Town of Branford
Coastal Resilience Plan

Presentation of Adaptation Options

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Scott Choquette, CFM, Dewberry

Presentation Agenda

- **Progress**
- **Resilience Review**
- **Approaches to Adaptation**
- **Adaptation Scales**
- **Branford Options**
- **Discussion**

Review: Project Steps

Done	• Review Existing Capabilities
Done	• Coordinate with “Regional Framework”
Done	• Data Collection
Done	• Vulnerability and Risk Assessment
Now	• Review of Adaptation Options
Now	• Public Information Meetings, Surveys
Winter	• Select Sandy-Impacted Neighborhoods
Winter	• Conceptual Designs
Spring	• Coastal Resilience Plan
Spring	• Implementation Plan and Process

Review: Resilience

Resilience

Prepare

Adapt

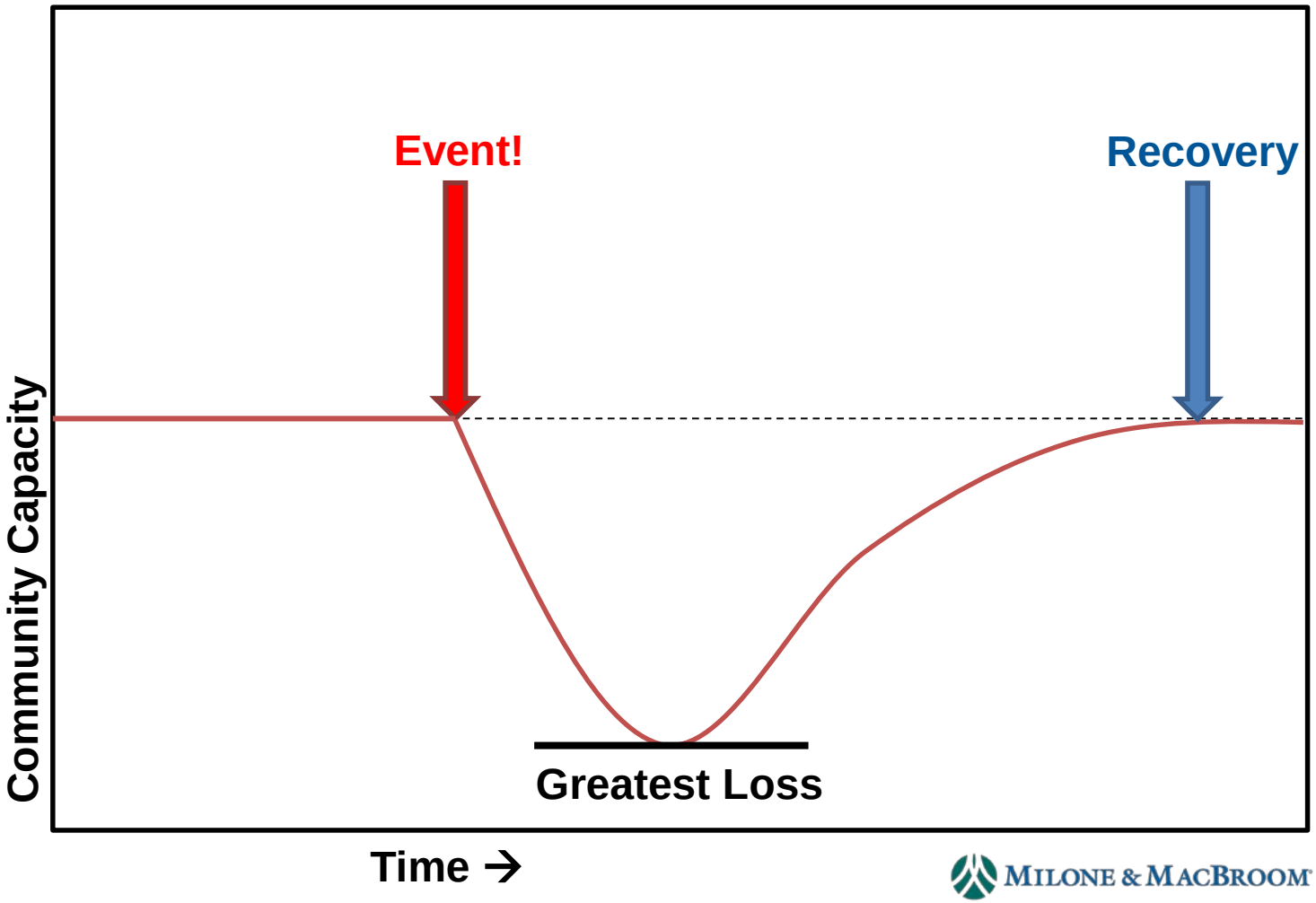
Withstand

Recover

Reduce Recovery Time

Decrease Damage

Increase Capacity



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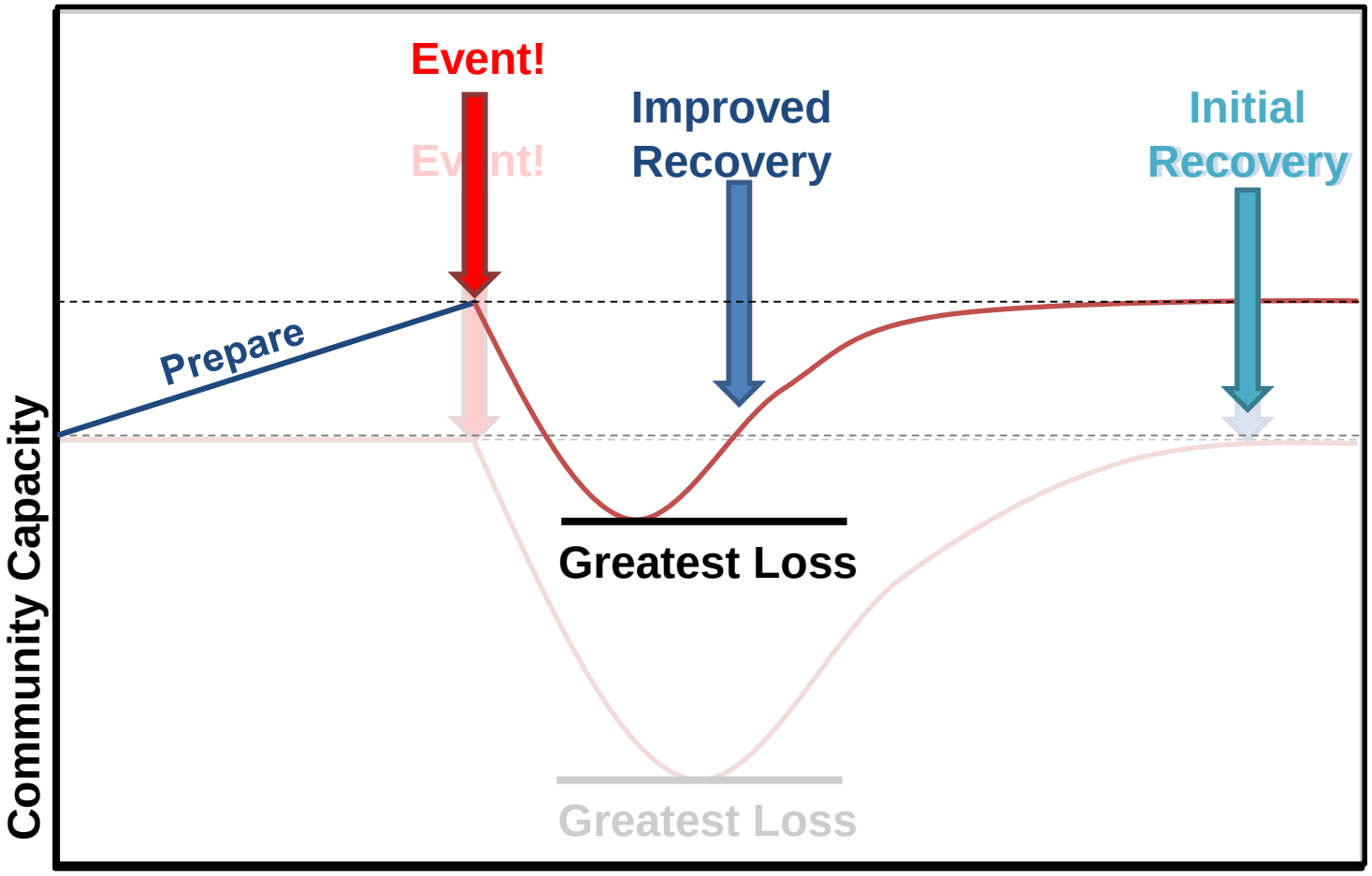

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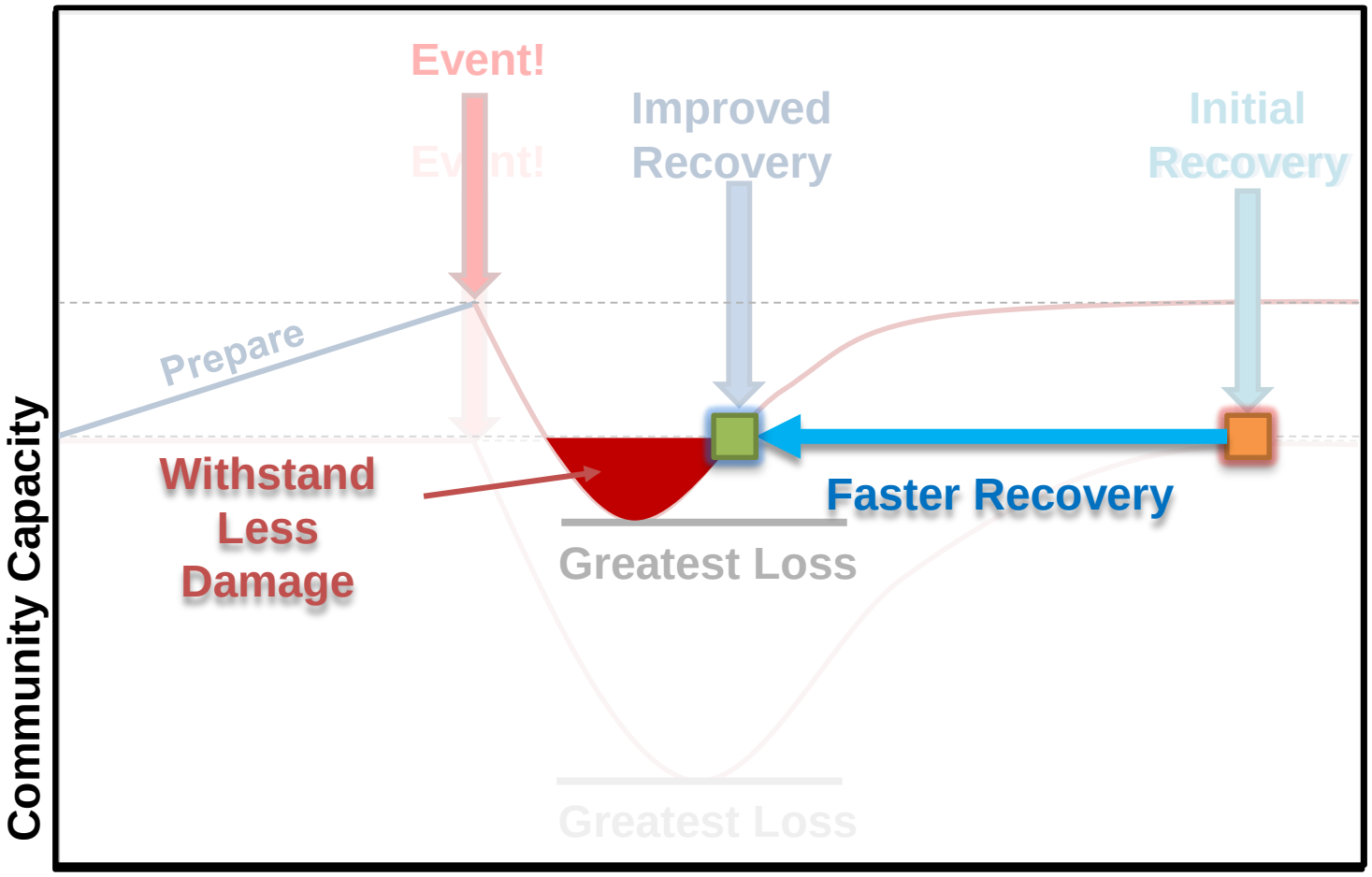

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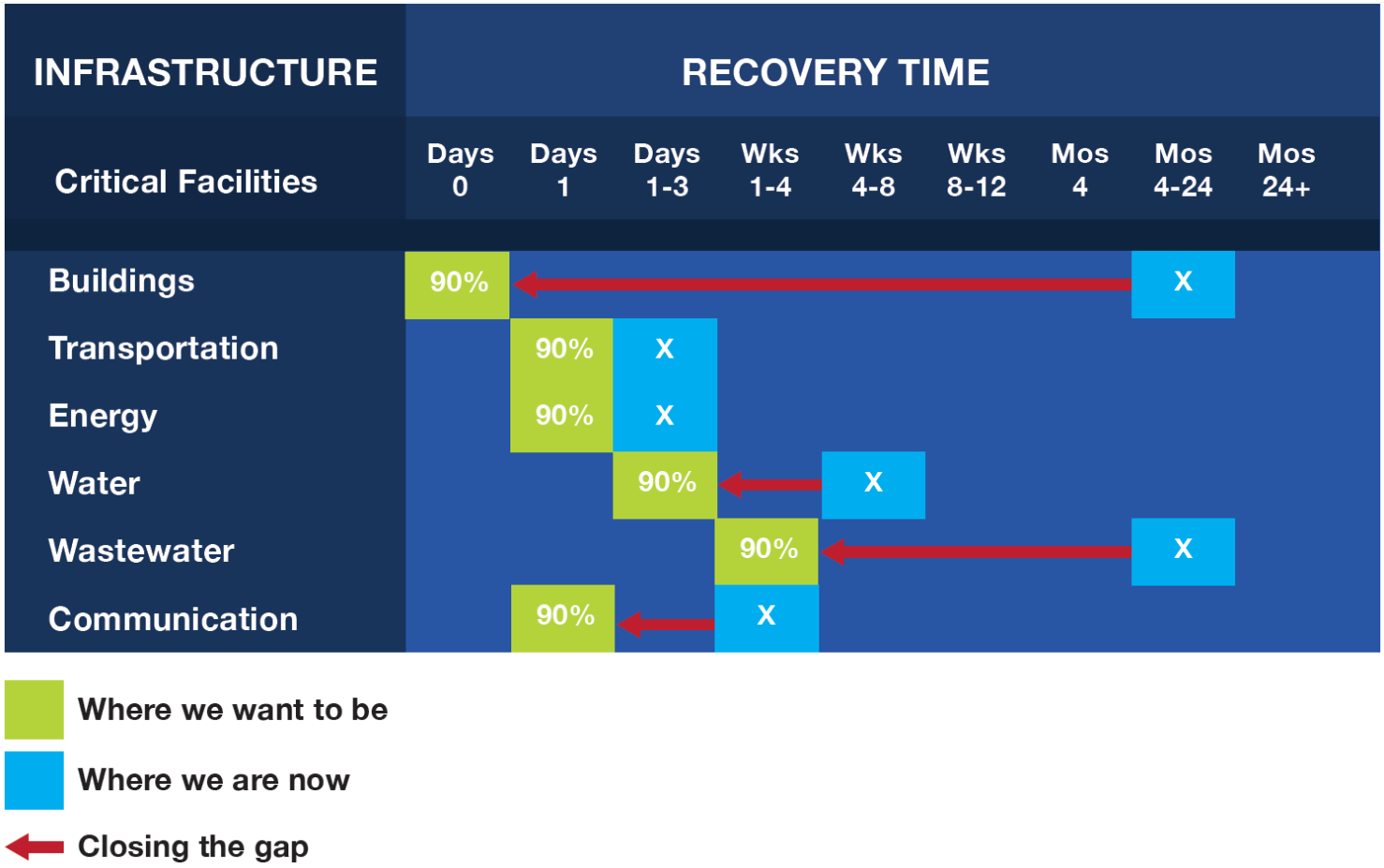

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Options in Branford

Community Engagement

Online Survey

www.surveymonkey.com/r/BRANFORDCRP

- **What you care about:**
  - Homes, Water Utilities, Drainage, Natural Systems
- **What you're worried about:**
  - Wind, water, waves, secondary hazards, failing drainage
- **What you want:**
  - Restore homes, water service, reopen roads, restore communications
  - Town projects, technical assistance and regulatory freedom

Adaptation: Approaches

3 General Types of Adaptation (IPCC, 1990)

- **Retreat**
  - No shoreline protection
  - Abandon vulnerable area
- **Accommodation**
  - No shoreline protection
  - Remain in vulnerable area
  - Adjust structures, infrastructure, land-use, preparation & response
- **Protection**
  - Shoreline protection
  - Remain in vulnerable area
  - No adjustment of structures, infrastructure, land-use, etc.

