

Jamestown, RI

COASTAL SEA LEVEL RISE AND STORM SURGE: TRANSPORTATION FACT SHEET



PLANNING FOR SEA LEVEL RISE ON YOUR ROADS

This fact sheet aims to provide municipal leaders and practitioners with a survey of Jamestown's transportation infrastructure elements that may be affected by sea level rise and storm surge. In addition to explaining and presenting the data, this fact sheet will outline strategies that may help in adapting to these conditions, and point towards resources that will enable further investigation.

Relevance

The impacts of Sea Level Rise (SLR) are often perceived as distant, but the assets being built today will still be within their design life when future effects of sea level rise are felt. In addition, sea level rise will magnify the impacts of 100-year storm surge events by raising the water level. Though current federal guidelines only require federally funded assets be built to survive a 100-year storm event, what the impact of a 100-year storm event entails is likely to change during the design life of the assets currently under consideration around Rhode Island.

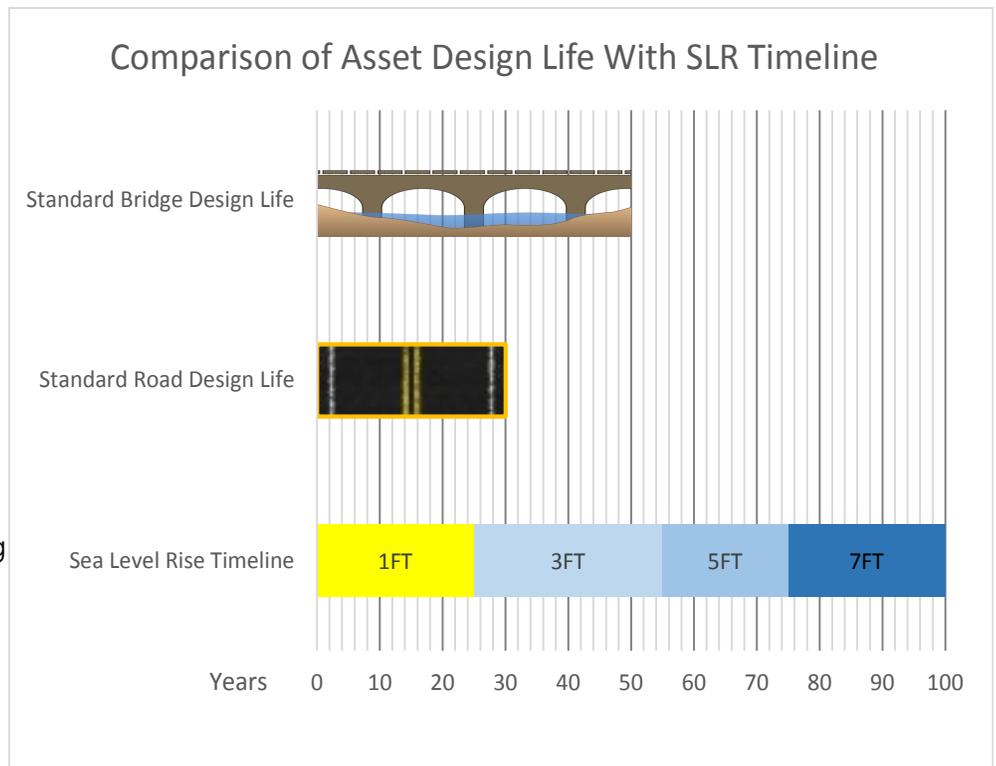


Figure 1

Data and Methodology



Figure 2: Flooding near Sauchest Point: June 2013

To help Rhode Island's cities and towns prepare for these changing conditions, the Statewide Planning Program (SPP) has engaged in an effort to analyze the potential impacts created by the sea level rise and storm surge. Using data developed under the name "STORMTOOLS" by the Coastal Resources Management Council and the University of Rhode Island, SPP identified the assets that could be impacted (exposure), and their vulnerability. As a result of this analysis, SPP identified the roads and bridges most likely to be impacted by Sea Level Rise, and scored their relative vulnerability based on the severity of the hazard they faced and the potential impact of asset damage on the transportation system as a whole.

