

# BUILDING COASTAL RESILIENCE THROUGH SUPPLY CHAIN MANAGEMENT

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THE  
UNIVERSITY  
OF RHODE ISLAND  
COLLEGE OF BUSINESS  
ADMINISTRATION

## MBA Team:

Gabe Rodriguez, Sarah Nowak, Stevie-Rae Wood,  
Noah Stephenson, Hikmat Haddada

## Advised By:

Yuwen Chen, Associate Professor - SCM  
Teresa Crean, AICP, Director and Town Planner

## In Partnership With:

Coastal Resources Center, URI  
Town of Warren, RI  
Envision Resilience: Narragansett Bay Challenge



# INTRODUCTION

Driven by fossil fuel emissions since the Industrial Revolution, anthropogenic climate change is the “biggest threat modern humans have ever faced.”[1] As scientists and governmental bodies continue to investigate the impact our rapidly changing environment will have on weather, food and water security, human health, and infrastructure, the consequences are being felt.

Increases in global mean sea level are one of the most evident and financially significant impacts threatening coastal communities and infrastructure. Over 94 million Americans live in coastal regions, supported by extensive infrastructure and cultural hubs [2]. As the immediacy of the increased threat of sunny days and coastal flooding becomes evident, flood mitigation plans and impact assessments are being conducted nationally at every level of federal and local governments.

Warren, RI, is a picturesque traditional northeastern waterfront town located along the eastern bank of the Warren River. Due to extensive historical waterfront development and high flood risk, the University of Rhode Island Envision Resilience MBA Capstone team chose the Water Street corridor of Warren to conduct a financial impact assessment and provide economic recommendations [3].

We established three goals to identify the economic and geographical effect of sea-level rise and to assess the continued financial viability of the Water Street corridor:

- **Goal 1:** Identify the impact of sea-level rise on the Water Street corridor.
- **Goal 2:** Assess the property tax implications of 4 defined sea-level rise scenarios.
- **Goal 3:** Evaluate the business environment of the Water Street corridor and provide recommendations for resilient growth and viability.

Utilizing property tax revenue as a proxy for the general financial state of the town, we investigated how four sea-level rise conditions would affect this corridor: 1-foot of sea-level rise, 1-foot of sea-level rise with a 100-year coastal storm, 2-foot sea-level rise, and 2-foot sea-level rise with a 100-year coastal storm. Referencing the NOAA 2022 Technical Sea Level Rise Report, we assumed a mean sea level increase of 12 inches by 2050 [4]. Assessing the impact of a 24-inch sea-level rise, while not expected until 2100, increases the lifespan of our report and allows for long-term financial and municipal planning.

# METHODOLOGY

Goals 1 and 2 required the construction of an Excel database using STORMTOOLS and the Town of Warren GIS website to provide land usage, zoning, and property valuation information for each parcel along the Water Street Corridor. Utilizing the property valuation metrics, we calculated the total property tax revenue from each parcel. Further financial and geographic values were computed using pivot tables and visualized with Tableau. Goal 3 relied upon case studies, site visits, town and state websites, and town ordinances to develop recommendations for Water Street's continued economic viability.

## GOAL 1: Identify the impact of sea-level rise on the Water Street corridor

We identified 4 scenarios on the Water Street Corridor that would either expose or impact this corridor in the near future. We explored 1-foot of sea-level rise, 2-feet of sea-level rise, 1-foot of sea-level rise with a 100-year coastal storm, and 2-feet of sea-level rise with a 100-year coastal storm. We further broke these 4 scenarios into two categories: exposed - inundation on the property but does not impact the functionality of the property, and impacted - inundation of the property impacts property functionality. Sea level rise is constant; it will keep creeping into backyards as years go by due to climate change. A 100-year coastal storm is unpredictable and has a 1% chance of happening every year. Recurrence intervals, the average number of years between floods of a specific size, measure these 100-year coastal storms, and an event like this can happen at any time if the conditions are suitable [5].

Utilizing the database, we were able to construct and help quantify our research and identify key metrics of the Water Street Corridor located on the Warren River. Water Street has 31.88 acres, 98 parcels located on the corridor, a total parcel assessment of \$79,603,300, and provides a total tax revenue of \$2,782,102.02 to the town of Warren. There are also 36 businesses, including restaurants and retail shops, 43 multi-family homes, 7 single-family homes, 2 large apartment buildings, 8 Warren Preservation Society landmarks, and 1 vacant lot located on the Water Street Corridor, as shown in **Exhibit 1** below.

## Exhibit 1: Total Data for Water Street Corridor

Sum of Property Tax Revenue	Sum of Parcel Area (acre)	Sum of Parcel Total Assessment
\$2,782,102.02	31.88	\$79,603,300.00
Business Type	Count of Parcel ID	
Apartments, brewery	1	
Apartments, services	1	
Business	20	
Multi-Family Home	43	
Office Building	1	
Restaurant	3	
Restaurant (WPS landmark)	1	
Restaurant, and now vacant storefront	1	
Restuarant	1	
Retail	8	
Retail	1	
Single Family Home	7	
Storage Facility	1	
Vacant lot	1	
WPS landmark	8	
<b>Grand Total</b>	<b>98</b>	

In the first scenario, 1-foot of sea-level rise was the least concerning of the 4 scenarios for the town of Warren. Using the STORMTOOLS application, Exhibit 2 below shows the extent with a faint yellow line to which a 1-foot sea-level rise extends onto the Water Street Corridor. The data found was that no parcels on the corridor were exposed or impacted, as shown in Exhibit 6, located in the appendix.

