

East Providence, 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 East Providence'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.

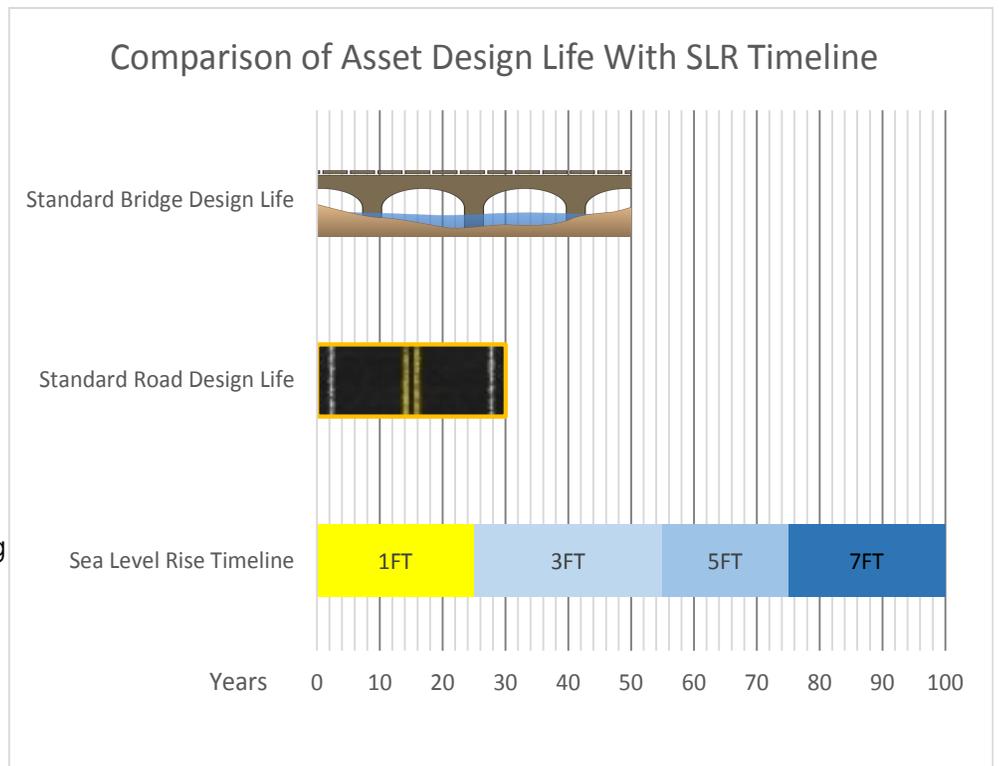
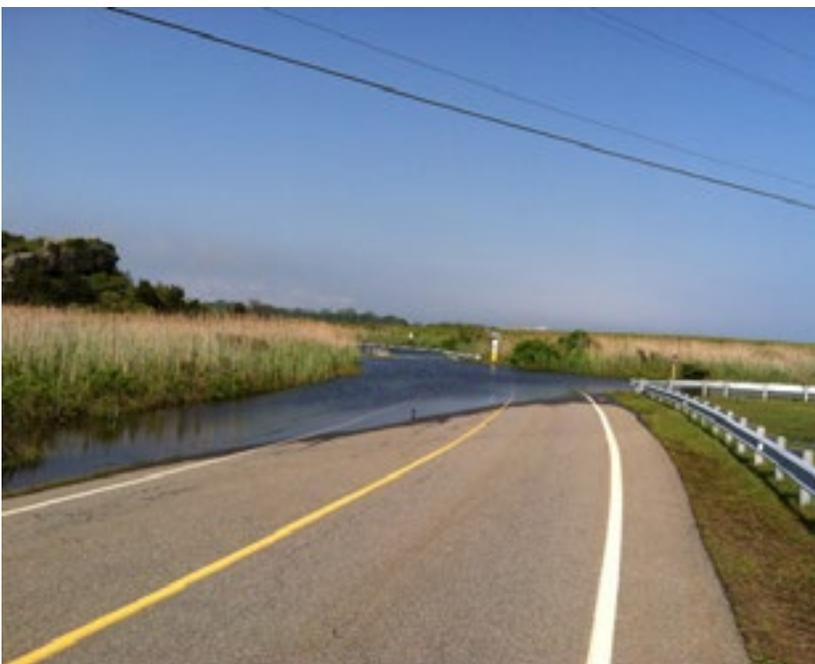


Figure 1

Data and Methodology



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.

