Bay Spring Resilience Plan

Town of Barrington
Rhode Island

April 10, 2020

FUSS & O'NEILL

317 Iron Horse Way, Suite 204
Providence, RI 02908

Project No. 20170585.B19

FUSS & O'NEILL

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Town of Barrington

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1 Introduction

The Town of Barrington is continuing its efforts to make its community more resilient to climate events and sea level rise through the creation of this Resilience Plan for the Bay Spring neighborhood. The Bay Spring neighborhood is bound to the north by Haines Park, to the east by the East Bay Bike Path, Annawamscutt Brook, and Allin's Cove, to the south by Narragansett Bay and to the west by Bullock's Cove. The neighborhood is a particular priority for the Town with respect to climate resilience, as it is surrounded by waterbodies on three sides, is almost entirely located within FEMA flood zones, and is southwest-facing, so it receives direct wave action from the Bay. Historic mapping of the neighborhood demonstrates a shrinking coast, and sea-level rise projections indicate continued, significant impacts to this neighborhood over the next century.

The goal of the project was to engage community stakeholders to identify specific projects and actions that can be implemented to increase the neighborhood's climate resilience. The community's vision for a resilient Bay Spring includes a combination of natural systems, like planned marsh migration and coir envelope erosion mitigation, as well as edge hardening through rip rap supplementation, to improve the neighborhood's shoreline and buffer inland areas. Green stormwater treatment practices will promote natural drainage and reduce impacts of stormwater runoff during rain events. Improvements to the neighborhood's emergency preparedness and response programs, as well as the creation of a Town resilient code overlay district, will expand the Town's planning and regulatory processes in response to climate. This report summarizes the process and outcomes of the Bay Spring Resilience Planning initiative.

2 Community Engagement Process

2.1 Social Media and Electronic Communication

The overall planning process for the Resilience Plan for the Bay Spring neighborhood was publicized to encourage maximum public participation. The project team designed and distributed posters which were displayed at Barrington Town Hall, the Bay Spring Community Center, the Town Library and several other public sites. The team created the project website at https://bit.ly/resilientbayspring where all agendas, presentations and work output was posted as the project progressed to allow full participation by those who cannot attend all public workshops. The project received media coverage in the Barrington Times and eco-News Rhode Island. The project was also featured on social media through the Town of Barrington, the Bay Spring Community Center, and Barrington Patch and was reposted by affinity organizations. Finally, the Town Planning and Economic Development office sent direct emails to approximately 25 businesses and organizations in the project area, inviting them to participate in the process.

2.2 Resilience Planning Workshop 1

Resilience Planning Workshop 1 was held on February 12, 2020. It was focused on information gathering and brainstorming and was attended by proximally 35 individuals. Workshop 1 consisted of a brief presentation regarding the existing conditions of the area, followed by facilitated group brainstorming. Each of the four groups compiled a list of their visions for a resilient neighborhood, the challenges and opportunities to reaching their visions, and the potential solutions/projects to achieve their visions. See *Appendix A* for a list of workshop objectives and the workshop schedule. See *Appendix B* for a PDF of the PowerPoint presentation from the Workshop.

The compiled results of the brainstorming at Workshop 1 can be found in *Appendix C*. The complete list of potential solutions is also listed in Section 3 of this report. Following Workshop 1, the list of proposed projects was condensed to include the projects of highest priority for the community. The prioritized projects, found in Section 4 of this report, were further researched and conceptually designed by Fuss & O'Neill. The findings and results of this process were then discussed with the community and stakeholders during Workshop 2.

2.3 Resilience Planning Workshop 2

Workshop 2 was held on February 26, 2020 and concentrated on discussing the potential projects, which were generated during Workshop 1, as well as future actions and was attended by approximately 25 individuals. During Workshop 2, small group discussions were facilitated about each of the prioritized projects (See Section 4 of this report) to gather input about design approaches, identify the most important solutions, and seek consensus about potential projects. See *Appendix F* for a description and agenda of Workshop 2. See *Appendix G* for a PDF of the Workshop 2 presentation. A list of Workshop 1 and 2 participants is included in *Appendix D*, and a list of nearby businesses is in *Appendix E*.

3 Identified Projects

During Workshop 1, stakeholders identified potential projects to improve the neighborhood's climate resilience and voted on those that they deemed the highest priorities. The following is a complete list of the ideas and the number of votes each received, organized by the six overarching themes discussed.

3.1 Improving Perimeter of Neighborhood (38 votes total)

- Oyster reef to slow erosion build living shoreline 12
- Surf break to slow erosion 2
- Boat channel negative impacts from wakes 1
- Latham Park/southwest edge treatment/hardening 9
- Green Avenue street end/shoreline adaptation 5
- Maintain Allin's Cove 5
- Clean-up invasive species 3
- Read Avenue property buyout; infrastructure removal? 1

3.2 Managing Stormwater (14 votes total)

- Make sure stormwater gets out 4
- End of road treatments at Bay Spring, Green, Adams, etc. 6
- Road maintenance to resolve flooding 2
- Marina pavement reduction 1
- Bay Spring culvert modifications, catch basin 1
- Dam removal – Barrington Cove 0

3.3 Building Overall Resiliency (9 votes total)

- Budget – Seek Grants / Town bond 5
- Resilient code overlay district 2
- Permitting is complicated and difficult 1
- Buy back of repetitive loss properties 1

3.4 Improving Power Supply (8 votes total)

- Plan to get power back 3
- Atria generator capacity 1
- Backup power – microgrids 1
- Generators – shared 2
- Solar street lights 1

3.5 Evacuation Preparedness (6 votes total)

- Evacuation plan and outreach education 4
- Improved evacuation signage 2

3.6 Post-event Recovery (6 votes total)

- Return plan (environmental) 4
- Recovery plan – homes/businesses 1
- More manpower for DPW to maintain systems 1

4 Prioritized Projects

From the list of projects identified in Section 3 above, the following list of prioritized projects was generated. Fuss & O'Neill then researched these ideas and created concept plans as applicable. Order of magnitude construction cost estimates are included for each project in this section, and are based on prevailing wage rates, as many funders require conformance with the Davis-Bacon Act.

4.1 Latham Park Shoreline Protection

Latham Park is an area of particular importance for the community, as it provides valuable shoreline access and serves as a buffer to a portion of the neighborhood. The shoreline along the edge of the park experiences erosion due to wave action. An existing wall is located along the northwestern shoreline of the park, while the area south of that is natural coastline. The southern portion of the park closely abuts Shore Drive, and consists of fair-condition rip rap and an earthen embankment. The park contains a low-lying area, which floods during storm events.

Erosion of Existing Shoreline at Latham Park

4.1.1 Marsh Migration

Marsh migration is proposed within the existing low-lying area of Latham Park in order to provide a natural transition between the shoreline and upland infrastructure, as well as to restore valuable salt marsh habitat. Allowing natural erosion of this portion of the shoreline, as opposed to hardening the entire edge, will allow public beach access to continue as the park adapts to a changing coastline. The expansion of marshland would be limited to areas which are already the lowest in elevation and currently flood during storm events. Park areas higher in elevation, and adjacent to improved facilities such as the playground and walkways, would continue to be maintained as recreational lawn areas. This project would consist of invasive species management, limiting mowing to once per year, and allowing natural migration of native coastal grasses within the identified area of the park. The estimated cost of this project is approximately $45,000, which includes erosion controls, stockpiling loam, grading, placing loam, seeding, and the pedestrian pathway. See *Figure 2, Concept Plan, Latham Park*.

4.1.2 Rip Rap Supplementation

The community was supportive of the idea of a hardened edge at the southern portion of Latham Park for protection of infrastructure. The most vulnerable area of erosion along Latham Park is adjacent to Shore Drive. Supplementation and repair of the rip rap is proposed along the embankment between Shore Drive and the Bay. The cost of rip rap supplementation for the area shown on *Figure 2, Concept Plan*, is estimated at $95,000.

4.1.3 Oyster Reef

The idea of an oyster reef off the coast of Latham Park received a great deal of interest from community members during Workshop 1. This was posed as a potential solution to the shoreline erosion, as oyster reefs can be used to dissipate wave action. Fuss & O'Neill researched this idea following Workshop 1, and found that oyster reefs have been successful as an erosion mitigation measure where wave action is minimal, however establishment of an oyster reef at Latham Park is likely infeasible given the direct wave action and long fetch that occurs at this particular site. Regionally, the primary objective of oyster reef projects has been water quality treatment rather than wave attenuation. Additionally, the cost of oyster reef installation averages $2.29 per cubic foot. For a 1,400 linear feet by 5-foot wide reef, the cost of such a reef off Latham Park would be $80,000.

4.2 Allin's Cove Erosion Protection

Two potential projects were identified to mitigate shoreline erosion adjacent to Allin's Cove and to protect upland infrastructure. The first project involves maintenance of existing coir envelopes at the end of Byway Road. These coir envelopes have been successful in mitigating erosion, but require repair where a section of fabric is exposed. The second project is to install additional coir envelopes at the southern end of Narragansett Avenue, at its intersection with Ocean Avenue. This project would involve regrading the existing bank at a gentler slope in order to help dissipate wave action, as well as replanting to improve slope stabilization. This would also include improvements to allow continued pedestrian access to the beach at this location. The total estimated cost of these Allin's Cove coir envelope improvements is $75,000.

Erosion from stormwater has also been observed at the southern end of Byway Road and to the east of the low point in Narragansett Avenue. These areas present opportunities to stabilize the embankments and address concentrated flows.

For locations of each of these potential improvements, see *Figure 6, Concept Plan, Allin's Cove.*

4.3 Road End Stormwater Management

Currently much of the stormwater from the Bay Spring neighborhood flows directly from roadways toward the shoreline without treatment or retention. There are several roads that run perpendicular to the shore, which are particularly suitable for retrofits to install road end stormwater management systems. Stormwater practices at the ends of Bay Spring Avenue and Allen Avenue were considered as potential projects, but limited space, low elevations, and steep slopes make stormwater systems more challenging at those locations. Concept plans were developed for the following stormwater projects in order to help mitigate water quality impacts from the neighborhood, remove pavement along the shoreline, and manage invasive plant species.

4.3.1 Woodbine Avenue

Existing Woodbine Avenue Outfall

Woodbine Avenue currently has several catch basins, which capture runoff and discharge it through a culvert at the western end of the street. The outfall pipe is exposed behind the existing headwall, as the bank has eroded around it. Removal of a portion of pavement at the end of Woodbine Avenue would allow space for a small stormwater management practice to settle out sediment within the runoff. Relocation of the outfall further back, so it is buried within the embankment, will make it more resilient to the tides and reduce vulnerability to damage. A pedestrian path is proposed to maintain and improve public access to this area of the shoreline. The estimated cost of this project is $55,000, which includes erosion and sedimentation controls, pavement removal, earthwork, replacing the outfall and headwall, a pedestrian walkway, guide rail, and loam and seed. Although the concept plan shows retrofitting the existing catch basin, this cost estimate conservatively assumes that a new drain manhole and catch basin will be required. See *Figure 3, Concept Plan, Woodbine Ave.*

4.3.2 Adams Avenue

The parcel of Town-owned land at the end of Adams Avenue provides the space for a stormwater basin and sediment forebay to filter runoff. Excess pavement at the end of Adams Avenue can be removed to reduce the impervious area and contribute additional space for treatment. This project would include invasive species management. The estimated cost of this project is $30,000. See *Figure 4, Concept Plan, Adams Ave.*

4.3.3 Greene Avenue

The area at the corner of Green Avenue and Byway Road is another opportunity for stormwater treatment. This area is low in elevation and receives stormwater runoff from a large area of the Bay Spring Neighborhood. Currently, buildup of sediment, leaves, and debris to the east of the roadway prevents natural drainage toward Allins Cove and causes occasional localized flooding. The proposed project would involve re-grading this area to direct runoff from the roadway toward a stormwater basin. It would also include invasive species management and planting native coastal grasses. The estimated cost of this project is $30,000. See *Figure 5, Concept Plan, Greene Ave.*

4.4 Read Avenue Flooding Mitigation

The section of Read Avenue between Lake Avenue and Spring Avenue is located in one of the lowest points of the Bay Spring neighborhood. This area was the location of a historic fresh water spring and also where a tidal creek runs north-south. There are wetlands on the parcel to the north of Read Avenue. A culvert beneath Read Avenue connects the wetlands and a storm drain from the north to the cove to the south of Read Avenue. During storm events and high spring tides, the street is frequently flooded

which causes deterioration to the road surfacing. A majority of the parcels on the section of Read Avenue are owned by the Barrington Land Conservation Trust.

Lot 1-161 (also known as 32 Spring Street) is the only parcel of land on this section of Read Avenue with a building served by the roadway. The parcel is within the mapped VE flood zone (Velocity) with a "build higher than" elevation of 18' above mean high tide. The parcel is owned by DLE Realty and the total assessment is $324,000 (Building value = $209,000, Land value = $104,000, Yard Items = $11,000). The 4,900 square foot building (known as 32 Spring Street) has a listed construction date of 1988. It most recently sold for $175,000 in 2011.

Assuming an increase in storm events and forecast sea level rise from climate change, it is anticipated that the section of Read Avenue between Lake Avenue and Spring Avenue will flood with more frequency and intensity. This will cause damage to the road structure itself, requiring the Town to make more frequent repairs to keep the road in service. If the structure at 32 Spring Street is damaged by flooding, the owner may make claims under Flood Insurance policies that are in effect. If this series of events occurs repeatedly, it may be advisable for the owner and the Town to declare the building a repetitive loss property, negotiate a sale of the building to the Town at market value and remove the building, site paving and all associated site improvements and systems. The paved section of Read Avenue could then be removed without negatively impacting any existing parcels. This would reduce Town infrastructure maintenance costs and allow restoration of the natural wetland features and improvement of natural system functions. The cost of removing this portion of Read Avenue and restoring the natural stream is approximately $75,000. This includes pavement removal, utility modifications, culvert removal, and stream and wetland restoration.

4.5 Bay Spring Avenue

The existing culvert that carries Annawamscutt Brook beneath Bay Spring Avenue is in need of repair and may be undersized for forecasted increased flow during future storm events. In conjunction with the Barrington Cove Dam (see Section 4.6), it may be beneficial to model future hydrodynamic and hydraulic flows from future storm events to understand how the sizing of this culvert impacts flood risk within the system. In addition, the elevation of Bay Spring Avenue is low where it crosses Annawamscutt Brook, making a vulnerable point for flooding during storms, which is of particular importance, as Bay Spring Avenue is a primary access route to the Bay Spring Neighborhood to and from the east, where major services and facilities are located. There has been improvement to the stormwater management systems in this area and future adaptation may be necessary. In order to evaluate the cost of this project, additional investigation and design are required, as the cost depends on structural considerations, dewatering approach, and culvert sizing.

Existing Bay Spring Avenue Culvert

4.6 Barrington Cove Dam

To the south of Bay Spring Avenue, the Annawamscutt Brook is impounded by historic dam that served the Barrington Lace Works (one of those buildings has since been converted to the adjacent Barrington Cove Apartments. The existing dam is privately owned by the entity that owns and manages the Barrington Cove Apartment facility. While flooding has not been reported in the area between the dam and the Bay Spring Avenue culvert, future storm events are forecast to bring more intense storms with increased rainfall. Ecologically, the dam inhibits upstream passage of native fauna.

In conjunction with the Bay Spring Avenue culvert, it may be beneficial to model future hydrodynamic and hydraulic flows from future storm events to understand flood risk within the system.

Dam removal costs are highly variable as they are dependent on the amount of impounded sediment, potential for contaminated sediment, the methods of water control, and the possibility of uncovering legacy dams. For reference, other recent dam removal projects Fuss & O'Neill has engineered had total costs ranging from $600,000 to $1.7 million. These costs include water control, erosion and sediment controls, channel restoration, and clearing, in addition to the actual dam removal. Additional investigation and design would be required to refine the cost estimate for removal of the Barrington Cove Dam.

4.7 Resilient Code Overlay District

The housing stock in the Bay Spring neighborhood varies in age, but the majority dates from the first half of the twentieth century and is composed of wood frame structures on low foundations. These types of structures can be vulnerable to severe storm and flooding events.

