VTrans Long-term Risk & Opportunity Register – Megatrend: Climate

Middle Peninsula Local Government Planners Monthly Meeting

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TODAY'S PRESENTATION: PURPOSE

- Present Draft Policy:
  Development and Monitoring of VTrans Long-term Risk & Opportunity Register

- Review one Megatrend: Climate

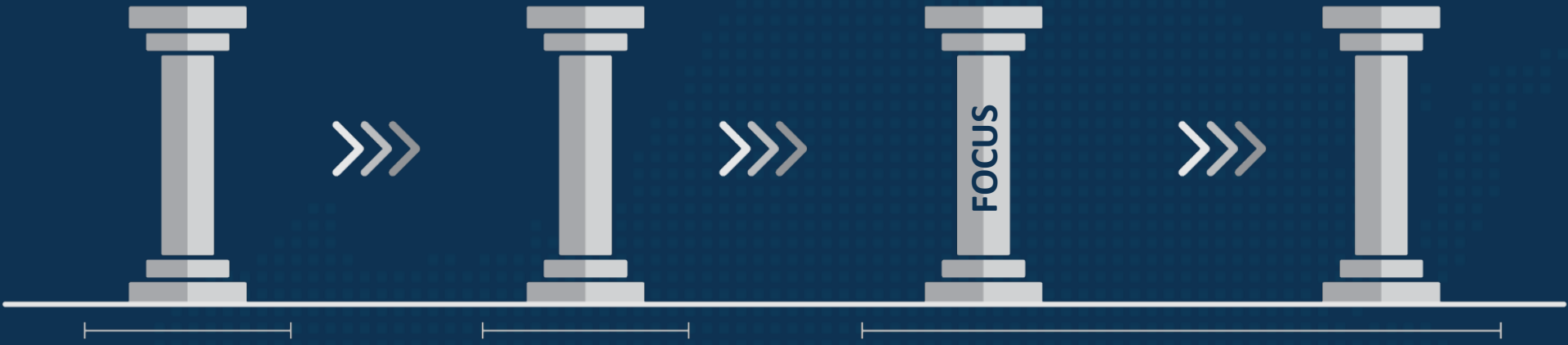
COMPONENTS OF VTRANS

1
CTB's Vision, Guiding Principles, Goals and Objectives

2
VTrans Mid-term Needs: Identification and Prioritization

3
VTrans Long-term Risk & Opportunity Register

4
Strategic Actions (Recommendations)



DRAFT POLICY FRAMEWORK

STEP 1 IDENTIFY MEGA- & MACROTRENDS

STEP 2 IDENTIFY SURROGATES FOR CTB GOALS

STEP 3 ESTIMATE IMPACTS OF MACROTRENDS ON SURROGATES

STEP 4 DEVELOP VTRANS LONG-TERM RISK & OPPORTUNITY REGISTER

STEP 5 TRACK MACROTRENDS FOR ANNUAL REPORTING

IDENTIFY MEGA- & MACROTRENDS

MEGATREND	IMPACT OF CLIMATE CHANGE / GREENHOUSE GAS EMISSIONS	TECHNOLOGICAL ADVANCEMENTS	CHANGE IN CONSUMPTION PATTERNS	SOCIO-DEMOGRAPHIC / EMPLOYMENT CHANGES
MACROTREND	Increase in Flooding Risk ▪ Sea-level Rise ▪ Storm Surge ▪ Inland/Riverine Flooding	Adoption of Highly Autonomous Vehicles Adoption of Electric Vehicles Growth in Shared Mobility	Growth in E-commerce Greater Automation of Production and Services	Increase in Workplace Flexibility Growth of Professional Service Industry Growth of the 65+ Cohort Population and Employment Shift

MEGATREND 1:
IMPACT OF CLIMATE CHANGE / GREENHOUSE GAS EMISSIONS

MACROTREND 1:

Increase in Flooding Risk due to

- Sea-level Rise
- Storm Surge
- Inland/Riverine Flooding

IDENTIFY MEGA- & MACROTRENDS: TODAY'S FOCUS

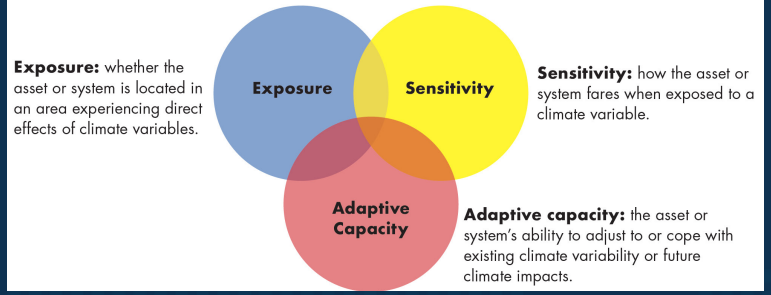
Vulnerability

- Vulnerability is a function of exposure to a hazard, the sensitivity to the given hazard, and adaptive capacity, or the system's ability to cope.

