



Anticipatory Planning For Sea-Level Rise Along The Coast of Maine



This report a joint effort in
cooperation with State of
Maine's State Planning Office.

**On the right track...
in 1995!**

**But it was never
brought to the
local level**

**So it was LOST in the
archives.**

More reports...and updated sea level regulations

2006 - As the result of a 2 year stakeholder process, Maine adopted 2 feet of sea level rise over the next 100 years, which was a “middle-of-the road” prediction for global sea level rise, into its NRPA.

Protecting Maine's Beaches for the Future

A Proposal to Create an Integrated
Beach Management Program



A Report of the Beach Stakeholder's Group
to the Joint Standing Committee on Natural Resources
122nd Maine Legislature, 2nd Regular Session

February 2006

Even More recently...

Working Groups:

*Built Environment
Coastal Environment
Natural Environment
Social Environment*



**PEOPLE
AND
NATURE**
ADAPTING TO A CHANGING CLIMATE

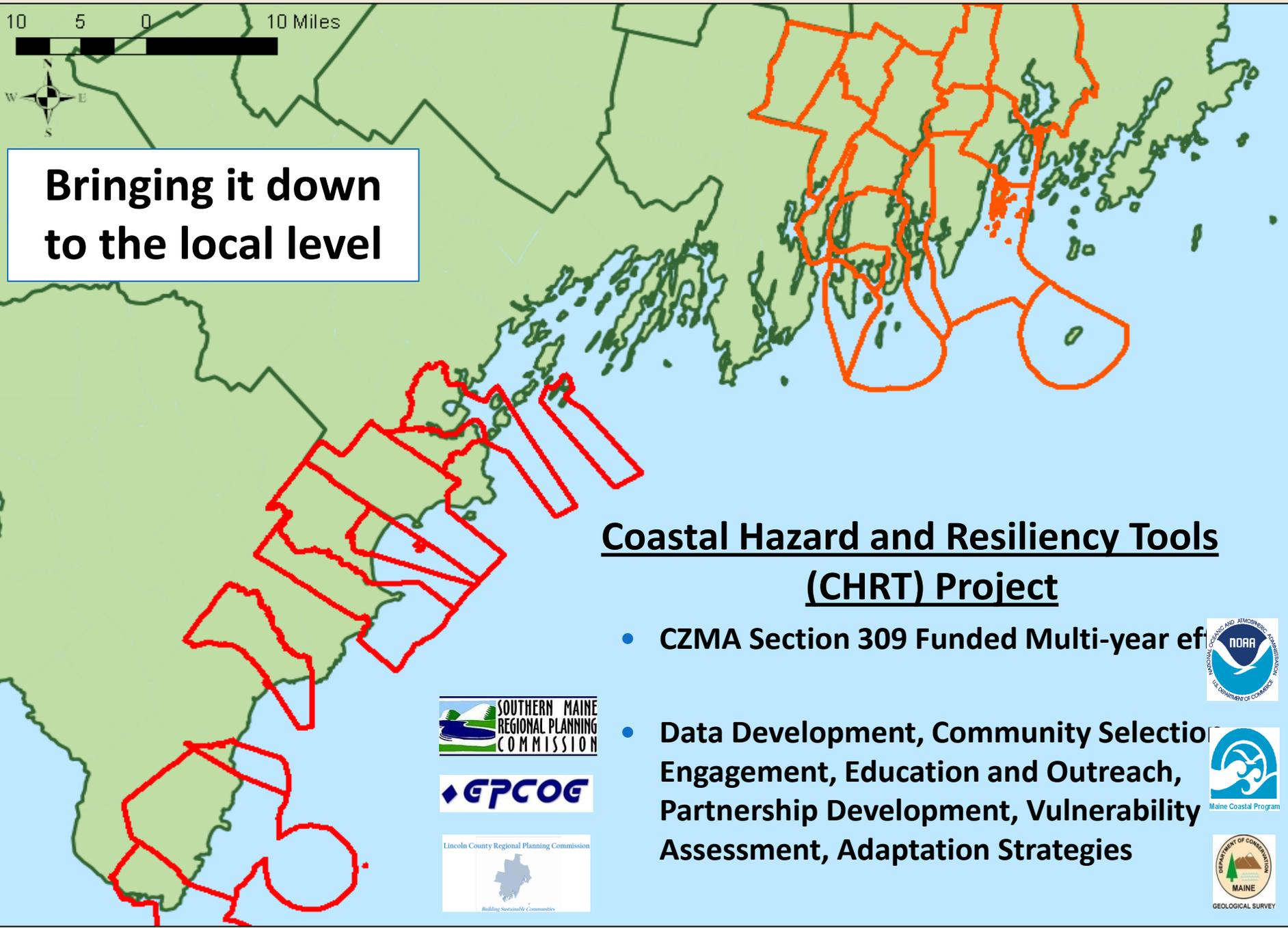
CHANGING THINGS GUIDE

- Year-long Stakeholder Process led to the production of a report in early 2010.
- Major recommendations related to ***bringing tools, models, and technical data to the local decision-making level relating to sea level rise planning.***

10 5 0 10 Miles



**Bringing it down
to the local level**



Coastal Hazard and Resiliency Tools (CHRT) Project

- CZMA Section 309 Funded Multi-year effort
- Data Development, Community Selection, Engagement, Education and Outreach, Partnership Development, Vulnerability Assessment, Adaptation Strategies



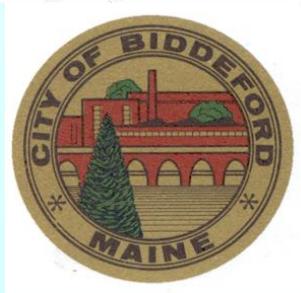
A comprehensive plan should do more than paint a disturbing picture of the future...it should move the community toward doing something!

