Coastal Resilience
Technical Advisory Committee

Quarterly Meeting

March 13, 2024

1:00 PM – 4:00 PM

East Reading Room, Patrick Henry Building

1111 E Broad St, Richmond, VA 23219

3/13/2024   COASTAL RESILIENCE TAC MEETING   **DCR** Virginia Department of Conservation & Recreation

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Meeting Agenda

1) Call to Order and Roll Call
2) Adoption of the Agenda
3) Adoption of Meeting Minutes
4) Reports from DCR
   1) General DCR Updates
   2) CRMP Updates
5) Reports from TAC Subcommittees
   a. Research, Data, and Innovation Subcommittee
   b. Project Prioritization Subcommittee
   c. Funding Subcommittee
   d. Outreach and Coordination Subcommittee

6) Old Business
   1) VFPMP Flood Hazard Data
7) New Business
   a. Subcommittee Recommendations Process Overview
   b. TAC Member Updates
   c. Other Items for Discussion
8) Public Comment

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Reports from DCR

Legislative Update

Resilient Virginia Revolving Fund

Community Flood Preparedness Fund

Resilience Planning and Consulting RFP

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Legislative Update

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TAC Meeting Slides

Resilient Virginia Revolving Fund

Reopened in February as a continuation of Round 1.
Applications accepted and evaluated on rolling basis **through June 30, or until funds exhausted**.

Total Available: **$12.5 M**

Category	Amount	Award Type	Notes
Local Match for Non-Federal Programs	$5,000,000	Loans	Below market-rate loans for localities to use as non-federal match for flood mitigation grants (FMA, HMA, CDBG, BRIC, etc).
Hazard Mitigation of Buildings	$7,500,000	Loans	Below market-rate loans for projects related to the hazard mitigation of buildings. Awards are for discrete projects that localities wish to support (may be on private property). Satisfies statutory requirement that a portion of the RVRF be set aside for this purpose.

Details available at: https://www.dcr.virginia.gov/dam-safety-and-floodplains/rvrf

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Community Flood Preparedness Fund Round 4

- 36 applicants submitted a total of 66 CFPF applications (between 1-6 applications/community)
- Total requested amount: ~$76M to support $147M of flood resilience actions

	Applications Submitted	~Amount Requested	~Total Costs	~% of Funds Requested by Communities Qualifying as Low Income
Capacity Building and Planning	18	$6,600,000	$8,000,000	58%
Studies	18	$9,700,000	$11,100,000	94%
Project	30	$59,800,000	$127,900,000	54%
Total	**66**	**$76,100,000**	**$147,000,000**	**60%**

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Resilience Planning and Consulting Contract

Services to Support Office of Resilience Planning

Awarded Contractors
- AECOM
- Arcadis
- Dewberry
- Stantec

Initial Task Orders
- Coastal Resilience Master Plan Phase II
- Coastal Resilience Web Explorer Update
- Virginia Flood Protection Master Plan
- Outreach for Flood Resilience Planning

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Office of Resilience Planning Staffing Update
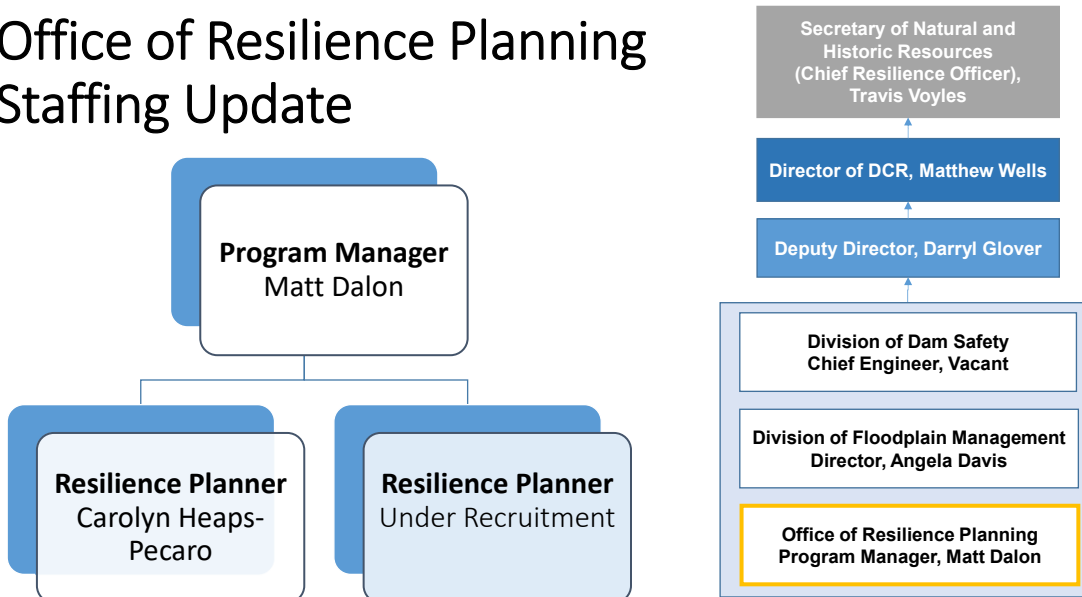
Program Manager
Matt Dalon

Resilience Planner
Carolyn Heaps-Pecaro

Resilience Planner
Under Recruitment

Secretary of Natural and Historic Resources (Chief Resilience Officer), Travis Voyles

Director of DCR, Matthew Wells

Deputy Director, Darryl Glover

Division of Dam Safety Chief Engineer, Vacant

Division of Floodplain Management Director, Angela Davis

Office of Resilience Planning Program Manager, Matt Dalon

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TAC Discussion

Virginia Coastal Resilience Master Plan, Phase II

Phase II Overview

End User Survey Results

Subcommittee Report-Outs & Staff Updates

CRMP Phase II – December 2024

Phase 2 Code Requirements [2022 GA HB516/SB551 now §10.1-658, 659]

- SACAP in coordination with DCR, shall update the Virginia Coastal Resilience Master Plan no later than December 31, 2024 (every 5 years thereafter)

- CRMP shall be a place-specific plan for mitigating severe and repetitive flooding and shall [adhere to the Framework Principles]

- Phase 2 will incorporate:
    - all major flood hazards, including precipitation-driven flooding
    - a comprehensive risk assessment of critical human and natural infrastructure
    - a list of all projects considered and an update of the status of all projects previously implemented

- Phase 2 will implement the Community Outreach and Engagement Plan

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CRMP Phase II – December 2024

This planning process will result in two major deliverables:
1) a PDF Document Plan
2) an updated Coastal Resilience Web Explorer

The key components of these two deliverables are:
1) Flood Hazard Exposure Model
2) Flood Hazard Impact Assessment
3) Planned Resilience Actions
4) Financial Needs for Flood Resilience
5) TAC Subcommittee Recommendations

Outreach and engagement will be utilized throughout the plan's development to collect feedback on the content and direction of these key components.

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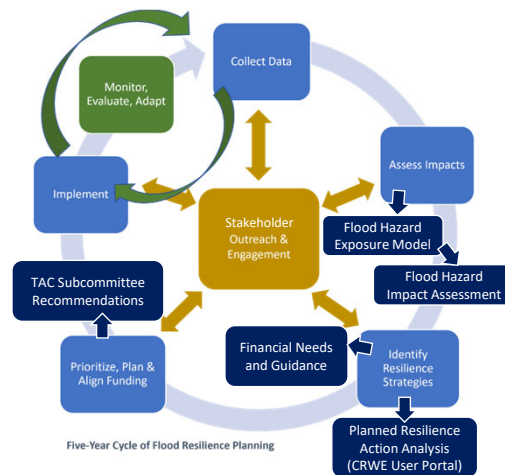
Contractor Support for CRMP Phase II

Dewberry:

- Flood hazard data
- Impact assessment
- ~~End user survey analysis~~
- Web explorer update mock-up

***Status**: in progress*

TBD Contractor(s):

Plan Delivery Contract:

- Projects & initiatives analysis
  - Includes assistance to end users to submit actions
- Stakeholder engagement
- Final report development

Additional Contract(s):

- Financial tools and information
- Web explorer updates

***Status:** DCR soliciting task order proposals*

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Plan Development Timeline

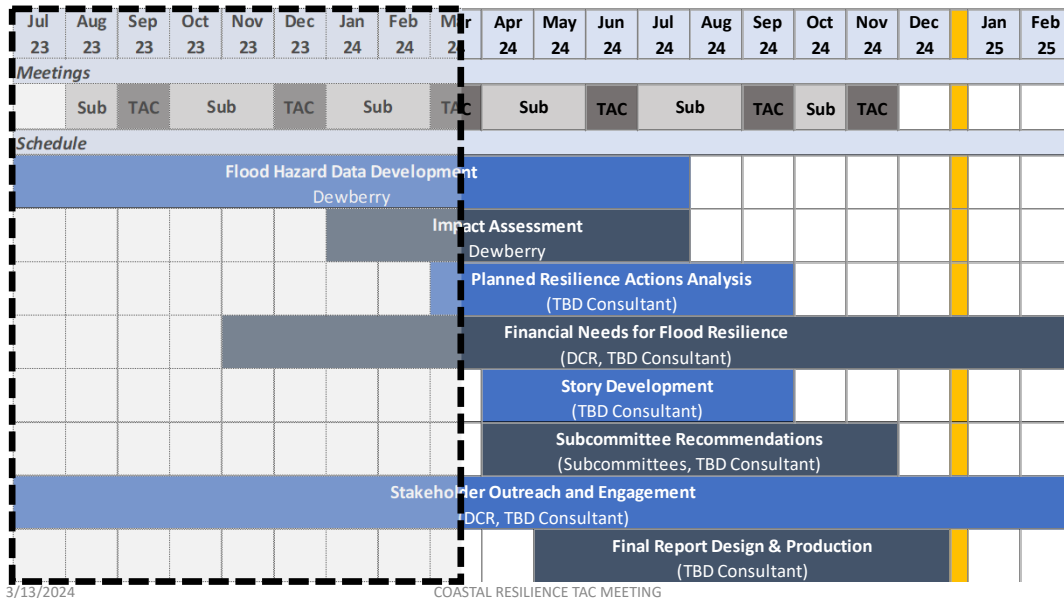|	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Jan 24	Feb 24	Mar 24	Apr 24	May 24	Jun 24	Jul 24	Aug 24	Sep 24	Oct 24	Nov 24	Dec 24	Jan 25	Feb 25
Meetings																				
		Sub	TAC	Sub		TAC	Sub		TAC	Sub		TAC	Sub		TAC	Sub	TAC			
Schedule																				
Flood Hazard Data Development (Dewberry)																				
Impact Assessment (Dewberry)																				
Planned Resilience Actions Analysis (TBD Consultant)																				
Financial Needs for Flood Resilience (DCR, TBD Consultant)																				
Story Development (TBD Consultant)																				
Subcommittee Recommendations (Subcommittees, TBD Consultant)																				
Stakeholder Outreach and Engagement (DCR, TBD Consultant)																				
Final Report Design & Production (TBD Consultant)																				

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TAC Discussion

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End-User Survey

41 responses from intended end-users.

Respondents included:

- All eight coastal PDCs
- One tribal government
- Six state agencies:
  - DEQ
  - DCR
  - DHCD
  - VDEM
  - VDOT
  - Virginia Port Authority

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End-User Survey

Key Takeaways:

- Most respondents think the Phase I products are useful.
    - The Web Explorer is most used
    - Open data downloads are least used
- The CRMP products have previously been utilized for a wide variety of use cases
    - Across all use cases, many more respondents said they will use the products in the future than said they have used the products previously.
- Respondents are overwhelming interested in funding flood resilience with federal or state grants and are not considering other types of funding.
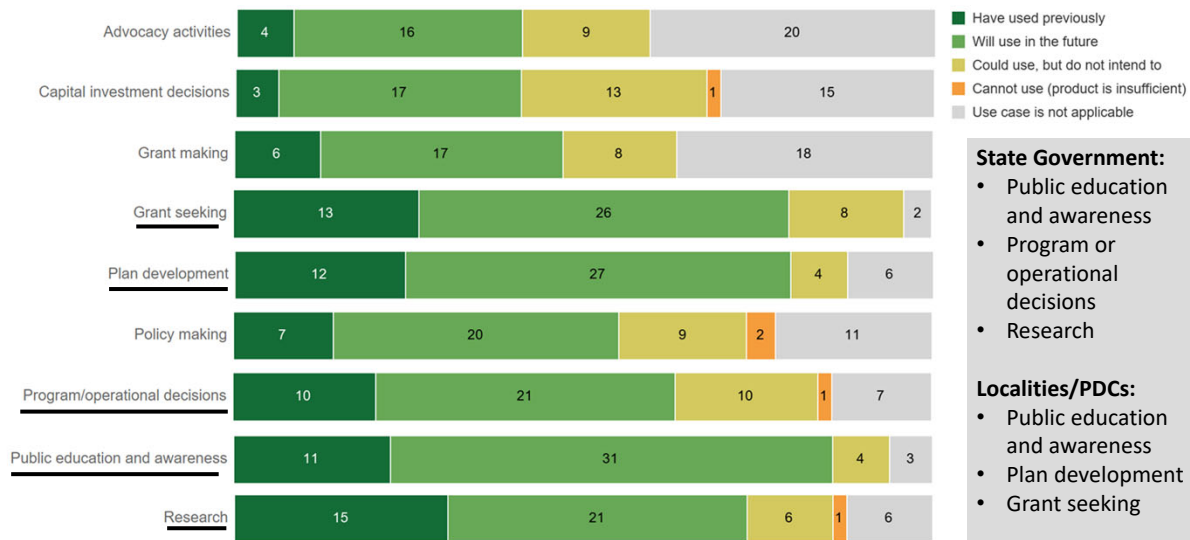- Respondents see clear opportunities for the Commonwealth to support flood resilience.

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How have/can the Phase I products be used?

State Government:
- Public education and awareness
- Program or operational decisions
- Research

Localities/PDCs:
- Public education and awareness
- Plan development
- Grant seeking

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TAC Meeting Slides

Figure 11. Responses to "What types of financing have you *sought* to fund your flood resilience activities (projects, staffing, initiatives, planning, etc.)?" broken down by organization type.

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Figure 12. Responses to "What could the Commonwealth do to help address barriers that prevent you from seeking or accessing funding for flood resilience activities?" broken down by organization type.
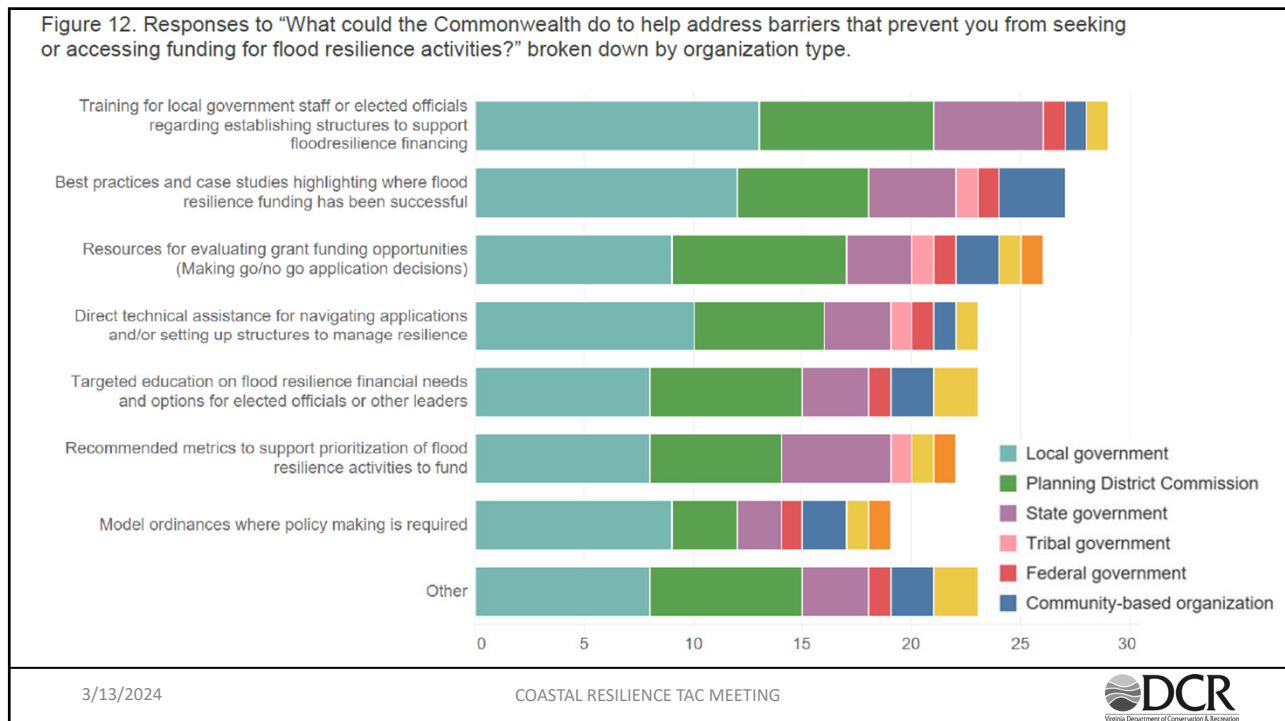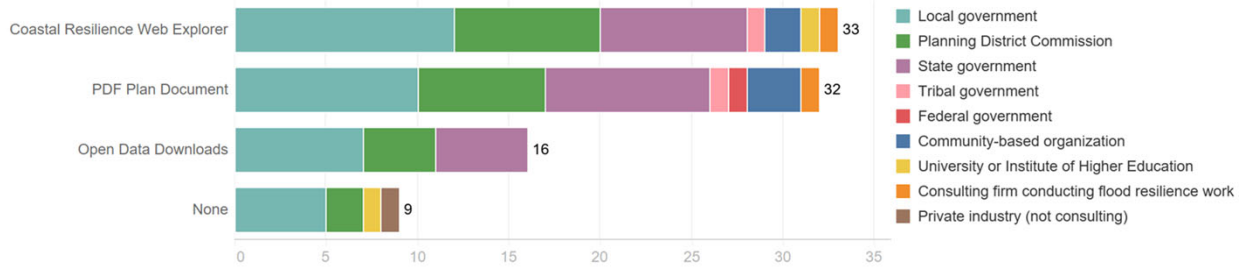
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Which products have been used?

