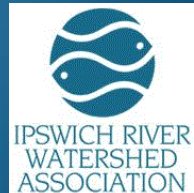
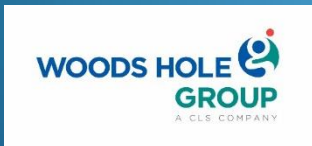




# Protecting Ipswich's Coastal Resources:

A Community  
Informational Meeting  
June 10, 2019



# Tonight's Speakers

- **Alicia Geilen**, Ipswich Conservation
- **Frank Ventimiglia**, Ipswich DPW
- **Kristen Grubbs**, Ipswich River Watershed Association
- **Tom O'Shea**, The Trustees

*With technical support from:*

- **Jen Relstab**, Horsley Witten Group
- **Kevin McHugh**, Coneco Engineers and Scientists
- **Ted Wickwire**, Woods Hole Group
- **Jen Ducey**, Stantec
- **Kathryn Glenn**, MA Coastal Zone Management

# Overview of Tonight's Presentation:

1. Brief discussion of impacts from climate change and sea-level rise on critical public infrastructure and private property in Ipswich;
2. Information on how protecting natural resources helps protect the public and why we focus on green infrastructure;
3. Steps taken by the Town to address future climate impacts;
4. Information on how property owners can increase resiliency to storm events;

## Overview of Tonight's Presentation (cont.):

5. Ipswich Riverbank Resiliency Project – Plans to repair riverbank using nature-based green infrastructure, and to improve stormwater management along the Shurcliff Riverwalk near the County Street Bridge;
6. Argilla Road Flood Mitigation Project – Plans to elevate the road, enlarge the culvert, and restore salt marsh;
7. Questions and comments.

# Impacts of Climate Change and Importance of Protecting Natural Resources

# Climate Change Impacts:

- Warmer weather causes stronger storms, increasing flooding and erosion;
- Sea level rise increases flooding and erosion;
- Routine flooding is “new normal.”



Erosion (undercutting) of coastal bank on Water Street



King Tide 4/18/18

# Nor'easter Flooding



photos from Wicked Local  
by Dan Mac Alpine



Photo from Climate Action Business  
Association



# Importance of Coastal Resource Areas

Coastal wetland resource areas protect people, property, and infrastructure from storm damage.

Resources like tidal flats, beaches, dunes, salt marsh, and coastal bank (aka bluffs) slow down water so it has less energy to erode upland areas.



Dune



Tidal flat  
and beach



# Importance of Coastal Resource Areas

In particular, plant roots naturally help reduce erosion by limiting the impact of rain, waves, and storm surge.



Salt  
Marsh



Coastal  
Bank and  
beach

Pavilion Beach, Plum Island, and Castle Neck are all Barrier Beaches: a beach and dune separating the ocean from other resource areas. Barrier Beaches protect inland areas from storm damage.

# Importance of Coastal Resource Areas

Hard structures like seawalls and stone revetments may protect a small area, but cause more erosion in other areas.

Vegetation, especially deeply-rooted native plants, protect without causing erosion elsewhere.



Erosion of an unarmored area between a seawall and a revetment by the Green Street Bridge

# Why Focus on Green Infrastructure?

Green infrastructure uses natural processes – such as plants and natural materials – to protect human infrastructure. They mimic nature.

Nature-based green infrastructure systems provide functions such as water infiltration for drinking water supply, flood control, and temperature moderation.

**Steps Ipswich and the  
Town's Partners Have  
Taken To Address Climate  
Change and  
How The Public Can Help**

# Great Marsh Resiliency Planning Project and Great Marsh Barriers Report

[www.greatmarshresiliency.org](http://www.greatmarshresiliency.org)



## THE GREAT MARSH RESILIENCY PLANNING PROJECT Preparing Communities for the Future

Salisbury • Newburyport • Newbury • Rowley • Ipswich • Essex



### Looking Forward

We know that the coastal communities we live and work in experience damage from storms. Flooding, erosion, and sea level rise are inevitable along the coast, and can result in loss of homes and businesses, power outages, and road closures. These climate impacts jeopardize public health and safety, and can be debilitating.

We also know that climate patterns are changing: storms are more intense; rainfall is heavier. The science is clear: the sea level is rising and will continue to do so for generations, and stronger storms are bringing more frequent and destructive flooding to our neighborhoods. Communities recognize that coastal hazard impacts and associated emergency management, debris removal, infrastructure repair, and post-storm recovery costs are escalating.

Our coastal communities and the environments we depend on for quality of life and commerce are increasingly vulnerable to chronic impacts from climate events. Our current approaches to addressing storms may not be sufficient to protect our communities in the future. How can we better prepare for the future?

Our goal is **RESILIENCE**, defined as the long term capacity of our communities and landscape to deal with change and to continue to develop and adapt, while retaining a satisfactory quality of life.

**There is a path forward.** Salisbury, Newburyport, Newbury, Rowley, Ipswich, and Essex are involved in a community planning project: assessing the risk and vulnerability of coastal communities to sea level rise, storm surge, erosion, and flooding, and developing plans to reduce those risks.

