Cleaning Up The Bays

Managing Stormwater in the Three Bays

APCC Association to Preserve Cape Cod
Preserving the Very Nature of Cape Cod

United States Environmental Protection Agency

Massachusetts Office of Coastal Zone Management

Seal of the Town of Barnstable, Mass. 1639. Adopted May 4, 1899

Barnstable Land Trust

Horsley Witten Group

Barnstable Clean Water Coalition

SNEP Southeast New England Program

Stormwater 101

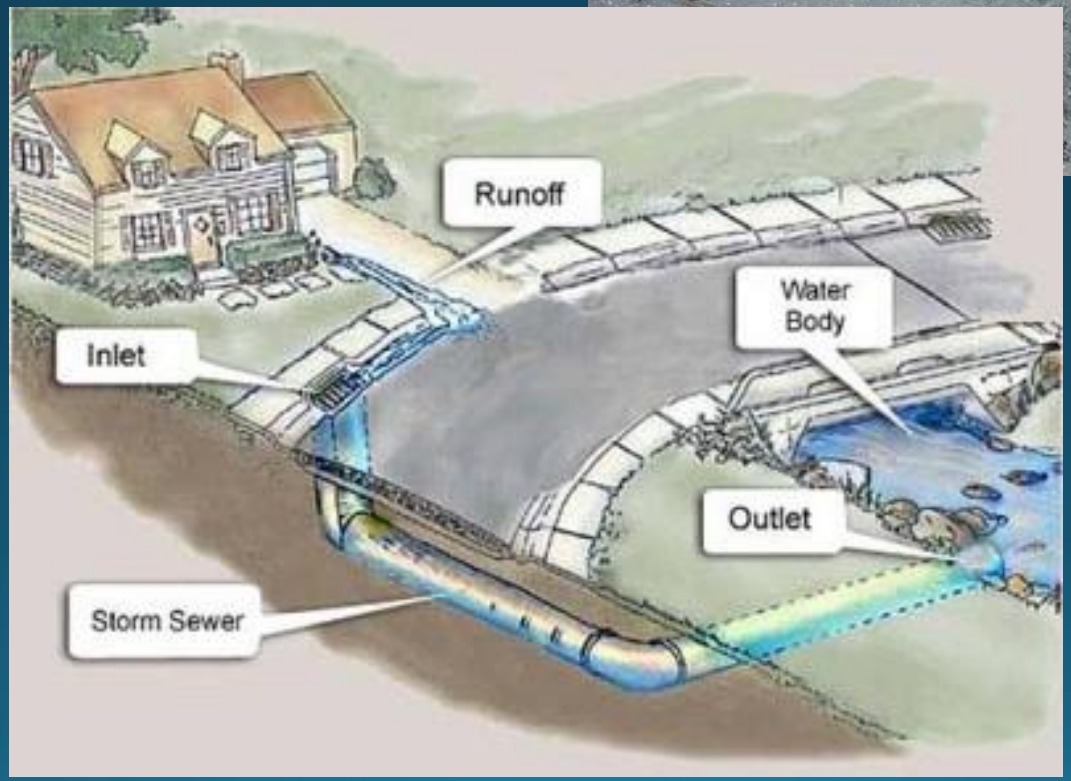
rain

↓

impervious surfaces

↓

runoff

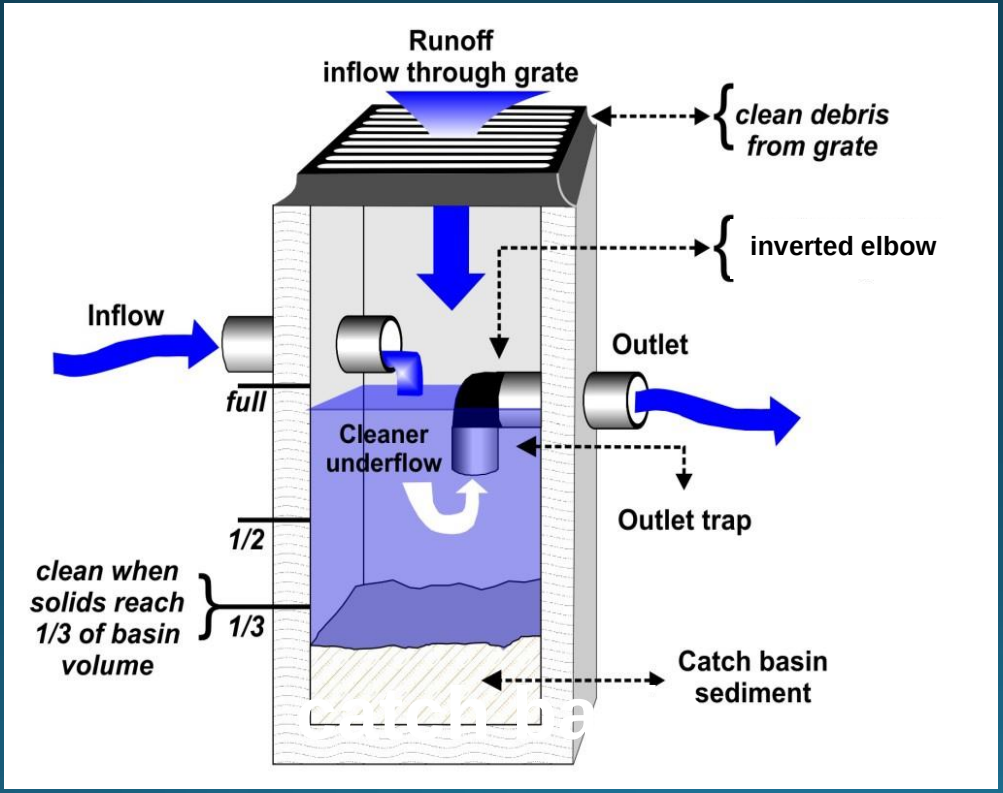


Conventional Stormwater Management

catch basin

roadway safety

reduce puddling



water quality is secondary

pre-treatment

Green Infrastructure

Engineering with Nature

green

modeled after nature

reduces volume

biological treatment

treats close to source

cost effective

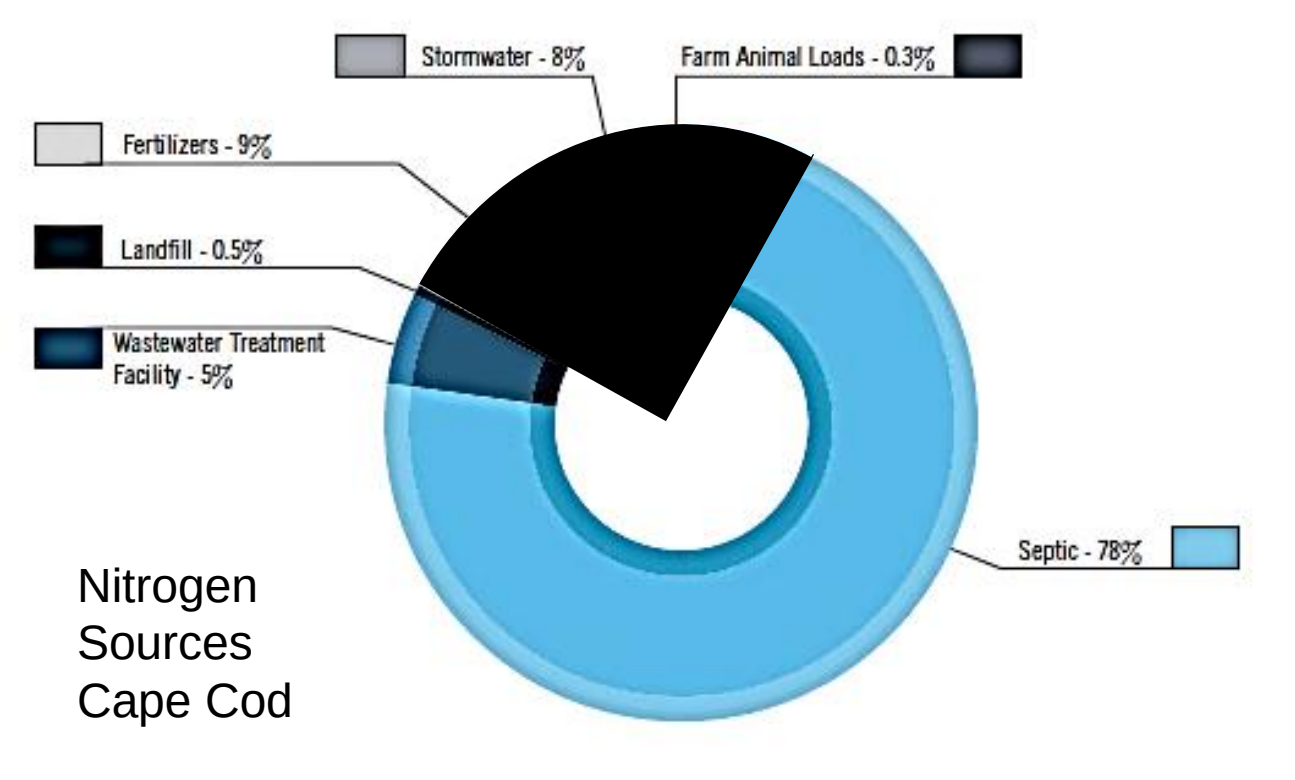
Negative Effects on the Environment and Community

A “blue economy”

livelihood and sustenance brought forth from the sea

Nitrogen and Stormwater

On average 8% of nitrogen in estuaries across the Cape is from stormwater runoff, and 9% from fertilizer use.



