



COMMONWEALTH of VIRGINIA
Office of the
SECRETARY of TRANSPORTATION

VTrans Long-term Risk & Opportunity Register

Commonwealth Transportation Board Workshop

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TODAY'S PRESENTATION: PURPOSE

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

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)

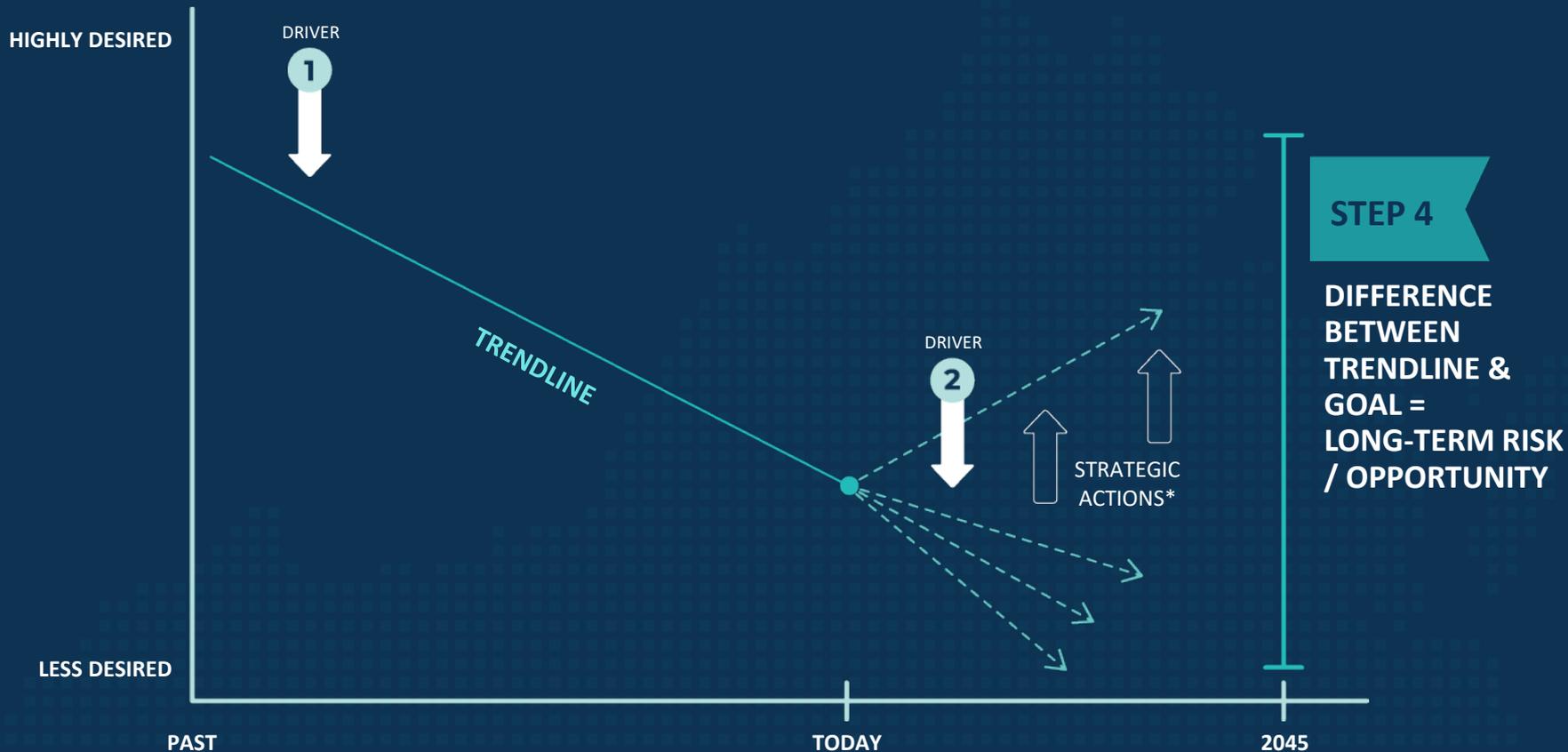


JAN 2020

JAN 2020
MARCH 2021

BY THE END OF 2021

CONTEXT & OVERVIEW: APPROACH



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: CLIMATE CHANGE MACROTRENDS