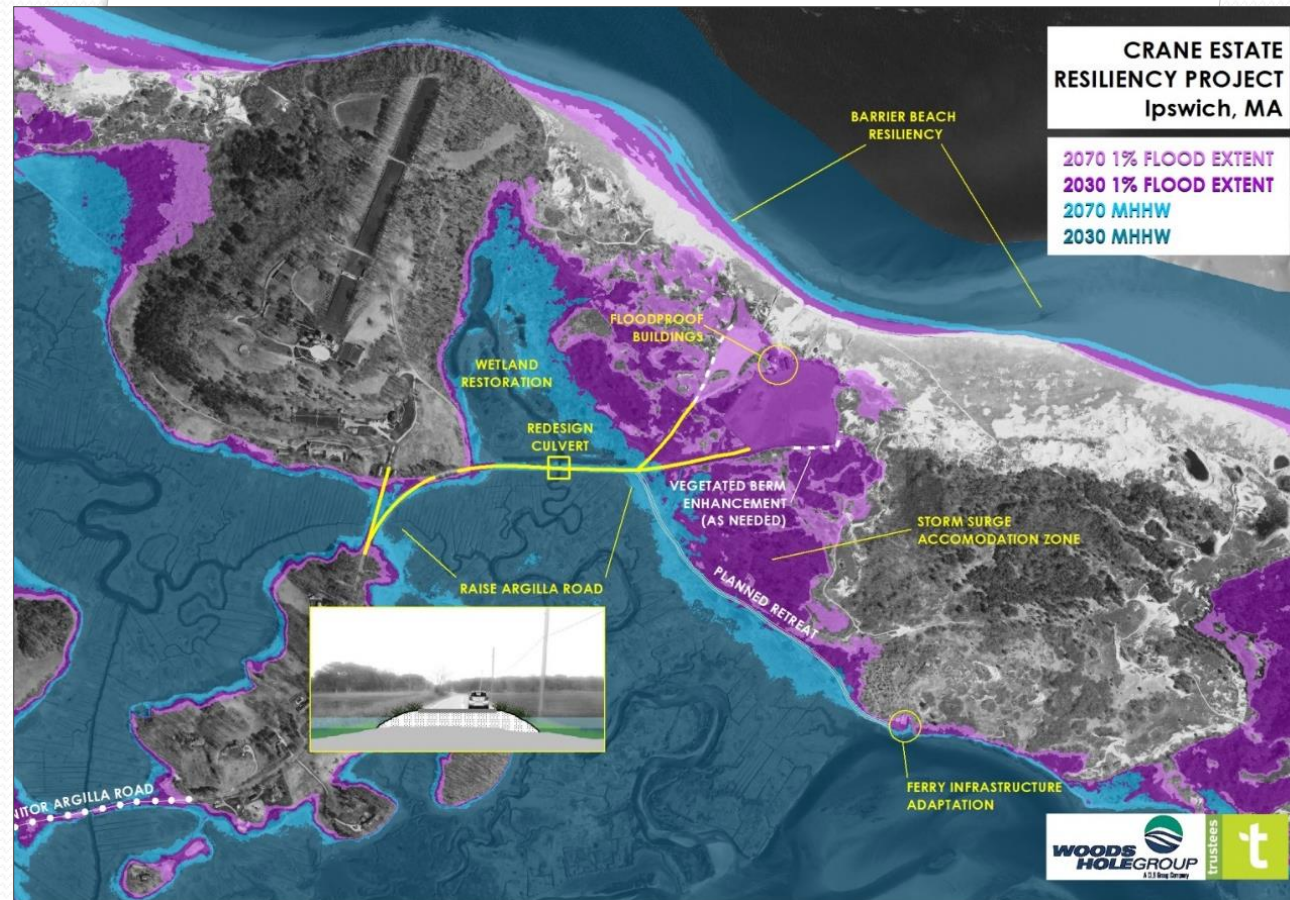


[WWW.GREATMARSHRESILIENCY.ORG](http://WWW.GREATMARSHRESILIENCY.ORG)



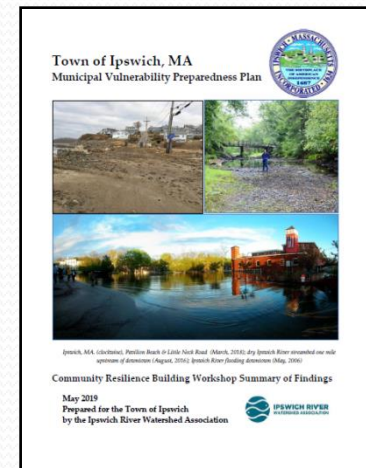
# Trustees Coastal Vulnerability Study

- Looked at flood inundation on Trustees' coastal properties
- Most susceptible area: Argilla Road between Castle Hill and Crane Beach entrances
- By 2030, more sections of the road will be susceptible to flooding at high tide
- By 2070, significant portions of the road will be underwater at high tide



# Other Town Efforts

- Municipal Vulnerability Preparedness (MVP) planning and listening sessions
  - Hazard Mitigation Plan update
  - Ipswich Sustainability Committee
  - Community Development Plan update
- bridgingipswich.com*



# Things you can do

## Give plants a chance!

- Use public launching areas for canoeing, kayaking, & paddle boarding;
- Don't drag boats into the water, or store them on wetland plants;
- Step on rocks, not plants, to access the water.





# Things you can do



## Slow the flow

- Prevent stormwater runoff by reducing pavement and other impervious surfaces.
- Establish vegetated areas that help water soak into the ground.



# Things you can do

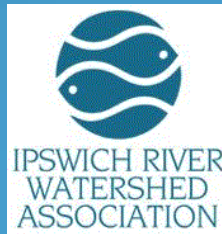
## Pick Up Pet Waste and Other Pollution!

- You hate stepping in it. Fish hate swimming in it.
- Dispose of dog waste properly (in a trash can!)
- Don't let oil leaks, dog waste, fertilizers, or any other trash end up in storm drains or our rivers!