Figure 2: Flooding near Sauchest Point: June 2013

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East Providence Roads Exposed to Sea Level Rise

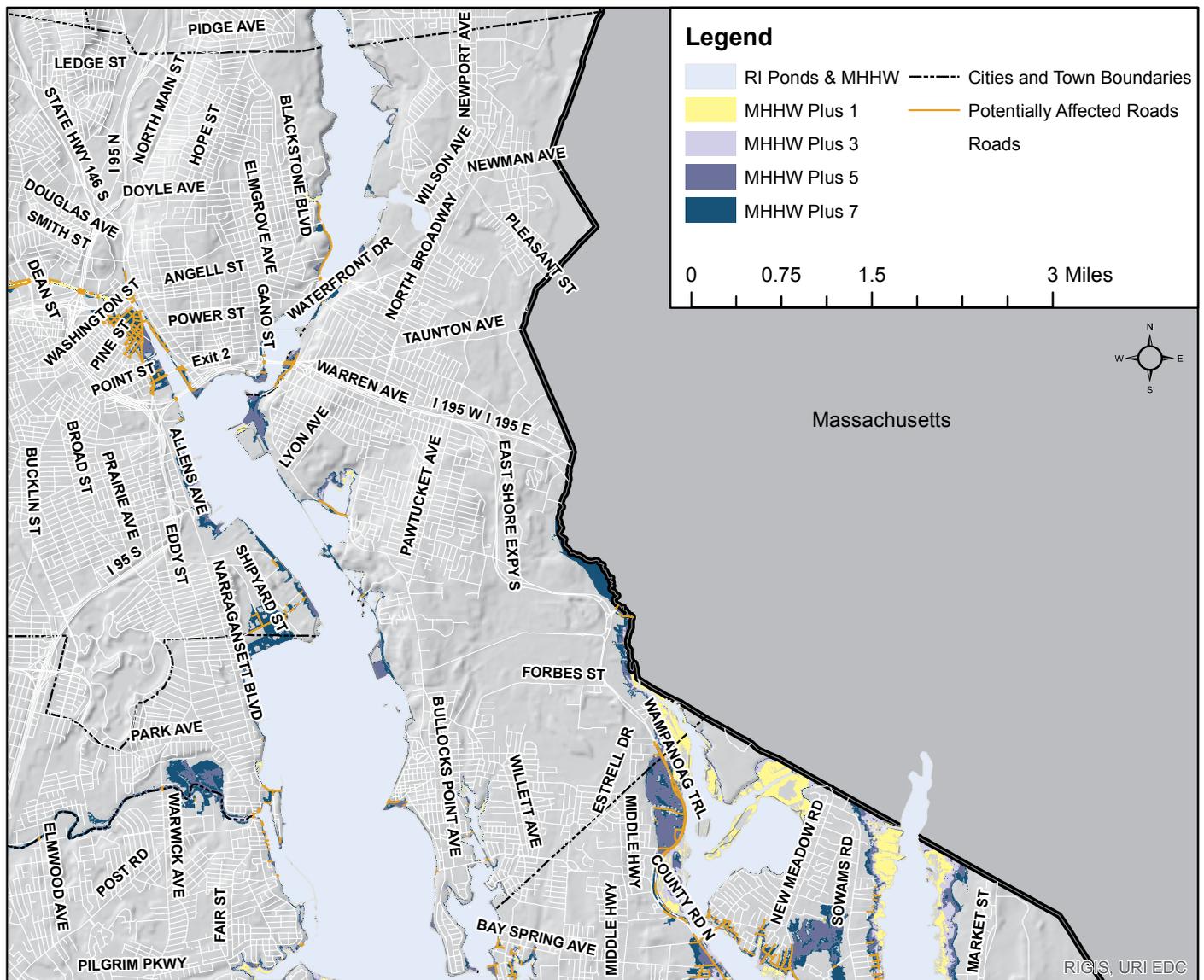


Figure 3

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 East Providence 1.59 miles of roadway inundation can be expected. Of this, 34% (0.54 miles) are local. East Providence's roads (state and local) are the 15th most vulnerable in the state of Rhode Island to sea level rise.