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Jamestown Roads Exposed to Sea Level Rise

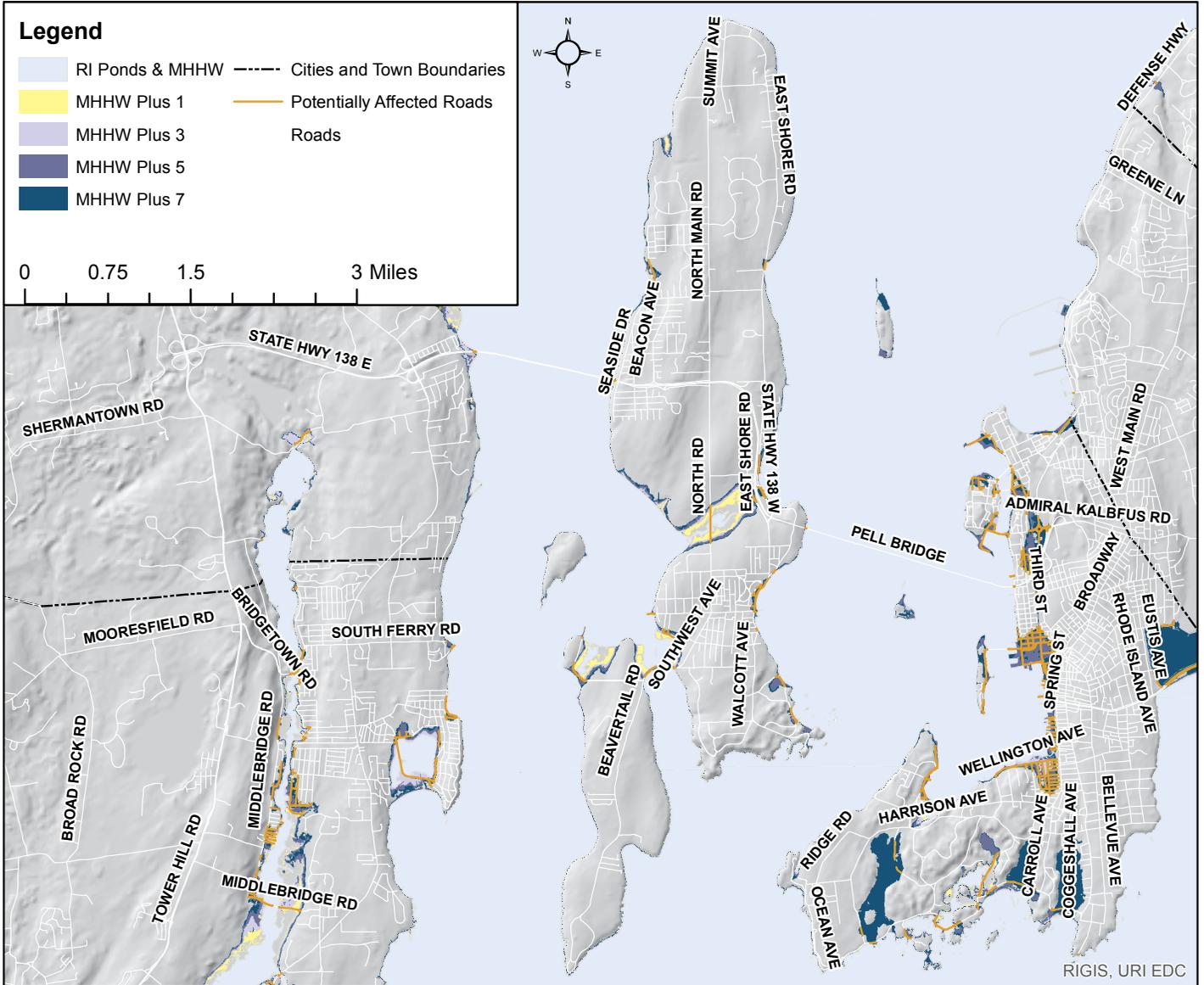


Figure 3

Given seven feet of sea level rise, a total of 156 miles of road in Rhode Island could be exposed to inundation, 70% of which would occur on local roads. For Jamestown three miles of roadway inundation can be expected. Of this, 53% (1.69 miles) are local. Jamestown's roads (state and local) are the 14th most vulnerable in the state of Rhode Island to sea level rise.