## Exhibit 2: 1-Foot of Sea-Level Rise



The second scenario 2-feet of sea-level rise shown in Exhibit 3 below, shows an increased amount of parcels exposed. We were able to identify that 29.41 percent of the corridor would be exposed to a 2-feet of sea-level rise which equates to approximately 9.375 acres, with 10 businesses out of the 21 parcels exposed potentially having to manage this level of sea-level rise in the future, as shown in Exhibit 6. Our assessment also came to find that 2-feet of sea-level rise would impact 1 parcel due to the water creeping into the back parking lot. This 1 parcel

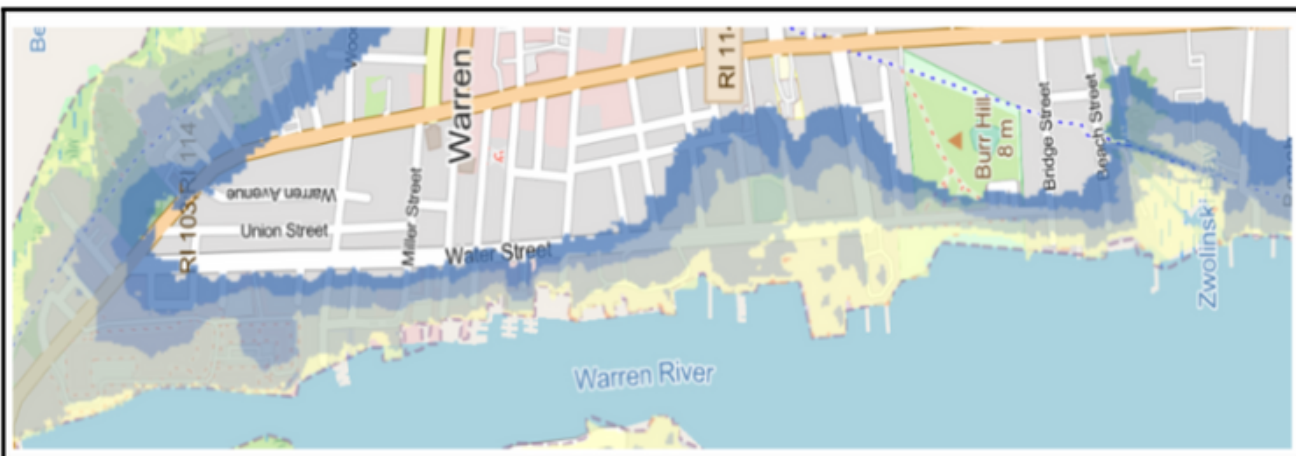
that would be impacted by future 2-feet of sea-level rise is one of the large apartment buildings on the corridor Tourister Mills as observed in **Exhibit 6**. This one property accounts for approximately 25.81% of the corridor, taking up 8.23 acres.

### Exhibit 3: 2-Foot of Sea-Level Rise



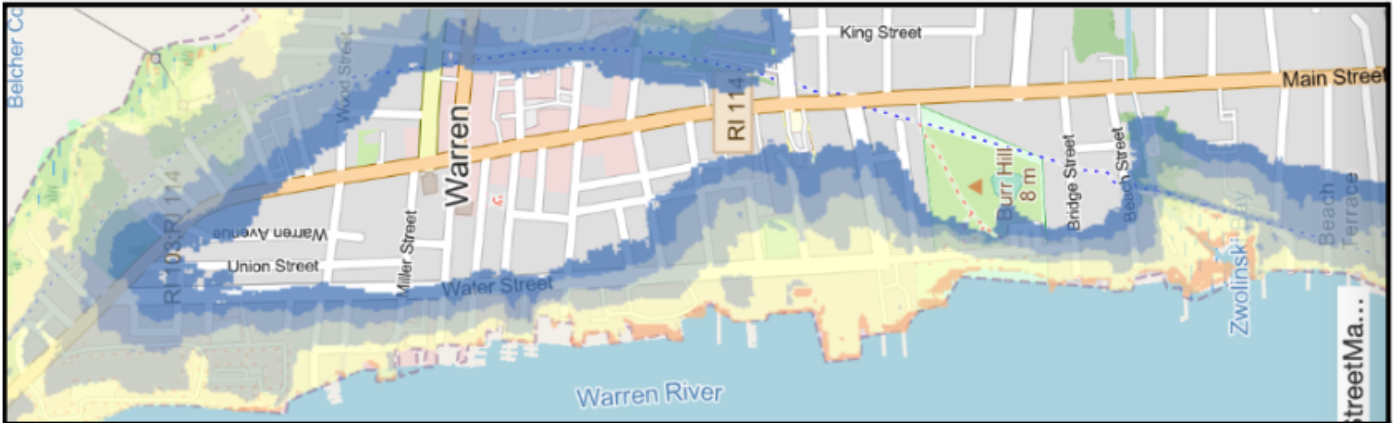
The third scenario, 1-foot of sea-level rise with a 100-year coastal storm, covers quite a significant zone on the Water Street Corridor in the cases of both impacted and exposed. **Exhibit 4** shows the extent to which this scenario will affect the corridor. Based on the data collected, this scenario will expose 31.74 acres, equating to approximately 99.56% of the corridor, leaving less than 1% not exposed to this coastal storm. The 2 parcels not exposed in this scenario would be 1 retail store and 1 multi-family home, shown in **Exhibit 6**. This scenario impacts fewer parcels; however, based on our research, it was found that 30.343 acres of Water Street would be impacted by this level of a storm, equating to approximately 95.179% of the corridor. This coastal storm will impact 83 out of the total 98 parcels, and 29 of these properties are businesses, as shown in **Exhibit 6**.