CLIMATE CHANGE MACROTRENDS	SUMMARY OF KNOWN IMPACTS ³
<ul style="list-style-type: none"> Air Quality¹ 	<ul style="list-style-type: none"> Impact on health and quality of life¹
<ul style="list-style-type: none"> Extreme sea levels² 	<ul style="list-style-type: none"> Traffic (vehicles and rail/transit service) disruptions Damage to transportation infrastructure Impact on structure and pavement life cycles
<ul style="list-style-type: none"> Tropical cyclones: precipitation² Tropical cyclones: proportion of intense cyclones² 	<ul style="list-style-type: none"> Traffic (vehicles and rail/transit service) disruptions Damage to transportation infrastructure Impact on structure and pavement life cycles
<ul style="list-style-type: none"> Heavy precipitation events² 	<ul style="list-style-type: none"> Traffic (vehicles and rail/transit service) disruptions Damage to transportation infrastructure due to landslides and washouts Impact on structure and pavement life cycles
<ul style="list-style-type: none"> Warm/hot extremes² 	<ul style="list-style-type: none"> Reduced visibility due to wildfires caused by extreme temperatures Limits to construction activities (due to heat waves) Damage to transportation infrastructure Impact on structure and pavement life cycles Impact on rail infrastructure life cycle Impact on vehicle longevity (vehicles last for shorter periods)
<ul style="list-style-type: none"> Cold extremes² 	<ul style="list-style-type: none"> Impact on structure and pavement life cycles Impact on vehicle longevity (vehicles last for shorter periods)
<ul style="list-style-type: none"> Agricultural, ecological droughts² 	<ul style="list-style-type: none"> Impacts on health and quality of life
<ul style="list-style-type: none"> Compound events² 	<ul style="list-style-type: none"> Combination of the items above
<ul style="list-style-type: none"> Marine heatwaves² 	<ul style="list-style-type: none"> Impacts of vessels and sea lanes

¹Centers for Disease Control and Prevention; ²United Nation's Intergovernmental Panel on Climate Change, Sixth Assessment; ³United States Environmental Protection Agency