Figure 4

Top 10 Road Assets in Jamestown Vulnerable to Sea Level Rise (SLR)												
Mun. Rank	Road Name	1 Ft of SLR	3 Ft of SLR	5 Ft of SLR	7 Ft of SLR	Total Linear Feet	Evac. Route	Intermodal Facility	Functional Classification	Vuln. Score	State Rank	
1	CONANICUS AVE	0	0	1,558	389	1,946	Yes	Yes	Minor Art.	7.96	4	
2	NORTH RD	0	1,257	328	207	1,791	Yes	Yes	Minor Art.	7.76	6	
3	EAST SHORE RD	0	0	529	1,349	1,878	Yes	No	Minor Art.	5.01	100	
4	BEAVERTAIL RD	0	0	1,038	651	1,689	Yes	No	Major Coll.	4.93	108	
5	FORT GETTY RD	0	332	658	405	1,395	Yes	No	Local	4.31	163	
6	SEASIDE DR	0	0	830	608	1,438	Yes	No	Local	4.25	172	
7	PELL BRIDGE	6	10	7	7	30	No	No	Freeways	4.20	180	
8	STATE HWY 138 E	3	7	7	9	27	No	No	Freeways	4.20	181	
9	STATE HWY 138 W	6	11	7	10	34	No	No	Freeways	4.20	182	
10	RACQUET RD	0	0	574	145	719	No	No	Local	3.70	287	

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Jamestown Bridges Exposed to Sea Level Rise