*Do your "doody" in both public areas and in your yard.*



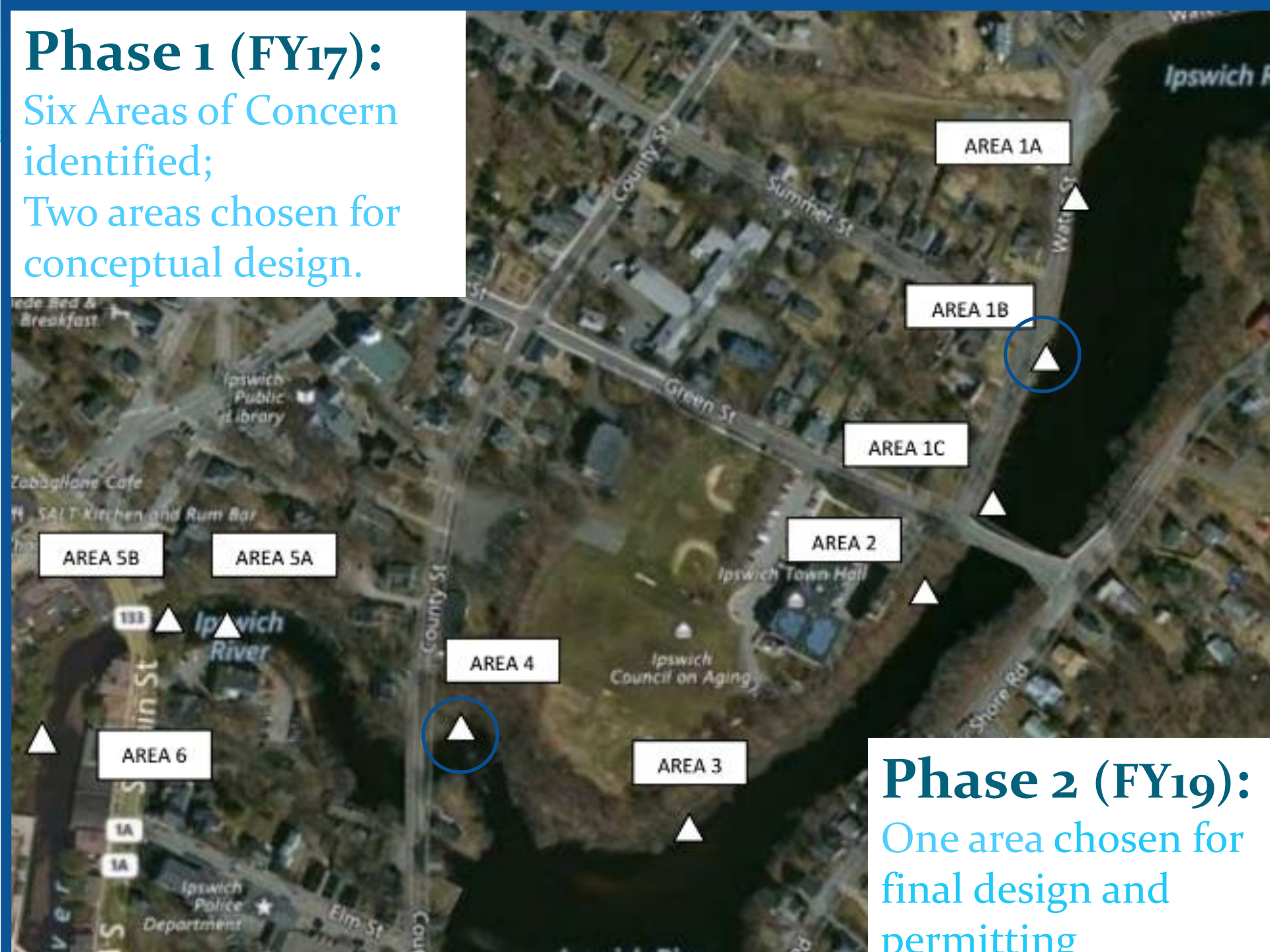
# Ipswich Riverbank Resiliency Project



# Phase 1 (FY17):

Six Areas of Concern identified;

Two areas chosen for conceptual design.



# Phase 2 (FY19):

One area chosen for final design and permitting

## Phase 2a: Stormwater Improvements

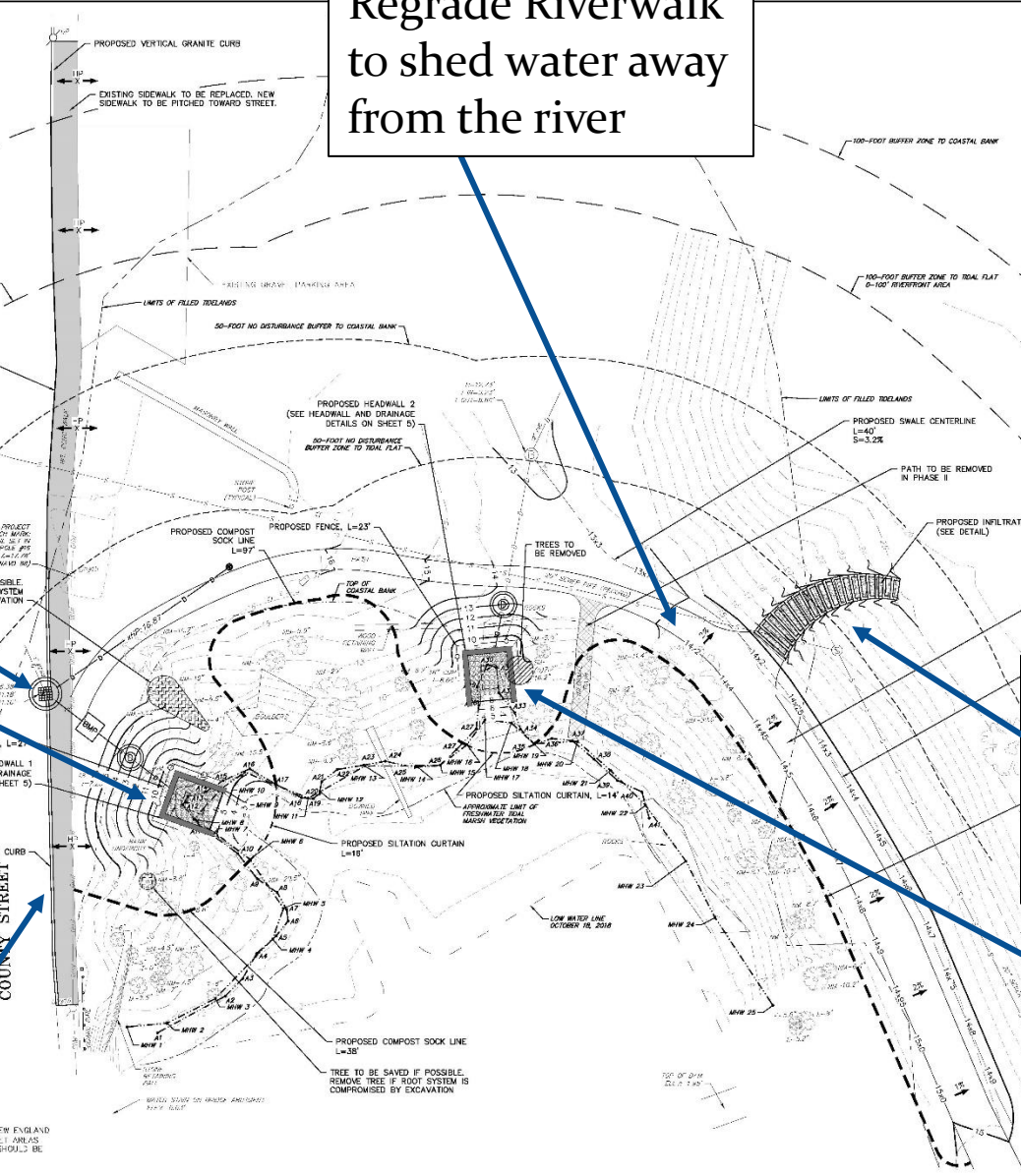
- Improve stormwater management from County Street (repair/replace culverts, catch basins, headwalls);
- Re-grade the Riverwalk and direct stormwater to new infiltration areas;
- Replace steps from fields to Riverwalk to make safer and infiltrate stormwater and restore eroded areas with native plants;



Replace stormwater outfall (new culvert, headwalls), and improve catch basin and add stilling basin to reduce velocity.

