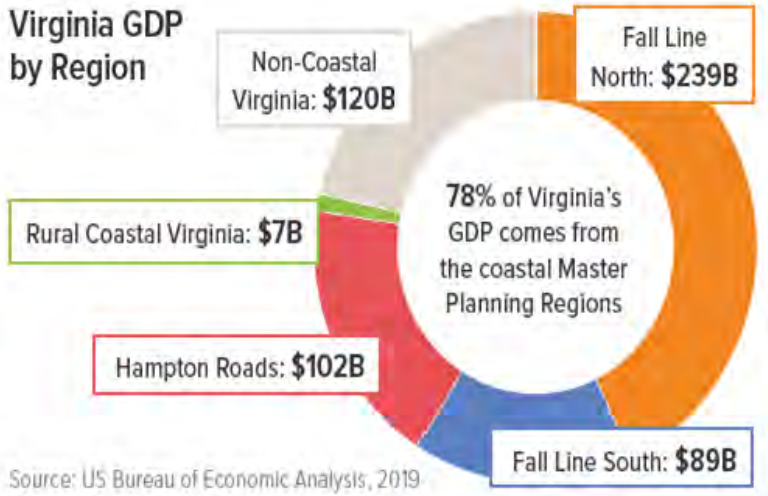
the number of **residents** living in homes exposed to major coastal flooding is projected to grow from approximately 360,000 to 943,000, an increase of **160%**.

the number of residential, public, and commercial **buildings** exposed to an extreme coastal flood is projected to increase by almost **150%**, from 140,000 to 340,000, while annualized flood damages increase by over **930%** from $550 million to $5.7 billion.

the number of miles of **roadways** exposed to chronic coastal flooding is projected to increase from approximately 500 to nearly 2,800 miles, an increase of **460%**.

an estimated 170,000 acres, or **89%**, **of existing tidal wetlands** and 3,800 acres, or **38%**, **of existing dunes and beaches** may be permanently inundated, effectively lost to open water.





Virginia Coastal Resilience Master Plan
Phase II Update

Coastal Resilience Master Plan, Phase II

OUR CONSULTANT TEAM

Critical to the plan's development is the work of consulting consortium teams led by the following three companies:

Dewberry

Stantec

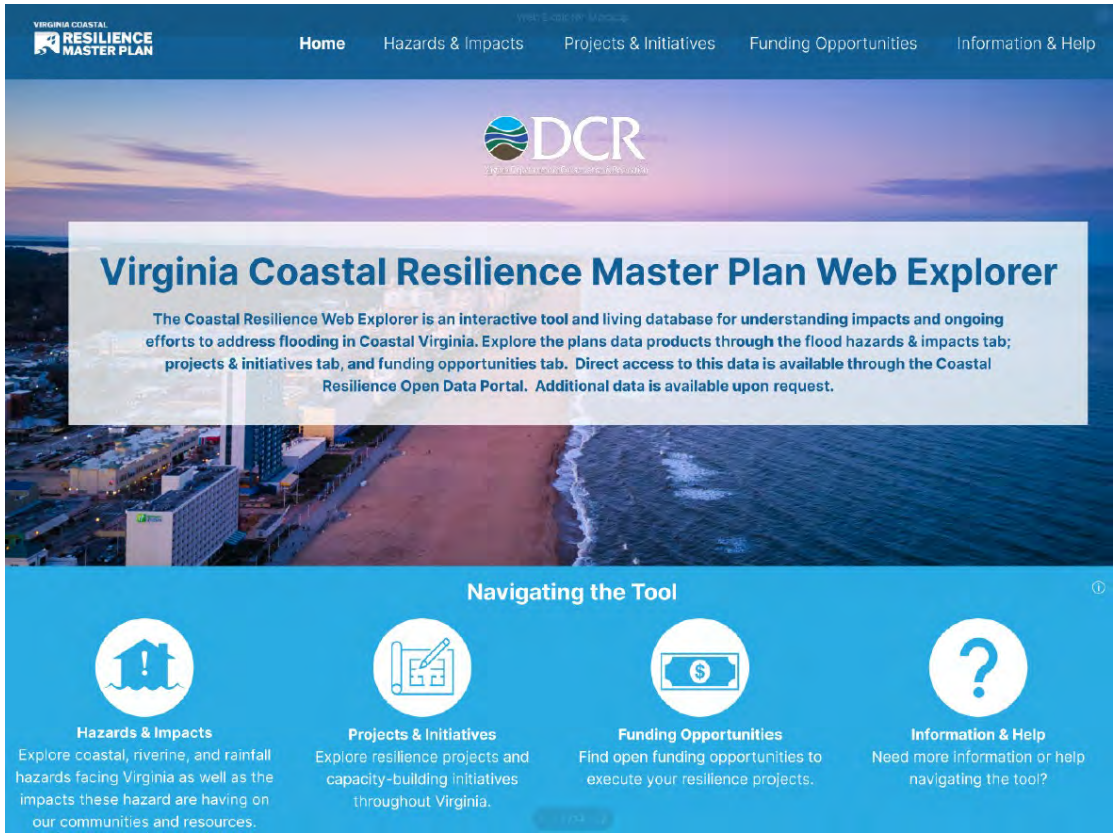
AECOM

INNOVATIONS OF THE PLAN

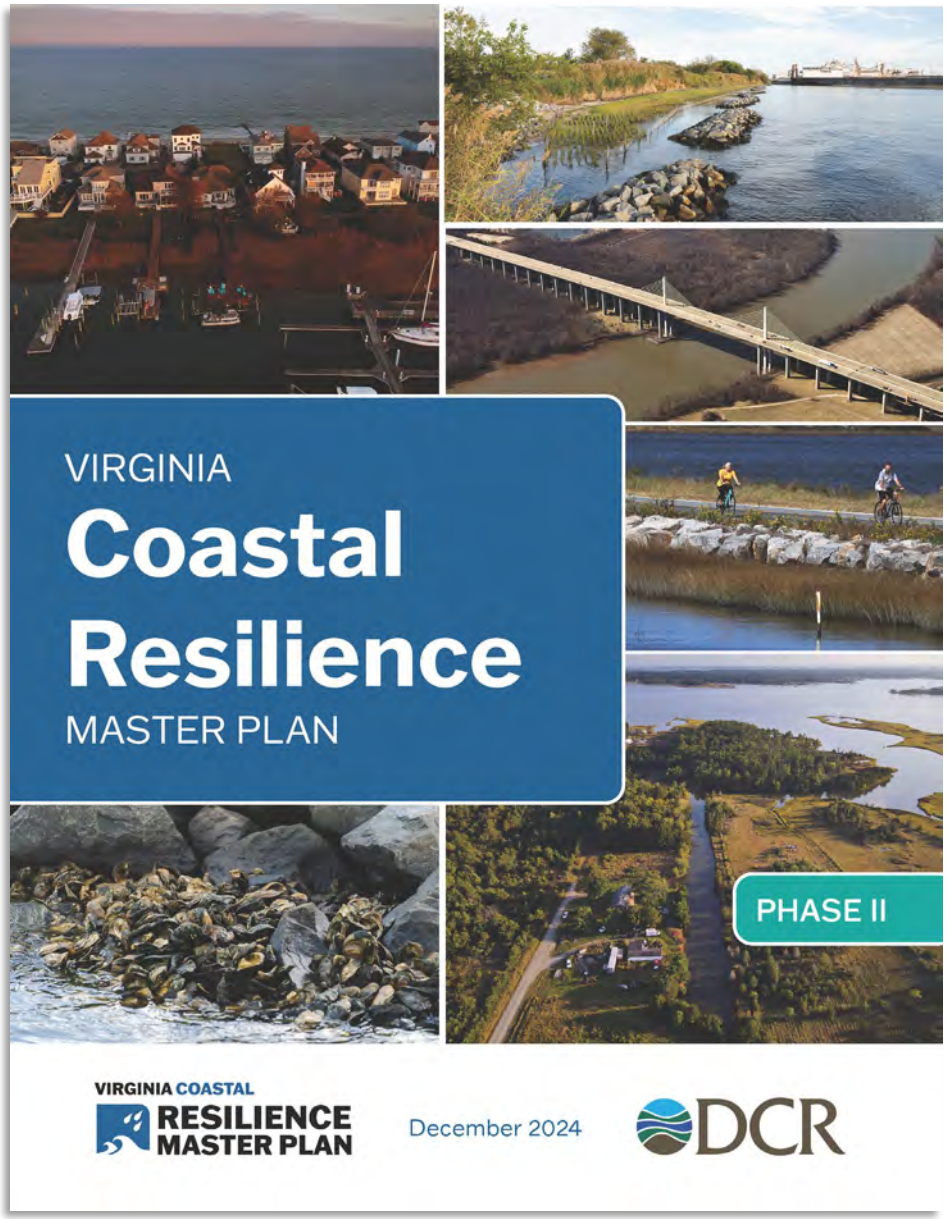
- Provide a picture of current and future rainfall-driven flooding based on climate forecasts.
- Forecast regional and local economic impacts of flooding. For example, the tax base implications of increasing flooding.
- Estimate, in dollar terms, how flooding is likely to impact the ability of natural resources to provide us with ecosystem services.
- Emphasize the development of recommendations of the Coastal Resilience Technical Advisory Committee for identifying next steps for flood resilience in coastal Virginia.