Source: Cape Cod Commission 208 Plan

Project Overview

5 Year Project

Total Cost: $1.2 million

$941,576 from state and federal grants

$301,045 from project team match

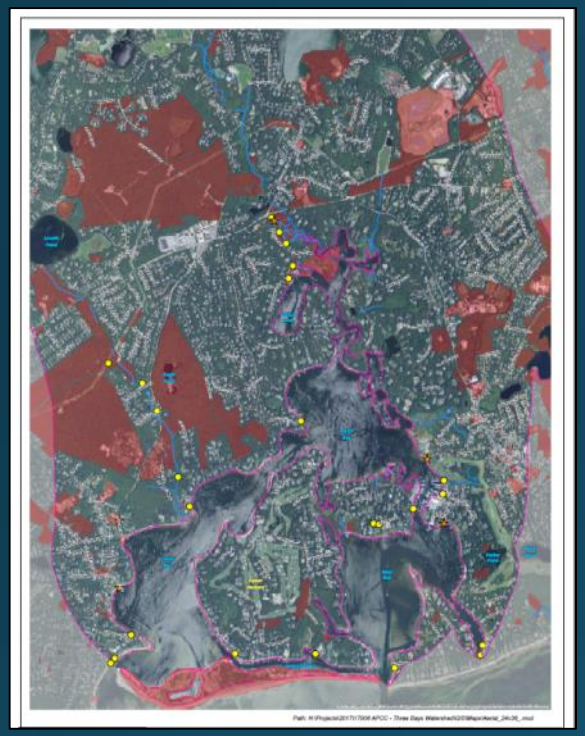
SHORT-TERM RESULTS

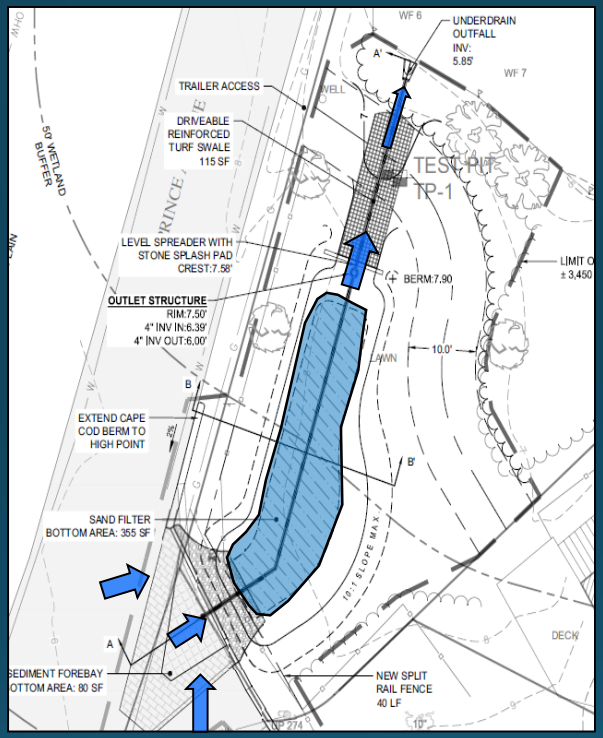
- Complete design and permitting for 8 BMPs
- Install a minimum of 4 BMPs
- Eliminate 70-85% of bacteria and 55% of nitrogen from runoff at retrofit sites
- Provide education and outreach to public and stormwater managers

LONG-TERM GOALS

- Reduction in beach and shellfish closures
- Reduction of algal blooms and fish kills
- Improve habitat for fish, shellfish and wildlife
- Support commercial and recreational uses
- Develop project model that can be transferred