IDENTIFY MEGA- & MACROTRENDS

MEGATREND

**IMPACT OF CLIMATE
CHANGE /
GREENHOUSE GAS
EMISSIONS**

MACROTREND



Increase in
Flooding Risk

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

IDENTIFY MEGA- & MACROTRENDS

MEGATREND

**IMPACT OF CLIMATE
CHANGE /
GREENHOUSE GAS
EMISSIONS**

MACROTREND



Increase in
Flooding Risk

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

**TECHNOLOGICAL
ADVANCEMENTS**



Adoption of
Highly
Autonomous
Vehicles

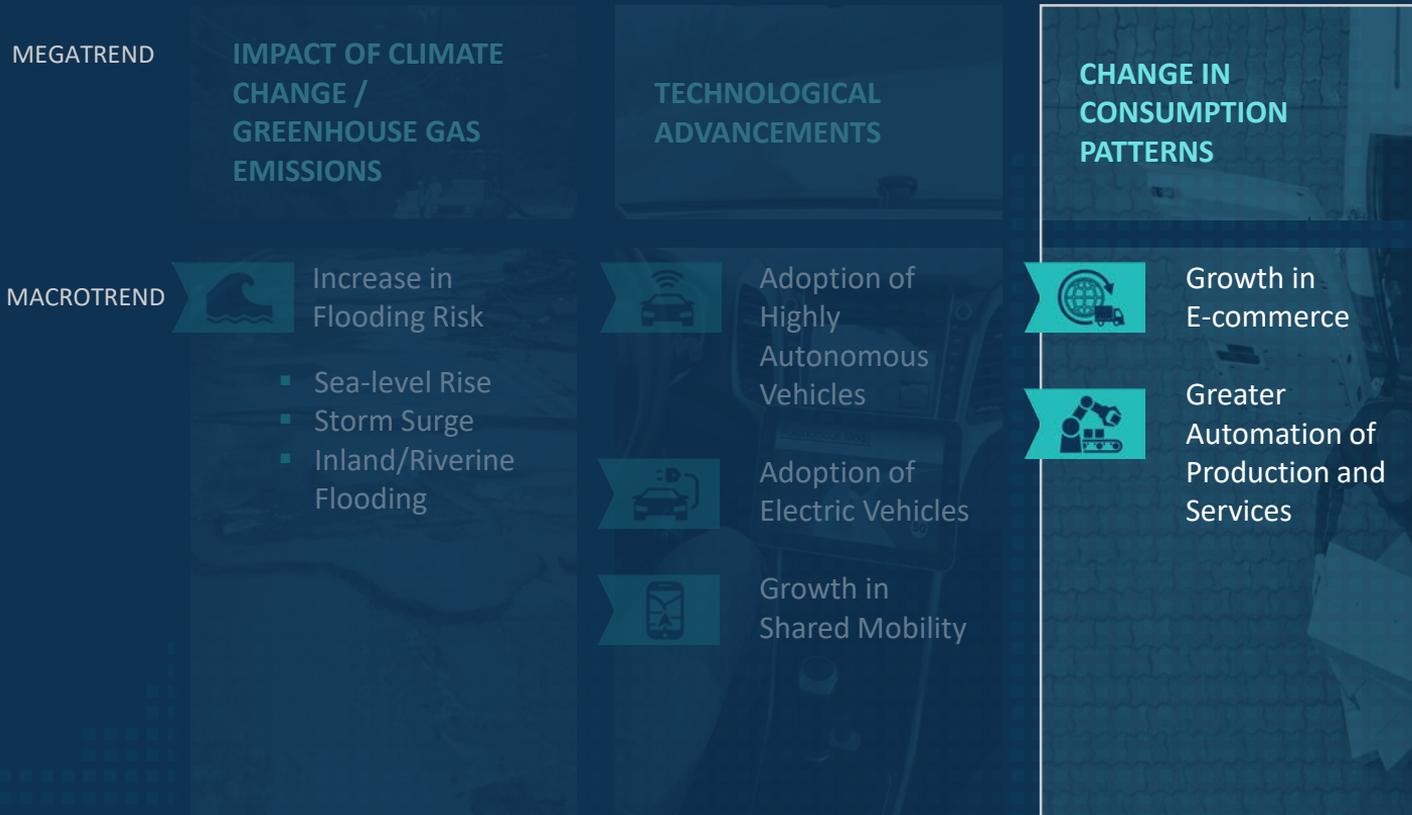


Adoption of
Electric Vehicles



Growth in
Shared Mobility

IDENTIFY MEGA- & MACROTRENDS



IDENTIFY MEGA- & MACROTRENDS

MEGATREND	IMPACT OF CLIMATE CHANGE / GREENHOUSE GAS EMISSIONS	TECHNOLOGICAL ADVANCEMENTS	CHANGE IN CONSUMPTION PATTERNS	SOCIO-DEMOGRAPHIC / EMPLOYMENT CHANGES
MACROTREND	 <p>Increase in Flooding Risk</p> <ul style="list-style-type: none">Sea-level RiseStorm SurgeInland/Riverine Flooding	 <p>Adoption of Highly Autonomous Vehicles</p>  <p>Adoption of Electric Vehicles</p>  <p>Growth in Shared Mobility</p>	 <p>Growth in E-commerce</p>  <p>Greater Automation of Production and Services</p>	 <p>Increase in Workplace Flexibility</p>  <p>Growth of Professional Service Industry</p>  <p>Growth of the 65+ Cohort</p>  <p>Population and Employment Shift</p>

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: 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.