The Coastal Resilience Technical Advisory Committee ("TAC") is a public body established by Code to advise and support the plan's development and implementation. More than 35 organizations with relevant knowledge and a stake in the plan's outcomes meet quarterly to receive plan updates and provide DCR with vital advice on planning decisions.

Our Plan Products



Coastal Resilience Web Explorer
Conceptual Draft Landing Page



Draft Plan Cover Page

Coastal Resilience Master Plan, Phase II: Plan Components

FLOODING IN COASTAL VIRGINIA

FLOOD HAZARDS

Where is flooding likely to occur in the future?

FLOOD IMPACTS

What impacts is flooding likely to cause in the future?

ADVANCING FLOOD RESILIENCE

FLOOD RESILIENCE SOLUTIONS

What projects and initiatives are underway to address flooding?

FINANCING FLOOD RESILIENCE

How much money is needed for flood resilience? What funding resources exist?

RECOMMENDATIONS

What actions should the state and other actors take to continue addressing flooding in coastal Virginia over the next four years?

Major Sources of Flooding

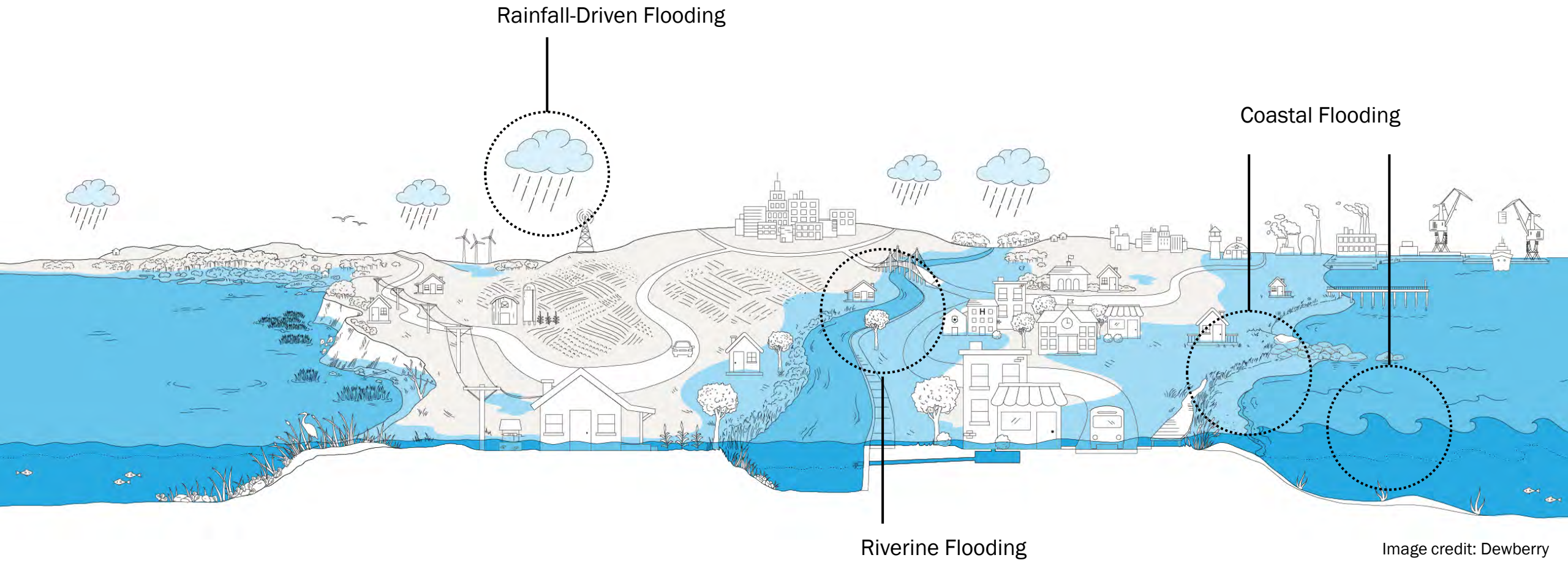
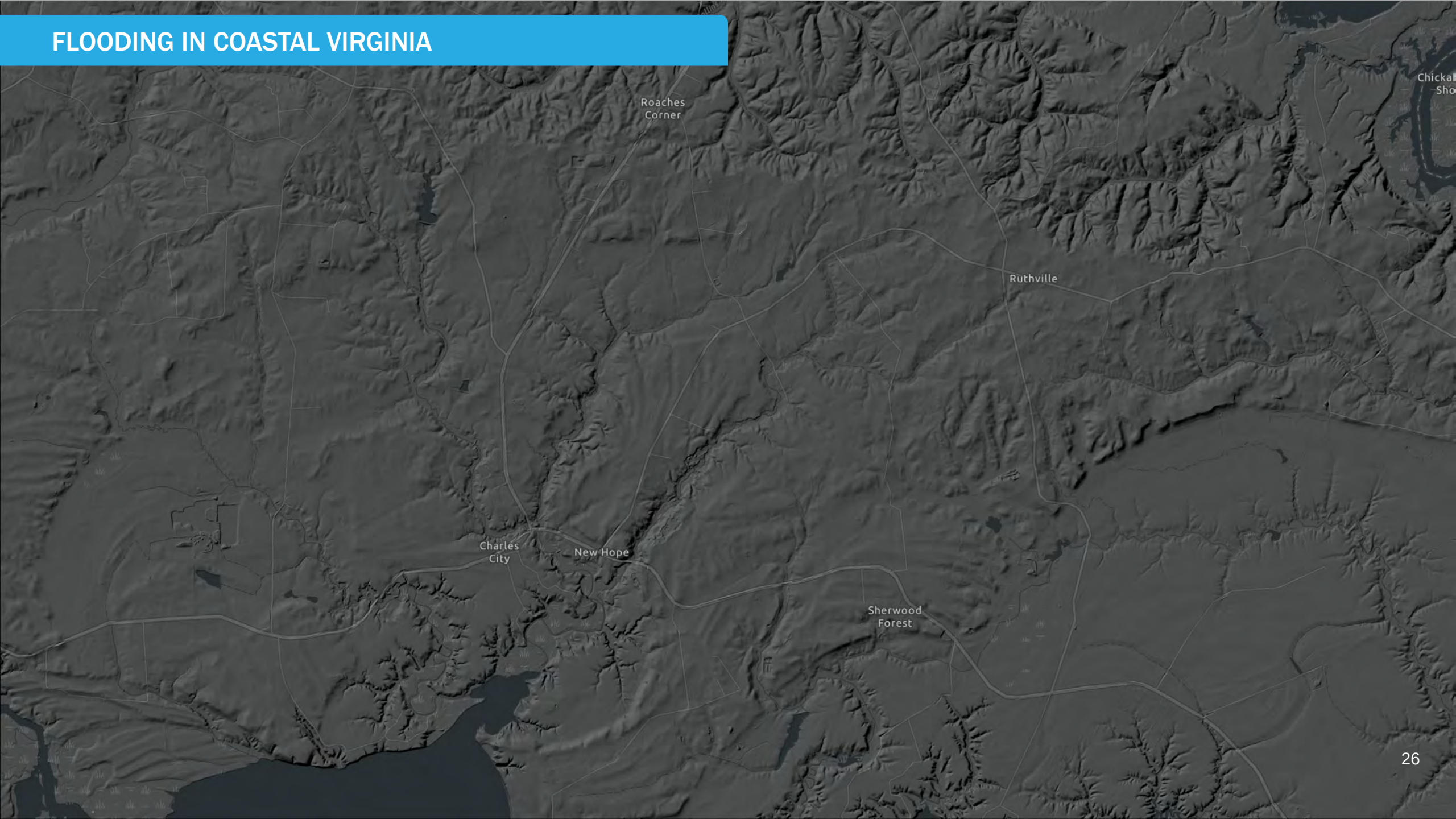