### Exhibit 4: 1-Foot of Sea-Level Rise during a 100-Year Coastal Storm



In the fourth scenario, 2-feet of sea-level rise with a 100-year coastal storm showed the most significant effect on the corridor. In the data obtained from our excel database, **Exhibit 6**, all the 98 parcels located on Water Street will be impacted and exposed under these conditions. Travel will be impeded as the main road will be under an estimated three feet of water, as shown in **Exhibit 5**.

**Exhibit 5: 2-Feet of Sea-Level Rise during a 100-Year Coastal Storm**

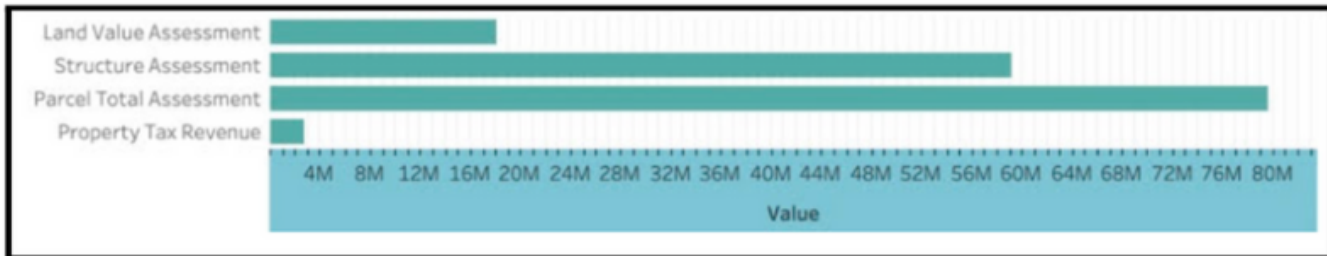


## GOAL 2: Identify the impact of sea-level rise on the Water Street corridor

To monetarily quantify the financial extent to which these scenarios pose a risk to the Town of Warren's tax levy, we used our database's GIS values and the tax rate to calculate the revenue generated from each parcel. As previously mentioned, we have recognized 98 parcels as the Water Street corridor, generating \$2,782,102.02 of revenue according to our calculations and Warren GIS information. These parcels are essential to the everyday lives of Warren's residents and high-interest stakeholders by generating property tax income for the town and are crucial to funding schools and other local government services. We calculated the property tax revenue of each parcel by summing land value, structure value, and total parcel value and multiplying by the Warren mill rate of 0.01772. Based on our 4 scenarios of 1-foot sea-level rise, 2-feet of sea-level rise, 1-foot of sea-level rise with a 100-year coastal storm, and 2-feet of sea-level rise with a 100-year coastal storm, the tax implications highly vary. It is also essential to differentiate between parcels exposed to sea-level rise/flooding versus being impacted. Using STORMTOOLS, we analyzed which parcels were impacted or exposed to sea-level rise and/or 100-year coastal storms to aggregate the parcel's total property value to then calculate the tax revenue at stake. We found that the Water Street corridor accounts for 11.4%

of the property tax revenue generated from the town of Warren as a whole. As previously stated, these properties consist of businesses, residences, and even historic landmark buildings. Using our Warren GIS findings, we calculated the total land value of the corridor as \$18,164,800 and the total structure value of \$59,235,400, as shown in Exhibit 7 below.

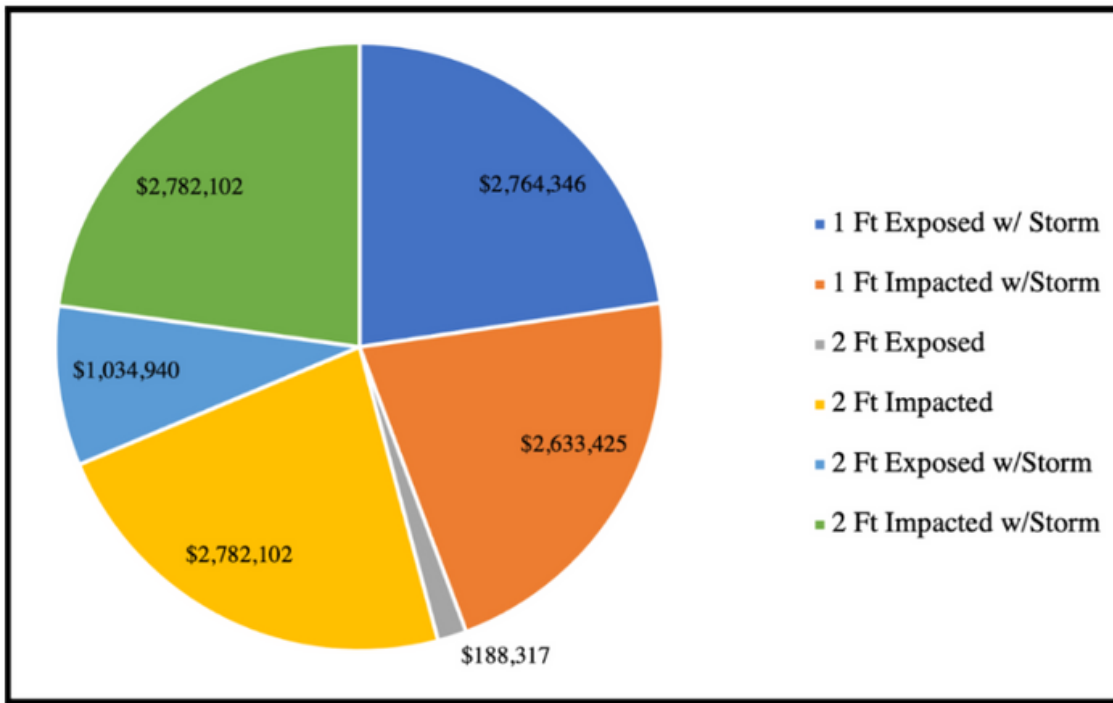
Exhibit 7: Total Parcel Valuation Breakdown with Property Tax Revenue