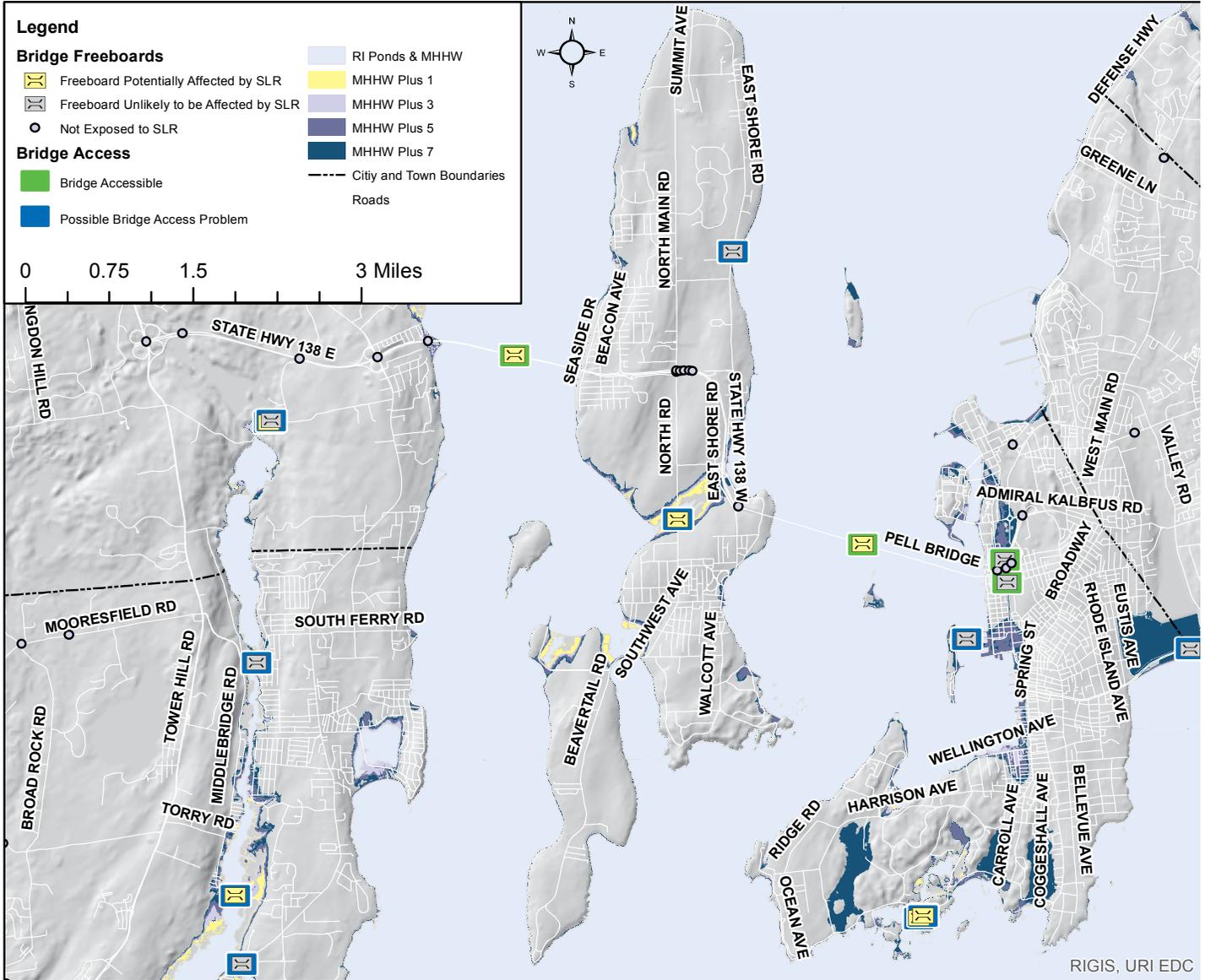


Figure 5

Given seven feet of sea level rise, a total of 90 bridges in Rhode Island cause concern either due to potential freeboard height or accessibility problems. In Jamestown there are four bridges of concern. Jamestown's bridge infrastructure is the eighth most vulnerable in the state of Rhode Island to sea level rise. Please note: The Jamestown-Verrazzano and Newport-Pell Bridge freeboards were not included in the data sets used, and so they were flagged as having a freeboard height that required further investigation.

Figure 6

Top 10 Jamestown Bridge Assets Vulnerable to Sea Level Rise												
Mun. Rank	Bridge Name	Facility Carried	Feature Intersected	Inches of Freeboard Relative to 7ftSLR	Terrain Crossed	Landing Access	Intermodal Facility	Evac. Route	AADT	Vuln. Score	State Rank	
1	Round Swamp	NORTH MAIN RD	TIDAL INLET	-11	Water	Problem	Yes	Yes	5,300	8.60	4	
2	Newport Bridge Authority	RI 138	EAST PASSAGE NARR BAY	-84	MHHW	Access	Yes	Yes	20,010	8.00	11	
3	Jamestown - Verrazzano	RI 138	WEST PASSAGE NARRA BAY	-84	MHHW	Access	Yes	No	33,533	7.00	25	
4	Conanicut	EAST SHORE RD	BROOK	8	Water	Problem	No	Yes	1,100	6.60	31	

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Jamestown Roads Exposed to 100-Year Storm Surge Events