In response to similar conditions, several communities in the United States have adopted Flood Resilient Building Guidelines to be applied within specially designated Flood Resiliency Zoning Overlay Districts. The intent of these guidelines is to promote best practices for flood resistant design measures to ensure that substantial rehabilitation or new construction in areas vulnerable to current and future flooding are prepared for potential coastal flood hazards. This also provides the municipality with regulatory tools to better influence, guide, and streamline resilience action. This may be an appropriate regulatory step by the Town of Barrington and are to increase resiliency and protect residents.

4.8 Emergency Preparedness

The Town of Barrington has a strong system of emergency preparedness through its Emergency Management Team and its professional Fire Department and Police Department, as well as associated assets such as the Harbor Patrol. Bay Spring neighborhood residents expressed a strong desire to be more prepared on the neighborhood level, in coordination with existing Town systems. Specific actions that can be taken on the neighborhood level include:

- increasing neighborhood participation in the Town's Code Red emergency notification and communications system;

- communicating existing emergency preparedness and evacuation plans with all neighborhood residents so that they can take appropriate action when instructed, through multiple methods including a strong online information platform, distribution of information on annual neighborhood events. This can be done in conjunction with local officials, the Rhode Island Emergency Management Agency RIEMA) and with the Federal Emergency Management Agency (FEMA) through its Citizen Corps program;
- engaging neighborhood residents to help protect vulnerable populations such as older homeowners and residents of senior housing through programs such as "adopt a neighbor";
- forming a volunteer community working group/organization such as a Community Emergency Response Team (CERT) to become trained in basic disaster response skills and coordination with public safety (Police and Fire) and nonprofit (American Red Cross) agencies;
- improving signage for emergency evacuation routes;
- researching and building community understanding about the ways in which area businesses prepare for emergency events (including area marinas) including removing moored/docked boats, status of hazardous materials (fuel tanks, etc.).

4.9 Post-event Recovery

At some point in the future, the Bay Spring Neighborhood will be impacted by an emergency event caused by a climate change impact such as a hurricane, severe precipitation event or high heat event. Advanced planning for post-event recovery can be the key to a resilient community that bounces back from the event. There are a number of resources that the neighborhood and Town of Barrington can utilize prepare for this eventuality:

- Create a neighborhood-specific, post-event recovery plan that builds on existing Town and State plans for larger events;
- Provide locations for temporary power supply that can be used during the period between resident return and reactivation of the electric grid. This can be a community building with a resilient generator and fuel source, which is estimated to cost $44,000;
- Plan for shared sources of supplies and materials for returning residents through community organizations or coalitions;
- Understand and plan for systems by which the Town will process applications for emergency building stabilization and/or demolition in the event of structural damage during an emergency event.

5 Conclusion

The Bay Spring Resilience planning and community engagement process was successful in building consensus from residents and other stakeholders regarding goals and steps forward for a more climate-resilient Bay Spring neighborhood. The priority projects discussed in this Bay Spring Resilience Plan address a range of climate-related challenges, including mitigating coastal erosion, treating and managing stormwater runoff, protecting infrastructure, and improving emergency preparedness and post-event recovery. The Town of Barrington will seek funding for these projects and will facilitate further planning, design and implementation.

Figures

BARRINGTON COVE

EAST BAY BIKE PATH

500-YEAR FLOOD
(FEMA ZONE X)

ADAMS AVE.

BAY SPRING AVE.

READ AVE.

100-YEAR FLOOD
ELEV. 18 FEET
(FEMA ZONE VE)

ALLINS COVE

ALLEN AVE.

NARRAGANSETT AVE.

WOODBINE AVE.

LATHAM AVE.

GREEN AVE.

100-YEAR FLOOD
ELEV. 13 FEET
(FEMA ZONE AE)

LATHAM PARK

PROVIDENCE RIVER

LEGEND

WETLANDS

AE — FEMA ZONE AE BOUNDARY

VE — FEMA ZONE VE BOUNDARY

NOTE:

WETLAND, FEMA, AND CONTOUR INFORMATION WAS OBTAINED FROM RIGIS MAPPING. PARCELS BOUNDARIES WERE OBTAINED FROM BARRINGTON GIS MAPPING AND ARE APPROXIMATE ONLY.

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SEAL

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DATUM: HORZ.:
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GRAPHIC SCALE

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PHILIP HERVEY

EXISTING CONDITIONS PLAN - OVERALL

BAY SPRING NEIGHBORHOOD RESILIENCE

BARRINGTON, RHODE ISLAND

BAY SPRING AVENUE

PROJ. No.: 20170585B19
DATE: JANUARY 2020

FIG. 1

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A EXISTING CONDITIONS PLAN – LATHAM PARK
SCALE: 1"= 40'

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FIG. 2

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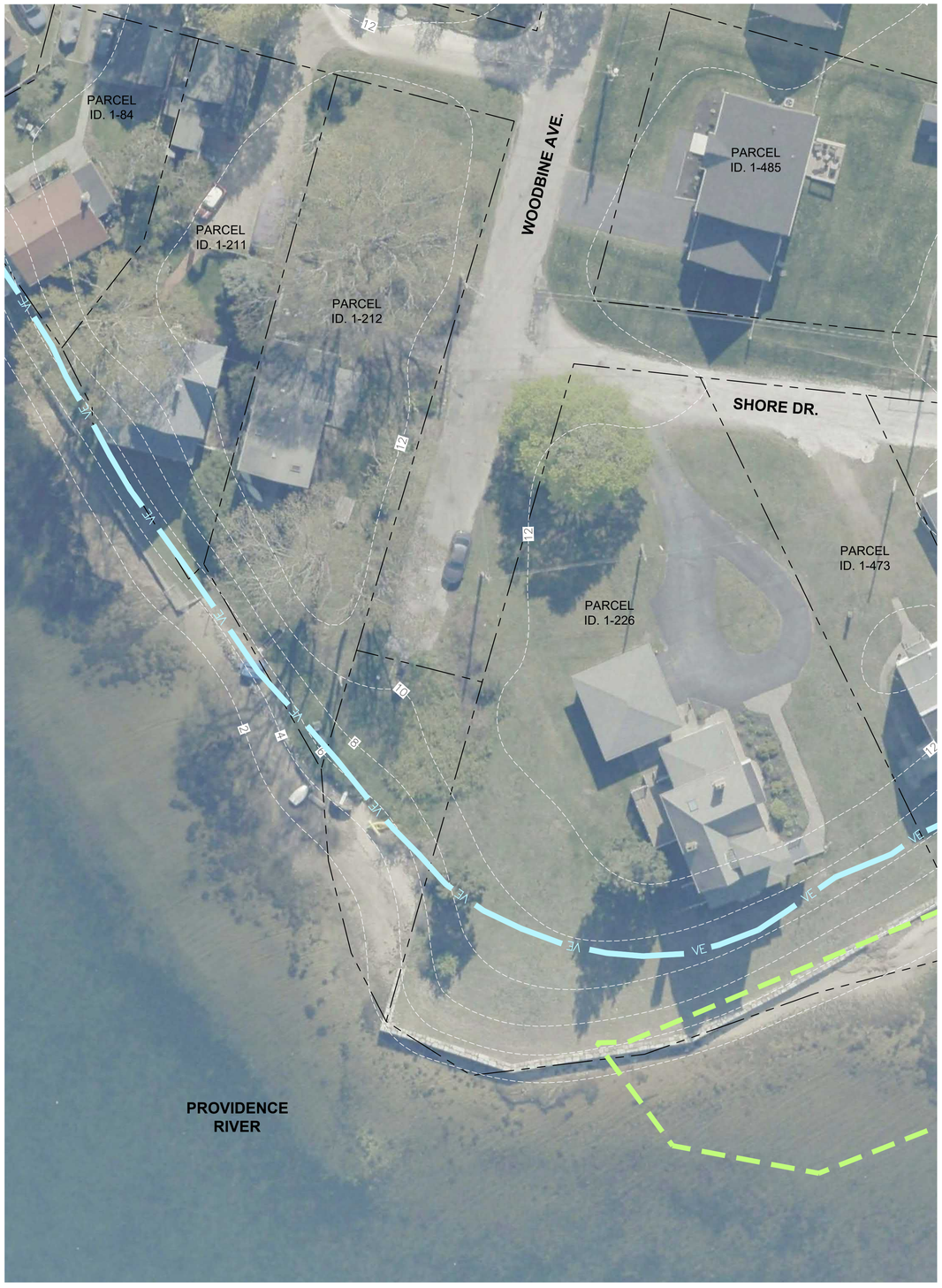

A EXISTING CONDITIONS PLAN – WOODBINE AVE.
SCALE: 1"= 20'

B EXISTING CONDITIONS PLAN – BAY SPRING AVE.
SCALE: 1"= 20'

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- WETLANDS
- CONTOURS (SHOWN WHITE ON PLANS)
- AE — FEMA ZONE AE BOUNDARY
- VE — FEMA ZONE VE BOUNDARY

NOTE:

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WOODBINE AVE. & BAY SPRING AVE.
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FIG. 3

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A EXISTING CONDITIONS PLAN – ALLEN AVE.
SCALE: 1"= 20'

B EXISTING CONDITIONS PLAN – ADAMS AVE.
SCALE: 1"= 20'

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- WETLANDS
- CONTOURS (SHOWN WHITE ON PLANS)
- AE — FEMA ZONE AE BOUNDARY
- VE — FEMA ZONE VE BOUNDARY

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FIG. 4

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A EXISTING CONDITIONS PLAN – READ AVE.
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FIG. 5

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A EXISTING CONDITIONS PLAN – ALLINS COVE
SCALE: 1"= 40'

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FIG. 6

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A EXISTING CONDITIONS PLAN – BARRINGTON COVE
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FIG. 7

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LEGEND

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A CONCEPT PLAN – LATHAM PARK
SCALE: 1"= 40'

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TOWN OF BARRINGTON
CONCEPT PLAN
LATHAM PARK
BAY SPRING NEIGHBORHOOD RESILIENCE
BAY SPRING AVENUE BARRINGTON, RHODE ISLAND

PROJ. No.: 20170585.B19
DATE: JANUARY 2020

FIG. 2

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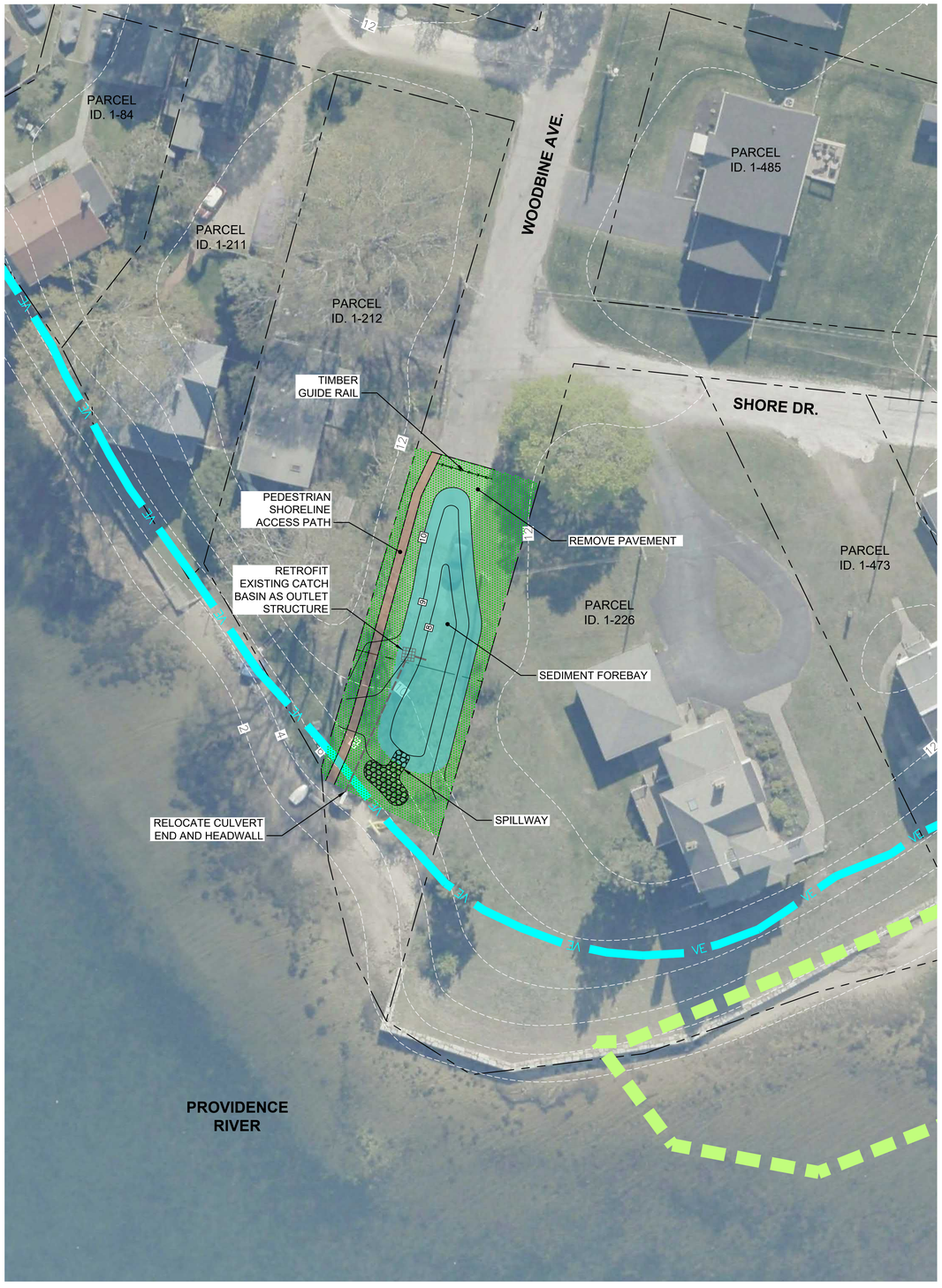
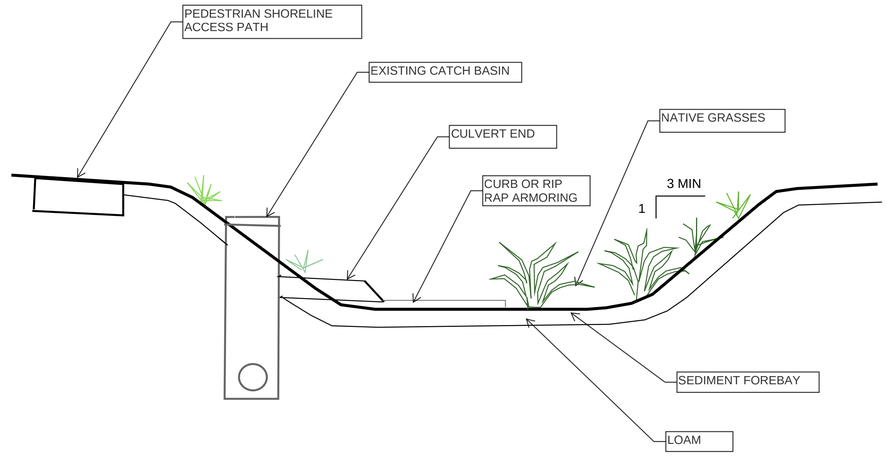


A CONCEPT PLAN – WOODBINE AVE.
SCALE: 1"= 20'



SEDIMENT FOREBAY
NOT TO SCALE

LEGEND
- APPROXIMATE PARCEL BOUNDARY
- WETLANDS
- CONTOURS (SHOWN WHITE ON PLANS)
- AE — FEMA ZONE AE BOUNDARY
- VE — FEMA ZONE VE BOUNDARY

NOTE:
WETLAND, FEMA, AND CONTOUR INFORMATION WAS OBTAINED FROM RIGIS MAPPING. PARCELS BOUNDARIES WERE OBTAINED FROM BARRINGTON GIS MAPPING AND ARE APPROXIMATE ONLY.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
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SCALE:
HORZ.: 1"= 20'
VERT.:
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HORZ.:
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TOWN OF BARRINGTON
CONCEPT PLAN
WOODBINE AVE.
BAY SPRING NEIGHBORHOOD RESILIENCE
BAY SPRING AVENUE BARRINGTON, RHODE ISLAND