First, we analyzed our findings based on 1-foot of sea-level rise and 1-foot of sea-level rise with a coastal storm using pivot tables from our database. With 1-foot of sea-level rise alone, none of our parcels are impacted or exposed. This may be deceptively reassuring due to the increasing intensity and frequency of a 100-year coastal storm. However, when a 100-year coastal storm is added to the equation, the financial impacts are drastic. 95.6% of our parcels property area is exposed, accounting for \$2,764,346 of tax revenue. When we examine the parcels that are impacted in the event of a 1-foot of sea-level rise with a 100-year coastal storm, the numbers are still astounding, with a slightly smaller tax implication of \$2,633,425. This indicates that 10.8% of Warren's property tax revenue would be fully impacted just from the Water Street corridor in this scenario. These scenarios are less extreme, but they are more immediate and are likely to occur by 2050.

Next, we assessed the financial exposure and impact tax implications for our more extreme scenarios. With 2-feet of sea-level rise, we have calculated that \$1,883,317 of property tax revenue is generated from the exposed parcels. This accounts for approximately 7.74% of Warren's total property tax revenue and 68% of the property tax revenue generated from the Water Street corridor without the presence of any extreme weather events. If we examine the Water Street parcels impacted by 2-feet of sea-level rise, their total property tax revenue is \$1,034,940. This accounts for approximately 37% of the Water Street corridor's total revenue and 4.25% of Warren's total tax revenue, shown in Exhibit 8. It is important to re-emphasize that these predictions are based on baseline sea level without 100-year coastal storms. When our team did incorporate a 100-year coastal storm into the calculation, we found that all 98 parcels are exposed and impacted by 2-feet of sea-level rise. Current predictions by NOAA expect 2-feet of sea-level rise by 2100.

## Exhibit 8: Scenarios with Property Tax Revenue at Risk



### Goal 3: Evaluate the business environment of the Water Street corridor and provide recommendations for resilient growth and viability

An assessment of resilience in the Water Street corridor showed the use of town codes and ordinances to provide a resilience framework in the corridor. Areas zoned as Waterfront or in the Waterfront Overlay District and property in special hazard flood areas have stricter requirements for improvements and development. Developments and new businesses in the Waterfront Overlay District are required at the state level to undergo a development team review done by the town. Town publications and plans such as the Hazard Mitigation Plan provide guidelines for floodproofing and mitigation practices. Individual businesses such as Blount Clamshack have utilized trailers to store unanchored equipment in their parking lots in preparation for the effects of storms. Additional business actions in preparation for coastal flooding and sea-level rise were not accessible to the URI project team.

The next step the team took to analyze Water Street was to conduct a business environment assessment using a SWOT analysis, shown in Exhibit 9. First, the strengths assessed include the established community of residents and business owners who occupy the area. Additionally, Water Street is located along waterfront property which is considered a coveted location for both locals and tourists and has a picturesque corridor of businesses and restaurants to welcome visitors.



Lastly, the city employees already have a thorough understanding and knowledge of sea-level rise and, as a result, have been proactive in creating zoning regulations, implementing infrastructure improvements, and informing residents. The weaknesses regarding Water Street include financial constraints due to ongoing projects in the area, including Market to Metacom and the Warren Gateway Project, which make it challenging to fund additional long-term projects. A lack of public support from the community is also concerning, mainly due to residents fearing diminishing property values. Public access to the waterfront, Water Street's highlight, is also unclear due to a lack of clear signage. Another weakness is the town website, which lacks organization and efficient resources for business and resilience planning, shown in **Exhibits 10-13**. Water Street has many opportunities for growth in the future, including establishing a stronger partnership with Commerce RI to advertise available parcels targeting new businesses and utilizing their business advisors, shown in **Exhibit 14**. The recent developments coming to the area due to the Warren Gateway project also offer the opportunity to host larger events in a potential hotel and utilize the proposed park to host recurring outdoor markets, which would attract local tourism to the area. Lastly, threats facing the area include potentially rapid sea-level rise, which is unavoidable and can result in several issues, including insurance companies refusing to offer coverage for properties in flood zones and diminishing property values due to recurring water damage.

The existing business environment lends itself to two main areas of growth: waterfront uses and arts and cultural uses. Warren hosts a variety of small businesses and showcases them at events such as Hope & Main, a recurring farmers market, and festivals in conjunction with collaborative RI. Warren is one of the oldest working waterfronts in New England and is supported by town codes that prioritize water-dependent uses, including public access, which is vital for the longevity of Warren's working waterfront. The Water Street corridor land usage is favorable for arts and cultural businesses. Through Warren's certified art district, there are both income and sales tax incentives for the sale of products made by local artists.

Business resilience can be improved in the corridor by increasing awareness and short and long-term initiatives. The Town of Warren can require businesses that are new registrants and renewals to undergo resilience training to build awareness and establish best practices. Having a standard plan for businesses, including tracking potentially hazardous goods and equipment, will strengthen the response capacity of the corridor following a climate event such as a 100-year coastal flood. Longer-term resilience measures include establishing a resilience fund

[6], where non-waterfront businesses contribute towards mitigation projects for high-risk areas such as the special hazard flood areas. While the Town of Warren is constrained financially for climate mitigation projects in the Water St corridor, partnerships with higher education institutions can provide scientific findings and recommendations for little cost. Research institutions are contributors to the RI blue economy [7] and can utilize areas of Warren that are untenable for other types of uses.