Why not form include an implementation step to create a Sea Level Adaptation Working Group?

A regional committee of course (safety in numbers)! That's what they did in Saco Bay!

Multi-municipal Standing Committee Sea Level Adaptation Working Group

Local Participation:



Science/Technical Support:



GEOLOGICAL SURVEY

Additional Support Funding:



Maine Coastal Program

Sea Level Adaptation Working Group

Steering Committee

- Met numerous times over summer of 2010 to develop an ***Interlocal Agreement*** outlining the creation of a Working Group and its potential duties and action plan.
- Received approval from each municipal council.
- Funded by Regional Challenge Grant (SPO) and local matches

Working Group

- Comprised of two assigned members from each community; and an SMRPC planner; with technical support from MGS.
- Includes Coastal Citizens and Municipal Planners
- Met during 2010/2011 to complete a ***Vulnerability Assessment and Action Plan*** that were submitted to municipal councils for approval.
- Initial Project – Floodplain Management Ordinances

**Without implementation,
there is not much point in
making plans!**

- *What are other communities doing?*
- *Can these efforts be duplicated in York?*

Implementation Steps

Increasing “freeboard” to 3 feet, in the Floodplain Management Ordinances

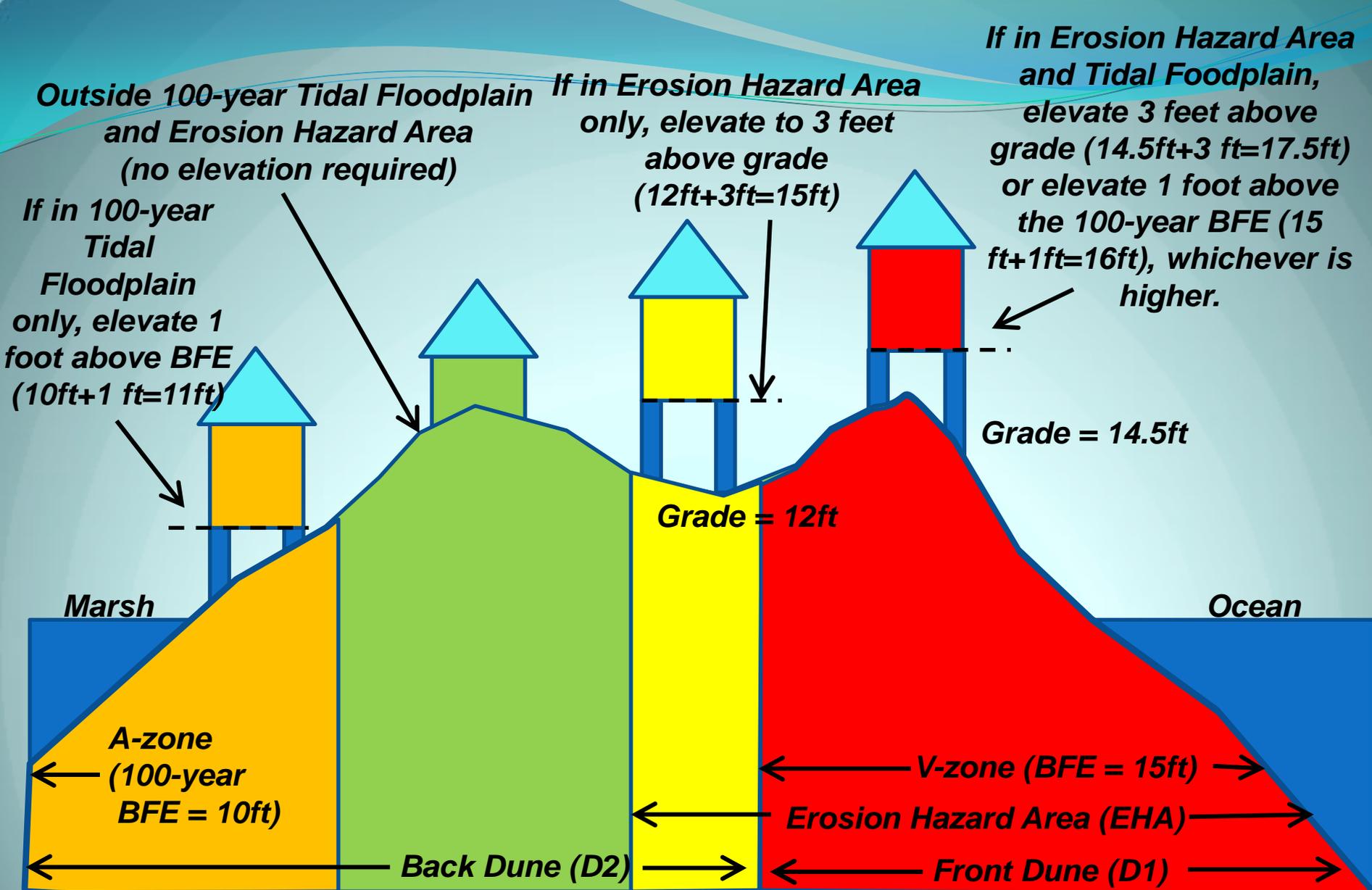


Currently, floodplain management requires structures to be elevated one foot above the 100-year Base Flood Elevation (BFE).