Approach





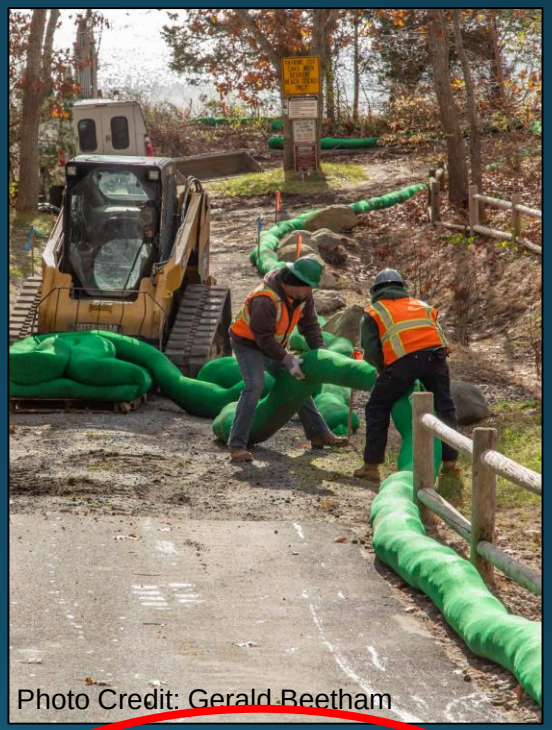


Photo Credit: Gerald Beetham

Assessment and Prioritization

Phase 1: March – Aug. 2017

Design and Permitting

Phase 1: 2017 – 2018

Installation

Phase 1: October 2018 - January 2019

CW-2: Cordwood Landing

Existing System Improvements

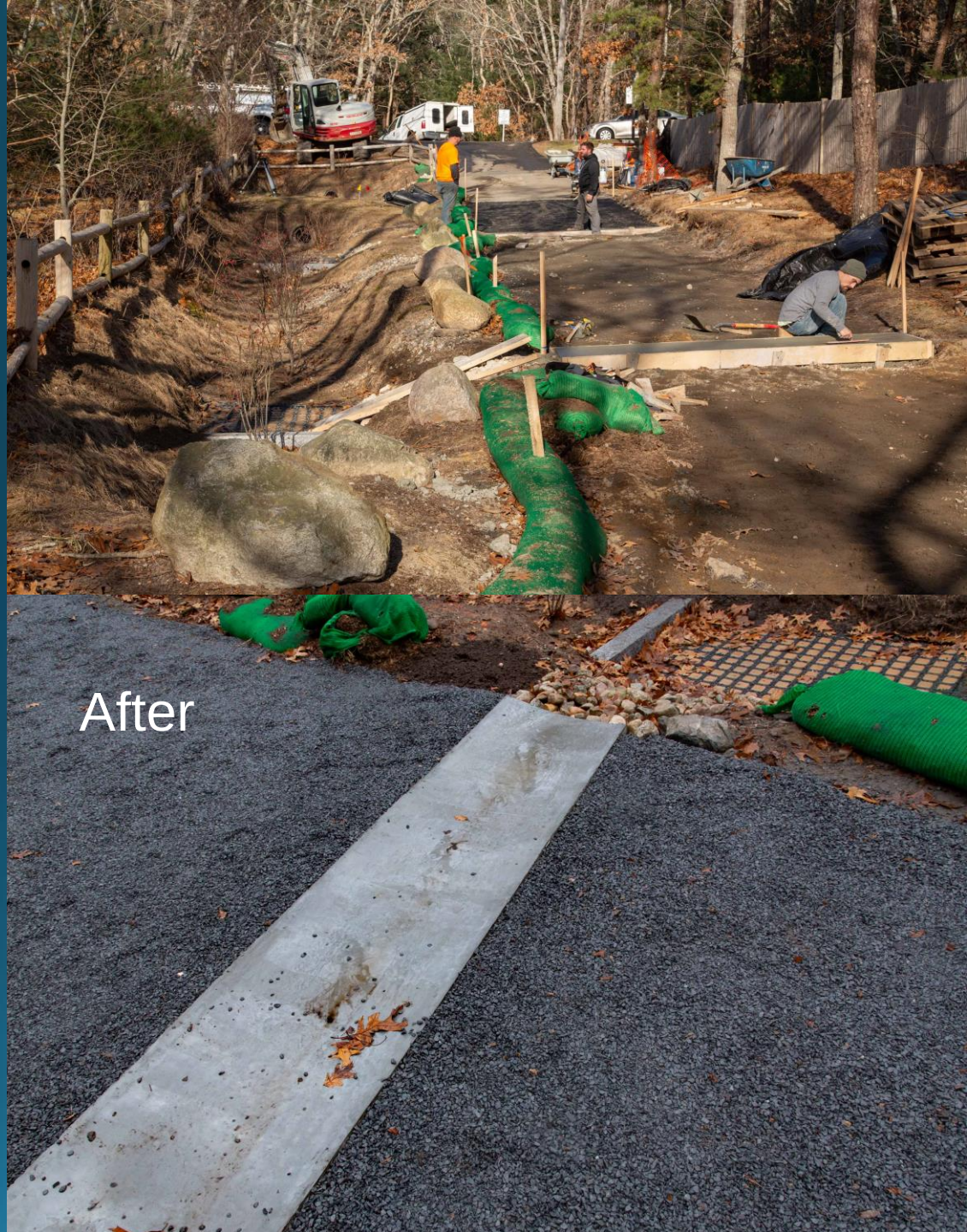


Photo Credits: Gerald Beetham

New Treatment System – End of Cordwood Landing

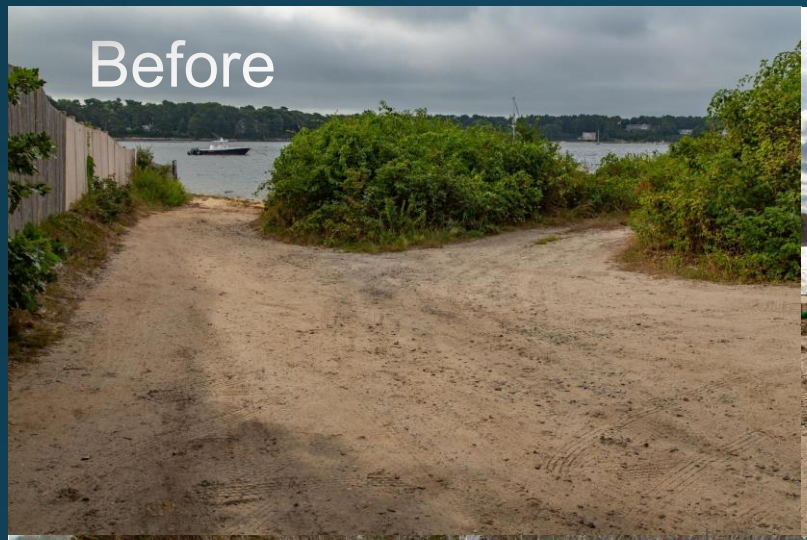


Photo Credits: Gerald Beetham

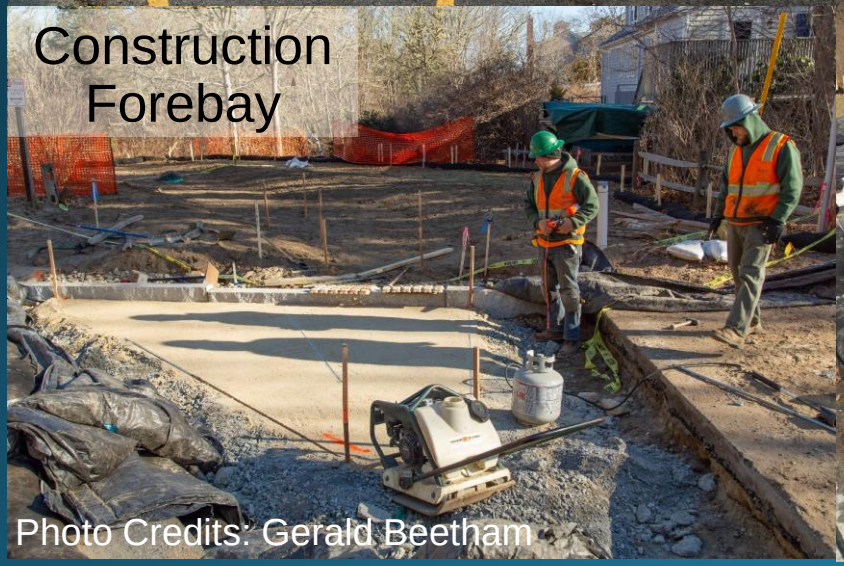
Cordwood: Site Access and Use

No
Plowing

Photo Credits: Gerald Beetham

PC-1: Prince Cove Marina

Prince Cove Sand Filter



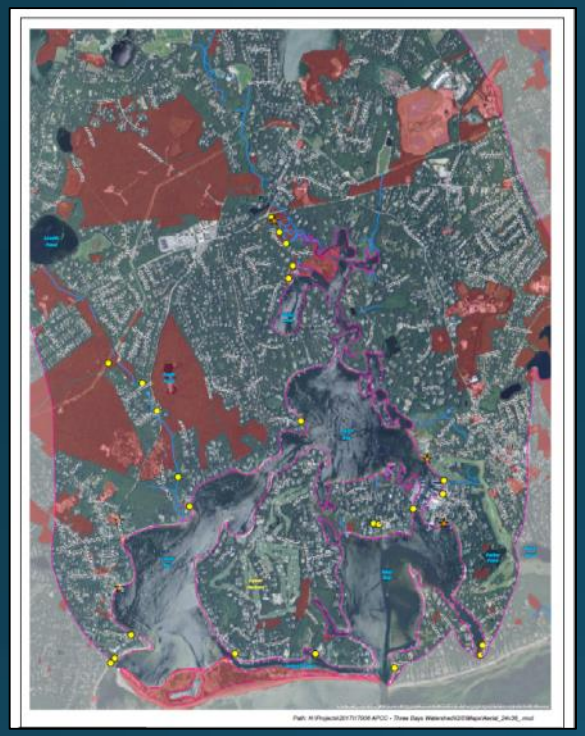
Ropes Beach Maintenance

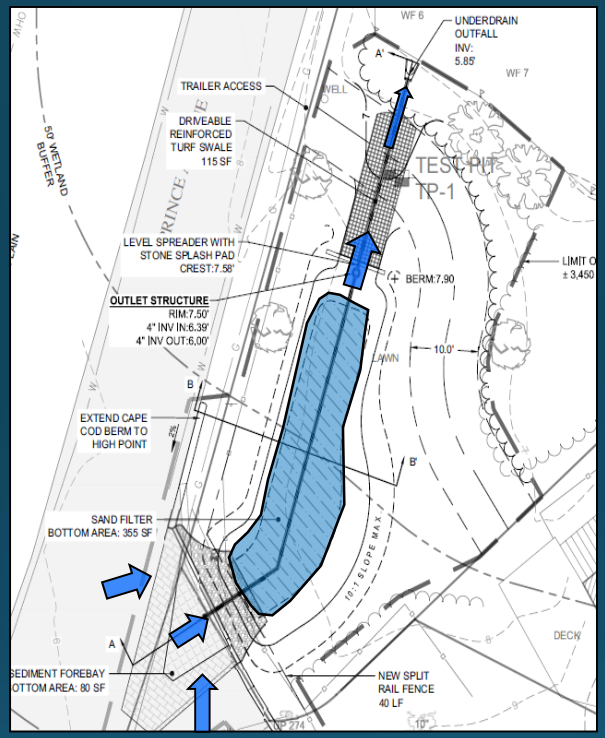
Total Impact of 2018-2019 Work

- Maintenance and improvement of 2 existing systems (Cordwood and Ropes)
- Installation of two new systems (Cordwood and Prince Cove Marina)
- Total of 8 Acres of Drainage Addressed
- 55% or greater Nitrogen Removal
- 70% Bacteria Removal
- Maintenance trainings spring and fall 2019