SCENARIOS BY IMPACT

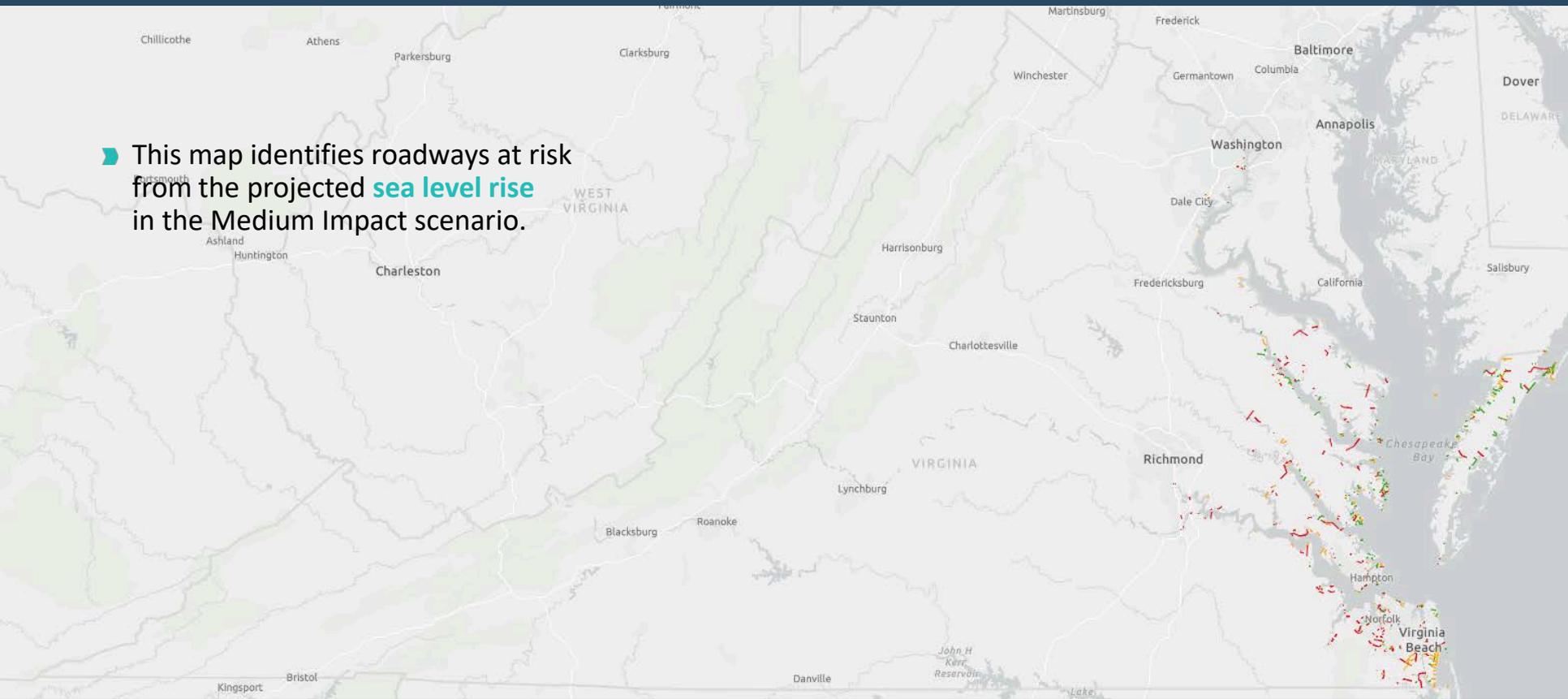
HAZARD	LOW	MEDIUM	HIGH
SEA LEVEL RISE	<ul style="list-style-type: none">Intermediate sea level rise scenario (Year 2040)	<ul style="list-style-type: none">Intermediate-high sea level rise scenario (Year 2040)	<ul style="list-style-type: none">Extreme sea level rise scenario (Year 2040)
STORM SURGE	<ul style="list-style-type: none">Category 2 hurricane storm surge	<ul style="list-style-type: none">Category 3 hurricane storm surge	<ul style="list-style-type: none">Category 4 hurricane storm surge
INLAND/RIVERINE FLOODING	<ul style="list-style-type: none">100-year flood zone ANDHistorical weather-related damages or closures	<ul style="list-style-type: none">500-year flood zone ANDHistorical weather-related damages or closures	<ul style="list-style-type: none">500-year flood zone with a buffer ANDHistorical weather-related damages or closures