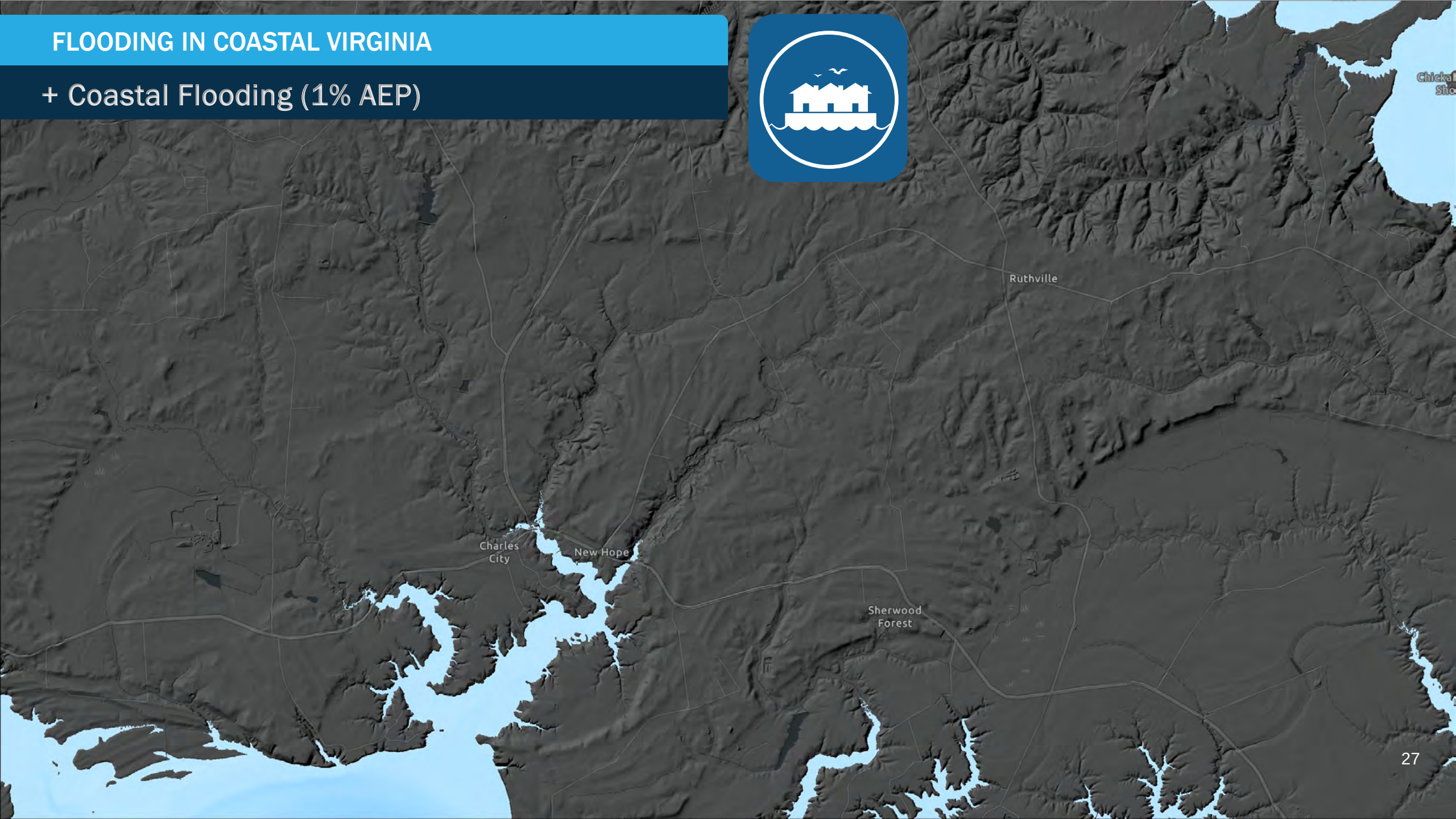
Image credit: Dewberry

FLOODING IN COASTAL VIRGINIA



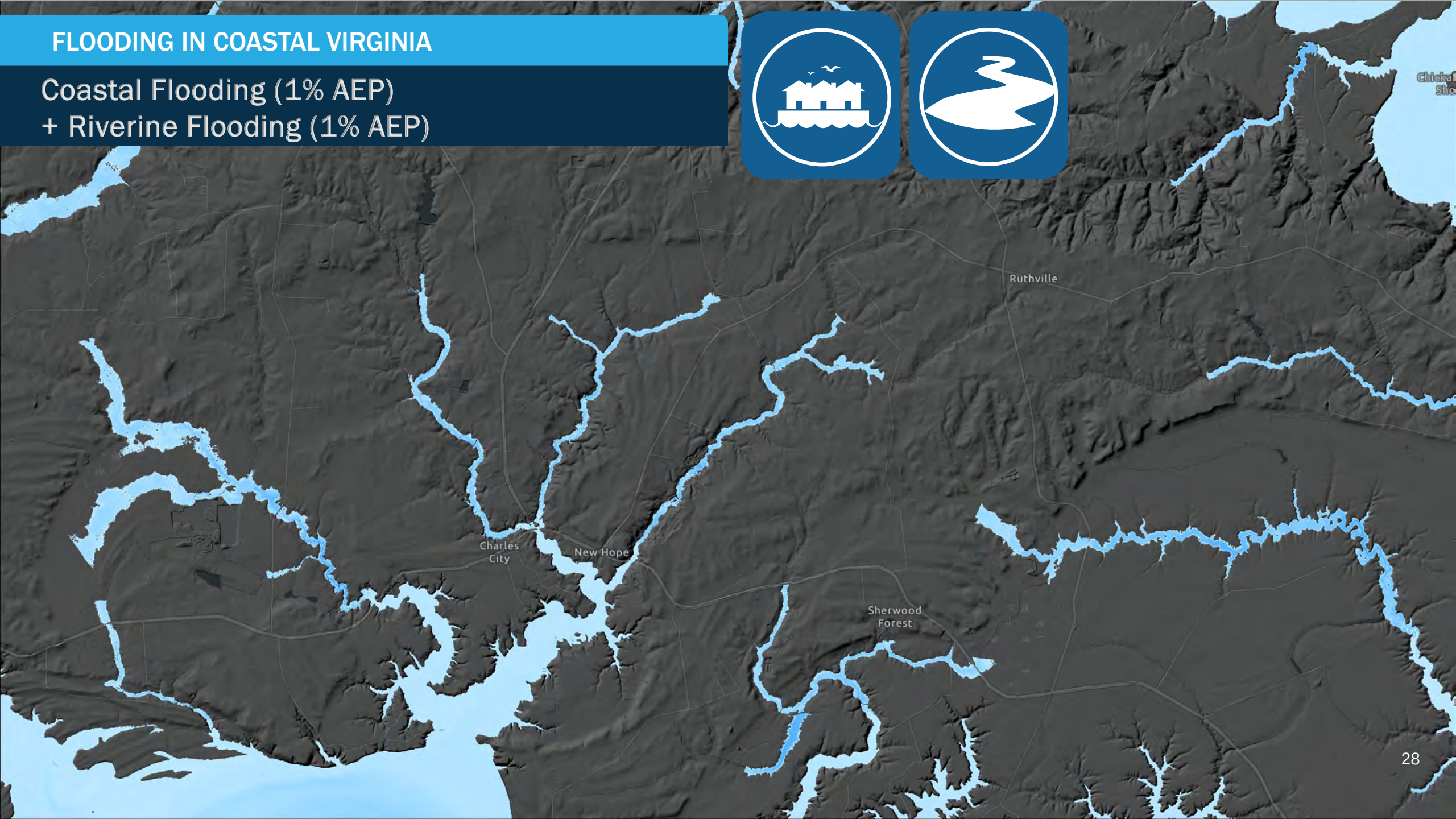
FLOODING IN COASTAL VIRGINIA

+ Coastal Flooding (1% AEP)