Figure 4

Top 10 Road Assets in East Providence 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	WAMPANOAG TRL	0	0	731	686	1,417	Yes	Yes	Freeways	5.65	51
2	EXIT 4	0	0	0	166	166	No	Yes	Interstate	5.50	61
3	I 195 E	0	7	164	207	378	No	Yes	Interstate	5.50	62
4	I 195 W	0	9	148	194	350	No	Yes	Interstate	5.50	63
5	ON RAMP I-195 W	0	0	102	197	299	No	Yes	Interstate	5.50	66
6	VETERANS MEMORIAL PKWY	14	113	1,018	207	1,352	No	No	Minor Art.	4.97	104
7	HENDERSON BRIDGE	29	53	60	122	265	No	Yes	Minor Art.	4.52	142
8	CRESCENT VIEW AVE	0	0	0	138	138	No	Yes	Minor Art.	4.30	166
9	WATER ST	0	0	99	1,089	1,188	No	No	Local	3.93	232
10	MINK RD	0	0	0	192	192	No	No	Minor Art.	3.30	357

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East Providence Bridges Exposed to Sea Level Rise

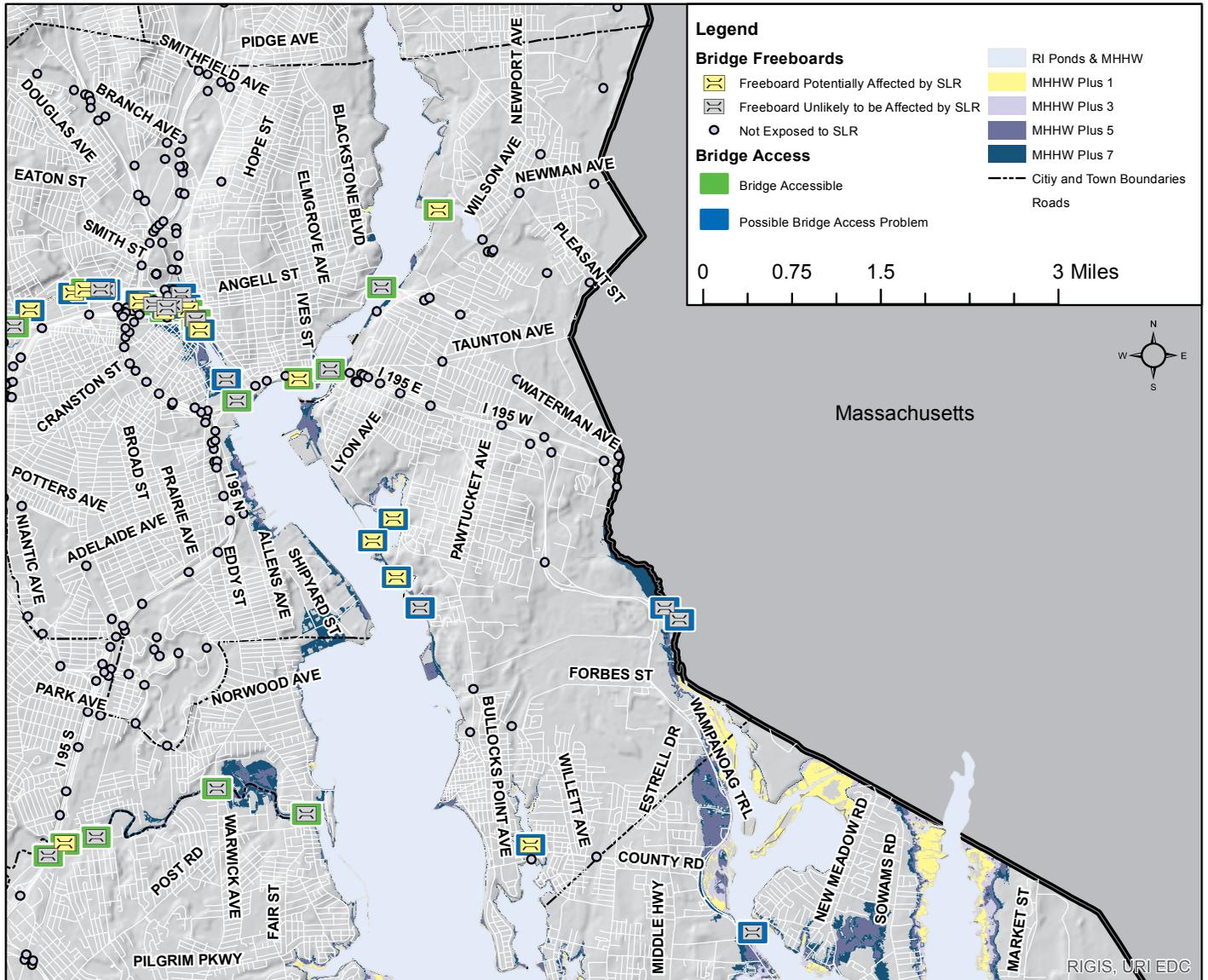


Figure 5