How we will use the feedback received:
- Final CRMP Phase II products content (analysis, narrative, format)
- TAC Subcommittee Recommendations (especially funding)
- Approach to sharing the final products (open data downloads, locations of content on website)
- Messaging about the benefits of the plan

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TAC Discussion

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Reports from TAC Subcommittees

Research, Data, and Innovation Subcommittee
Project Prioritization Subcommittee
Funding Subcommittee
Outreach and Coordination Subcommittee

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Research, Data and Innovation Subcommittee

Quarter 1 Update

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Research, Data, and Innovation Objectives

1. **Inform Development of Flood Hazard Exposure Model.**
   Using the best available data, provide recommendations to DCR and Dewberry to select pluvial modeling approach (including climate scenarios), advise on the selection of fluvial modeling data and scenarios, and advise on approach to compound flooding joint probability analysis.

2. **Inform Inputs to Flood Hazard Risk Assessment.**
   Based on the flood hazard exposure model developed, advise DCR and Dewberry on how to utilize the flood hazard model for conducting the flood hazard risk assessment.

3. **Develop recommendations for future planning.**
   This includes, but is not limited to:
   - Develop a data development plan to fill gaps in advance of future planning processes. **Consider research and data products that can meet the state's needs**.
   - **Advise on innovations suited to address flood risks and fill gaps in resilience action** for future planning efforts. Consider R&D, public-private partnerships, collaborative research.

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Subcommittee Meeting Summary

- Old Business
  - VFPMP Flood Hazard Data
  - Integrated Flood Hazard Scenarios for Planning
- New Business
  - Combined Flood Hazard Analysis and Visualization

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Subcommittee Comment Summary

- Guidance and Technical Support is Needed for Implementation
  - It is difficult to serve multiple end users with the single product. Different stakeholders have different applications. This should be as flexible as possible.
  - DCR needs to help users walk through this data and locate what data they should be using. This is a messaging issue to show how this data fits in with the decisions the users are making.
  - The sea level rise planning curves assume that the rates change over time, but there is variability that does not go away. Guidance needs to make that clear as well.
  - Decision-makers will need a guide to what risks they need to look at for their area, and then how to look at those hazards.
- Seek Additional External Input
  - Pluvial Flooding: The MARISA IDF RCP 4.5 and RCP 8.5 numbers similar. Subcommittee recommended using RCP 4.5 and DCR should seek additional input on the 75th % or the 90th % for the low risk tolerance scenario.
  - VFPMP Flood Hazard Data: DCR to seek additional input from NOAA.

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Subcommittee Additions

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TAC Discussion

Questions and Comments

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CRMP Phase 2
Flood Resilience Planning Scenarios

Existing
Conditions
(~2020-2025)

Near Future
(~2030 – 2060)
• Moderate Risk
  Tolerance
• Low Risk Tolerance

Far Future
(~2060 – 2100)
• Moderate Risk
  Tolerance
• Low Risk Tolerance
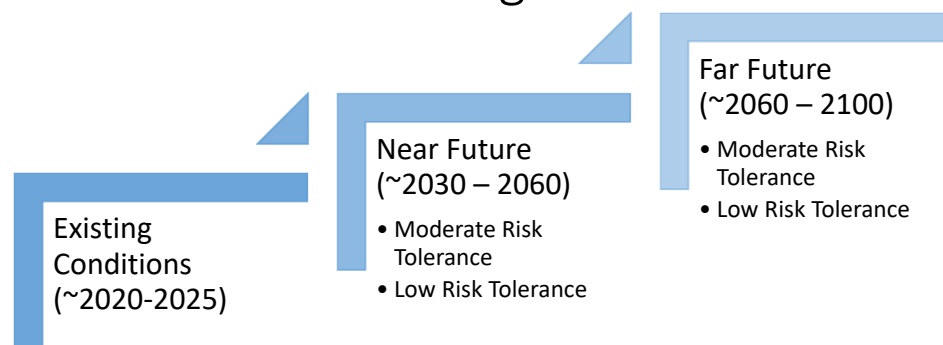
Risk Tolerance
- Moderate ~ Minimum Planning Standard?
- Low ~ Critical Infrastructure Planning Standard?

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Flood Hazard Data Time Horizons

	2000	2020	2030	2040	2050	2060	2070	2080	2090	2100
Coastal		2017 Int-High		2017 Int-High		2017 Int-High		2017 Int-High		2017 Int-High
Pluvial	Atlas 14		RCP 4.5							
			RCP 8.5							
							RCP 4.5			
							RCP 8.5			
Fluvial	FEMA									

Existing Conditions | Near Future (2030-2060) | Far Future (2060-2100)

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Phase 2 Flood Resilience Planning Scenarios?

Planning Horizon	Existing Conditions ~2020-2025	Near Future ~2030-2060		Far Future ~2060-2100	
Risk Tolerance		Moderate	Low	Moderate	Low
Coastal	2020 CRMP	2040 CRMP	2060 CRMP	2060 CRMP	2080 CRMP
Pluvial	Atlas14	2020-2070 RCP 4.5 Median	2020-2070 RCP 4.5 90th %	2050-2100 RCP 4.5 Median	2050-2100 RCP 4.5 90th %
Fluvial	FEMA	FEMA	FEMA	FEMA	FEMA

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TAC Discussion

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Project Prioritization Subcommittee

Quarter 1 Meeting Updates

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Subcommittee Objectives
Project Prioritization

1. **Inform and support the flood hazard risk assessment.**
   - Specifically: the asset data inputs; the approach to quantifying the vulnerability of assets; and impact assessment outputs needed to support decision-making, coordination, and collaboration.

2. **Inform and support the identification of planned resilience actions.**
   - Specifically, identify shared themes, and gap trends between projects and initiatives submitted to the Coastal Resilience Web Explorer User Portal.

3. **Develop recommendations for future planning.**
   This includes, but is not limited to:
   - Identify goals and associated metrics for resilience that should be used to determine project/needs evaluation and prioritization in future plans.
   - Develop objective protocols for evaluating and prioritizing identified project **needs** for the Coastal Region.
   - Develop a process and objective protocols for evaluating and prioritizing resilience **actions**. (Consider separate evaluation protocols for critical human, built, and natural infrastructure needs.)

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Q1 2024 Meeting Topics

- Reviewed end-user survey results

- Received update on impact assessment from Dewberry

- Received update on planned resilience actions analysis from DCR

- Discussed subcommittee recommendations development

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Flood Hazard Impact Assessment

Updates from Dewberry

The Phase II updated impact assessment will:

| Revisit Phase I data and methods | Expand flood hazard types assessed | Expand set of impact indicators | Improve data quality | New data products |

Graphic developed by Dewberry

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Impact Assessment Review & Discussion

Reviewed:
- Process for assessing impacts for different asset types and metrics.
- List of asset data sources and associated metrics.

Discussed feedback and requests for more information:
- **Septic impacts** – request more information about VIMS' ongoing work to assess septic vulnerability.

- **Water supply impacts** – suggest investigating America's Water Infrastructure Act (AWIA) risk and resilience assessments.

- **Social vulnerability and impacts** – suggestions to use downscaled data, simplify representation of gridded geographic outputs, improve messaging.

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Planned Resilience Actions Analysis

Updates from DCR

- Reviewed status of projects & initiatives data collection

- Revisited approach to projects & initiatives in Phase I
  - Purpose, challenges, presentation of results, TAC subcommittee recommendations

- Discussed next steps for Phase II
  - Contractor support timeline, types of analyses to produce, request for feedback on presenting results

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Planned Resilience Actions

Subcommittee Discussion and Feedback

- Interested in synthesizing information learned about resilience actions. Specifically:
  > "**Providing guidance on the type and location of projects** that will advance the Commonwealth's flood resilience goals"

- Requested info on **geographic gaps in resilience actions.**

- Identified the question: should DCR/the TAC **provide feedback on the appropriateness** of individual actions inventoried?

- **Expressed concern** that remaining **meeting time will be insufficient** to review planned resilience actions analysis, deliberate, and develop strong recommendations.

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Next Steps

- DCR will:
    - Circulate impact assessment methodology and updated asset data list for subcommittee review and feedback.
    - Provide additional information on VIMS' septic vulnerability work.

- Subcommittee will:
    - Review Phase I Recommendations and End-User Survey results prior to next meeting.

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Subcommittee Additions

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Questions and Comments

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Flood Hazard Impact Assessment

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Impact Assessment Process

In Dewberry scope

In future scope

Asset List Review
Developing the base asset database

Methodology Review
Updating the impact calculation methodology

⭐ **January - April**

Impact Assessment and Data Summary
Overlay hazards data on assets to estimate impacts.

March - July

Flood hazard data inputs are due in April.

Data Review and Story Development
Identify and summarize the most important findings to communicate in the plan.

July - September

Will also incorporate qualitative data and input, and separate contextual data analysis.

Final Product Design and Delivery
Communicate the key data and stories in the plan.

August - December

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Impact Assessment: Progressive Levels of Detail

Hazard Model → Asset Location

Exposure

Asset Characteristics

Semi-Quantitative Assessment Approaches

Vulnerability

Financial Consequences

Quantitative Assessment Approach

Risk

Existing Asset Data

Figure 7: Asset information required to describe impacts with varying levels of detail.

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Impact Assessment: Methodology

Inputs	Key Processes	Calculation Results

All Event Floodplains

Asset Locations

Annual Likelihood of a Asset Flooding

Annual Likelihood of an Asset Experiencing Flooding

Annualized Number of Assets Experiencing Flooding

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Planned Resilience Actions Analysis

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Planned Resilience Actions Analysis

Results may include:

- Summarize needs
  - Number, cost, and type of action for each locality, watershed, planning district, and full coastal region
- Identify themes
  - Common classes, types of actions
- Identify gaps
  - Areas with no actions that are at high flood risk
- Highlight opportunities
  - Potential coordination opportunities based on geographic proximity, action type

Required Fields:
- Location
- Phase
- Scale of Benefits
- Coastal Hazards Addressed
- Climate Scenarios
- Class/Type/Subtype
- Implementation Cost

Optional Fields:
- Estimated Start Date
- Estimated End Date
- Design Life
- Additional Costs (Planning, Engineering, Permitting; Construction; Operations)
- Permitting Status
- Funding - Cost-Share Capacity
- Funding - Administrative Capacity

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TAC Discussion

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Funding Subcommittee

Quarter 1 Meeting Updates

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Funding Subcommittee Objectives

- Inform quantification of financial need for flood resilience.
  - What funding needs should be identified in the CRMP Phase II, including to guide appropriations needs?
- Identify and examine financial tools and processes that are suited and/or needed to implement flood resilience.
- Identify challenges/opportunities to implementing financial tools.
- Develop recommendations for future planning.
  This includes, but is not limited to:
    - Recommend approach to quantifying and presenting financial need for flood resilience during future planning efforts.

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2024Q1 Subcommittee Meeting Summary
Peer State Review of Resilience Plans Financial Sections

- Louisiana Coastal Resilience Master Plan (5th Edition)
  - ~$50B Plan (Restoration and Risk Reduction Projects)
  - Plan includes Avoided land loss, damaged, and structural damages.
- Texas Coastal Resiliency Master Plan (5th Edition)
  - Economic drivers in different regions
  - $1.87B for 121 projects
  - Defined project benefit area and project metrics (Economic, Environmental, Social Benefits)
  - Focus on leveraged funding
- Florida Statewide Resilience Plan
  - Resilient Florida Trust Fund of $100 million for Year 1 (FY 2024-25)
  - Florida received 196 eligible proposals totaling $1.8B

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Gathering Stakeholder Input

Gather Stakeholder Input

Develop Plan Products

Make Informed Decisions

- End User Survey
- Subcommittee Survey

- CRMP Phase II
- VFPMP
- Financial Resources

- Local
- Regional
- State Agency

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Subcommittee Discussion Summary

- Need to review direct and indirect impacts and project benefits methodology for flooding, but also other natural hazards (i.e. wildfire)
- What is the level of effort needed to implement these methodologies for project benefits? Does the project database have sufficient information?
- Beyond project-specific costs, the subcommittee should also consider costs associated with each funding source (i.e. reimbursement costs, long-term maintenance costs).
- Need for financial impacts to be characterized between private and public.
- The subcommittee should consider addressing the gap between funding programs and the planning process in proposed recommendations.

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Subcommittee Additions

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TAC Discussion

Questions and Comments

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DCR Update

Subcommittee Survey Results

Financial Information Plan

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Funding Subcommittee Lines of Effort

LOE-1   Building the Financial Baseline

LOE-2   Making the Financial Case

LOE-3   Document Opportunities for State Support

LOE-4   Providing Guidance and Information

Prioritizing Funding Efforts

	Metric	Description	1 – Low	3 – Medium	5 – High
Subcommittee	Impact	How impactful will this information be to building flood resilience?	This information is nice to have but not necessary.	This information can help overcome a small hurdle to progress.	This information can help overcome a major hurdle to progress.
	Urgency	When does this need to be delivered by?	Rolling Basis	2025 VFPMP	2024 CRMP
DCR/Contractor	Feasibility	How feasible will it be to produce the requested information? (technical, schedule, ..)	It will be very difficult to meet the request.	There are some obstacles, but progress can be made.	There are minimal obstacles to meet the request.

Building the Financial Baseline

Financial Need	Impact	Urgency
Locality funding readiness	4.7	4.7
Geographic funding priority areas	4.0	3.7
Locality financial capacity	3.7	3.7
Natural infrastructure baseline assessment	4.0	3.3
Public-private lands data	3.3	3.0
Economic baseline data	3.3	2.7
Natural infrastructure local/MPPDC assessment	3.0	2.7

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Making the Financial Case

Financial Need	Impact	Urgency
Quantifying direct economic impacts	4.7	4.7
Property tax impacts	4.3	4.0
Indirect impact mapping	4.0	3.7
Quantifying co-benefits	4.3	3.3
Quantifying indirect economic impacts	4.0	3.3

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Document Opportunities for State Support

Financial Need	Impact	Urgency
Financial training and technical support	4.3	4.0
Financial services gaps analysis	4.3	4.0
Financial services goals	3.7	3.7
Scaling financial programs	3.3	2.7
CFPF resilience funding overview	2.7	2.3

Providing Guidance and Information

Financial Need	Impact	Urgency
Financial tool sheet - financing	4.3	4.3
Leveraging state and federal funds guidance	4.3	3.3
Financial adjacent tool sheet	3.7	3.7
Financial tool sheet - funding	3.7	3.3
Financial process map	3.7	3.3
Stacking financial tools guidance	3.7	3.0
Adapt vs Relocate public infrastructure guidance	3.7	3.0
Parametric feasibility insurance	3.7	2.7
Private land implementation guidance	3.0	2.3

TAC Discussion

Outreach and Coordination Subcommittee

Quarter 1 Meeting Updates

Subcommittee Objectives
Outreach and Coordination

1. **Inform and support outreach and engagement for the CRMP Phase II.**
   Specifically: identify and prioritize stakeholders to engage; advise on purpose, goals and strategies for stakeholder engagement consistent with DCR's COEP; guide implementation of engagement strategies.

2. **Strengthen relationships with key stakeholders identified as critical to engaging in the CRMP Phase II.**
   - Examples include, but are not limited to minority communities, Tribal Nations, the Department of Defense, critical infrastructure facility owners, and other federal facilities owners.

3. **Develop recommendations for future planning.**
   This includes, but is not limited to:
   - Identifying sustainable outreach and engagement goals and strategies for state support to build coastal resilience beyond CRMP Phase II.
   - Developing locality capacity and needs assessment approaches.

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Q1 Meeting Topics
Outreach and Coordination Subcommittee

- Reviewed the O&E Strategy goals
- Received updates and provided feedback on O&E Strategy implementation:
  - Sharing the strategy with the public
  - Schedule of activities
  - End-User Survey results
  - Update on planned activities (status, details)
- Discussed information needed to develop recommendations

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O&E Strategy Implementation

Subcommittee Feedback

Flood Impacts Participatory Mapping:
- Consider opportunities to pull in multiple sources of crowd-sourced flood impacts spatial data into a single mapping tool (i.e., new VFRIS Flood Stories, Catch the King, locality 411, etc.)

Stakeholder Meetings – Coordination Opportunities:
- Partner with USACE to host local government staff meetings for Hampton Roads Peninsula together with the Peninsula Coastal Storm Risk Management Study kick-off meetings.
- Collaborate with USACE in upcoming underserved community meetings to share information about available Corps' assistance.
- Invite federal partners to participate in relevant meetings in Hampton Roads directly.

Subcommittee Recommendations

Potential Materials to Support Deliberation

DCR Activities:
- Status update on progress toward engaging identified stakeholders in the plan.
- Summary of communities identified as underserved and at flood risk.
- Updates from engagement with tribes.
- Map of grant funding for flood resilience by locality (DCR Community Flood Preparedness Fund, but also FEMA, and other federal sources)

Others' Activities:
- Overview of flood resilience O&E activities conducted by NGOs in coastal region.
- Graphical representation of plans that already exist to address flood resilience in the region.