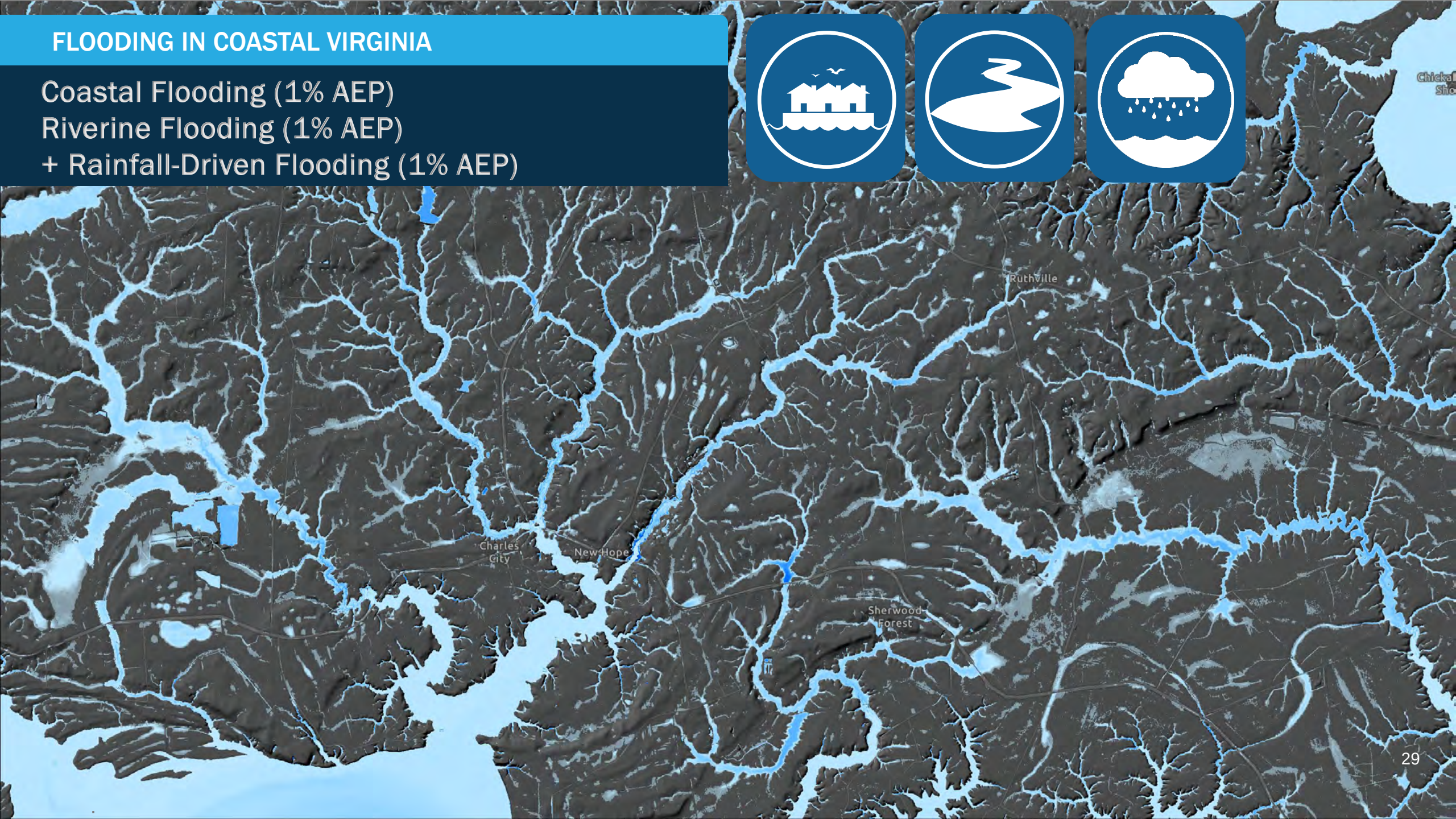
FLOODING IN COASTAL VIRGINIA

Coastal Flooding (1% AEP)
+ Riverine Flooding (1% AEP)

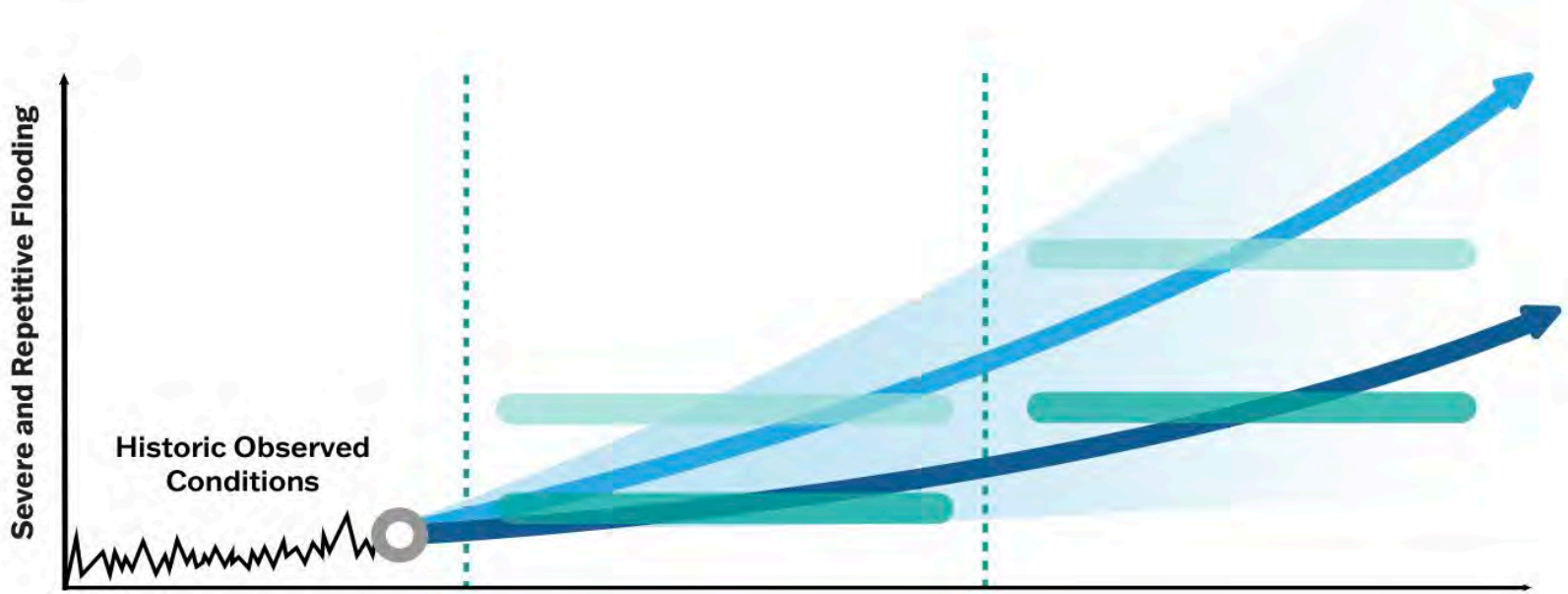


FLOODING IN COASTAL VIRGINIA

Coastal Flooding (1% AEP)
Riverine Flooding (1% AEP)
+ Rainfall-Driven Flooding (1% AEP)



Forecasting Future Flooding with “Planning Scenarios”



		Near Future (2030-2060)	Far Future (2060-2100)
	Coastal Flooding	+3 ft Sea Level Rise +1.7 ft Sea Level Rise	+4.6 ft Sea Level Rise +3 ft Sea Level Rise
	Rainfall-Driven Flooding	+25% Precipitation +6% Precipitation	+30% Precipitation +11% Precipitation
	Riverine Flooding	Baseline only. Change not modeled.	Baseline only. Change not modeled.