PROJ. No.: 20170585.B19
DATE: JANUARY 2020

FIG. 3

File Path: J:\DWG\P2017\0585\B19\Civil\Plan\20170585B19_CON01.dwg Layout: FIG 3 Plotted: Wed, February 26, 2020 - 9:27 AM User: cviera
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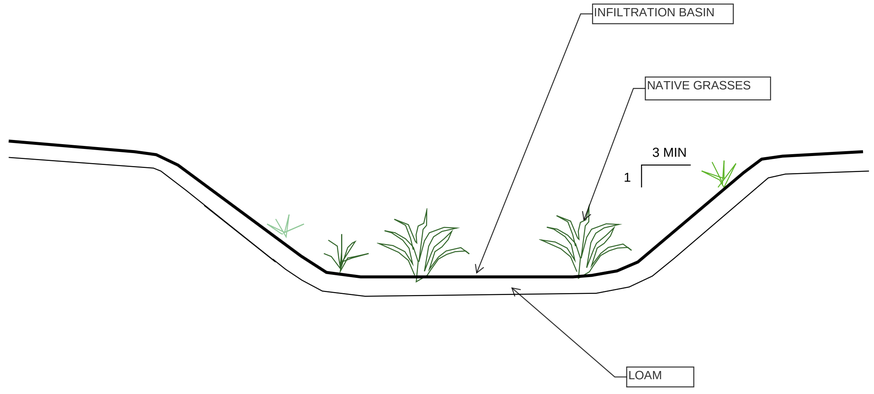
MS VIEW:

A CONCEPT PLAN – ADAMS AVE.
SCALE: 1"= 20'



INFILTRATION BASIN
NOT TO SCALE

LEGEND
- APPROXIMATE PARCEL BOUNDARY
- WETLANDS
- CONTOURS (SHOWN WHITE ON PLANS)
- AE — FEMA ZONE AE BOUNDARY
- VE — FEMA ZONE VE BOUNDARY

NOTE:
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TOWN OF BARRINGTON
CONCEPT PLAN
ADAMS AVE.
BAY SPRING NEIGHBORHOOD RESILIENCE
BAY SPRING AVENUE BARRINGTON, RHODE ISLAND

PROJ. No.: 20170585.B19
DATE: JANUARY 2020

FIG. 4

File Path: J:\DWG\P2017\20585B19\Civil\Plan\20170585B19_CON01.dwg Layout: FIG 4 Plotted: Wed, February 26, 2020 - 10:01 AM User: cvlera
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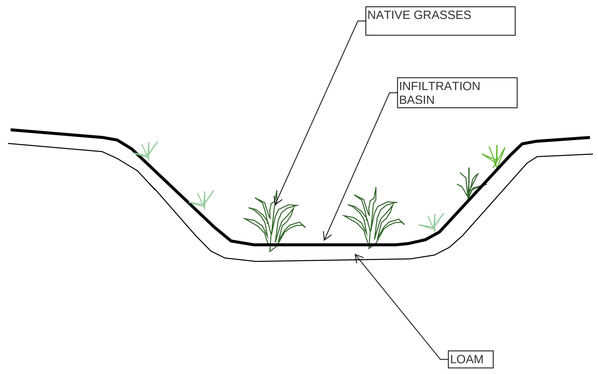
A CONCEPT PLAN – GREENE AVE.
SCALE: 1"= 20'



INFILTRATION BASIN
NOT TO SCALE

LEGEND

- APPROXIMATE PARCEL BOUNDARY
- WETLANDS
- CONTOURS (SHOWN WHITE ON PLANS)
- AE — FEMA ZONE AE BOUNDARY
- VE — FEMA ZONE VE BOUNDARY

NOTE:
WETLAND, FEMA, AND CONTOUR INFORMATION WAS OBTAINED FROM RIGIS MAPPING. PARCELS BOUNDARIES WERE OBTAINED FROM BARRINGTON GIS MAPPING AND ARE APPROXIMATE ONLY.

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SCALE:
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TOWN OF BARRINGTON
CONCEPT PLAN
GREENE AVE.
BAY SPRING NEIGHBORHOOD RESILIENCE
BAY SPRING AVENUE BARRINGTON, RHODE ISLAND

PROJ. No.: 20170585.B19
DATE: JANUARY 2020

FIG. 5

A CONCEPT PLAN – ALLINS COVE
SCALE: 1"= 40'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
1.			XX/XX	XX

SCALE:
HORZ.: 1"= 40'
VERT.:
DATUM:
HORZ.:
VERT.:
40 20 0 40
GRAPHIC SCALE

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TOWN OF BARRINGTON
CONCEPT PLAN
ALLINS COVE
BAY SPRING NEIGHBORHOOD RESILIENCE
BAY SPRING AVENUE BARRINGTON, RHODE ISLAND

PROJ. No.: 20170585.B19
DATE: JANUARY 2020

FIG. 6

File Path: J:\DWG\P2017\05858\B19\Civil\Plan\20170585B19_CON01.dwg Layout: FIG 6 Plotted: Wed, February 26, 2020 - 9:28 AM User: cviera
MS VIEW: LAYER STATE: Plotter: NONE CTB File: FO.STB

Appendix A

Workshop 1 Agenda

Bay Spring Neighborhood Resilience Planning
Town of Barrington
Info Gathering and Brainstorming Workshop (2/12/20)

INTRODUCTION:

The Town of Barrington is continuing its efforts to make our community more resilient to climate events and sea level rise through the creation of a Resilience Plan for the Bay Spring neighborhood. The goal of the project is to identify specific projects and actions that can be implemented to increase community resilience. Resilience is often defined as the ability to absorb a blow and to recover quickly and to adjust to change.

At tonight's workshop participants will learn about forecasts for climate impacts, past and ongoing projects to increase resilience and then have the opportunity to share their own ideas for projects and actions. Based on these outputs, Town staff, working with engineers, scientists and planners from Fuss & O'Neill professionals in engineering, design, policy and other specialties take the workshop ideas and formulate projects and changes that can increase resilience.

WORKSHOP OBJECTIVES

- Build shared knowledge about the existing conditions in the area
- Build shared knowledge about Barrington's existing planning for hazard mitigation, climate change and goals for the area
- Be honestly open to the ideas and preferences of participants
- Hold facilitated, small group discussions focused on key topics to:
    - Gather honest opinions about existing problems
    - Gather honest opinions about possible solutions/design approaches
    - Seek consensus about potential projects
- Identify the most important priorities for Town and neighborhood action
- Build consensus and support from stakeholders to support action

WORKSHOP #2 - February 26, 2020
At this event participants will see work generated during and after the first Workshop and have the opportunity to express their preferences for the priority of future. The Town will then use these outputs to seek funding for projects that will improve the neighborhoods resilience to climate events.

BAY SPRING RESILIENCE PLANNING PROJECT
WORKSHOP SCHEDULE – FEBRUARY 12, 2020

6:45 Stakeholders begin arriving, coffee, mingling

7:00 Welcome – Town of Barrington
Project goals – Phil Hervey

7:05 Format/schedule/ground rules – Arnold Robinson
Facilitators and experts
Scribes!

7:10 Existing conditions

7:30 Small group exercise (Three questions)

1. What is your Vision for a resilient Bay Spring neighborhood?
   (On post its on big paper pad)
2. What are the problems and opportunities on the way to your Vision?
   (Marked on maps and on post-its on big paper pad)
3. What are your possible responses to each problem/opportunity?
   (Marked on maps and on post-its on big paper pad)

8:20 Small group report out

8:45 Prioritize responses to support Vision

1. Check elements of Vision
2. Most pressing problems - vote
3. Most important possible responses - vote

8:55 Next steps

1. Create more detailed recommendations for top priority responses
2. February 26, 2020 Workshop 2

9:00 Adjourn

Appendix B

Workshop 1 Presentation

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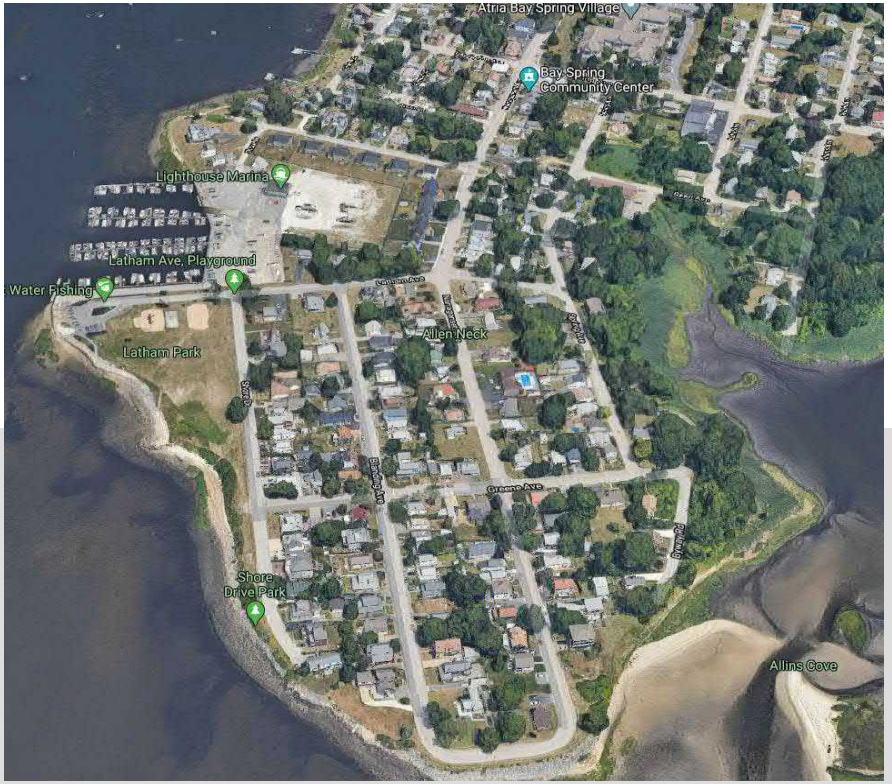

Bay Spring Neighborhood Resilience Planning Workshop 1

February 12, 2020

Workshop Agenda

- Welcome – Town of Barrington
- Resilience Planning in Barrington
- Bay Spring Project Goals
- Workshop - Format, schedule, ground rules
- Climate Change, Natural Hazards and Barrington
- Small Group work
- Break
- Report out and prioritize
- Next Steps to 2/26/20 Workshop

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Bay Spring Then and Now

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Bay Spring Then and Now

FUSS & O'NEILL

Barrington CRB Workshop – Fall 2019

- Community Resilience Building
  - Identify impacts using available data including new climate projections developed by CRMC/NOAA
  - Hold CRB workshop to engage stakeholders
    - Identify community strengths and vulnerabilities from community input input
    - Identify possible responses
    - Prioritize actions - conclude workshop
  - Prepare and review report and priorities
  - Move forward into action:
    - Identify and monitor funding opportunities for recommendations;
    - Incorporate plan into other local planning efforts

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Barrington's Climate Resilience Building Workshop

Selected High Priority Actions

- Advance project to reduce erosion at Latham Park (south of revetment at Narragansett using nature-based solutions
- Explore and prioritize additional shoreline adaptation projects for low-lying, dead end roads the shore…which may include pavement removal and green infrastructure to manage and erosion
- Strengthen evacuation route awareness and wayfinding via more prominent signage
- Seek ways to ensure private facilities (e.g. Atria Bay Springs Village, Barrington Cove Apartments) have generators installed to provide heat for residents…
- Conduct outreach and education to residential property owners located in flood zone with on flood insurance
- Protect western shore beaches with natural and hybrid infrastructure projects
- Inspect and design alternative approach to maintaining Bay Spring area culverts

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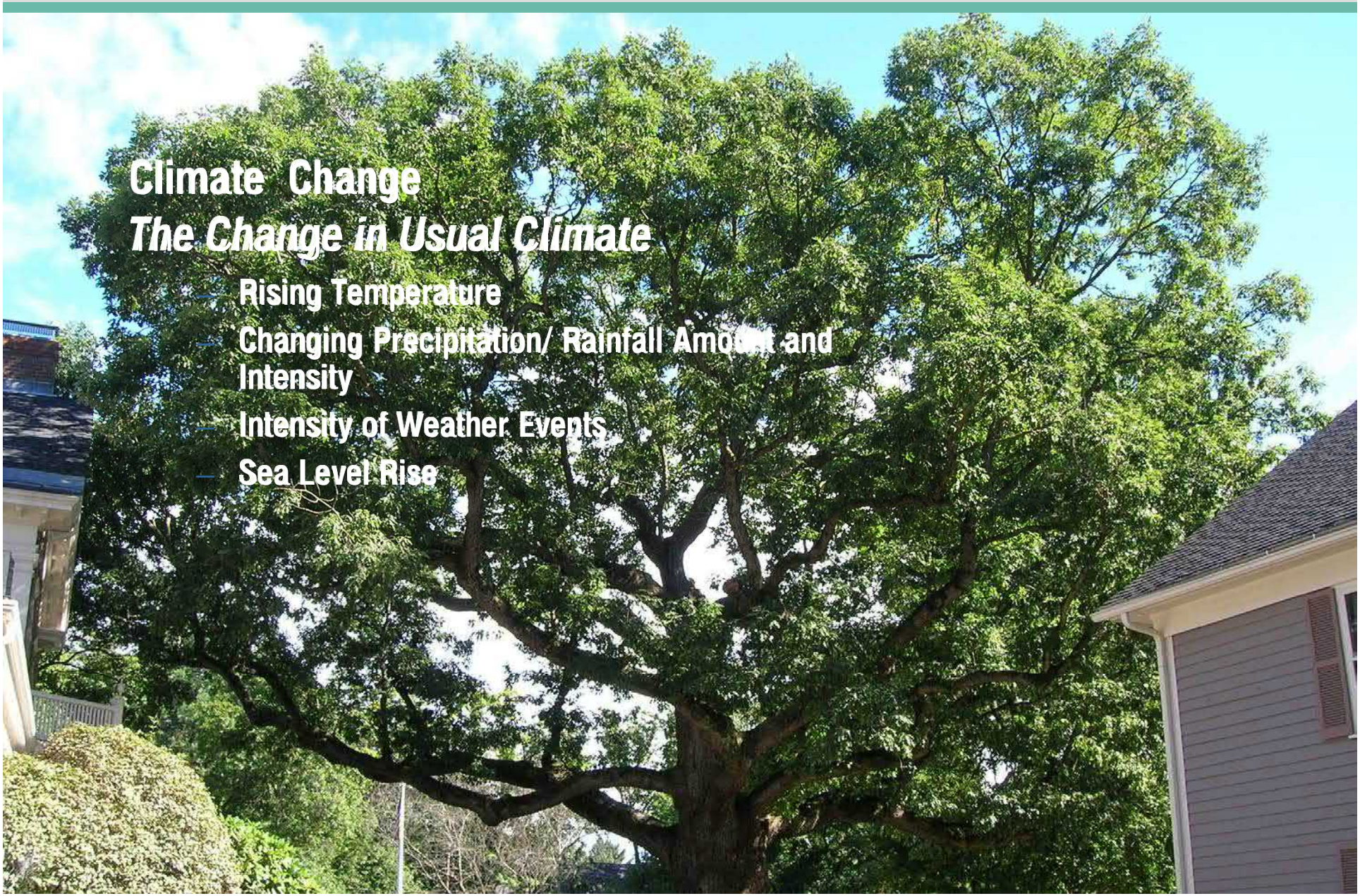
Barrington's Climate Resilience Building Workshop

Selected Moderate Priority Actions

- Protect western shore beaches with natural and hybrid infrastructure projects
- Inspect and design alternative approach to maintaining Bay Spring area culverts
- Increase education and awareness amongst coastal residents in areas with routinely flooded roads as as install signage to alert residents of flooding issues
- Engage with marina owners and operators to ensure the best available information about extreme and climate change are provided in hopes of more informed decisions about operations and longer-term
- Explore intersection of residential homes in existing (2014 FDMA Flood Insurance Rate Maps) and flood zones to proactively educate on potential future home elevation, voluntary buyouts and or
- Examine the feasibility of securing and installing micro grids in select areas of Barrington
- Work with Fire Department and management to ensure assisted living facilities, group homes, and Apartments have disaster and resilience plans in place

Terminology



Barrington/Bay Spring – History of Vulnerability to Storms

- Facing southwest (storm direction)
- Surrounded by water on three sides
- Tidal streams
- Low-lying areas

FUSS & O'NEILL

Barrington/Bay Spring – History of Vulnerability to Storms

- Facing southwest (storm direction)
- Surrounded by water on three sides
- Tidal streams
- Low-lying areas