Next Steps

DCR Staff will:

• Incorporate feedback on outreach and engagement implementation.
• Connect offline with subcommittee members regarding coordination opportunities.
• Develop materials for recommendations discussion.

TAC Subcommittee members will:

• Review the Phase I TAC recommendations and End-User Survey results prior to the next meeting.

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Subcommittee Additions

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TAC Discussion

Questions and Comments

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CRMP Phase II O&E Goals

Five-Year Cycle of Flood Resilience Planning

1. **Understand** how the plan can be leveraged by intended **end users**.
    State agencies, PDCs, localities, tribes.

2. **Contextualize** the plan's content with qualitative data on **flood impacts**.

3. **Contextualize** the plan's content with information on planned and ongoing **interventions** to address risk in the planning area.

4. **Drive awareness** of, and empower whole community action toward, coastal flood resilience.

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Outreach and Engagement Activities

Activity	Complete by	Status	Stakeholders	O&E Strategy Goals
1 Coastal Resilience TAC	Ongoing (quarterly)	**In progress**	Primary plan end users and partners	All goals
2 NGO Coordination Meetings	Ongoing (monthly)	**In progress**	Non-profits and other partners	Drive awareness (4)
3 Critical Infrastructure Working Group (led by VDEM)	Ongoing	**In progress**	Critical infrastructure owners and managers	Understand end users (1); Contextualize interventions (3); Drive awareness (4)
4 End-User Survey	Jan '24	**Complete**	Primary plan end users	Understand end users (1)
5 Participatory Mapping (Flood Story)	Mar '24	Development	Public	Contextualize flood impacts (2)
6 Locality Meetings	May '24	Development	Local governments	All goals
7 Resilience User Portal & Data Call	Apr '24 / Jun '24	**In progress**	Primary plan end users	Contextualize interventions (3)
8 Tribal Engagement Meeting(s)	Jun '24	**In progress**	Tribal governments	All goals
9 Underserved Community Meetings	Aug '24	Development	Underserved communities	Contextualize flood impacts (2); Drive awareness (4)
10 Virtual Public Meetings (mid-point / end-point)	August '24 / Dec '24	Not started	Public	Drive awareness (4)
11 Private Sector Meeting	Sep '24	Not started	Private sector	Drive awareness (4)
12 Federal Facility Owners Meeting	Sep '24	Not started	Federal facility owners	Drive awareness (4)
13 PDC Interviews	Sep '24	Not started	Planning District Commissions	Understand end users (1); Contextualize flood impacts (2); contextualize interventions (3);
14 Public Comment	Feb '25	Not started	Public	Contextualize flood impacts (2); Contextualize interventions (3)

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DCR Flood Story App

Participatory Mapping Tool

- Publicly accessible online tool
- Survey 123 app format
- Entries will collect:
  - Date
  - Description
  - Type of flooding
  - Frequency of flooding
  - Impacts of flooding
  - Photos
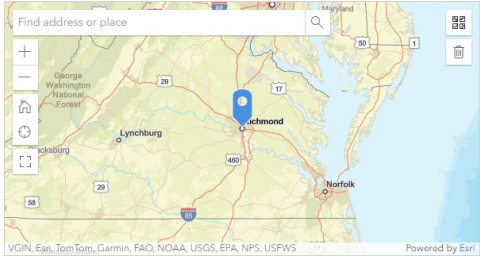- Will be reviewed by staff before being posted to view

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Resilience User Portal & Data Call

Virginia's Coastal Resilience Master Plan update is underway!

Will your organization's flood resilience priorities be represented in the plan?

The Phase II Coastal Resilience Master Plan will include an updated inventory of planned actions to build resilience to all forms of flooding across Virginia's eight easternmost planning district commissions.

The "living" inventory is available online via the Coastal Resilience Web Explorer.

Act by April 1, 2024 to make sure the plan reflects your flood resilience actions!

Benefits of participating include:
- ✓ Showcase resilience priorities and accomplishments in an adopted state plan.
- ✓ Help create an accurate record of flood resilience funding needs.
- ✓ Access recommendations for grant and loan funding opportunities for your projects.
- ✓ Take part in regional collaboration and knowledge sharing.

Check out the "living" inventory online: dcr.virginia.gov/crmp/ResilienceExplorer

VIRGINIA COASTAL RESILIENCE MASTER PLAN

What is Virginia's Coastal Resilience Master Plan?

- Overview of present and future flooding challenges and opportunities in the coastal region of Virginia.
- Place-specific resource to aid in mitigating severe and repetitive flooding from all flood sources.
- Decision support tool for state leaders, regional and local governments, and other flood resilience partners.

Learn more online: dcr.virginia.gov/crmp/plan-phase2

What types of actions should I submit?

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

How do I get started?

➤ **Option 1: If you have action info ready to go...**
Submit actions directly to the web explorer by April 1 via DCR's user portal. Get started at: dcr.virginia.gov/crmp/user-portal.

➤ **Option 2: If you need a little help getting organized...**
Email us at flood.resilience@dcr.virginia.gov by April 1 to request technical assistance uploading your actions to the inventory.

Remember: *you may already have actions in the inventory!* There are already more than 600 actions included. Many were submitted in 2021. In addition to submitting new entries, be sure to review and update any existing entries.

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TAC Discussion

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Old Business

VFPMP Flood Hazard Data

Virginia Flood Protection Master Plan

Purpose

An **actionable plan for state government** to use in crafting **policies and programs** to mitigate the impacts of flooding on people, the economy, and the environment.

Details

• Dec. 2025 timeline for delivery

• Updated every five years

• Est. in Code §10.1-602

Elements

1. Flood Impact Summary

2. Flood Resilience Gaps Analysis

3. Policy and Program Strategy

4. Flood Resilience Resources

	Virginia Flood Protection Master Plan	Regional Flood Resilience Master Plans	Local Flood Resilience Plans
Plan Owner	**State** – DCR	**State** – DCR	**Localities** (Towns, Cities, Counties, Planning District Commissions), **Tribes**
Scale	**Statewide**	**Master region** (ex., Coastal region)	**Locality**
Flood Data Resolution and Use	**~10 m (30 ft).** Locality and watershed prioritization of policies/programs	**~2 m (10 ft).** Place-specific project identification	**~2 m (10 ft) or less.** Place-specific project identification
Flood Resilience Strategy Types and Examples	• **State policies.** Virginia Floodplain Management Standards. • **State programs.** Critical Infrastructure Working Group establishment. • **State funding or financing strategies.** Community Flood Preparedness Fund structure.	• **Local and regional projects.** Interjurisdictional flood gate project. • **Local and regional policies.** Regional sea level rise policy guidance. • **Local and regional programs.** Roadway flood sensor network installation and management. • **Regional financing strategies.** Regional taxing authority structure.	• **Local projects.** Living shoreline construction. • **Local policies.** Municipal development standards for flood resilience. • **Local programs.** Home elevation and acquisition program. • **Local financing strategies.** Stormwater fee increase structure.
Primary End Users	**State agencies**	**State agencies, Localities, Tribes**	**Localities, Tribes**
Outreach & Engagement Scale	• Statewide • Regions • Localities	• Regions • Localities • Communities	• Communities • Neighborhoods • Individual residents

COASTAL RESILIENCE TAC MEETING

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2025 VFPMP Flood Hazard Data

Data Gaps

1. Consistent Statewide Coverage
2. Coastal, Pluvial, and Fluvial
3. Multi-Frequency
4. Future Conditions

Use Case

• The data will be used for planning purposes to:
  • Identify focal regions and additional data needs (locality/watershed scale)
  • Develop actionable implementation strategy for state agencies policies and programs

• The data is not intended to:
  • Replace existing data
  • Conduct site-specific regulation or design policy

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Virginia Flood Protection Master Plan
Flood Hazard Data Gaps

There is a range in the level of detail of flood hazard data.

National Flood Hazard Data – Detailed Study → Base Level Engineering Data → National Flood Hazard Data - Approximate Study → Other Potential Data Sources → No/Outdated Data

Multiple flood hazard data updates are pending.

Federal Flood Risk Management Standards (Summer 2024)

FEMA Detailed Study Update – Southside (2024/25)

NWS Inundation Model (2026)

CRMP Phase II (2024)

VFPMP (2025)

FEMA Detailed Study Updates
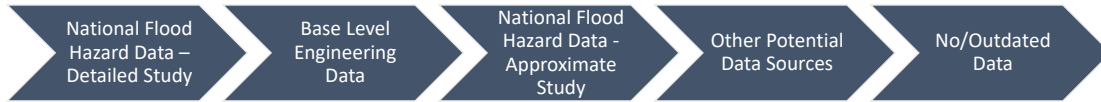- SWVA (2027+)
- Other Areas (2030+)

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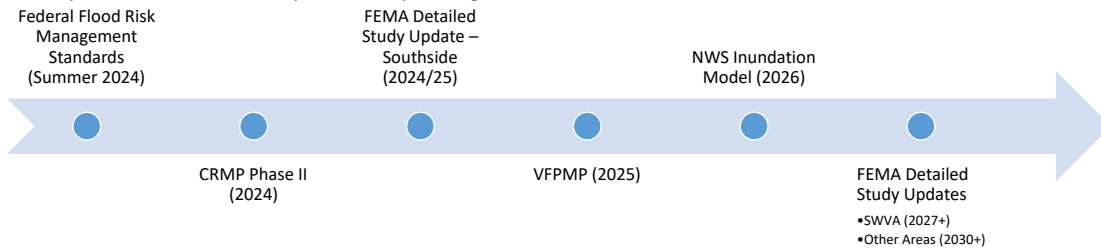
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Virginia Flood Protection Master Plan
Flood Hazard Data Gaps

Subcommittee Comments:

• DCR should consider developing Base Level Engineering (BLE) data.

• BLE, land use, and other data development should be part of a long-term data development plan for Virginia.

• Potential legal liability needs to be explored

• Research universities in Virginia are not using this data.

• Climatological institutes are evaluating 3rd party data.

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Fathom Flood Hazard Data Evaluation

- Fathom Flood Hazard Data
  - Coastal, Pluvial, Fluvial at 10-m
  - Current Conditions
  - Future Conditions
    - 2030, 2040, 2050, 2060, 2080 and 2100
    - SSP1-2.6, SSP2-4.5 and SSP5-8.5
- Evaluation Overview
  - Evaluation Team
  - Two Evaluation Sites
    - Dahlgren
    - Farmville

Fathom data
Depth (cm)
500
0

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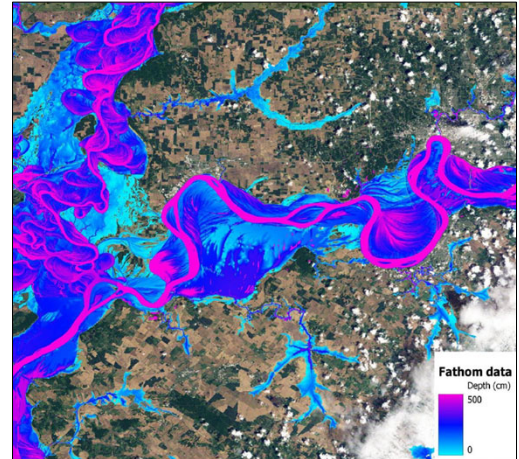
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Virginia Flood Protection Master Plan
Flood Hazard Data Gaps

NOAA Comments:
- Concerns with downscaling climate data for future flood conditions.

- Evaluation Team Comments:
  - Data is suitable for the 2025 VFPMP as previously described
  - Not suitable for regulation
  - Not a long-term solution
  - Access to the data is necessary

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TAC Meeting Slides

Data Access Level	DCR	State Agency/Univ	Locality/ PDC	Public
Figures/Images (flood hazard maps e.x. CRMP pdf)				
Derivative Product Map (relative flood hazard rating by locality ex FEMA NRI)				
Flood Online Flood Depth/Extent Viewer (e.x. CRMP Web Explorer-Hazards)				
Derivative Product Feature Service (e.x. ConserveVirginia Feature Service)				
Flood Depth/ Extent Map/Feature Service (e.x. CRMP REST Services)				
Data Download (e.x. Texas Fathom Data)				

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TAC Discussion

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New Business

Subcommittee Recommendations

TAC Member Discussion

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Subcommittee Recommendations

Draft
Recommendations

Review/Revise
Recommendations

Final
Recommendations

Q2 2024

Q3 2024

Q4 2024

[Facilitated by Resilience Planning and Consulting Contractor]

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TAC Member Updates

VDEM

Others

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STORM FY 24 Application Update

• Virginia is following a similar application strategy as FY 23, where Virginia will be awarded $6.2M from STORM

  - Utilize STORM for non-federal share of eligible BRIC/FMA projects

BRIC = Building Resilient Infrastructure and Communities
FMA = Flood Mitigation Assistance

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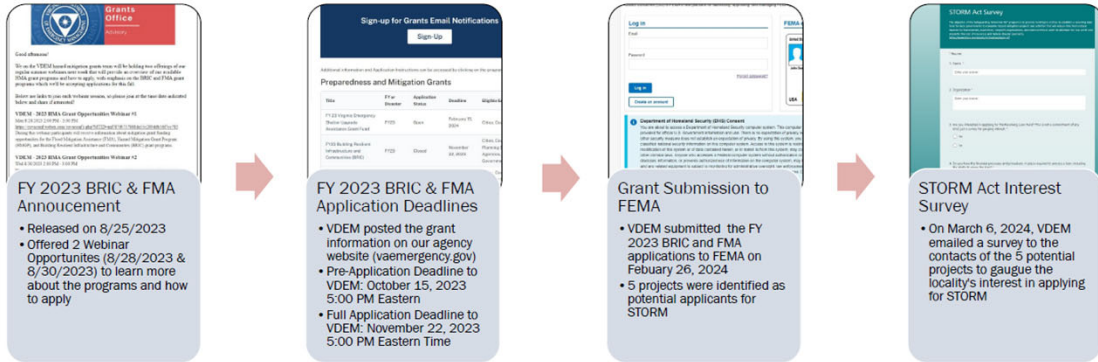
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Potential FY 24 STORM Project List

Applicant	Project Type	Project Name	Total Amount	Federal	Non-Federal
Rivanna Water and Sewer Authority	Infrastructure Protective Measure	Ragged Mountain Reservoir Water Pipeline	$76,103,336	$50,000,000	$26,103,336
City of Virginia Beach	Drainage	Cubb Lake/Lake Bradford Pump Station and Outfall	$60,295,298	$45,221,473	$15,073,824
City of Alexandria	Drainage	Commonwealth, Ashby, Glebe Flood Mitigation	$37,814,288	$23,436,000	$9,453,572
Greene County	Aquifer Storage	White Run Reservoir Project	$31,248,000	$23,436,000	$7,812,000
Hampton Roads Sanitation District	Wastewater or Sewer Protective Measure	Dozier's Corner &Washington District Pump Stations (VB)	$25,318,172	$18,988,629	$6,329,543

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TAC Discussion

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Public Comment

If you would like to provide public comment, please let us know using the Chat window.

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Adjourn

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....

VIRGINIA COASTAL RESILIENCE MASTER PLAN END USER SURVEY – RESULTS SUMMARY

Virginia Coastal Resilience Master Plan, Phase 2

JANUARY 22, 2024

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Document contains edits by DCR Office of Resilience Planning.

CONTENTS

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Overview

This memorandum presents and interprets responses to the Virginia Coastal Resilience Master Plan (CRMP) End-User Survey that was conducted in December 2023 – January 2024. The purpose of the survey was to collect feedback from the plan's intended end users to inform development of the data and products created during the Phase II plan update, due December 2024. This memo presents a summary of survey respondents, responses and key findings disaggregated by organization type, and key takeaways for Phase II development.

Survey Respondents

The survey had 49 total respondents, with the majority representing government agencies. Respondents represented:

- 18 Local governments
- 8 Planning District Commissions
- 8 State government agencies, departments, or divisions
- 9 other organizations, including tribal or federal governments, community-based organizations, universities, or private industry.

A summary of the respondents by organization type is provided below in Figure 1. A complete list of respondents by organization can be found at the end of this memorandum (Table 7, pages 18-19). Organization type is also used to classify responses to questions throughout the survey.

Figure 1. Count of survey respondents by employer type as indicated in the question "Please indicate which of the following best represents your employer's primary function."
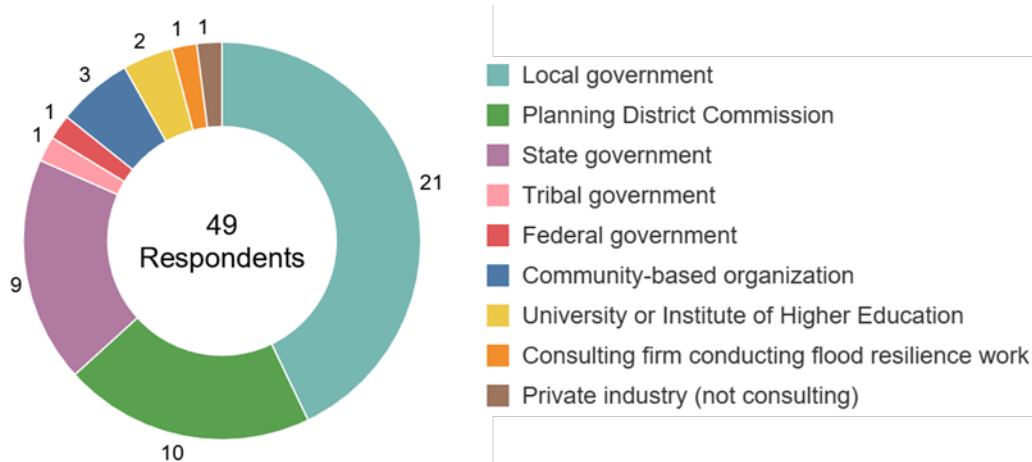
Summary of Key Findings

Survey responses across all questions are consolidated into the below summary of key findings. This summary groups findings into feedback that is either: (1) relevant to the overall CRMP planning effort; (2) specific to the creation of the PDF document; (3) specific to the creation of the web-based services; or (4) funding-relevant findings relevant to work beyond the scope of the CRMP. Within each group, feedback is classified as either positive feedback, critique, or specific suggestion.