Photo Credits: Barnstable Clean Water Coalition and APCC

Approach





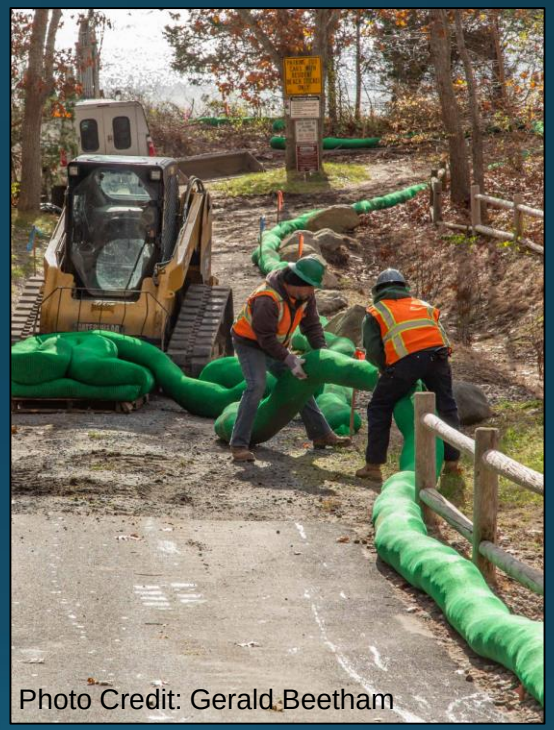


Photo Credit: Gerald Beetham

Assessment and Prioritization

Phase 1: March – Aug. 2017

Phase 2: September 2018 – February 2019

Design and Permitting

Phase 1: 2017 – 2018

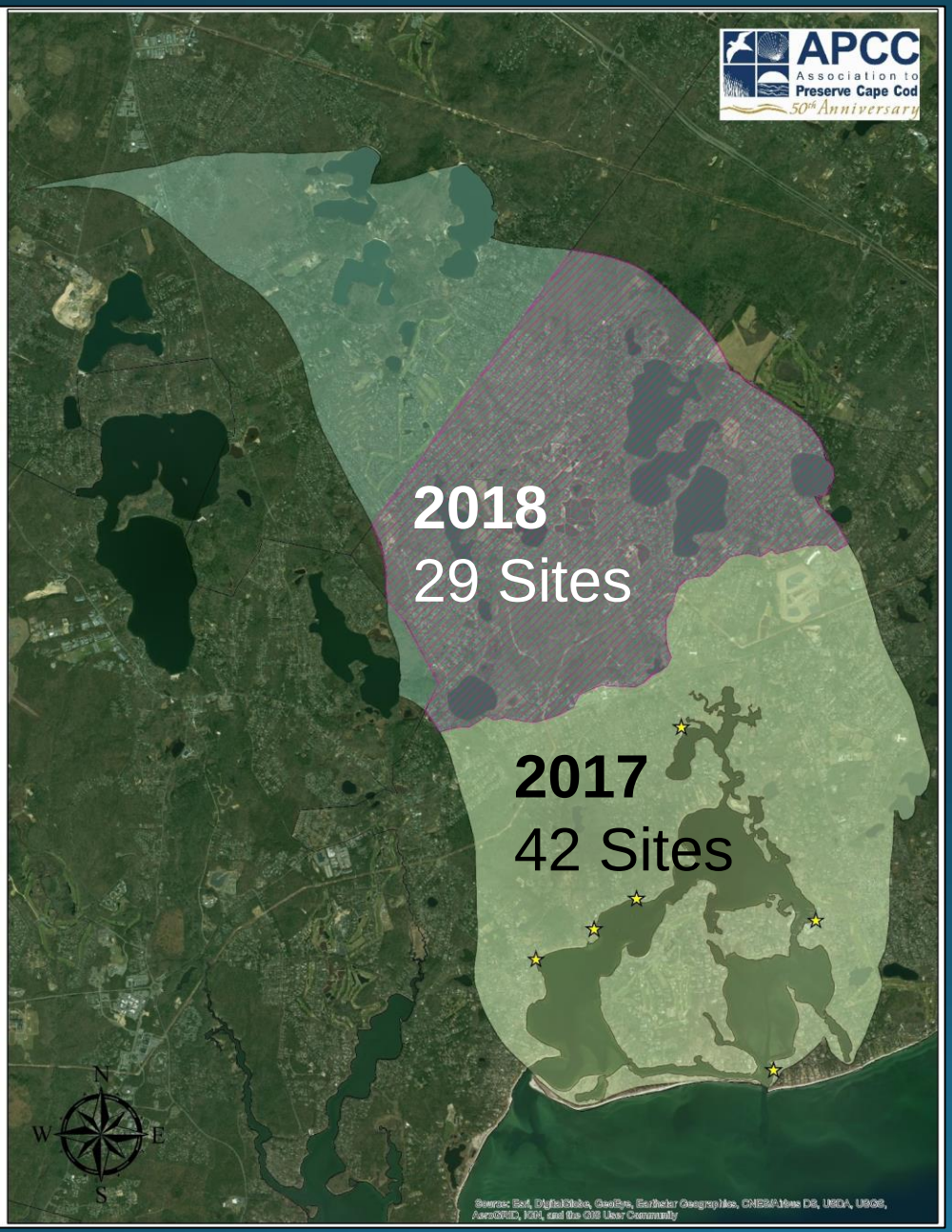
Phase 2: 2019

Installation

Phase 1: October 2018 - January 2019

Phase 2: Spring 2020

Project Area



Field Assessment - Methods

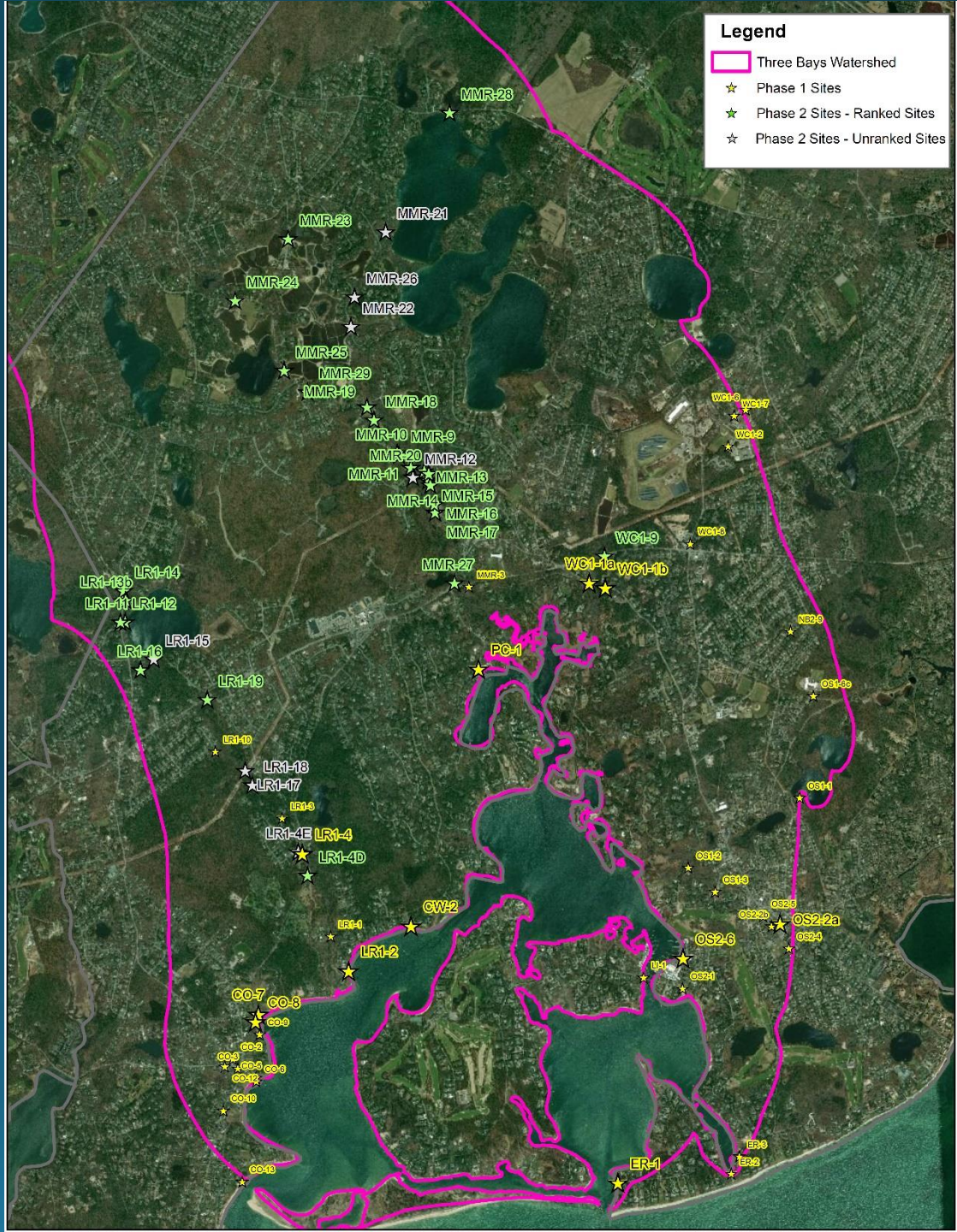
- Collect data on iPads loaded with existing info
- Visit pre-identified areas
- Talk to the experts/locals

After the Fieldwork…

- Collect additional information
- Perform sizing calculations
- Develop concept designs
- Determine pollutant removal
- Estimate costs

<u>29 ranked sites in addition to 42 ranked sites from Phase 1</u>

and many more unranked project suggestions!