Adaptation: Approaches

7 Updated Categories of Adaptation (NOAA, 2010)

1. **Impact Identification and Assessment**

   Know the facts

2. **Awareness and Assistance**

   Share the facts

3. **Growth and Development Management**

   Prevent creation of new vulnerabilities

4. **Loss Reduction**

   Decrease existing vulnerabilities

5. **Shoreline Management**

   Protect natural, aesthetic, & economic benefits of beach & shore

6. **Coastal Ecosystem Management**

   Protect natural, aesthetic, & economic benefits of coastal ecosystems

7. **Water Resource Management**

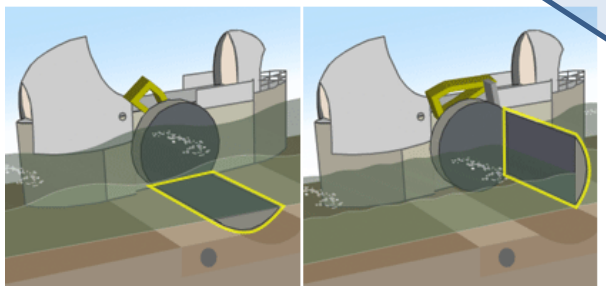
   Decrease unique risks to drainage & water supply infrastructure

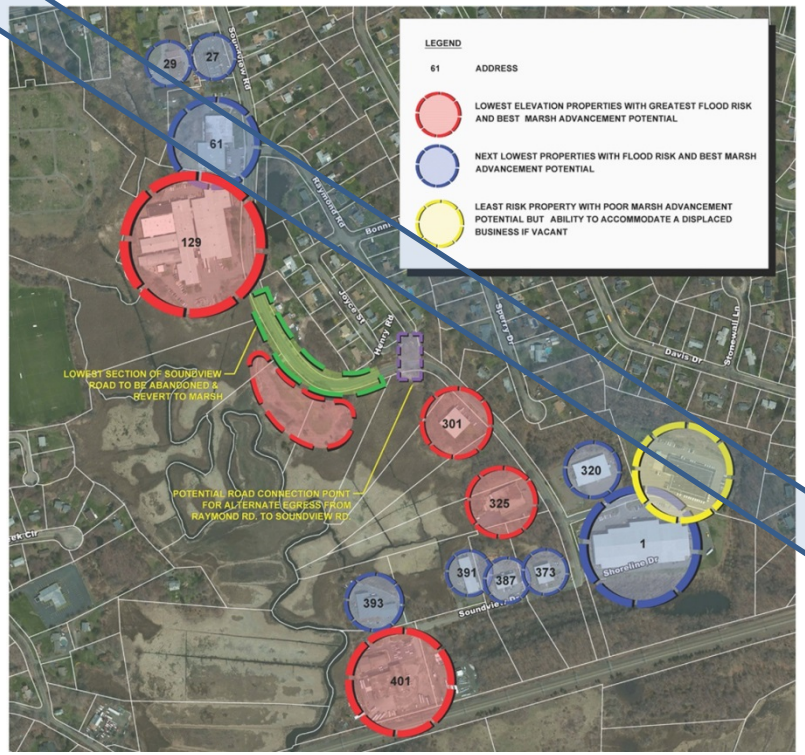
Adaptation: Scale

Regional Scale

Open position

Closed position





Site-Specific Scale

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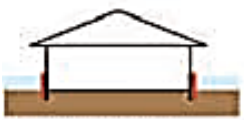
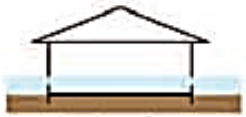
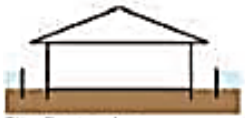
Adaptation: Scale


Dry Floodproofing


Wet Floodproofing

Elevate on Fill or Mound

Elevate on Piles


Site Protection

Floating Structures

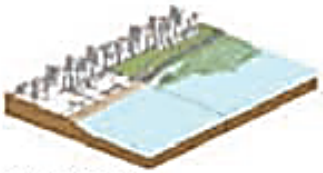
Amphibious Structures

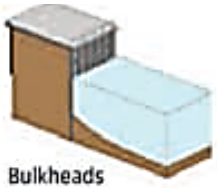
Elevation of Land and Streets

Deployabe Floodwalls

Permanent Floodwalls

Waterfront Parks


Strategic Retreat


Bulkheads

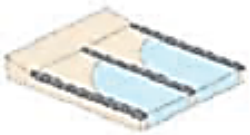
Revetments

Living Shorelines

Beaches and Dunes

Levees (or Dikes)

Multi-purpose Levees


Groins

Breakwaters

Constructed Wetlands

Artificial Reefs

Floating Islands / Breakwaters

Constructed Barrier Islands

Surge Barriers

Coastal Morphology Restoration

Polders

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Adaptation: Shoreline Scale

Groins

Artificial Reefs

Living Shorelines

Breakwaters

Adaptation: Neighborhood Scale

Elevated Roads and Sidewalks

Riprap

Seawalls

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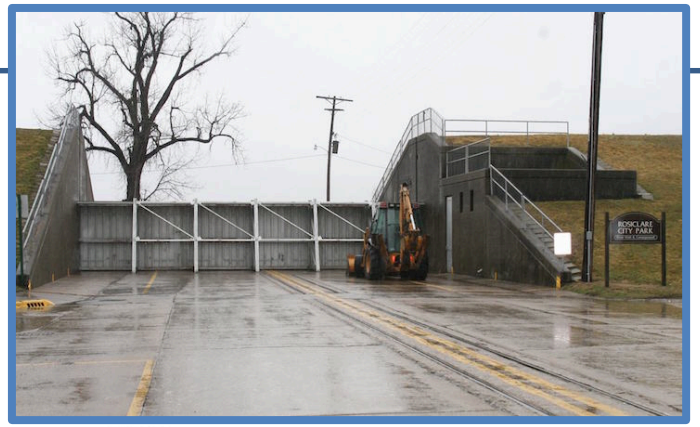
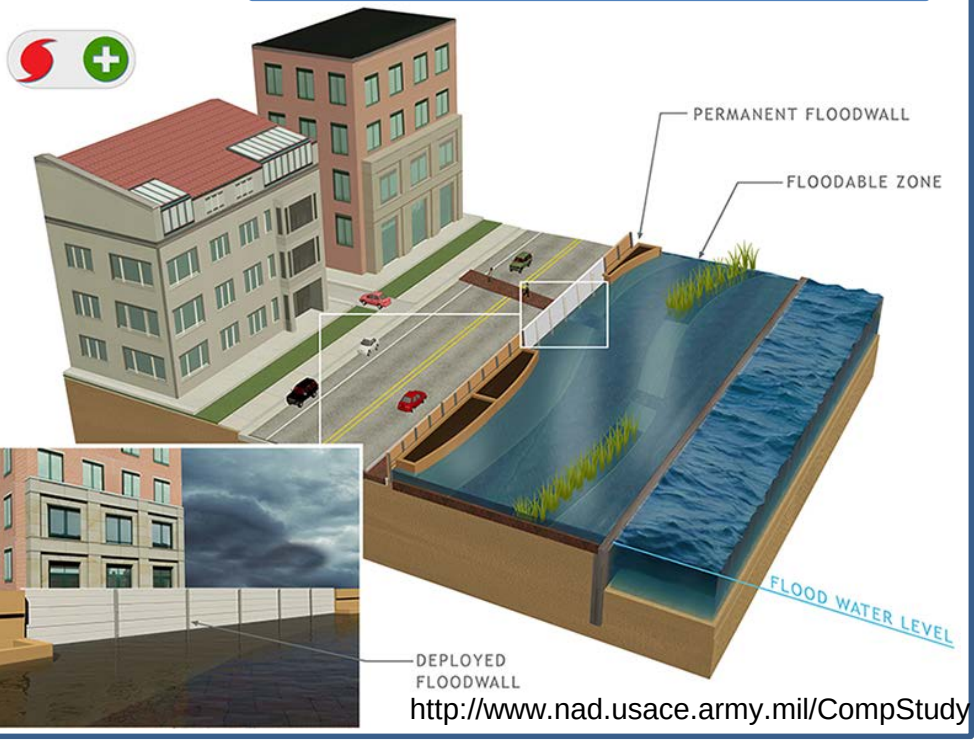
Adaptation: Neighborhood Scale

Removable Floodwalls





http://www.nad.usace.army.mil/CompStudy

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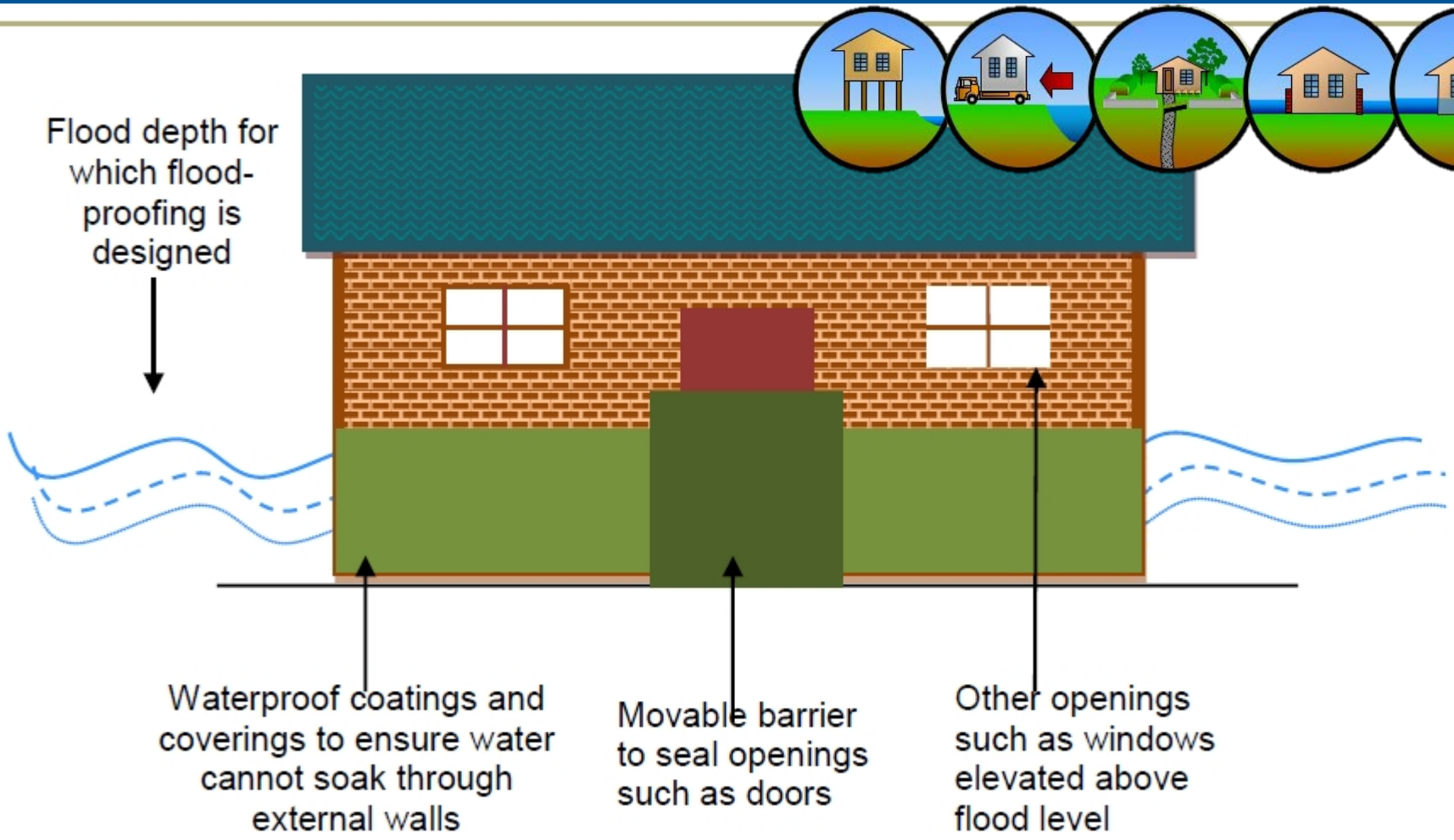
Adaptation: Site Scale