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Overall Feedback

Of the 49 survey respondents, 40 (82%) reported actively using at least one of the CRMP products before filling out the survey.

Positive Feedback

- The CRMP products have previously been utilized for a wide variety of use cases, with the most popular being public education and awareness (11 responses), grant seeking (13), and plan development (12), and research (15).
- Products are helpful for providing an overview of resilience-related activities happening across the state, both top-down driven by the Commonwealth and bottom-up driven by communities.
- Products are useful for communicating to non-technical audiences, ranging from individual residents to elected officials.

Critiques

- The Phase I plan's focus on coastal flooding limits its applicability for communities that face significant interior flooding and leads to a potentially misleading narrative that more inland areas do not face flood risks.
- CRMP data products (including underlying sea-level rise scenarios and funding sources) can become outdated, and require regular update to ensure relevancy for use.
- Not all critical infrastructure (as identified by localities) and resilience-related projects are captured.

Specific Suggestions

- Incorporate revised sea level rise projections.
- Expand analysis and narrative to encompass other flooding types, including pluvial/rainfall-driven flooding, riverine flooding, and composite flood impacts.
- Conduct additional economic analysis to capture more impacts in terms of dollars. This will help communicate risks and importance of resilience investments to decision makers.
- Add contextual information about flood insurance coverage, and the insurance gap that needs to be addressed.
- Further integrate and align the plan with other state plans, including the HMP.
- Develop a scorecard and tracking on community outreach by localities and regions.
- Continue education and engagement efforts with localities to further resilience planning capacity.

Plan Document

32 survey respondents (65%) have used the PDF plan document.

Positive Feedback

- Clear communication and flow in the plan document, making it readable and easy to navigate.

Critiques

- Example projects are seemingly arbitrary and often do not address the most pressing regional resilience needs.
- Impacts are not framed in terms of economic losses, which would be more helpful for driving decisions.

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Specific Suggestions

- Project sheets should be expanded and could be improved by including an icon to indicate project type and description or score to indicate population served.

- Include a narrative about coordination between state agencies and plans.

- Highlight case studies about how the plan and related products are being used.

- Expand content related to resilience-related economic development, job creation, and innovation.

- Place greater emphasis on natural infrastructure and incorporate biodiversity and ecological resilience.

- Include more specific actions to guide other state planning work.

- Improve tribal representation.

Web Explorer & Data Download

33 survey respondents (67%) have used the Web Explorer, while 16 (33%) have used the Portal Hub, and 4 (8%) have used the AWS data download options.

Positive Feedback

- Users found all elements of the web explorer useful, with the hazard information cited as being the most useful.

Critiques

- Web explorer can feel cluttered, hard to navigate, and overwhelming to users – there is almost too much information.

- Metadata and calculation methods are not clear in the web application, nor where to go to find that information.

- Not all data is available for download, and downloadable data can be hard to work with.

Specific Suggestions

- Include more context to explain the data, possibly through a pop-up function.

- Integrate more dynamic and user-friendly data download process, including:
  - Jurisdiction-specific impacts
  - Projects and initiatives
  - SLR models as a locally-storable raster rather than web service.

- Adding recommended citations in metadata would be helpful when referencing information in plans and grant applications.

- Improve and expand on the inventory of past, present, and future resilience work so that it is a more user-friendly and living database.

Funding & Financing

- Respondents have most experience seeking and winning federal and state grant funding sources.

- Barriers to engaging with funding include:
  - Lack of staff and staff capacity, both in terms of numbers and expertise.
  - Challenges related to funding caps and local match requirements.

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- Competitive landscape and meeting requirements related to benefit-cost and environmental justice metrics.
- Gaps in data hindering project design and grant applications.
- Lack of awareness about relevant grant opportunities and timelines.
- Issues with slow administration and lack of coordination between state and localities/tribes.
- Limited political will and prioritization of resilience across competing interests.
- There are many steps the Commonwealth can take to address these barriers. Most popular were offering training for local government staff, highlighting best practices and successful case studies, and offering resources for evaluating funding opportunities.

Detailed Survey Responses

Product Use

Respondents were asked which products they've used in their work, shown in Figure 2. 67% of respondents have used the Web Explorer while 65% of respondents have used the PDF Plan document. 18% of respondents had not yet used any of the Coastal Resilience Master Plan products in their work.

Figure 2. Responses to "Which of the Coastal Resilience Master Plan products have you used in your work?" broken down by organization type.
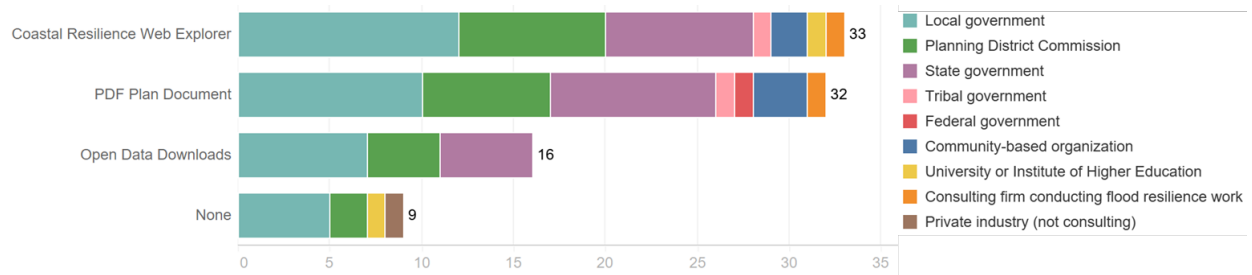
More specifically, respondents were asked if they had used the open data products through AWS or portal hub. Responses are shown in Figure 4.

Figure 3. Responses to "If you have downloaded open data, which of the two Coastal Resilience Open Data Portals have you used?" broken down by organization type.

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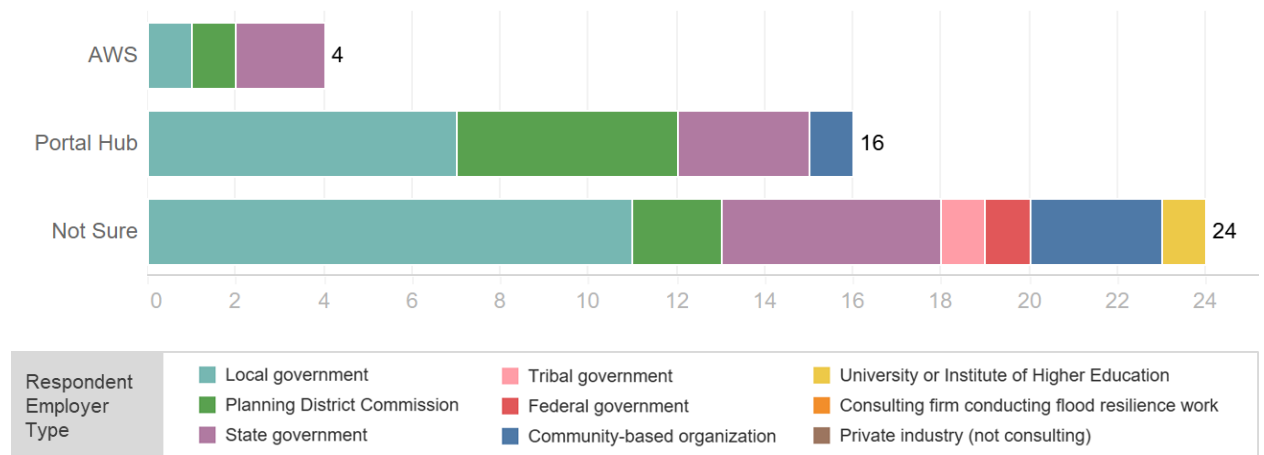
Product Usefulness

When asked about the usefulness of each product, the majority of respondents said all three products were either somewhat or extremely useful, as shown in Figure 4. and Figure 5.

Figure 4. Responses to "Please rank the overall usefulness of the Coastal Resilience Master Plan products."
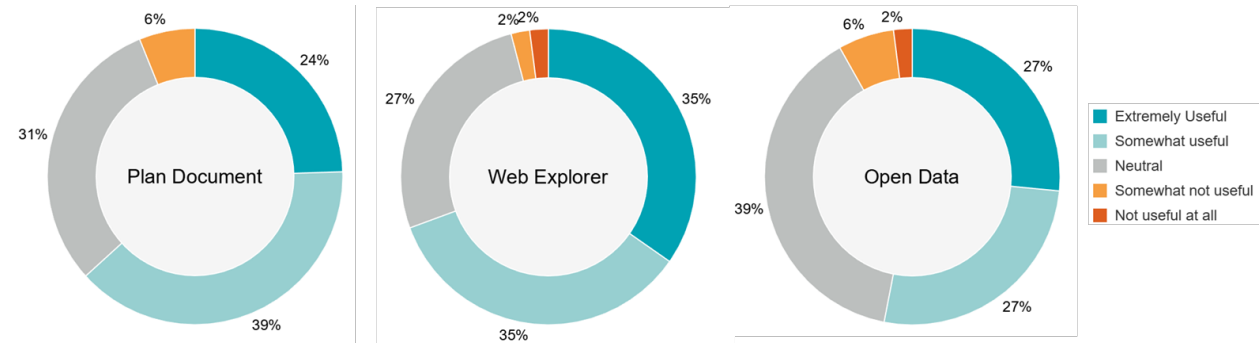
Figure 5. Responses to "Please rank the overall usefulness of the Coastal Resilience Master Plan products" broken down by organization type.
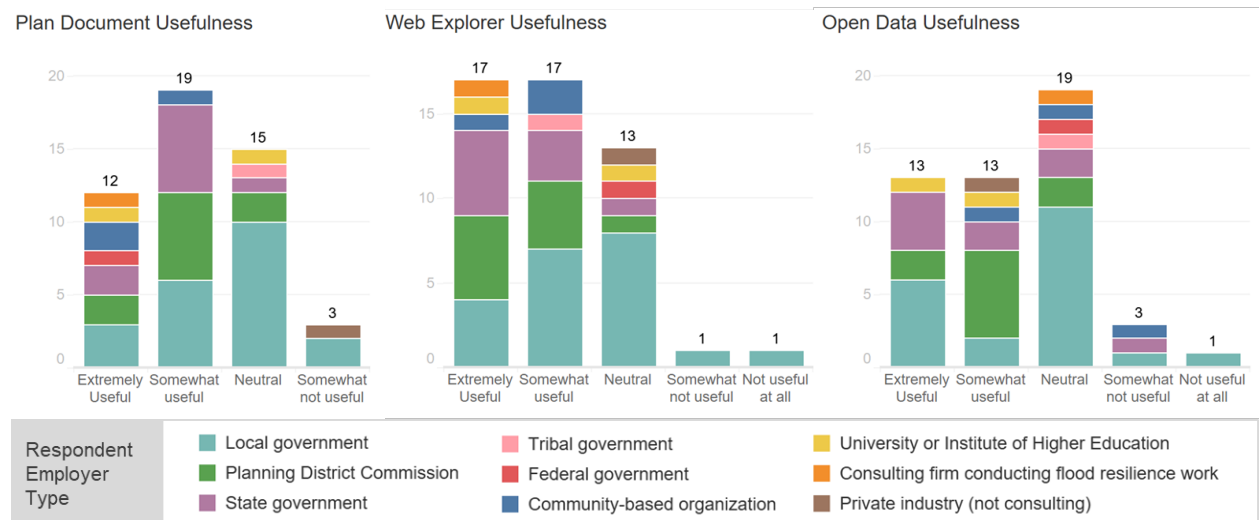
More specifically, respondents were asked to reflect on the usefulness of the Web Explorer tabs and responses are presented in Figure 6 and Figure 7.

Figure 6. Responses to "Please rank the usefulness of the Coastal Resilience Web Explorer tools."
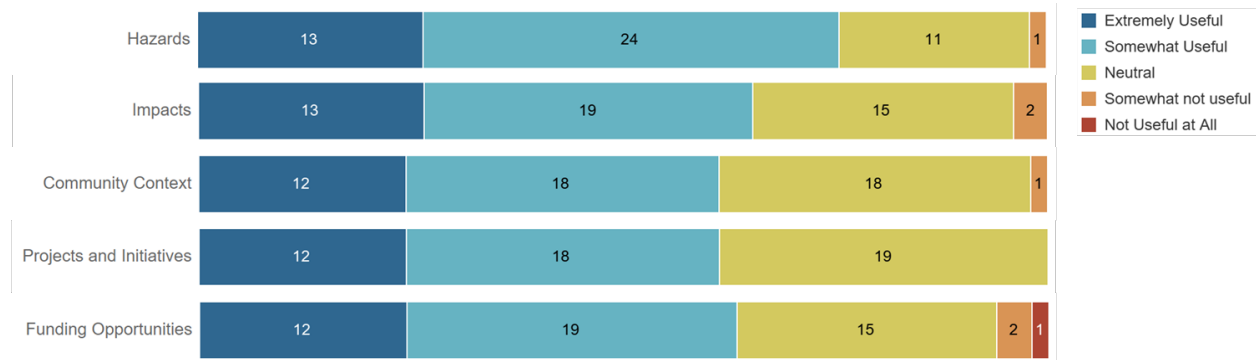
Figure 7. Responses to "Please rank the usefulness of the Coastal Resilience Web Explorer tools." broken down by organization type.
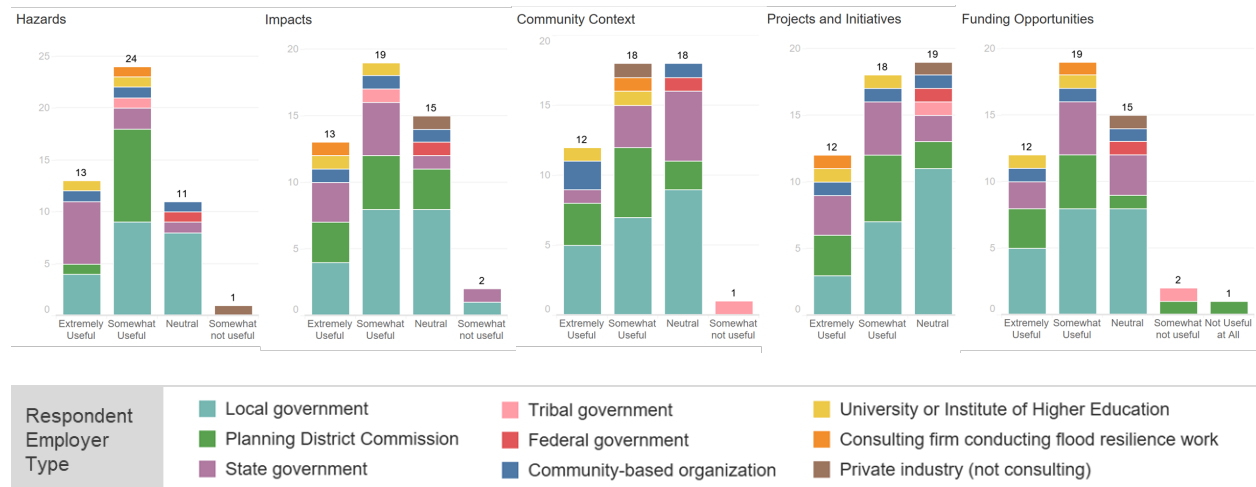
Respondents provided additional comments regarding product usefulness, described in Table 1.

Table 1. Responses to "Please provide any comments regarding the usefulness of the Coastal Resilience Master Plan products." Responses that were left blank or indicated a simple "no" or "not applicable" are excluded.

ORG TYPE	RESPONSE
Local government	The updated Energy and Climate Change Action Plan (May 2023) utilized the Coastal Resilience Master Plan: https://www.alexandriava.gov/energy/energy-and-climate-change-action-plan. The City plans to develop a Flood Resilience Plan in 2024 and will utilize all products as we discuss updates to policy and programs understanding what is happening across the state is incredibly valuable. I'm not sure how the products were or were not used for the City's Waterfront Mitigation Program.
	Current plan is too focused. As a coastal community we face many types of flooding.
	Articulated very clearly. Clear format and flow, very readable and easy to navigate to find everything I'm looking for.
	The social vulnerability index map has been useful when social vulnerability is a criteria for grants.