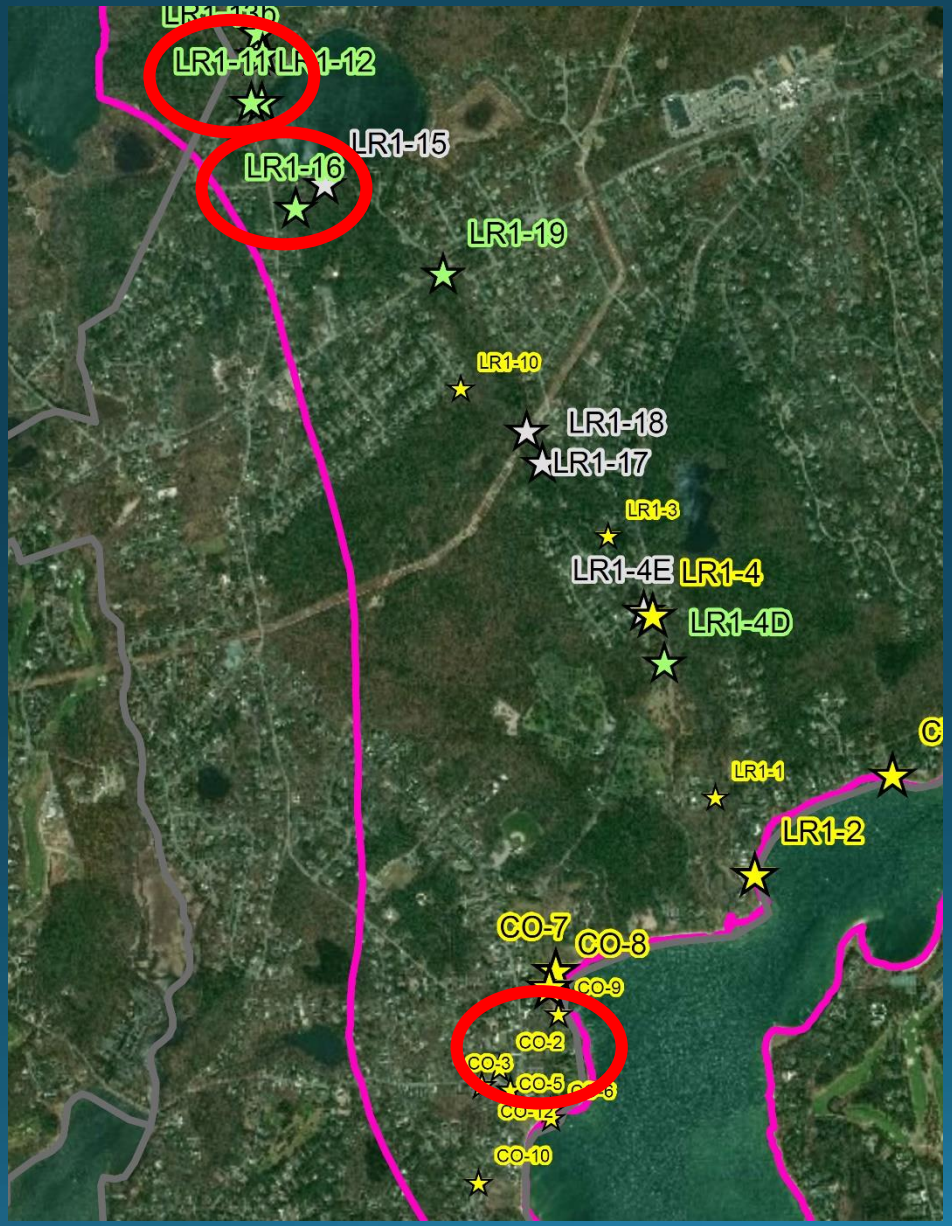


Credit: Three Bays Preservation, Inc.

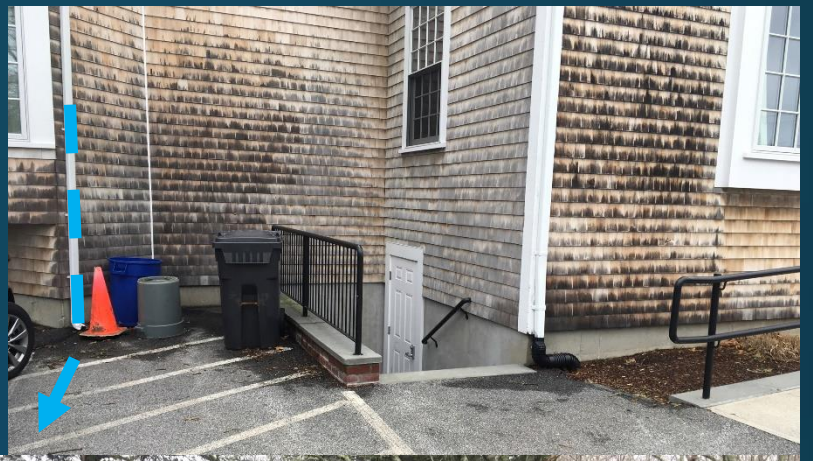
Prioritization of Sites

- **Pollution Removals**
- **Cost**
- **Ease of Implementation**
- **Additional Benefits:**
  - Public Education
  - Direct benefits to the key resources? (shellfish beds, beaches, fish, discharges to river systems, etc.)
- **10 Priority Sites**

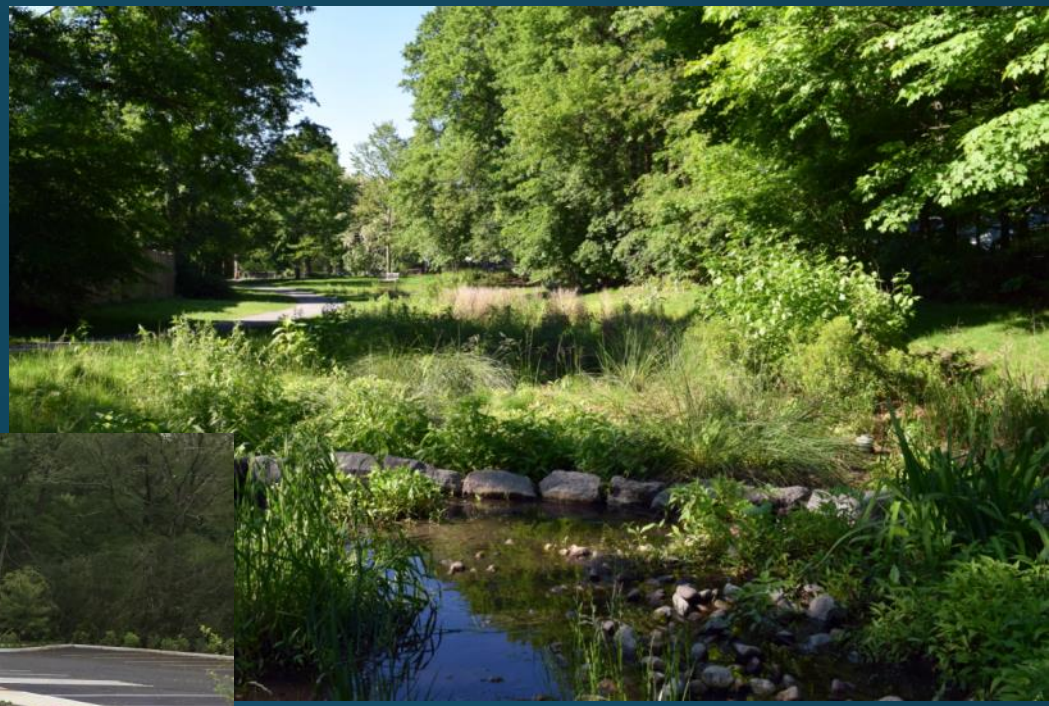
3 Cotuit/Little River Sites:



