Implementation of the Community Coastal Resilience Plan

Presented to:
RAE Conference
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Presented by:
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Milone & MacBroom, Inc.

Project Partners:
The Nature Conservancy
UEDLlab
Gulf of Maine Council on the Marine Environment
NOAA
Presentation Agenda

- History of Coastal Hazard Planning in Guilford
- How did Guilford Evaluate Vulnerabilities and Risk?
- Options for Adaptation
- Plan Implementation
  - Roadway Adaptation
  - Tidal Wetlands Restoration and Living Shoreline
  - Neighborhood Scale Planning
  - Plan Revisions and Town Adoption
- Funding Recap
History of Coastal Hazards & Climate Change Planning

- 1982 – Initial Municipal Coastal Program per CZM
- 2006 – Harbor Management Plan
- 2007 – Town Center South Plan
- February 5, 2007 – the government of the Town of Guilford formally recognized climate change as a phenomenon requiring long term governmental monitoring and management
- 2008 – Municipal Coastal Program Update with Emphasis on Coastal Hazards
- 2010 – Hazard Mitigation Plan with SLR Section and Emphasis on Coastal Hazards
- 2012 – Commenced the Three-Part Community Coastal Resilience Plan
Coastal Resilience

The four basic steps of the “Coastal Resilience Program”

1. Generate awareness of coastal risk
2. Assess coastal risks, vulnerabilities, and opportunities
3. Identify options for addressing priority risks
4. Develop and implement an action plan to put selected options into place

Shell Beach Road
Irene Flooding, 2011

Shell Beach Road
Sandy Wrack Line, 2012
Guilford is at a crossroads:

- Vulnerabilities can remain static and risks can increase.
- Vulnerabilities can be reduced to hold risk at bay.
- If vulnerabilities can be reduced even further, then risks can be lowered in the face of rising sea level and increased coastal storms, leading to increased resilience.
How did Guilford Assess Vulnerabilities and Risks?

- Guilford developed a risk and vulnerability report funded through a grant from NOAA as part of the New England Municipal Resilience Initiative.
- TNC’s web-based decision support toolbox (coastalresilience.org) was the basis for the assessment.

Vulnerability Assessment

<table>
<thead>
<tr>
<th>Year</th>
<th>Infrastructure</th>
<th>Natural</th>
<th>Societal</th>
<th>Daily Inundation</th>
<th>Chronic Storms</th>
<th>Major Storms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td></td>
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<td></td>
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<td>2050</td>
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<tr>
<td>2080</td>
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</table>
How did Guilford Assess Vulnerabilities and Risks?

- TNC’s web-based decision support toolbox (coastalresilience.org)

### How did Guilford Assess Vulnerabilities and Risks?

- **2080s: scenarios mapped by the coastal resilience viewer**

<table>
<thead>
<tr>
<th>Decade</th>
<th>Condition</th>
<th>Sea Level Rise Estimates*</th>
<th>Elevation (feet, NAVD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2080s</td>
<td>No Storm</td>
<td>High</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conservative</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>Category 2</td>
<td>High</td>
<td>13.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>10.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conservative</td>
<td>10.6</td>
</tr>
<tr>
<td></td>
<td>Category 3</td>
<td>High</td>
<td>16.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>13.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conservative</td>
<td>13.6</td>
</tr>
</tbody>
</table>

Source: TNC (www.coastalresilience.org)

*Sandy water elevation = 8.4 to 8.5
Current FEMA BFE = 11 to 13 feet*
What is Vulnerable and What is at Risk?

- Social
- Economic
- Infrastructure
- Utilities
- Emergency Services
- Natural Systems
What is Vulnerable and What is at Risk?

• Example: Lost Egress

2050s Daily Inundation

2080s Category 3 Storm
What is Vulnerable and What is at Risk?

• Example: Inundated Neighborhoods
What is Vulnerable and What is at Risk?