Resiliency

- Resiliency is the capability to anticipate, prepare for, respond to and recover from extreme weather event(s) with minimum damage to social well-being, infrastructure, the economy, and the environment.
- FHWA defines resilience or resiliency as "the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."
- When defining resilience, most State DOTs, MPOs, and other transportation organizations use a similar approach to FHWA, focusing on the ability to prepare for and recover from disasters and disruptive events.
- There can be phase/task-specific definitions – for example a definition that addresses resiliency in the context of a project planning and design.

Definition and Framework for the VTrans Vulnerability Assessment



IDENTIFY MEGA- & MACROTRENDS: RELATED WORK

Since the initiation of the VTrans work in 2018, there have been several related state-led efforts.

VIMS Study

Coastal Virginia Transportation Infrastructure Inundation Study and Virginia Dept of Transportation (VDOT) At-Risk Infrastructure Report
from VIMS & VDOT

Enhancement to Precipitation Estimates

from the Office of the Governor, Secretary of Natural Resources, Special Assistant to the Governor for Coastal Adaptation and Protection, Department of Environmental Quality, Commonwealth Center for Recurrent Flooding Resiliency (CCRFR), & VDOT

Virginia Coastal Resilience Master Plan

from Office of the Governor, Secretary of Natural Resources, Special Assistant to the Governor for Coastal Adaptation and Protection, & DCR

Other State Efforts

- Joint Subcommittee on Coastal Flooding, Report
- Commonwealth Center for Recurrent Flooding Resiliency
- Joint Commission on Technology and Science – Coastal Areas: Study on Economic Consequences of Weather-Related Events

IDENTIFY SURROGATES FOR CTB GOALS

	GOALS	SURROGATES FOR CTB GOALS
	Economic Competitiveness and Prosperity	Vehicle Miles Traveled (VMT)
	Accessible and Connected Places	Switch to Shared Mobility
	Safety for All Users	Number of Crashes Involving Fatalities and Serious Injuries
	Proactive System Management	Roadways At Risk from Flooding
	Healthy Communities & Sustainable Transportation Communities	Tailpipe Emissions

ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

For each hazard, three scenarios or **estimates of impacts** have been developed to account for uncertainties.

HAZARD	SCENARIOS BY IMPACT		
	LOW	MEDIUM	HIGH
SEA LEVEL RISE	▪ Intermediate sea level rise scenario (Year 2040)	▪ Intermediate-high sea level rise scenario (Year 2040)	▪ Extreme sea level rise scenario (Year 2040)
STORM SURGE	▪ Category 2 hurricane storm surge	▪ Category 3 hurricane storm surge	▪ Category 4 hurricane storm surge
INLAND/RIVERINE FLOODING	▪ 100-year flood zone AND ▪ Historical weather-related damages or closures	▪ 500-year flood zone AND ▪ Historical weather-related damages or closures	▪ 500-year flood zone with a buffer AND ▪ Historical weather-related damages or closures