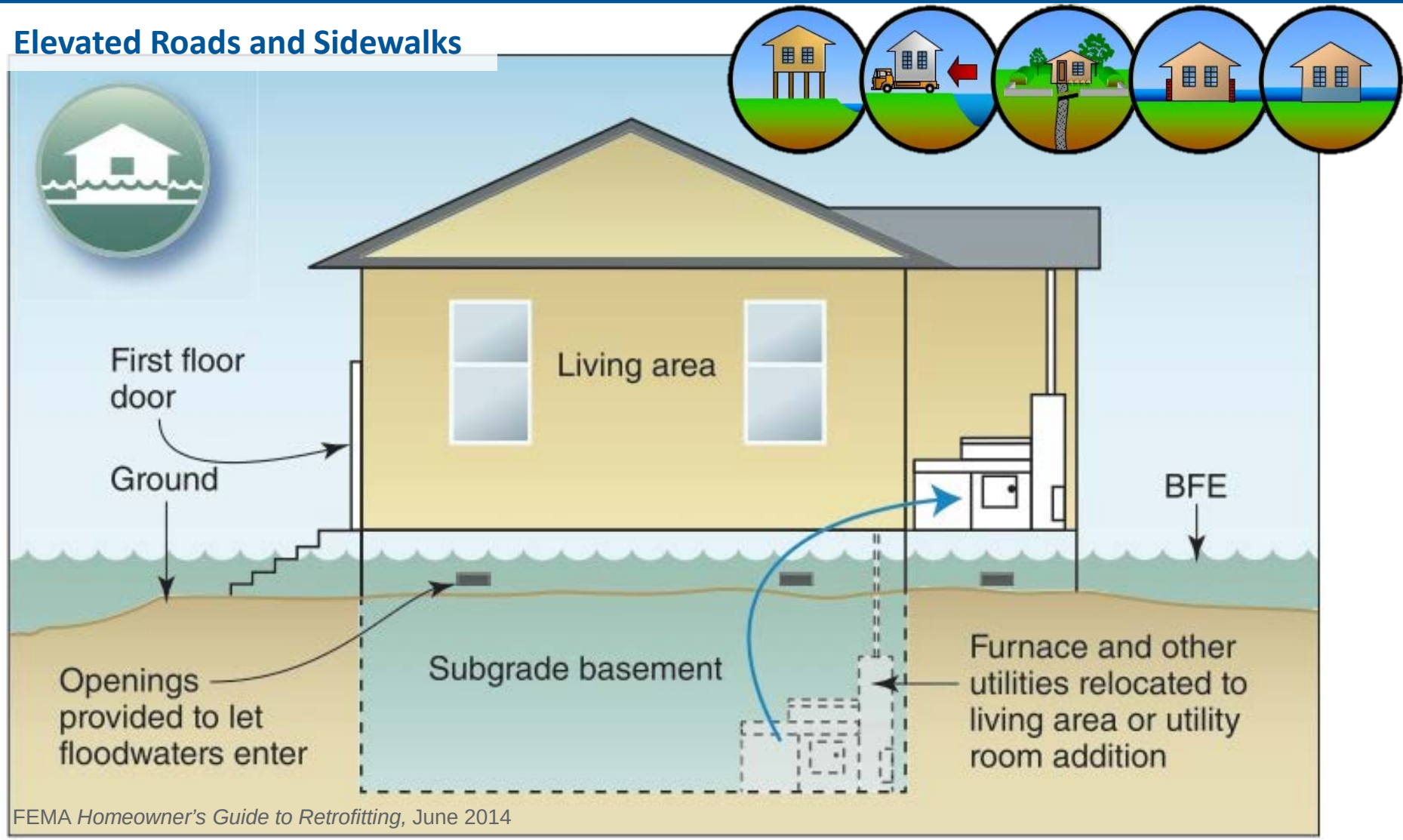


Source: Linham and Nicholls, 2010

Dry Floodproofing

Adaptation: Site Scale

Elevated Roads and Sidewalks



FEMA *Homeowner's Guide to Retrofitting*, June 2014

Wet Floodproofing

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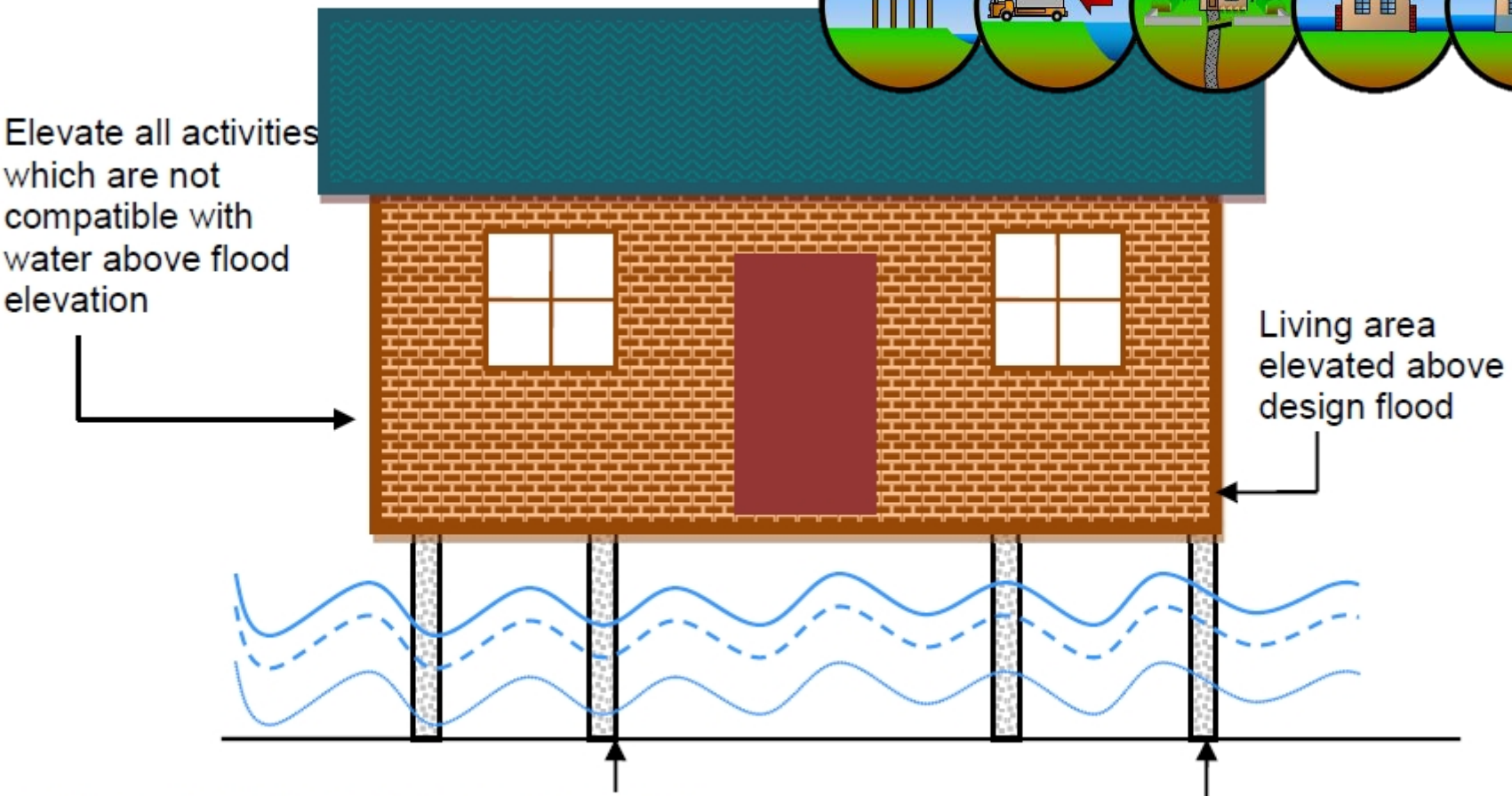
Adaptation: Site Scale

Elevate



Source: Linham and Nicholls, 2010

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Adaptation: Site Scale

Floodwall

www.reddit.com

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Options in Branford

Specific Options for Branford

Transportation Options

Elevate or Retire Roads

Shoreline Management

Living Shorelines, Beach Nourishment, Sediment Management, Dune-Management, Bioengineered Banks

Protective Structures

Seawalls, Bulkheads, Revetments

Home Elevation

Critical Facilities

Relocation, Satellite Facilities

Utility Management

Drainage, Wastewater, Water Supply

Acquisition and Retreat

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Options: Wastewater Systems

Collection Systems and Pumping Stations

- Elevate
- Floodproof
- Use submersible pumps
- Standby power
- Set up for rapid repair
- Harden system components
- Convert gravity to pumped systems
- Install backflow prevention
- Alternate collection systems

A flooded pump-station in Warwick, RI, 2010

Photo: Janine Burke

Options in Branford

Adapting WWTPs/WPCFs

- Flood wall around facility
- Floodproof structures
- Elevate internal components
- Floodproof components
- Elevate electrical systems & controls
- Use corrosion-resistant materials
- Harden outfall
- Prevent sedimentation of outfall
- Prevent backflow
- Secure tanks that can float

- Protect electric supply
  - Harden lines
  - Redundant lines
  - Standby power
- Protect access (elevate driveway)
- Backup records and files
- Move office to higher level
- Designate flood-safe spaces
- Remote access programs
- Train Personnell

or...

Relocate the entire treatment facility!

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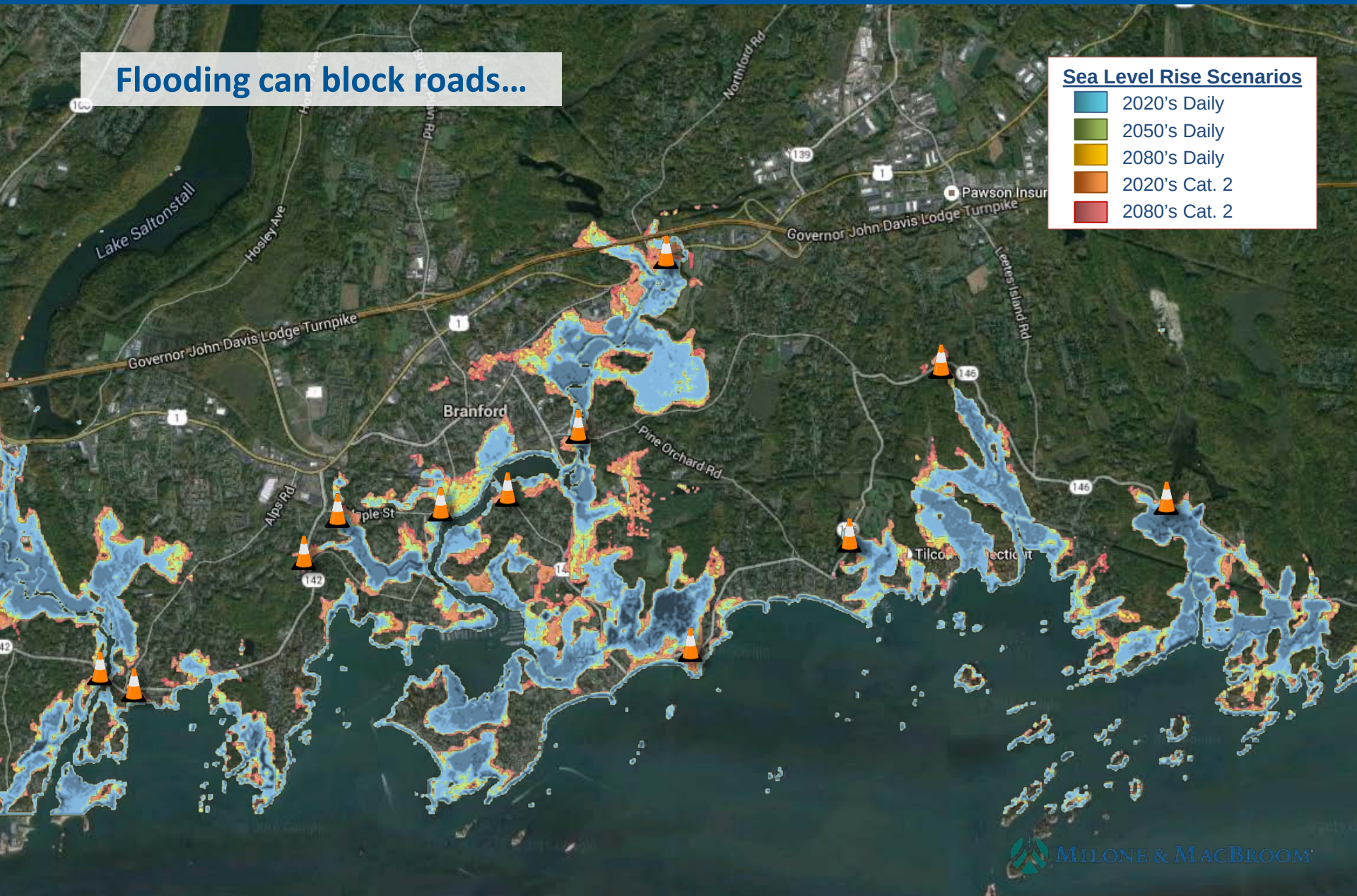
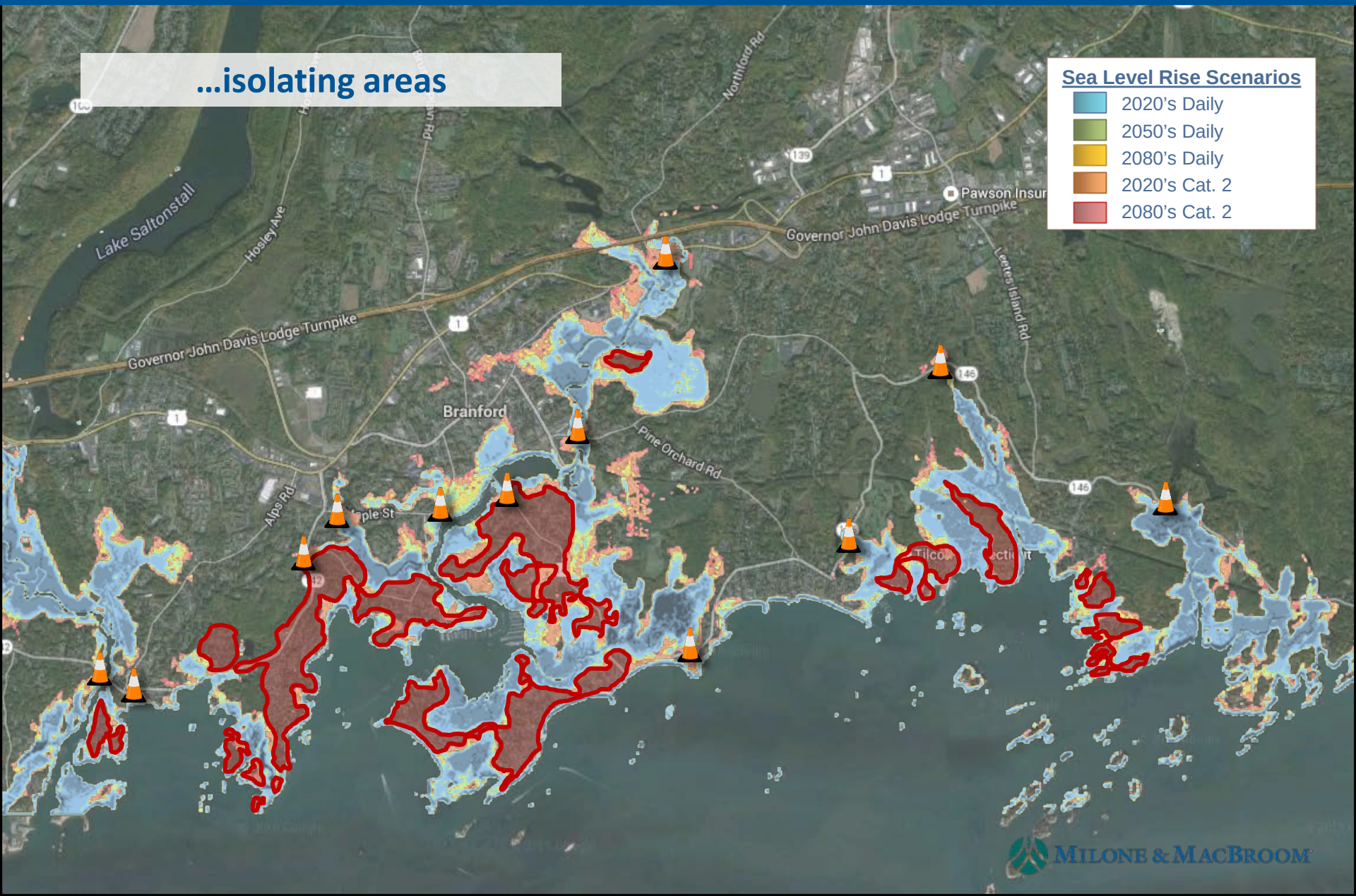
Adapting to Isolation Risks



