NROC Coastal Resilience Webinar April 1, 2014

Town of Marshfield Massachusetts

Building Coastal Resiliency

Sea Level Rise Planning on the South Shore
Marshfield Scituate & Duxbury

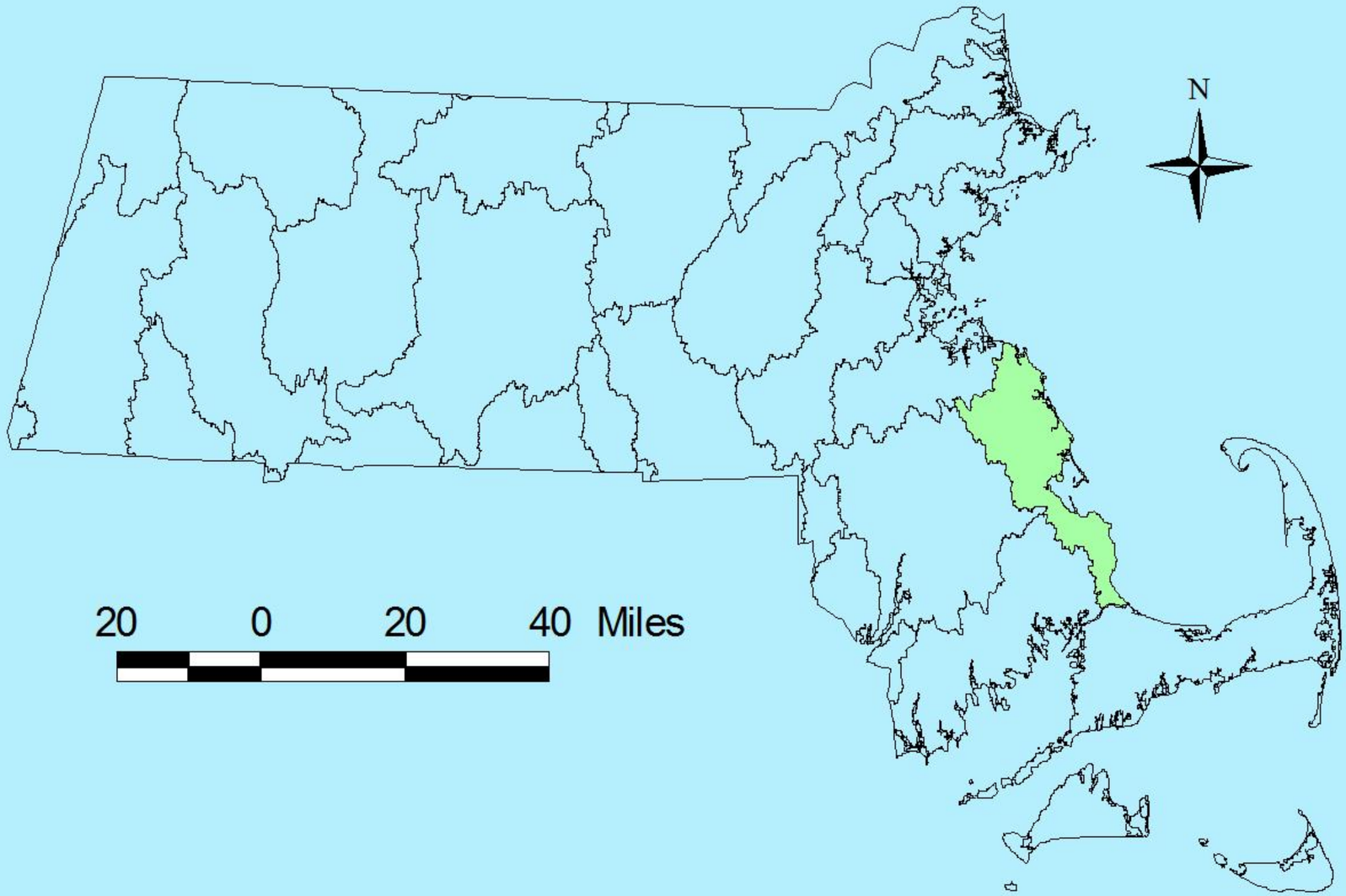
Tackling Sea Level Rise in Marshfield

- Direct Local Technical Assistance Grant- MAPC

- Gulf of Maine Coastal Municipal Resilience Grant

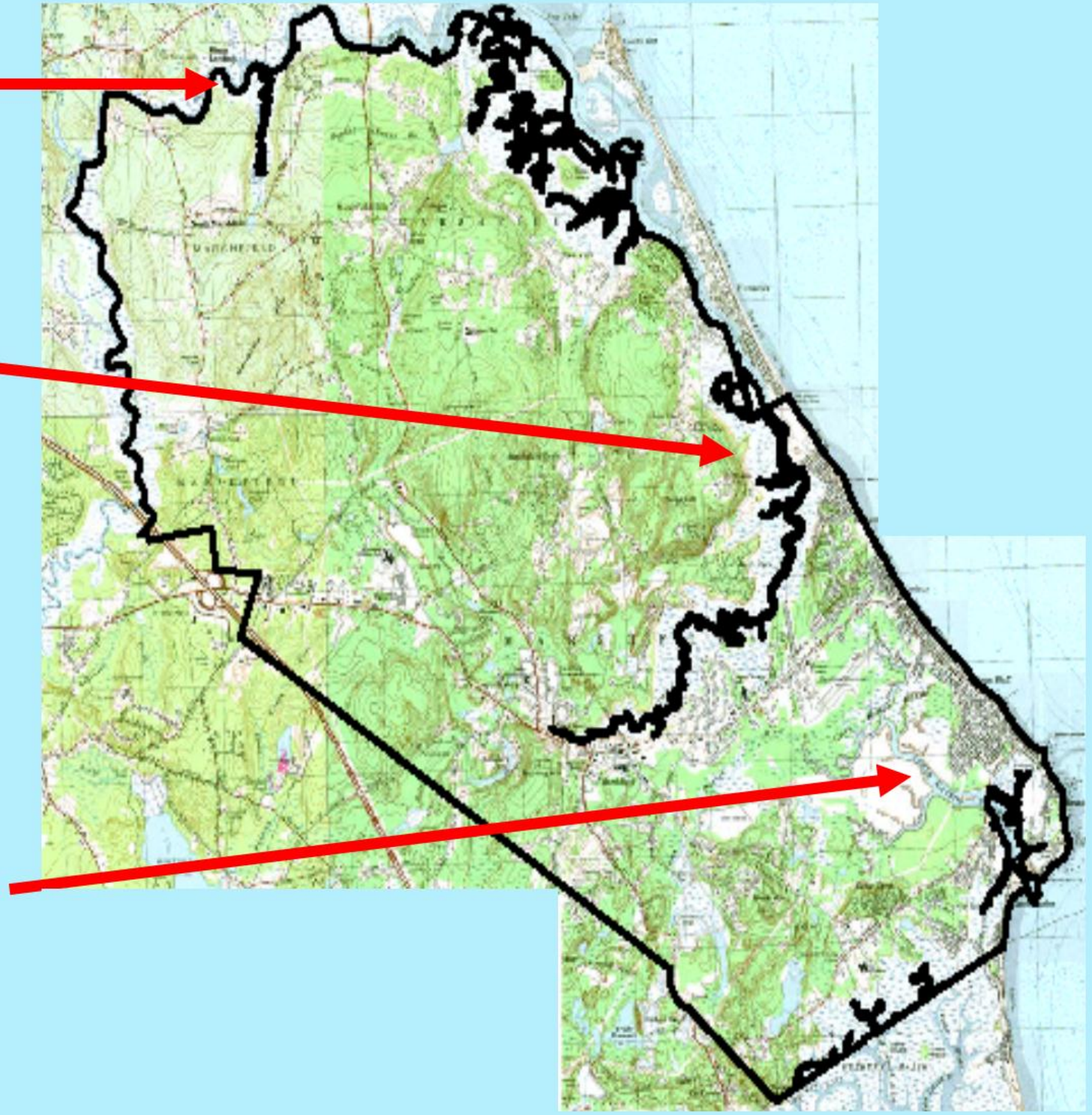
- Coastal Advisory Committee

South Shore Region Marshfield – Duxbury - Scituate



3 Rivers in Marshfield

- North
- South



Green Harbor

Marshfield is More Vulnerable to Sea Level Rise

Why ?

- Geography – 3 Rivers that reach inland into the interior of our town.

- Extensive floodplains and marshes

- North & South River Watersheds cover 12 towns over an area of 93 square miles.

- This large watershed area drains to the mouth of the rivers.

Marshfield is More Vulnerable to Sea Level Rise

- Barrier beach narrow fragile landform
- Densely populated coast
- Exposure to high energy surf from Massachusetts & Cape Cod Bay

2.4 miles of sea walls

Densely developed shoreline

Flooding Hot Spot

- The three town region Marshfield, Scituate & Duxbury has received 23% of the total FEMA Flood Insurance Claims for the entire state.

- This totals $72,088,437 for the three town area. (2010)

- From Gloucester to Provincetown to New Bedford. Our 3 towns had 23% of the total flood loss claims.

Flooding in Marshfield

- 156 flood damage claims in the Town of Marshfield