The business environment of the corridor can be strengthened by attracting businesses to the area and providing support to existing businesses. Warren as a whole would benefit from partnerships with Commerce RI, which would offer business advisors and funding sources to prospective businesses, and RI HUB, a business incubator in Providence, RI. The economy of Water Street would benefit from having a business coalition, where businesses can support one another and attract customers through corridor-wide events and sales. This coalition can then be connected to other districts in Warren, such as Main Street.

To address some weaknesses and opportunities identified in the SWOT analysis explained previously, the team compiled a list of recommendations that can be implemented in the greater Water Street Community when considering a short-term timeline that is also cost-effective. Many recommendations revolve around aesthetic improvements that increase the satisfaction of residents and tourists by creating a unique visitor experience [8,9]. The recommendations are regarding the following topics:

- **Signage**

- The “Welcome to Warren” sign is small and low to the ground, Exhibit 15. It is also difficult to see as individuals drive across the bridge, which is currently blocked by barriers due to construction, Exhibit 16. We suggest improving visibility by increasing the size and raising the sign to eye level, Exhibit 17.

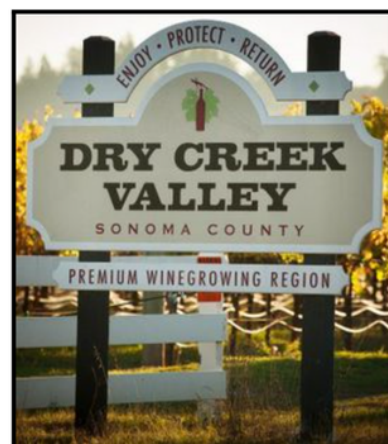
**Exhibit 15:**  
Town of Warren Sign



**Exhibit 16:**  
Temporary Barriers



**Exhibit 17:**  
Suggested Design



- The East Bay Bike Bath has an access point at the entrance of Warren. However, there is a lack of signage marking the entrance to the path, **Exhibit 18**. By adding a sign to the entrance, visitors to the area will be introduced to the town's features. Additionally, a sign can be added on the bike path listing various restaurants and shops on Water Street along with bike racks so that users are inclined to stop and tour the area, **Exhibit 19**.

**Exhibit 18:**  
Lack of Bike Path Signage



**Exhibit 19:**  
Directional Sign



• **Public Access**

- The Historic Tourister Mill Riverfront Walkway is a public path that runs across the waterfront and leads into town. Currently, there is very little signage to indicate that the walkway is available for public use or designated parking in the Tourister Mill lot for public use, **Exhibit 20**. More residents and visitors will be made aware of the path by upgrading the signage.
- In addition to the beginning of the path being unclear, the pathway ends abruptly at a dead-end street with no signage indicating what else is nearby, **Exhibit 21**. By adding signage that lists nearby businesses, walkers are encouraged to continue onto the main corridor and explore the area.

**Exhibit 20:**  
Public Walkway Signage



**Exhibit 21:**  
Abrupt and Unmarked Walkway Ending



- **Community Events**

- With the Warren Gateway project underway, potential tenants may include a hotel and various restaurants, while features will consist of a park and boat docks, **Exhibit 22**. This development creates opportunities to host large-scale events in a hotel ballroom and capitalize on the small/local business Warren has to offer. Water Street can mirror farmers' and flea markets that nearby Providence hosts, **Exhibit 23**, and partner with local business Hope & Main to expand the "What's Local Wednesdays" events.

**Exhibit 22:**

Warren Gateway Sign



**Exhibit 23:**

Providence Outdoor Market



- **Education**

- The residents of Warren are currently wary of supporting local initiatives to combat the impacts of sea-level rise in the area. To gain public support, city planning offices can partner with private businesses or institutions, such as the Coastal Resource Center or Envision Resilience, to host events that will educate residents in an approachable manner.
- The city can also work towards gaining the support of younger residents by hosting relevant themed student art contests. Winning submissions would be painted on various structures throughout the city, such as electrical boxes, **Exhibit 24**, or murals, **Exhibit 25**.

**Exhibit 24:**

Electric Box on Water Street



**Exhibit 25:**

Mural by Charlie Johnston  
Churchill, Manitoba, Canada



In addition to short-term recommendations that can be implemented at a relatively low cost, the team also put together recommendations focusing on long-term establishments funded and maintained by the town.

- The first location identified is an empty lot located on the waterfront behind Any Water Yachts, **Exhibit 26**. We propose addressing the lack of parking on Water Street by repaving the area and offering public parking. Additionally, the boat docks on the property would also be repaired and offered as public boat docks, similar to the docks at the Warren Gateway, that can be reserved ahead of time.

**Exhibit 26:**  
Empty Lot on Water Street



- The second location is a vacant storefront, **Exhibit 27**. Capitalizing on the culture of buying local and supporting small businesses, we suggest the town acquire this property to be used as a rotating pop-up storefront. This business model, made popular by The Carousel @ Bloomingdale's, **Exhibit 28**, offers a creative and fun shopping experience with a sense of exclusivity [10]. Here, local businesses that are not ready or able to open a permanent storefront can feature their products to an in-person crowd. This will increase visibility for the businesses but also keep customers coming back to shop at the ever-changing selection.