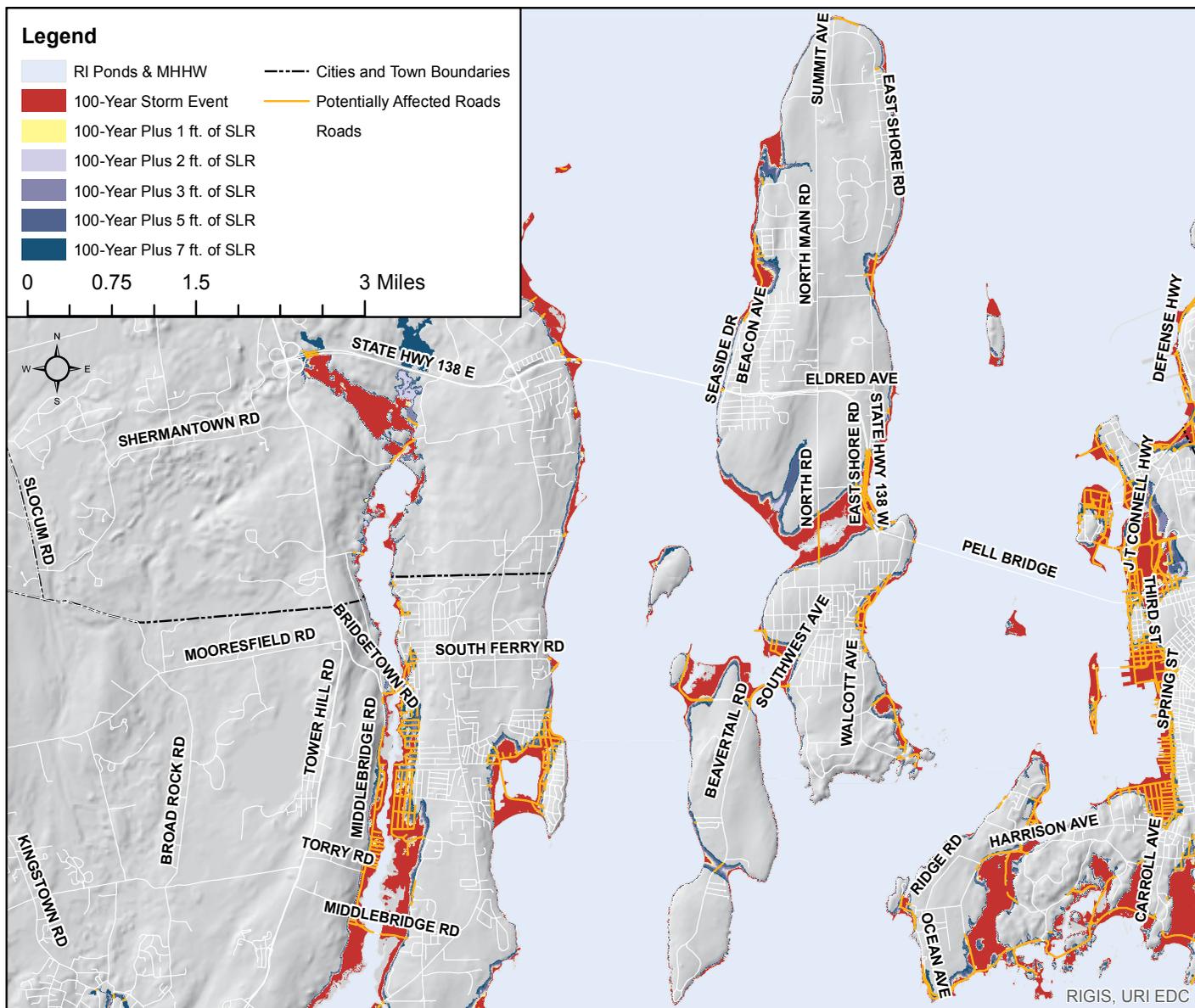


Figure 7

Given seven feet of sea level rise and a 100-year storm surge event, a total of 573 miles of road in Rhode Island will potentially be exposed to inundation, 73% of which will occur on local roads. For Jamestown, 12 miles of roadway inundation can be expected, 58% (~7 miles) of which are local. Jamestown's roads are the 16th most vulnerable in the state of Rhode Island to storm surge.