- 87 have had repetitive losses
- 37 have had flood insurance claims at least 3 times
- 11 claims have been for over $ 100,000 in damage
- $14,347,458 total for Marshfield (2010)


DYKE RD
OCEAN ST

May 2010 – Sea Wall Failure

- A 500’ section of sea wall failed at the end of Farragut Rd.
- Although the wall was old, built in the 1930’s
- I believed sea level rise was a factor
- The DPW has historically managed the coastal infrastructure
- I decided to get more involved because this is a long range environmental planning issue.

September 2010 Selectmen's Meeting

- Town needs to take a more proactive approach to managing our coastal infrastructure.

- Sea Level Rise was one of the factors for the collapse.

- Sea Level Rise will make this a more common event

- We need to plan ahead and account for the impacts of sea level rise.

Initial Reaction - What can we do?

- Climate Change and sea level rise are huge global issues.

- What can we do at the local level, with little staff and money to scratch the surface on a huge global issue?

- Response - Apply for a grant to get some outside assistance.

Direct Local Technical Assistance Grant (DLTA)

- Contacted Planners from Duxbury & Scituate

- Regional problem – Regional approach

- Applied for a (DLTA) grant from our regional planning agency the Metropolitan Area Planning Council (MAPC)

- Duxbury, Scituate & Marshfield awarded a grant to study adaptation & mitigation options for sea level rise.