**Exhibit 27:**  
Vacant Storefront



**Exhibit 28:**  
The Carousel @ Bloomingdale's  
Pop-Up Feature



## SUMMARY

This project provided an in-depth insight into the future of the Water Street Corridor in the next couple of decades as a result of sea-level rise. It also gave a perspective of what can happen at any moment in the corridor in the event of a 100-year coastal storm. This is why we devised a recommendation plan to help Warren bounce back in the event of a severe storm. The team compiled a replicable database to quantify the revenue that the Town of Warren risks losing based on sea-level rise and storms. The scope of such databases can be furthered by quantifying revenue from sales, meal, and beverage taxes in each climate scenario that are at risk. The data was not accessible to the URI team in an unaggregated format. Future steps could include gathering these metrics from businesses directly or working at the state level to have a record of tax revenue passed through to the town. Additionally, the Town of Warren has been provided with low-cost actions that can improve the viability of the Water Street corridor and suggestions for longer-term, cost-intensive projects. This project's low-cost recommendations are beneficial for Warren as it is in the midst of a large-scale investment project in Market to Metacom. Options for growth and development in the Water Street corridor should be reevaluated following an update to the Town of Warren's Comprehensive Plan. This project can be furthered by gaining the perspective of local businesses and their business plans that the URI project team did not have access to. Understanding local businesses' willingness to stay in the area and invest in climate resilience measures is imperative to creating a cohesive resilience strategy for the Water Street corridor.

# APPENDIX

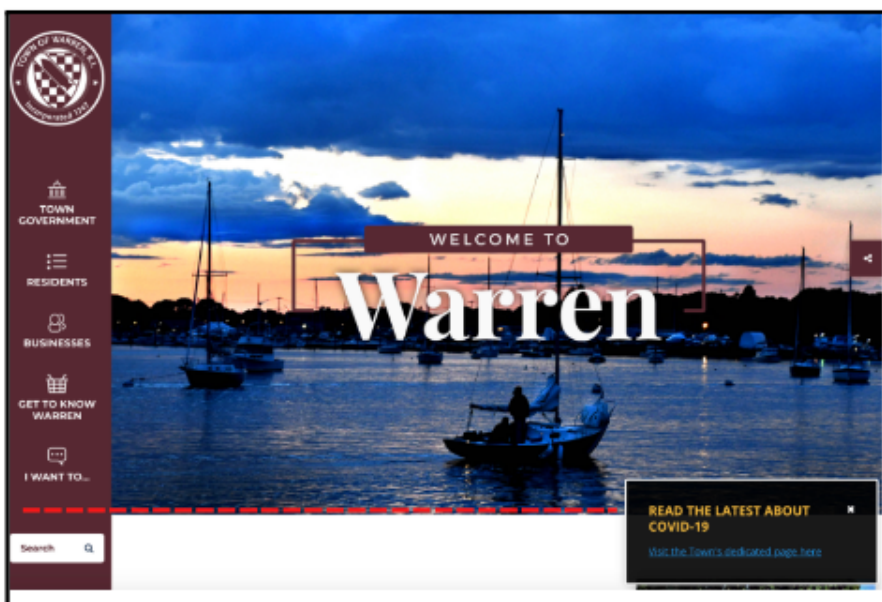
## Exhibit 6: Excel Database - Four Scenarios with Impact and Exposure Levels