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ORG TYPE	RESPONSE
	I am grateful for the staff that produced the Coastal Resilience Master Plan.
	These products should prove helpful
	Information from this plan will be utilized in PWC's upcoming development of a PWC Flood Resilience Plan.
	Southampton County is a considerable distance from the coast, so the usefulness of the Plan hasn't been determined.
	I really like the mapping products. As we implement our MS-4 program it will be good to know what areas of Spotsylvania are most at risk for climate impacts.
	I've used these products to discuss resilience resources and goals with elected officials.
	I don't know that I've had the need to use the coastal resilience master plan.
Planning District Commission	Coastal Resilience Web: Funding Opportunity update would be useful. Lack of downloadable Impact data. The data that is downloadable is difficult to parse and navigate. Most ESVA projects are initiated at the local town level - specific impacts on especially prone towns and jurisdictions would be useful. PDF Plan Document: Example projects are seemingly arbitrary and often do not address the most pressing regional resilience needs. Impacts on Community Resources, Critical Sectors, and Natural Infrastructure except Annual Structure Losses not put into dollar amounts - info that local stakeholders and decision-makers use to make determinations. Open Data Downloads: Dynamic Mapping would help with utilization.
	They are needed guidance in our own resilience planning.
	The primary benefit of the pdf is that it provides a solid overview of the context and history of the Commonwealth's planning efforts while also providing a narrative of what we are trying to accomplish. Static maps are nice and easy to read, but they can quickly become outdated. The web explorer is almost too much information. It's not clear how the "composite" impacts are calculated, and directing someone to the plan without a link is unhelpful. The project tab is very cluttered. The open data downloads are great to have, but the datasets themselves are not particularly useful.
	There are some nice graphics and statistics. But we don't come back to these products much.
	Its usefulness relates to either a public policy issue where we need context/data or if a grant funder requires certain data, maps, or narrative which the plan can assist with. We know the Master Plan is a good document, how we use it is driven by policy or $
	Since I am rather new to my position, I haven't had a lot of opportunities to utilize the CRMP products in any real-world scenarios. However, from what I have been able to see of the products, I can see how they would be of use in planning for resilience in our area. I think that it helps to see what areas are most at risk when planning ahead since it costs less to be proactive rather than reactive to potential risks.
	I found the print/PDF master plan product to be easily digestible. Having started my current position after the Master plan Phase I was completed, I thought it was really helpful to understand the foundations of resilience planning progress for the Commonwealth and to get a sense of the direction for future efforts.
State government	The future inundation products were very useful for assessing the resilience of natural heritage resources and protected lands in the coastal zone of Virginia.
	The products provide great historical data.
	The PDF was useful for someone who is new coming into this field. It gave a good lay of the landscape.
	The web explorer has been helpful for visualizing and exploring the data. Especially for someone new to all of

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ORG TYPE	RESPONSE
	this.
	We've also used the map services in a mapping tool we've been using on the Eastern Shore to identify future impacted communities.
	In using the plan, data download, and tools for grant writing and other technical reporting, it would be great to have recommended citations for each. For example, DCR is using the 2080 SLR projections in our planning and related grant proposals. The data comes from NOAA, but it's housed in Open Data Downloads. Having a recommended citation in the metadata, or ArcGIS Online landing page, would alleviate some ambiguity, i.e., should NOAA be the citation for the SLR map service or is it DCR, another entity?
	PDF Plan Document lists TAC recommendations, needs for improvement, and other locality/regional information not provided elsewhere. CRWE provides tabular summary at the locality scale and very local mapping impacts
	At VDEM there is some commonalities in the FEMA required hazard mitigation plans (state and local). The PDF document provides the references - where we can incorporate those findings into future hazard identification and risk assessments. FEMA requires the best available data. The better integrated these planning processes, the more useful these products will be for grant making decisions at our agency. It is challenging to set funding priorities from two different planning efforts, so alignment is key. The Coastal Resilience Web Explorer is helpful to get a quick glance at flood hazards, and social vulnerabilities.
	Provides good insights to coastal flooding exposure of transportation infrastructure. Provides good information on planned transportation related resilience improvements.
	I have not used the web explorer hence the answer to #7. Most design effort at the port is handled by consulting services.
Tribal government	I know the document would be really useful and I have had a chance to read some of it, but because of limited capacity, I have not been able to dedicate time to reading the whole document, and so I have not been able to fully take advantage of all of the information it has to offer.
Other	Key core resource for developing crucial Coastal Community on-community Community Action Plans to implement and actualize positioning for funding opportunities that are direct Shoreline and unique Riverine based Communities.
	Used data tables from plan document to supplement sea level rise risk and vulnerability info in 2 regional hazard mitigation plans, as well as the State HMP.
	Data driven information useful for grant writing and assessment of integrated services to broker and deliver.

Use Cases

Respondents were asked how they have used or would apply the products to their work across nine potential use cases. Across all respondents, there was the greatest interest in using the products in the future for public education and awareness (31), grant seeking (26), and plan development (27). The top use cases for the products to date have been research (15), grant seeking (13), plan devleopment (12), and public education and awareness (11).

- **Localities and PDCs** are particularly interested in using for public education and awareness, plan development, and grant seeking.
- **State government respondents** were most interested in public education and awareness, program/operational decisions, and research.

A breakdown of responses is shown in Figure 8 and Figure 9.

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Figure 8. Responses to "Consider the following potential use cases of the Coastal Resilience Master Plan products. Which of the following responses best reflect how you use the plan in your work?"
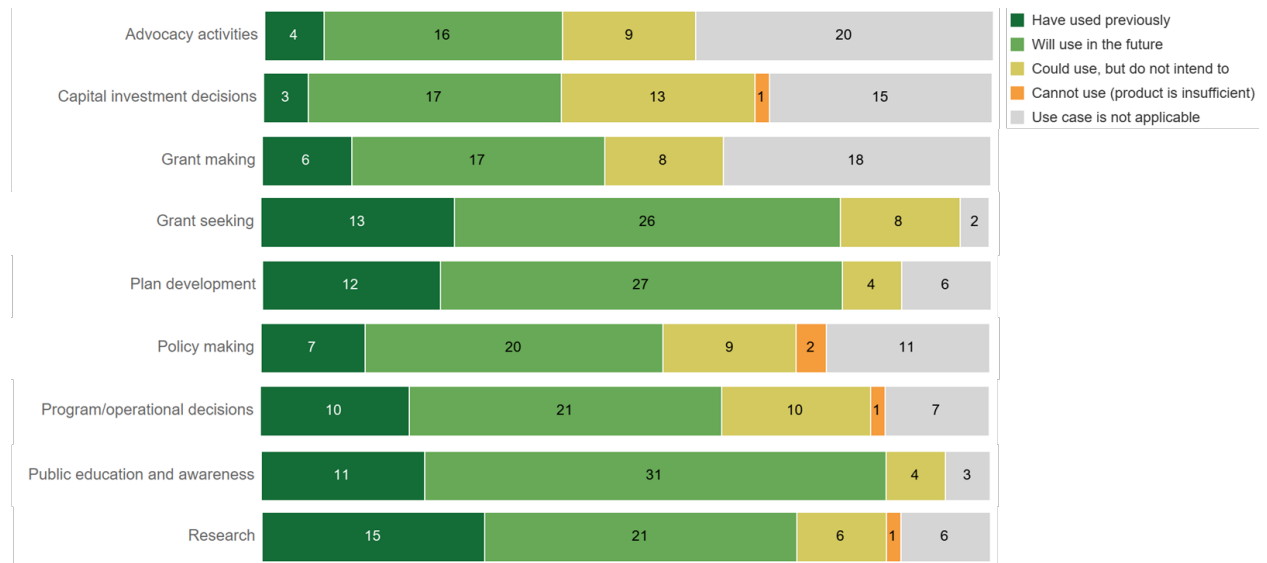
Figure 9. Responses to "Consider the following potential use cases of the Coastal Resilience Master Plan products. Which of the following responses best reflect how you use the plan in your work?" broken down by organization type.
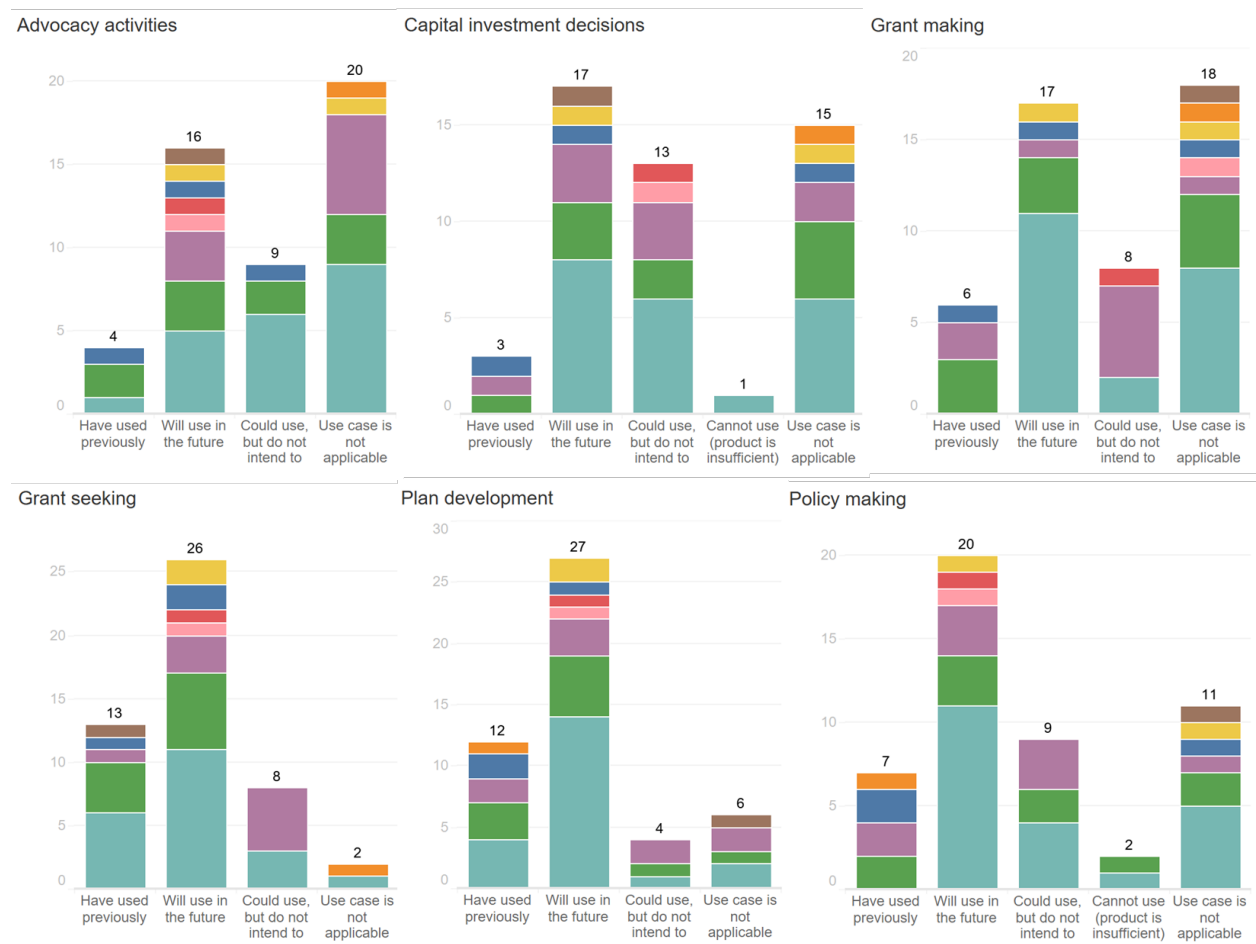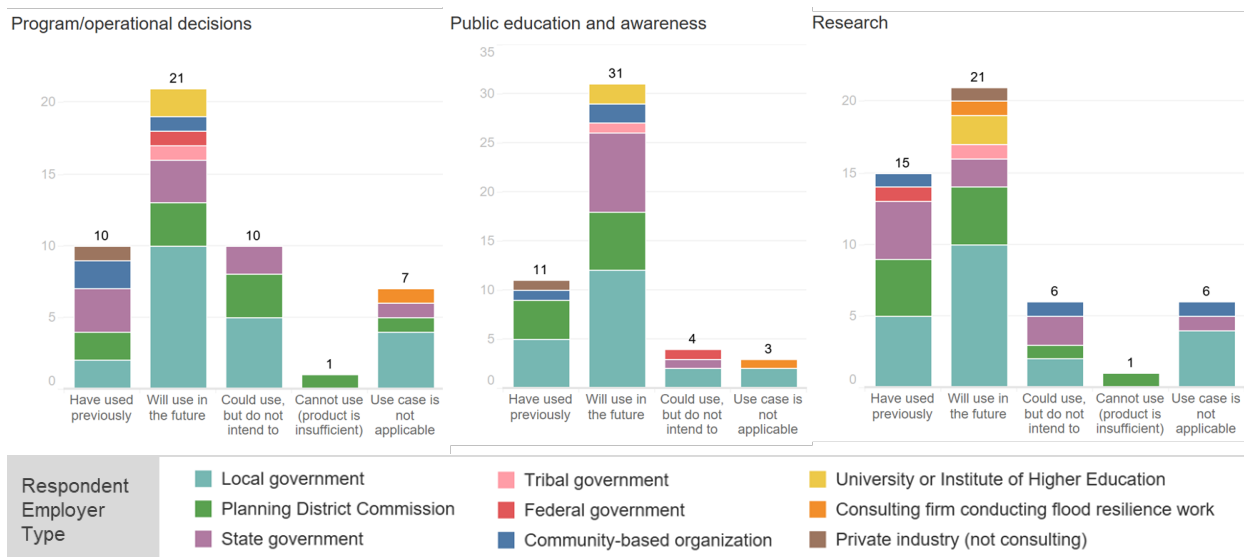
To complement the nine use cases presented above, respondents were also asked if they had used the products in other ways. Through this open-ended question, respondents generally provided more detailed information on the ways they have used products for planning and grant application development.

Table 2. Responses to "Have you used the Coastal Resilience Master Plan products in other ways? If so, please describe the product and its applications." Responses that were left blank or indicated a simple "no" or "not applicable" are excluded.

ORG TYPE	RESPONSE
Local government	Our consultant has used the data for our own master planning effort.
	To build educational and outreach materials.
	We have used it to determine social vulnerability for grant applications.
	I have used it to inform property owners of potential for sea level rise at or near their property.
Planning District Commission	Used as a base or point of reference for other tools and products.
	I have embedded them in our website.
	We refer to the master plan when giving presentations or briefings, usually in the context of being consistent with our own regional policies.
	Its driven by the question and how best to answer such question either qualitative or quantitative
	I have used the CRMP products as a way to understand the region that I now work in and the potential risks that it faces. It has helped me to get a better idea of what issues I am working with and what areas may need the most focus for resilience projects.
State government	We used the future inundation products to assess the resilience of natural heritage resources and protected lands in the coastal zone of Virginia.
	Mentioned above, we used the map service from the data portal to identify future impacted communities. We are using that information to design a community project on the Eastern Shore around flooding impacts.
	None other than already mentioned, we look at grant projects that are funded by FEMA that were identified in the plan.
Other	Community Action Plan partnership

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Limitations

Respondents were asked about the limitations they have encountered when using the CRMP materials and responses are presented in Table 3.

Table 1. Responses to "Have you encountered any limitations in the plan's products that have prevented you from using them how you would like? If so, please describe the product and its limitations" broken down by organization type. Responses that were left blank or indicated a simple "no" or "not applicable" are excluded.

ORG TYPE	RESPONSE
Local government	Focus is too limited for all the climate change/flooding issues localities face. In addition, we have developed our own City-specific and more focused materials and evaluations.
	The example project sheets need an icon or indicator for the project type (ex. for structural projects, is the example a flood risk reduction measure, a structural shoreline stabilization, or community infrastructure). See pg. 180-181.
	I have used them despite limitations and just have caveats added to my product.
	We have a small town, but we have critical infrastructure that will be inundated during a 100-yr flood event. Don't see this info on the map.
	Already answered that I have not used the products.
Planning District Commission	Coastal Resilience Web: Funding Opportunity update would be useful. Lack of downloadable Impact data. The data that is downloadable is difficult to parse and navigate. Most ESVA projects are initiated at the local town level - specific impacts on especially prone towns and jurisdictions would be useful. PDF Plan Document: Example projects are seemingly arbitrary and often do not address the most pressing regional resilience needs. Impacts on Community Resources, Critical Sectors, and Natural Infrastructure except Annual Structure Losses not put into dollar amounts - info that local stakeholders and decision-makers use to make determinations. Open Data Downloads: Dynamic Mapping would help with utilization.
	The Resilience Web Explorer is not linked everywhere it should be across State Agencies and so it can be difficult to find.
	It doesn't consider rain driven flooding and the associated stormwater projects. It doesn't layout enough implementation strategies to drive state budget discussions and priorities (compared to state programs other than resiliency).
	The scenarios for hazards do not really correspond to local or regional planning scenarios or timelines. (e.g. 2020/2040/etc. vs twenty-five years, thirty years).
	I have not encountered limitations in its use. However, as part of the project prioritization committee for phase II, we have discussed how more information/data could be useful.
	Any limitations are being addressed through phase 2, i.e. precipitation impacts as a key component to coastal resilience in the region.
	On the web explorer, I really want to click on map shading to see a popup that explains the underlying data. Also, the data available for the Projects and Initiatives is almost non-existent, making that page not so useful.
State government	Not really, but I/we've used them at a very high level.
	Much of my work with the plan and related data includes GIS analysis. The current format of the SLR models (web map service) limits our ability to analyze the spatial data. Having these data available as rasters that can be locally stored and analyzed with typical GIS processing abilities would improve efficiency and produce better results.

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ORG TYPE	RESPONSE
	Limited to coastal flooding. We are looking at statewide flooding.
Other	Access/Awareness/Communication/Inclusion

Desired Plan Content

Respondents were asked to reflect more specifically on the PDF plan document and what content they would like to see in a future revision. Responses are presented in Table 4.

Table 2. Responses to "What content would you most like to see included in future PDF plan documents?" broken down by organization type. Responses that were left blank or indicated a simple "no" or "not applicable" are excluded.