Regrade Riverwalk to shed water away from the river

LEGEND		
EXISTING	PROPOSED	DESCRIPTION
		TOP OF COASTAL BANK
		EDGE OF WETLAND
		MEAN HIGH WATER
		30' BUFFER TO TIDAL FLAT OR COASTAL BANK
		100' BUFFER TO TIDAL FLAT OR COASTAL BANK
		LIMITS OF FILLED TIDELANDS
		LOW WATER LINE
		MAJOR GROUND CONTOUR
		MINOR GROUND CONTOUR
		SPOT GRADE
		EDGE OF PAVEMENT
		EDGE OF GRAVEL
		CURB
		DRAINAGE LINE
		SEWER LINE
		OVERHEAD WIRE
		STREET MAN HOLE
		DRAIN MANHOLE
		CATCH BASIN
		UTILITY POLE
		GUARD RAIL
		IRON AND RAIL FENCE
		COMPOSITE SOCK LINE
		FLOATING SILTATION CURTAIN



Repair timber steps and eroded side slopes

Repair stormwater outfall (new headwalls and improved stilling basin)

new curb on County Street directing flow to catch basin

PROJECT NO.	1581.0
DATE	6/12/2019
DESIGNED BY	MJD
CHECKED BY	JAN
DRAWN BY	N. CHANG
SCALE	1" = 10'
PROJECT NO.	1581.0
SHEET NO.	4

TOWN OF IPSWICH  
 COUNTY STREET STABILIZATION PROJECT  
 IPSWICH, MA 01938

DESIGN PLANS  
 SITE PLAN

**CONECO**  
 Engineers & Scientists  
 4 FIRST STREET, WILLOWHURST, MASSACHUSETTS 02124  
 PHONE: 603-887-1100 FAX: 603-887-5998

NOTE: ALL DISTURBED DRY AREAS TO BE RESEDED WITH NEW ENGLAND LEONARD COMPOUND/LEONARD MIX AND ALL DISTURBED WET AREAS TO BE RESEDED WITH NEW ENGLAND WETMIX. BOTH MIXES SHOULD BE APPLIED AT A LOSING RATE OF 1.5"/100 SQ. YD.