FUSS & O'NEILL

No Sea Level Rise – 100 year storm impact

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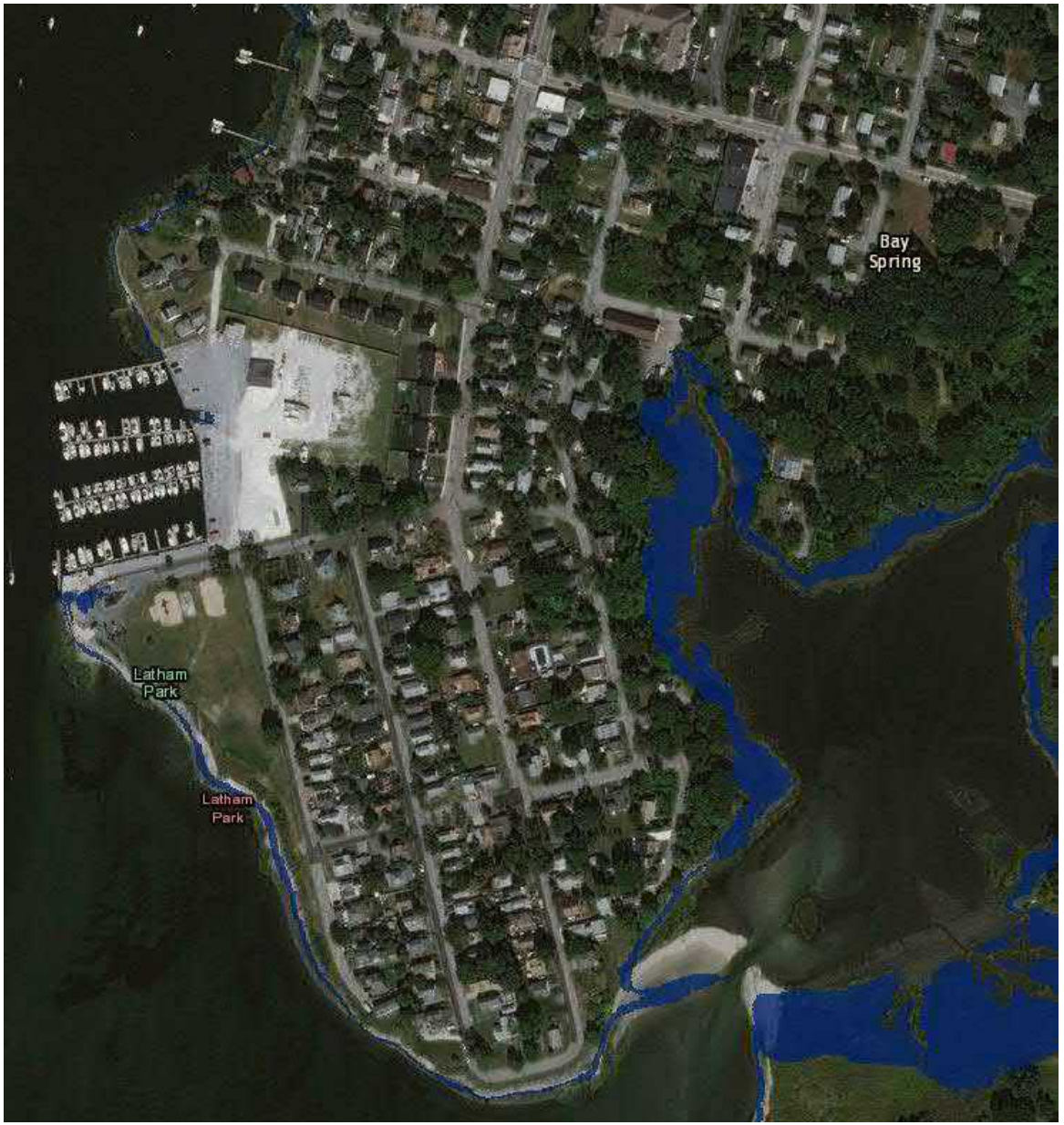
Forecast Sea Level Rise – 2 feet (2050)



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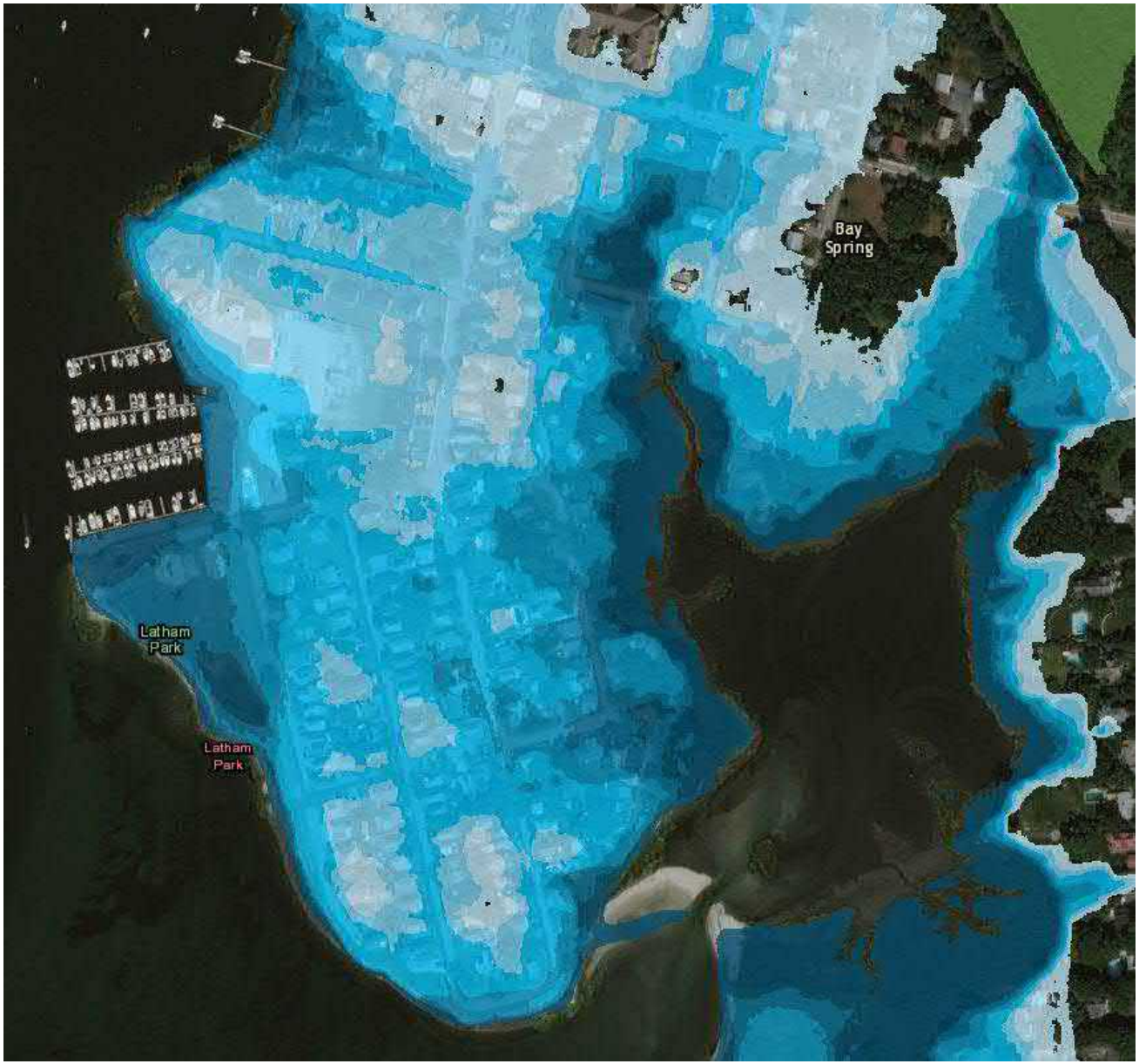
Forecast Sea Level Rise – 2 feet with 100 year storm



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Action and Adaptation

- Town of Barrington allocates Resilience funding in budget each year
- Barrington has completed:
  - Comprehensive Plan that includes climate resilience
  - Hazard Mitigation Plan
  - Climate Resilience Building Workshop and Actions
- Save the Bay has been an active partner with Barrington on adaptation and resilience projects
- This framework puts the Town in strong position to seek implementation funding from Federal and State sources
- Needs to be ready with highest priority, effective projects
- First neighborhood-level planning/project identification is with the Bay Spring community

Bay Spring Resilience Project Area

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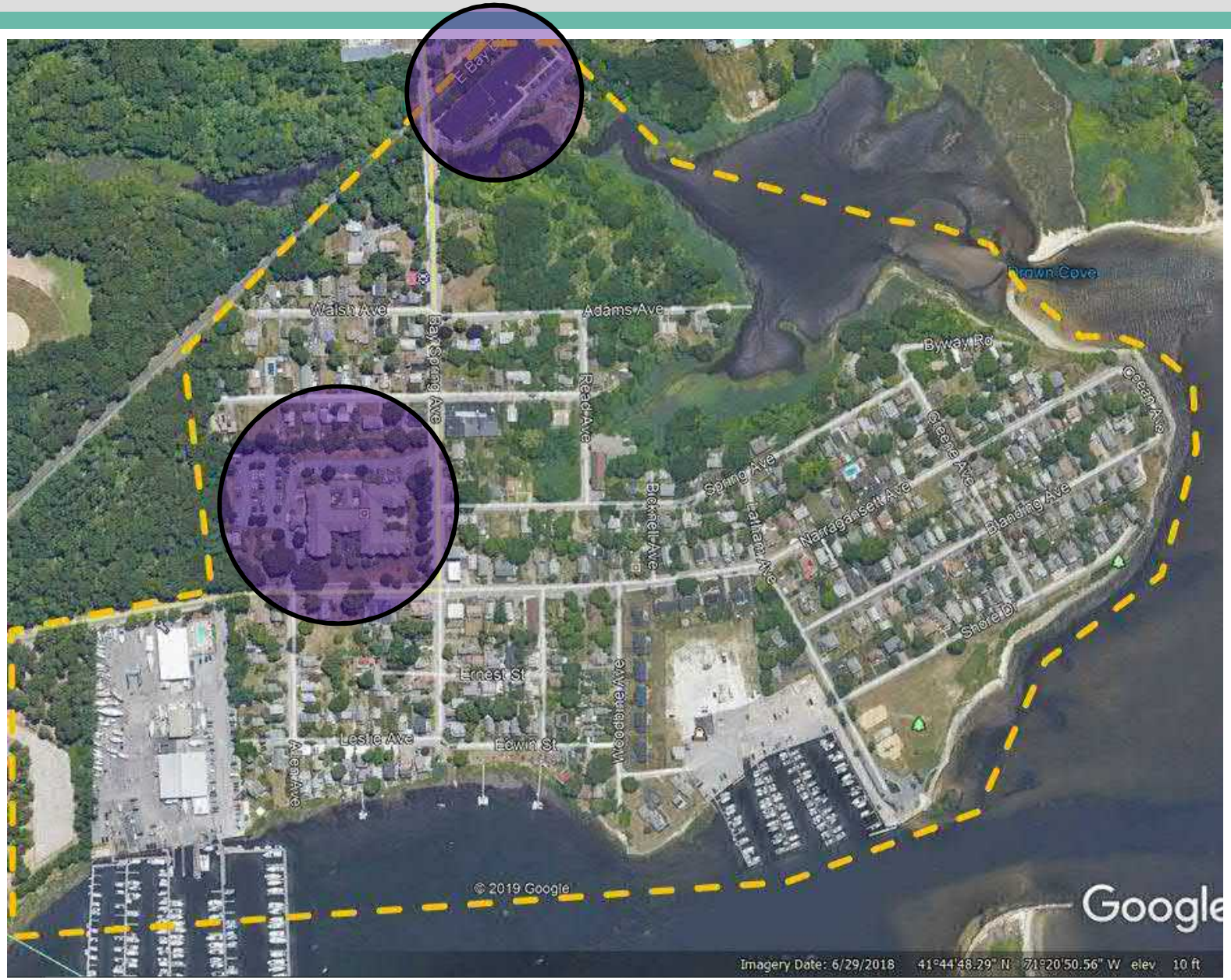
Bay Spring – Senior Communities



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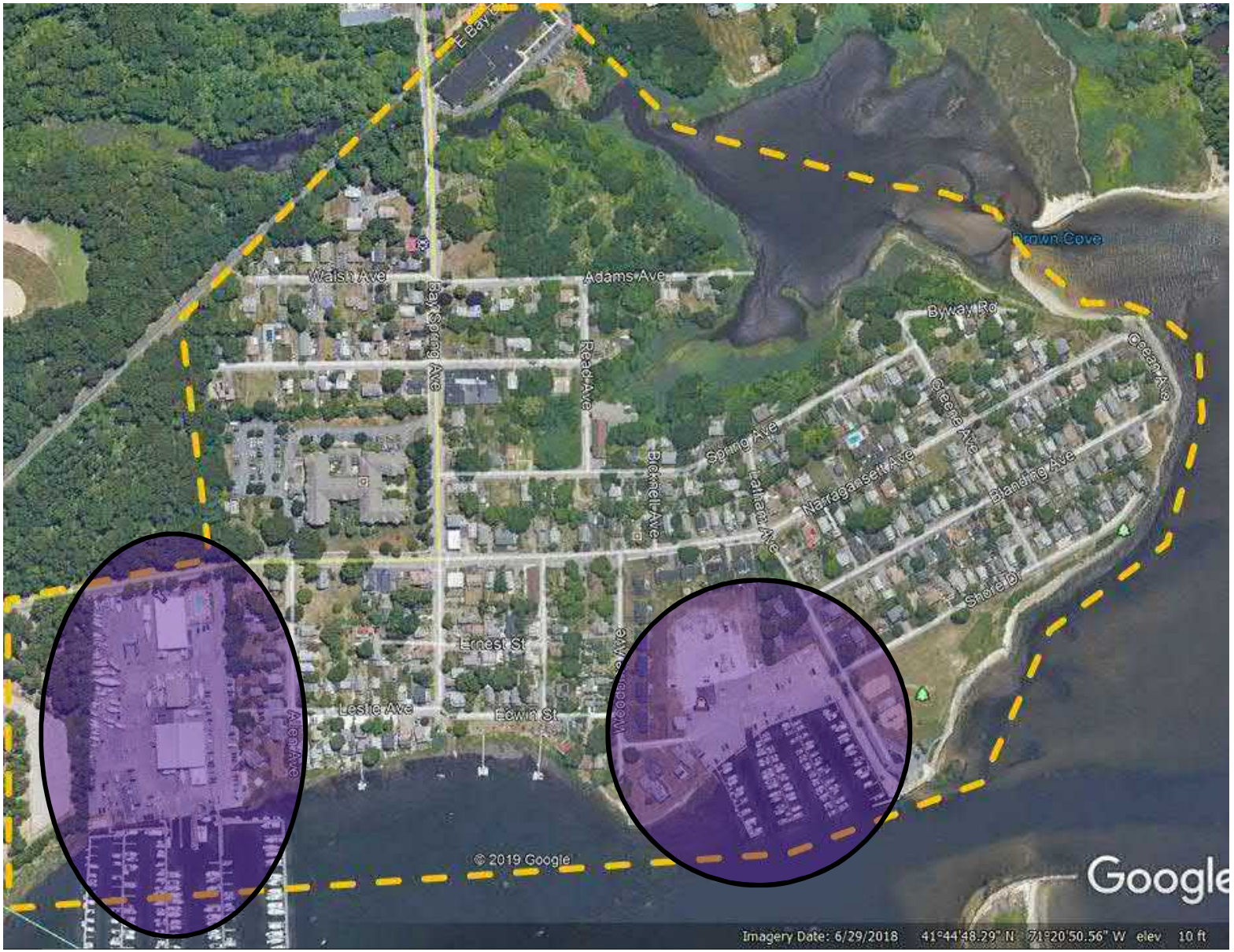
Bay Spring - Marinas



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Bay Spring – Street Ends/Stormwater Flow