ORG TYPE	RESPONSE
Local government	We would benefit by more in depth info on pluvial flooding in coastal zones. It sounds like this will be explored more in future versions.
	rainfall data, urban flooding issues
	More project sheets, with a EJ lens/score on sheet, plus population served/protected.
	I'm new here, so I really don't feel qualified to make a recommendation.
	I would like to see information about storm surge flooding
Planning District Commission	Specific impacts on especially prone towns and jurisdictions. Dollar amounts on flooding impacts.
	Drainage issues
	Revised sea level rise projections. Narrative about coordination between state agencies and plans. Case studies of how the plan is being used.
	Expand sections on water management economic development, job creation, innovation being developed in Virginia
	It may be helpful to know what percentage of homes and businesses have flood insurance within each area identified for coastal flood exposure. There are Land Acres Exposed and Buildings Exposed with High Tide and Extreme Flood for both 2020 and 2080 with the percent change, but knowing the extent of insurance and how many will need it would be nice.
State government	Greater emphasis on natural infrastructure.
	Data currency
	An inventory of past, present, and future resilience work in the Coastal Zone. It's too easy to reinvent the wheel and documenting this work somewhere that is searchable and living would be a huge value add.
	recommended citation and more specific actions for land conservation and conservation planning. Incorporation of biodiversity priorities and ecological resilience
	No recommendations, however I would like to request an overview of the plan and web based products to our agency. We have a wide range of divisions and programs that may find these products useful.
	Pluvial and fluvial impacts. Composite flooding impacts.
Tribal government	I would really like to see something mentioned about the Tribes in Virginia. I think it is important that a state-wide planning document have at least some reference to how Tribes experience coastal resilience issues in the larger context of the surrounding community, and the state in general.
Other	Scorecard on Community Outreach by Local and Regional levels

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Funding & Financing Experience

Separate from the CRMP materials, respondents were also asked about their experience seeking and using funding and financing mechanisms to implement resilience activities. Responses are presented in Figure 10 and Figure 11.

Figure 10. Responses to "What types of financing have you *successfully used* to fund your flood resilience activities (projects, staffing, initiatives, planning, etc.)?" broken down by organization type.
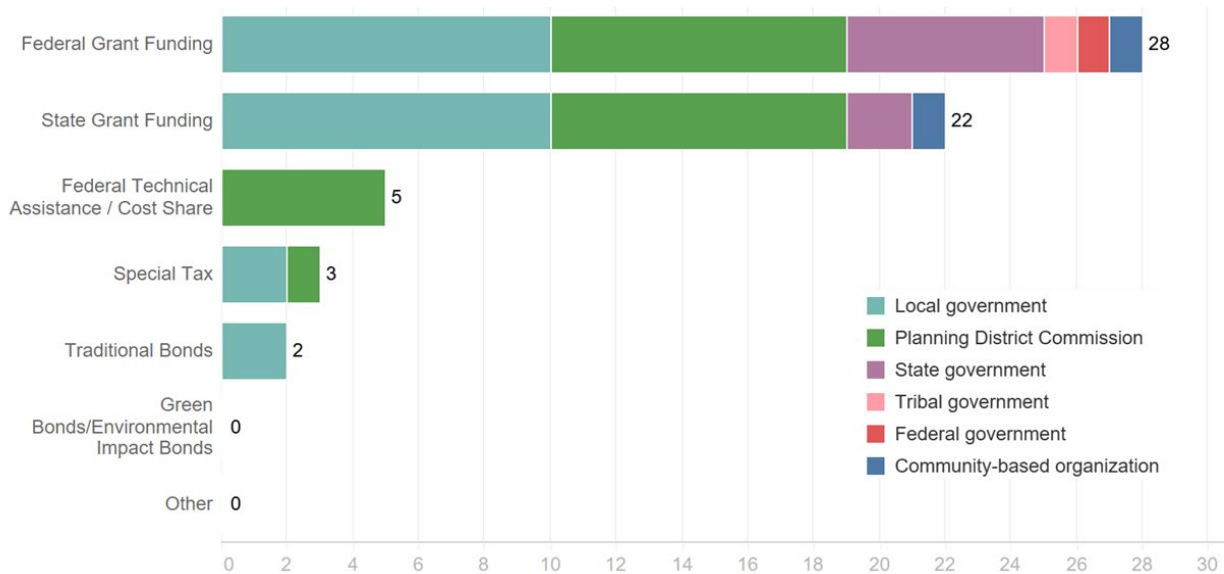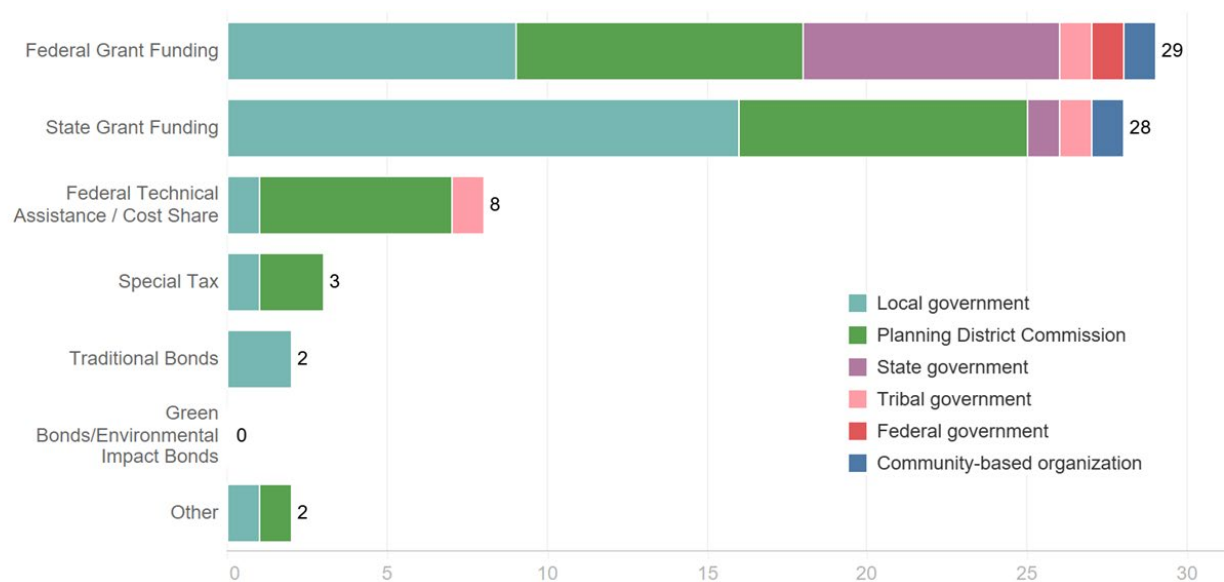

Figure 11. Responses to "What types of financing have you *sought* to fund your flood resilience activities (projects, staffing, initiatives, planning, etc.)?" broken down by organization type.

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Funding Barriers

Additionally, respondents were asked about the barriers they face when seeking or accessing funding for resilience activities and responses to that are presented in Table 5.

Table 3. Responses to "Are there any specific barriers that have prevented you from seeking or accessing funding for flood resilience activities?" broken down by organization type. Responses that were left blank or indicated a simple "no" or "not applicable" are excluded.

ORG TYPE	RESPONSE
Local government	Many funding sources require the project to be identified in a 'plan' so having all of our projects in this plan is expected to be beneficial as we look for future funding.
	The Grant application process has become extremely cumbersome and time consuming. We weigh the amount against how much we will need to spend just to put an application together which is getting ridiculous. Also many state grants are becoming difficult to get funds back in a timely manner, which means we are fronting the money for months or a year.
	CFPF maximum grant cap, state revolving loan max. cap, limited time between NOFO and grant deadline (need time for City Manager signature).
	Lack of staff to apply for grants is the biggest challenge for us. Also, better communication of grants that are available.
	I think our limited population size might have prevented us from obtaining BRIC funding. Not sure about that.
	insufficient staff
	lack of staff - Because the VA grants only cover the cost of hiring new employees and do not cover salaries of existing employees, we do not have the staff to execute any grants. In small areas like Northampton County, the cost of a CFM has historically been too much. Until the Phase one of the CFPF grant we did not have a CFM. Now the county is deciding whether or not they will continue to have a CFM because the funding for that position is gone.
	Local match required by state and federal grants.
	Just that I haven't decided yet how to approach grant application for project related to LiDAR or aerial drone imagery
	County Admin does not want to do anything that curbs the development community.
	Capacity
	General capacity to write the grants and apply for them.
	Staff time
	staffing/matching funding
	H & H analysis before addressing flooding issues, but no funds for the analysis
Planning District Commission	Agency and government capacity. Willingness of local decision-makers.
	Because flood resilience doesn't include more ancillary impacts (such as rates of septic failure and soil mapping), our region appears to not be impacted which can dissuade elected officials from acting and hurt our grant funding chances. There are also just more opportunities out there than we can possibly keep up with and we rarely have extra capacity to keep making "shovel ready" projects.
	Local contributions
	Limitations on how often one can apply (DSFPP five-year gap). Inability to use CFPF funds for existing staff or to include indirect costs. Staff capacity for developing proposals.

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ORG TYPE	RESPONSE
	staff to manage new initiatives.
	Limitations are related to grant funder priorities.
	I'm honestly unsure since I haven't done anything with funding so far.
	Northern Virginia is often limited by environmental justice and/or marginalized community requirements within grant programming, especially in recent BIL/IRA programs. While this is important to ensure that marginalized communities have equitable access to funding, the screening tools can be limiting for communities in the region that are marginalized, but do not fit into the screening tools' programming.
	we need more data on Pluvial flooding before we can design resilience projects and apply for funding.
State government	Challenged to find grants that apply to specific needs
	Not sure/NA - Our program (CZM) is a pass through organization, so we're driven by the needs of our network.
	VDEM traditionally seeks funding on behalf of localities that are interested in applying. Barriers we have seen at the local level are cost share, and staffing.
	Seeking funding grants for resilience requires quite a bit of work. There is a limitation on staffing resources.
Tribal government	Limited staff capacity in terms of numbers and subject-matter expertise hinder out ability to apply for funding for a multitude of reasons, some of which amount to simply not having enough time to read a NOFO. At the state-level, some funding opportunities are not available to Tribes, and for those that are, the competition is so strong that it often is not worth the time and resources to apply for a grant that likely will not be awarded anyway. In general, I think Tribe-to-state funding and coordination processes are still very new, especially for the Federally recognized Tribes, so it's just uncharted territory for both sides.
Other	A lack of grant writing personnel
	Local match requirements
	NOAA/EPA Smart Growth for Coastal and Waterfront Communities (2009) not adopted locally by Locality, initially, no locality Certified Floodplain Manager, and deficient implementation of Planning for any but headwater area the Locality. Without administrative Implementation, Planning and incorporated language in State Statute required local "Plans" i.e. Official Map (Zoning) and Comprehensive Plan, the Administrative representation of Hazards is poor and poorly positions Community Action Plans in the most at risk communities. I
	Petersburg City Council
	We do not specifically engage in flood resilience advocacy, education or other activities. However, we are working with RAFT to see how we can empower business owners who seek to facilitate flood resilience for area residents.

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When presented with a multiple-choice question about actions the Commonwealth could take to address funding barriers, the majority of respondents said that training for local staff, best practices and case studies, and resources for evaluating grant opportunities would be helpful. The distribution of responses are show in Figure 12.

Figure 12. Responses to "What could the Commonwealth do to help address barriers that prevent you from seeking or accessing funding for flood resilience activities?" broken down by organization type.
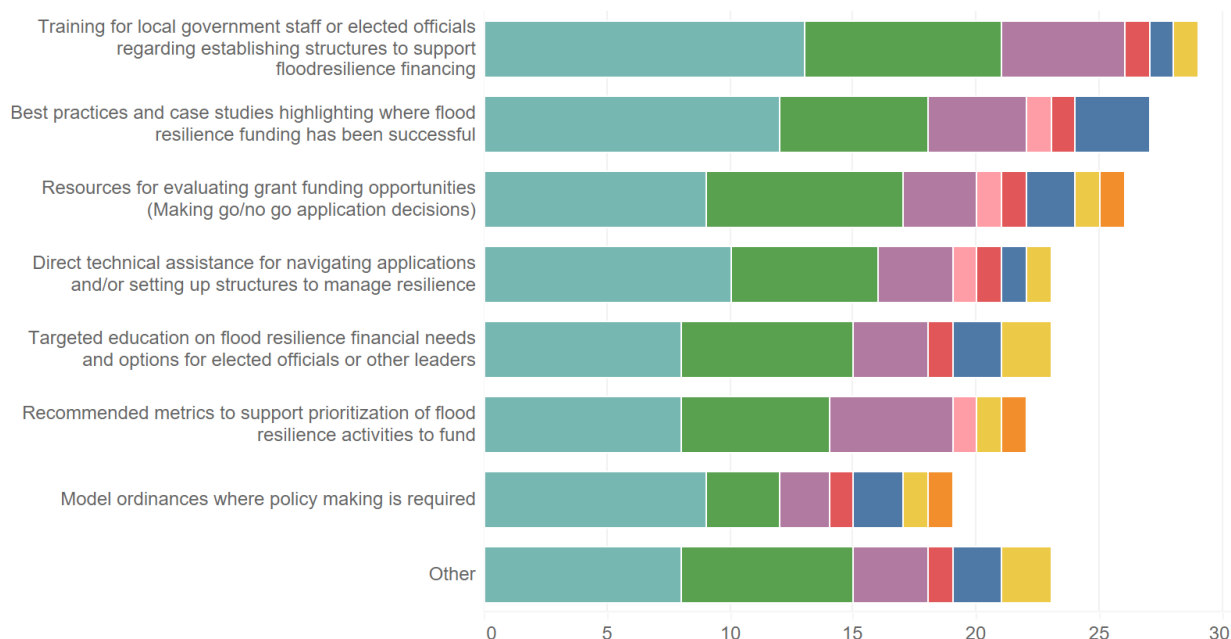
General Support Needs

Finally, respondents were asked for additional input on ways the Commonwealth could support their flood resilience needs. Responses are presented in Table 6.

Table 4. Responses to "Are there any other ways in which the Commonwealth could support your organization's flood resilience needs?" broken down by organization type. Responses that were left blank or indicated a simple "no" or "not applicable" are excluded.

ORG TYPE	RESPONSE
Local government	It is very valuable to understand what is happening across the state, especially in communities like ours - small and highly urban with older infrastructure being decimated with these very severe storm events that don't trigger a declaration of a NR disaster but they really negatively impact our community (cars are totaled, basements and first floors under water, driving is unsafe, pets get swept away, people are displaced, etc.). While we understand what is happening here in NoVA through those relationships and through our PDC, it would be great to learn from other cities facing these challenges! We are looking to learn as much as we can from our partners across the state so helping to facilitate that would be very valuable! Thank you!
	Climate Change issues are more than just sea level rise. Extreme rainfall and urban flooding in old drainage systems is a major issue. Unfortunately, in an effort to provide funding to coastal issues, other issues now have less priority.
	Create a model pathway for communities to obtain a state-match on large federal Coastal Storm Risk Management projects. Similar to NY/NYC.
	This falls into another Departments purview.
	Education classes and updates telling local government how to be involved.

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ORG TYPE	RESPONSE
	You all are doing a wonderful job and I am grateful for your support thus far.
	Yes. Our county does not have the funds to hire a full time grant expert. At this time the CFM is also the grant writer. This person is not experienced in writing grants. The county would benefit from funding staff so that the employee can get acquainted with the job and the funding available.
	Continue to fund traditional grey infrastructure flood resilience projects (flood walls, elevation projects, etc.) and Dam Safety improvements/upgrades. While green infrastructure is important, it is not always feasible and limited in certain major flooding applications.
Planning District Commission	More capacity-building initiatives and opportunities. Supporting and scaling proven efforts, skill sharing. Developing and supporting more regional-wide approaches. Reaching out to local decision-makers and non-traditional partners. Monetizing future flood impacts.
	To be determined
	change the stormwater regulations to reflect projected rainfall, provide more grants even to low scoring CFPF applications, setup policy that guarantees state share of non-federal match for large construction projects, invest more state funding to address roadway flooding
	The waterfront along the Chesapeake Bay and tributaries are ~98% privately owned. Clearly declare that funding flooding problems on private property with public resources helps to protect the tax base of rural localities. There is a public nexus between spending public dollars on private property and protection of public health, safety, and welfare. If flooding decreases real-estate values, local govt can't fund essential services. If they raise taxes to cover the lost revenue, flooding becomes a regressive tax on the poor who don't live on the waterfront.
	Training on grant writing itself would be really helpful for myself. Also, more information on where to start for dam assessments either locally or on a regional scale. We have many that are not assessed and we know that there is funding. I'm just not sure where/who to start with.
	Continued communication and education opportunities with the PDCs to pass information on to the localities. At least in Northern Virginia, this has worked well through our workgroups and engagement with localities, but additional engagement opportunities for localities to participate and understand how they can utilize the plan and its tools would also be helpful. An example would be through the precipitation data/analyses through Phase II - having a workshop or training event for interested localities to understand how they could utilize/apply the data to their own planning and projects.
	Capacity is a major issue. Every community has flood resilience projects they want to see implemented, but who is going to design it, plan it, seek funding for it, manage the grant, and execute the project? Staff and nonprofits are mostly at capacity. Can the Commonwealth do anything to make flood resilience projects more accessible to neighborhoods?
State government	More certainties around how state funds will be tied to planning efforts. This may just take time to get to, but it's definitely an issue we hear about in our network a lot.
	Could DCR provide a presentation to VDEM staff on the CRMP products?
Tribal government	I really think more meaningful engagement and more frequent dialogue needs to happen between the state government and Tribal governments. I believe the state is making great strides to that end, but there is a lot of work left to do. For example, this survey did not have an option at the beginning for Tribal entity. It is vital to Tribal communities that they be actively consulted and that the results of those conversations are shown in spaces like this where DCR is seeking feedback from the different groups affected by sea-level rise and other coastal resilience issues. I do believe as conversations progress that incorporation of the Tribes will be easier and more evident so long as the conversation is continuous.
Other	Provide examples of completed projects with the details of the project. Include lessons learned and pitfalls encountered, if any.
	Public Outreach in mobilized communities. "See one do one" approach. Communication and technical guidance for positioning where Communities have provided feedback and engagement to DCR is key.