INCREASING IMPACT

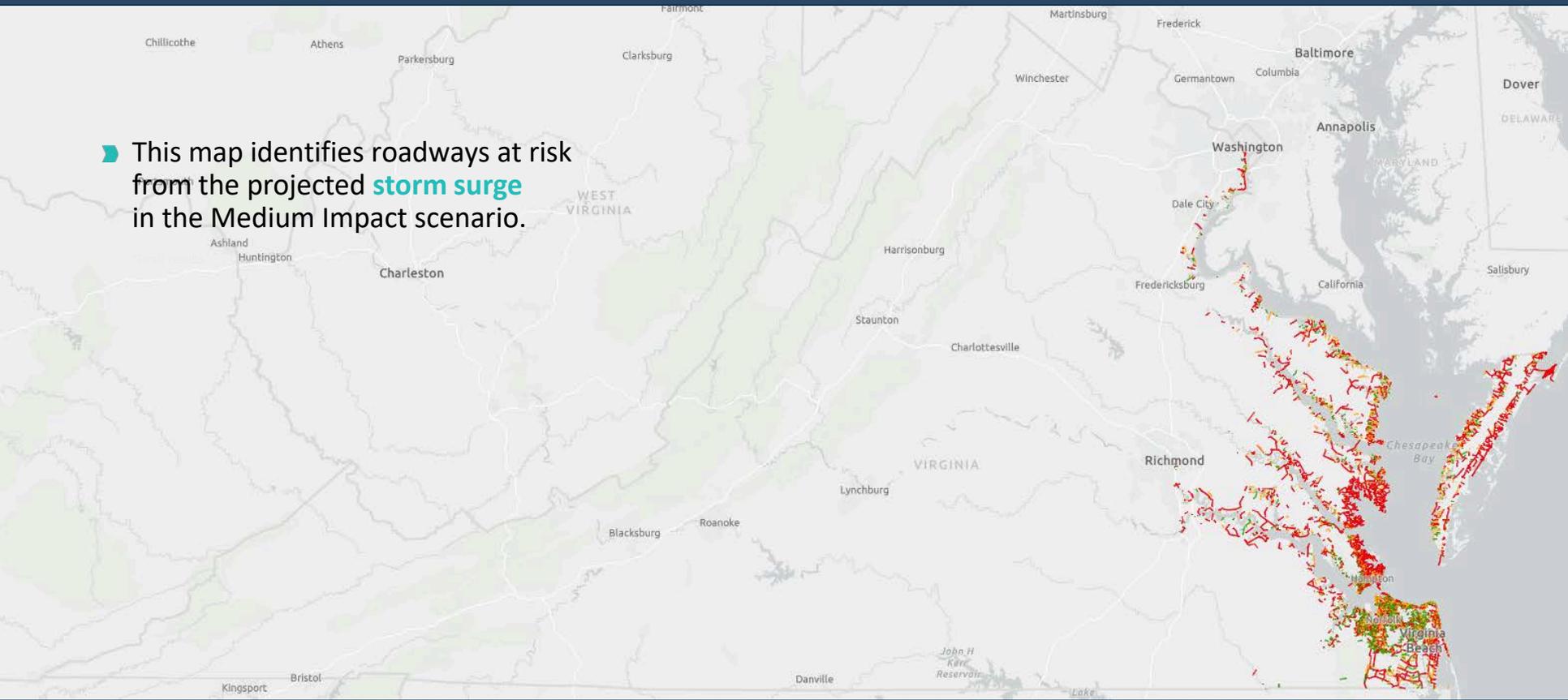
ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

► 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.