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 East Providence there are seven bridges of concern, four of which are non-motorized facilities. East Providence's bridge infrastructure is the third most vulnerable in the state of Rhode Island to sea level rise.

Figure 6

Top 10 East Providence 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	Barrington Parkway	VETERANS MEM PKWY	WATCHEMOKET COVE	-4	MHHW	Problem	No	No	17,362	8.00	10
2	Burgess Cove EBBF	E BAY BICYCLE FAC	BURGESS COVE	-9	MHHW	Problem	Yes	No	0	6.00	51
3	Watchemoket Cove EBBF	E BAY BICYCLE FAC	WATCHEMOKET COVE	-24	MHHW	Problem	Yes	No	0	6.00	52
4	Bullock Cove EBBF	E BAY BICYCLE FAC	BULLOCKS COVE	-9	MHHW	Problem	Yes	No	0	6.00	53
5	River Road	SCHOOL ST	RUNNINS R	21	Water	Problem	No	No	5,400	5.40	66
6	Runnins River Slab	RI 114A MINK ST	RUNNINS R	36	Water	Problem	No	No	13,300	5.00	70
7	Squantum Cove EBBF	E BAY BICYCLE FAC	SQUANTUM COVE	22	Water	Problem	Yes	No	1	4.30	79

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East Providence Roads Exposed to 100-Year Storm Surge Events