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ORG TYPE	RESPONSE
	Hire someone who knows about these things to work for the city of Petersburg. We simply need more people in order to do the job.

Survey Respondents by Organization

Table 7. Number of survey respondents from each organization, classified by organization type.

ORG TYPE	ORGANIZATION	NUMBER OF RESPONDENTS
Local government	City of Alexandria	1
	City of Newport News	1
	City of Norfolk	1
	City of Portsmouth	1
	City of Richmond	1
	City of Suffolk	1
	King George County	1
	King William County	1
	Lancaster County	1
	Middlesex Department of Social Services	1
	Northampton County	2
	Prince William County	2
	Southampton County	1
	Spotsylvania County	1
	Stafford County	2
	Town of Ashland	1
	Town of Dumfries	1
	Town of West Point	1
Planning District Commission	Accomack-Northampton PDC	1
	Crater PDC	1
	George Washington RC	2
	Hampton Roads PDC	2
	MPPDC	1
	Northern Neck PDC	1
	Northern Virginia RC	1
	PlanRVA	1
State government	Department of Environmental Quality	1
	Department of Housing and Community Development	1

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ORG TYPE	ORGANIZATION	NUMBER OF RESPONDENTS
	Virginia Coastal Zone Management Program; DEQ	1
	Virginia Department of Conservation & Recreation - Division of Natural Heritage	2
	Virginia Department of Conservation and Recreation	1
	Virginia Department of Emergency Management	1
	Virginia Department of Transportation	1
	Virginia Port Authority	1
Tribal government	Nansemond Indian Nation	1
Federal government	Marine Corps Base Quantico	1
Community-based organization	Bay Aging	1
	Crittenden, Eclipse and Hobson (CE&H) Heritage Civic League	1
	Northumberland Public Library	1
University or Institute of Higher Education	Virginia State University	2
Consulting firm conducting flood resilience work	Salter's Creek Consulting	1
Private industry (not consulting)	Communities In Schools of Petersburg, Inc.	1

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Flood Hazard Impact Assessment Asset Data Inputs

Input Dataset	Data Type	Source	Description	Phase I Sub-Component	Link	Date Last Updated	Spatial Data Type
Wastewater Treatment Facilities	Asset	United States Environmental Protection Agency (EPA) (accessed via HIFLD)	This GIS dataset contains data on wastewater treatment plants, based on EPA's Facility Registry Service (FRS) and NPDES, along with Clean Watersheds Needs Survey (CWNS) and other data sources. This dataset was developed to serve as a general-purpose GIS layer depicting wastewater treatment plant locations, together with a few set of core attributes.	Wastewater	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::epa-facility-registry-service-frs-wastewater-treatment-plants/about	4/17/2022	Points
Pluvial Flood Events	Hazard	Dewberry	Dewberry-created pluvial floodplain extents and depths from all modeled event conditions.	~Not included in Phase I			
Riverine SFHA	Hazard	Federal Emergency Management Agency (FEMA)	Floodplain extent of the riverine Special Flood Hazard Area (SFHA), which represents the present-day 100-year riverine flood, as found in FEMA's National Flood Hazard Layer.	~Not included in Phase I	https://www.fema.gov/flood-maps/national-flood-hazard-layer		
Substations	Asset	HIFLD Secure	This feature class/shapefile represents electric power substations primarily associated with electric power transmission. In this layer, substations are considered facilities and equipment that switch, transform, or regulate electric power at voltages equal to, or greater than, 69 kilovolts. Substations with a maximum operating voltage less than 69 kilovolts may be included, depending on the availability of authoritative sources, but coverage of these features should not be considered complete. The Substations feature class/shapefile includes taps, a location where power on a transmission line is tapped by another transmission line. HIFLD Secure This feature class/shapefile is for the Homeland Infrastructure Foundation Level Database (HIFLD) https://gii.dhs.gov/HIFLD as well as the Energy modelling and simulation community.	~Not included in Phase I	https://gii.dhs.gov/gii/apps/sites/#/hifld/datasets/b3437e4ee5ef43c08aab6735b05560f2/about?layer=0	7/20/2023	Points
Public Refrigerated Warehouses	Asset	The International Association of Refrigerated Warehouses (accessed via HIFLD)	This data represents the locations of public refrigerated warehouses participating in the International Association of Refrigerated Warehouses (IARW).	~Not included in Phase I	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::public-refrigerated-warehouses/about	7/5/2023	Points
Dams	Asset	Virginia Department of Conservation and Recreation (DCR)	Displays the location of all dams in Virginia tracked by the Virginia Department of Conservation and Recreation's (DCR) Dam Safety program.	~Not included in Phase I	https://dsfpm-vdcr.hub.arcgis.com/datasets/vdcr::dam-points-attributes-2023q2/about	2/12/2024	Points
Conserved Lands	Asset	Virginia Department of Conservation and Recreation (DCR)	Lands currently conserved under various management regimes. This dataset contains the boundaries for lands of conservation and recreational interest in Virginia.	~Not included in Phase I	https://www.dcr.virginia.gov/natural-heritage/cldownload	11/1/2023	Area Polygons
Conservation Priority Areas: Protected Landscapes Resilience	Asset	Natural Habitat and Ecosystem Diversity Exposure (ConserveVA); Virginia Department of Conservation and Recreation (DCR)	Protected Landscapes Resilience represents priority areas identified by five public resource agencies as lands and waters around existing protected lands that are important habitats, connections to the landscape, critical to enhance climate resilience, and protect key scenic and recreational values. The Protected Landscapes Resilience category was developed and provided by the U.S. Fish and Wildlife Service, National Park Service, Department of Game and Inland Fisheries, Department of Conservation and Recreation and Department of Forestry.	~Not included in Phase I	https://vdcr.maps.arcgis.com/home/item.html?id=4b2bfaa80cda476aaa71b65bb874d62c&sublayer=6	11/18/2021	Area Polygons

3/13/2024

Flood Hazard Impact Assessment Asset Data Inputs

Input Dataset	Data Type	Source	Description	Phase I Sub-Component	Link	Date Last Updated	Spatial Data Type
Conservation Priority Area: Agriculture and Forestry	Asset	Natural Habitat and Ecosystem Diversity Exposure (ConserveVA); Virginia Department of Conservation and Recreation (DCR)	Unprotected lands with high conservation value for agriculture and forestry from ConserveVA: Agriculture and Forestry. The Agriculture & Forestry Category identifies priority agricultural and forest lands across Virginia and was developed under the Secretary of Agriculture and Forestry. It is comprised of two datasets one for agriculture and one for forestry. The Agriculture dataset identifies agricultural lands across Virginia that are threatened by development, as well as provides a spatial dataset that represents the land's agricultural potential. The Agriculture dataset is comprised of data from the American Farmland Trust (AFT) Farms Under Threat: State of the States project, version 2.0. The Farms Under Threat State of the States spatial data includes a detailed assessment of the extent, diversity, location, and quality of agricultural land in the United States, as well as the threats to this land from expanding commercial, industrial, and residential development. The results of this effort include: An agricultural land cover dataset with rangeland, pastureland, cropland and woodland land cover classes, an index of agricultural land Productivity, Versatility, and Resiliency (PVR), and a valuation of the impact of low density residential development and urban high density development on agricultural land.	~Not included in Phase I	https://vdcr.maps.arcgis.com/home/item.html?id=4b2bfaa80cda476aaa71b65bb874d62c&sublayer=1	11/18/2021	Area Polygons
Conservation Priority Area: Natural Habitat and Ecosystem Diversity	Asset	Natural Habitat and Ecosystem Diversity Exposure (ConserveVA); Virginia Department of Conservation and Recreation (DCR)	Unprotected lands with high conservation value: biodiversity priority from ConserveVA: Natural Habitat and Ecosystem Diversity Exposure. The Natural Habitat & Ecosystem Diversity category has been developed by working with five key data resource areas. The Virginia Natural Landscape Assessment identifies large patches commonly referred to as Cores of forests, marshes, dunes and beaches with at least 100 acres of continuous interior natural habitat. The cores are ranked based upon many variables including environmental diversity, species diversity, water quality benefits and habitats. The Outstanding category (C1) was used in the strategy, excluding the four lower-ranked categories. Landscape Corridors of natural land cover were included connecting C1 Cores to maintain connectivity to allow species movement between larger natural land patches, elevations, latitudes and from ocean to inland.	~Not included in Phase I	https://vdcr.maps.arcgis.com/home/item.html?id=4b2bfaa80cda476aaa71b65bb874d62c&sublayer=2	11/18/2021	Area Polygons
Land Cover Data	Asset	Chesapeake Conservancy and Virginia State	The Chesapeake Conservancy Land Cover data categorizes surface characteristics of land into classes, including tree canopy, scrub/shrub, low vegetation, etc.	~Not included in Phase I	https://www.chesapeakeconservancy.org/conservation-innovation-center/high-resolution-data/lulc-data-project-2022/	1/1/2018	Raster
Predicted Suitable Habitat for Sensitive Species	Asset	High-resolution Predicted Suitable Habitat Summary (non-public dataset); Virginia Department of Conservation and Recreation (DCR)	Dataset combining predicted suitable habitat layers for rare, threatened, and endangered species.	~Not included in Phase I	https://www.dcr.virginia.gov/natural-heritage/nhserviceform/#:~:text=2%20A%20Predicted%20Suitable%20Habitat,available%20for%20each%20raster%20cell.	12/5/2023	Area Polygons
Natural and Nature-Based Features	Asset	Virginia Institute of Marine Science (VIMS)	Community resilience to storm-driven coastal flooding is improved with the presence of natural and nature-based features (NNBFs) such as wetlands, wooded areas, living shorelines, and beaches. These natural and created features can provide multiple benefits for a local community, including mitigating the impacts of storm surge and sea-level rise and allowing communities to take advantage of programmatic incentive programs like FEMA's Community Rating System and nutrient reduction crediting.	~Not included in Phase I	https://scholarworks.wm.edu/data/442/	1/1/2021	Area Polygons
Nature Based Recreational Access Model	Context	Virginia Department of Conservation and Recreation (DCR)	The purpose of the Nature-based Recreation Access Model is to quantify the availability of opportunities for nature-based recreation on Virginia's public lands and waters, and to identify areas where more opportunities are needed. We developed two sets of metrics to evaluate land- and water-based recreation needs.	~Not included in Phase I	https://www.dcr.virginia.gov/natural-heritage/vaconvisrec	7/1/2021	Raster
Development Vulnerability Model	Context	Virginia Department of Conservation and Recreation (DCR)	The Virginia ConservationVision Development Vulnerability Model quantifies the risk of conversion from greenspace to urbanized or other built-up land uses. Relative vulnerability ranges from 0 (least vulnerable) to 100 (most vulnerable). Undevelopable areas are coded as -1 and developed areas are coded as 101. Values are presented as 30 meter resolution raster.	~Not included in Phase I	https://www.dcr.virginia.gov/natural-heritage/vaconvisvulnerable	6/16/2022	Raster

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Flood Hazard Impact Assessment Asset Data Inputs

Input Dataset	Data Type	Source	Description	Phase I Sub-Component	Link	Date Last Updated	Spatial Data Type
Watershed Impact Model	Context	Virginia Department of Conservation and Recreation (DCR)	The Virginia ConservationVision Watershed Impact Model relies on multiple data sources to characterize where activities on land are expected to have the greatest impact on water. The model scores areas on a scale of 1 (lowest impact) to 100 (highest impact). Values are presented as 10 meter resolution raster.	~Not included in Phase I	https://www.dcr.virginia.gov/natural-heritage/vaconviswater#:~:text=The%20purpose%20of%20the%20Virginia,and%2For%20aquatic%20ecological%20integrity	6/7/2022	Raster
HUC12 Boundaries	Geography	United States Geological Survey (USGS)	The Watershed Boundary Dataset (WBD) is a seamless, national hydrologic unit dataset. Hydrologic units represent the area of the landscape that drains to a portion of the stream network. More specifically, a hydrologic unit defines the areal extent of surface water drainage to an outlet point on a dendritic stream network or to multiple outlet points where the stream network is not dendritic. A Hydrologic unit codes (HUC) are developed using a progressive two-digit system where each successively smaller areal unit is identified by adding two digits to the identifying code the smaller unit is nested within. WBD contains eight levels of progressive hydrologic units identified by unique 2- to 16-digit codes. The dataset is complete for the United States to the 12-digit hydrologic unit.	~Not included in Phase I	https://prd-tnm.s3.amazonaws.com/index.html?prefix=StagedProducts/Hydrography/NHD/State/GDB/	12/27/2023	
Airports	Asset	United States Department of Transportation, Federal Aviation Administration-Aeronautical Information Services (Accessed via ArcGIS Hub)	Airport locations.	Airports	https://hub.arcgis.com/documents/f74df2ed82ba4440a2059e8dc2ec9a5d/explore	11/30/2023	Points
Broadband Radio Service and Educational Broadband Service Transmitters	Asset	Federal Communications Commission (accessed via HIFLD)	The Broadband Radio Service (BRS) is a commercial service. The Educational Broadband Service (EBS), formerly known as the Instructional Television Fixed Service (ITFS), is an educational service that has generally been used for the transmission of instructional material to accredited educational institutions and non-educational institutions.	Broadband Internet	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::broadband-radio-service-brs-and-educational-broadband-service-ebs-transmitters-1/explore	11/23/2021	Points
FDIC Insured Banks	Asset	Federal Deposit Insurance Corporation (accessed via HIFLD)	The Summary of Deposits (SOD) is the annual survey of branch office deposits for all FDIC-insured institutions including insured U.S. branches of foreign banks.	Community Capacity	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::fdic-insured-banks/about	5/17/2022	Points
Federally-Owned Land	Asset	BLM, DoD, USFS, USFWS, NPS, PADUS 2.1 (accessed via ESRI)	These lands include over 30 million acres managed by the Department of Defense.	Defense	https://www.arcgis.com/home/item.html?id=5e92f2e0930848faa40480bcb4fdc44e	7/7/2023	Area Polygons
Child Care Facilities	Asset	Virginia Department of Social Services (accessed via HIFLD)	This feature class/shapefile contains locations of child day care centers for the 50 states of the USA, Washington D.C., and Puerto Rico.	Education Facilities	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::child-care-centers/about	12/8/2022	Points
Supplemental Colleges	Asset	National Center for Education Statistics (accessed via HIFLD)	The Supplemental Colleges feature class/shapefile contains additional postsecondary education features that are not included in the National Center for Education (NCES) Integrated Post Secondary Education System (IPEDS). Included are Doctoral/Research Universities, Masters Colleges and Universities, Baccalaureate Colleges, Associates Colleges, Theological seminaries, Medical Schools and other health care professions, Schools of engineering and technology, business and management, art, music, design, Law schools, Teachers colleges, Tribal colleges, and other specialized institutions.	Education Facilities	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::supplemental-colleges/about	12/7/2022	Points
Public Schools	Asset	National Center for Education Statistics (accessed via HIFLD)	This Public Schools feature dataset is composed of all Public elementary and secondary education facilities in the United States as defined by the Common Core of Data (CCD, https://nces.ed.gov/ccd/), National Center for Education Statistics (NCES, https://nces.ed.gov), US Department of Education for the 2017-2018 school year.	Education Facilities	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::public-schools/about	12/7/2022	Points
Higher Education Facilities	Asset	National Center for Education Statistics (accessed via HIFLD)	The Colleges and Universities feature class/shapefile is composed of all Post-Secondary Education facilities as defined by the Integrated Post-Secondary Education System (IPEDS, http://nces.ed.gov/ipeds/), National Center for Education Statistics (NCES, https://nces.ed.gov/), US Department of Education for the 2018-2019 school year.	Education Facilities	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::colleges-and-universities/about	12/7/2022	Points
Private Schools	Asset	National Center for Education Statistics (accessed via HIFLD)	This Private Schools feature dataset is composed of private elementary and secondary education facilities in the United States as defined by the Private School Survey (PSS, https://nces.ed.gov/surveys/pss/), National Center for Education Statistics (NCES, https://nces.ed.gov), US Department of Education for the 2017-2018 school year.	Education Facilities	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::private-schools/about	10/4/2023	Points
Power Plants	Asset	Oak Ridge National Laboratory (accessed via HIFLD)	This feature class/shapefile represents electric power plants.	Electricity	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::power-plants-2/about	9/21/2023	Points

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Flood Hazard Impact Assessment Asset Data Inputs