- Example: Damaged Infrastructure
## Options for Adaptation in Guilford

<table>
<thead>
<tr>
<th>Option</th>
<th>Typical Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Management of coastal real estate and structures</td>
<td>May include phasing with coastal realignment strategies and may occur through zoning overlay districts or zoning amendments; May include strengthening building codes to require freeboard, using V zone standards in A zones, and acquisition of property damaged by coastal hazards.</td>
</tr>
<tr>
<td>2. Shoreline protection and management of coastal and near-shore lands</td>
<td>May include hard shoreline protections, living shorelines, land acquisition and land conservation practices for tidal marsh advancement, and tidal wetland buffers for near-shore flood protection.</td>
</tr>
<tr>
<td>3. Roadway alterations</td>
<td>May include elevation of roadways, abandonment of some roads, re-analysis of emergency access, and developing alternative egress for some areas.</td>
</tr>
<tr>
<td>4. Protection or replacement of water supply wells and septic systems</td>
<td>May include on-site retrofits, development of community systems, extension of sewer and water systems, or vacating properties.</td>
</tr>
</tbody>
</table>
Where to Find the Three-Part Coastal Resilience Plan

Coastal Vulnerability and Risk Assessment:

Report of Coastal Adaptation Options:

Coastal Resilience Plan:
Coastal Resilience Plan Implementation

Four Areas of Focus:

1. Roadway Adaptation
2. Tidal Wetlands Restoration and Living Shoreline
3. Neighborhood Scale Planning
4. Plan Revisions and Town Adoption
Three roads were selected
• Old Quarry Road – $1M
• Chaffinch Island Road – $1M
• Tuttles Point Road – $1M
• 2014-2015 Capital Plan

Funding was approved
• Referendum 4/9/13
• The bond passed with 60% approval
Roadway Adaptation

- Chaffinch Island Road Elevation
Roadway Adaptation

- Old Quarry Road Elevation

2020s Daily Inundation

Present Day Cat 2 Storm
Roadway Adaptation

- **Old Quarry Road**
  - Elevate 2,500 feet
  - Replace two culverts
  - 15,000 sf of fill – only 0.3% of the marsh system
  - CT DEEP, federal, and local permits needed
Roadway Adaptation

• Old Quarry Road permit conditions:
  • Establish vegetation on the new roadway embankments
  • Standard sediment and erosion controls for coastal and tidal wetland areas
  • Mitigation for the 15,000 sf of fill will consist of installation of new tide gates for the nearby Leetes Marsh
  • The new tide gates will help restore 40 acres of tidal wetlands in the Leetes Marsh
• Upon issuance of the Draft Permit, an adjudicated hearing was requested by petitioners
• Hearing proceeded in autumn 2013
I have reviewed the hearing record in this matter, including the documentary evidence, oral testimony, and public comment on the environmental impacts of widening the road. I accept the Agreed Draft Decision provided by the DEEP and the applicant. It is fully supported by this record and provides the necessary factual findings and conclusions of law to support the conclusion that the proposed elevation of Old Quarry Road, as defined and conditioned by the draft permit, will not cause adverse environmental impacts.

I make one comment and share one observation that are not essential to my decision, but which I believe are noteworthy. First, in response to public concern and a comment by its expert soil scientist, the Town agreed to cover the riprap shoulders with topsoil. This will not only mitigate impacts to tidal wetlands but will specifically increase the rate of re-establishment of the wetland vegetation on the road shoulders. Second, one of the goals of the Coastal Management Act is to preserve and enhance coastal resources. General Statutes §22a-92 (2). The minimization of flooding and drainage issues will improve the overall quality of the tidal marsh system adjacent to and in the area of Old Quarry Road.

The Town of Guilford has demonstrated that the proposed activity, if performed in compliance with the proposed permit terms and conditions, would comply with the applicable statutes and regulations. I therefore recommend issuance of the proposed draft permit (Attachment B).