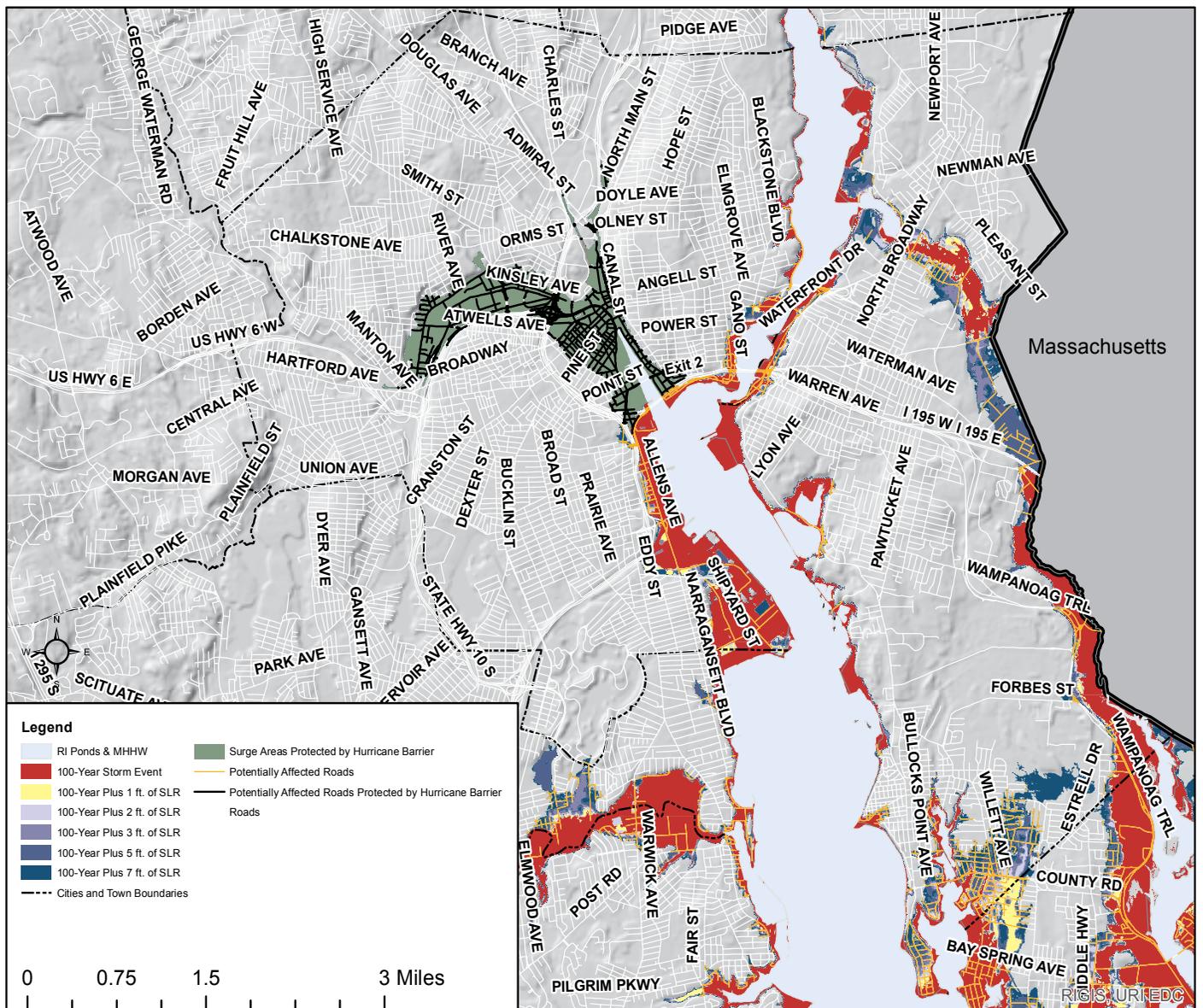


Figure 7

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 East Providence, 33 miles of roadway inundation can be expected, 69% (~23 miles) of which are local. East Providence's roads are the sixth most vulnerable in the state of Rhode Island to storm surge.

Figure 8

Top 10 Road Assets in East Greenwich 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	I 195 W	485	77	30	14	67	673	No	Yes	Interstate	8.17	22
2	WAMPANOAG TRL	6,044	563	1,085	1,699	2,484	11,875	Yes	Yes	Freeways	8.11	23
3	EXIT 4	251	86	35	16	16	404	No	Yes	Interstate	8.09	24
4	ON RAMP I-195 W	438	85	164	46	23	757	No	Yes	Interstate	8.06	26
5	I 195 E	480	80	30	20	85	695	No	Yes	Interstate	8.05	27
6	HENDERSON BRIDGE	983	11	32	61	27	1,114	No	Yes	Minor Art.	7.39	52
7	PAWTUCKET AVE	449	131	347	596	304	1,826	No	Yes	Principal Art.	7.04	73
8	WILLET AV	3	1,335	1,640	988	694	4,660	Yes	No	Principal Art.	6.92	85
9	MINK RD	257	0	0	0	0	257	No	No	Minor Art.	6.80	93
10	CRESCENT VIEW AVE	1,814	947	441	440	149	3,791	No	Yes	Minor Art.	6.61	109

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East Providence Bridges Exposed to 100-Year Storm Surge Events