Expanding Maine's Minimum Floodplain Requirements

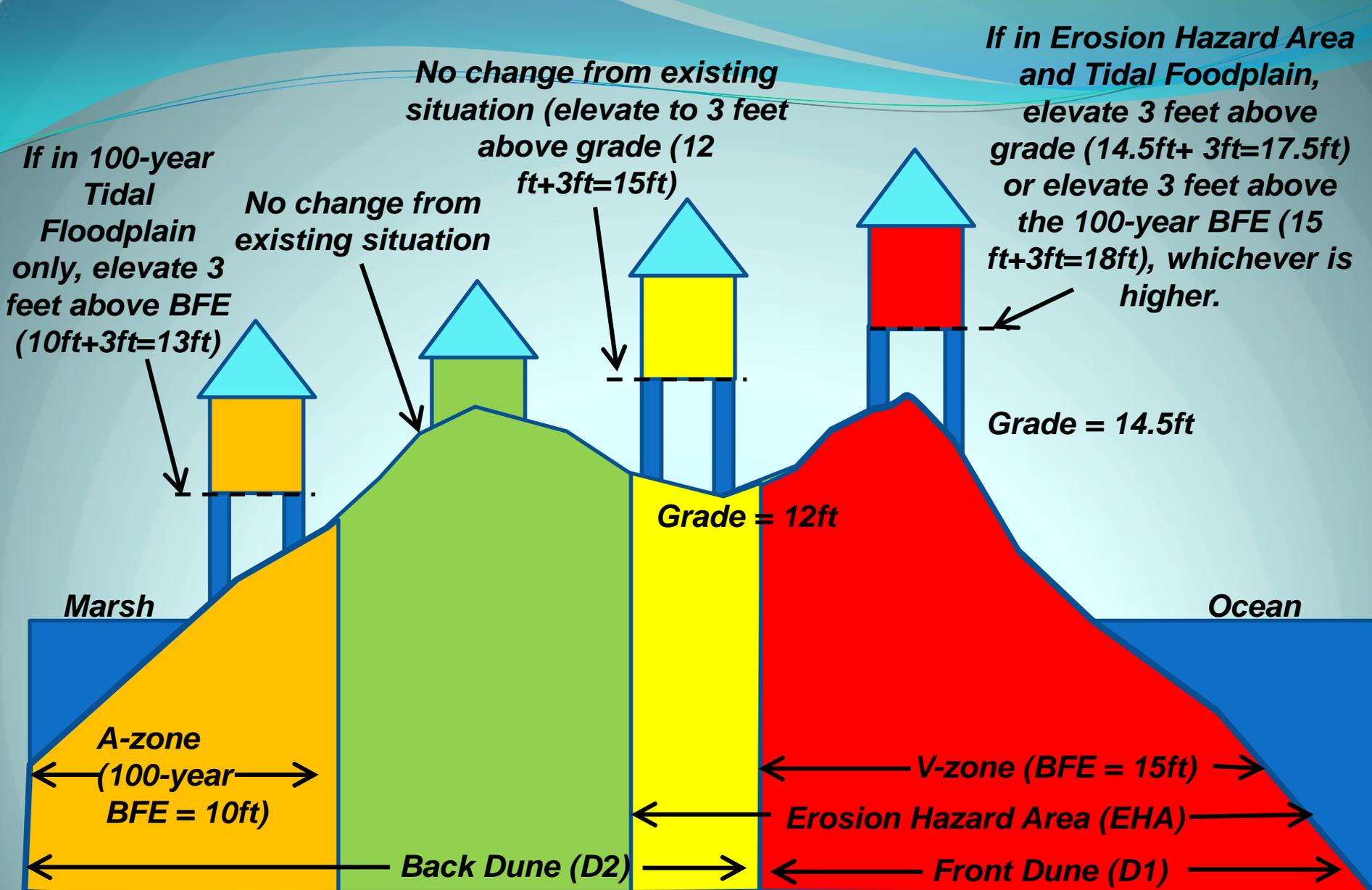


Increasing “freeboard” to include sea level rise in a regional ordinance (3 feet above the 100 year BFE)



Existing Regulations

(Coastal Sand Dune Rules and Municipal Floodplain Ordinance)

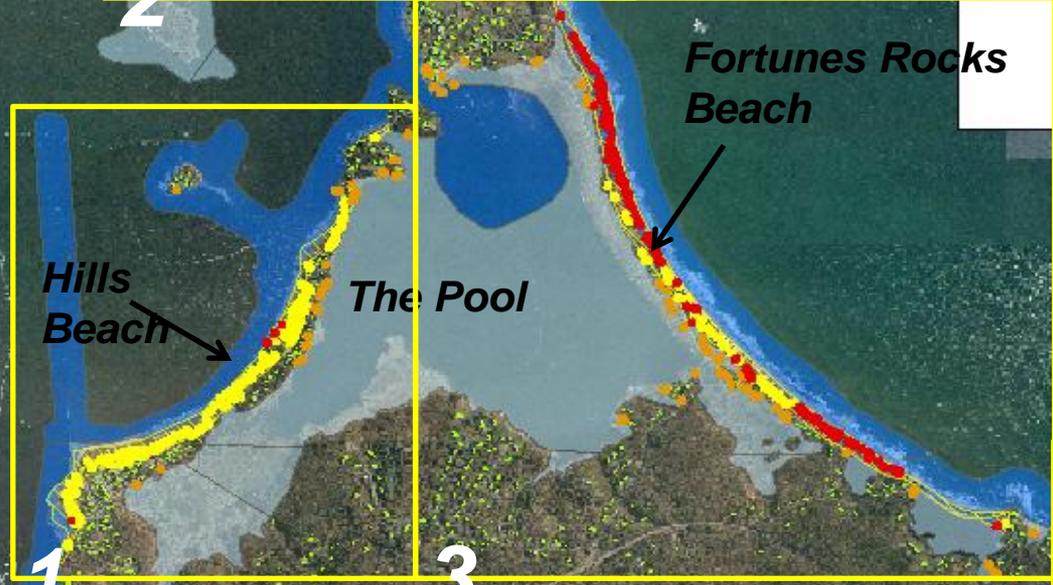


Potential Revised Regulation

(Revised Municipal Floodplain Ordinance)