Figure 8

Top 10 Road Assets in Jamestown Vulnerable to 100-Year Surge Events												
Mun. Rank	NAME	No SLR	1 Foot of SLR	3 Feet of SLR	5 Feet of SLR	7 Feet of SLR	Total Linear Feet	Evac. Route	Intermodal Facility	Functional Classification	Vuln. Score	State Rank
1	STATE HWY 138 W	1,264	845	290	145	110	2,653	No	Yes	Freeways	8.54	10
2	NORTH RD	2,060	52	98	95	92	2,398	Yes	Yes	Minor Art.	8.35	15
3	CONANICUS AVE	2,720	133	227	62	59	3,201	Yes	Yes	Minor Art.	7.99	30
4	STATE HWY 138 E	1,112	937	381	175	115	2,719	No	Yes	Freeways	7.98	31
5	EAST SHORE RD	4,577	245	346	342	374	5,884	Yes	No	Minor Art.	7.19	68
6	JOHN C ELDRED PKWY	0	438	751	292	182	1,662	No	Yes	Freeways	6.97	81
7	ON RAMP RI-138 W	364	51	0	0	0	415	Yes	No	Local	6.30	146
8	NARRAGANSETT AVE	504	49	95	85	89	822	Yes	No	Minor Coll.	6.29	147
9	BEAVERTAIL RD	2,145	63	93	63	601	2,965	Yes	No	Major Coll.	6.25	152
10	SEASIDE DR	3,770	104	142	86	186	4,288	Yes	No	Local	6.23	154

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Jamestown Bridges Exposed to 100-Year Storm Surge Events