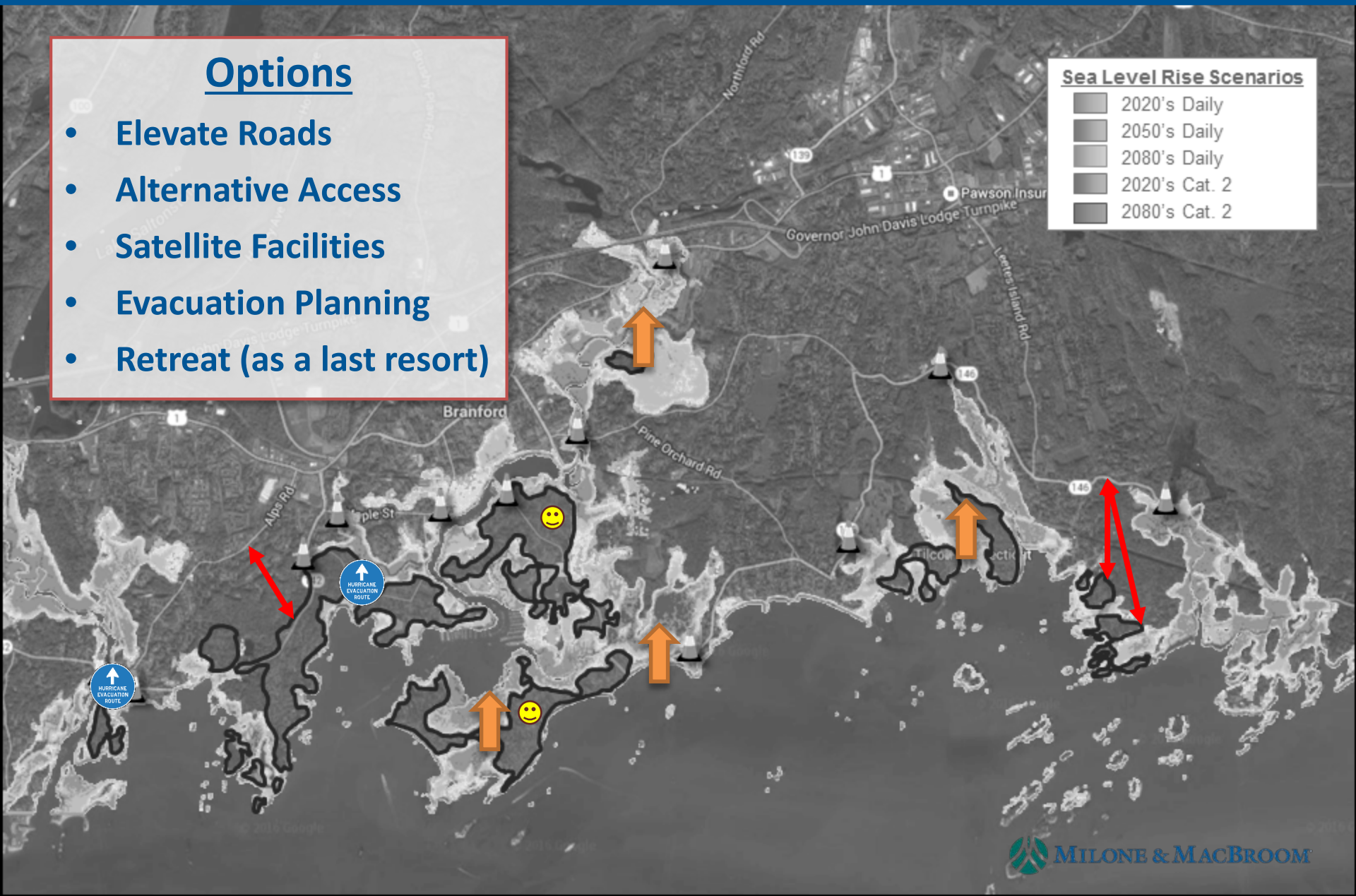
Adapting to Isolation Risks



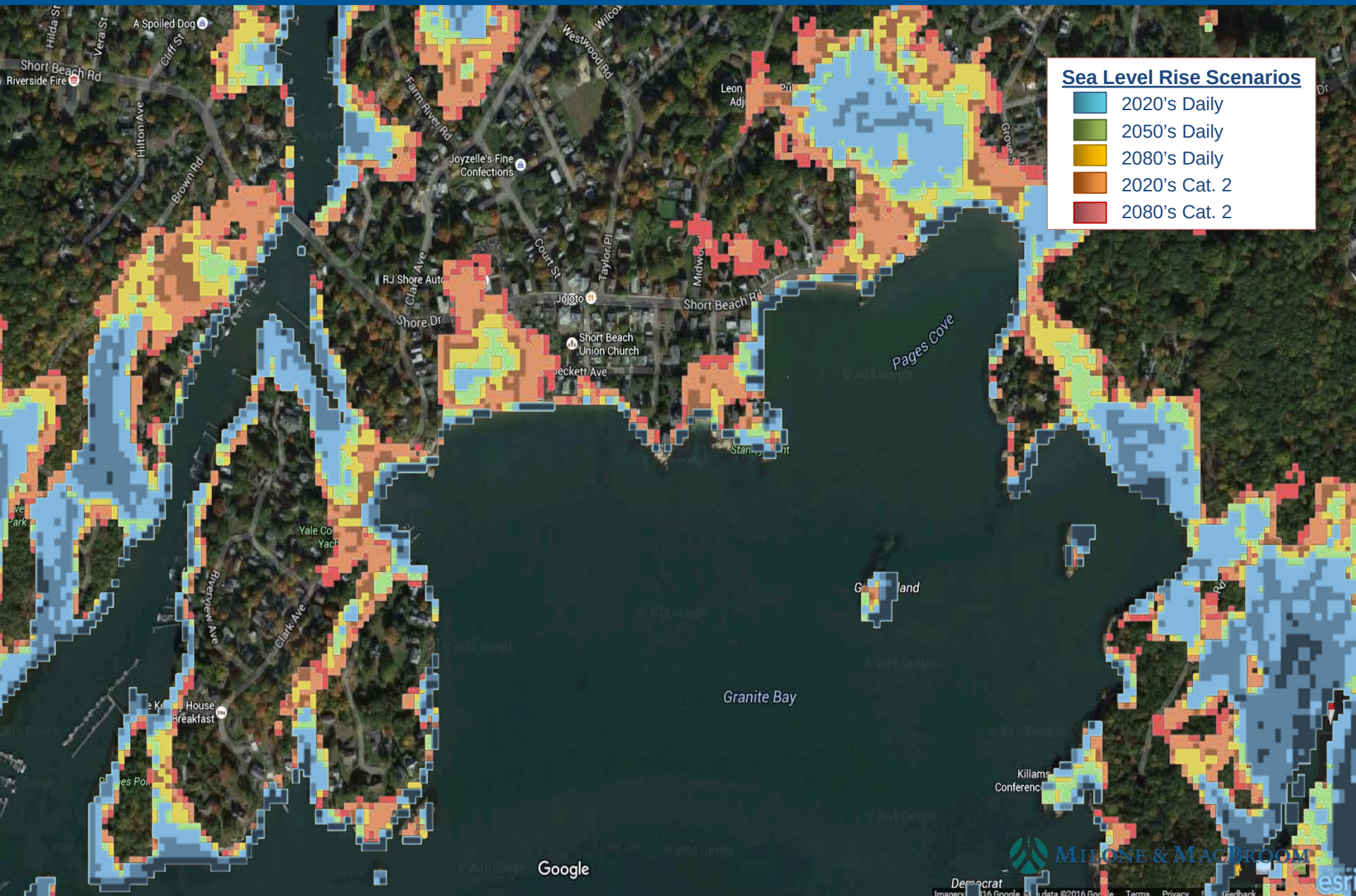
Adapting to Isolation Risks

Options

- Elevate Roads
- Alternative Access
- Satellite Facilities
- Evacuation Planning
- Retreat (as a last resort)



Neighborhood: Short Beach



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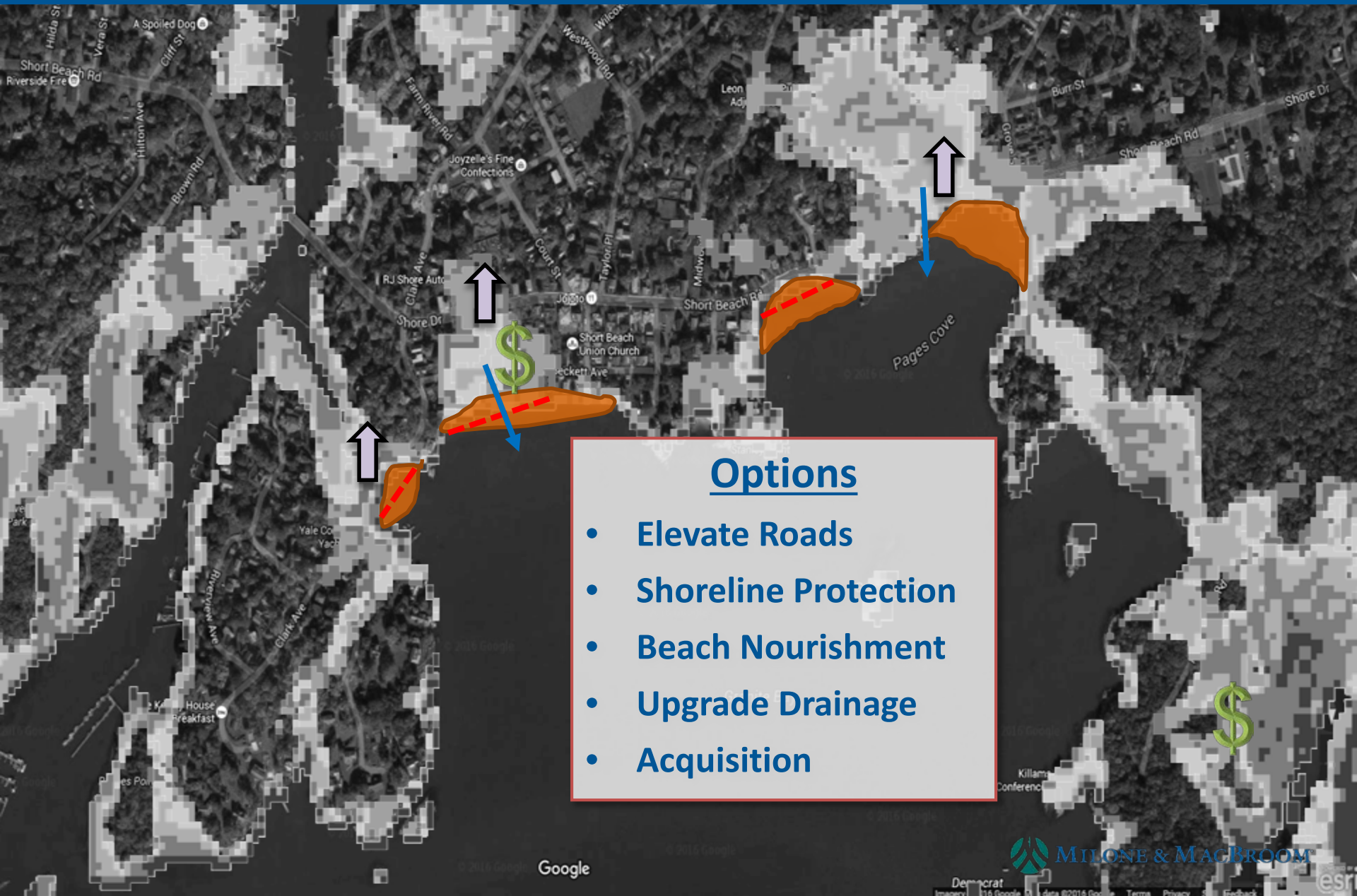
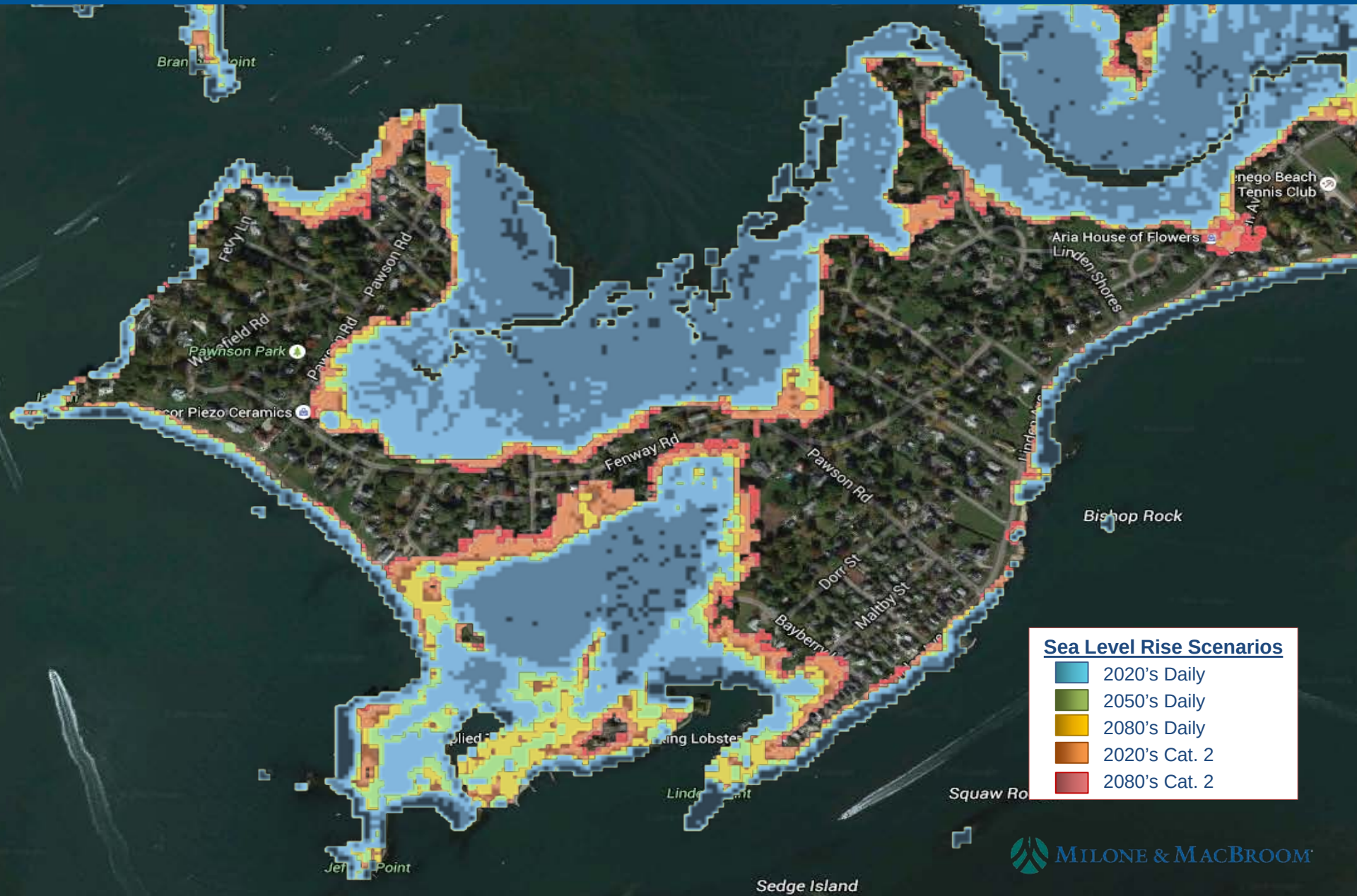