2

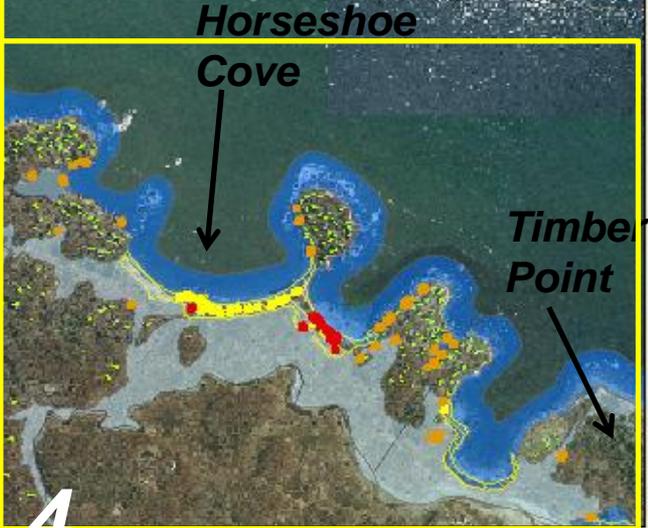
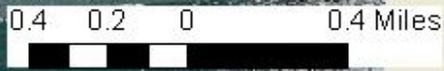


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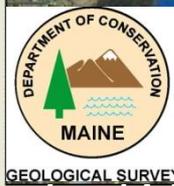
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Analysis of Potential Structures impacted by Floodplain Ordinance Biddeford, ME

- Footprint in EHA and Floodplain
- Footprint in Tidal Floodplain only
- Footprint in EHA only
- Building Footprints
- Erosion Hazard Area (EHA)
- AO_VE_zones
- A_AE_zones



4



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0.09 0.0450 0.09 Miles



DEPARTMENT OF CONSERVATION
MAINE
GEOLOGICAL SURVEY

The Pool

Fortunes Rocks Beach

Rt. 208

Etherington Pond



Implementation Steps Studying How to Adapt the

Ogunquit Sewage Treatment Plant

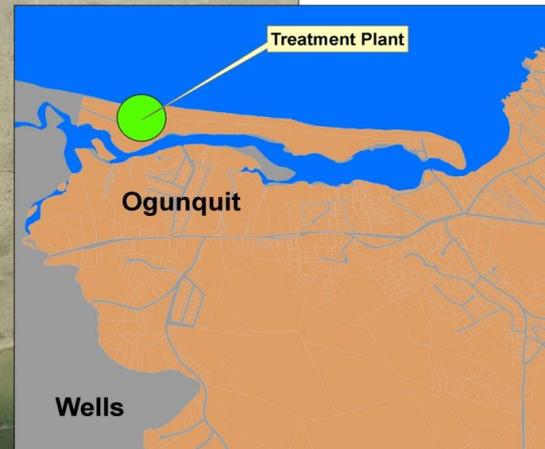
Marsh



Soon to select a proposal for a preliminary engineering study to identify adaptation strategies, funded by GMOC / NROC

Beach

Ogunquit Sewage Treatment Plant Context



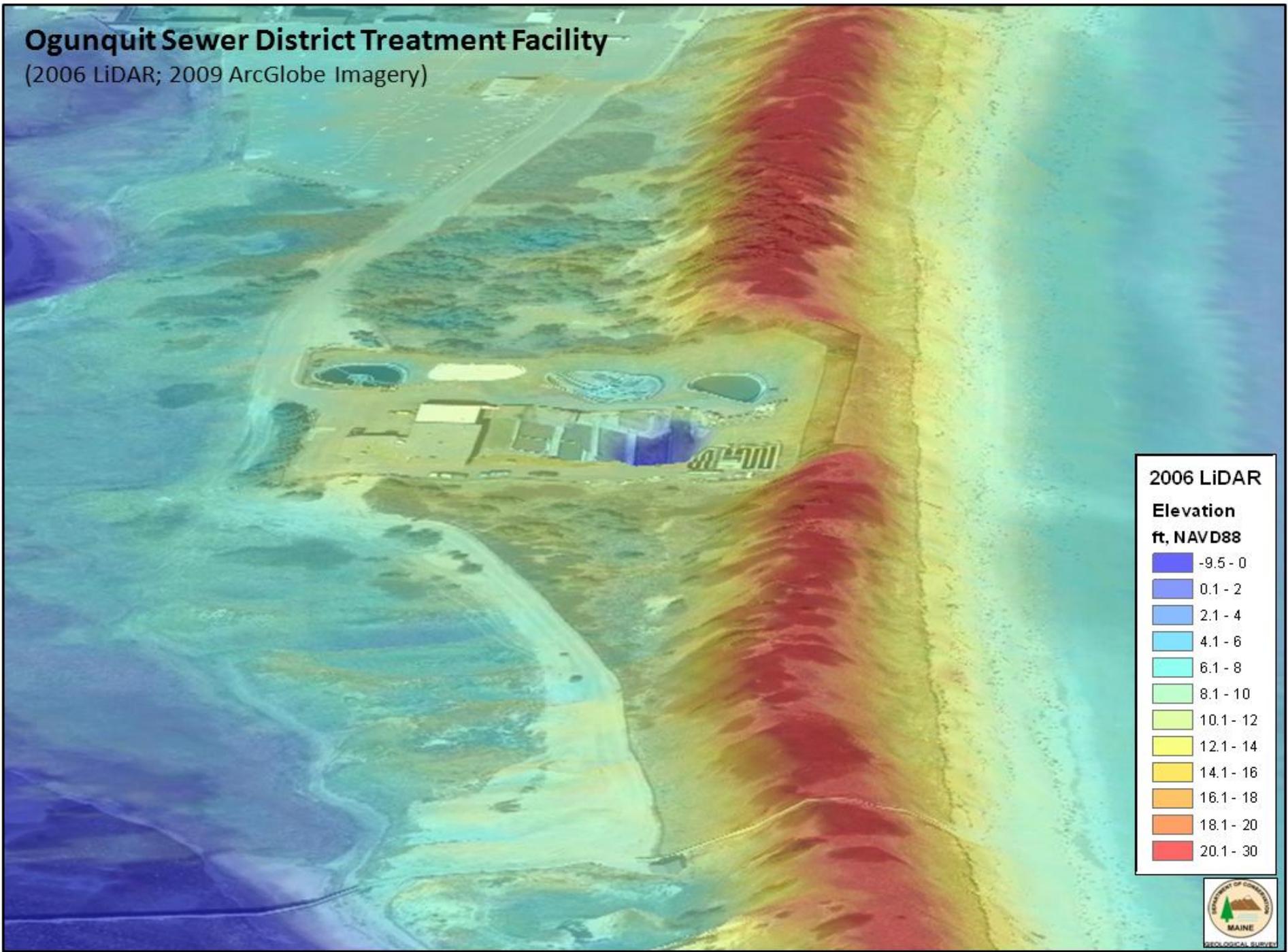
Ogunquit Sewage Treatment Plant
2006 Aerial Photography