## Phase 2b: Riverbank Stabilization

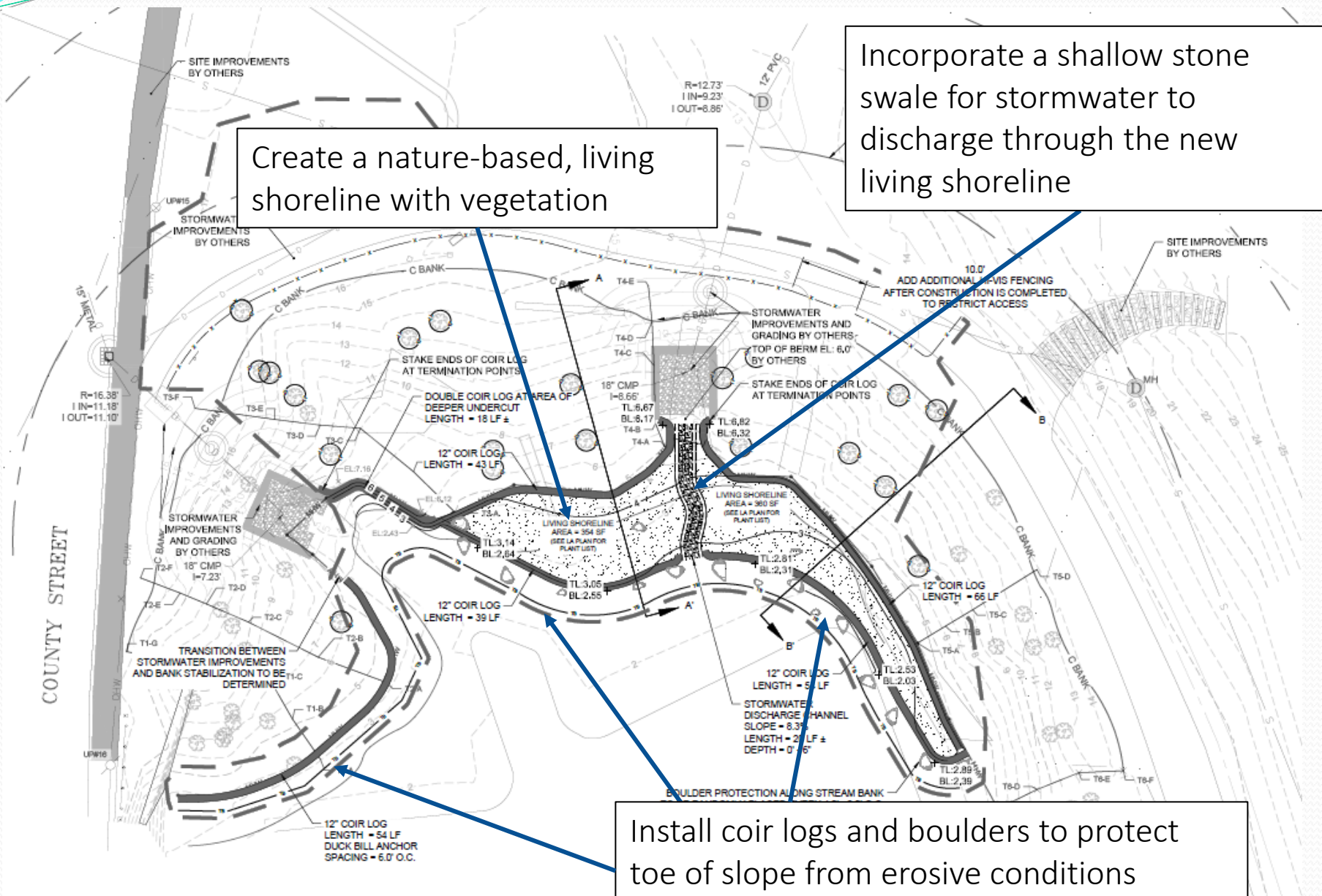


- Remove invasive trees on bank and re-vegetate with native plants;
- Repair undercut bank, and protect toe of slope with coconut fiber logs and native vegetation (nature-based solution);
- Revegetate informal pedestrian access paths.

Create a nature-based, living shoreline with vegetation

Incorporate a shallow stone swale for stormwater to discharge through the new living shoreline

Install coir logs and boulders to protect toe of slope from erosive conditions



COUNTY STREET



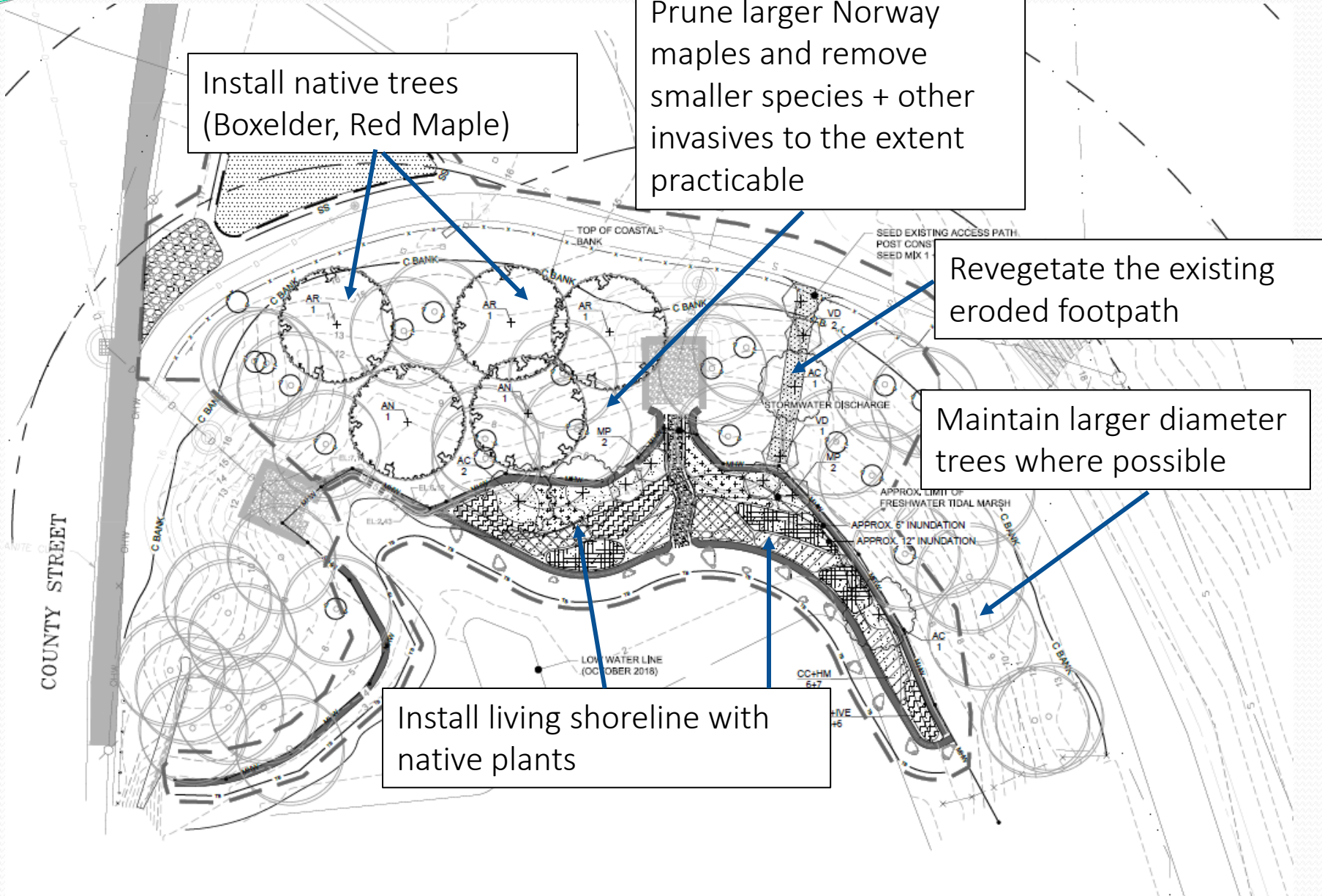
Prune larger Norway maples and remove smaller species + other invasives to the extent practicable

Install native trees (Boxelder, Red Maple)

Revegetate the existing eroded footpath

Maintain larger diameter trees where possible

Install living shoreline with native plants



# Seaside brookweed



# Other Areas of Concern

- DPW is planning repairs on Water Street at Summer Street (Area 1);
- Wastewater Department is planning repairs to protect sewer line (Areas 2 and 5);
- Planning Department is enhancing vegetation on riverbank at the Riverwalk extension downtown (Area 6).



# Next Steps

**Phase 2 ends June 30<sup>th</sup>:**

- ✓ Design plans completed;
- ✓ All environmental permits applied for.

**Seek CZM support for Phase 3:**

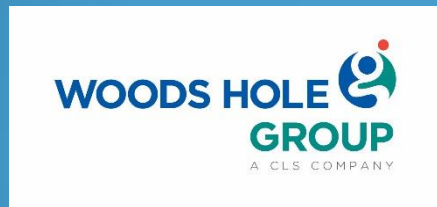
- apply for grant in 2020
- Implementation of work;
- Continued education & outreach.