Options

- Elevate Roads
- Shoreline Protection
- Beach Nourishment
- Upgrade Drainage
- Acquisition

Neighborhood: Pawson Park



Neighborhood: Pawson Park

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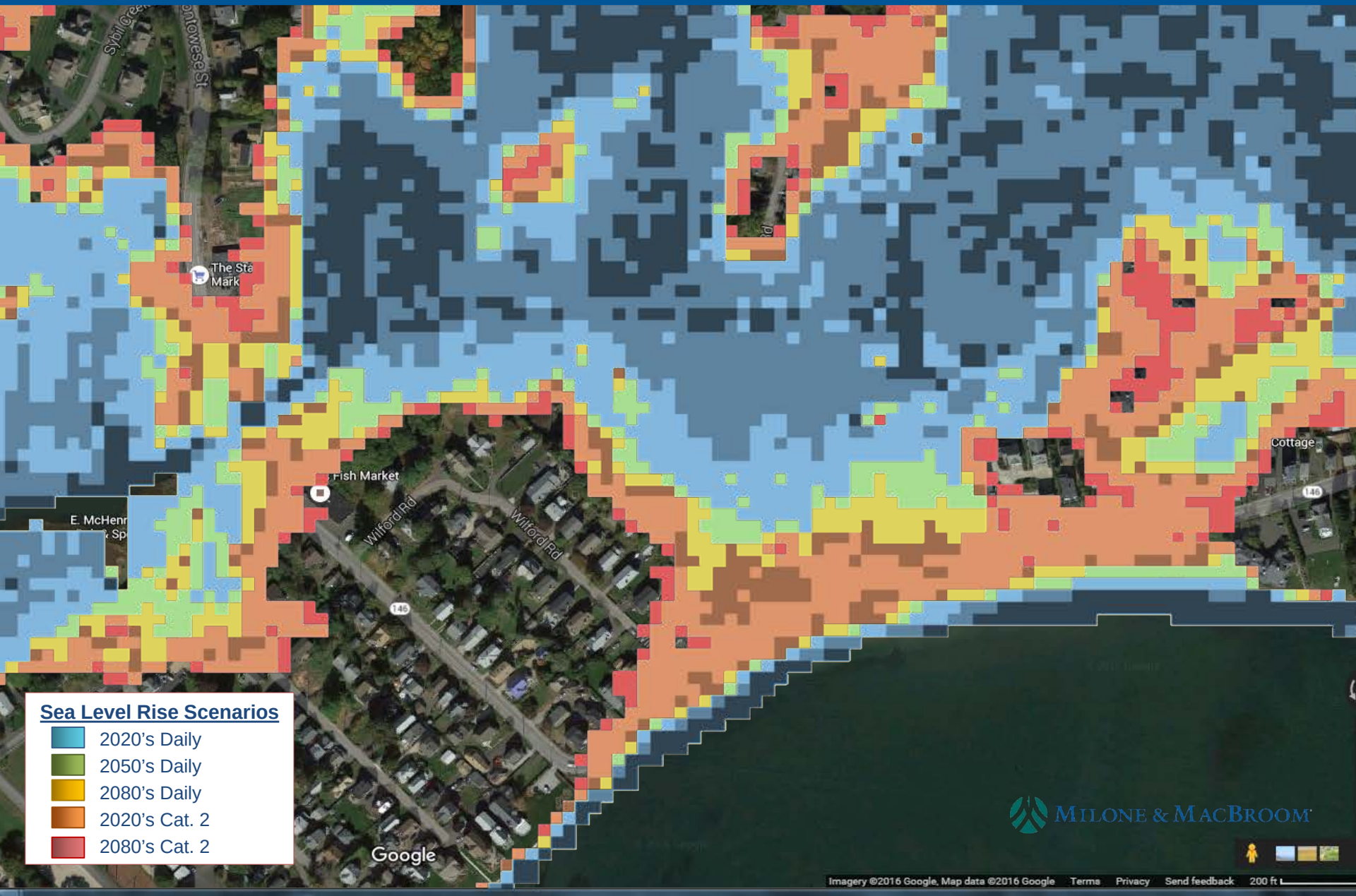
Neighborhood: Limewood Beach



Neighborhood: Limewood Beach

Options

- Elevate Roads
- Elevate Homes
- Acquisition

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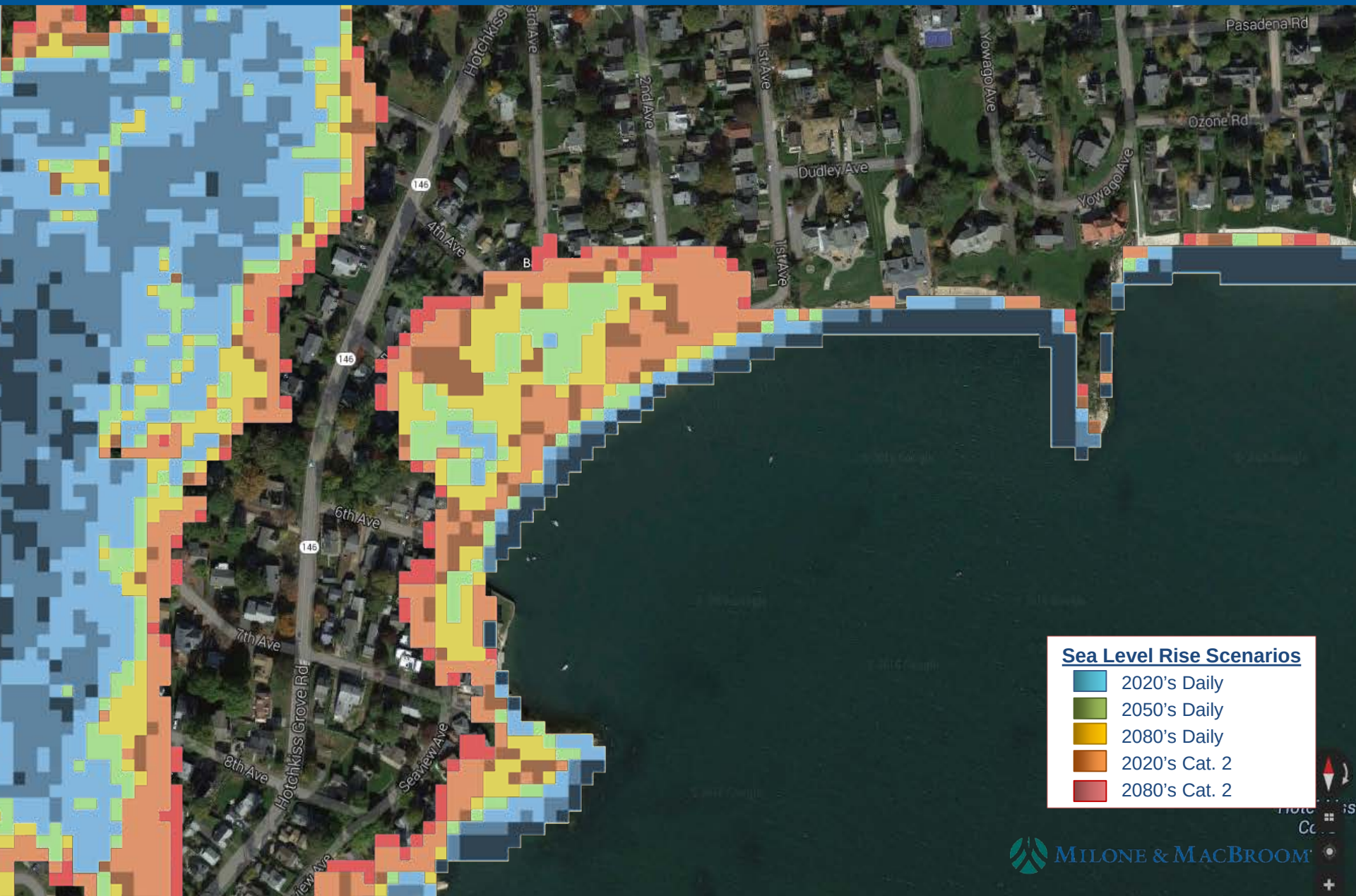
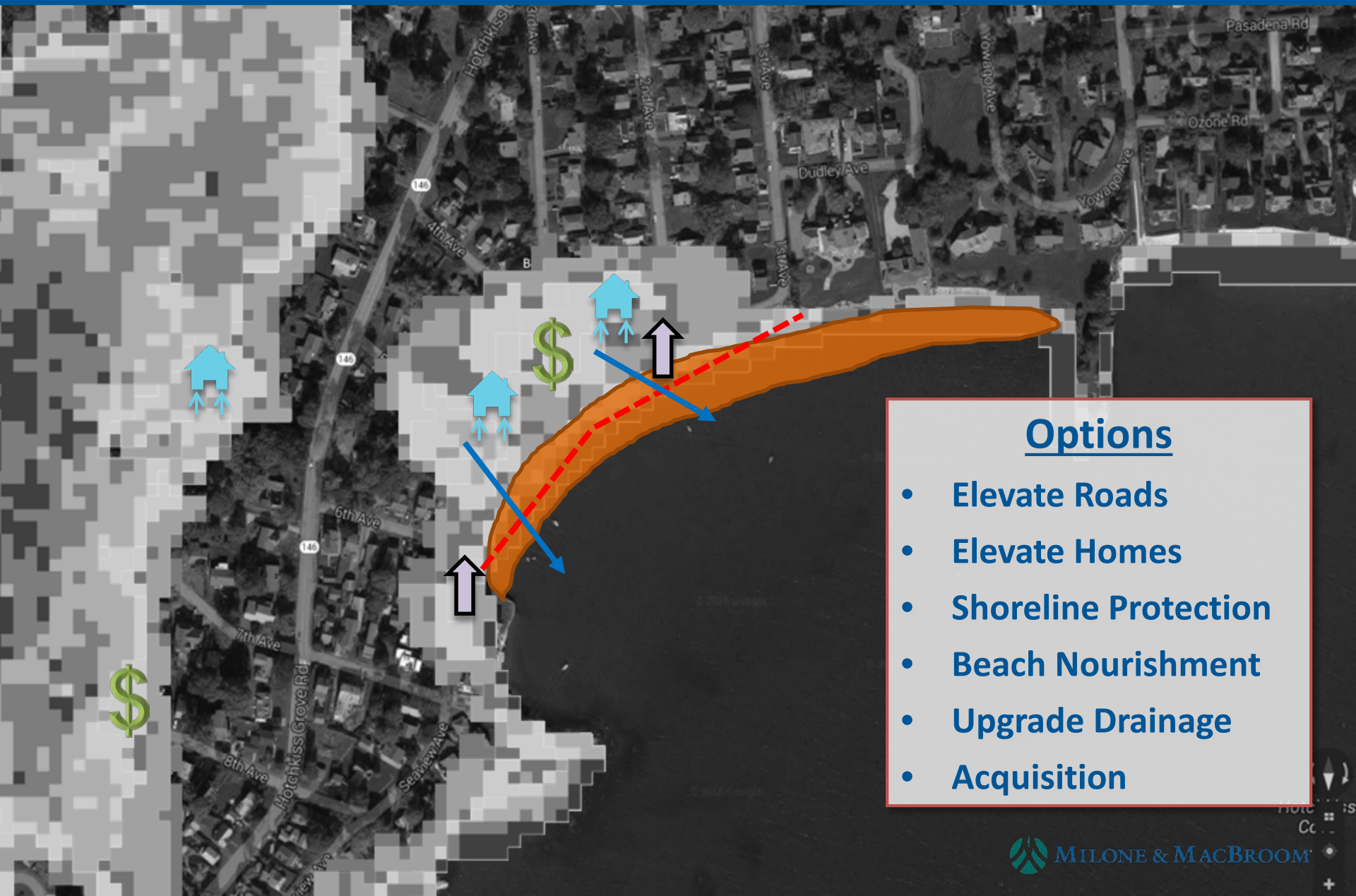
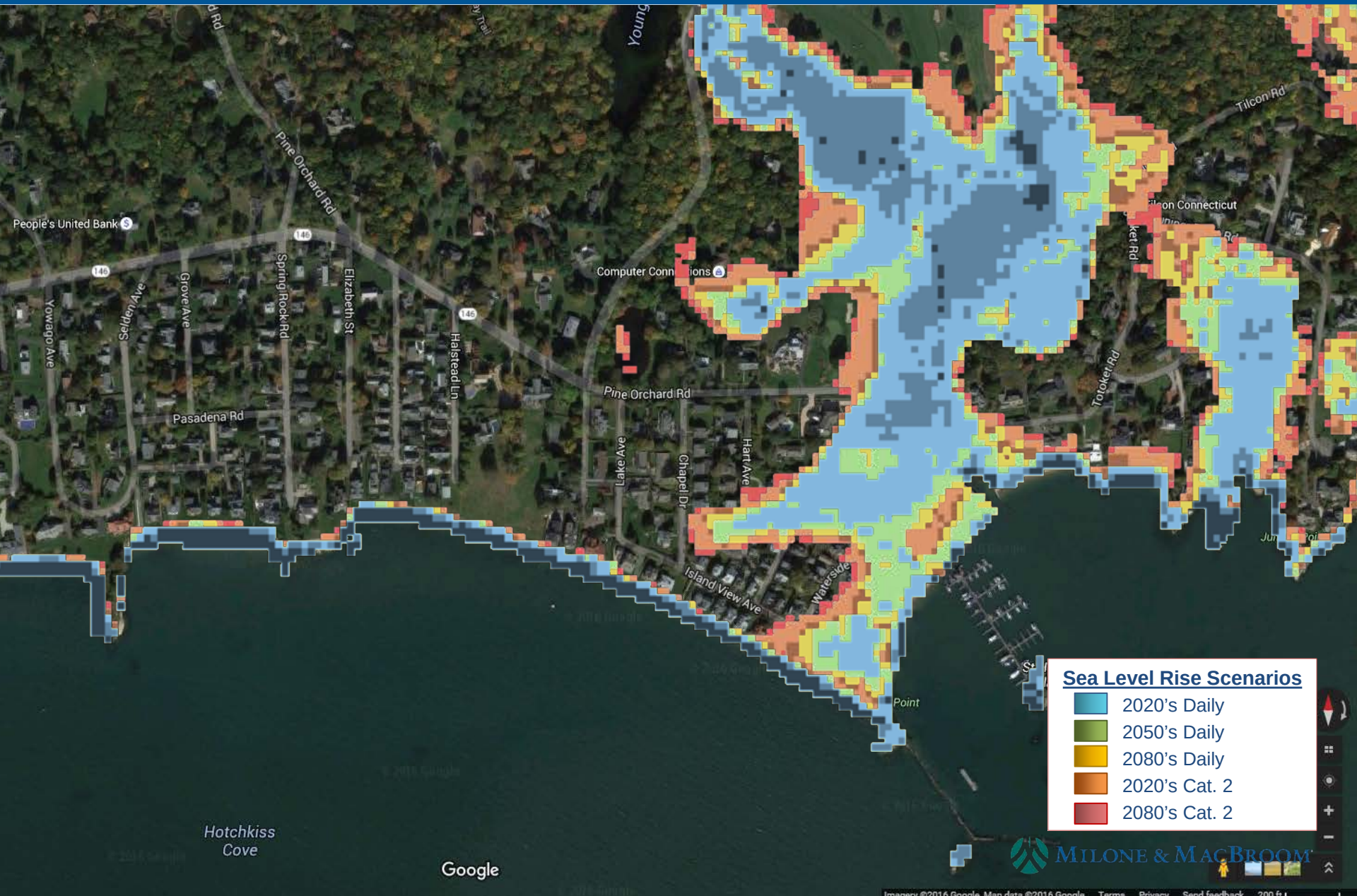
Neighborhood: Hotchkiss Grove