1 inch = 50 feet

Feet

Ogunquit Sewer District Treatment Facility

(2006 LiDAR; 2009 ArcGlobe Imagery)



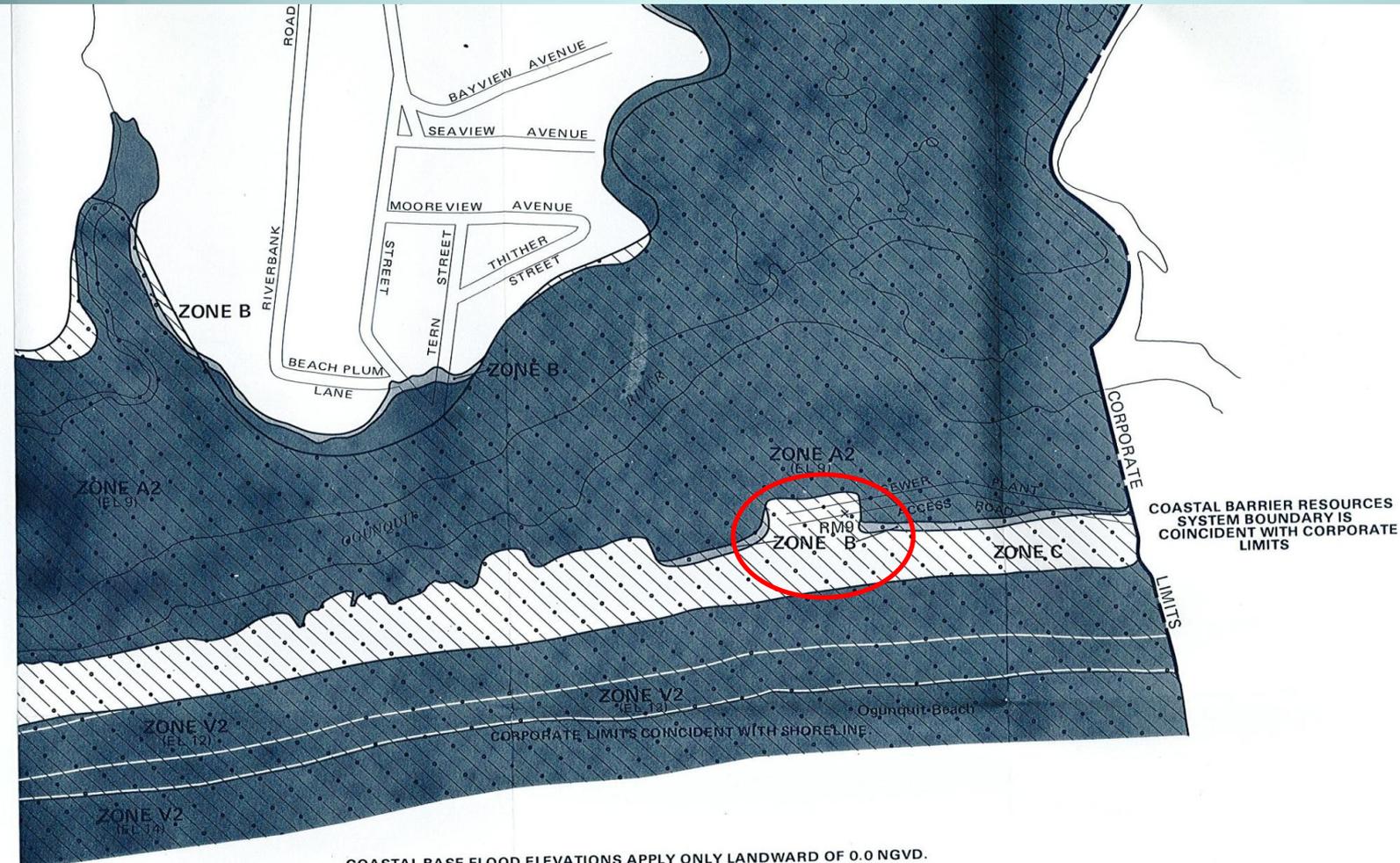
2006 LiDAR

Elevation
ft, NAVD88

Dark Blue	-9.5 - 0
Blue	0.1 - 2
Light Blue	2.1 - 4
Cyan	4.1 - 6
Light Green	6.1 - 8
Green	8.1 - 10
Yellow-Green	10.1 - 12
Yellow	12.1 - 14
Orange	14.1 - 16
Red-Orange	16.1 - 18
Red	18.1 - 20
Dark Red	20.1 - 30



Ogunquit Sewage Treatment Plant – Current Firm Panel



COASTAL BASE FLOOD ELEVATIONS APPLY ONLY LANDWARD OF 0.0 NGVD.