1-Foot SLR Exposed & Impacted	Sum of Parcel Total Assessment	Sum of Parcel Area (acre)	Count of Parcel ID
N	\$ 79,603,300.00	31.88	98
<b>2-Foot SLR Exposed</b>	<b>Sum of Parcel Total Assessment</b>	<b>Sum of Parcel Area (acre)</b>	<b>Count of Parcel ID</b>
N	\$ 25,467,300.00	9.375	77
Business	\$ 4,964,000.00	1.996	15
Multi-Family Home	\$ 10,529,500.00	3.949	36
Restaurant	\$ 842,000.00	0.237	1
Restaurant (WPS landmark)	\$ 415,500.00	0.237	1
Restaurant, and now vacant store front	\$ 286,800.00	0.297	1
Retail	\$ 2,370,400.00	0.713	7
Retail	\$ 201,800.00	0.03	1
Single Family Home	\$ 3,183,700.00	1.025	7
WPS landmark	\$ 2,673,600.00	0.891	8
Y	\$ 54,136,000.00	22.505	21
Apartments, brewery	\$ 15,840,000.00	5.92	1
Apartments, services	\$ 29,202,600.00	8.23	1
Business	\$ 1,987,100.00	2.593	5
Multi-Family Home	\$ 2,803,200.00	2.188	7
Office Building	\$ 726,100.00	0.647	1
Restaurant	\$ 1,583,700.00	0.935	2
Restaurant	\$ 66,600.00	0.068	1
Retail	\$ 1,070,600.00	1	1
Storage Facility	\$ 561,600.00	0.57	1
Vacant lot	\$ 294,500.00	0.354	1
<b>2-Foot SLR Impacted</b>	<b>Sum of Parcel Total Assessment</b>	<b>Sum of Parcel Area (acre)</b>	<b>Count of Parcel ID</b>
N	\$ 50,400,700.00	23.65	97
Y	\$ 29,202,600.00	8.23	1
Apartments, services	\$ 29,202,600.00	8.23	1
<b>1-Foot Exposed W/ 100-Year Coastal Storm</b>	<b>Sum of Parcel Total Assessment</b>	<b>Sum of Parcel Area (acre)</b>	<b>Count of Parcel ID</b>
N	\$ 501,000.00	0.14	2
Multi-Family Home	\$ 217,500.00	0.06	1
Retail	\$ 283,500.00	0.08	1
Y	\$ 79,102,300.00	31.74	96
Apartments, brewery	\$ 15,840,000.00	5.92	1
Apartments, services	\$ 29,202,600.00	8.23	1
Business	\$ 6,951,100.00	4.589	20
Multi-Family Home	\$ 13,115,200.00	6.077	42
Office Building	\$ 726,100.00	0.647	1
Restaurant	\$ 2,425,700.00	1.172	3
Restaurant (WPS landmark)	\$ 415,500.00	0.237	1
Restaurant, and now vacant store front	\$ 286,800.00	0.297	1
Restaurant	\$ 66,600.00	0.068	1
Retail	\$ 3,157,500.00	1.633	7
Retail	\$ 201,800.00	0.03	1
Single Family Home	\$ 3,183,700.00	1.025	7
Storage Facility	\$ 561,600.00	0.57	1
Vacant lot	\$ 294,500.00	0.354	1
WPS landmark	\$ 2,673,600.00	0.891	8
<b>1-Foot Impacted W/ 100-Year Coastal Storm</b>	<b>Sum of Parcel Total Assessment</b>	<b>Sum of Parcel Area (acre)</b>	<b>Count of Parcel ID</b>
N	\$ 4,265,900.00	1.537	15
Business	\$ 580,500.00	0.295	3
Multi-Family Home	\$ 2,149,600.00	0.73	7
Retail	\$ 1,232,200.00	0.4	4
Single Family Home	\$ 303,600.00	0.112	1
Y	\$ 75,337,400.00	30.343	83
Apartments, brewery	\$ 15,840,000.00	5.92	1
Apartments, services	\$ 29,202,600.00	8.23	1
Business	\$ 6,370,600.00	4.294	17
Multi-Family Home	\$ 11,183,100.00	5.407	36
Office Building	\$ 726,100.00	0.647	1
Restaurant	\$ 2,425,700.00	1.172	3
Restaurant (WPS landmark)	\$ 415,500.00	0.237	1
Restaurant, and now vacant store front	\$ 286,800.00	0.297	1
Restaurant	\$ 66,600.00	0.068	1
Retail	\$ 2,208,800.00	1.313	4
Retail	\$ 201,800.00	0.03	1
Single Family Home	\$ 2,880,100.00	0.913	6
Storage Facility	\$ 561,600.00	0.57	1
Vacant lot	\$ 294,500.00	0.354	1
WPS landmark	\$ 2,673,600.00	0.891	8
<b>2-Foot SLR W/ 100-Year Coastal Storm</b>	<b>Sum of Parcel Total Assessment</b>	<b>Sum of Parcel Area (acre)</b>	<b>Count of Parcel ID</b>
Y	\$ 79,603,300.00	31.88	98

## Exhibit 9: SWOT Analysis

<p style="text-align: center;"><b>Strength</b></p> <ul style="list-style-type: none"> <li>Established community</li> <li>Waterfront property</li> <li>Picturesque corridor</li> <li>Knowledge of sea-level rise</li> </ul>	<p style="text-align: center;"><b>Weakness</b></p> <ul style="list-style-type: none"> <li>Financial Constraints</li> <li>Lack of public support</li> <li>Public access to waterfront</li> <li>Website user experience</li> </ul>
<p style="text-align: center;"><b>Opportunity</b></p> <ul style="list-style-type: none"> <li>Commerce RI advertising properties</li> <li>Hosting events in Warren Gateway</li> <li>Local tourism</li> </ul>	<p style="text-align: center;"><b>Threat</b></p> <ul style="list-style-type: none"> <li>Rising sea levels</li> <li>Flood insurance concerns</li> <li>Diminishing property values</li> </ul>

## Exhibit 10: Town of Warren Website Homepage



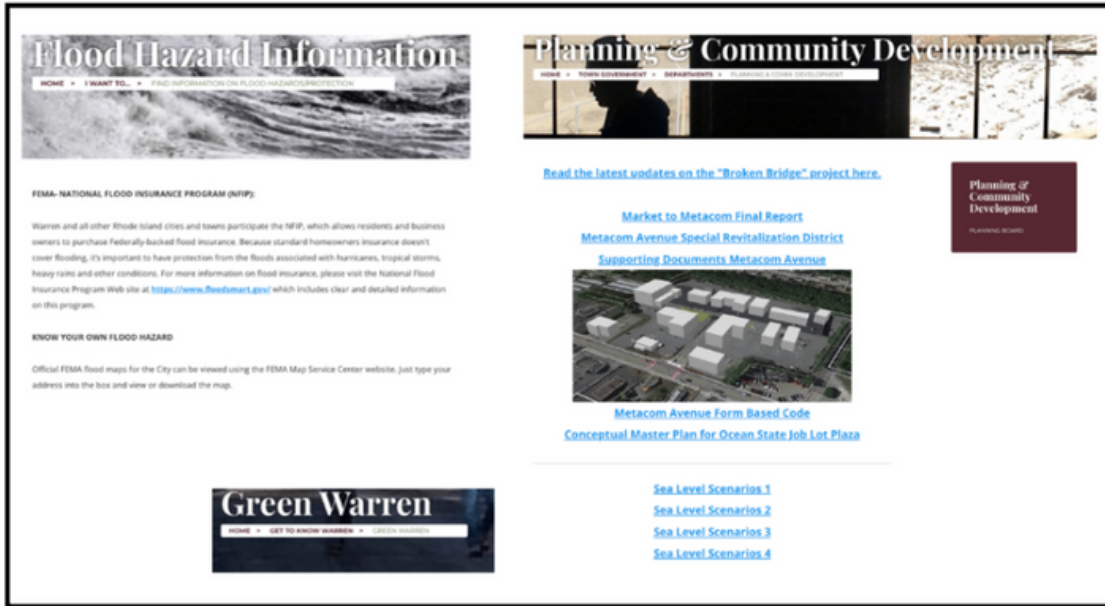
For a user in Google Chrome or Firefox, the search option on the town website is not visible unless the window is at less than 100% zoom. On Safari the search button is only slightly visible. The red dashed line shows the cutoff point of the town website on a chrome browser in a normal zoom setting.