Neighborhood: Hotchkiss Grove



Neighborhood: Pine Orchard



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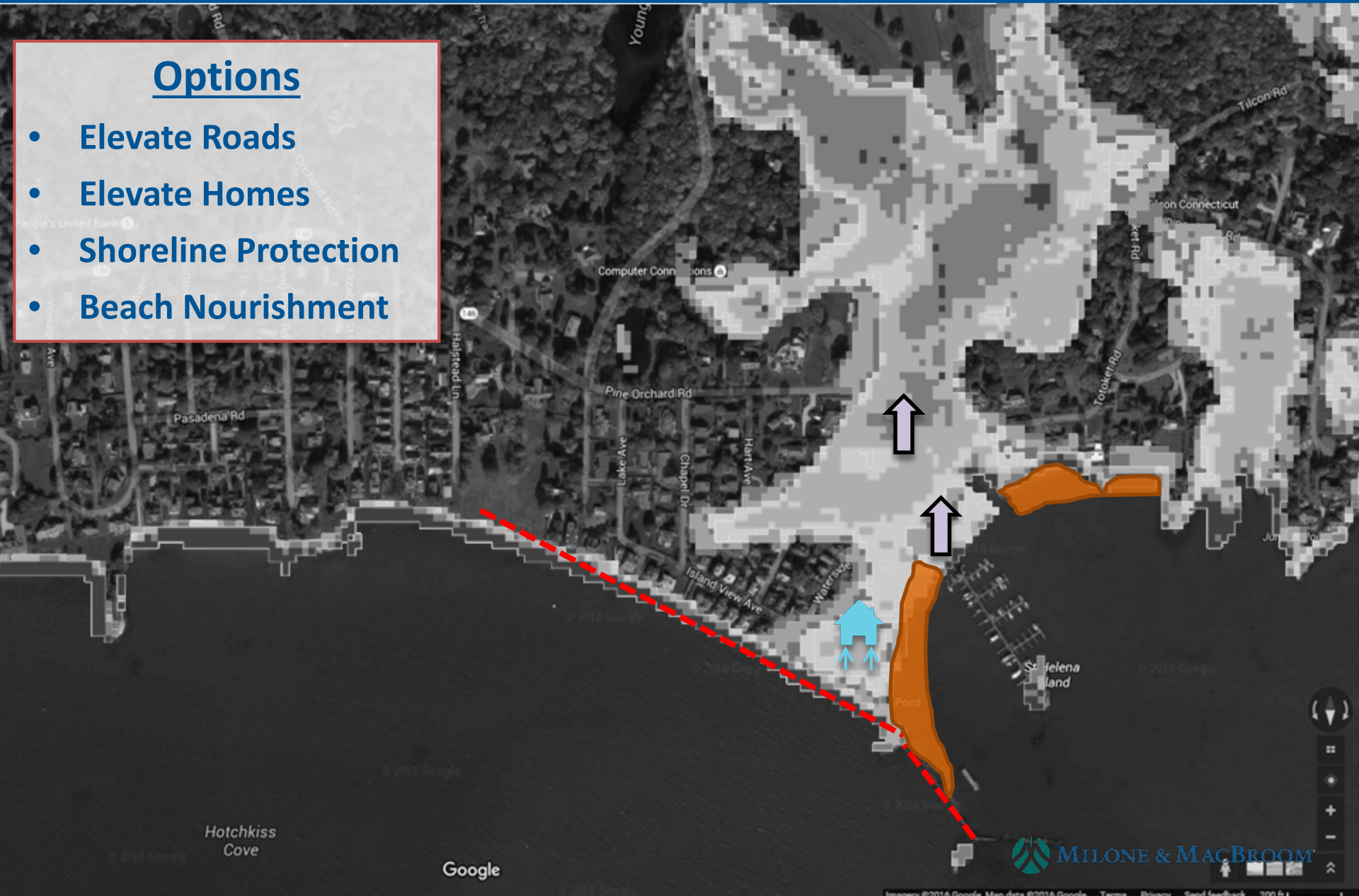
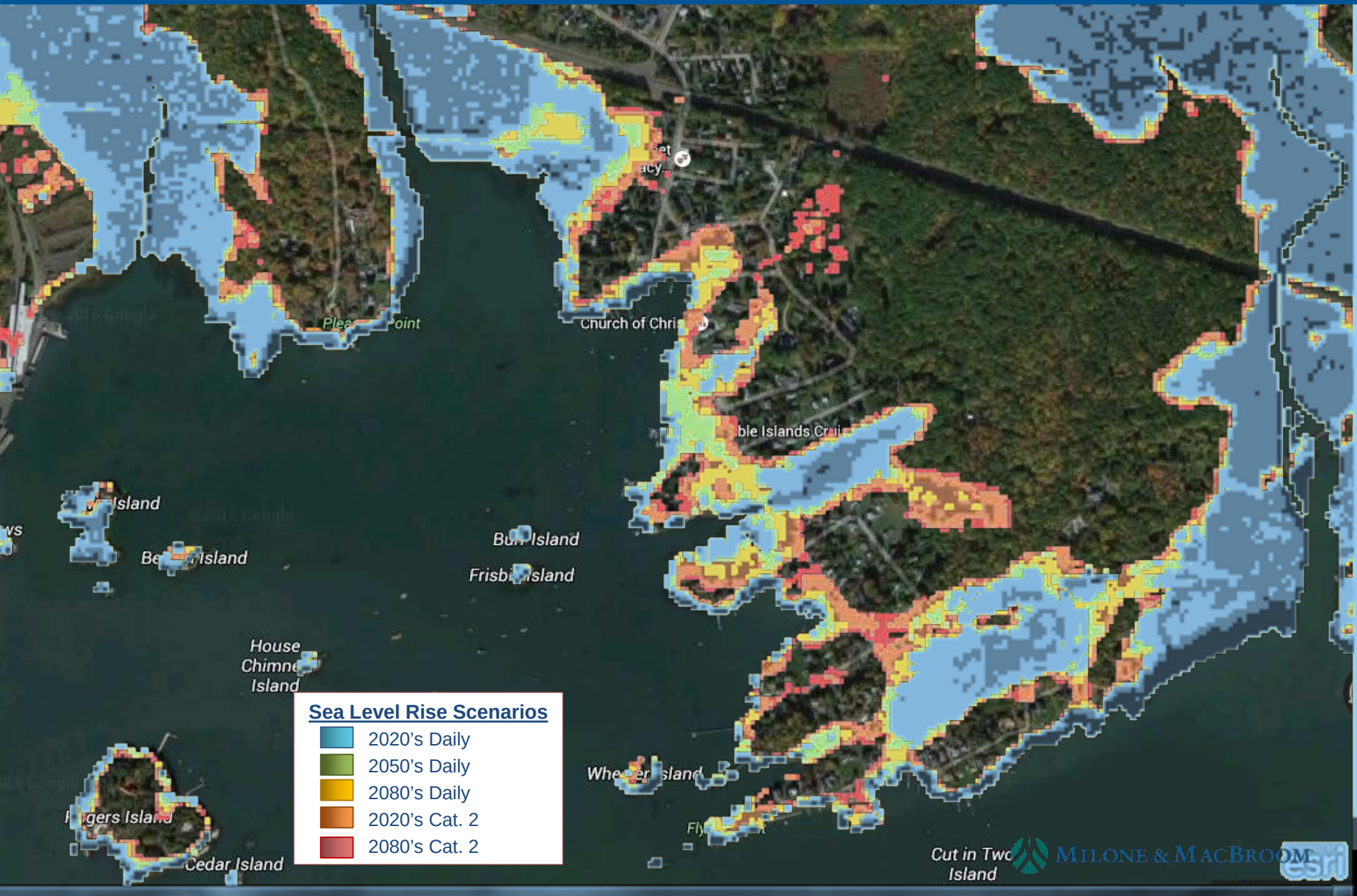


Neighborhood: Stony Creek



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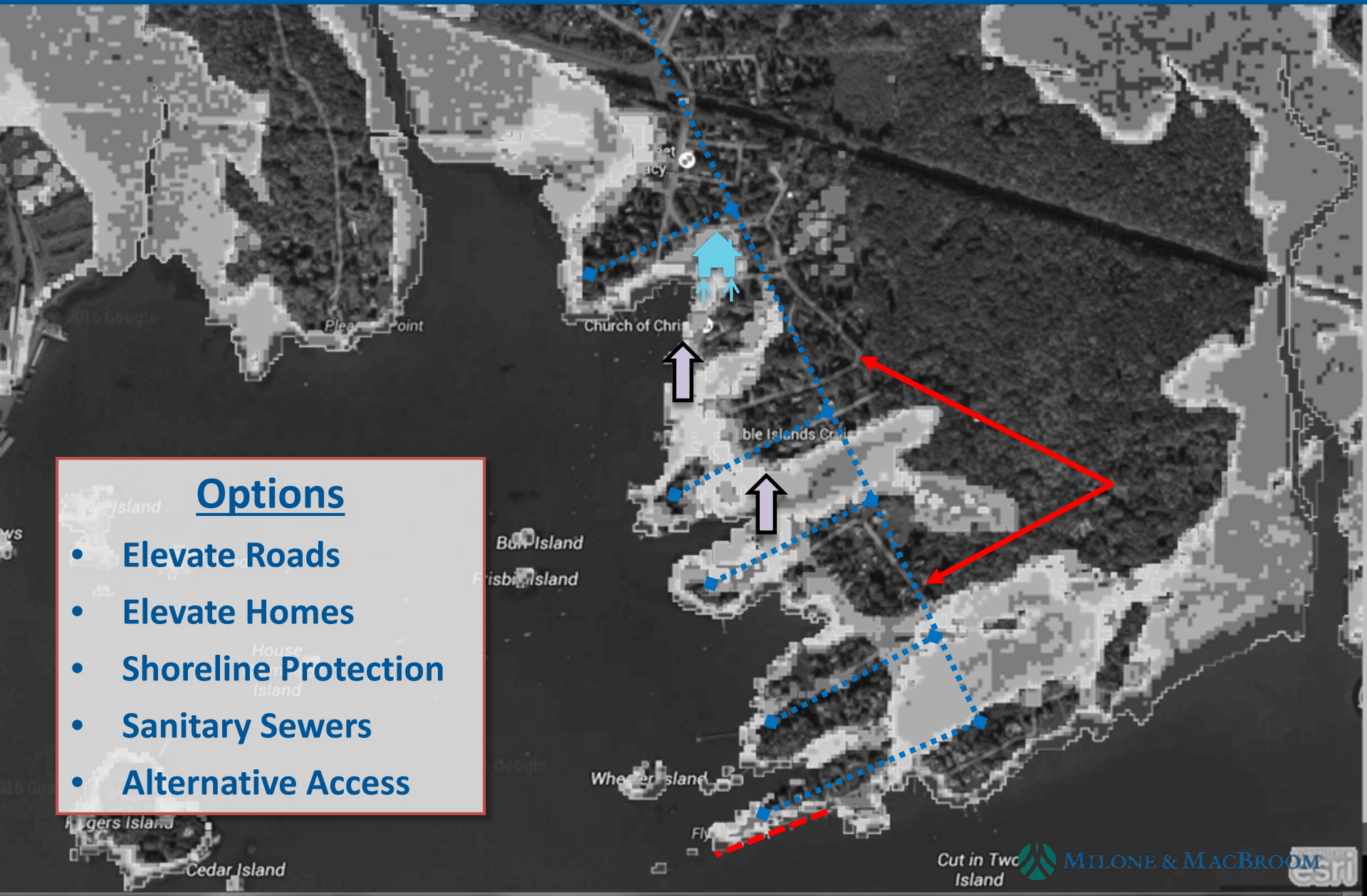
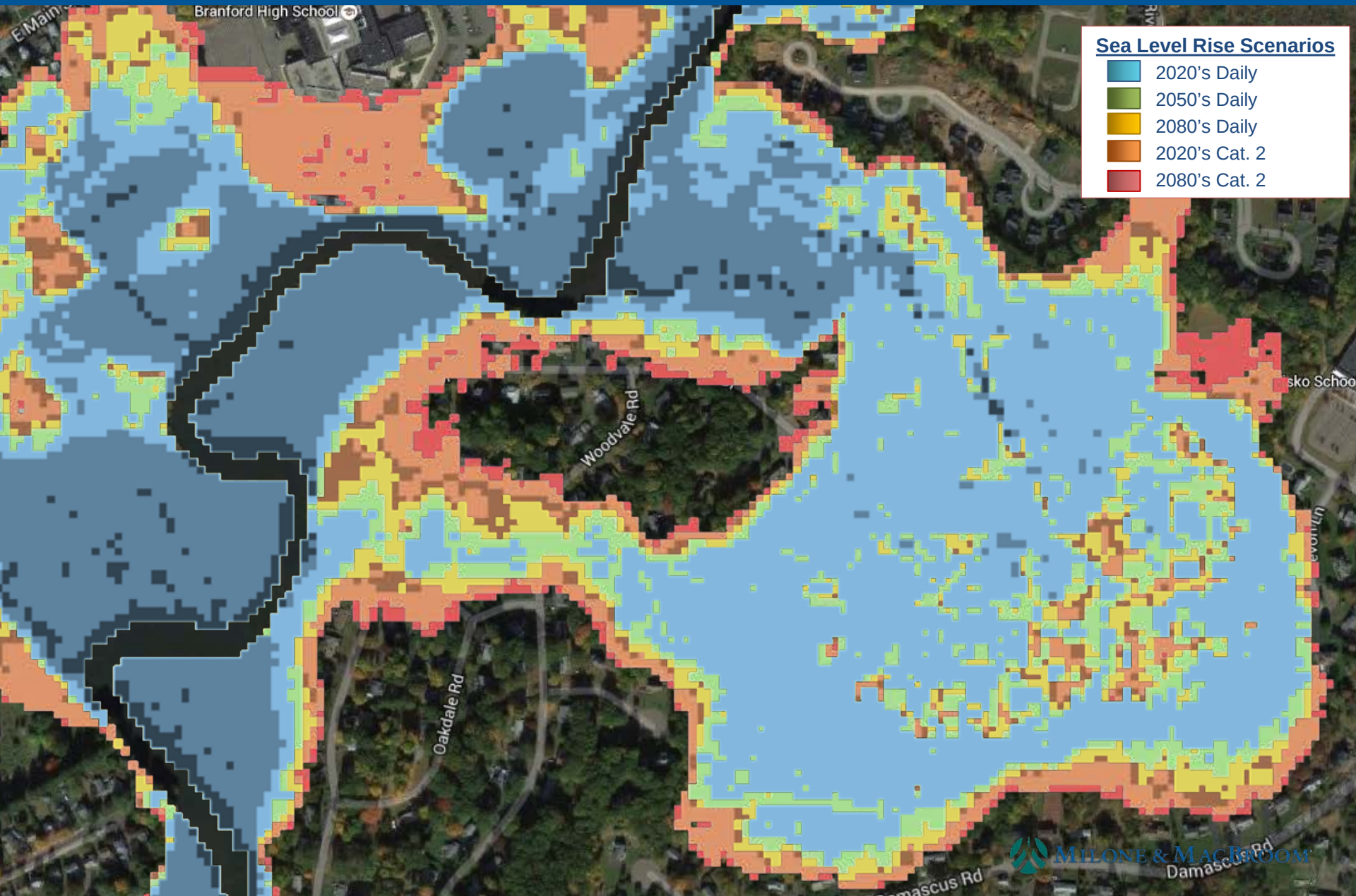