INCREASING IMPACT

ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

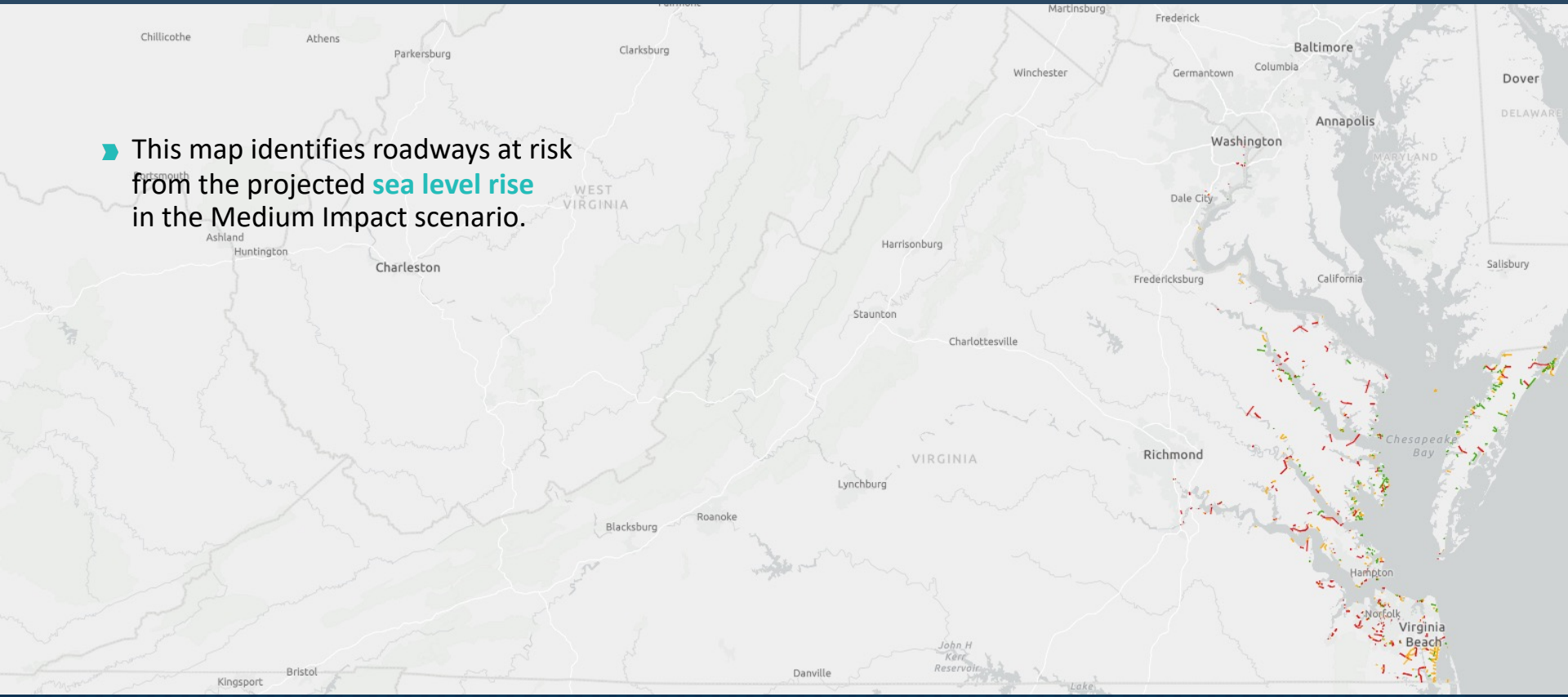
- Several data gaps and limitations have been identified.
  - The intent is to utilize available data and resources to the fullest extent to quantify risk to reflect the current state of practice.
  - The identified data gaps will be used to develop VTrans Strategic Actions to improve planning and preparedness.
- **This a screening-level assessment and is not intended to be used to develop location-specific recommendations.**
- **Known and other unknown limitations present opportunities for continuous improvement.**

Known Limitations and Associated Impacts on the Draft Results

Limitation	Impact on the Draft Results
• Lack of roadway elevation data	• Presence of false positives: Locations that are exposed but are not sensitive
• Lack of available data for all facilities	• Less precision. Example: In absence of data for alternative routes, Adaptive Capacity relies on surrogate measures.
• Data format/data with greater spatial and temporal precision	• Less precision: Transportation data in different formats can allow for greater precision.
• Computations	• Less precision: Available computational processes are impacted by the data formats and data resolution.

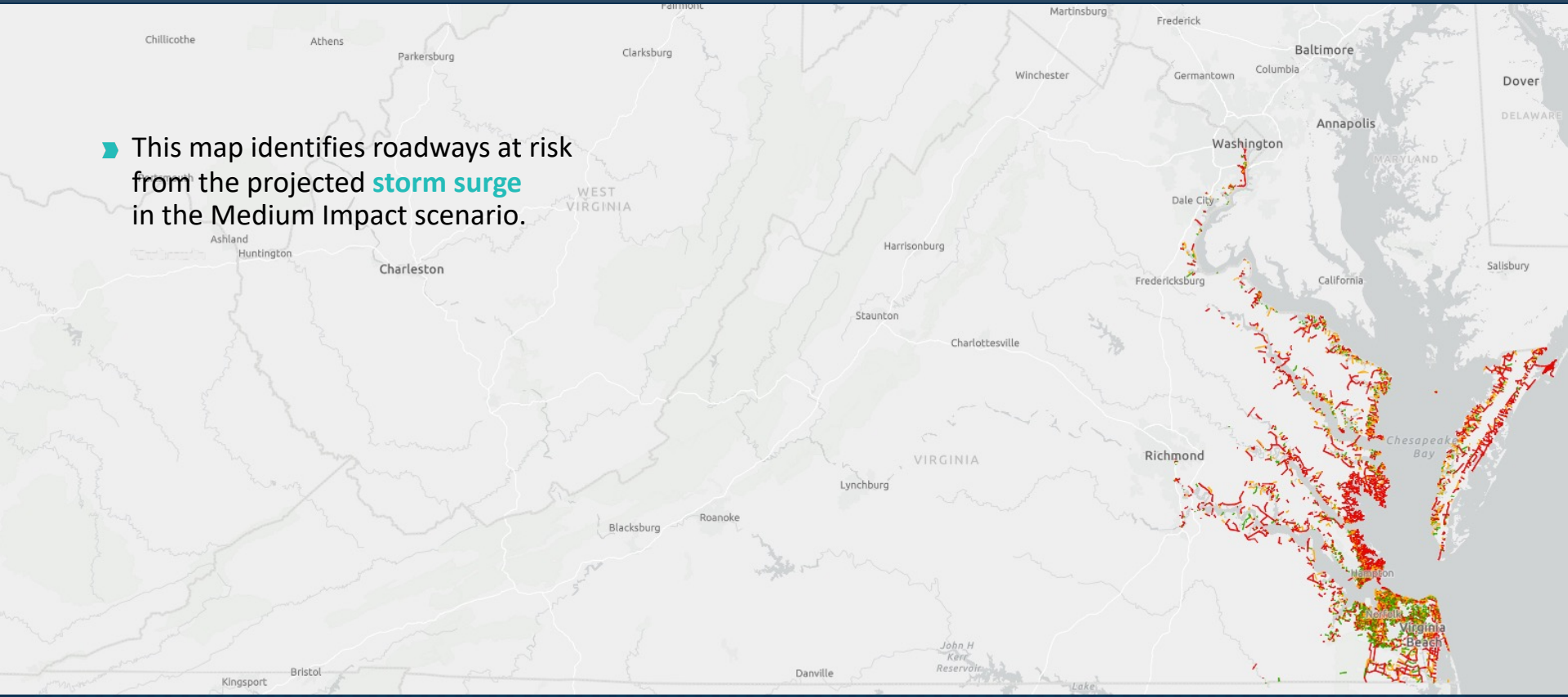
ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