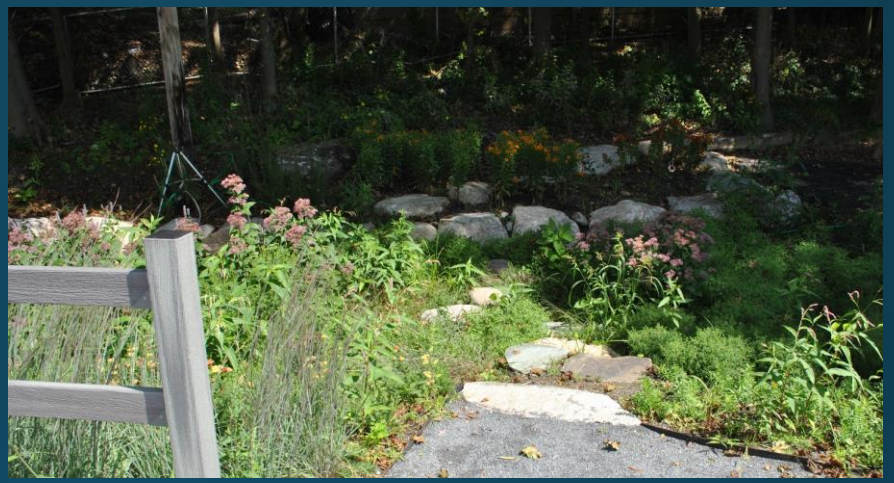
CO-2 Cotuit Library Bioretention



Bioretention Area

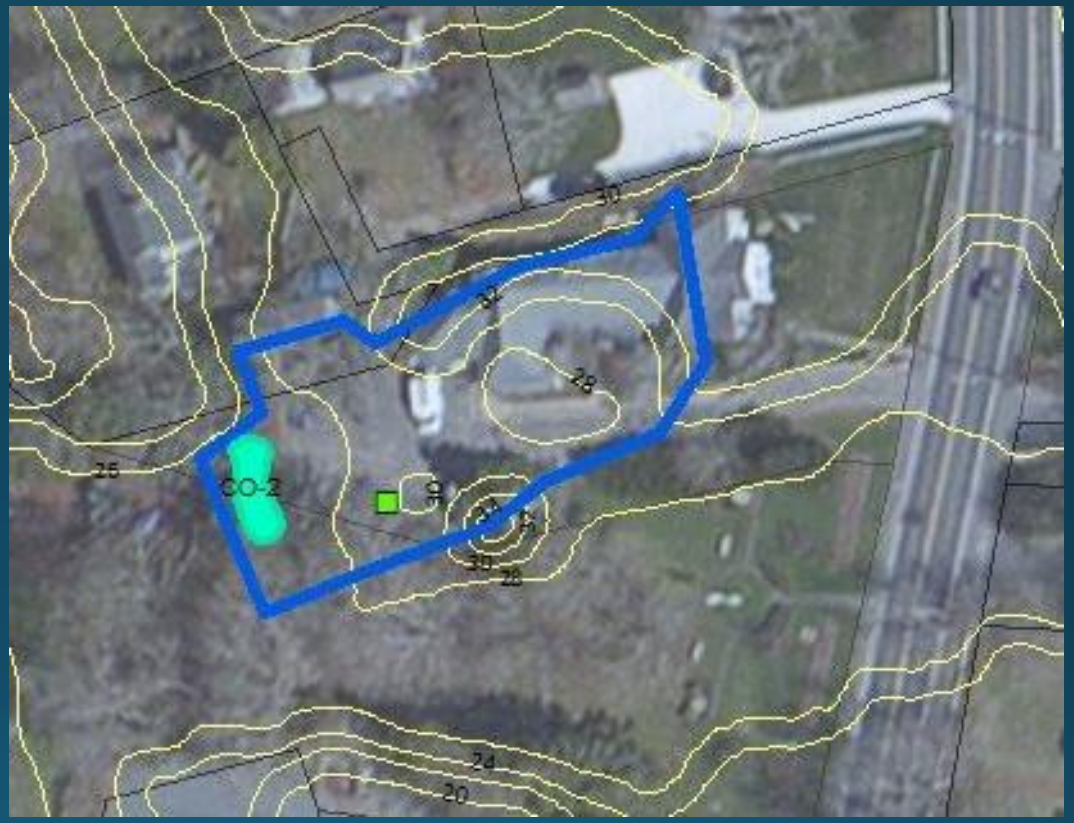


Artful Design and Educational



Concept:

- Bioretention
- Public Educational Signage
- 0.3-acre Drainage Area, 0.2 acres impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal



LR1-11 Lovell's Pond Boat Ramp Bioretention

Remove the inactive treatment shed

Capture and treat runoff from adjacent Santuit-Newtown Rd

Concept:

- Bioretention
- Public Educational Signage
- 0.2-acre Drainage Area, 70% impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal

LR1-16 Lovell's Pond Beach Bioretention

Runoff currently flows from the driveway/parking lot/building into a leaching chamber

Propose to regrade emergency access to direct runoff into a bioretention

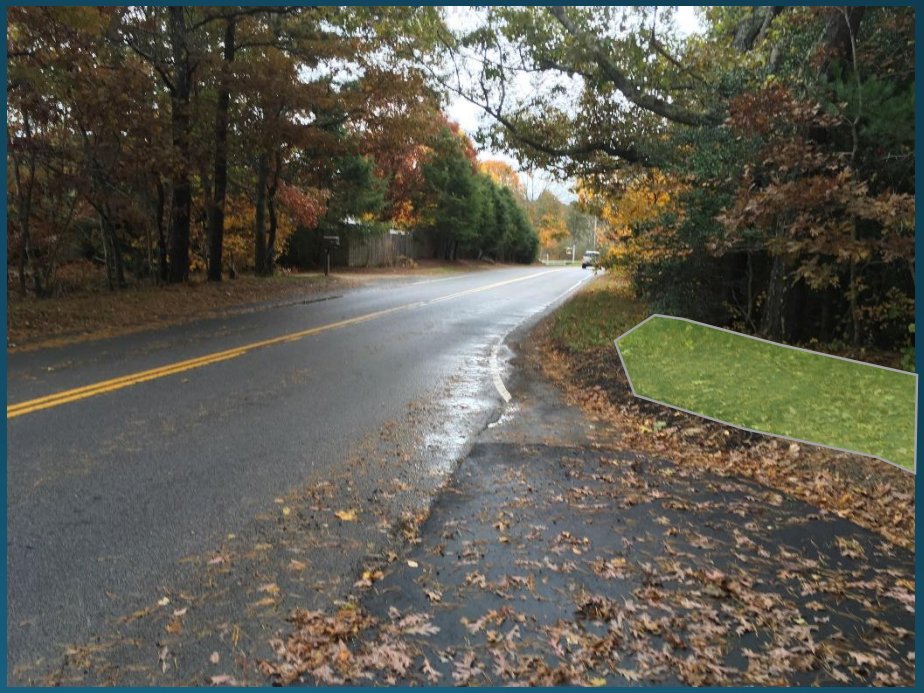
Concept:

- Bioretention
- Public Educational Signage
- 0.2-acre Drainage Area, 50% impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal

7 Marstons Mills River Sites

MMR-9 Hi River Road Bioretention

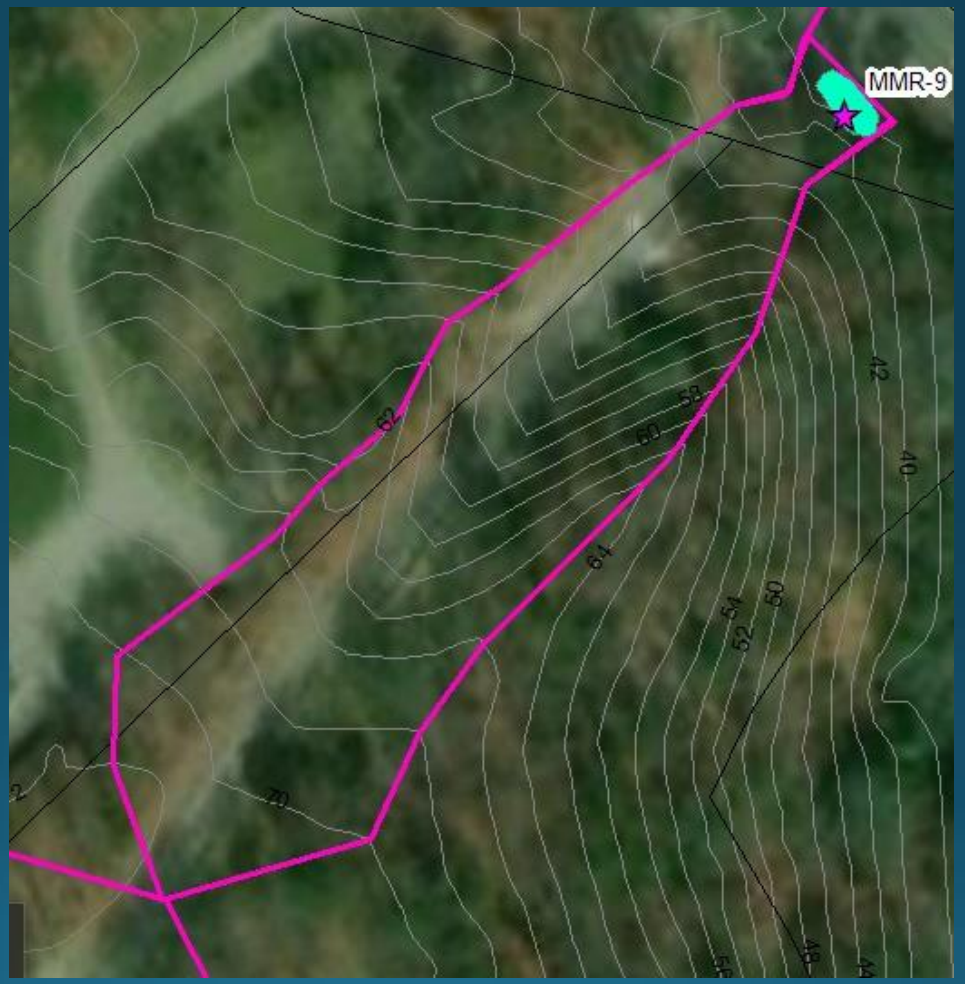
Steep, Unpaved Private Driveway



Intersection of Hi River Road and River Road

Concept:

- Bioretention with enhanced pretreatment
- 0.5-acre Drainage Area, 0.2 acres impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal

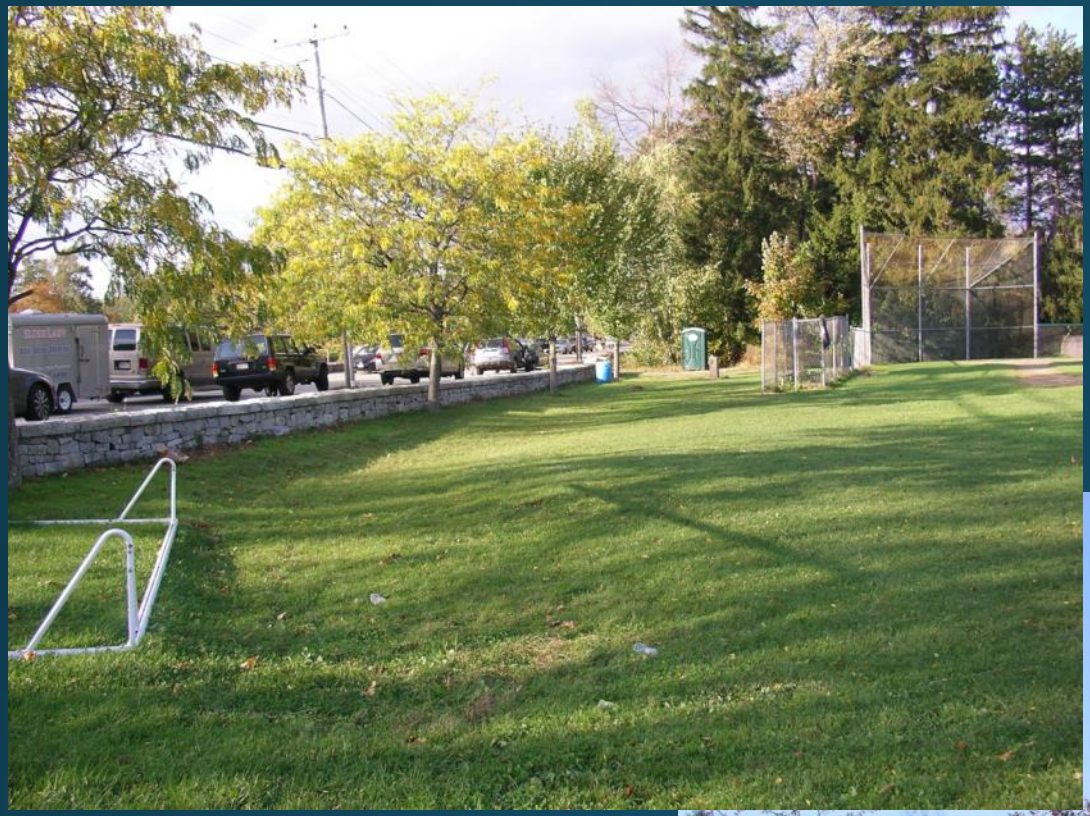


MMR-10A River Road Dry Swales

Intersection of Hi River Road and River Road

Yard debris on steep slope

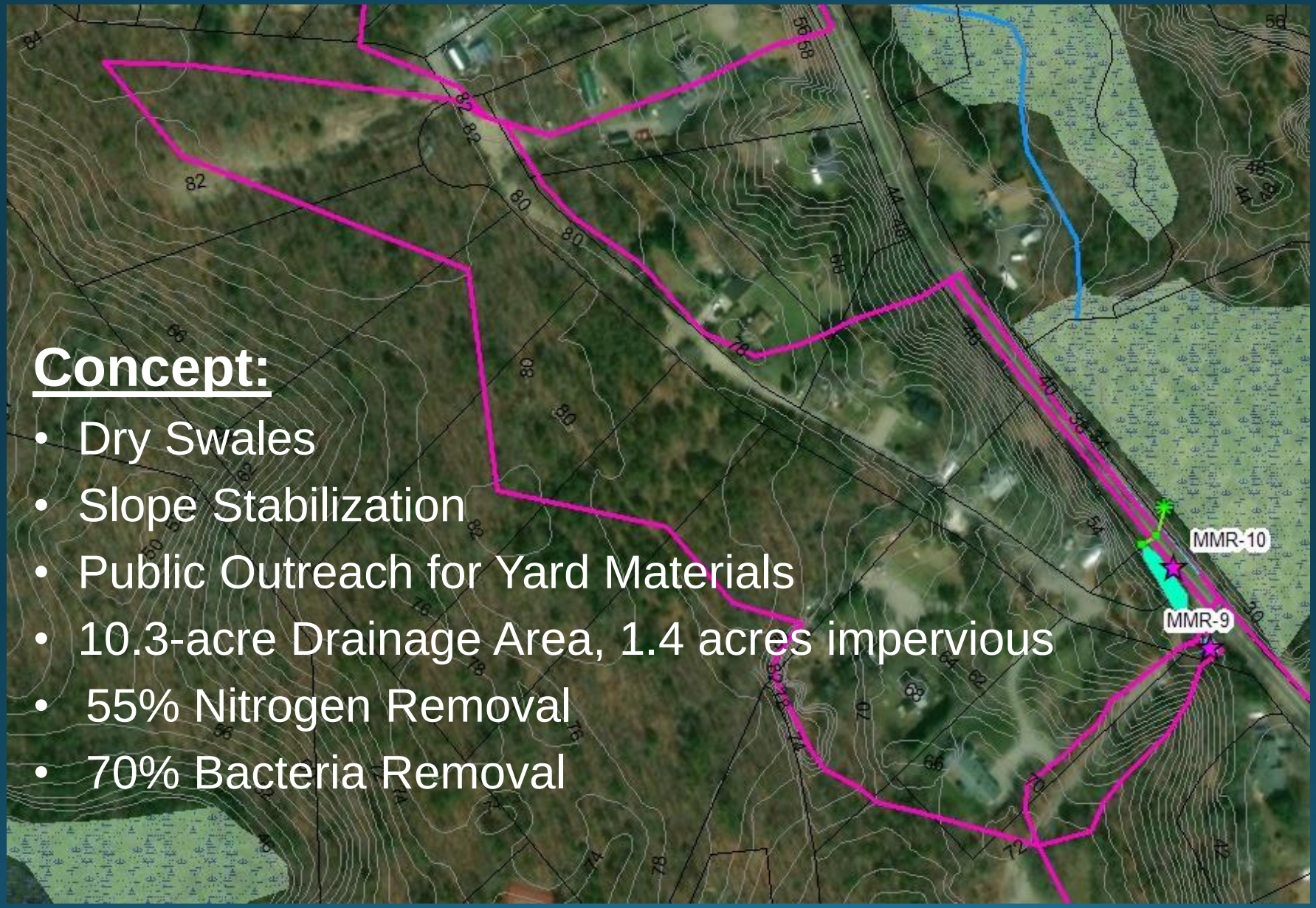
Dry Swale



MMR-10B Dry Swale

East side of River Road, looking south

Looking towards MMR-10B from Hi River Rd



Concept:

