Coastal Resilience Methods

***Warning***

These are the wide verity of methods. Some Nantucket examples of existing structures and methods are shown. There are no proposed methods for specific locations on Nantucket. These are examples of what could potential be in the Coastal Resilience Plan. This is to introduce the CRAC to methods and considering methods that can or should be used on Nantucket.

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Oct 1, 2019
The Big Problems

Water is Coming

Erosion Happens
Adaption Options

Planning Resiliency

Emergency preparation and response

Redirection or retreat of development

Procedural, regulatory, and financial modifications

Structural Resiliency

Construction of seawalls and bulkheads

Construction of floodwalls and levees

Construction of groins and jetties

Installation of temporary flood barriers

Floodproofing of buildings

Elevation of buildings

Scale

Site-specific

Neighborhood-scale

Large-scale

Water management

Managing peoples expectations
Basic Structural Adaption Strategies

Accommodate

Protect

Retreat
Shoreline Management

Hard infrastructure

Hard Bank Protection
Sometimes called hard armoring

Seawalls
Revetments
Bulkheads
Levees

Hard Sediment Management structures
Shoreline Management

Hard infrastructure

Hard Sediment Management structures

Jetties

Breakwaters

Groins

Adaptive methods

Nantucket Jetties

Hyannis Breakwater

Groins by Hallowell Lane, Nantucket

A type of detached Breakwater from Norfolk, VA used to manage sediments and wave strength.
Shoreline Management

Hard infrastructure
Issues and problems

Visual impacts
Horizontal and vertical access restrictions
Loss of sand supply to beach from armoring backshore

Placement losses with construction of revetment or seawall
Passive erosion
Active erosion

Would any of these every be acceptable on Nantucket?

Some of these would be very difficult or impossible to obtain a permit for on Nantucket or in Mass.
Shoreline Management

Living shoreline or Green infrastructure

Beach Nourishment / Replenishment

Dune Management

Tidal wetland management & creation

Hybrid techniques (gray infrastructure, or in-combination techniques)
Community infrastructure protection

Storm water Management
Avoid in-combination flooding with coastal flooding
Drain coastal flooding ASAP

Inland Stormwater retention
Green Stormwater Infrastructure
Stormwater Pump Stations
Gasketed Piping
Floodgates at Outlets

Green = wetland areas. Wetlands, ponds and great ponds can all store excess water. Native wetland plants are best, but Phrag is excellent at holding, filtering and cleaning stormwater.

Usually, stormwater pump stations are underground installations. This is a temporary pump station at Children's beach while solutions are being sought for the underground pump.
Property Protection / Adaption

- Structure Elevation
- Wet Floodproofing
- Dry Floodproofing
- Site-scale Floodwalls
- Temporary Barriers
- Adaptive Re-Use of Structure
- Structure Relocation or Abandonment

- Change the use of the building or part of the building. For example;
  - Primary uses on the higher floors; tertiary uses on first floor
  - First floor commercial and upper floors residential
Water Management

- Reduce the water's energy
- Drain the water
- Hold and drain the water later
- Resist or accommodate the water
Review
Freeboard — Freeboard standards require structures to be elevated higher than the level that FEMA

Building Height Standards — It is important to consider the relationship between building height regulations, flood-protection elevation standards, and the economic and social impacts that an exceptionally high structure could have on a neighborhood.

Applying V Zone Standards in A zones — This requirement would cause a structure in the coastal A zone to be constructed per V zone standards

Substantial Improvement — If more than fifty percent of the market value of a structure is spent making improvements to that property the property must be brought into compliance with the most recent floodplain management code.
Regulatory Tools

Zoning Amendments and Other Regulatory Procedures

**Tidal Marsh Protection and Advancement** — Areas suitable for marsh advancement may be regulated under a resource protection model of management.

**Transfer of Development Rights** — Such that developers continue to own coastal land, but development is relocated to less-sensitive areas.

**Flexible Development Process** — Clustered development, planned residential development, & open-space subdivision procedures allow development consistent with coastal resiliency.

**Land Conservation for Marsh Advancement** — Protect land through conservation easements, “rolling easements,” and other arrangements. Property would remain privately owned.

**Green Infrastructure for Private Property and Homeowner Development** — Implement incentives for property owners implementing green infrastructure improvements.

**Water Dependent Uses** — allow commercial water-dependent uses in residential areas to compensate property owners for loss of value due to restricted development opportunities.

**Expedited Permits for Reconstruction after Emergency Events** — for work which meets new standards of coastal resiliency.
**Regulatory Tools**

**Rolling Easements**

Usually, a rolling easement would be either
(a) a law that prohibits shore protection or
(b) a property right to ensure that wetlands, beaches, barrier islands, or access along the shore moves inland with the natural retreat of the shore

**Land Acquisition**

Coastal land acquisition should be pursued for both ecological protection and human use.

**Zoning Map Overlays**

A “future risk area” zoning overlay district may be delineated using projected extents of future daily inundation or future storms of a given intensity.

**Procedural Tools**

Emergency Plans
Debris Management Plans
Tree and Utility Maintenance Plans
Mitigation Project Operation and Maintenance Plans
Most Coastal Resilience Plans mention advising property buyers. Not sure how this would work or be accepted on Nantucket. Could be part of newsletter, pamphlets, public events, or a separate guide for Nantucket property owners.
Ultimate goals of resilience

- Reduce financial losses
- Reduce the timeframe of impacts
- Bounce back to regular business faster
- Increase the longevity of island