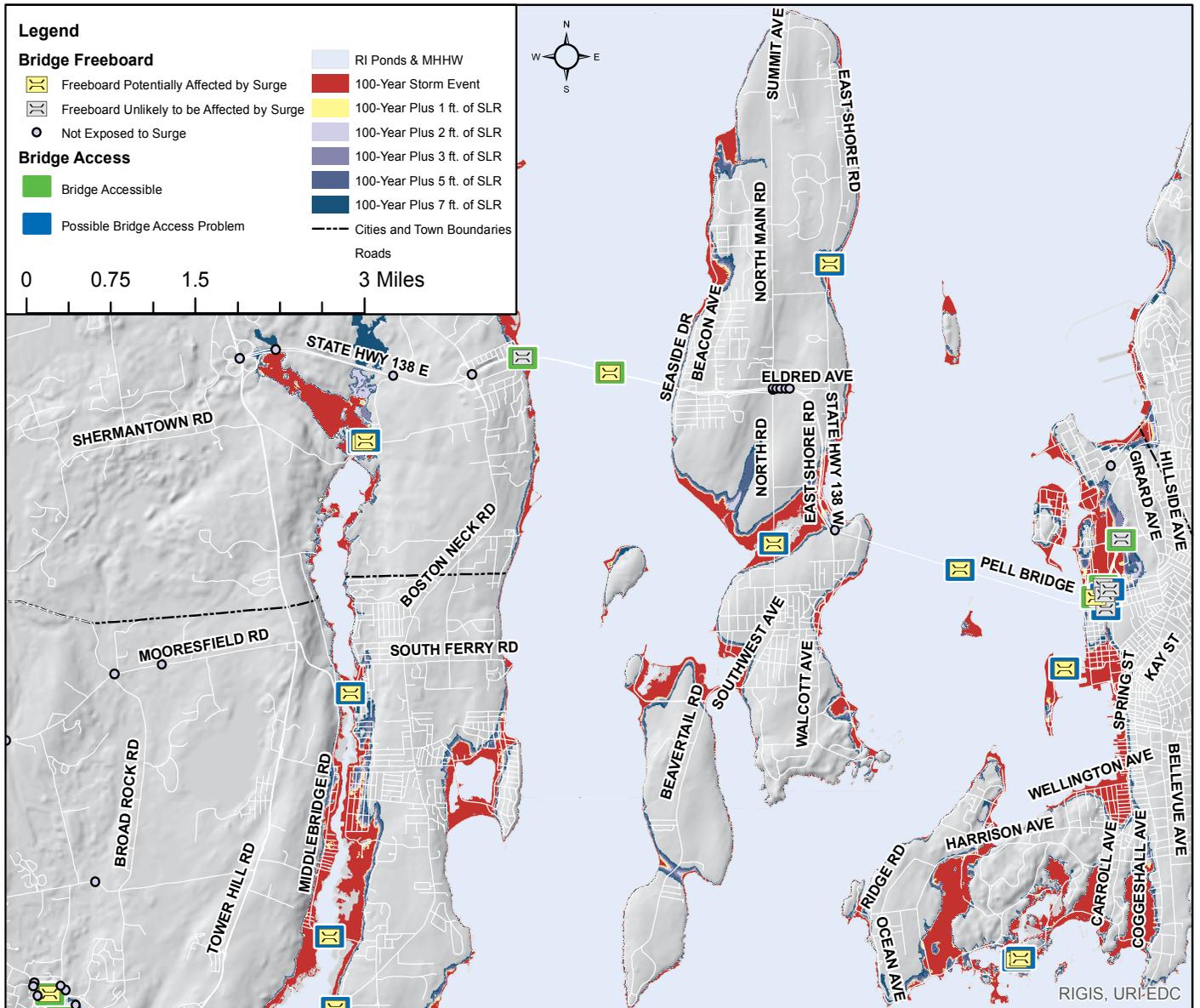


Figure 9

Given seven feet of sea level rise plus a 100-year storm surge event, a total of 148 bridges statewide cause concern either because of potential free-board height or accessibility problems. In Jamestown there are four bridges of concern. Jamestown's bridge infrastructure is the 14th most vulnerable to storm surge in the state of Rhode Island. Please note: The Jamestown-Verrazzano and Newport-Pell Bridge freeboards were not included in the data sets used, and so they were flagged as having a freeboard height that required further investigation.

Figure 10

Top 10 Jamestown Bridge Assets Vulnerable to Sea Level Rise Plus a 100-Year Storm Surge Event											
Mun. Rank	Bridge Name	Facility Carried	Feature Intersected	Inches of Freeboard Relative to 7FtSLR	Terrain Crossed	Landing Access	Intermodal Facility	Evac. Route	AADT	Vuln. Score	State Rank
1	Newport Bridge Authority	RI 138	EAST PASSAGE NARR BAY	-216	MHHW	Problem	Yes	Yes	20,010	10.00	2
2	Round Swamp	NORTH MAIN RD	TIDAL INLET	-144	Water	Problem	Yes	Yes	5,300	8.30	17
3	Jamestown - Verrazzano	RI 138	WEST PASSAGE NARRA BAY	-216	MHHW	Access	Yes	No	33,533	7.00	42
4	Conanicut	EAST SHORE RD	BROOK	-132	Water	Problem	No	Yes	1,100	6.10	65

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Next Steps

Given the potential scale of the impacts of sea level rise and storm surge on local transportation infrastructure, local communities will need to find a way to prepare. A variety of approaches are available, and programs exist to help communities execute these strategies. Finding preparedness strategies will require undertaking further analysis, formulating a clear adaptation strategy, and then taking advantage of planning opportunities that may present themselves.



Further Analysis

The most important step is the pursuit of further analysis. The data contained in this factsheet serves as introduction to municipal level transportation issues associated with sea level rise and storm surge. The data contained here and in Technical Paper #167: Vulnerability of Municipal Transportation Assets to Sea Level Rise and Storm Surge (published by SPP and available at <http://www.planning.ri.gov/geodeminfo/data/slr.php>) should allow local decision makers to prioritize the assets that may require an engineering analysis. Decision makers would also be advised to consult The methodology for STORMTOOLS, a key source of data for this project, which is available on-line at <http://www.beachsamp.org/the-science-behind-stormtools/>.

Figure 11: Consideration of Sea Level Rise can be included in regular planning activities



Adaptation

Once the nature of the ongoing changes are understood, a policy should be developed to prepare for the changes holistically. The specific policies to be implemented will vary widely based on the community, the assets under threat, and the resources available. The policies can broadly be described as Protect, Accommodate, Retreat, and Do Nothing.