South Shore Coastal Hazards Adaptation Study

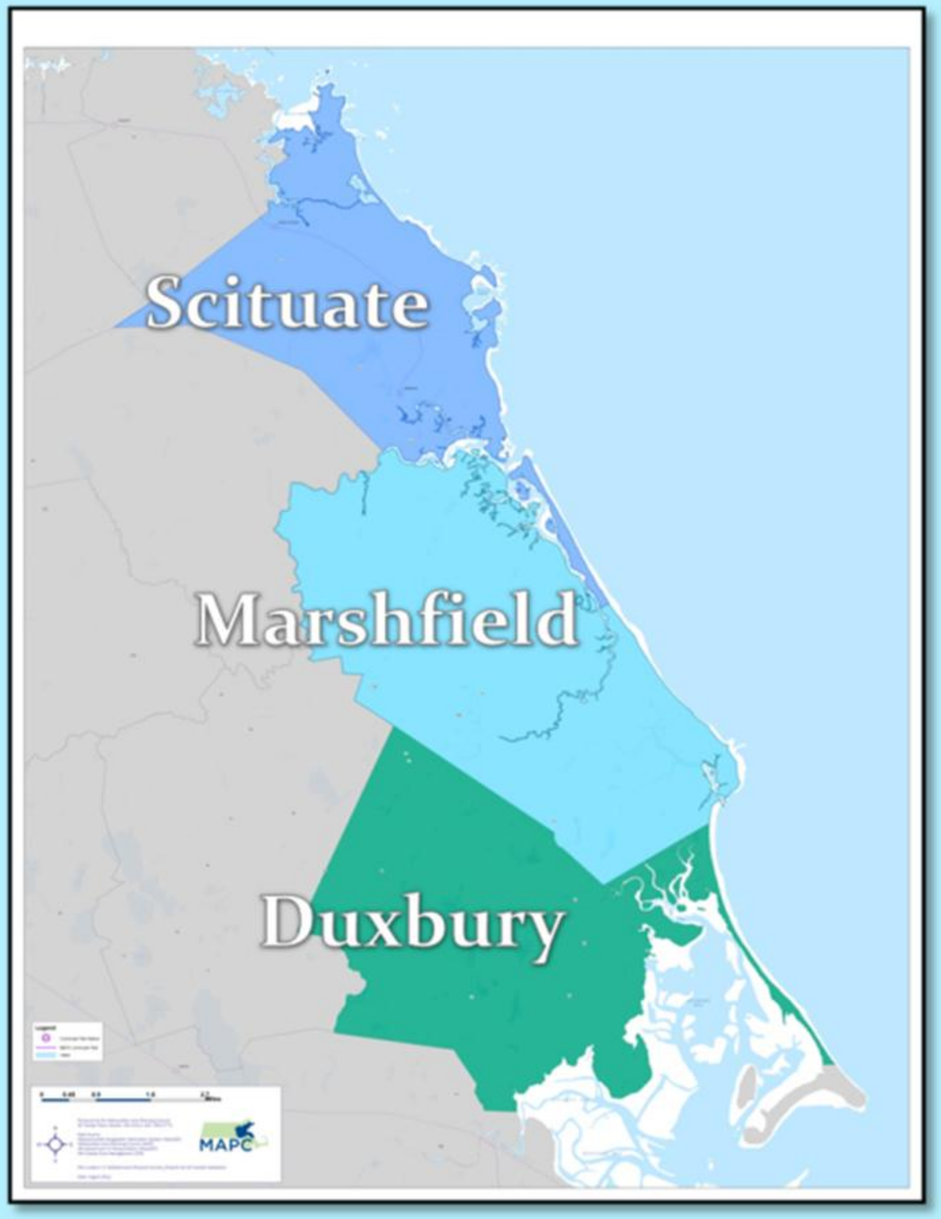
Funding provided by the
District Local Technical Assistance program

Prepared for the

Towns of Duxbury, Marshfield, and Scituate

December 31, 2011

Prepared by
Metropolitan Area
Planning Council
60 Temple Place, 6th Floor
Boston, Massachusetts 02111
Tel (617) 451-2770
www.mapc.org



Coastal Hazard Adaptation Study

- ✓ Review and analysis of existing reports & studies.
- ✓ Explored current and potential future coastal vulnerabilities.
- ✓ Identified a range of possible adaptation options.
- ✓ Provided information about resources that could support local actions and strategies.

Other Goals - Public Education

- ✓ Analysis of the 40 year history of flooding in the South Shore region, since the National Flood Insurance Program started.

- ✓ Study served as a primer on climate change and sea level rise.

- ✓ A tool to educate the public on potential impacts of sea level rise.

The Study followed Standard Planning Process

- **Inventory** – Coastal infrastructure
- **Assessed** – Condition of Infrastructure, historical trends, geography and natural resources
- **Alternatives** – Provided Mitigation & Adaptation Strategies
- **Recommended Actions** – Such as flood proofing
- **List of resources –** Grant opportunities
- **Public Education**

Adaptation Strategies
Three major categories of adaptation

- **Protect** – Measures to shield land uses from the impacts of sea level rise such as sea walls.

- **Accommodate** – Measures that adjust to the impacts of a rising sea while maintaining existing land uses, flood proofing / elevating structures.

- **Retreat** – Measures that accept the impacts of sea level rise and move land uses farther inland.

Recommended Actions

- Regulations – Greater setbacks
- Land Acquisition – Buying properties
- Development/Building guidelines – Locating out of the flood zone
- Flood proofing – Elevating structures


ARTHUR & PATS

Gulf of Maine Council for the Marine Environment &Northeast Regional Ocean Council Grant

- Planners from the 3 towns applied for a second grant from Gulf of Maine Council on the Marine Environment & Northeast Regional Ocean Council

- One Pilot project was selected from Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut.

- Our 3 town region was awarded the $30,000 grant for Massachusetts.