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Bay Spring- Latham Park

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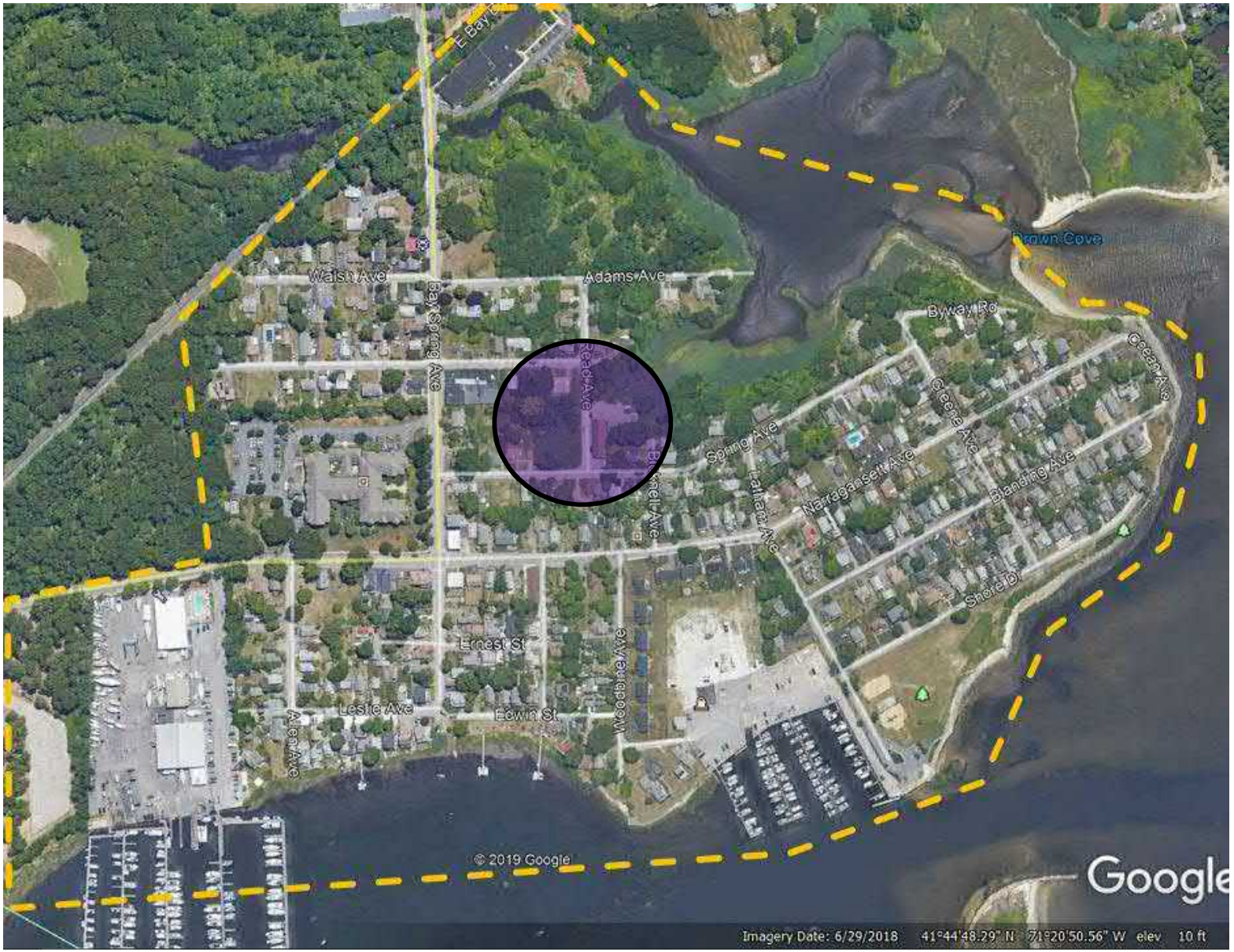
Bay Spring- Read Avenue/Wetlands



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Bay Spring- Allin's Cove

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Barrington Hazard Mitigation Plan

1. Byway Road – bioengineering (coir envelopes) used to prevent erosion and protect a sewer line.

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Barrington Hazard Mitigation Plan

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Barrington Hazard Mitigation Plan

3: Hanes Park, Bullocks Cove, Barrington, RI: opportunity to remove pavement in upland adjacent to shoreline to provide room for stormwater infiltration

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Barrington Hazard Mitigation Plan

FUSS & O'NEILL

Barrington Hazard Mitigation Plan

Barrington Hazard Mitigation Plan

2: Latham Park: allow natural shoreline to erode and low lying area to become salt marsh over time; enhance buffer; opportunity to move parking lot inland and create a filter strip to infiltrate runoff; repair existing walls to protect infrastructure


1: Parking lot edge


2: Natural shoreline area


3: Former marsh area that floods during coastal storms

Barrington Hazard Mitigation Plan

11: Woodbine Ave.: east side of Bullocks Cove

Opportunity to carve back pavement and to create infiltration area; could potentially move outlet inland and daylight in grass slope

Barrington Hazard Mitigation Plan

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Small Table Work (7:30-8:15)

Tools at Each Table:

- Large format map of project area
- Large pad of paper
- Post its and Markers
- Facilitator and scribe

Three questions:

1. What is your vision for a resilient Bay Spring?
   E.g.: “People can….”, “The streets are…”
   Capture on large paper sheet: “Vision”
2. What are the problems/issues that may impede achieving to your vision?
   Capture on large paper “Problems/issues”
   Note specific locations on map
3. What are your ideas for possible responses to each problem/issue?
   Capture on large paper “Responses”
   Note specific locations on map

FUSS & O'NEILL

Bay Spring Resilience Workshop

Large Group Work:

- Small Group Reports:
  - Vision
  - Problems issues
  - Responses to problems/issues
- Identify Themes
- Identify Top Priorities

FUSS & O'NEILL

Bay Spring Resilience Workshop

What Happens Next?

- You can ALWAYS e-mail ideas/thoughts to: resilientbayspring@gmail.com
- F&O will research/design top priorities
  - Sketches
  - Cost estimates
- F&O and Town present prioritized projects/actions at 2/26/20 Workshop
  - Discussion and reprioritization
- Town can pursue resources for implementation

FUSS & O'NEILL

Thank you!

Appendix C

Workshop 1 Outcomes Report

FUSS & O'NEILL

Barrington, RI – Bay Spring Neighborhood Resiliency Plan
Results from Workshop 1: Info Gathering and Brainstorming
Wednesday, February 12, 2020

Elements that make up a VISION for a more resilient Bay Spring:

Natural Systems and Resources

1. Natural shorelines, wetlands and barrier beaches are preserved, expanded and enhanced as buffers against flooding
2. There are active efforts to reduce invasive species such as Phragmites
3. There is a plan and actions for the maintenance and improvement of Allin's Cove that maintains shorelines and reduces sediment buildup
4. Latham Park is improved so that it serves as a buffer to storm events while still serving as a community open space and shore access point
5. Residents are well-educated about reducing negative environmental impacts from lawns, etc.

Preparedness and Emergency Response

6. There is a strong emergency preparedness and evacuation plan, with supporting systems (signage, routes, etc.) that are well-communicated to all residents.
7. There is coordination with area businesses for emergency event protocols including marina's removing moored/docked boats, status of hazardous materials (fuel tanks, etc.).
8. Protect vulnerable populations such as older homeowners and residents of senior housing.
9. There is a strong plan for return and recovery after emergency evacuations/emergency event impacts for residents and businesses.

Infrastructure

10. Rehabilitate and adapt streets so they are in good conditions and well-graded
11. There are excellent stormwater management systems to reduce stormwater volumes, improve water quality and reduce flooded areas
12. There is a resilient system for backup power through multipole sources (generators, solar, etc.)
13. Reduce impervious surfaces by removing redundant asphalt

Adaptation

14. The community builds its resilience to Sea Level Rise impacts, including slowing, reducing erosion, especially near vulnerable infrastructure
15. There is clear, accessible information and technical assistance available for property owners about possible adaptation actions

OPPORTUNITIES that can assist in reaching the Vision

O – Educate about erosion/pollution impacts from properties
O – Continued maintenance of existing mitigation measures (also a challenge)
O - Communication building to help each other in disasters/storms
O - Resilient code overlay district
O - Oyster reef
O - Buy back
O - Surf break
O – Latham Park – Mitigate erosion with marsh
O – Green Avenue and Adams Avenue – End of road removal
O – Green Avenue stormwater infiltration
O – Emergency resource staging
O – Public Access point @ Allin's Cove – Erosion control

PROBLEMS that may inhibit reaching the Vision

P - Finding long-term effective solutions
P – Cost / Budget
P - Boat channel
P – Permitting
P - Density – end of street
P - Bureaucracy
P- Stormwater backup into road because of outfall blockage
P – Lack of manpower at DPW to maintain existing systems
P – Question of who leads the effort for Town?
P – Housing density is high – leads to lots of variance
P – Money to adapt
P – Unwillingness to change
P – Aging community – floor heights
P – Piecemeal approach vs. unified
P – Lack of information
P – Southwest exposure

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Bay Spring Neighborhood Resiliency Plan
Workshop 1 Outcomes: PAGE 3 OF 3

SOLUTIONS (with Workshop Attendees' Votes):

THEME: Improving Perimeter of Neighborhood (38 votes total)	
Oyster reef to slow erosion build living shoreline	12
Latham Park/southwest edge treatment/hardening	9
Maintain Allin's Cove	5
Green Avenue street end/shoreline adaptation	5
Clean-up invasive species	3
Surf break to slow erosion	2
Boat channel negative impacts from wakes	1
Read Avenue property buyout; infrastructure removal?	1
THEME: Managing Stormwater (14 votes total)	
Make sure stormwater gets out	4
End of road treatments at Bay Spring, Green, Adams, etc.	6
Road maintenance to resolve flooding	2
Bay Spring culvert modifications, catch basin	1
Marina pavement reduction	1
Dam removal – Barrington Cove	0
THEME: Building Overall Resiliency (9 votes total)	
Budget – Seek Grants / Town bond	5
Resilient code overlay district	2
Buy back of repetitive loss properties	1
Permitting is complicated and difficult	1
THEME: Improving Power Supply (8 votes total)	
Plan to get power back	3
Atria generator capacity	1
Backup power – microgrids	1
Generators – shared	2
Solar street lights	1
THEME: Evacuation Preparedness (6 votes total)	
Evacuation plan and outreach education	4
Improved evacuation signage	2
THEME: Post-event recovery (6 votes total)	
Return plan (environmental)	4
Recovery plan – homes/businesses	1
More manpower for DPW to maintain systems	1

Appendix D

Workshop Participants Contact List

Bay Spring Workshop Participants

	Name	Attended Workshop 1	Attended Workshop 2	E-mail	Phone
1	Sean Solley	Y	Y	solleydesign@earthlink.net	(401) 246-0180
2	Katrin Boening	Y		kboening@earthlink.net	
3	Steve Fuller	Y	Y	steveandbarbfuller@gmail.com	(401) 310-0496
4	Barb Fuller	Y		steveandbarbfuller@gmail.com	(401) 310-0496
5	Bethany Aspinwall	Y		bethanyaspinwall@yahoo.com	
6	Sandra Kaufman	Y		sandrakaufman3@gmail.com	(401) 644-6095
7	Carol Guimelli	Y		cguimelli3@gmail.com	
8	Wenley Ferguson	Y	Y	wferguson@savebay.org	
9	Lynne Carter	Y		lcarter231@aol.com	
10	Joan Bergeron	Y	Y	ronaldbergeron@yahoo.com	(401) 573-1402
11	Ron Bergeron	Y	Y	ronaldbergeron@yahoo.com	(401) 573-2115
12	Charlotte Carrington-Farmer	Y	Y	ccarrington-farmer@rwu.edu	
13	John Farmer	Y	Y	jfarmer@rwu.edu	
14	Ann Gass	Y		Anne3@cox.net	
15	Janice O'Donnell	Y		janiceodonnell49@gmail.com	(401) 369-0315
16	Kim Fournier	Y	Y	parkhurstri@cox.net	(401) 692-3338
17	Carol Johnson	Y	Y	carol.barnes.johnson@gmail.com	(401) 241-2327
18	Mark Johnson	Y	Y	mark_johnson_1@brown.edu	(401) 289-0975
19	Randy Willier	Y		rwillier@risd.edu	(401) 569-9855
20	Richard Metz	Y	Y	rwmetz222@verizon.net	
21	Simi Harrison	Y	N	harrison.simi@epa.gov	(508) 265-8189
22	Colin O'Hara	Y	N	cohara@barrington.ri.gov	(401) 347-5564
23	Phil Hervey	Y	Y	PHervey@barrington.ri.gov	
24	John Wood	N	Y	johnpwood@cox.net	
25	Maria Portugali	N	N	meportugali@gmail.com	
26	Simi Harrison	Y	N	harrison.simi@epa.gov	(508) 265-8189
27	Jacob Brier	Y	Y	jacob@jacobbrier.com	741-7879
28	Jamie German	N	Y	jgerman@mosesbrown.org	246-2136
29	Alan Bradbury	Y	Y	alanbradbury@cox.net	258-5981
30	Denise Conway	N	Y	denisec4@cox.net	489-3771
31	Rebecca Kepple	N	Y	rkepple9@gmail.com	
32	Sandra Wyatt	N	Y	swyatt9@cox.net	
33	Jim Cunha	N	Y	jcunha@barrington.ri.gov	247-1900
34	Mark Tague	N	Y	markbb1@aol.com	626-7012
35	Dave Parkhurst	N	Y	parkhurstri@cox.net	
36	Shawn Martin	Y	Y	smartin@fando.com	
37	Christina Viera	Y	N	cviera@fando.com	
38	Arnold Robinson	Y	Y	arobinson@fando.com	
39	Bill Guenther	N	Y	wguenther@fando.com	

Appendix E

Nearby Businesses List

Businesses Near Neighborhood Resiliency Area

Business Name	Business Type	Address	City	State	Zip	Phone	Website or Email
Barrington Cove Apartments	Apartment Building - 62+	90 Bay Spring Ave.	Barrington	RI	02806	401-246-2409	www.barringtoncoveapartments.com
Bay Spring Service	Auto Repair	115 Bay Spring Ave.	Barrington	RI	02806	401-246-2700	
Atria Bay Spring Village	Senior Living	147 Bay Spring Ave.	Barrington	RI	02806	401-237-4409	www.atriaseniorliving.com
R. Gary Clark Associates	Accountant	166 Bay Spring Ave.	Barrington	RI	02806	401-246-1040	
Viking Industries, Inc.	Insulation Contractor	32 Spring Ave.	Barrington	RI	02806	401-246-1855	
Ken's Canvas & Cushions	Manufacturer	101 Narragansett Ave.	Barrington	RI	02806	401-246-1244	
Bay Spring Community Center	Community Centr	170 Narragansett Ave.	Barrington	RI	02806		www.bsccri.org
Alicia's Table	Linens Store	28 Alfred Drowne Rd.	Barrington	RI	02806	401-338-1083	
Lighthouse Marina	Marina	110 Shore Drive	Barrington	RI	02806	401-246-1180	
Narragansett Sailing School	Sailing School	101 Narragansett Ave.	Barrington	RI	02806	401-575-0964	www.narragansettsailingschool.com
Classic Kitchen & Countertops	Cabinet Store	65 Bay Spring Ave.	Barrington	RI	02806	401-246-1200	
Boiler Busters	Heating Contractor	55 Bay Spring Ave.	Barrington	RI	02806		
Synergy Power Yoga	Yoga Studio	32 Bay Spring Ave.	Barrington	RI	02806	401-289-0966	www.synergypoweryoga.com
Management Solutions	Bus. Mgmt. Consultant	60 Bay Spring Ave.	Barrington	RI	02806	401-246-0050	www.mgtcapital.com
Andreozzi Associates, Inc.	Construction Co.	60 Bay Spring Ave.	Barrington	RI	02806	401-245-6300	www.andreozziaassociates.com

Appendix F

Workshop 2 Agenda

Bay Spring Neighborhood Resilience Planning
Town of Barrington
WORKSHOP #2: Prioritization of Potential Actions (2/26/20)

INTRODUCTION:

The Town of Barrington is continuing its efforts to make our community more resilient to climate events and sea level rise through the creation of a Resilience Plan for the Bay Spring neighborhood. The goal of the project is to identify specific projects and actions that can be implemented to increase community resilience. Resilience is often defined as the ability to absorb a blow and to recover quickly and to adjust to change.

WORKSHOP #1: At the first Workshop on 2/12/20, participants learned about forecasts for climate impacts, past and ongoing projects to increase resilience in Barrington and then everyone shared their own ideas for projects and actions. Based on these outputs, Town staff worked professionals in engineering, design, planning and policy to take the workshop ideas and formulate projects and changes that can increase resilience.

WORKSHOP #2: What Happens Tonight?
At this event participants will see work generated during and after the first Workshop and have the opportunity to discuss the priority of future actions. The Town will then use these outputs to seek funding for projects that will improve the neighborhoods resilience to climate events.