- This map identifies roadways at risk from the projected **sea level rise** in the Medium Impact scenario.



ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

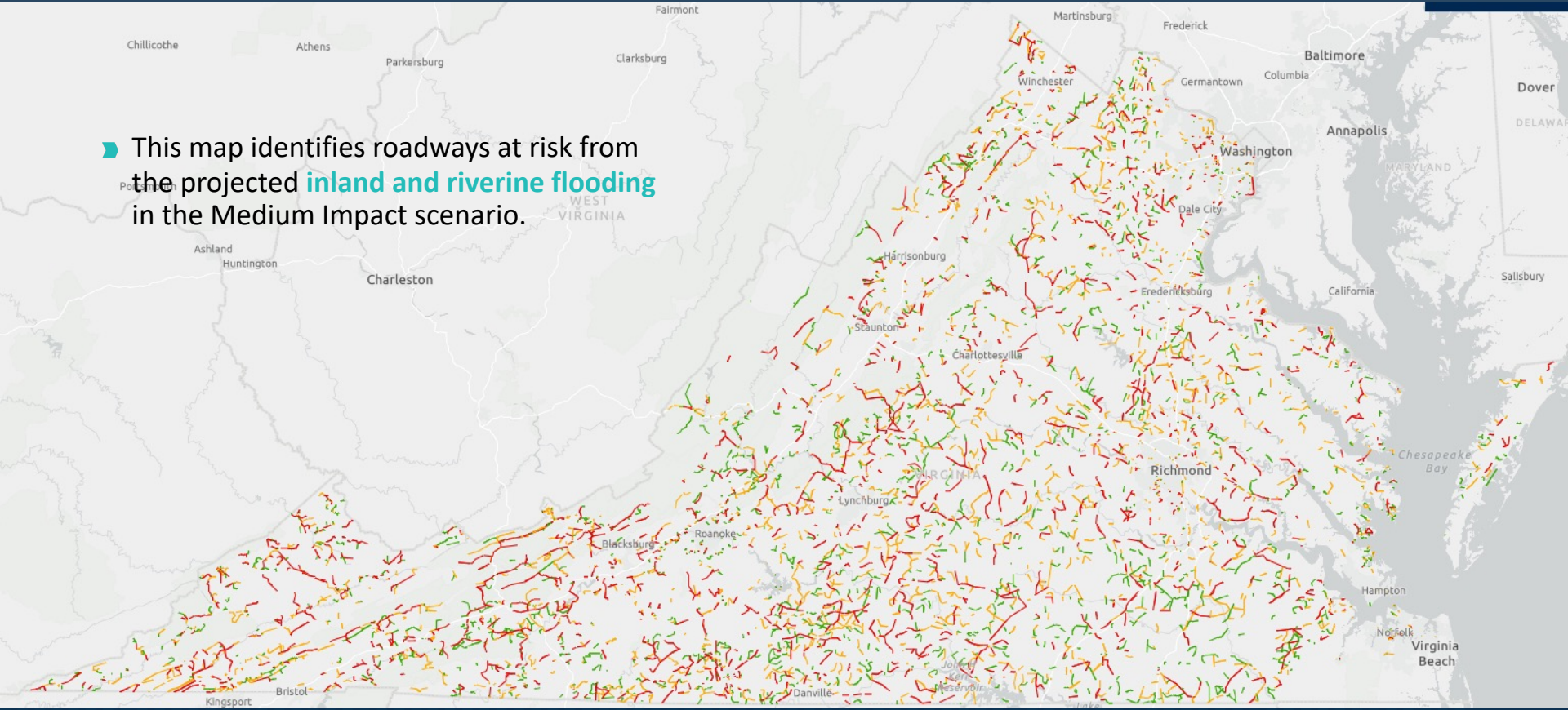
- This map identifies roadways at risk from the projected **storm surge** in the Medium Impact scenario.