Marshfield-Scituate-Duxbury
Municipal Coastal Resilience Initiative

- NOAA recently completed new LiDAR maps for the New England coastal region.

- LiDAR – Light Detection and Ranging

- Aerial Photos with higher vertical accuracy

Step 1. Mapping Hazard Areas

- NOAA has provided our towns with flood inundation maps. Our 3 towns were the first in the state to receive these maps from NOAA.

- They project where areas may flood at 1'contour intervals.

- Consultants used these maps to project where the mean high water line will be in 25, 50 & 75 years from now.

- Worst Case 100 year storm 25, 50 & 75 years from now.

Step 2. Vulnerability Assessment

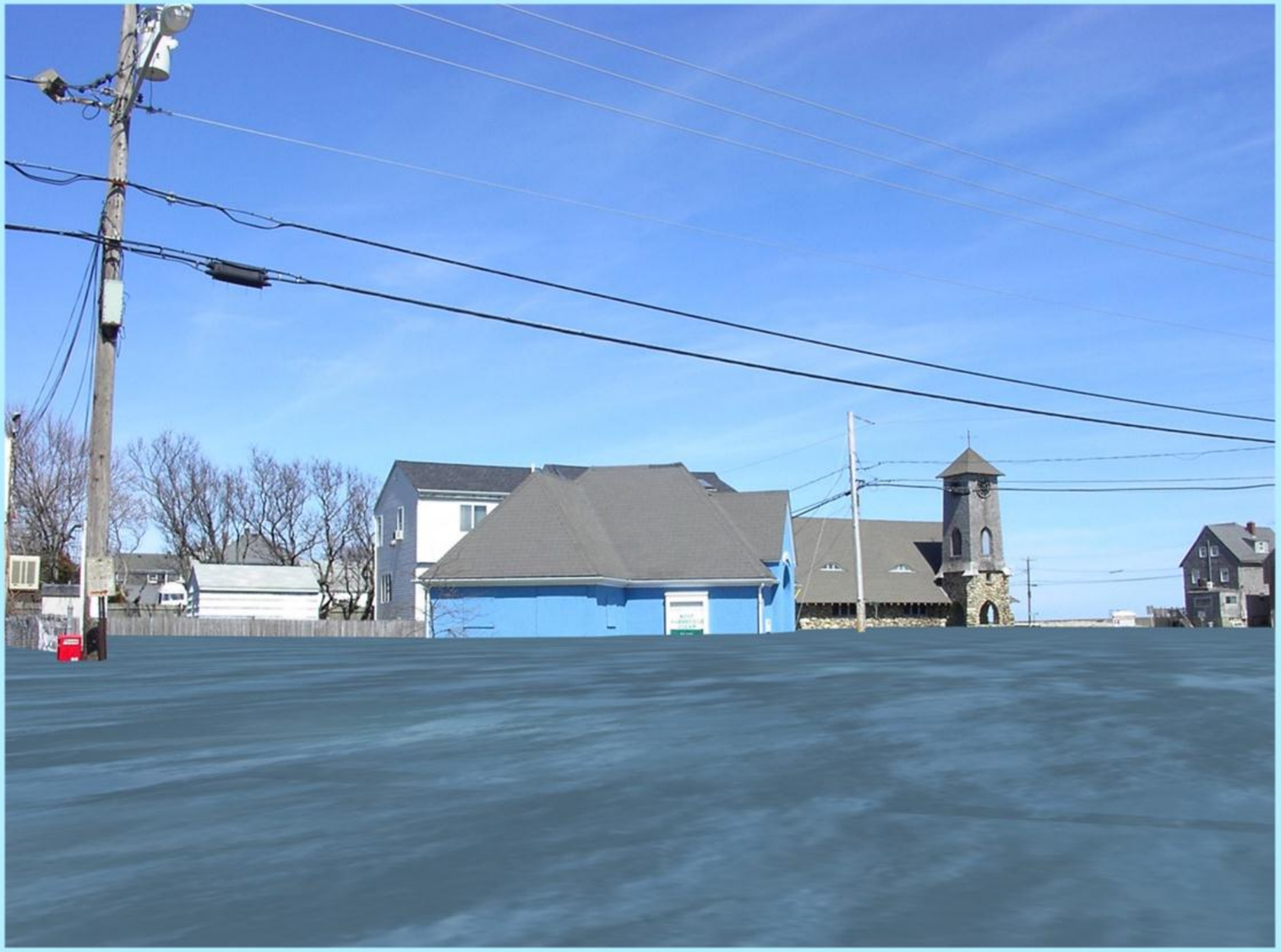
- Identify key public & private properties and natural resources in projected areas of flooding.

- Conduct a risk or vulnerability assessment in flood prone areas.

- We selected 5 public buildings & facilities for 3-D inundation imaging in each town.

- The 3-D images will show the projected depth of flooding for the three specified time periods

Comfort Station in Brant Rock
2088 (75-years) with SLR and Storm Surge



Step 3. Project Impacts to Natural Resource

- Consultants assessed the impacts to natural resources in the three town area based on the inundation models produced for the three time frames.

- Planners assisted the consultants by identifying sensitive resource areas that should be analyzed for potential flooding impacts such as salt marsh and shellfish beds.

Step 4. Develop Adaptation & Mitigation Options

Consultants provided:

- Location specific recommendations to minimize and mitigate the effects of sea level rise in areas that are projected to be flooded in each town.

- List of possible mitigation or adaptation options and discuss the pros and cons of each recommended option.

- Provide cost estimates for each option in a general way such as low, medium and high.