# Questions about Ipswich River Project?



# Argilla Road Flood Mitigation Project



# Argilla Road Flood Mitigation Project

## Scope of Work

Complete a “30% design” for a flood-resilient Argilla Road that uses living shoreline techniques for slope stabilization

Identify design alternatives that incorporate analysis of collected data

Evaluate permitting issues with proposed improvement work

## What is a 30% Design?

A 30% design is part-way to a full design

Includes enough detail/specs to allow engineers to realistically model and assess design alternatives

Survey work carried out in Autumn 2018



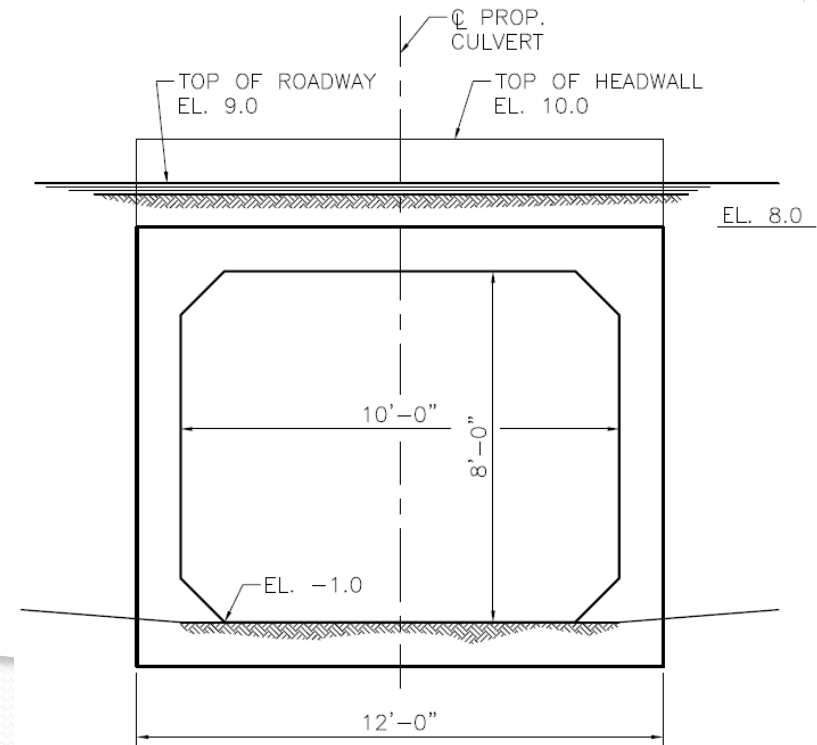
# Design Development: Replacement culvert

## Goals

- Increase hydraulic opening to restore full tidal range and reduce velocities
- Use durable structure material for salt water environment
- Minimize tidal flow interruption during construction
- Minimize demo/construction timeframe

## Alternatives

- Single Precast Box Culvert
- Three-Sided Precast Culvert
- Twin Precast Box Culvert





# Design Development: Roadway

## Goals

- Design a resilient roadway structure
- Assess impacts to adjacent resource areas
- Limit interruptions to beach and estate access during construction

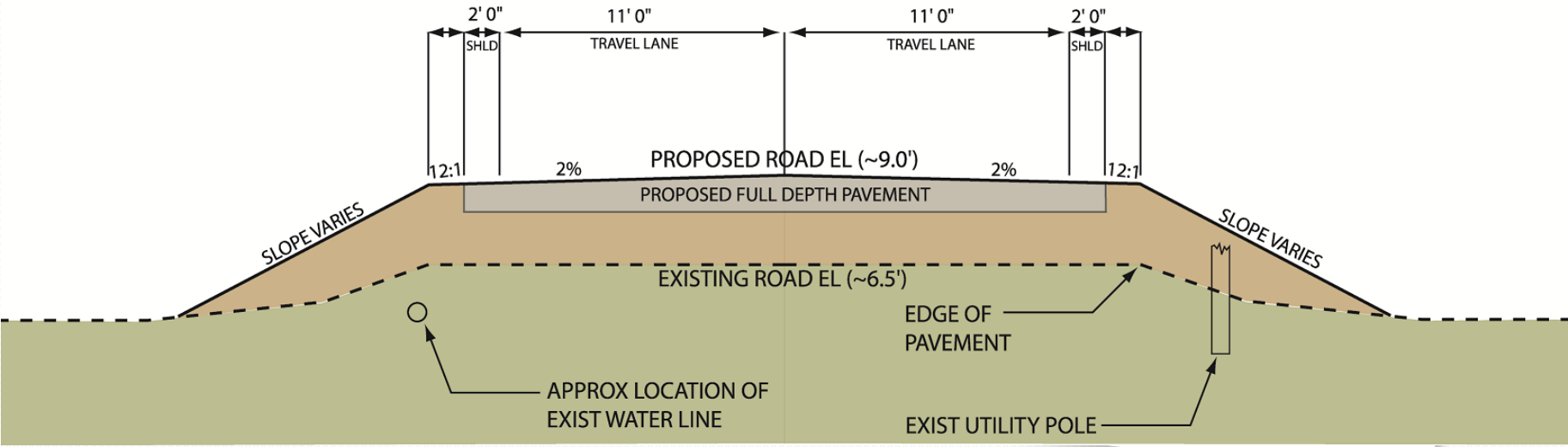
## Key Considerations

- Proximity of adjacent resource areas
- Match existing paved footprint
- Maintain existing utilities on-site
- Constructability and anticipated construction sequence/timing