High Scenario
Possible Future

Moderate Scenario
Likely Future

Baseline

Less Tolerance for Flood Risk

More Tolerance for Flood Risk

Understanding Flood Impacts

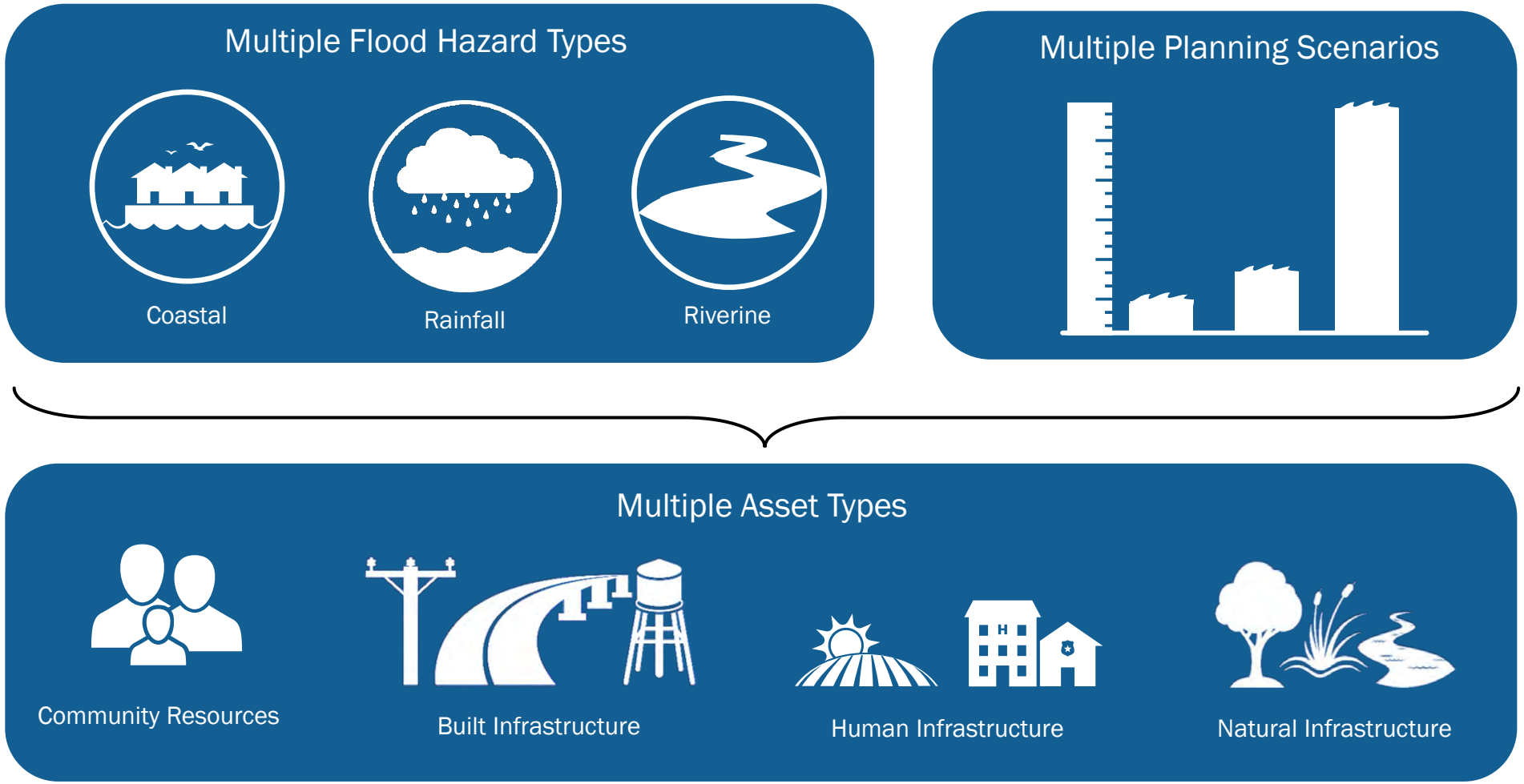


Image credit: Dewberry

Example of Flood Impact Information from Phase I

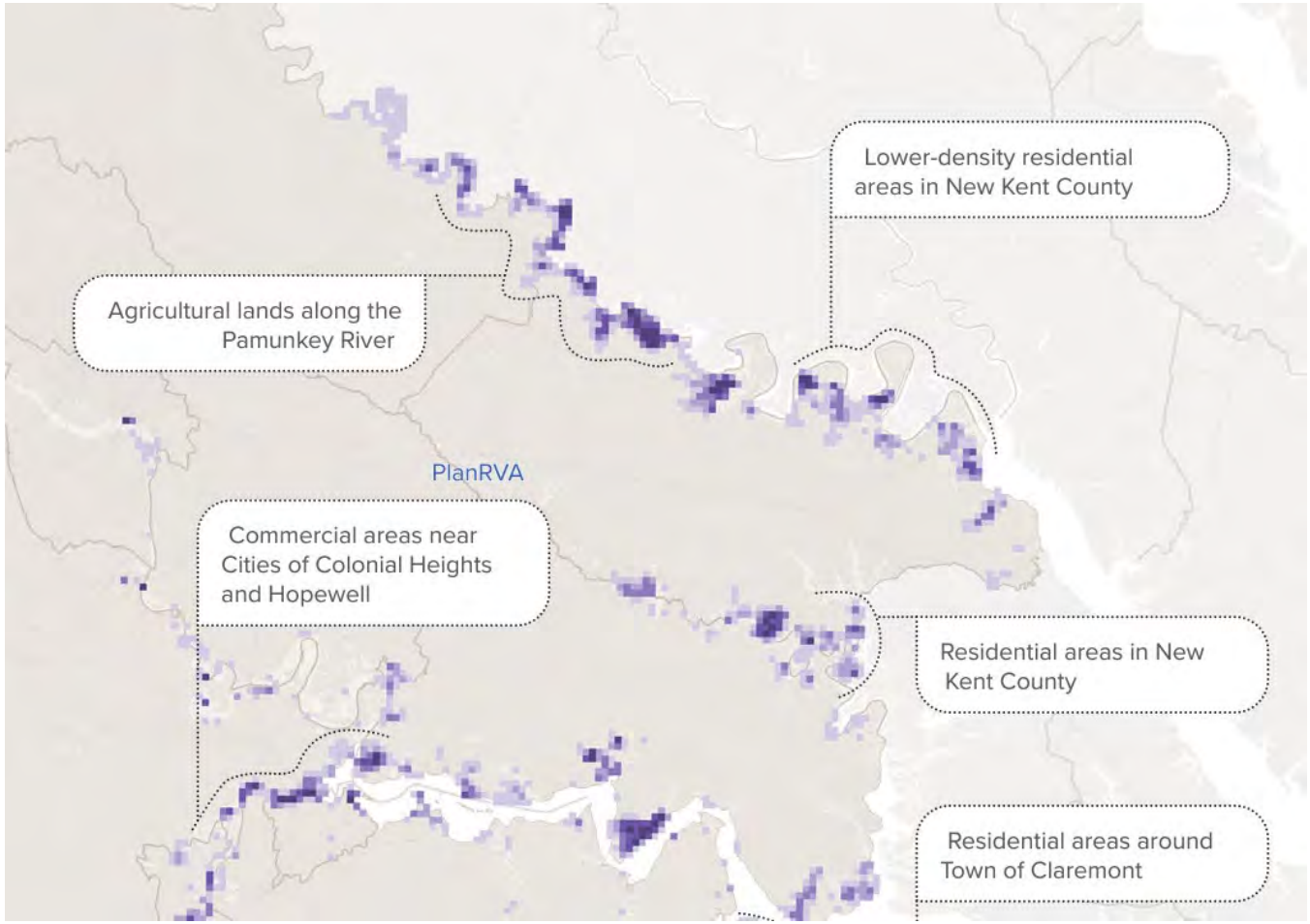
Residential Population Exposed		2020	2080	Change
Crater PDC	High tide	< 5	80	+ 2700%
	Extreme flood	130	530	+ 302%
PlanRVA	High tide	20	500	+ 2495%
	Extreme flood	1,100	2,200	+ 105%