Step 5. Public Education & Outreach Meetings

- Public meetings were held to present the results of the study to the Selectmen in the 3 towns.

- Maps have been displayed in the 3 towns in public places such as Town Halls, libraries and web sites.

- Information has been provided to public officials, environmental groups and the media in the region in an effort to educate them about the potential impacts of sea level rise.

How Has the Study Been Used ?

- Public meetings were held in the 3 towns to present the findings of the study.

- Over 150 people were in attendance at presentations in Scituate & Marshfield.

- Since the study focused on problems that will impact people in 25 – 75 years some people were not concerned. Several Scituate residents spoke about the more immediate problem of replacing the ageing sea walls.

How Has the Study Been Used ?

- Identified where the high tide line will be in 25, 50 and 75 years.

- The projections will help civil engineers designing replacement sea walls to know if the footings of the walls will be in standing water in 25 years.

- If the design life of the structure is 50 years, we need to know if the walls will be occasionally subjected to wave action or constantly hit by waves.

How Has the Study Been Used ?

- ✓ Inundation maps will be used to focus attention on areas that are projected to flood.

- ✓ Residents and Businesses can plan ahead and flood-proof buildings that are projected to be flooded more often.

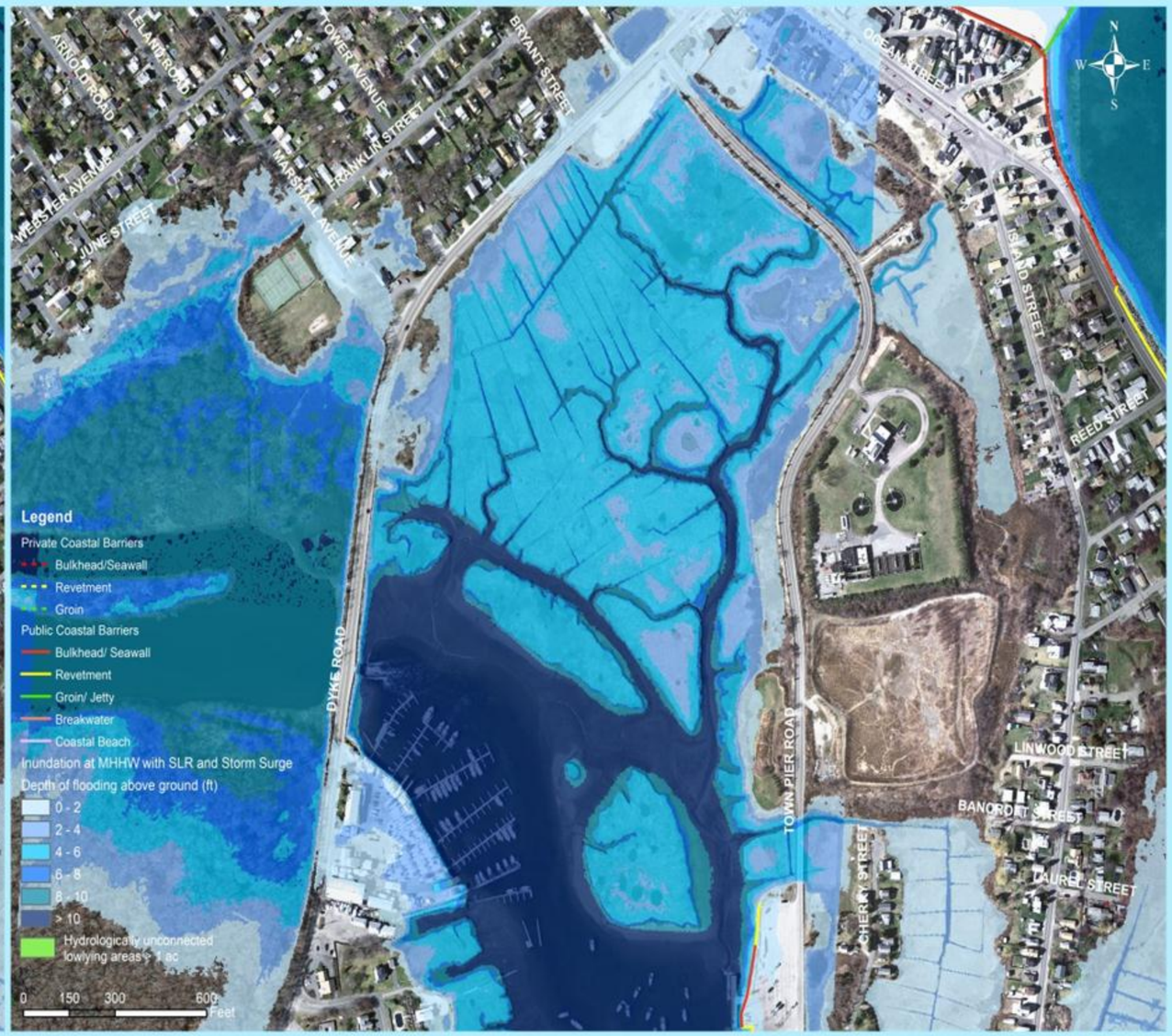
How the Data in the Report Will Be Used

- ✓ The Town can focus on mitigation measures for roads and other public buildings and infrastructure.
- ✓ Public education – Help people visualize what the flooding will look like from 3-D inundation photo simulations.

How the Data in the Report Will Be Used

- Identifying roads that will flood will help in evacuation route planning.
- Help get future grants for mitigation design work
- Help with Capital budget planning for mitigation/adaptation projects.