High Med Low

ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

- This map identifies roadways at risk from the projected **inland and riverine flooding** in the Medium Impact scenario.

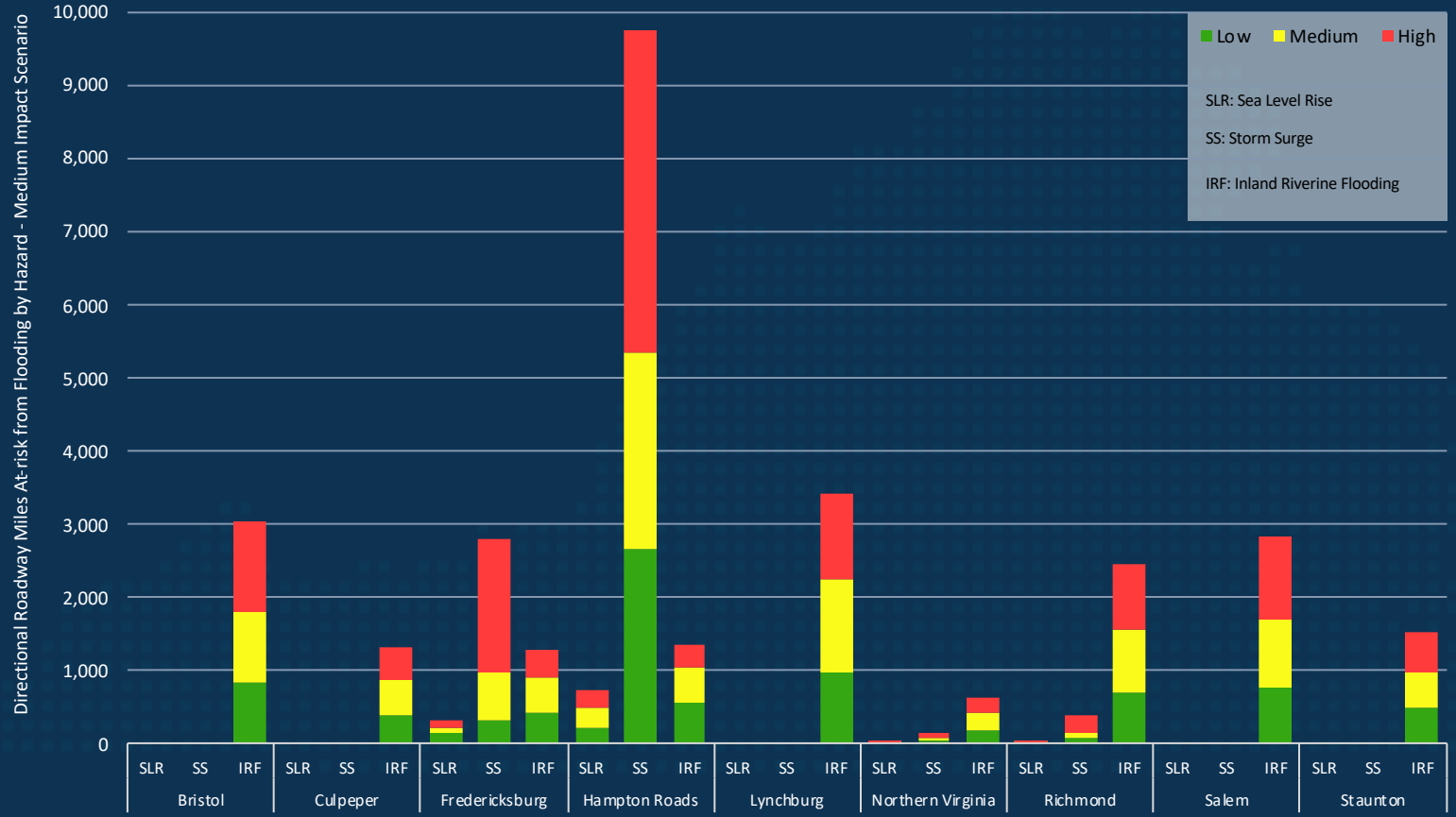


Note: Data available to perform this assessment is not available for all locally-maintained roadways.