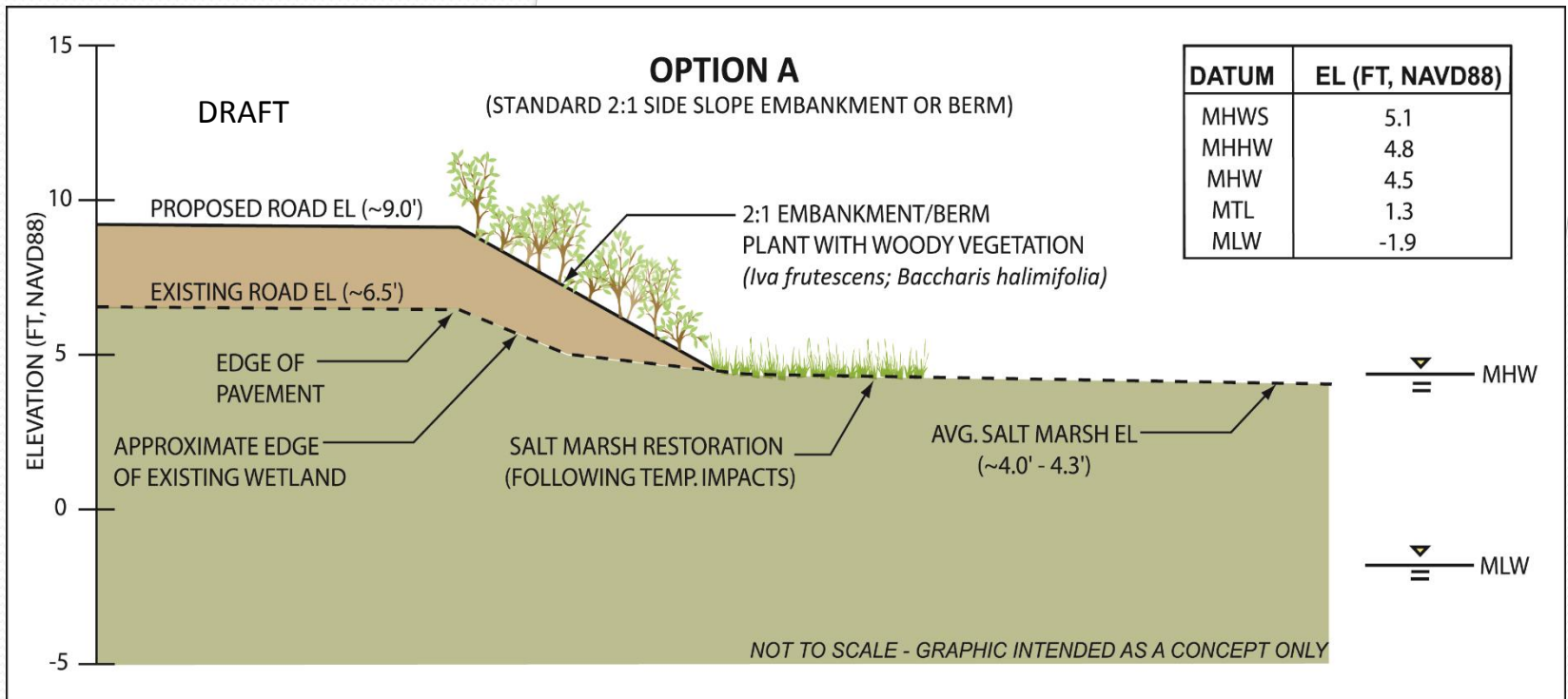


# Design Development: Roadway

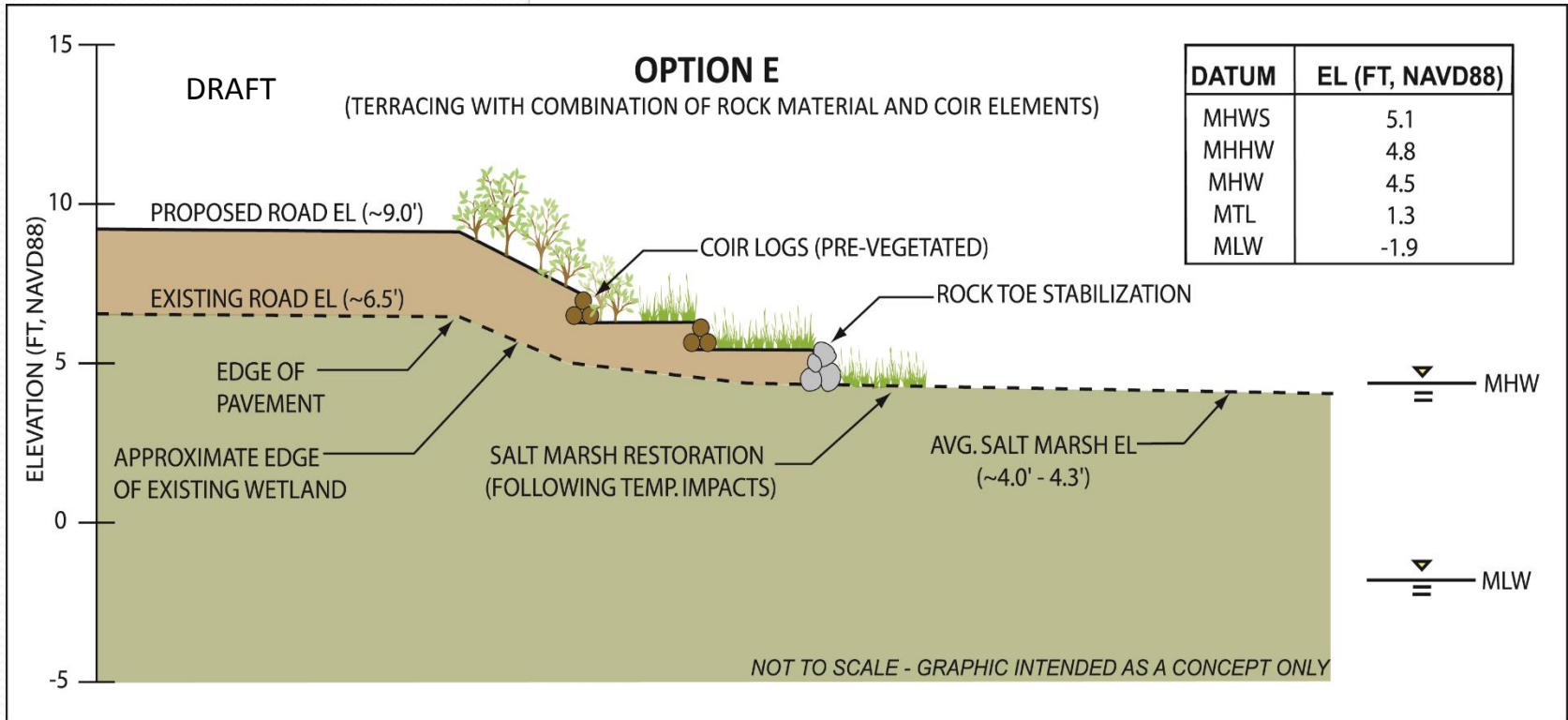
## ARGILLA ROAD TYPICAL SECTION



# Data Analyses: Living shorelines



# Data Analyses: Living shorelines



# Next steps

Phase 2: Design and permitting (2020)