Dyke Rd & Waste Water Treatment Plant
Sea Level Rise Only

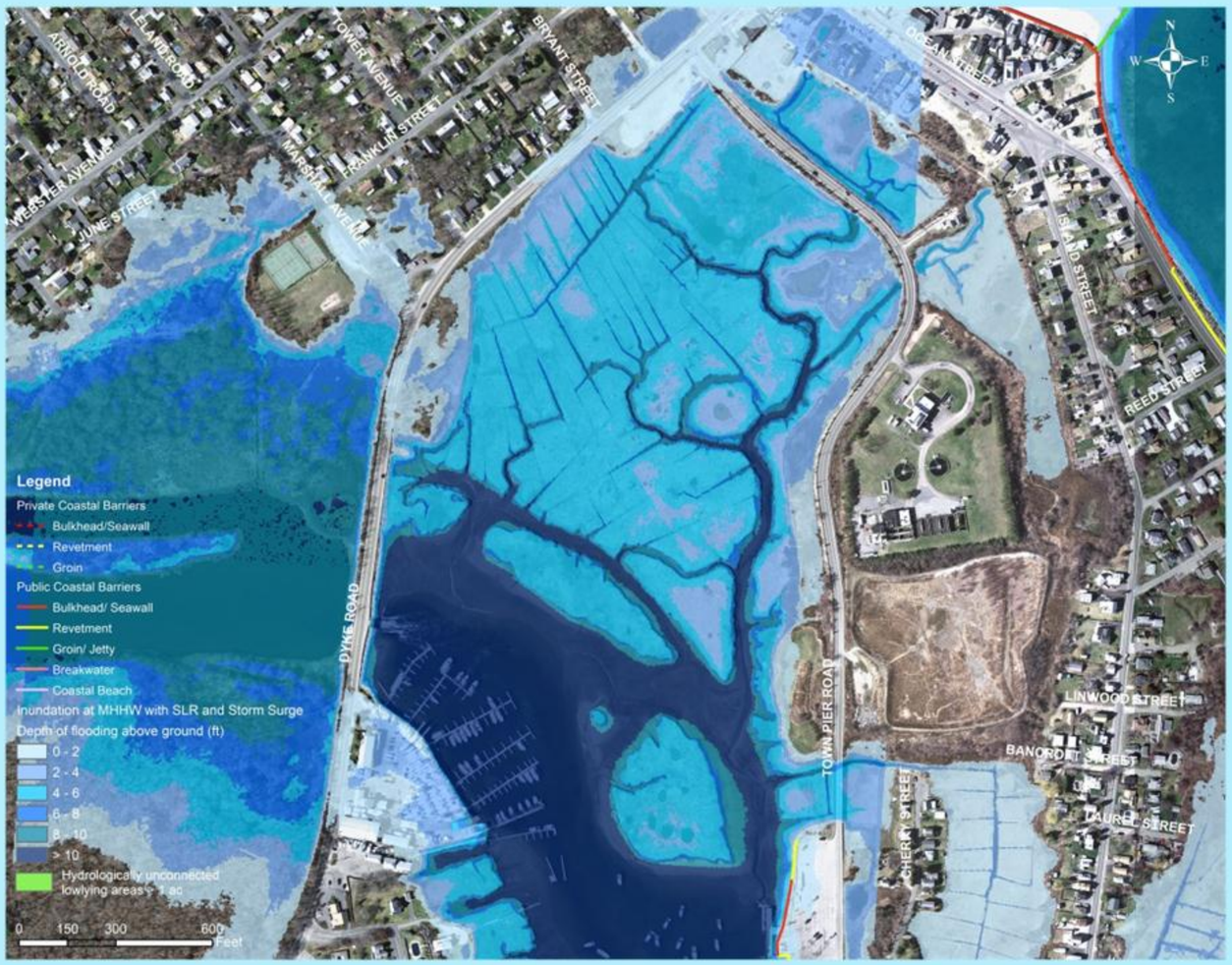


SLR of 1.08 ft by 2038

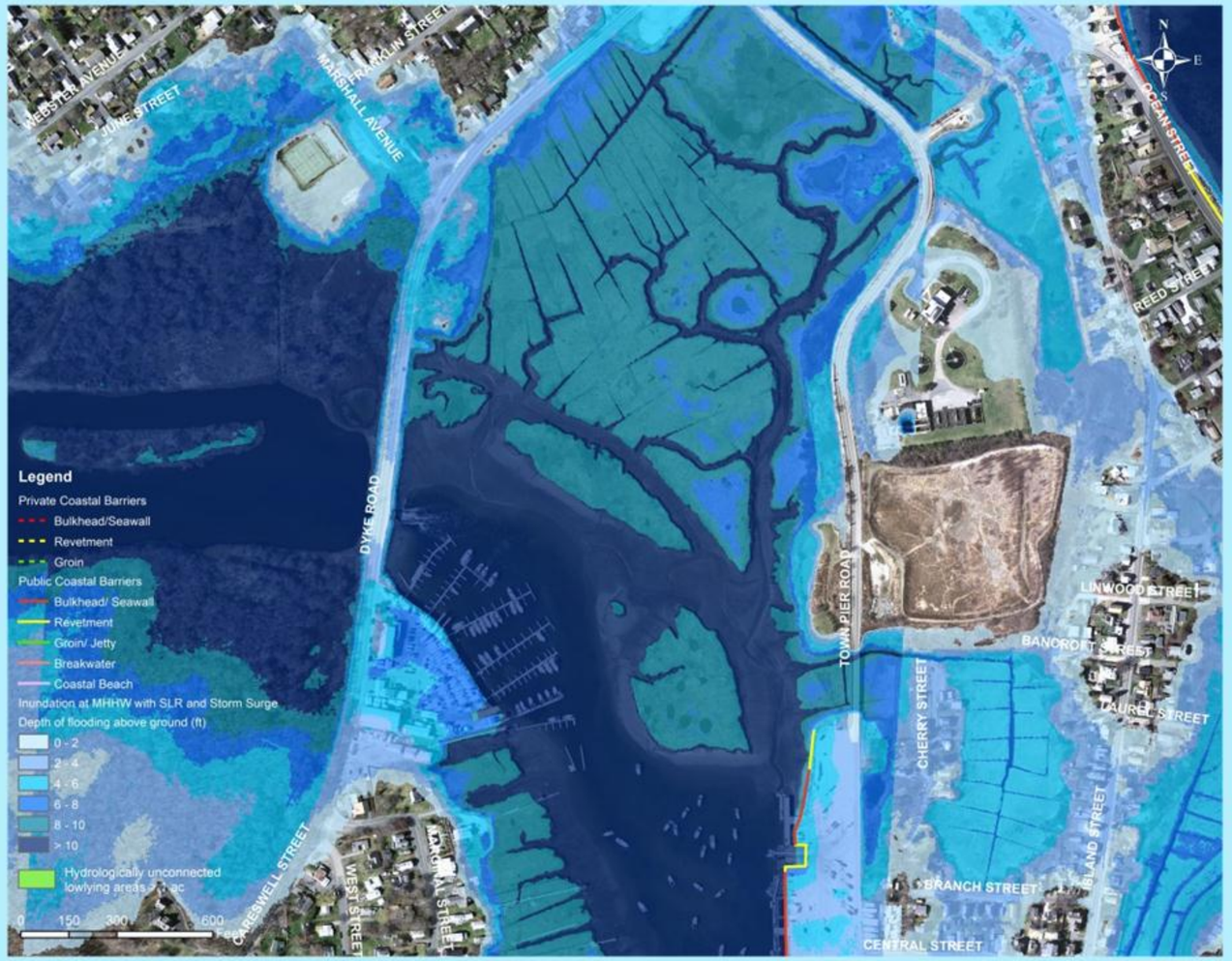
SLR of 5.61 ft by 2088

Sea Level Rise & Storm Surge

Dyke Rd & Waste Water Treatment Plant

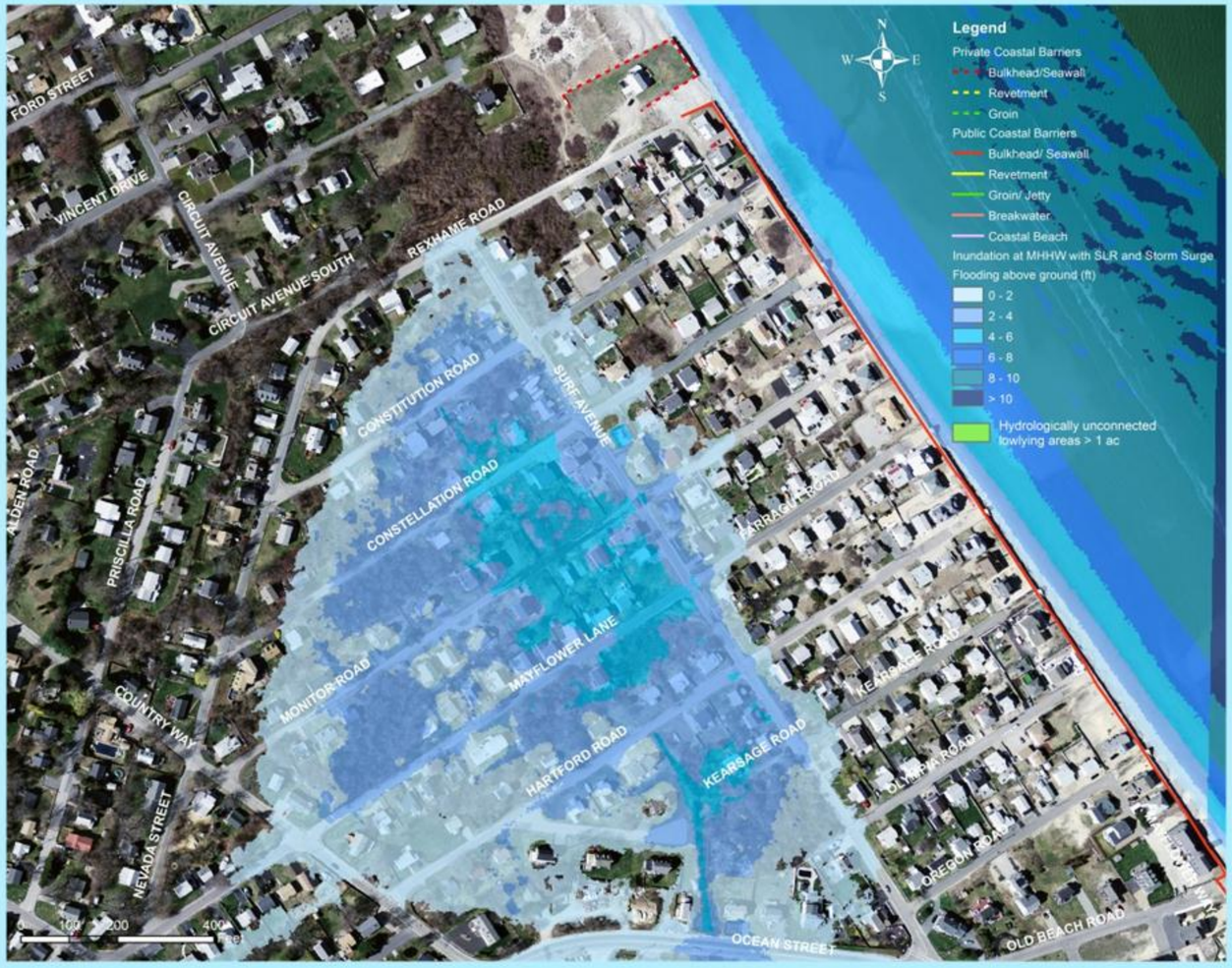


SLR of 1.08 ft by 2038 and
Storm Surge from Category 1 Hurricane

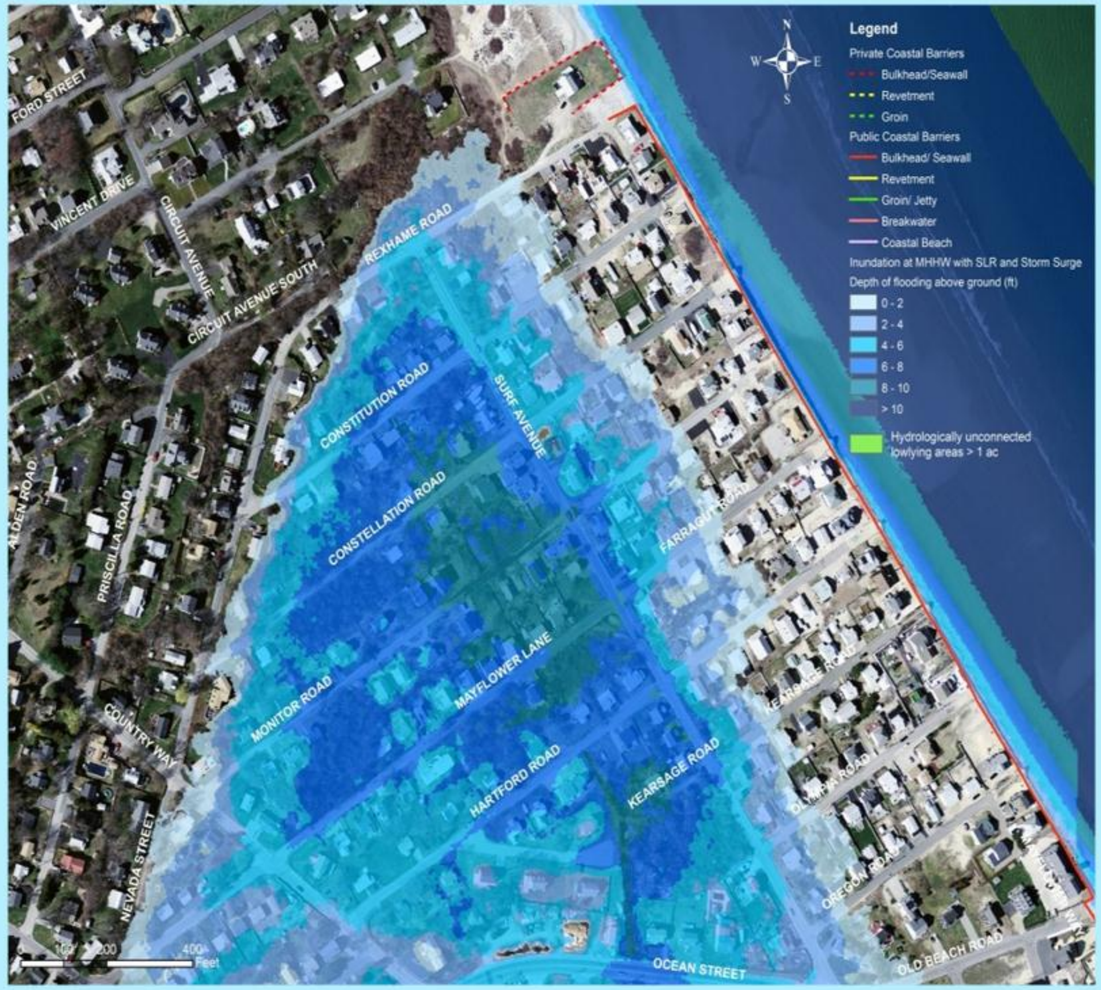


SLR of 5.61 ft by 2088 and
Storm Surge from Category 1 Hurricane

Rexhame Road Area
Sea Level Rise & Storm Surge



SLR of 1.08 ft by 2038 and
Storm Surge from Category 1 Hurricane



SLR of 5.61 ft by 2088 and
Storm Surge from Category 1
Hurricane

Coastal Advisory Committee

March 2013 Selectmen appointed a new Coastal Advisory Committee.

- Advise the Town on sea level rise adaptation strategies that include but are not limited to protection, accommodation or retreat so as to enable sustainable living in our coastal community

Committee Charge

- To proactively promote a research-based approach to making local decisions about various sea level rise adaptation strategies that include but not be limited to: flood-proofing, beach nourishment, armoring sea walls, tactical retreat and land acquisition.

- Develop policies that will help to minimize the Town's exposure to coastal storms in an effort to protect public safety, infrastructure, natural resources and private property.

- Develop various bench mark indicators to measure sea level rise, coastal storm frequency and intensity.

Sandy

Brant Rock - Nemo

Comments & Questions