WORKSHOP OBJECTIVES

- Build shared knowledge about the existing conditions in the area
- Build shared knowledge about Barrington's existing planning for hazard mitigation, climate change and goals for the area
- Be honestly open to the ideas and preferences of participants
- Hold facilitated, small group discussions focused on key topics to:
    - Gather honest opinions about existing problems
    - Gather honest opinions about possible solutions/design approaches
    - Seek consensus about potential projects
- Identify the most important priorities for Town and neighborhood action
- Build consensus and support from stakeholders to support action

(AGENDA ON REVERSE)

BAY SPRING RESILIENCE PLANNING PROJECT
WORKSHOP 2 SCHEDULE – FEBRUARY 26, 2020

6:45 Stakeholders begin arriving, coffee, mingling

7:00 Welcome and project goals

7:05 Format/schedule/ground rules

7:10 Quick Summary of Workshop 1
Existing Conditions
Outcomes (with Priority ranking)

7:20 Potential Actions to increase resilience in Bay Spring

7:40 Rotating Work Stations: Discussion and Additional Work

1. **Improving Perimeter of Neighborhood**
    a. Latham Park and Shore Drive
    b. Allins Cove
    c. Read Avenue
2. **Managing Stormwater**
    a. Road end treatments
    b. Annawamscutt Brook/Bay Spring Culverts/Dam
    c. Pavement reduction at large paved areas
3. **Post-Disaster Recovery**
    a. Improving power supply recovery
    b. Homeowners
    c. Businesses
4. **Disaster Preparedness**
    a. Evacuation plan and routes
    b. Outreach and education
    c. Resilient code overlay district

8:30 Work Station report out

8:50 Define Next steps
    1. Town Actions
    2. Bay Spring community actions

9:00 Adjourn

Appendix G

Workshop 2 Presentation

FUSS & O'NEILL

Bay Spring Neighborhood Resilience Planning Workshop 2

February 26, 2019

Workshop Agenda

- Welcome - Town of Barrington
- Terminology/Bay Spring Impacts
- Resilience Planning in Barrington
- Bay Spring Resilience Project
- Workshop 1: Outcomes
- Potential Actions to Increase Resilience
- Rotating Work Stations
  - Discussion
  - Additional feedback
- Report out
- Next Steps

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Terminology

- Climate Change: Changes in the Usual Climate
  - Rising Temperature
  - Changing Precipitation/Rainfall Amount and Intensity
  - Intensity of Weather Events
  - Sea Level Rise

Terminology

- Resiliency
  - Resilience is often defined as the ability:
    - to absorb a blow,
    - to recover quickly, and
    - to adjust to change.

Terminology

- Adaptation consists of the following four types of tools or responses:
  - Natural mitigations to preserve environmental assets and increase the use of natural and nature-based features
  - Engineered defenses to pursue a defense network
  - Prepared communities to grow educational outreach and promote resilience
  - Adapted structures to regulate new building and development codes and standards, support incentives for flood-resilient design or retrofits, and minimize infrastructure vulnerabilities

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Bay Spring Then and Now

FUSS & O'NEILL

Bay Spring Then and Now

FUSS & O'NEILL

Bay Spring Shoreline Change

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Barrington/Bay Spring – History of Vulnerability to Storms

- Facing southwest (storm direction)
- Surrounded by water on three sides
- Tidal streams
- Low-lying areas

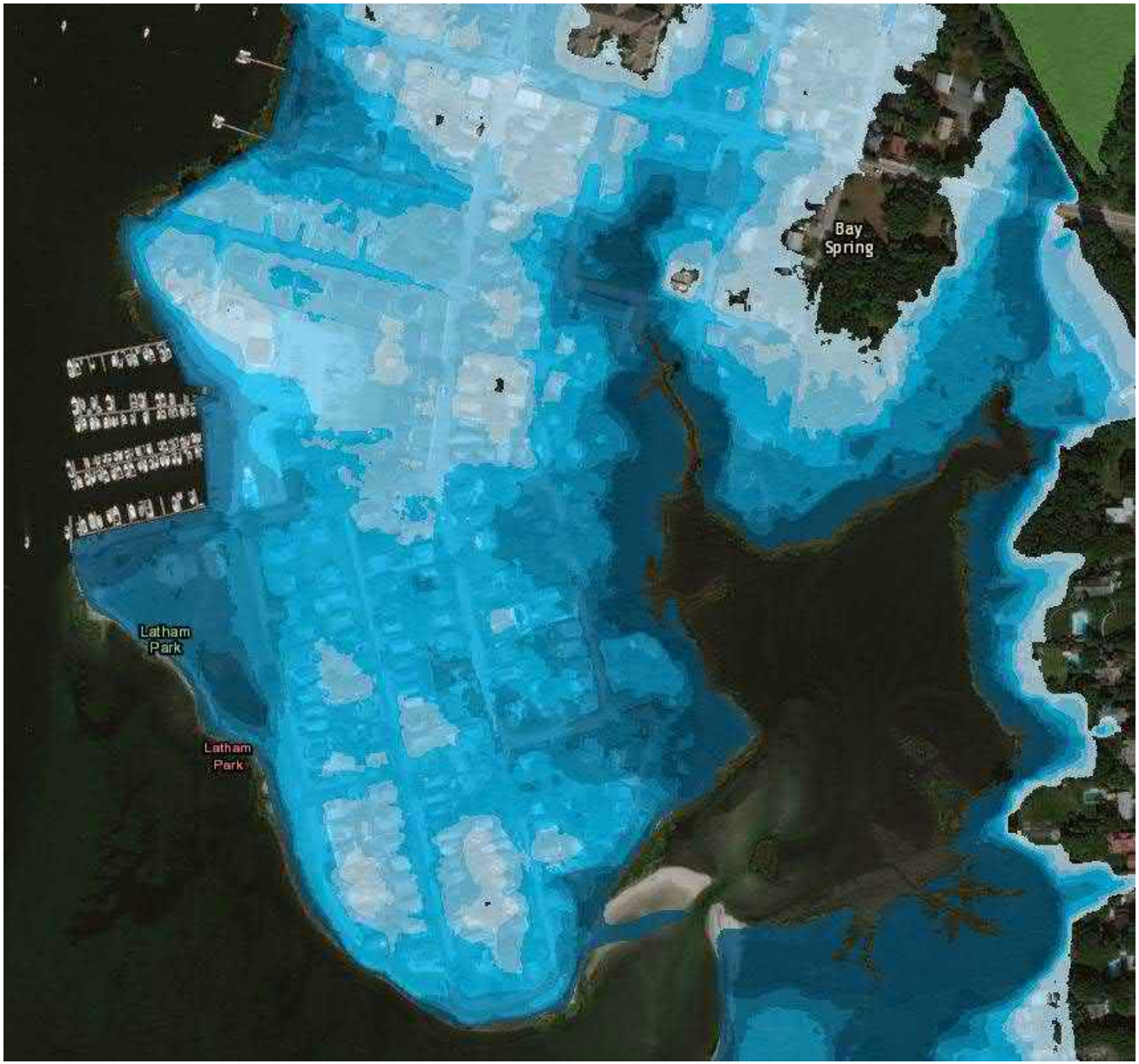
No Sea Level Rise – 100 year storm impact

FUSS & O'NEILL

Forecast Sea Level Rise – 2 feet (2050)

FUSS & O'NEILL

Forecast Sea Level Rise – 2 feet with 100 year storm



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Barrington Resilience Planning

- Hazard Mitigation Plan – 2017
- Community Resilience Building – Fall 2019
  - Identify impacts using available data including new climate projections developed by CRMC/NOAA
  - Hold CRB workshop to engage stakeholders
    - *Identify community strengths and vulnerabilities from community input*

Town of Barrington – Action and Adaptation

- Town of Barrington allocates Resilience funding in budget each year
- Barrington has completed:
  - Comprehensive Plan that includes climate resilience
  - Hazard Mitigation Plan
  - Climate Resilience Building Workshop and Actions
- Save the Bay has been an active partner with Barrington on adaptation and resilience projects
- This framework puts the Town in strong position to seek implementation funding from Federal and State sources
- Needs to be ready with highest priority, effective projects
- First neighborhood-level planning/project identification is with the Bay Spring community

Bay Spring Resilience Project Area

FUSS & O'NEILL

Bay Spring Resiliency Workshop 1: Vision

Category: Natural Systems and Resources

- Natural shorelines, wetlands and barrier beaches are preserved, expanded and enhanced as buffers against flooding
- There are active efforts to reduce invasive species such as Phragmites
- There is a plan and actions for the maintenance and improvement of Allin's Cove that maintains shorelines and reduces sediment buildup
- Latham Park is improved so that it serves as a buffer to storm events while still serving as a community open space and shore access point
- Residents are well-educated about reducing negative environmental impacts from lawns, etc.

Bay Spring Resiliency Workshop 1: Vision

Category: Preparedness and Emergency Response

- There is a strong emergency preparedness and evacuation plan, with supporting systems (signage, routes, etc.) that are well-communicated to all residents.
- There is coordination with area businesses for emergency event protocols including marina's removing moored/docked boats, status of hazardous materials (fuel tanks, etc.).
- Protect vulnerable populations such as older homeowners and residents of senior housing.
- There is a strong plan for return and recovery after emergency evacuations/emergency event impacts for residents and businesses.

Bay Spring Resiliency Workshop 1: Vision

Category: Infrastructure

- Rehabilitate and adapt streets so they are in good condition and well-graded
- There are excellent stormwater management systems to reduce stormwater volumes, improve water quality and reduce flooded areas
- There is a resilient system for backup power through multipole sources (generators, solar, etc.)
- Reduce impervious surfaces by removing redundant asphalt

Bay Spring Resiliency Workshop 1: Vision

Category: Adaptation

- The community builds its resilience to Sea Level Rise impacts, including slowing, reducing erosion, especially near vulnerable infrastructure
- There is clear, accessible information and technical assistance available for property owners about possible adaptation actions

Bay Spring Resiliency Workshop 1: Potential Projects and Policies

Theme: Natural Systems and Resources (38 votes total)

- Oyster reef to slow erosion build living shoreline 12
- Latham Park/southwest edge treatment/hardening 9
- Maintain Allin's Cove 5
- Green Avenue street end/shoreline adaptation 5
- Clean-up invasive species 3
- Surf break to slow erosion 2
- Boat channel negative impacts from wakes 1
- Read Avenue property buyout; infrastructure removal? 1

Bay Spring Resiliency Workshop 1: Potential Projects and Policies

Theme: Managing Stormwater (14 votes total)

- Make sure stormwater gets out 4
- End of road treatments at Bay Spring, Green, Adams, etc. 6
- Road maintenance to resolve flooding 2
- Bay Spring culvert modifications, catch basin 1
- Marina pavement reduction 1
- Dam removal – Barrington Cove 0

Bay Spring Resiliency Workshop 1: Potential Projects and Policies

Theme: Building Overall Resiliency (9 votes total)

- Budget – Seek Grants / Town bond 5
- Resilient code overlay district 2
- Buy back of repetitive loss properties 1
- Permitting is complicated and difficult 1

Bay Spring Resiliency Workshop 1: Potential Projects and Policies

Theme: Improving Power Supply (8 votes total)

- Plan to get power back 3
- Atria generator capacity 1
- Backup power – microgrids 1
- Generators – shared 2
- Solar street lights 1

Bay Spring Resiliency Workshop 1: Potential Projects and Policies

Theme: Evacuation Preparedness (6 votes total)

- Evacuation plan and outreach education 4
- Improved evacuation signage 2

Theme: Post-event recovery (6 votes total)

- Return plan (environmental) 4
- Recovery plan – homes/businesses 1
- More manpower for DPW to maintain systems 1

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Bay Spring Resiliency: Potential Projects and Policies

Oyster/Marl Reefs

Costs of oyster reefs

- $100,000 per acre in 2007 US dollars (TNC, 2008)
- $2.29/cubic foot
- Latham Park/Shore Drive area would require 1,400 linear feet at 5’ width and depth = 35,000 cubic feet
- $80,000 without permitting

Site Suitability

- Latham site has SW orientation and long fetch
- Wave force may be too strong for oyster reef structure

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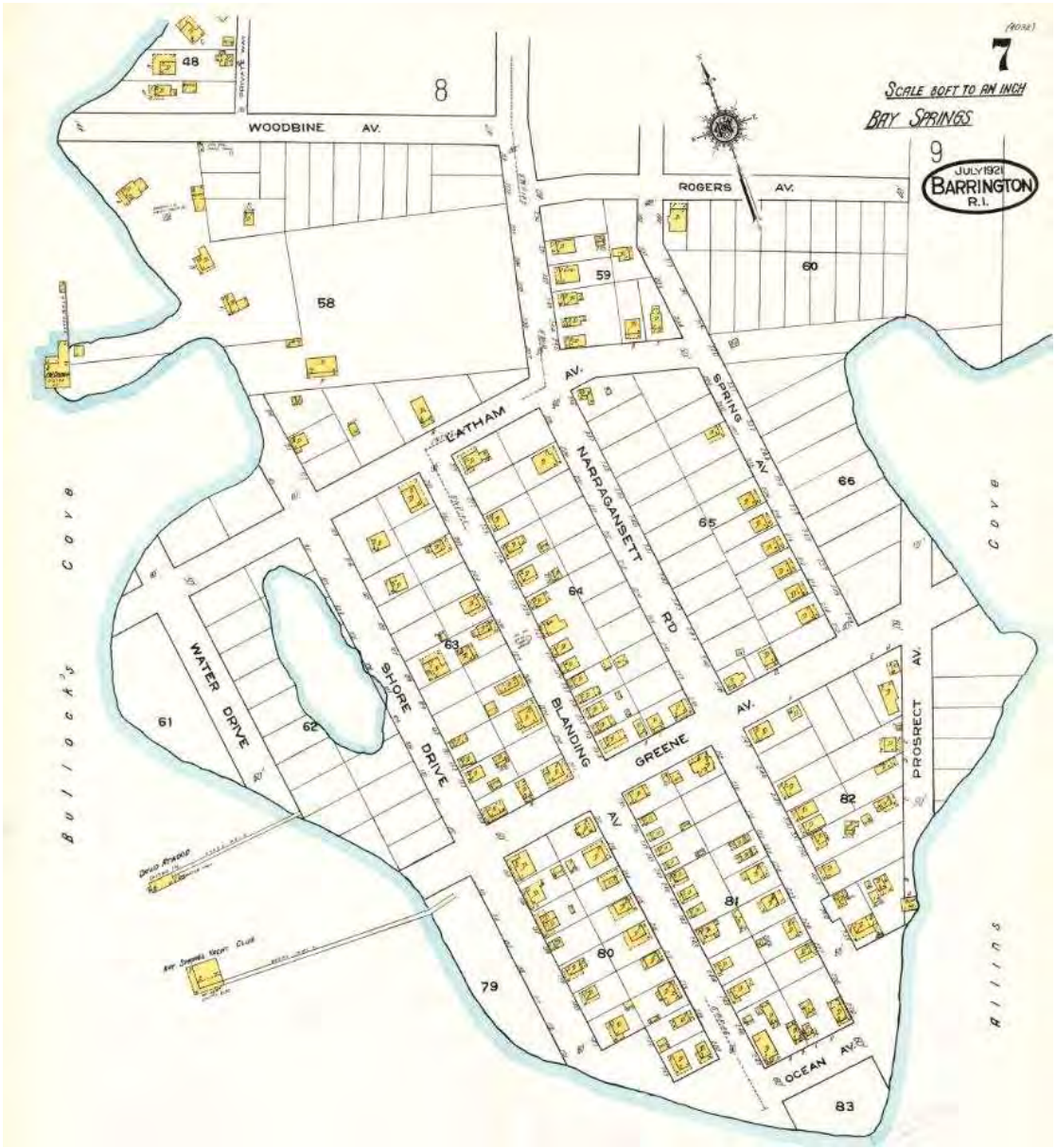
Latham Park



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Latham Park

2: Latham Park: allow natural shoreline to erode and low lying area to become salt marsh over time; enhance buffer; opportunity to move parking lot inland and create a filter strip to infiltrate runoff; repair existing walls to protect infrastructure

1: Parking lot edge

2: Natural shoreline area

3: Former marsh area that floods during coastal storms

Latham Park

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Allins Cove

FUSS & O'NEILL

Shoreline Stabilization

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Read Avenue

- Stream path
- Road degrading
- Flood zone
- Building location
- Conservation Land Trust properties