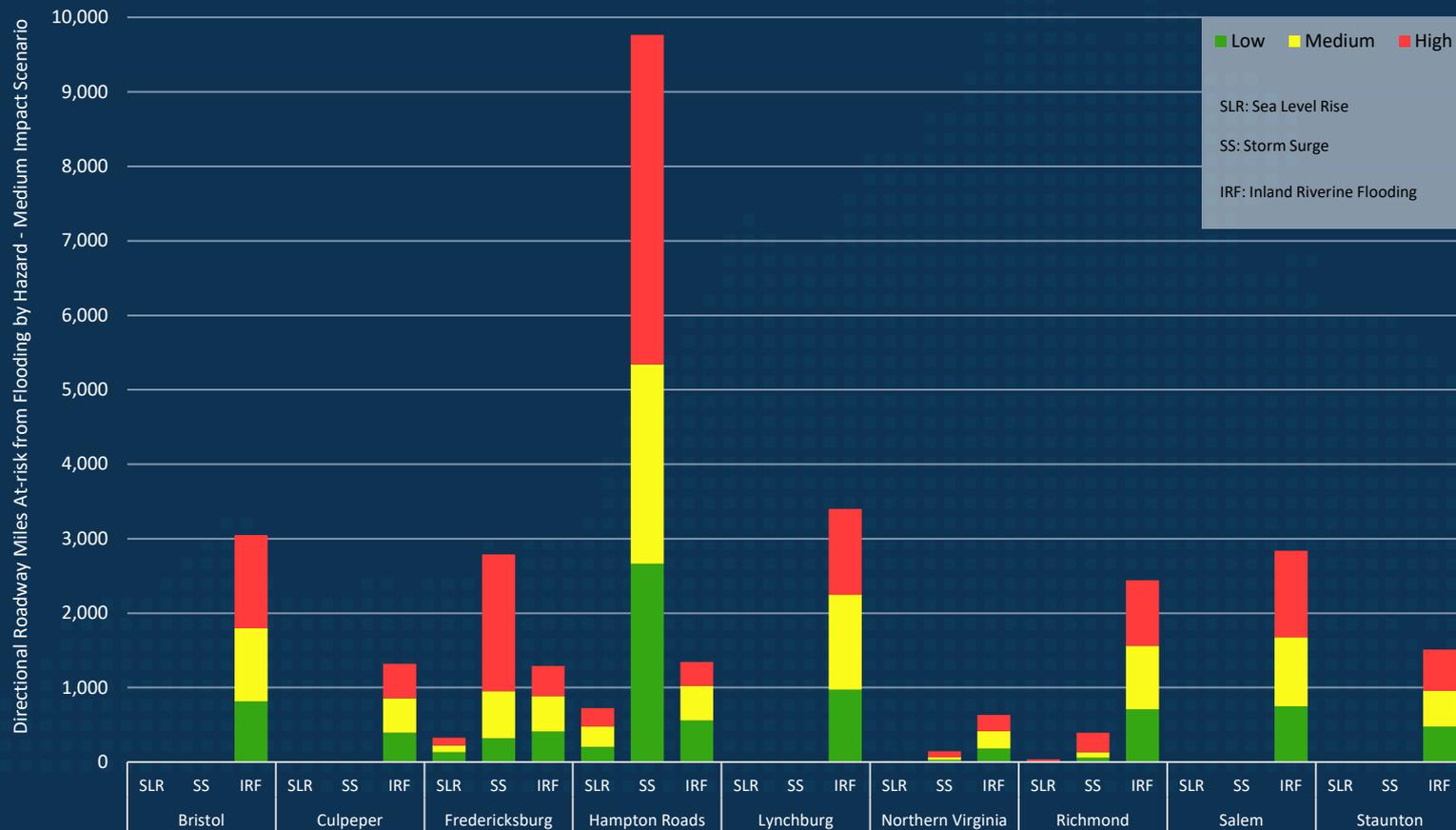
High

Med

Low

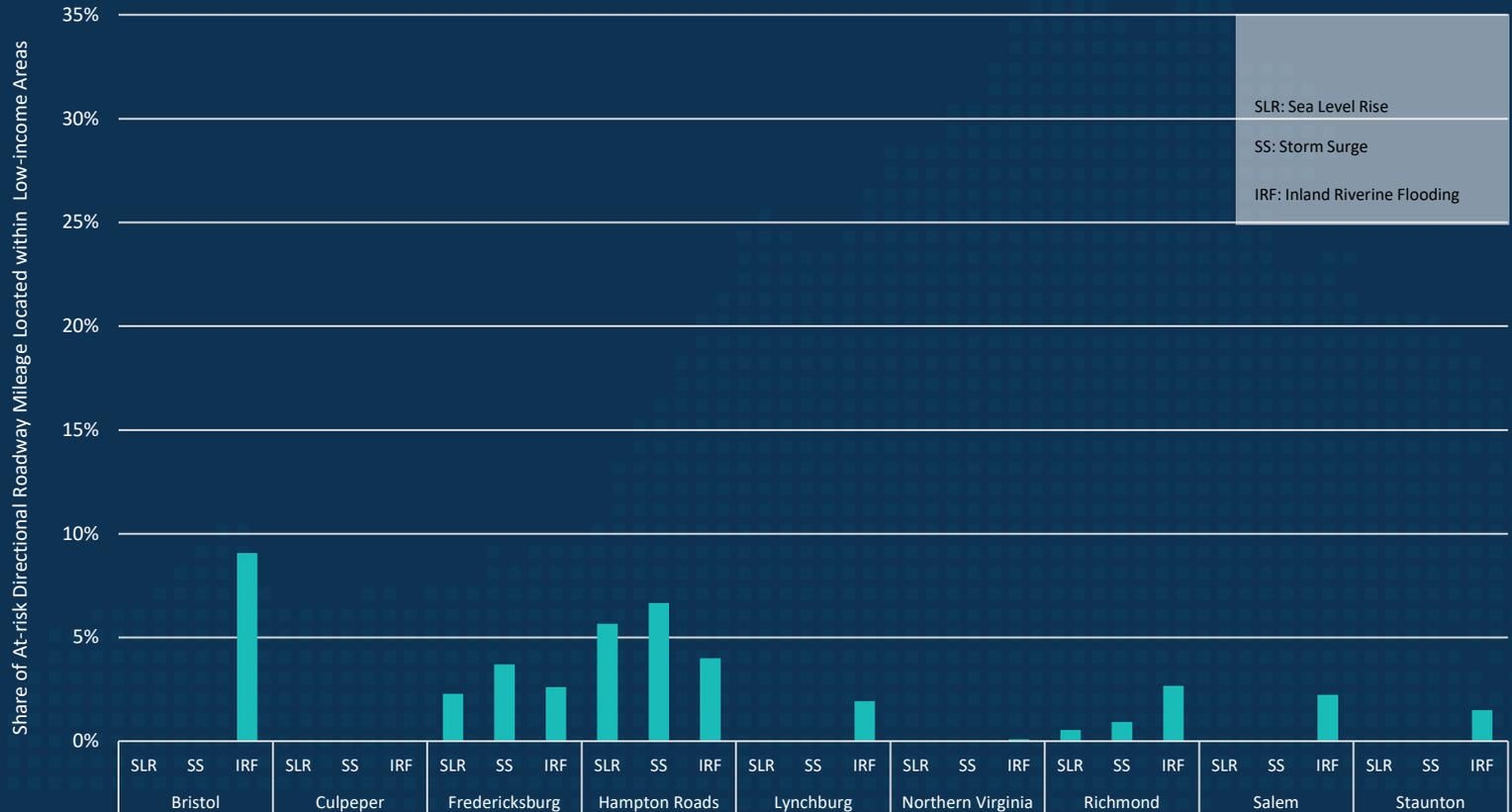
ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

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



ESTIMATE IMPACTS OF TRENDS ON SURROGATES FOR GOALS

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



DEVELOP VTRANS LONG-TERM RISK & OPPORTUNITY REGISTER

#	Nature	Description of Risk/Opportunity	CTB Goal Addressed					Proximity	Priority
			Goal A	Goal B	Goal C	Goal D	Goal E		
1	Risk	A large number of state's roadways are at risk from flooding				x		Mid-term	
2	Opportunity	Proactively eliminate or mitigate identified flooding risks				x		Mid-term	
3	Risk	Several unknown and unquantified flooding risks might be present				x		Long-term	
4	Risk	Impacts of increased flooding risk are disproportionately higher for certain areas and populations		x		x		Long-term	
5	Opportunity	Increase state's preparedness to address <u>other macrotrends</u> associated with climate patterns megatrend				x		Mid-term	

TRACK MACROTRENDS

OIPI will provide annual updates to the Board.

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



- 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*



- 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)

TRACK MACROTRENDS

OIPI will provide annual updates to the Board.

MACROTREND	VTRANS TREND TRACKERS
	<ul style="list-style-type: none">▪ Value output of 3D Printing▪ Number of short-range and long-range drone deliveries▪ Number of last-mile robotic deliveries
	<ul style="list-style-type: none">▪ Number of Workers with Workplace Flexibility*▪ Utilization of Workplace Flexibility*
	<ul style="list-style-type: none">▪ Share of Professional Service Industry
	<ul style="list-style-type: none">▪ Number of Virginias Age 65 or higher▪ Share of Age 65+ Cohort
	<ul style="list-style-type: none">▪ VTrans Land Use Vitality Index▪ Population▪ Employment▪ Income

NEXT STEPS

In the coming months, OIPI will:

- Gather feedback from CTB members on risks and opportunities.
- Continue outreach and engagement activities.
- Present the following at the October CTB Workshop:
 - VTrans Macrotrends #2 through #10
 - Draft list of VTrans Strategic Actions