High Med Low

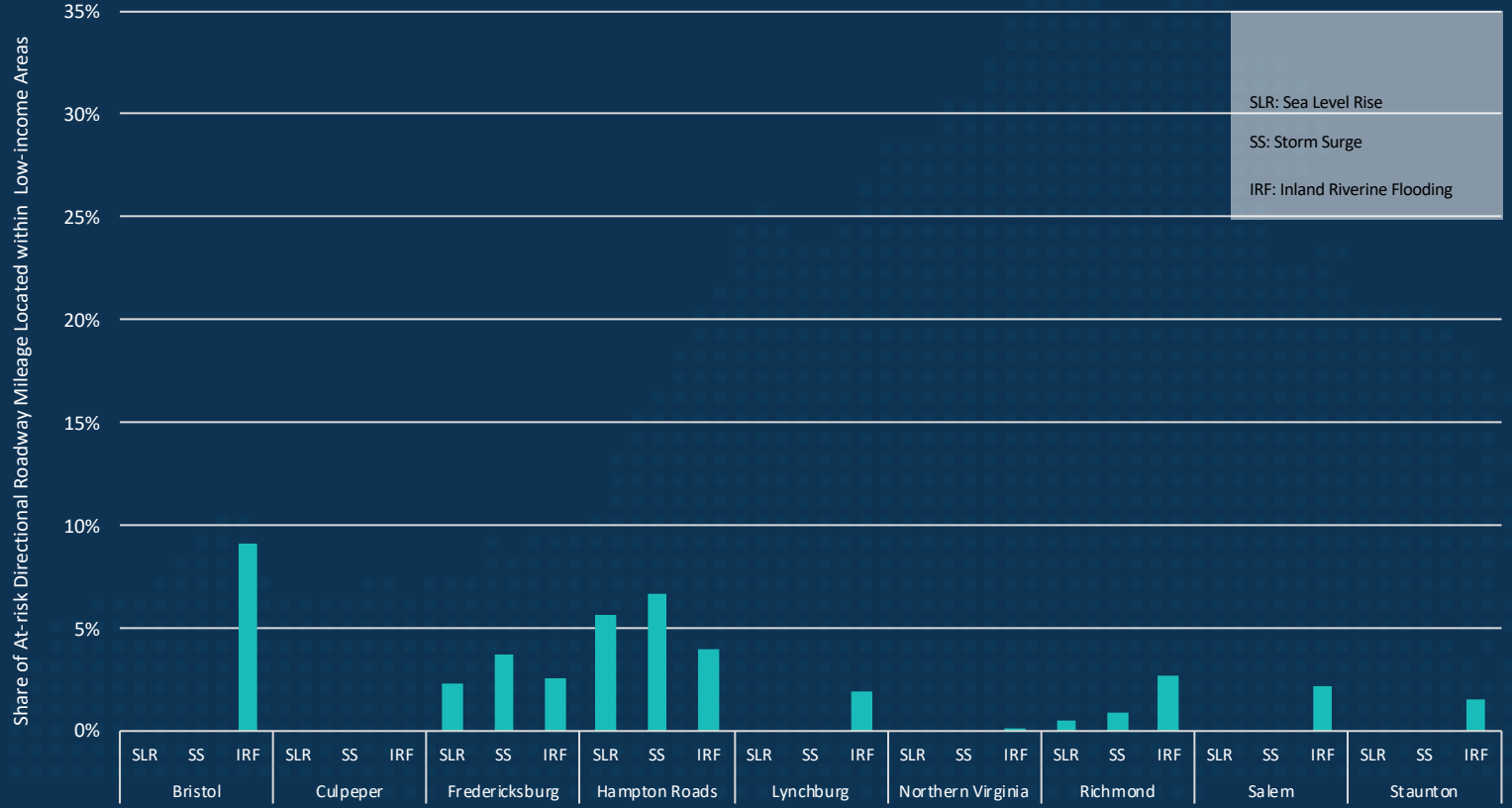
ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