Annualized Structure Losses*		2020	2080	Change
Crater PDC	Residential	$1.62M	$7.46M	+ 360%
	Non-Residential	$0.69M	$6.00M	+ 765%
PlanRVA	Residential	$3.30M	$14.2M	+ 331%
	Non-Residential	$13.0M	$27.40M	+ 111%

* Projected average annualized losses due to damages to structures and contents.

Agricultural Land Acres Exposed		2020	2080	Change
Crater PDC	High tide	480	1,300	+ 176%
	Extreme flood	1,500	1,900	+ 23%
PlanRVA	High tide	2,400	4,500	+ 86%
	Extreme flood	5,300	7,500	+ 41%

Differences in asset exposure numbers and percentage changes can be attributed to rounding for presentation. Percentage changes reflect exact exposure numbers.

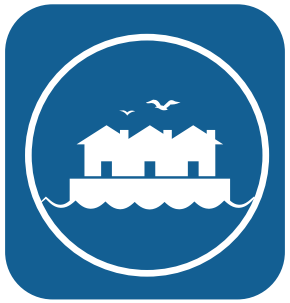


Initial Findings from Phase II

COASTAL FLOODING

Coastal flooding is expected to **increase significantly** in some areas of the region in the long-term. The land area likely to be flooded in a **1% annual chance flood** is expected to increase from **300,000 acres to more than 635,000 acres** under the long-term, moderate scenario.

About 65% of that land area is currently occupied by primarily natural resources or vegetation.



RAINFALL-DRIVEN FLOODING

Models show that **rainfall-driven flooding** may already **annually inundate more than 6%** of the land area. This area, totaling more than 450,000 acres, is about 85% natural or vegetated.

In the far future, moderate scenario, we expect this annual exposure to **increase to about 9% of land area (650,000 acres)**. Of this 81% is presently natural or vegetated.

RIVERINE FLOODING

The plan **does not include future-looking forecasts for riverine flooding.**

During the baseline scenario major flood event, 7.4% of land area in the coastal region – **more than 547,000 acres – is exposed to riverine flooding.**

Almost 80% of that area is primarily natural or vegetated.

Initial Findings from Phase II

PEOPLE

The number **of people likely to be impacted** by coastal flooding on an annual basis is expected to rise from about **14,500 to more than 360,000** under the long-term, high scenario.

5.8% of population is currently exposed to rainfall-driven flooding annually (over 350,000 people). This **increases to 6.8%** by the long-term, high scenario.

Presently, most of the population exposed to **coastal flooding** is in the **Hampton Roads region**, while most of the population exposed **to rainfall-driven flooding** is in the **Northern Virginia region**.

BUILDINGS AND ROADS

Presently**, 0.3% of buildings are exposed** to annual coastal flooding. By 2100, **this increases to 7.2%**. Building exposure to coastal flooding is most prevalent on the **Eastern Shore**.

Models show that buildings in **Northern Virginia** may currently see the most annual exposure to **rainfall-driven flooding** of all PDCs, totaling over 27,000 impacted annually.

The **total length of all roads** in the region exposed to coastal flooding annually is expected to **increase from 1% to 8% in the long-term**, high scenario. Presently, more than 5% of total road length is exposed to rainfall-driven flooding annually.

NATURAL INFRASTRUCTURE

Most of the natural features assessed were **wooded, tidal marsh, or forested wetland areas.** The plan also reviews impacts to beaches and dunes, emergent wetlands, marsh, and oyster sills.

About **two-thirds of the total land area** for non-shoreline assets were shown to be exposed to riverine flooding.

Modeling suggests that marshes may successfully migrate in the near term. However, net gains in marsh areas across the entire region in the long-term will face **challenges from upland infrastructure and accelerated SLR**.

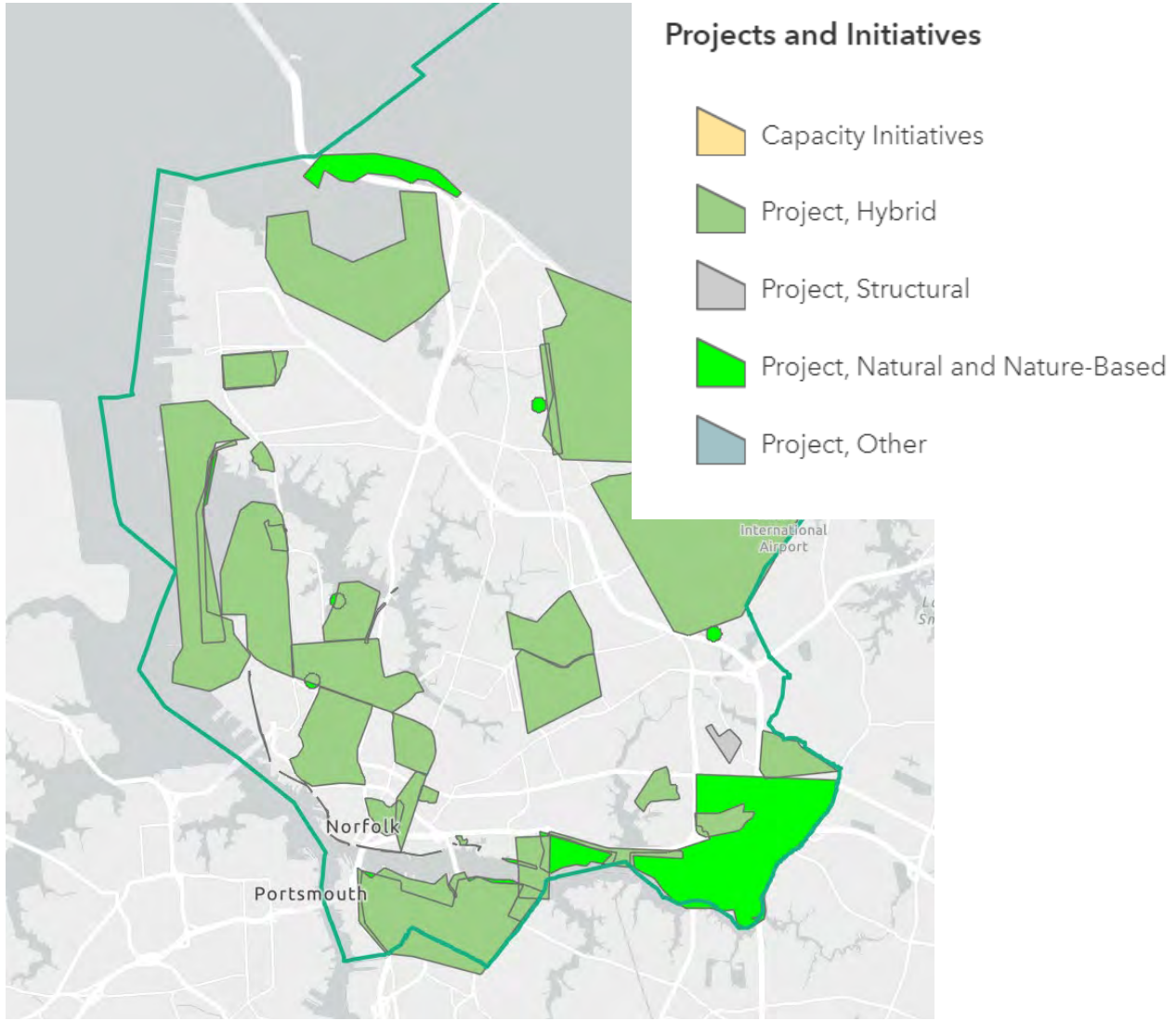
Projects and Initiatives

Programs, studies, plans or projects located in coastal Virginia which are led or supported by the government. They have a primary purpose to address the impacts of flooding on people, the environment or the economy.