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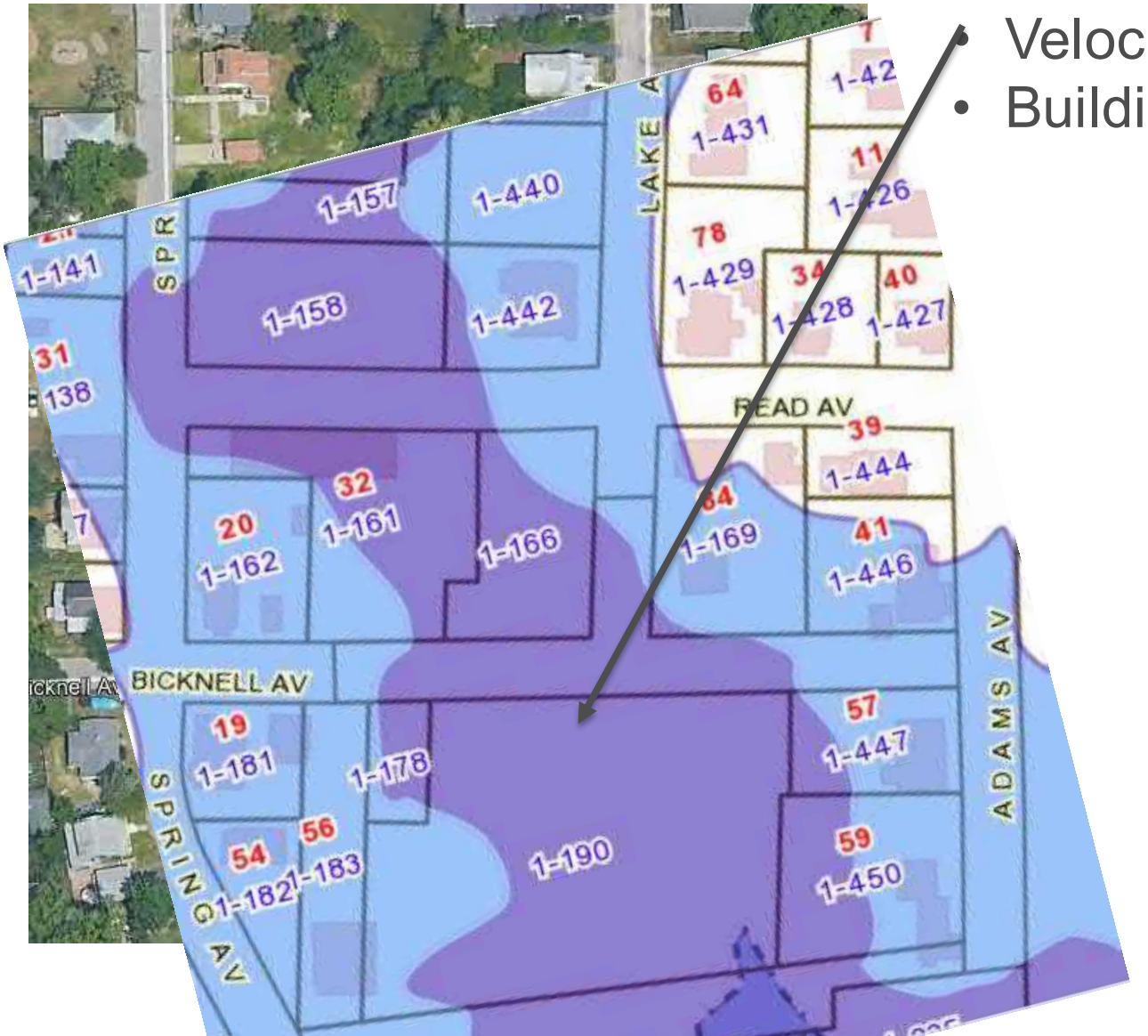
Read Avenue



- Velocity flood zone
- Building location

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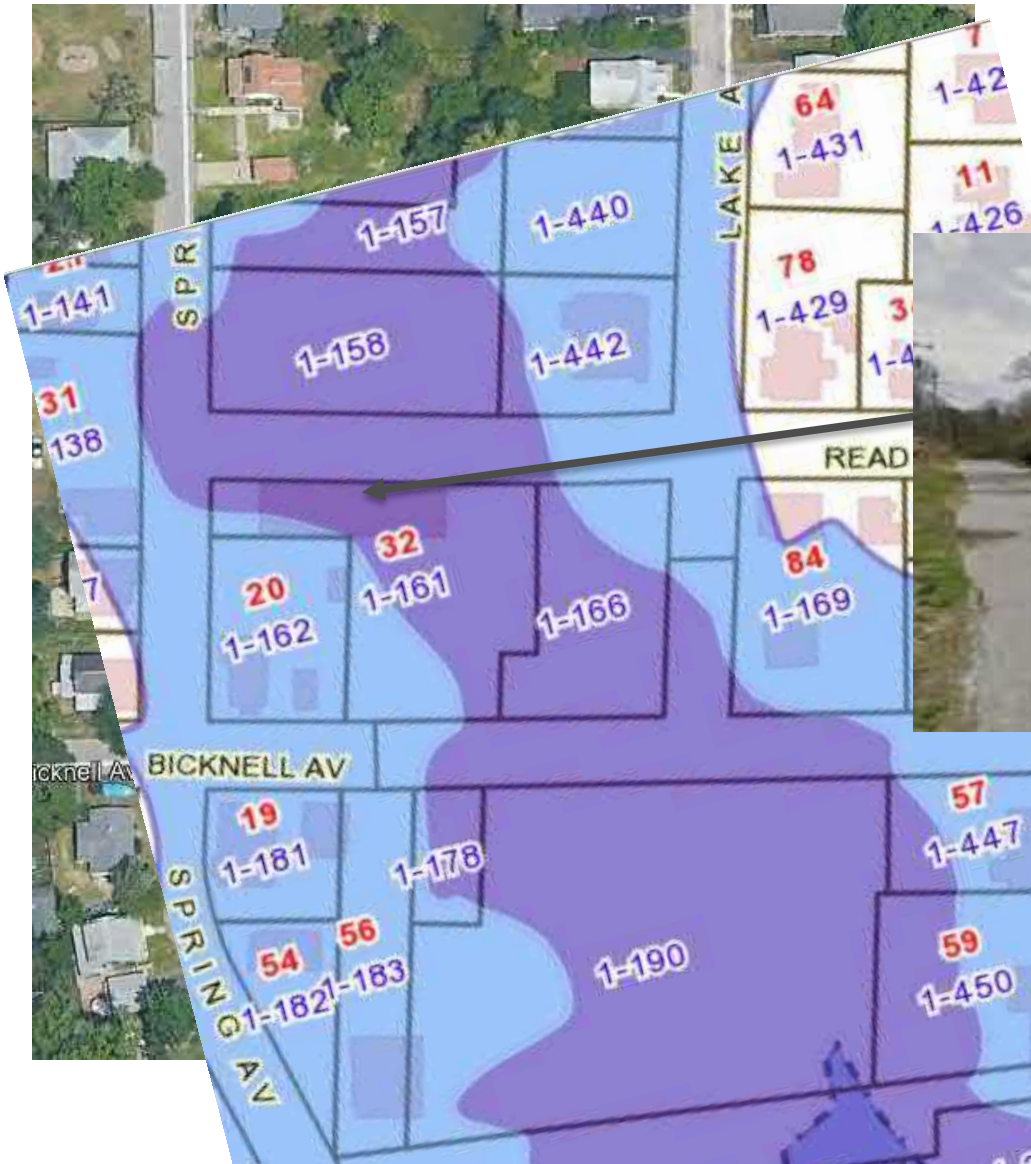
Read Avenue



- Velocity flood zone
- Building location

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Road End Retrofits

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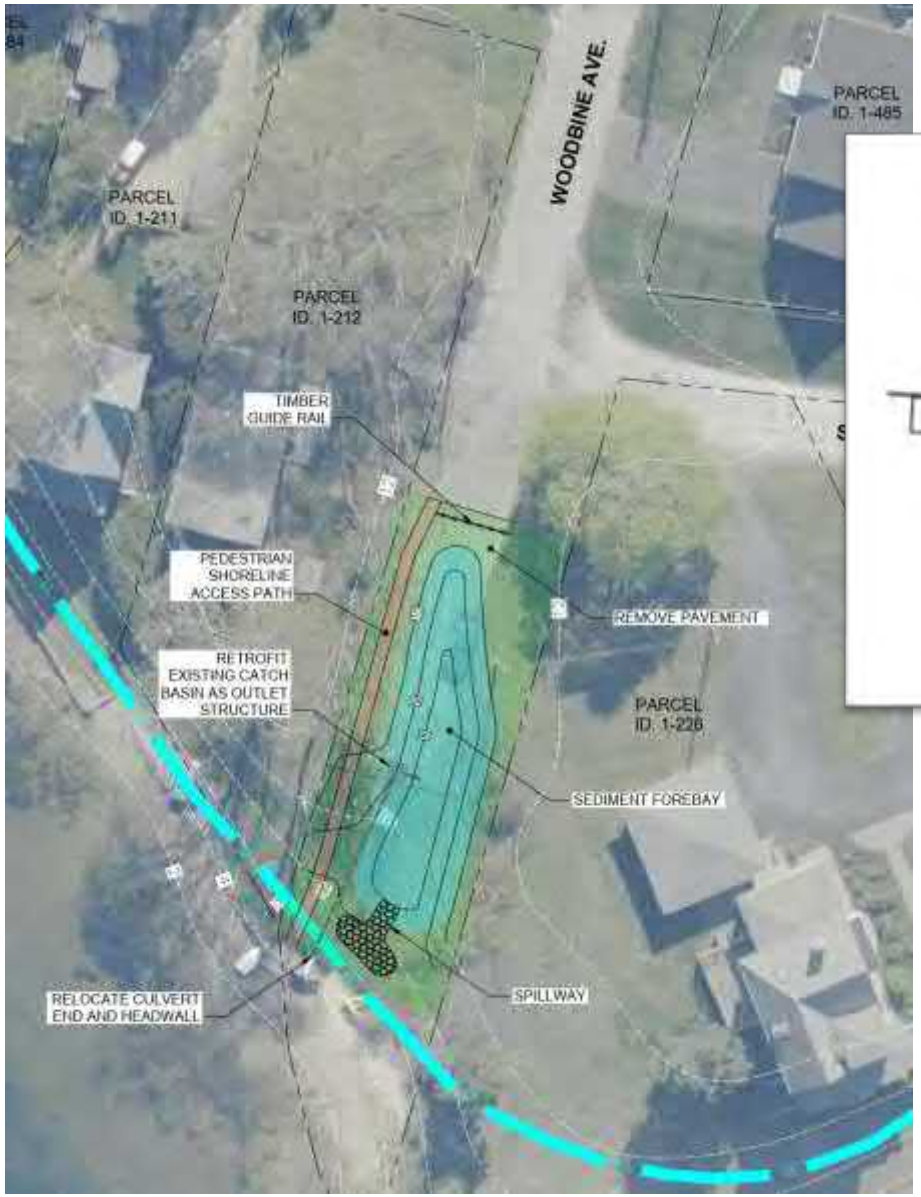
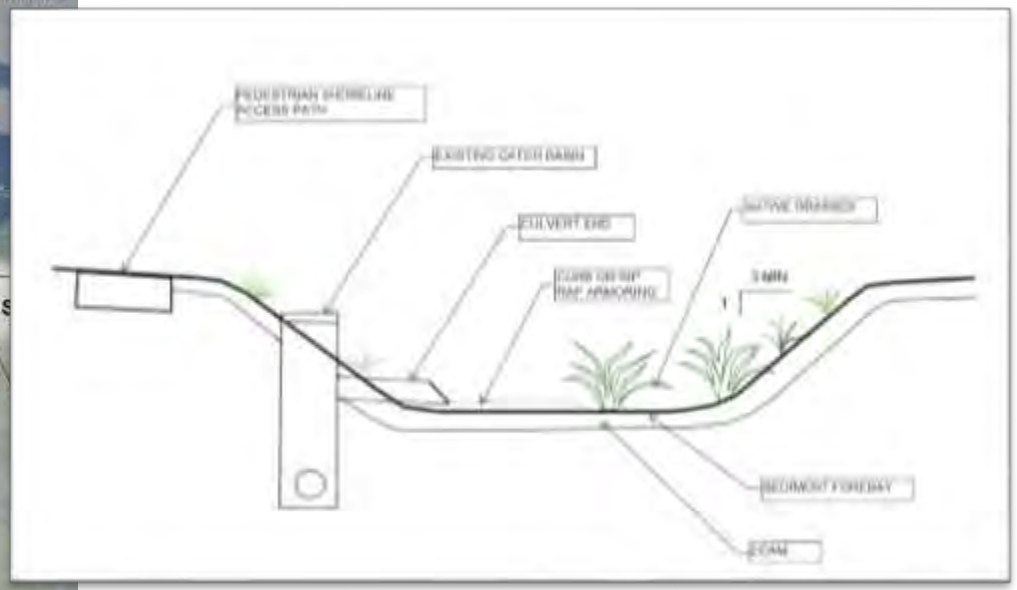
Woodbine Avenue

11: Woodbine Ave.: east side of Bullocks Cove

Opportunity to carve back pavement and to create infiltration area; could potentially move outlet inland and daylight in grass slope

Woodbine Avenue





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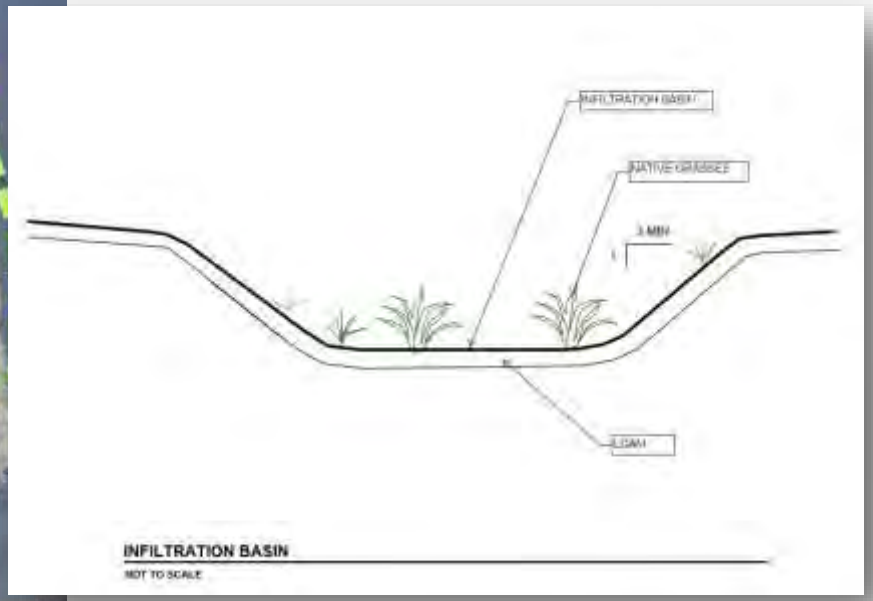
Adams Avenue



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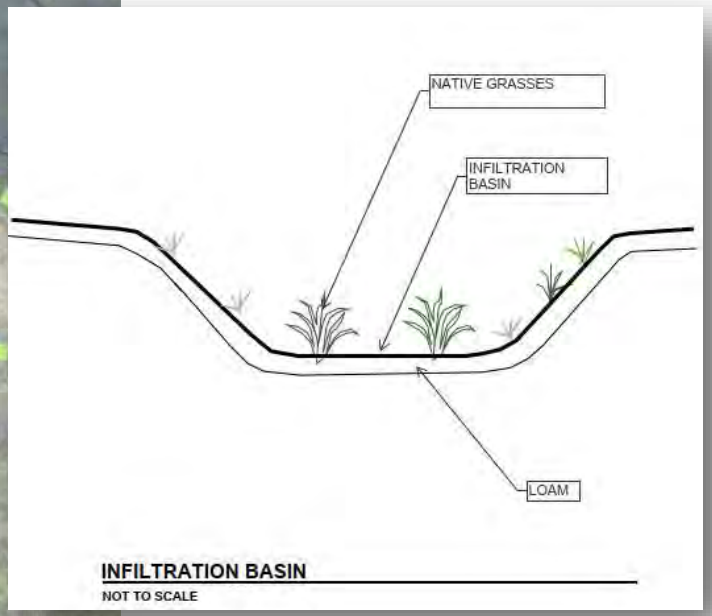
Greene Avenue



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Bay Spring Avenue Culvert

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Barrington Cove Dam

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Resilient Code Overlay District/Permitting

The Boston Planning & Development Agency, in partnership with the City's Environment Department is currently developing recommendations for Flood Resilient Building Guidelines to be applied within a Flood Resiliency Zoning Overlay District. The intent of this effort is to promote best practices for flood resistant design measures to ensure development in areas vulnerable to current and future flooding are prepared for potential coastal flood hazards and provide the City with a regulatory tools to better influence, guide, and streamline resilience action. This project is part of Climate Ready Boston, the Mayor's ongoing initiative to help the City grow and prosper in the face of climate change.