Phase 3: Construction (2022-23)

## Considerations

- Additional funds needed
- Town will seek grant funding to carry the project forward
- The Trustees will continue to partner with the Town as both have a significant stake in providing public access to the beach

Transferability of lessons learned to other sites around the Commonwealth

- Technical paper to be produced



# Questions about Argilla Road Project?



# Where To Go For More Information

# Project Websites

For Ipswich River Project, go to:

[www.pie-rivers.org/ipswichriverbankproject](http://www.pie-rivers.org/ipswichriverbankproject)

For Argilla Road Project, go to:

<https://ttr.maps.arcgis.com/apps/MapSeries/index.html?appid=d67f8e8fd2cc4d2c942caf4293afe778>



# Visit CZM's Website

[LIVING](#) ▼[WORKING](#) ▼[LEARNING](#) ▼[VISITING & EXPLORING](#) ▼[YOUR GOVERNMENT](#) ▼

OFFERED BY [Massachusetts Office of Coastal Zone Management](#)

RELATED TO [StormSmart Coasts Program](#)

## StormSmart Properties

Find fact sheets for property owners on reducing coastal erosion and storm damage, developed by the Massachusetts Office of Coastal Zone Management (CZM) as part of StormSmart Coasts.

StormSmart Properties fact sheets—developed by CZM as part of the [StormSmart Coasts Program](#)—give coastal property owners important information on a range of measures that can effectively reduce erosion and storm damage while minimizing impacts to shoreline systems. This information is intended to help property owners work with consultants and other design professionals to select the best option or combination of options for their circumstances.

### RELATED

[CZM StormSmart Coasts Program Home](#) →

[www.mass.gov/service-details/stormsmart-properties](http://www.mass.gov/service-details/stormsmart-properties)

# Pick up our handouts

- CZM StormSmart Fact Sheets
- Ipswich brochure on protecting Coastal Resource Areas
- CABA Resilience Guide: Businesses Acting on Rising Seas
- Greenscapes North Shore Coalition  
[www.greenschapes.org](http://www.greenschapes.org)
- Additional Resources for Coastal Resilience & Preparedness



**StormSmart Coasts** StormSmart Properties Fact Sheet 2:  
**Controlling Overland Runoff to Reduce Coastal Erosion**

The coast is a very dynamic environment and coastal shorelines—especially beaches, dunes, and banks—change constantly in response to wind, waves, tides, and other factors such as seasonal variation, sea level rise, and human alterations to the shoreline system. Consequently, many coastal properties are at risk from storm damage, erosion, and flooding. Innovative shoreline stabilization methods can actually do more harm than good by increasing beach erosion, damaging neighboring properties, impacting marine habitats, and diminishing the capacity of beaches, dunes, and other natural resources to protect inland areas from storm damage and flooding. StormSmart Properties—part of the Massachusetts Office of Coastal Zone Management's (CZM) StormSmart Coasts Program—provides coastal property owners with important information on a range of shoreline stabilization techniques that can effectively reduce erosion and storm damage while also being adaptive to changing conditions. This information is intended to help property owners work with consultants and other design professionals to select the best option for their circumstances.

**What is Runoff and How Does it Cause Coastal Erosion?**

Runoff is rainwater, snowmelt, and water from irrigation systems and other sources that does not soak into the ground or evaporate, but instead flows over the ground surface. Runoff can occur when water falling on and/or running across bare or partially vegetated areas dislodges soil and other sediments. When runoff flows over a coastal bank, dune, or beach, it can erode these landscape features and exacerbate other coastal erosion problems.

Channels or gullies on the face of a bank or dune are a sign of runoff erosion. An erosion in the presence of wind-blown sediment carried by runoff is often described in a fan-shaped pile at the base of the slope. The channels and fan-shaped objects are both indicators that runoff is eroding the bank. Similarly, runoff can erode soil from behind concrete seawalls and other such structures if it, shoreline stabilization structures constructed of sloping rock, causes them to slump or collapse. Indicators that runoff may be contributing to the erosion of seawalls and

The shoreline stabilization option permanently stops all erosion or storm damage. The level of protection provided depends on the option chosen, project design, and site specific conditions such as the exposure to storms. The option requires maintenance and may also require other to address unique impacts to the shoreline system, such as erosion, sand and other hard structures, and any adjacent to very limited erosion because of their impacts to the shoreline system. When evaluating shoreline property owners should first determine which options are allowable under state, federal, and local regulations and then evaluate the expected level of protection, predicted lifespan, benefits, and costs of project design, installation, and long-term maintenance.



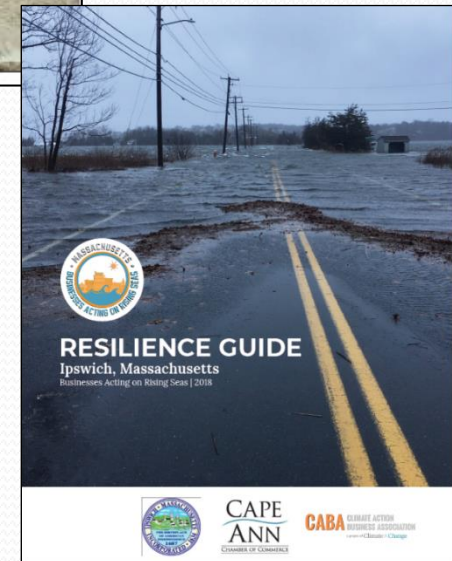
**Enjoying, Restoring and Protecting Ipswich's Coastal Resource Areas**







**GREENSCAPES**

**RAIN GARDENS**

Small, local, low-maintenance rain gardens (CZM)



**RESILIENCE GUIDE**  
Ipswich, Massachusetts  
Businesses Acting on Rising Seas (2018)



# Comments? Questions?



Special thanks to CZM for the funding that made the project and presentation possible.

*Thanks for coming!*