Options

- Elevate Roads
- Elevate Homes
- Shoreline Protection
- Sanitary Sewers
- Alternative Access

Neighborhood: Blackstone Acres



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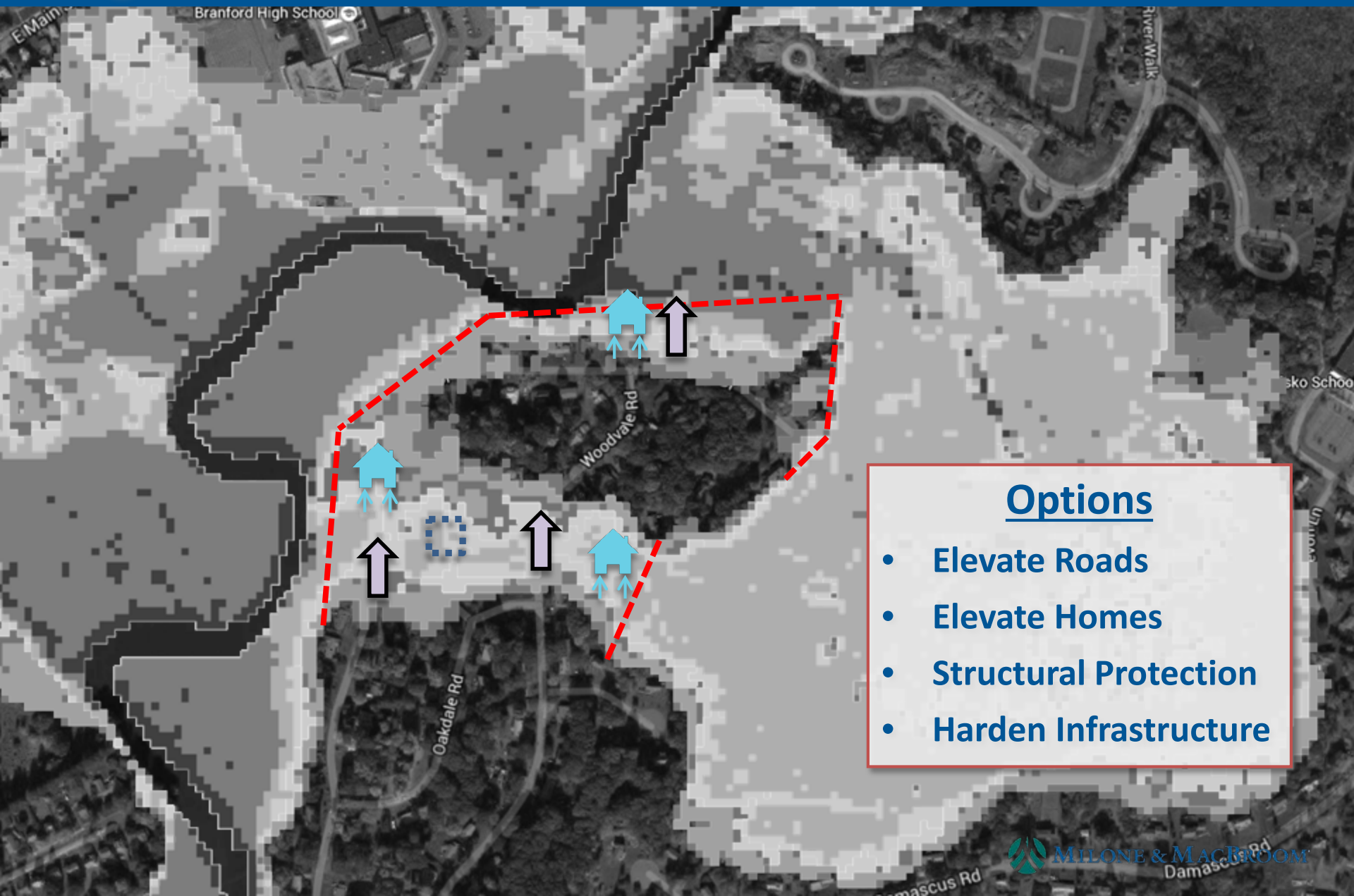
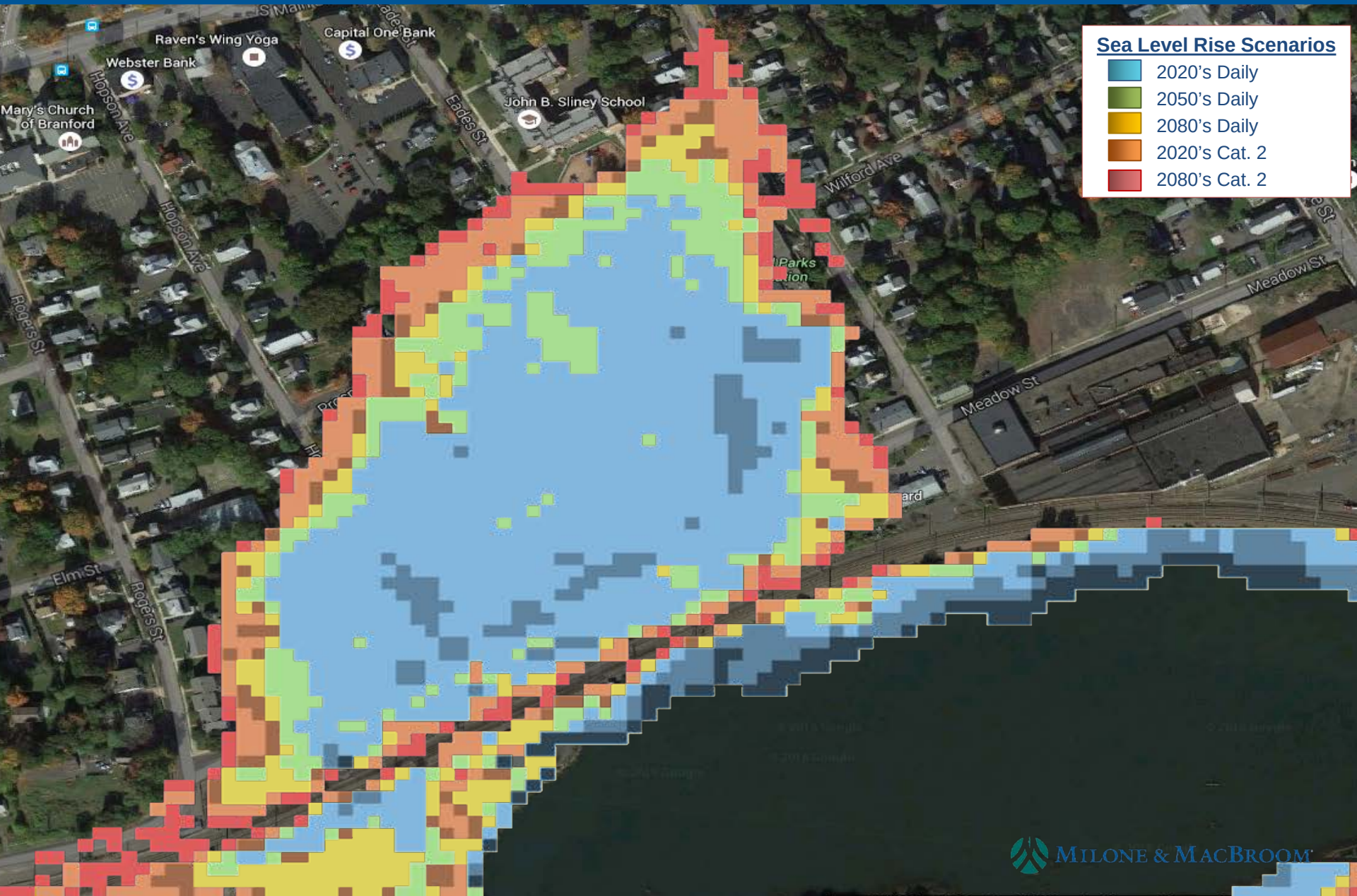
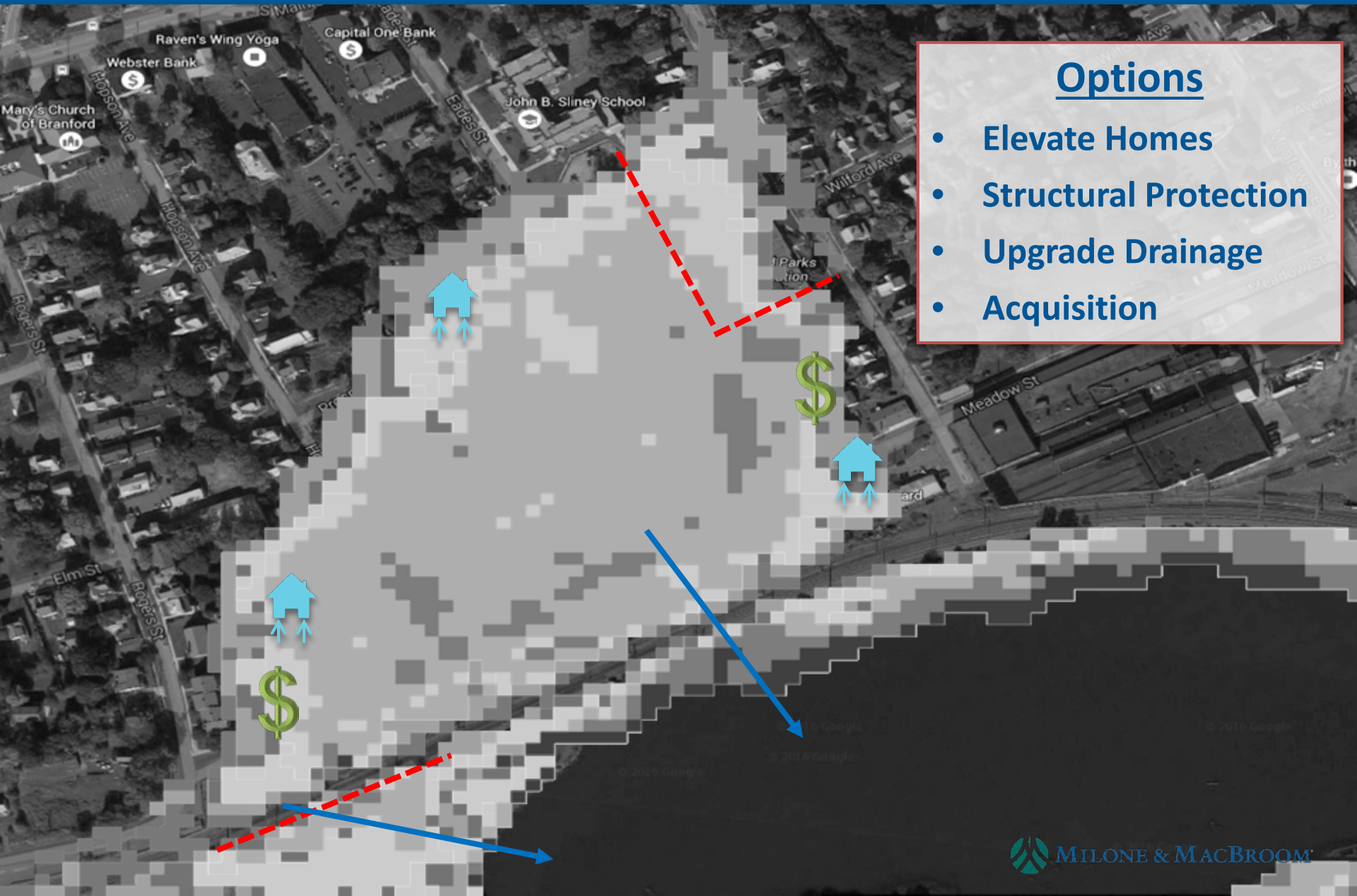