River Mile

UNDEVELOPED COASTAL



Identified
1983



Identified
1990

†Coastal barrier areas are normally located in hazard areas.

**Referenced to the National Geodetic Vertical Datum of 1988.

*EXPLANATION OF ZONES

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations not determined.
AO	Areas of 100-year shallow flood (one (1) and three (3) feet; shown, but no flood hazard factors are determined).
AH	Areas of 100-year shallow flood (one (1) and three (3) feet; base flood elevations and flood hazard factors are determined).
A1-A30	Areas of 100-year flood; base flood elevations determined.
A99	Areas of 100-year flood to be determined under construction; hazard factors not determined.
B	Areas between limits of the certain areas subject to 100-year flood (one (1) foot or where than one square mile; or are flood). (Medium shading)
C	Areas of minimal flooding.
D	Areas of undetermined, but less than 100-year flood.
V	Areas of 100-year coastal flood elevations and flood hazard factors are determined.
V1-V30	Areas of 100-year coastal flood elevations and flood hazard factors are determined.

NOTES TO USER

This map is for use in administering the Flood Hazard Mitigation Act. It does not necessarily identify all areas subject to flooding, or all planned drainage sources of small size, or all planned drainage sources. Hazard Areas. The community map report will be updated with updated flood hazard information prior to the start of construction or construction purposes.

Coastal base flood elevations apply only to areas of wave action; these elevations were developed by the National Weather Service.

Areas of special flood hazard (100-year flood)

Ogunquit Sewer District Treatment Facility

(2009 Provisional DFIRM, *not effective*)

(2009 ArcGlobe Imagery)

**AO-zone
(3 ft depth)**

**V-zone
(17 ft NAVD)**

**A-zone
(9 ft NAVD)**



Ogunquit Sewage Treatment Plant

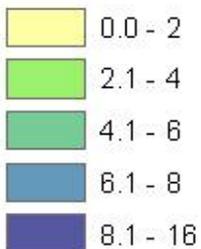


Footbridge
Parking

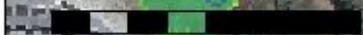
Potential Inundation Analysis Ogunquit, ME

1978 Storm + 1 m

Potential Flood Depths (ft)