Protect: Though often popular, this is the most financially expensive option. A municipality can seek to safeguard an asset by building sea walls, or take a slightly more green approach by attempting to artificially recreate the types of dune or wetland structures that naturally stabilize a shoreline. These approaches offer short term security if well designed and implemented, but their effectiveness in the long term may be limited by further changing conditions and the resources required for maintenance.

Figure 12



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Accommodate: Accommodation can imply a number of built solutions that take into account the new conditions. An engineering oriented solution would be to elevate the assets in question above the new waterline, while another option would be to rebuild the asset in a way that suits the new conditions better, for example by rebuilding a road using a new alignment on higher ground.

Retreat: If built solutions are infeasible, a community may decide to simply abandon the asset. Private stakeholders may take over responsibility for the asset, or the need for its maintenance may diminish as users of the asset leave the area. Though undoubtedly the most efficient solution from a fiscal perspective, there are complex legal issues involved that remain unresolved.

Do Nothing: Communities may choose to take no action in response to rising sea levels. In effect this would consist of maintaining the status quo infrastructure, regardless of risk and the increasingly common inundations. In practice this approach may closely resemble retreat, as assets are incapacitated with increasing regularity until all those served by the assets move away. The financial strain of repeated maintenance could have significant fiscal effects on communities.

Planning Opportunities

Once the subject of sea level rise and storm surge have been adequately researched, and an overall municipal adaptation strategy has been decided upon, decision makers should attempt to take advantage of planning opportunities that may allow the city or town to begin implementation of their planning goals. A key first step to this process will be building awareness amongst staff and constituents, either by direct outreach or simply through informal discussions.

As awareness grows, the community would be well served simply by keeping their readiness policy goals in mind when conducting their regular planning activities, such as comprehensive planning, or zoning compliance review. More concrete policies like overlay zones and rolling easements may become important tools for communities seeking a way to realize their policy goals.

Communities that are critically threatened by sea level rise and storm surge may seek to directly invest in readiness measures using municipal funds. Additional funding may be available to aid in this process from state and federal sources. Placing eligible projects for consideration in the State Transportation Improvement Plan, or other sources of Federal and State funding, is a good way to leverage local funding.

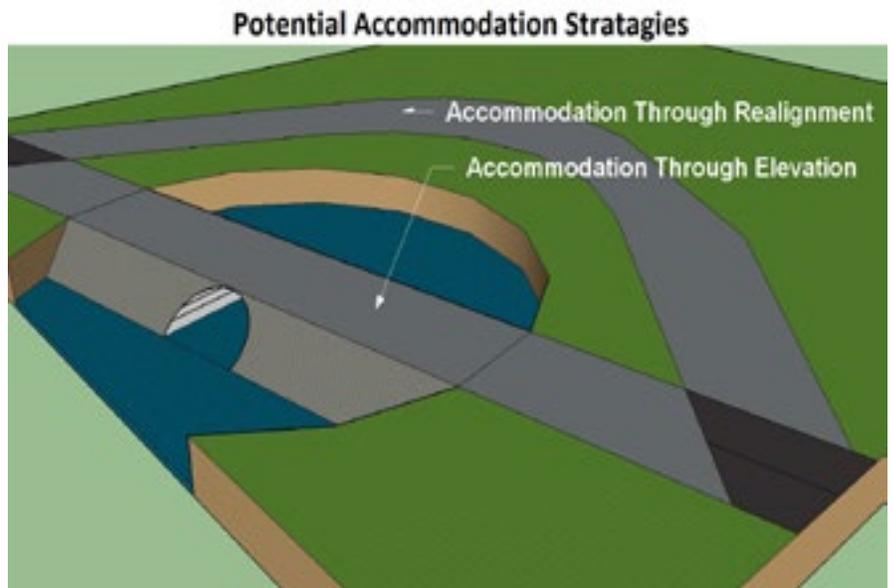


Figure 13

Figure 14