The Coastal Resilience Web Explorer serves as the “living” inventory of these projects and initiatives.

HOW WAS THE INVENTORY DEVELOPED?

- August 2021: initial development completed via a data call for the Phase I Plan with PDCs and localities.
- August 2023: data call with PDCs to collect and update the existing inventory. Six of the 8 PDCs submitted updates.
- September 2023: Launched a user portal to allow project owners to make updates to the inventory any time.
- April 2024: Deadline to submit projects and initiatives for inclusion in the Phase II plan.
- July 2024: Data review and quality improvement completed.

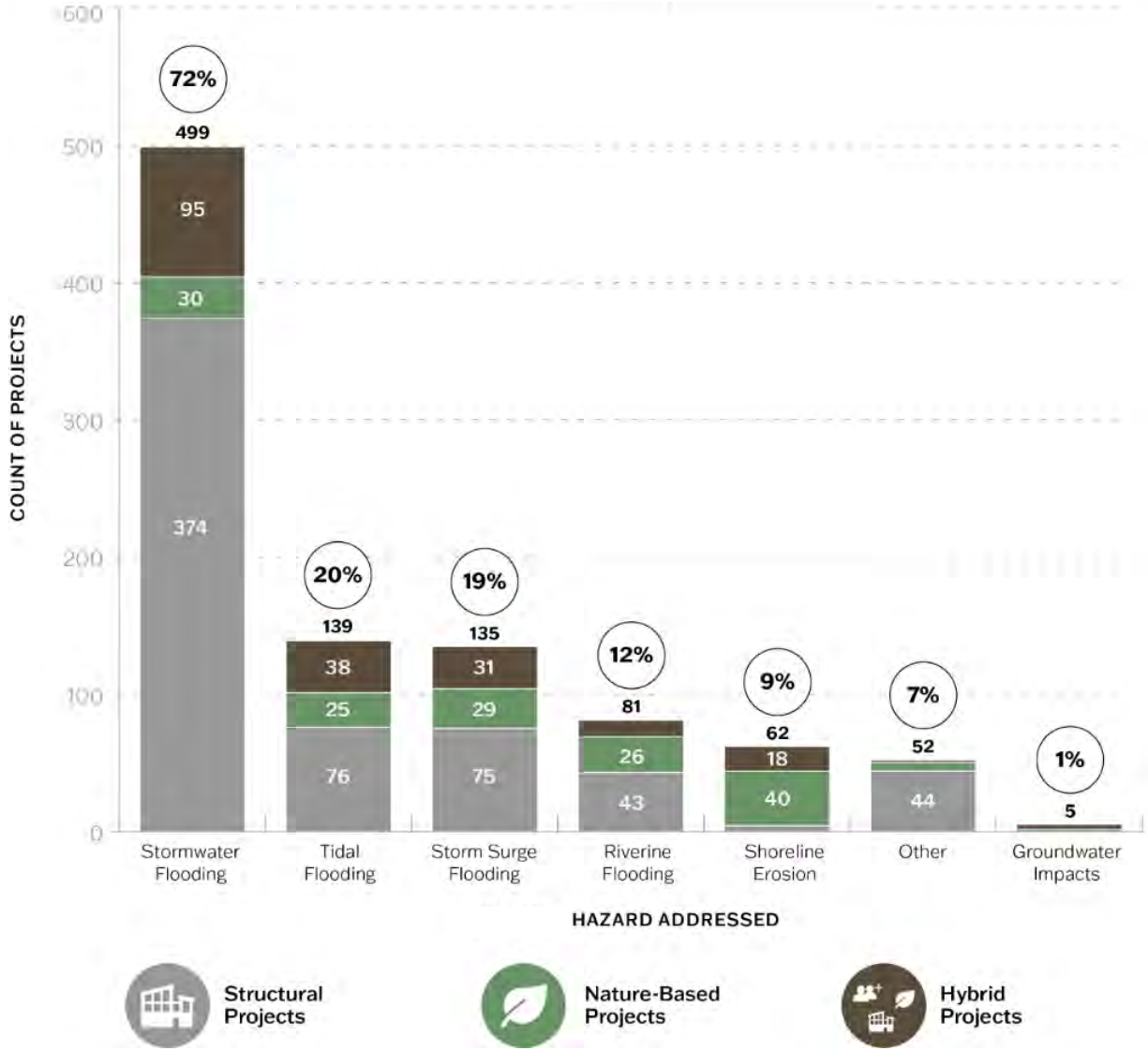


Projects in Norfolk, VA in the Coastal Resilience Web Explorer

Projects and Initiatives Analysis

Region Name	No. Projects & Initiatives	Project Costs	Initiative Costs	Funding Awarded*
Accomack-Northampton	87	$43 M+	$21 M+	$1.7 M+
Crater	22	$30M+	$1 M+	$8.4 M+
George Washington Regional	37	$27 M+	$17 M+	$97 K+
Hampton Roads	543	$6.9 B+	$224 M+	$93 M+
Middle Peninsula	22	$1.1 B+	$419 K+	$1.9 M+
Northern Neck	7	$6 M+	$737 K+	$183 K+
Northern Virginia	84	$548 M+	$304 M+	$31 M+
Plan RVA	129	$225 M+	$930 K+	$13 M+

*Funding awarded includes grants provided via the Community Flood Preparedness Fund (2021 – July 2024) and by the Virginia Department of Emergency Management between (2018 – July 2024)



Example Flood Resilience Projects

FLOODED ROADWAY TRAFFIC GATE

Project Type: Structural/Flood Risk Reduction

Prince William County implemented a tool that tracks and monitors real-time flood conditions. Through this system, the roads that are unsuitable for travel are closed. More high-water detection equipment will be installed in the most vulnerable areas in the County. The system includes rainfall and stream summaries, display thresholds, and alarms to support public safety and situational awareness.

Flooded road gate system example (Source: Versilis)

KENT GARDENS NEIGHBORHOOD STORMWATER IMPROVEMENT

Project Type: Community Infrastructure/Drainage Improvement

This stormwater improvement project in Fairfax County aims to assess a concrete channel network impacting the Kent Gardens Neighborhood. This project has various goals including targets for localized flooding, addressing public safety, and erosion, and community collaboration to develop and maintain solutions.

A concrete channel near Kent Gardens (Source: Fairfax County)

Example Flood Resilience Initiatives

ONANCOCK HISTORIC WHARF PRESERVATION AND PROTECTION PLAN

Action Owner: Town of Onancock

The Town of Onancock and the County of Accomack are working to develop a plan to guide resilience improvements and adaptation options to the historic wharf that faces lunar tide flood events. The area is both an active and an economic driver in recreation.

Onancock Historic Wharf and Marina (Source: Water Way Guide)

THE RAFT: MAINTAINING PROGRESS IN COASTAL VIRGINIA

Action Owner: University of Virginia, Old Dominion University, Virginia Tech, and community partners

The Resilience Adaptation Feasibility Tool (RAFT), developed by an interdisciplinary academic collaborative aids coastal communities in Virginia towards resilience improvement and targeting hazards created by coastal storms. The RAFT considers both economic and social factors in the assessment process.