Janice B. Deshais
Hearing Officer
Tidal Wetland Restoration and Living Shoreline

- Tidal wetland restorations are desired in three locations:
  - Leetes Marsh
  - Long Cove
  - Chittenden Park/West River
- In all cases, tidal wetlands are believed to contribute to coastal resilience
- Healthy and restored tidal wetlands will decrease the frequency and magnitude of flooding of Route 146 and the town center south area
Tidal Wetland Restoration and Living Shoreline

Chittenden Park/West River

• Most complex project of the three
• Edge of tidal wetland has been receding (50 feet per decade)
Tidal Wetland Restoration and Living Shoreline

Chittenden Park/West River

- Incorporates living shoreline
- Estimated cost of $4 million
- Will help attenuate storm surges and waves and therefore protect the town center south area
Funding:

- Grants are desired
- DOI/NFWF application submitted in January 2014
- Includes design and construction costs
- Total cost of $4.9M
- Was not selected for funding
Neighborhood Plan Examples

- Objective is to showcase possible inundation/surge scenarios and adaptation outcomes for two types of neighborhoods:
  
  - **Soundview Road** was selected to consider commercial and industrial land uses and demonstrate tradeoffs in zones of shared risk
  
  - **Seaside Avenue** was selected to consider residential and municipal land uses and demonstrate future outcomes in zones of shared risk
Neighborhood Plan Example – Soundview Road

- Scenarios that informed the Soundview Road plan

2020s Daily Inundation

2080s Daily Inundation

Source: TNC (www.coastalresilience.org)
Coastal adaptation will require tradeoffs:

- New road connection vs. raising Soundview Road’s lowest section
- Floodproofing nonresidential properties vs. local relocation vs. regional relocation
- Facilitating marsh advancement on private properties vs. on Soundview Road
Coastal adaptation may allow different outcomes:

- Relocated residents from elsewhere may be able to settle here
- Housing would need to be resilient and able to withstand floods and storm surges
- Space for tidal marshes must be available
Seaside Avenue/Guilford Marina

- Flooding of structures
- Septic system failures
- Public beach at one end and marina at the other end
Neighborhood Plan Example – Seaside Avenue

- Scenarios that informed the Seaside Avenue plan
Neighborhood Plan Example
Seaside Avenue
Plan Revisions and Town Adoption

- To Date, the CR Plan remains a town planning document completed in accordance with the NOAA grant.
- Types of revisions that are under consideration:
  - **Which agency will implement** the plan going forward – the Town’s Hazard Mitigation Commission vs. a new commission.
  - **How land could be acquired, and by whom** – The Town as a development agency, a new Coastal Development Commission, or the existing Land Acquisition Commission.
  - **Need for partnering** with neighborhood representatives.
  - **How to adopt** the plan – POCD or separate plan?
Management of Coastal Real Estate and Structures

- Building Codes (freeboard, etc.)
- Zoning Amendments
- Zoning Overlays
- Acquire Damaged Properties

Hazard Mitigation Commission

- Planning and Zoning Commission
- Board of Selectmen
- Coastal Development Authority

Coastal Realignment

FEMA mitigation funds

Other funds
Shoreline Protection and Management of Coastal and Near-Shore Lands

Hard Shoreline Protections
Living Shorelines
Buffers for Wave and Surge Protection
Land Conservation for Marsh Advancement
Land Acquisition for Marsh Advancement

Hazard Mitigation Commission

Town Engineering Department
Conservation Commission

Planning and Zoning Commission
Harbor Management Commission may review all

Land Acquisition Commission
Local Land Trusts and Others
Coastal Development Authority
The Nature Conservancy and Others
Protection or Replacement of Water Supply Wells and Septic Systems

- On-site Retrofits of Septic Systems
- Community Wastewater Systems
- Extension of Sewer System
- Individual Water Treatment Systems
- Community Water Systems
- Extension of Water Mains

Hazard Mitigation Commission

Town Engineering Department and Health Department

Coastal Development Authority

Abandon Properties without Viable Water and Wastewater Services
Recap: Funds Needed for Implementation

1. Roadway Adaptation – Bonds Approved
2. Tidal Wetlands Restoration and Living Shoreline – DOI/NFWF Grant Application (Town as applicant) not selected
3. Additional Neighborhood Scale Planning – DOI/NFWF Grant Application (Yale as applicant) not selected
4. Plan Revisions and Adoption – Conducted by Staff and Pro Bono Assistance from Yale & TNC
Questions?