Number of Directional Roadway Miles At-risk from Flooding by Hazard

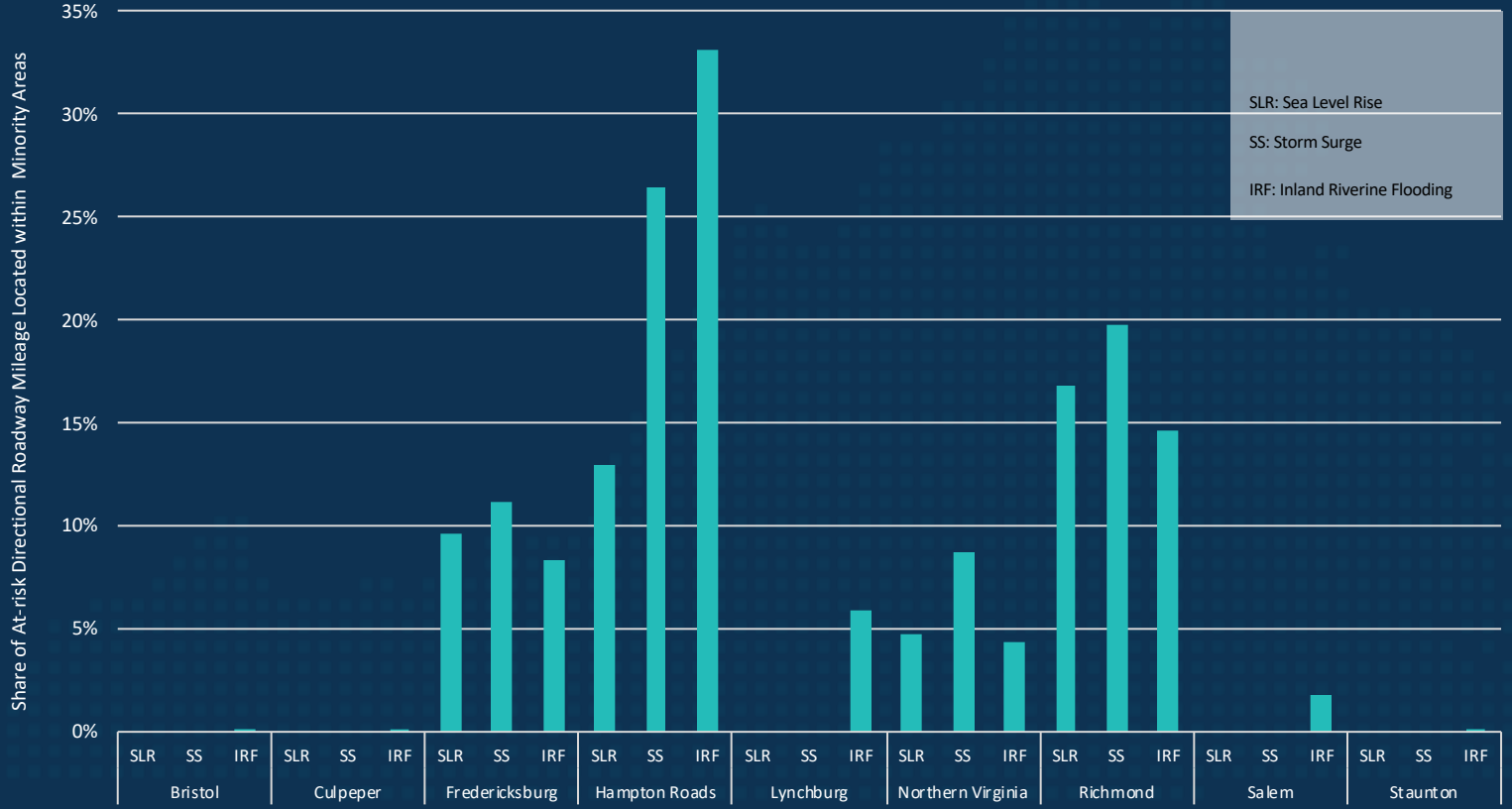


ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

Share of At-Risk Roadway Mileage Located in Areas with High Concentration of Low-income Populations



Share of At-Risk Roadway Mileage Located in Areas with High Concentration of Minority Populations



DEVELOP VTRANS LONG-TERM RISK & OPPORTUNITY REGISTER: APPROACH

- Risks and opportunities are identified utilizing the following criteria and based on estimated impacts (Step 3) of Macrotrends on CTB Goals.
  - Strategic in nature
  - Manageable in number
  - Level of detail suitable for policy-makers and executives
  - Most importantly based on Step 3 evidence that is measurable, replicable, and with an ability to monitor

DEVELOP VTRANS LONG-TERM RISK & OPPORTUNITY REGISTER

STEP FOUR

MACROTREND	NATURE[1]	DESCRIPTION
		1. A large number of the state's roadways are at risk from flooding 2. Several unknown and unquantified flooding risks are present 3. Impacts of increased flooding risk are disproportionately higher for certain geographic areas and populations
		4. Proactively eliminate or mitigate identified flooding risks 5. Increase state's preparedness to address other macrotrends associated with climate change megatrend

[1]  Uncertainty with negative impacts on CTB Goals in Step 3.  Uncertainty with a positive impact on CTB Goals in Step 3.

OIPI will provide annual updates to the Board utilizing the following VTrans Trend Trackers.

MACROTREND	VTRANS TREND TRACKERS
	▪ Number of directional miles at risk from sea level rise ▪ Number of directional miles at risk from storm surge ▪ Number of directional miles at risk from inland/riverine flooding ▪ Annual cost of transportation repair due to flooding events
	▪ Market Penetration of Highly Autonomous Vehicles* ▪ Attitude and Preferences for Adoption of Highly Autonomous Vehicles*
	▪ Market Penetration of Electric Vehicles* ▪ Attitude and Preferences for Adoption of Electric Vehicles* ▪ Transportation Revenue by Revenue Source ▪ Greenhouse Gas (GHG) Emissions
	▪ Access to Shared Mobility Services* ▪ Utilization of Shared Mobility Services by Type*
	▪ Number of Warehouse and Distribution Centers ▪ Square Footage of Warehouse and Distribution Centers ▪ Share of E-commerce Sales (business-to-business, business-to-customers)

*Based on the VTrans State of Transportation Biennial Survey

OIPI will provide annual updates to the Board utilizing the following VTrans Trend Trackers.