Input Dataset	Data Type	Source	Description	Phase I Sub-Component	Link	Date Last Updated	Spatial Data Type
Emergency Operations Centers	Asset	VDEM	Local Emergency Operations Centers in Virginia. All local EOC locations were verified by locality EM contacts via VDEM regional staff.	Emergency Services	Not publicly available	10/1/2023	Points
Fire Stations	Asset	U.S. Geological Survey, National Geospatial Technical Operations Center (Accessed via HIFLD)	To document the spatial location of fire stations in the U.S. for general cartographic purposes on USGS mapping products at 1:24,000 scale.	Emergency Services	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::fire-stations/about	10/22/2023	Points
Emergency Medical Service Stations	Asset	Homeland Infrastructure Foundation-Level Database (HIFLD), original source unclear	This dataset represents the EMS stations of any location where emergency medical service (EMS) personnel are stationed or based out of, or where equipment that such personnel use in carrying out their jobs is stored for ready use.	Emergency Services	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::emergency-medical-service-ems-stations/about	6/1/2022	Points
Local Law Enforcement Facilities	Asset	Oak Ridge National Laboratory (Accessed via HIFLD)	This feature class/ shapefile contains law enforcement agencies as defined by the US Department of Justice - Bureau of Justice Statistics for the Homeland Infrastructure Foundation-Level Data (HIFLD) database.	Emergency Services	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::local-law-enforcement-locations/about	2/1/2021	Points
National Shelter System Facilities	Asset	Federal Emergency Management Agency (FEMA) (accessed via HIFLD)	This layer contains shelter facilities for the Homeland Infrastructure Foundation-Level Data (HIFLD) database.	Emergency Services	https://hifld-geoplatform.hub.arcgis.com/maps/national-shelter-system-facilities	7/3/2023	Points
Port of Virginia Facilities	Asset	Virginia Economic Development Partnership (VEDP)	This layer contains locations for all active Port of Virginia facilities. These facilities are all managed by the Virginia Port Authority.	Freight, Ports, and Shipping Facilities	https://gis.vedp.org/datasets/86a71d06874c453dafb7798fe09e8f59_18/about	10/22/2022	Points
Census Block Groups	Geography	American Community Survey (ACS), Census Bureau	Block Groups (BGs) are clusters of blocks within the same census tract. Block groups generally contain between 600 and 3,000 people. Virginia has 5,332 block groups.	Geographic Summary Unit	https://catalog.data.gov/dataset/tiger-line-shapefile-2020-state-virginia-block-groups	10/12/2021	
Reference Grid Cells	Geography	Dewberry	A custom reference grid with a tiling schema of 1,375 ft x 1,375 ft, which creates a mesh of 290,000 grid cells to cover the study area. The flood hazard model has a tiling schema that is 55,000 ft x 55,000 ft, and so the reference grid cells were designed as fractions of those tiles. In the Phase 1 assessment, four alternative reference grid cell sizes were explored but only the 1,375 ft x 1,375 ft one (the smallest option) was found most useful and is therefore the sole focus of Phase 2.	Geographic Summary Unit			
Coastal Flood Events	Hazard	Dewberry	Dewberry-created coastal floodplain extents and depths from all modeled tidal boundaries and storm events across all time horizons.	Hazard			
Hospitals	Asset	Oak Ridge National Laboratory (Accessed via HIFLD)	This feature class/shapefile contains locations of Hospitals. The database does not contain nursing homes or health centers. Hospitals have been categorized into children, chronic disease, critical access, general acute care, long term care, military, psychiatric, rehabilitation, special, and women based on the range of the available values from the various sources after removing similarities.	Health	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::hospitals/about	9/20/2023	Points
General Manufacturing Facilities	Asset	Industrial PinPointer database of manufacturing companies (accessed via HIFLD)	This dataset represents the entire Industrial PinPointer database of manufacturing companies.	Manufacturing	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::general-manufacturing-facilities/explore	7/3/2023	Points
Structures (Lightbox/HIFLD)	Asset	Lightbox/HSIN (accessed via HIFLD Secure)	Parcels and associated tax assessment information from Lightbox will be used to attribute structure footprints with relevant information about use and type.	Multiple	Not publicly available	7/15/2023	Structure Polygons
Structures (Phase I Supplemental)	Asset	Composite from CRMP Phase I (Sources including ODU, USACE, HRPDC, OSM, CityGML, and Dewberry)	Composite of identified Phase 1 building data not included in Lightbox/HSIN dataset.	Multiple	Not publicly available		Structure Polygons
Population Demographics	Context	American Community Survey (ACS), Census Bureau	The American Community Survey (ACS) covers a broad range of topics about social, economic, demographic, and housing characteristics of the U.S. population. Only demographic data related to the CDC's Social Vulnerability Index methodology will be used from this source.

The 5-year estimates from the ACS are "period" estimates that represent data collected over a period of time. The primary advantage of using multiyear estimates is the increased statistical reliability of the data for less populated areas and small population subgroups. The 5-year estimates are available for all geographies down to the block group level. | Multiple | https://www.census.gov/data/developers/data-sets/acs-5year.html | 7/20/2023 | |
| Petroleum Ports | Asset | Federal Communications Commission (accessed via HIFLD) | This feature class/shapefile represents Petroleum Ports. This includes ports in the 50 states and the District of Columbia that handle 200 or more short tons per year in total volume (import and export) of petroleum products (URL: http://www.eia.gov/maps/layer_info-m.cfm). | Oil & Biofuel | https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::petroleum-ports/about | 1/8/2022 | Points |

Flood Hazard Impact Assessment Asset Data Inputs

Input Dataset	Data Type	Source	Description	Phase I Sub-Component	Link	Date Last Updated	Spatial Data Type
Petroleum Registered Tank Facilities	Asset	Virginia Department of Environmental Quality (DEQ)	The GIS layer shows AST/UST Tank Facilities registered with DEQ.	Oil & Biofuel	https://geohub-vadeq.hub.arcgis.com/datasets/137437097e1444a6aed31081b9812330_102/explore?location=37.844888%2C-79.487250%2C6.92	1/9/2024	Points
Petroleum Terminals	Asset	Federal Communications Commission (accessed via HIFLD)	This feature class/shapefile represents Petroleum Terminals.	Oil & Biofuel	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::petroleum-terminals/about	4/5/2022	Points
Natural Gas Receipt Delivery Points	Asset	Oak Ridge National Laboratory (accessed via HIFLD)	This feature class/shapefile contains operational Natural Gas Receipt/Delivery points for the Homeland Infrastructure Foundation-Level (HIFLD)	Oil & Biofuel	https://hifld-geoplatform.hub.arcgis.com/datasets/6e01edc178ea4b7e9cec874e206248a2_0/explore	12/11/2023	Points
Above Ground LNG Storage Facilities	Asset	Homeland Infrastructure Foundation-Level Database (HIFLD), original source unclear	This feature class/shapefile represents Above Ground Liquefied Natural Gas Storage (AG_LNG) facilities. Above Ground Liquefied Natural Gas Storage facilities are used to provide Above Ground storage of LNG for multiple purposes, including but not limited to, Peak Shaving Plant operations, Agricultural CO-OP corn drying, manufacturing, vehicular fuel distribution, etc. In some of these cases, the Above Ground LNG storage facility is developed to provide the storage because it is not cost efficient for the natural gas suppliers to install natural gas pipeline for a single large user. This layer consists of LNG Above Ground Storage locations with the exclusion of LNG Import/Export Terminals which are already provided in another existing layer. Temporary or Mobile LNG storage is not included in this layer due to its transitory nature. Data contains locational and other attribute information for Above Ground Liquefied Natural Gas Storage facilities. Geographical coverage includes the continental United States, Alaska, and Hawaii.	Oil & Biofuel	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::above-ground-lng-storage-facilities-/about	12/15/2022	Points
AM Transmissions Towers	Asset	Federal Communications Commission Licensing Database (accessed via HIFLD)	AM transmission tower locations as recorded by the Federal Communications Commission, extracted from the FCC Licensing Database.	Phone, Radio, and TV	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::am-transmission-towers/about	5/7/2022	Points
Cellular Towers	Asset	Federal Communications Commission (accessed via HIFLD)	This dataset represents cellular tower locations as recorded by the Federal Communications Commission	Phone, Radio, and TV	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::cellular-towers-1/about	6/1/2022	Points
FM Transmissions Towers	Asset	Federal Communications Commission (accessed via HIFLD)	This data represents FM transmission tower locations as recorded by the Federal Communications Commission.	Phone, Radio, and TV	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::fm-transmission-towers/about	9/18/2018	Points
Land Mobile Broadcast Towers	Asset	Federal Communications Commission (accessed via HIFLD)	This dataset represents the Land Mobile Broadcast tower locations as recorded by the Federal Communications Commission.	Phone, Radio, and TV	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::land-mobile-broadcast-towers/about	9/18/2021	Points
Land Mobile Commercial Transmission Towers	Asset	Federal Communications Commission Licensing Database (accessed via HIFLD)	This dataset represents Land Mobile Commercial transmission tower locations as recorded by the Federal Communications Commission, extracted from the FCC Licensing Database.	Phone, Radio, and TV	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::land-mobile-commercial-towers/about	11/23/2021	Points
Microwave Service Towers	Asset	Federal Communications Commission (accessed via HIFLD)	This dataset represents Microwave Service Towers, which is a part of a communications system that uses a beam of radio waves in the microwave frequency range to transmit video, audio, or data between two locations.	Phone, Radio, and TV	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::microwave-service-towers/about	8/23/2022	Points
Paging Transmission Towers	Asset	Federal Communications Commission Licensing Database (accessed via HIFLD)	Paging transmission tower locations as recorded by the Federal Communications Commission, extracted from the FCC Licensing Database.	Phone, Radio, and TV	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::paging-transmission-towers/about	9/18/2021	Points
TV Analog Transmitters	Asset	Federal Communications Commission (accessed via HIFLD)	This dataset represents the locations of television analog station transmitters.	Phone, Radio, and TV	https://hifld-geoplatform.opendata.arcgis.com/datasets/geoplatform::tv-analog-station-transmitters/about	12/16/2021	Points
Bridges & Culverts	Asset	Virginia Department of Transportation (VDOT)	This feature class consists of point features which represent physical structures that Interstate, Primary, Secondary and Urban roads travel under or over on all Virginia Department of Transportation maintained roadways	Roads	https://www.virginiaroads.org/datasets/vdotbridgesculverts-ec/explore	1/19/2024	Points
Road Intersections	Asset	Virginia Department of Transportation (VDOT)	This feature class consists of approximately 430,000 features representing roadway intersections throughout the State of Virginia.	Roads	https://www.virginiaroads.org/datasets/VDOT::lrs-road-intersections/about	3/22/2023	Points
Roadway Centerlines	Asset	Virginia Geographic Information Network (VGIN); Virginia Department of Transportation (VDOT)	Virginia roadway centerlines in geodatabase form	Roads	https://vgin.vdem.virginia.gov/datasets/virginia-road-centerlines-rcl/about	1/12/2024	Lines

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Input Dataset	Data Type	Source	Description	Phase I Sub-Component	Link	Date Last Updated	Spatial Data Type
Hurricane Evacuation Routes	Asset	VDOT	The Evacuation Route Study Map contains the primary evacuation routes throughout the Commonwealth of Virginia. These routes were identified by the Virginia Department of Transportation and the Virginia Department of Emergency Management. This map was developed to meet the requirements set forth in the 2022 Code of Virginia; Title 33.2 - Highways and Other Surface Transportation Systems; Chapter 2 - Transportation Entities § 33.2-275.1. Primary evacuation routes; public information The data included in this map is produced, owned, and managed by VDOT - Office of Safety, Security, and Emergency Management (SSEM). Please coordinate with SSEM if this data is to be used or altered for the creation of derivative work products, linked to various technology solutions, or to support other efforts outside of expected tasks in support of hurricane evacuations.	Roads	https://www.arcgis.com/home/item.html?id=73ec5df5396f4c11a29229538b2f6d6a	9/20/2023	Lines
Major State Government Buildings	Asset	Technographics Inc. (accessed via HIFLD)	This dataset represents the locations of buildings or properties that are owned or leased by state level governments.	State & Local Government Facilities	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::major-state-government-buildings/about	10/19/2021	Points
Hazardous Waste Generators	Asset	U.S. Environmental Protection Agency (EPA) (accessed via VGIN)	The Resource Conservation and Recovery Act Information System (RCRAInfo) is EPA's comprehensive information system in support of the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. It tracks many types of information about generators, transporters, treaters, storers, and disposers of hazardous waste.	Waste	https://vgin.vdem.virginia.gov/datasets/36ec9358374a430d884495a001e993b3_16/about	11/18/2020	Points
Solid Waste Facilities	Asset	Virginia Department of Environmental Quality (DEQ)	The GIS layer shows Solid Waste Facilities permitted with DEQ.	Waste	https://geohub-vadeq.hub.arcgis.com/datasets/5a56c7a8daf04cb0bf584ffca72d8e46_100/about	7/12/2023	Points
EPA Toxic Substance Control Act Facilities	Asset	US EPA	The Facility Registry Services (FRS) is a centrally managed database that identifies facilities, sites or places subject to environmental regulations or of environmental interest.	Waste	https://frs-public.epa.gov/ords/frs_public2/fii_map_master.fii_retrieve?fac_search=primary_name&fac_value=&fac_search_type=Beginning+With&postal_code=&location_address=&add_search_type=B&city_name=&county_name=&state_code=VA&epa_region_code=&cong_dist=&legis_dist=&huc_code=&fed_agency=&TribalLand=0&selectTribe=noselect&sic_type=Equal+to&sic_code_to=&naic_type=Equal+to&naic_to=&org_name=&duns_num=&prog_search=&int_search=&int_search=TSCA+SUBMITTER&search_type=&search_type=others&all_programs=YES&sysname=&sysname=TSCA&page_no=1&output_sql_switch=TRUE&report=1&database_type=FII&tribal_ind=&last_facility=&univ_search=&fac_search_term=&tribetype=&triballand=&selecttribe=&tribedistance1=	3/11/2024	Points
Marsh Migration	Asset	National Oceanic and Atmospheric Administration (NOAA)	These data were created as part of the National Oceanic and Atmospheric Administration Office for Coastal Management's efforts to map the potential distribution of each wetland type based on their elevation and how frequently they may be inundated under potential future SLR scenarios.	Wetland Habitat Loss	https://www.fisheries.noaa.gov/inport/item/55958	5/30/2023	Raster
Homeless Shelters	Asset			~Not included in Phase I			

Flood Hazard Impact Assessment Asset Data Inputs

Input Dataset	Data Type	Source	Description	Phase I Sub-Component	Link	Date Last Updated	Spatial Data Type
Areas of High Cultural Significance	Asset	Virginia Department of Conservation and Recreation (DCR)	The Cultural Resource Preservation Index ranks cultural resources by cultural interest on a scale of 1-3 and displays the likelihood of a given location to have conservation value when considering known and evaluated cultural heritage resources. Data is presented as a 250 acre hexagon grid.	~Not included in Phase I	https://www.dcr.virginia.gov/natural-heritage/vaconviscultural	5/18/2018	Area Polygons
Amtrak Stations	Asset	Federal Railroad Administration (FRA), U.S. Department of Transportation (USDOT)/Bureau of Transportation Statistics (BTS) National Transportation Atlas Database (NTAD) (Accessed via USDOT on ArcGIS)	AMTRAK train and bus stations	Freight, Ports, and Shipping Facilities	https://data-usdot.opendata.arcgis.com/datasets/amtrak-stations/explore	11/16/2023	Points
Bus Stations	Asset	Federal Railroad Administration (FRA), U.S. Department of Transportation (USDOT)/Bureau of Transportation Statistics (BTS) National Transportation Atlas Database (NTAD) (Accessed via USDOT on ArcGIS)	AMTRAK train and bus stations	Freight, Ports, and Shipping Facilities	https://data-usdot.opendata.arcgis.com/datasets/amtrak-stations/explore	11/16/2023	Points
Railways	Asset	Virginia Geographic Information Network (VGIN), Virginia Department of Rail and Public Transportation (DRPT)	The purpose of this data is to provide a geographic representation of the location of existing rail in Virginia.	Freight, Ports, and Shipping Facilities	https://www.arcgis.com/home/item.html?id=9e1e6aa9ee8041bb8a65b08bddcbeb1b	9/14/2021	Lines
Bus Routes	Asset	Virginia Office of Intermodal Planning and Investment (OIPI); Virginia Department of Rail and Public Transportation (DRPT)	Feature layer hosted by Office of Intermodal Planning and Investment based on Virginia Department of Rail and Public Transportation (DRPT) data for state-funded Intercity Bus Routes in the Commonwealth of Virginia.	Roads	https://www.arcgis.com/home/item.html?id=f87a8df336a74c8b9bdc820994f78f01	3/9/2022	Lines
Social Vulnerability	Context	Virginia Department of Conservation and Recreation (DCR)	Virginia Social Vulnerability Index at Census Block Group Scale using CDC Methodology. Credit to IPUMS National Historical Geographic Information System (NHGIS) for providing geographic features that correspond to summary data from the U.S. 2020 Decennial Census and American Community Survey, for the entire U.S. and Puerto Rico, at the geographic summary level of Block Group. NHGIS derived this shapefile from the U.S. Census Bureau's 2020 TIGER/Line Shapefiles.	Social Vulnerability	https://vdcr.maps.arcgis.com/home/item.html?id=b63e5a07ad46425baa069c5f1d2cca72	10/18/2023	
State Building Inventory	Asset	Virginia Department of General Services (DGS)		State & Local Government Facilities			
Tribal-Owned Lands	Asset	United States Census Bureau	Current American Indian/Alaska Native/Native Hawaiian (AIANNH) Areas TIGER/Line Shapefile	Tribal-Owned Lands	https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2023&layergroup=American+Indian+Area+Geography	11/11/2023	Area Polygons
Septic Systems	Asset	Virginia Department of Health (VDH)	Septic system locations.	Wastewater			Points
Public Water Supply	Asset	Virginia Department of Health (VDH)	Drinking water supply.	Water	https://www.vdh.virginia.gov/drinking-water/drinking-water-data/		Points

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