Neighborhood: Meadow Street



Neighborhood: Meadow Street



Concepts: Examples for Planning

Concepts: Meadow Street

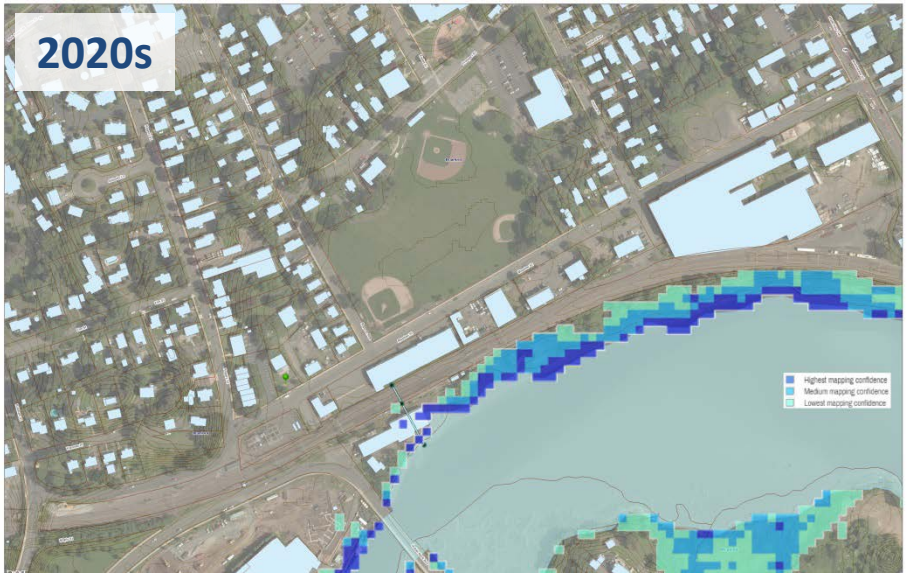
Existing Conditions

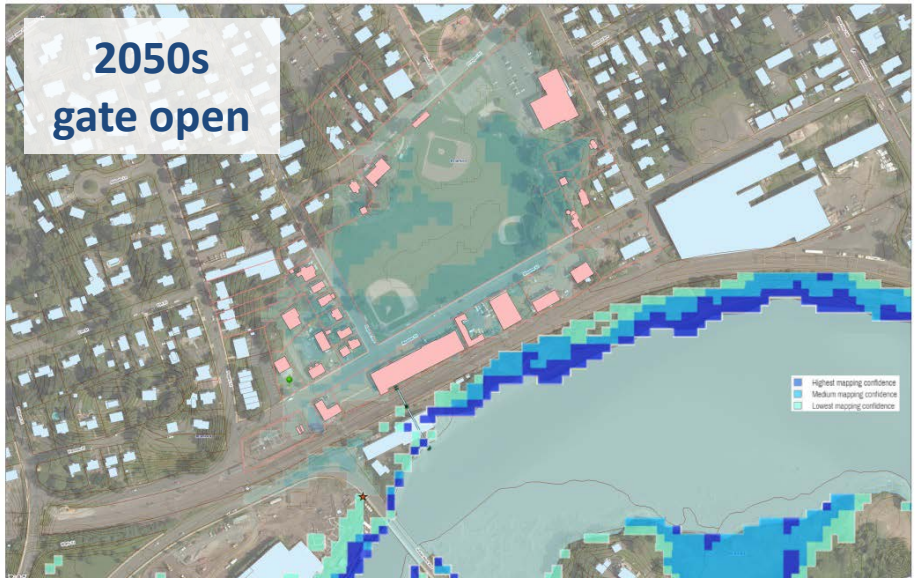
Abandon Opening

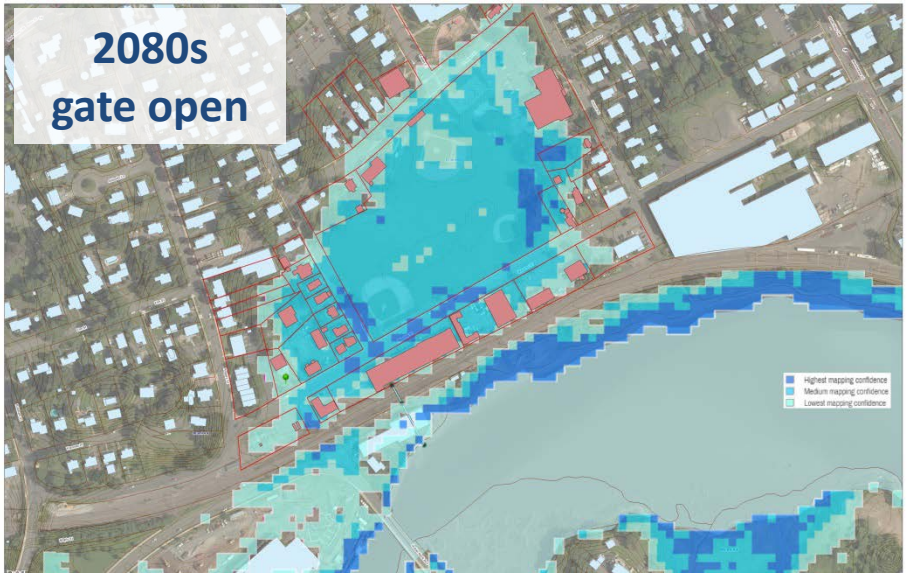
Flood Gate Option 1

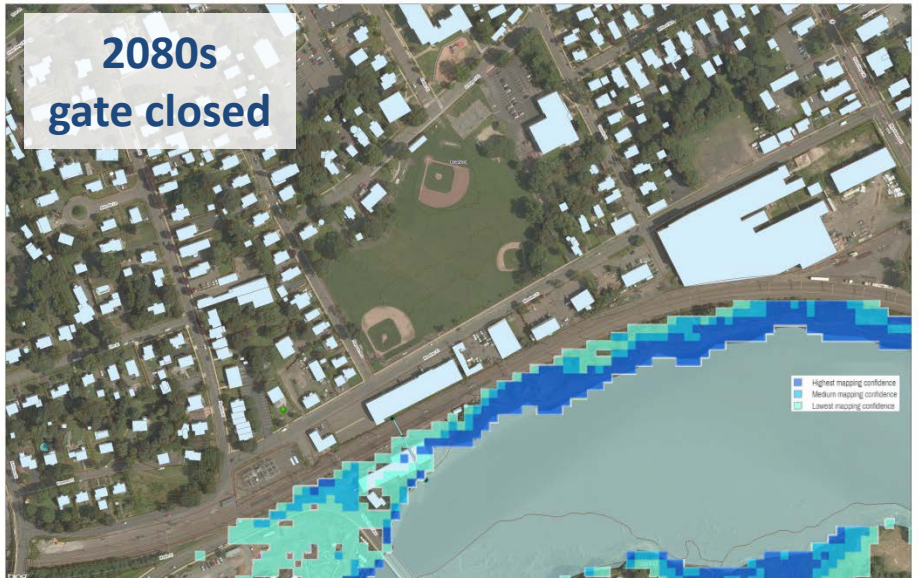
Flood Gate Option 2

Concepts: Meadow Street

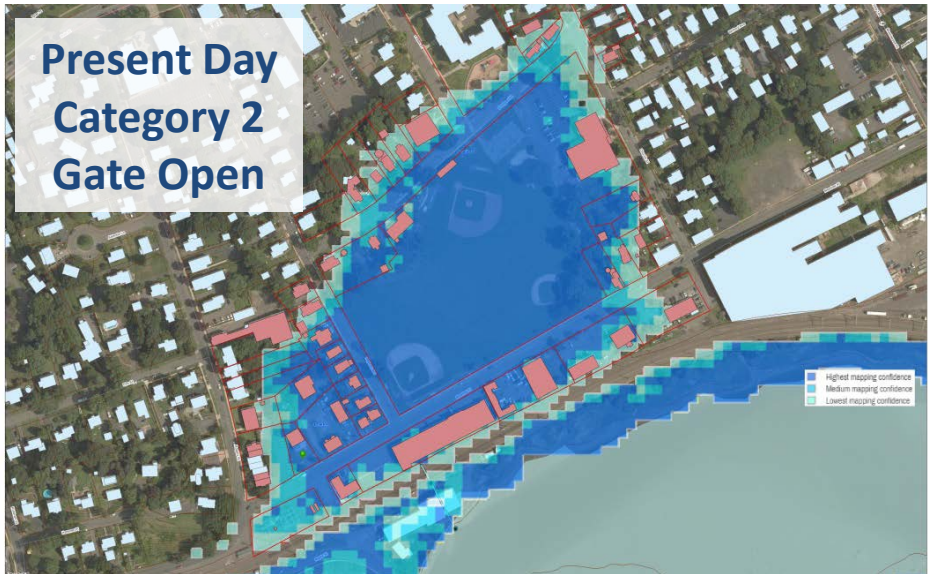


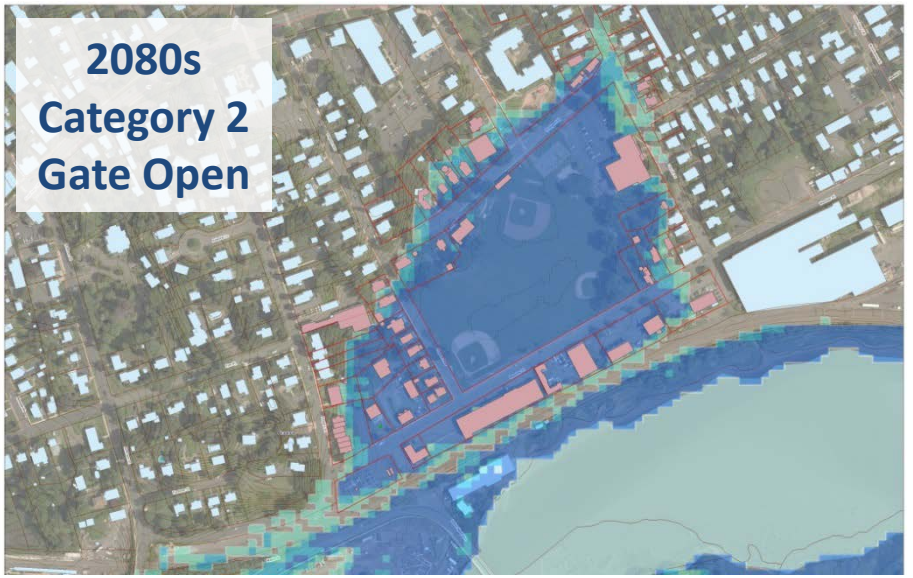


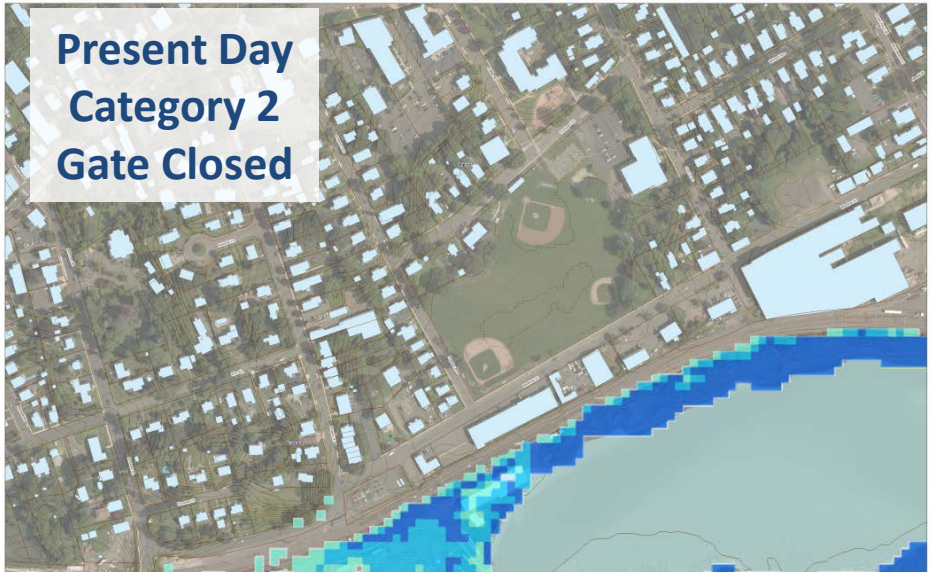


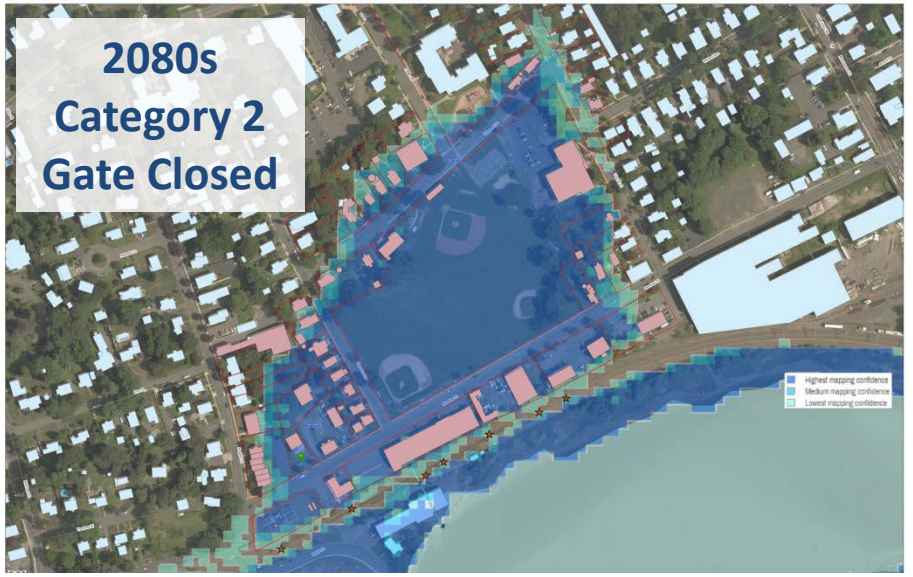


Concepts: Meadow Street









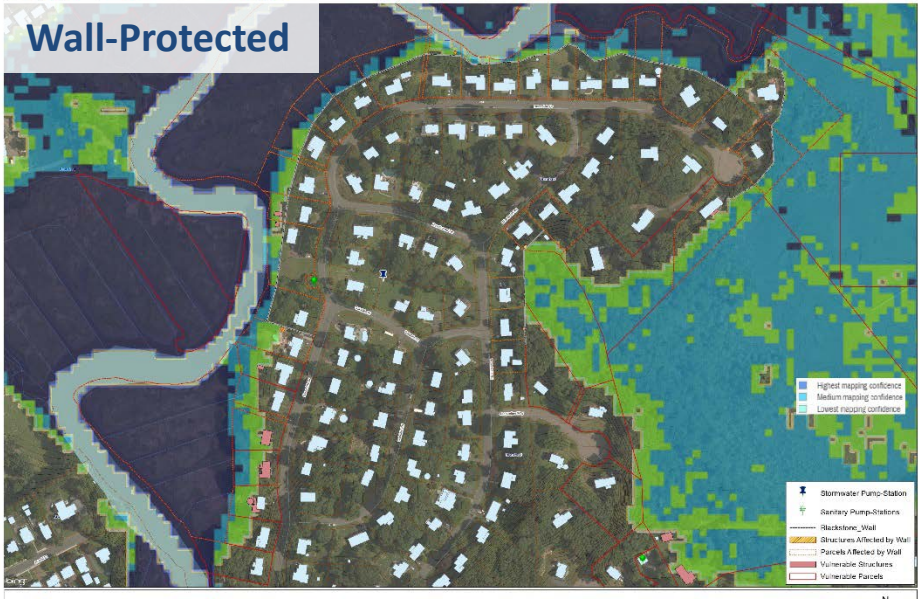
Concepts: Blackstone Acres

Concepts: Blackstone Acres

2020s No Storm

Concepts: Blackstone Acres

2080s No Storm

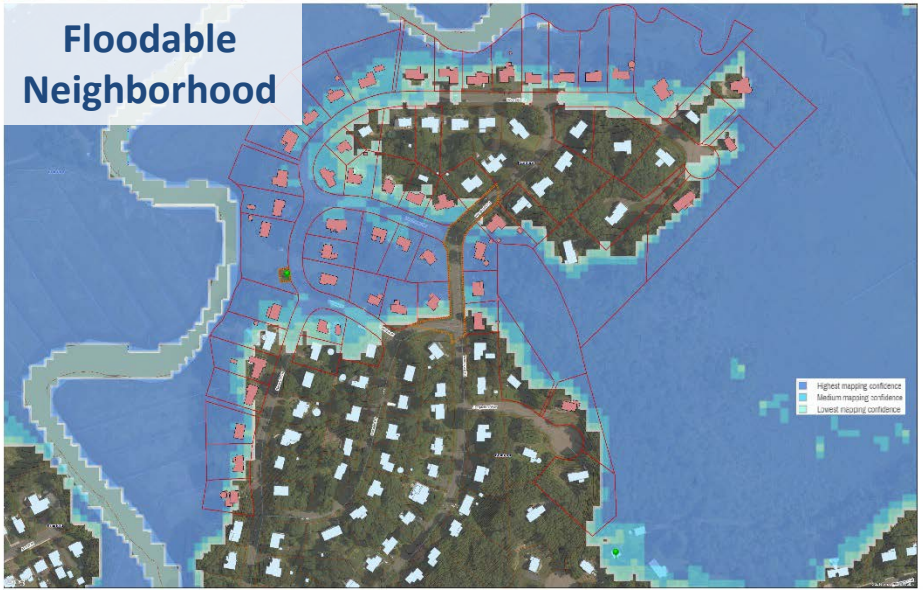


Concepts: Blackstone Acres

Present Day Category 2 Storm

Concepts: Blackstone Acres

2080s Category 2 Storm



Summary

	Elevate Roads	Elevate Homes	Shoreline Protection	Beach Nourishment	Upgrade Drainage & Utilities	Acquisition & Retreat	Relocate Roads or Facilities
Isolation	X					X	X
Short Beach	X		X	X	X	X	
Pawson Park	X	X	X				X
Limewood Beach	X	X				X	
Hotchkiss Grove	X	X	X	X	X	X	
Pine Orchard	X	X	X	X			
Stony Creek	X	X	X		X		X
Blackstone Acres	X	X	X		X		
Meadow Street		X	X		X	X	X

Resilience Discussion

- What areas are important to you?
- What options interest you?
- Where would specific options work?
- What challenges do you see to different options?

Online Survey

www.surveymonkey.com/r/BRANFORDCRP

Branford

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