90 45 0 90 Meters

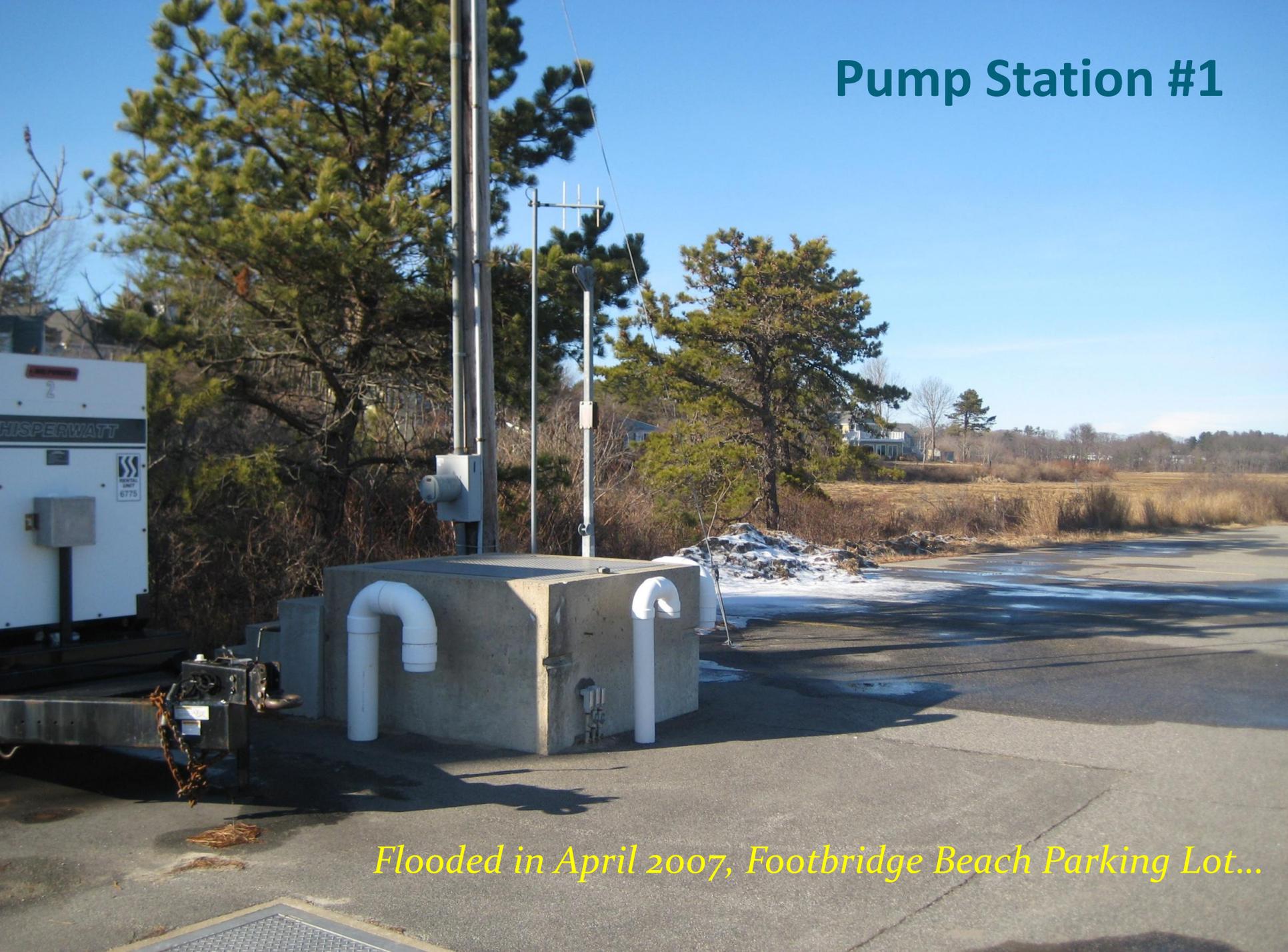


Ogunquit Sewage Treatment Plant

Looking NE across river, from Footbridge Beach Parking Lot...



Pump Station #1



Flooded in April 2007, Footbridge Beach Parking Lot...

Ogunquit Sewage Treatment Plant



Looking west out the main gate, towards the salt marsh....

Ogunquit Sewage Treatment Plant



*Looking south down the road to the main gate,
marsh on right...*

Ogunquit Sewage Treatment Plant



*Looking South along the dune line,
Steel Storm Barrier on right...*

Ogunquit Sewage Treatment Plant



Ogunquit Sewage Treatment Plant



Implementation Steps

LiDAR Based Zoning Lines – Highest Annual Tide

Old Orchard Beach – East Grand Avenue Area



Implementation Steps

Jones Creek

Removing tidal restrictions

Storage Areas
- Enhance School Street Storage
- Restore Cascade Road Storage

Walnut Street
- Install 12' wide x 3' high Box Culvert
- Raise Road by 1'

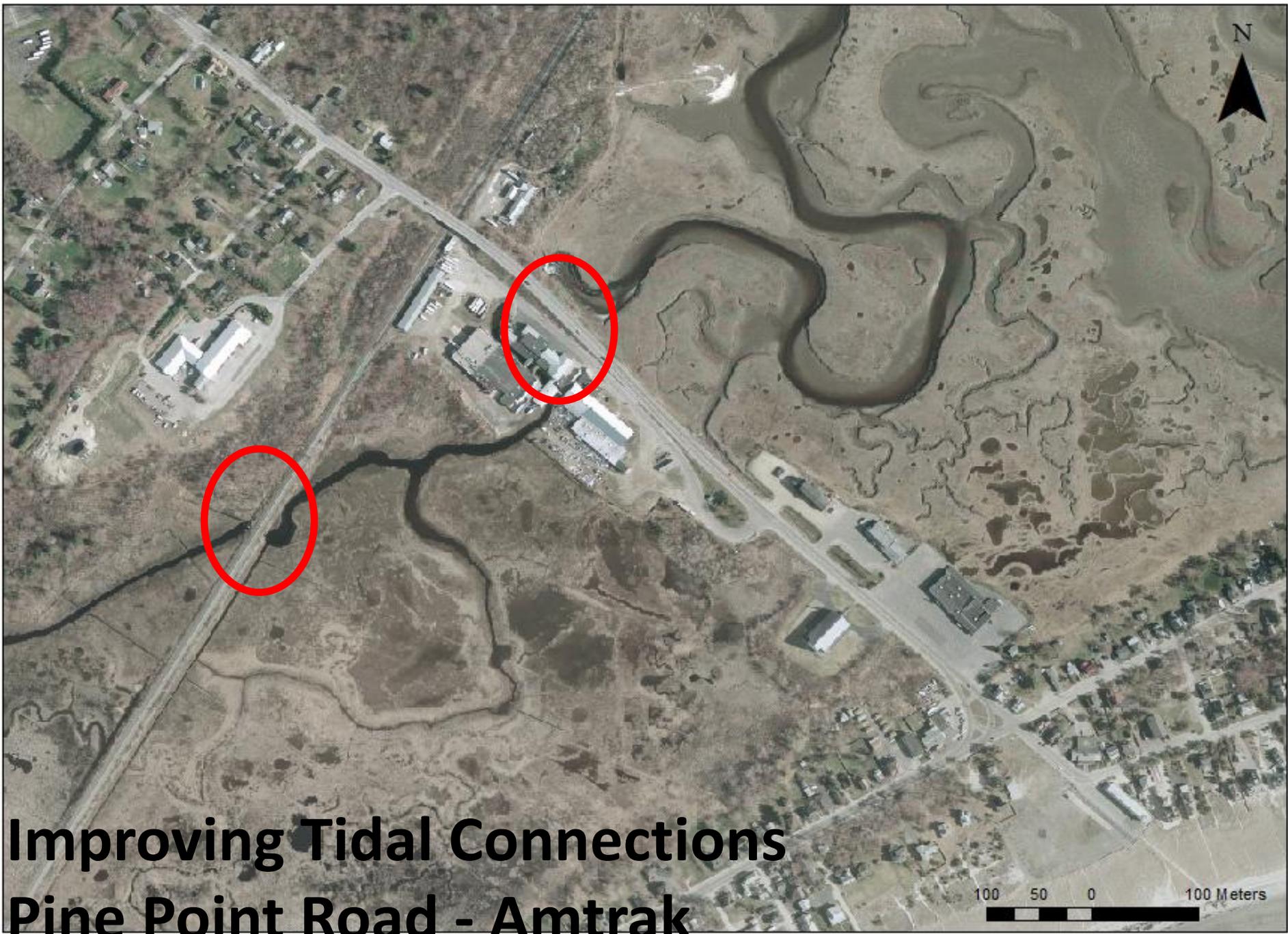
Bayley Dam
- Remove or Modify Dam

Depot Street and Route 9
- Add Two 12' x 7' Culverts
- Add Tide Gate on Existing and Proposed Culvert
- Lower Invert to Elevation -2.0
- Add Overflow Channel
- Retain Existing Culvert