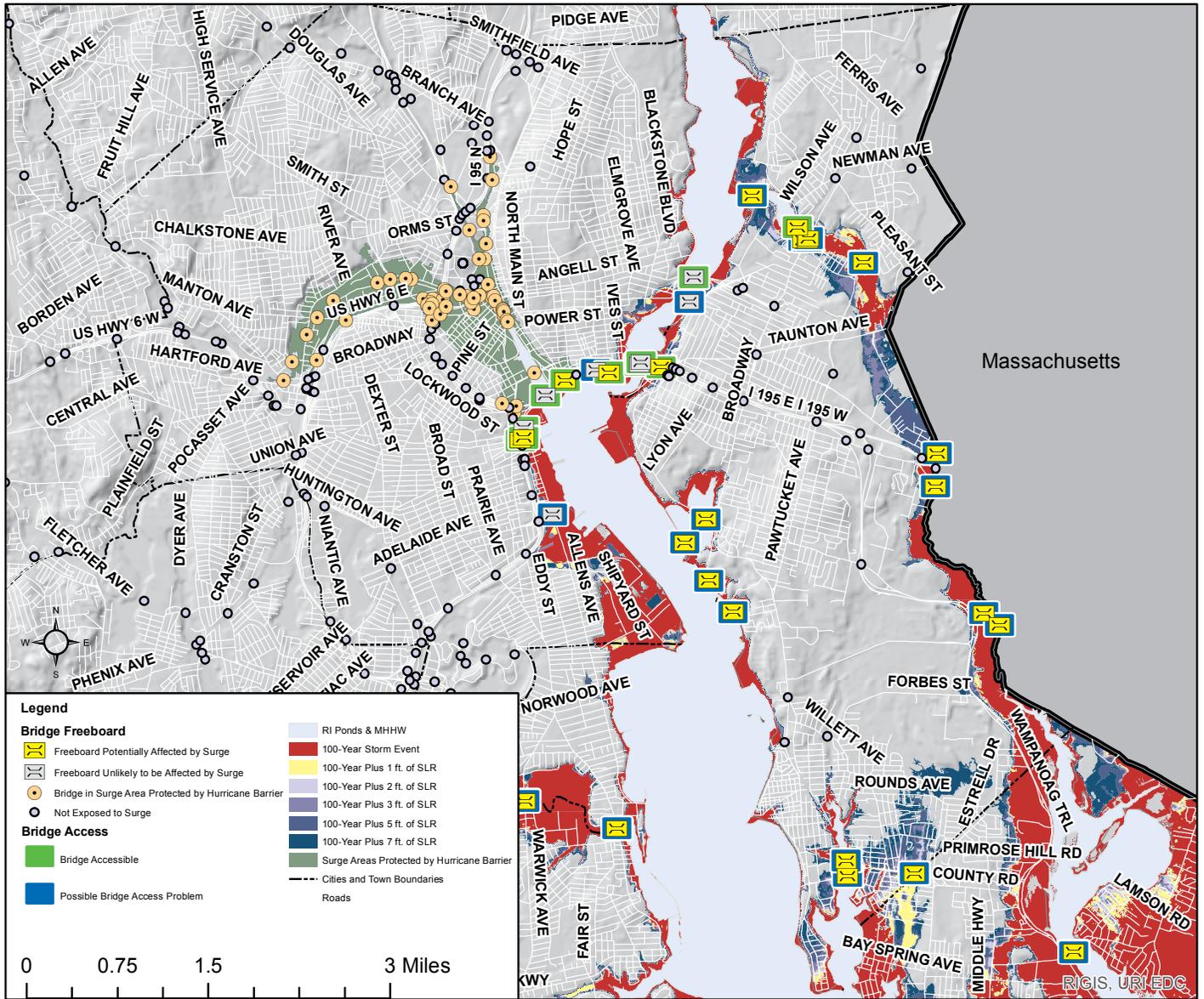


Figure 9

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 East Providence there are 19 bridges of concern, four of which are non-motorized facilities, two of which are railroad facilities, and one of which is local facility that may not be eligible for federal aid. East Providence's bridge infrastructure is the most vulnerable to storm surge in the state of Rhode Island.