Emergency Preparedness – FEMA

- From Ready.gov

Get Involved

There are many ways to Get Involved especially before an emergency or a disaster occurs, the content found on this page will give you some ideas of how you can take action in your community.

- Join a Community Emergency Response Team (CERT) program and get trained on basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations.
- You Are the Help Until Help Arrives, designed by FEMA, are trainings that can be taken online or in-person, where you learn through simple steps how to save a life before a professional arrives.
- During a disaster donate to a reputable organization of your choice through the National Voluntary Organizations Active in Disasters (NVOAD), and volunteer to respond to disasters and help your fellow Americans.
- Volunteer and receive training to support disaster and preparedness efforts in your community.
- Teach preparedness curriculum in your school. Download everything you need for grades K-12 through our Ready Kids program.
- Promote preparedness online by sharing preparedness tips on your social media account with Ready's online social media toolkit or public service announcements.
- Take a free online independent study course through FEMA's Emergency Management Institute and gain more knowledge to help your community become more prepared.

Emergency Preparedness – RIEMA and Town

- Coordinate with existing, empowered local and State agencies and organizations
  - RI Emergency Management Agency (RIEMA)
  - Fire and Police
  - Town Emergency Management Team
- Form neighborhood/community preparedness working group committee:
  - Coordinate with existing system and partners
  - Educate and prepare neighbors
  - Provide ready group of local volunteers
  - Consider FEMA Citizen Corps and CERT

Community Emergency Response Team - CERT

Program Name	Miles
Swansea CERT	6 Mile(s)
Cranston CERT	6 Mile(s)
Rhode Island Citizen Corps State Council	8 Mile(s)
Town of East Greenwich	9 Mile(s)
Providence CERT	9 Mile(s)
Rehoboth CERT	9 Mile(s)
Pawtucket/Central Falls (PCF) CERT	10 Mile(s)
Central Falls High School Emergency Response Team	11 Mile(s)
Central Falls CERT	11 Mile(s)
Fall River Fire Special Services	11 Mile(s)
Portsmouth Citizen Volunteer Team	11 Mile(s)
North Providence Emergency Management Agency CERT TEAM	11 Mile(s)
Coventry CERT	13 Mile(s)
Cumberland CERT	14 Mile(s)

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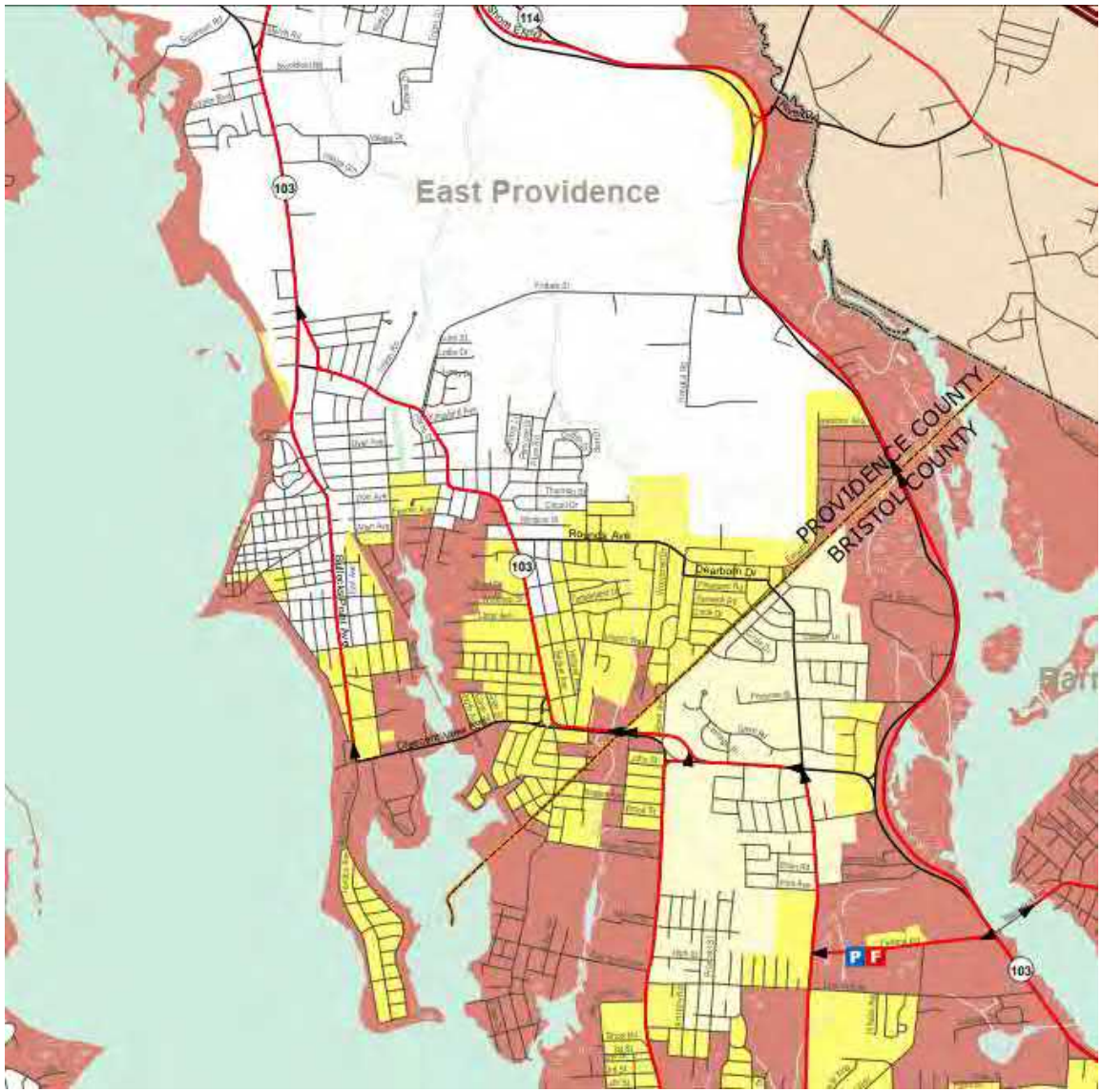
Evacuation Preparedness



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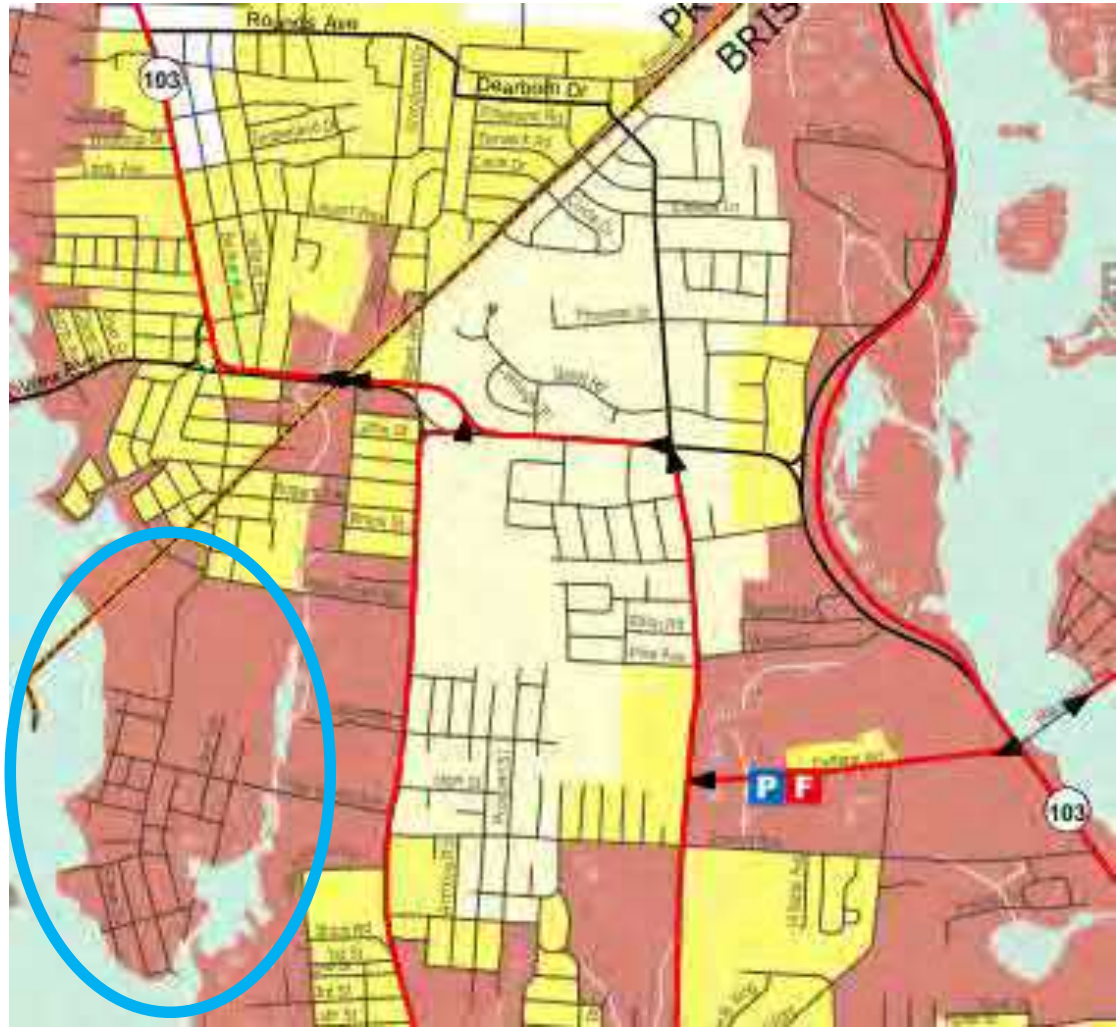
Evacuation Preparedness



Hurricane Evacuation Zones

Zone A

Zone B

FEMA 100 year flood zone

Evacuation Route

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Evacuation Preparedness

Hurricane Evacuation Zones

Zone A

Zone B

FEMA 100 year flood zone

Evacuation Route

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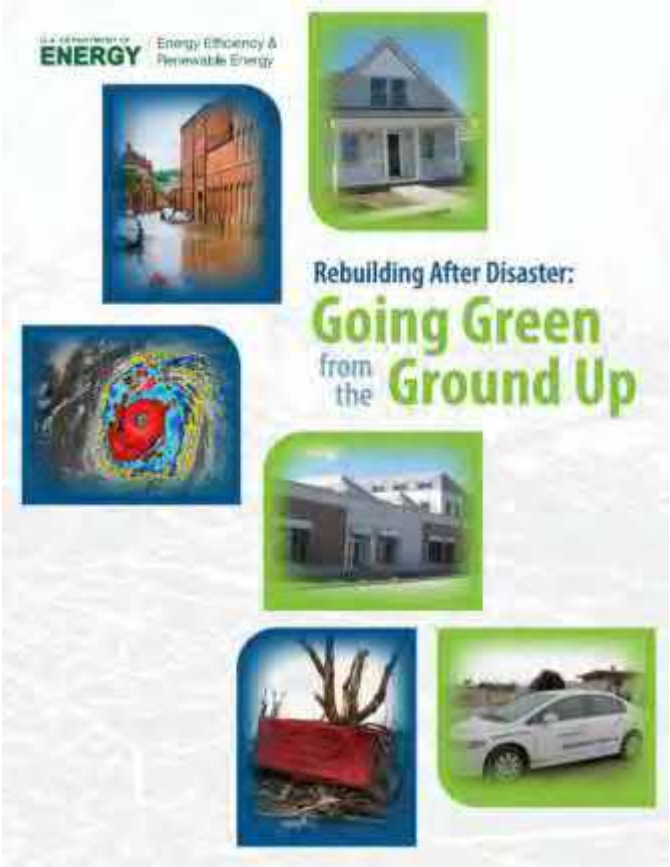
Post-event recovery – Resources



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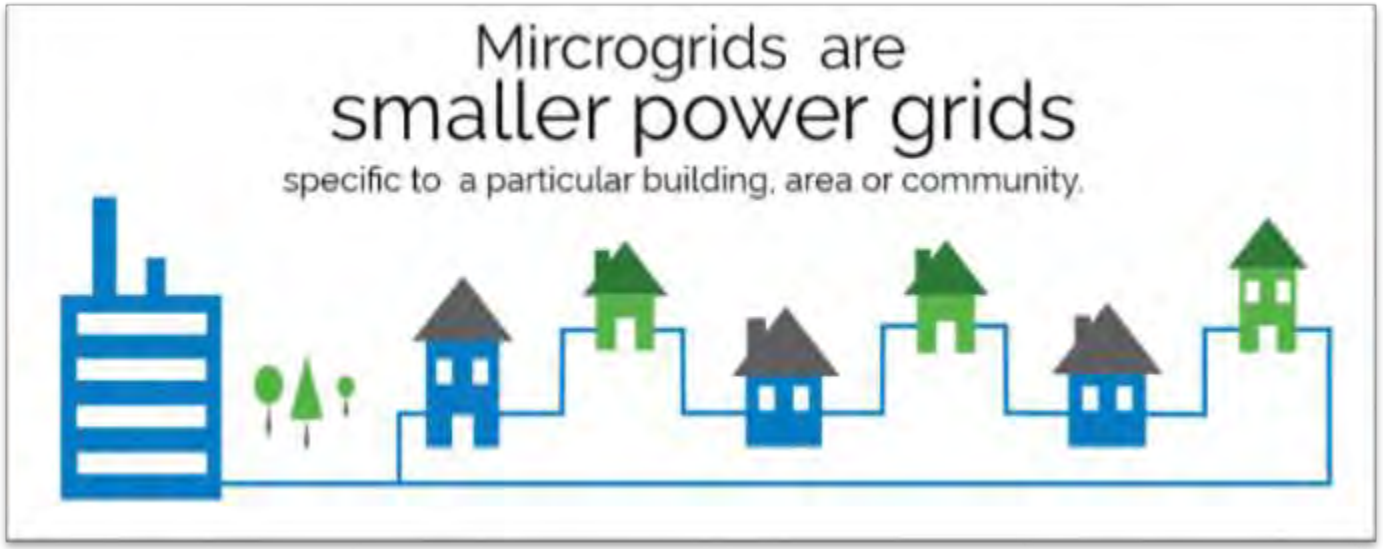
Power Supply for Recovery

- Plan to get power back at neighborhood center
- Large generator location/capacity
- Block generators – shared
- Microgrids
- Solar street lights



Funding Sources for Implementation

- RI DEM
  - Green Economy Bond
  - Resiliency Grants
  - Water Quality
- RI Resiliency Funding
- RI Infrastructure Bank
- RI CRMC
- BWRF - Restoration
- SNEP – Natural Solutions
- FEMA – Risk Mitigation

Workshop 2: Rotating Work Stations (7:40-8:30)

1. **Improving Perimeter of Neighborhood**
   a. Latham Park and Shore Drive
   b. Allins Cove
   c. Read Avenue

2. **Managing Stormwater**
   a. Road end treatments
   b. Annawamscutt Brook/Bay Spring Culverts/Dam
   c. Pavement reduction at large paved areas

3. **Disaster Preparedness**
   a. Evacuation plan and routes
   b. Outreach and education
   c. Resilient code overlay district

Post-Disaster Recovery
   a. Improving power supply recovery
   b. Homeowners
   c. Businesses

Tools at Each Table:

- Large format plans/policy ideas
- Post its and Markers
- Fuss & O'Neill staff and local leaders

FUSS & O'NEILL

What Happens Next?

- You can ALWAYS e-mail ideas/thoughts to: resilientbayspring@gmail.com
- Fuss & O'Neill documents process and outcomes
- Planning for action:
  - Town actions
  - Bay Spring community actions
  - Property owner actions
- Town and community pursue resources for implementation

Thank you!