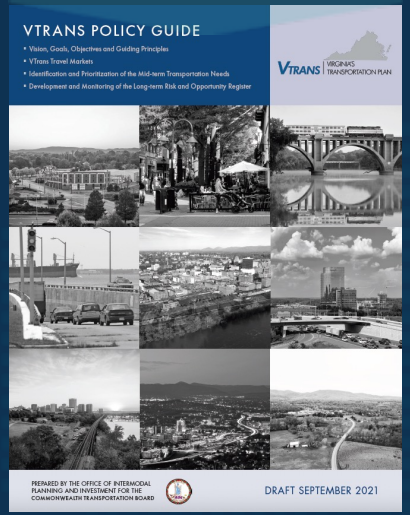
MACROTREND	VTRANS TREND TRACKERS
	▪ Number of short-range and long-range drone deliveries ▪ Number of last-mile robotic deliveries ▪ Value output of 3D Printing
	▪ Number of Workers with Workplace Flexibility* ▪ Utilization of Workplace Flexibility*
	▪ Job Share of Professional + Technical Services Industry
	▪ Number of Virginians Age 65 or older ▪ Share of Age 65+ Cohort
	▪ VTrans Land Use Vitality (LUV) Index ▪ Population ▪ Employment ▪ Income

*Based on the VTrans State of Transportation Biennial Survey

DRAFT LONG-TERM POLICY: RESOURCES

POLICY GUIDE
(DRAFT Chapter 6)

A resource for policy makers.



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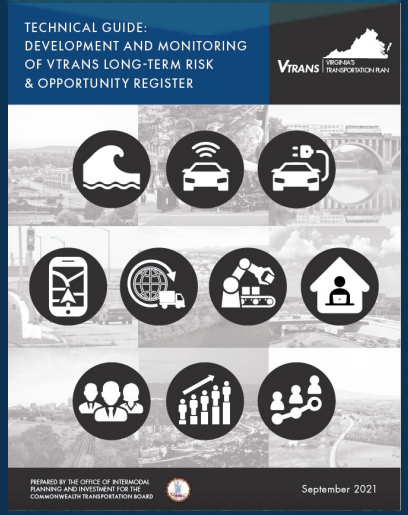
TECHNICAL GUIDE

A resource for planners, engineers, and other professionals interested in the data sources, processes, and methods used to implement the CTB's policies.



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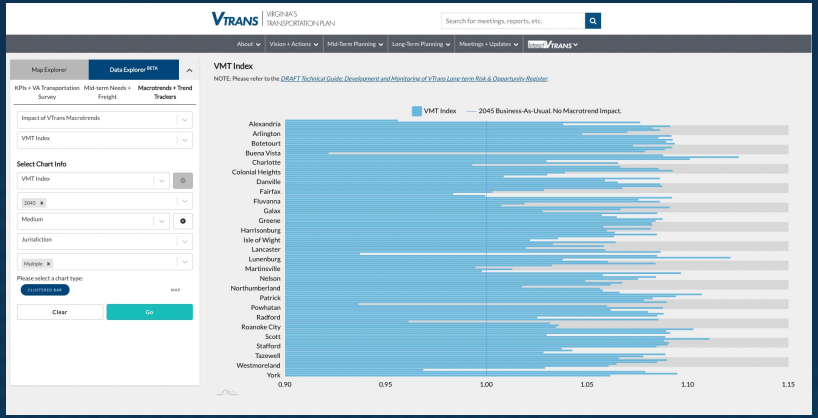
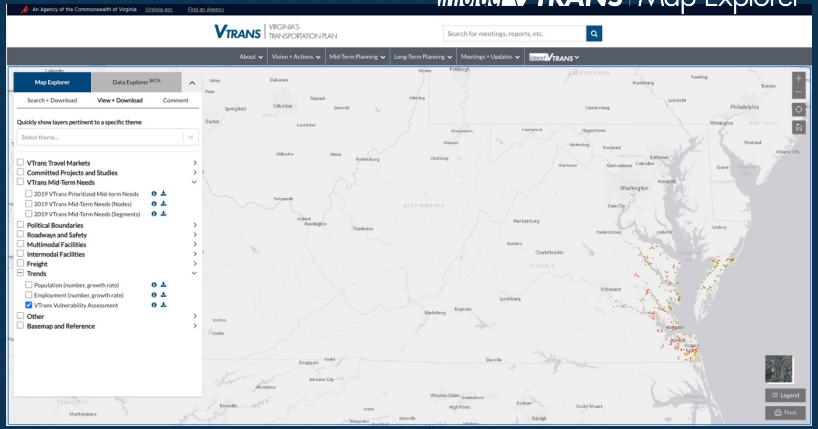
DRAFT LONG-TERM POLICY: RESOURCES

- All data is available in two formats: map and infographics on InteractVTrans (https://vtrans.org/interactvtrans/map-explorer).

InteractVTRANS | Data Explorer



InteractVTRANS | Map Explorer



NEXT STEPS

- November
  - Gather CTB input on VTrans Strategic Actions
  - Conduct outreach and engagement

- December: Request CTB Action on:
  - Draft Policy for the Development and Monitoring of VTrans Long-term Risk & Opportunity Register
  - VTrans Strategic Actions
  - Document synthesizing CTB-adopted policies for the Governor and the General Assembly