Figure 10

Top 10 East Providence 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	Barrington Parkway	VETERANS MEM PKWY	WATCHEMOKET COVE	-184	MHHW	Problem	No	No	17,362	8.00	19
2	Roger Williams Ave	ROGER WILLIAMS AV	TEN MILE R	-126	MHHW	Problem	Yes	No	10,151	7.80	23
3	Luther's Corner	US 6 FALL RIVER RD	RUNNINS R	-54	Water	Problem	No	No	25,200	7.50	28
4	Pecks	RI 103 WILLETT AV	PECKS BROOK	-5	Water	Problem	No	Yes	12,300	7.30	29
5	Coles	US1A&RI114PWTCKTAV	TEN MILE R	-99	Water	Problem	Yes	No	14,747	7.30	30
6	Crescentview Drive Culvert	CRESCENT VIEW AV	BULLOCK COVE	-116	Water	Problem	Yes	No	6,868	7.30	31
7	Ten Mile River South	RI 152 N BROADWAY	TEN MILE R	-142	MHHW	Problem	No	No	10,807	6.80	48
8	Runnins River	WARREN AV	RUNNINS R	-84	Water	Problem	No	No	12,600	6.30	57
9	Runnins River Slab	RI 114A MINK ST	RUNNINS R	-150	Water	Problem	No	No	13,300	6.30	58
10	River Road	SCHOOL ST	RUNNINS R	-164	Water	Problem	No	No	5,400	6.30	59

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

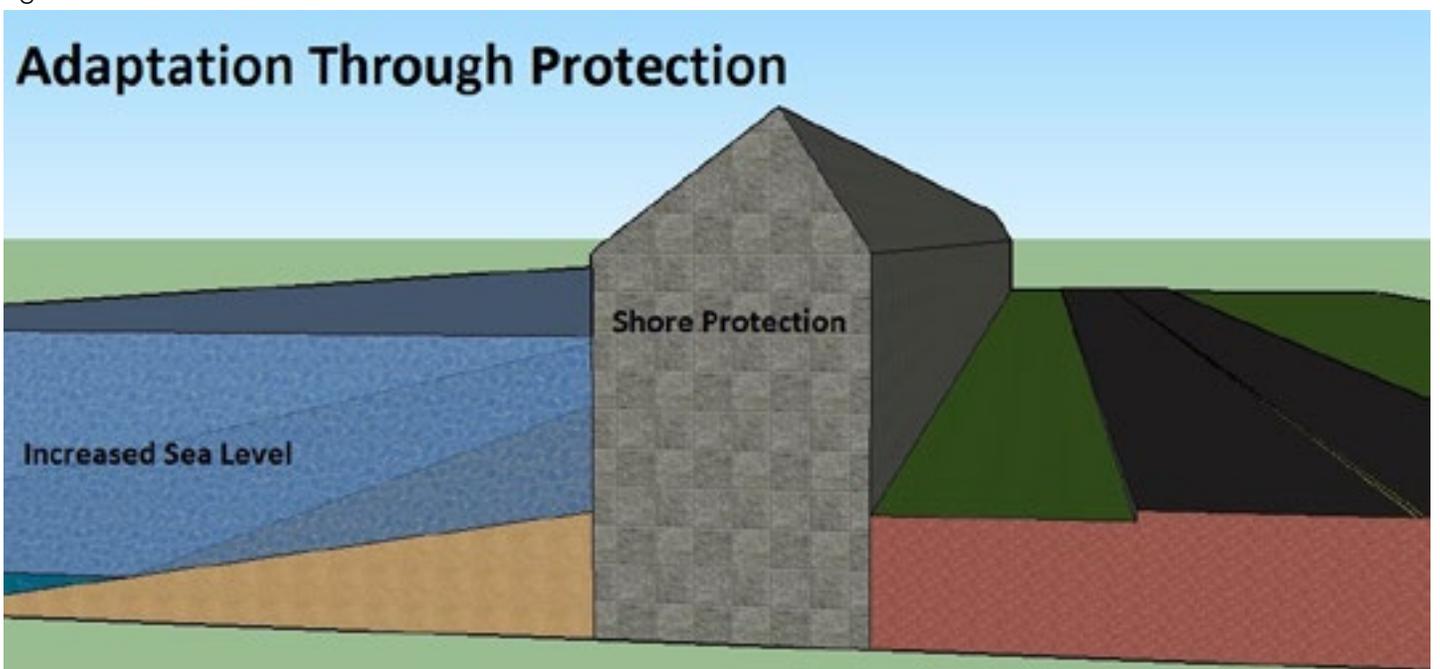


Adaptation

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 11



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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 12

Figure 13