## Exhibit 11: Town of Warren Website- Starting a Business

Information is not clearly found under the webpage for Starting a Business in Warren, particularly having all inquiries go through a town contact is not scalable. Barrington has a brief overview of starting a business in Barrington that Warren could replicate. The link to ordinances on the right side of Starting a Business in Warren provides information on zoning ordinance, but takes an unnecessary step for the user to actually access the town zoning ordinance.

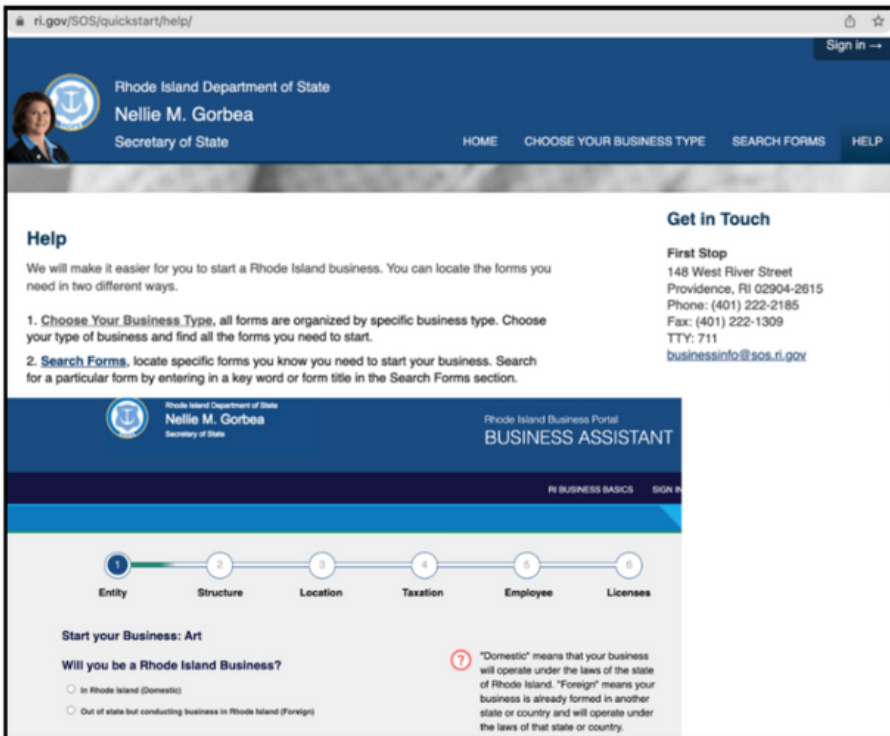


## Exhibit 12: Town of Warren Website- Resilience Information



The Flood Hazard Information page contains external links to FEMA and RIEMA, but does not link to specific guidelines for Warren. Including links and information specific to Warren would increase the proximity to flood hazards felt by Warren residents, and allow the town to share up to date flood guidelines. Additionally, the link to FEMA Substantial Damage/Substantial Improvement Desk Reference goes to an error page. Green Warren lacks coastal resilience information, and sea level rise scenarios are only found under the town department page of Planning and Community Development. The information on Planning and Community Development is not user friendly and unorganized. The links to Sea Level Rise scenarios are not meaningful to the general public. Resilience information and guidelines should be incorporated into the website directly, rather than only being found in document libraries.

## Exhibit 13: RI Secretary of State Quick Start



The RI Secretary of State's office contains a tool for prospective businesses that provides necessary forms and recommendations based on the provided information on basic business information. This link would be beneficial to have on the Town of Warren website, as it provides information for each town in RI.

## Exhibit 14: Commerce RI Opportunity Zone Advertising- Providence

The screenshot displays the Rhode Island Commerce website's property search interface. At the top, navigation links include 'Rhode Island Commerce', 'PROPERTY SEARCH', 'EXPLORE COMMUNITIES', 'COMPARE COMMUNITIES', and 'ALL SITES'. The search bar is set to 'Providence' with a 'City' dropdown menu. Below the search bar, there are options for 'All Properties', 'Size', and 'All Filters', along with a 'New Search' button and a 'Saved Results' indicator. A map of Providence is shown on the right, with several blue location pins indicating property locations. The map includes labels for various neighborhoods like Elmhurst, Mt Hope, and Lower Providence, as well as landmarks like Brown University and Roger Williams Park. On the left side, there are two property listings:

Property Name	Address	City	County	Zip Code	Min Size	Max Size
<b>The Foundry - Life Science</b>	291 Promenade St	Providence	Providence County	02908	9,000 sqft	29,600 sqft
<b>225 Dyer</b>	225 Dyer Street	Providence	Providence County	02903	15,000 sqft	31,000 sqft

Each listing includes a 'View Details' button. The map interface also features a 'Map Layers' section, a 'Show Properties' button, and a 'Search as I move the map' feature. The bottom of the map shows a toolbar with options like 'Pinpoint', 'Measure', 'By Address', 'Filter Area', 'Filter Radius', and 'Export'.

Commerce RI provides properties available in opportunity zones for incoming businesses across RI. While Commerce RI is linked to the Town website, Commerce RI does not work in the Warren area, and is a great opportunity for Warren to attract new businesses to the area by advertising availability.

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