Flooding in a RAFT target area (Source: University of Virginia)

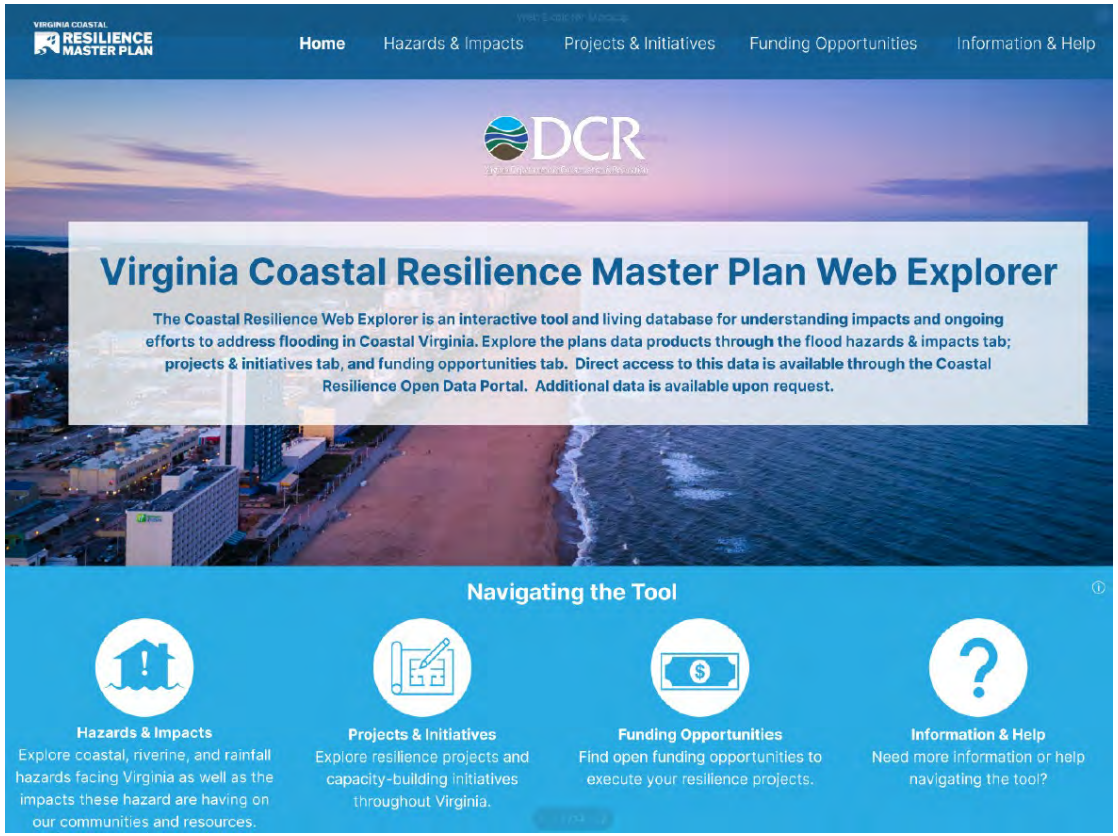
Recommendations of the Coastal Resilience Technical Advisory Committee

- Each subcommittee of the TAC is collaboratively developing recommendations to improve mitigation of severe and repetitive flooding in the coastal region.
- The Committee members will vote on the highest priority recommendations at their final meeting on November 13, 2024.
- DCR's Office of Resilience Planning will develop a strategy for adaptively implementing the plan after it's release, to include a strategy for advancing the final priority recommendations.

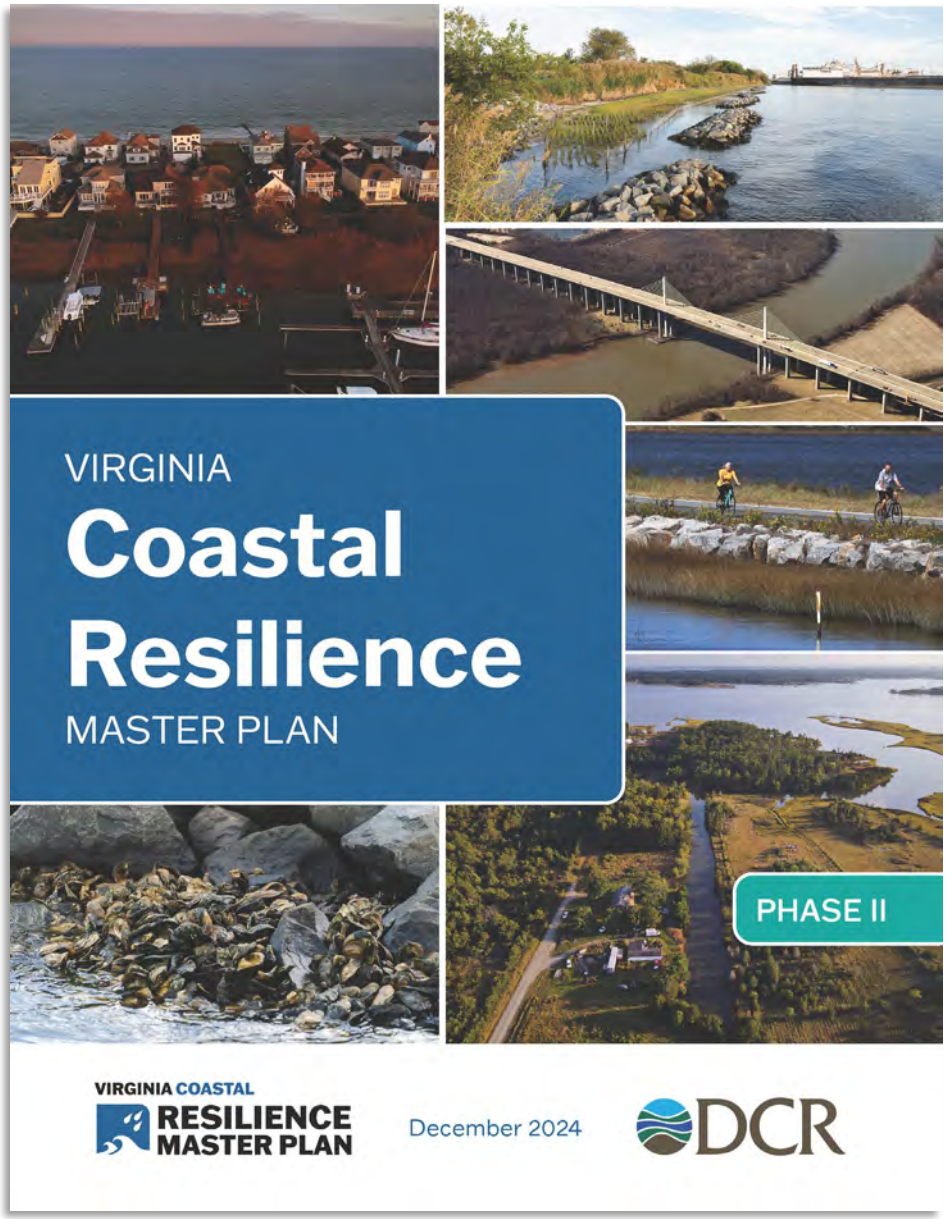
EXAMPLE ILLUSTRATIVE RECOMMENDATION

The DCR Office of Resilience Planning should develop and maintain a comprehensive list of available funding resources which can be leveraged to sustainably support uptake and implementation of the Coastal Resilience Master Plan, Phase II.

Tying it All Together: What to Expect



Coastal Resilience Web Explorer
Conceptual Draft Landing Page



Draft Plan Cover Page

VIRGINIA COASTAL
RESILIENCE
MASTER PLAN

Stay Involved in the Plan

ATTEND OUR NEXT ROUND OF WEBINARS

- Two more webinars coming when the plan is released. (Anticipated December 2024)
- Receive updates on the final plan and information about public comment.

PARTICIPATE IN PUBLIC COMMENT

- Provide your thoughts on the plan and ideas for improvement.
- Plan will be posted to Virginia Town Hall for a 45-day public comment period.

SHARE YOUR FLOOD STORY

- Visit DCR's web app to submit photos and info about your experiences with flooding to help inform our plans.

http://www.dcr.virginia.gov/floodstory

Thank you!

DCR
Virginia Department of Conservation & Recreation

VIRGINIA COASTAL
RESILIENCE
MASTER PLAN

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Questions

Feedback Survey