Railroad Culvert
- Add Two 8' H x 7' W bypass culverts

From OOB's "Milone McBroom" report



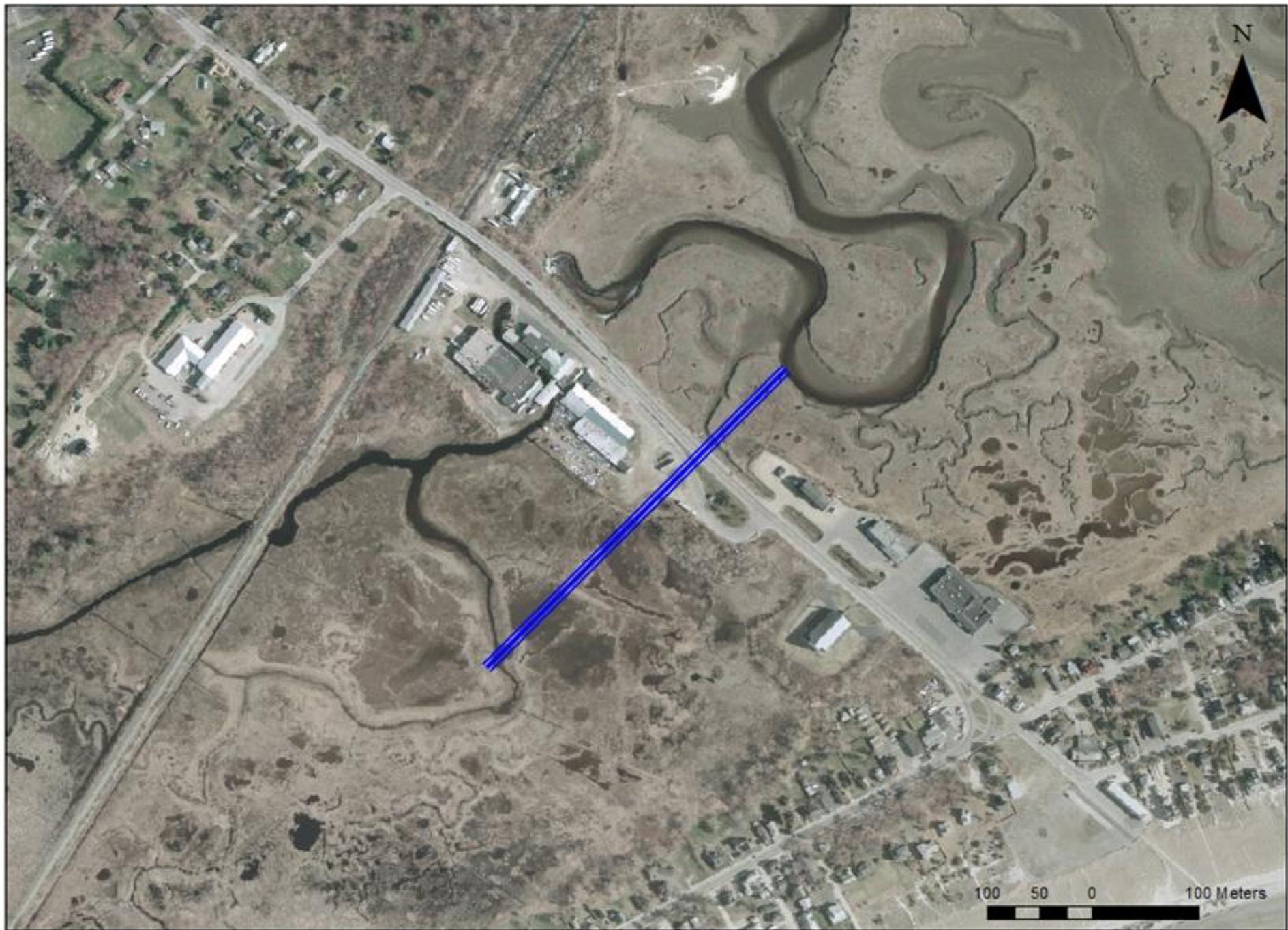


Improving Tidal Connections Pine Point Road - Amtrak

100 50 0 100 Meters

All that water has to fit through here....







• Identify areas of undeveloped uplands which may have potential for acquisition to allow for the landward migration of coastal marshes.





Implementation Steps Not Considered Yet?

*Elevate vulnerable infrastructure,
including sewer pump stations, roads,
culverts and bridges*



Utility Retrofitting

*Base of Pump Station
below the generator
dike*

*Generator
placed in
new dike*

***After \$1 million upgrade, new backup
generator protected – Pump station
unchanged...Oops!***

Elevating Roads

This has happened already in Norfolk Virginia, and is under discussion in Kennebunkport at Goose Rocks Beach



Considerations for the Town of York Comprehensive Plan Sea Level Rise Chapter

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