- Dry Swales
- Slope Stabilization
- Public Outreach for Yard Materials
- 10.3-acre Drainage Area, 1.4 acres impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal

MMR-11 River Road Dry Swales

Northeast side of River Road

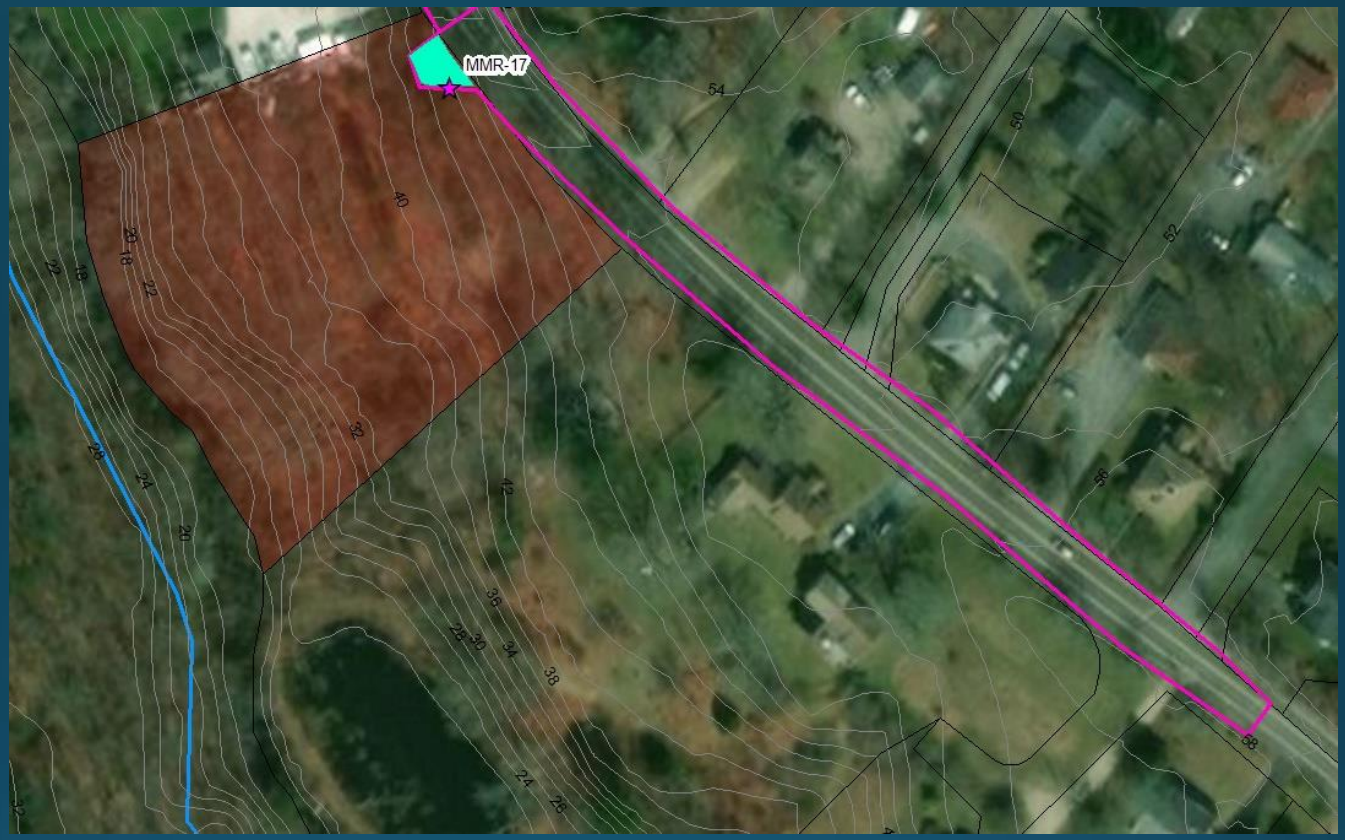
Southwest side of River Road

Concept:

- Dry Swales
- 3.6-acre Drainage Area, 0.5 acres Impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal

7 Marstons Mills River Sites

MMR-17 River Road Bioretention



Concept:

- Bioretention
- 0.5-acre Drainage Area, 84% impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal

MMR-18a/b River Road Options

Concept A – Dry Swale

Concept B – Wet Swale

Wet Swale

Concept A:

- Dry Swale in ROW
- 1.4-acre Drainage Area, 0.4 acres impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal

Concept B:

- Wet Swale (Drainage Easement Required)
- 4.2-acre Drainage Area, 0.43 acres impervious
- 30% Nitrogen Removal
- 60% Bacteria Removal

MMR-19 River Road Dry Swale

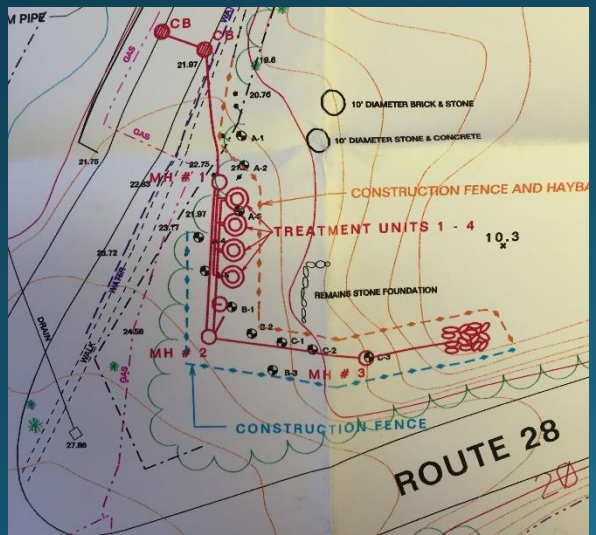
Concept:

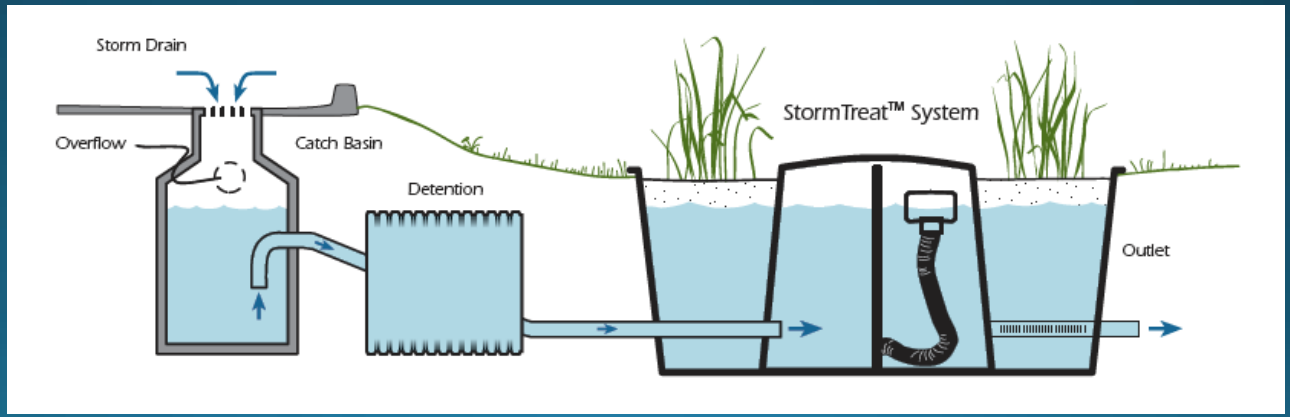
- Dry Swale in Right of Way
- 1.5-acre Drainage Area, 0.45 acres impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal

MMR-27 StormTreat Maintenance

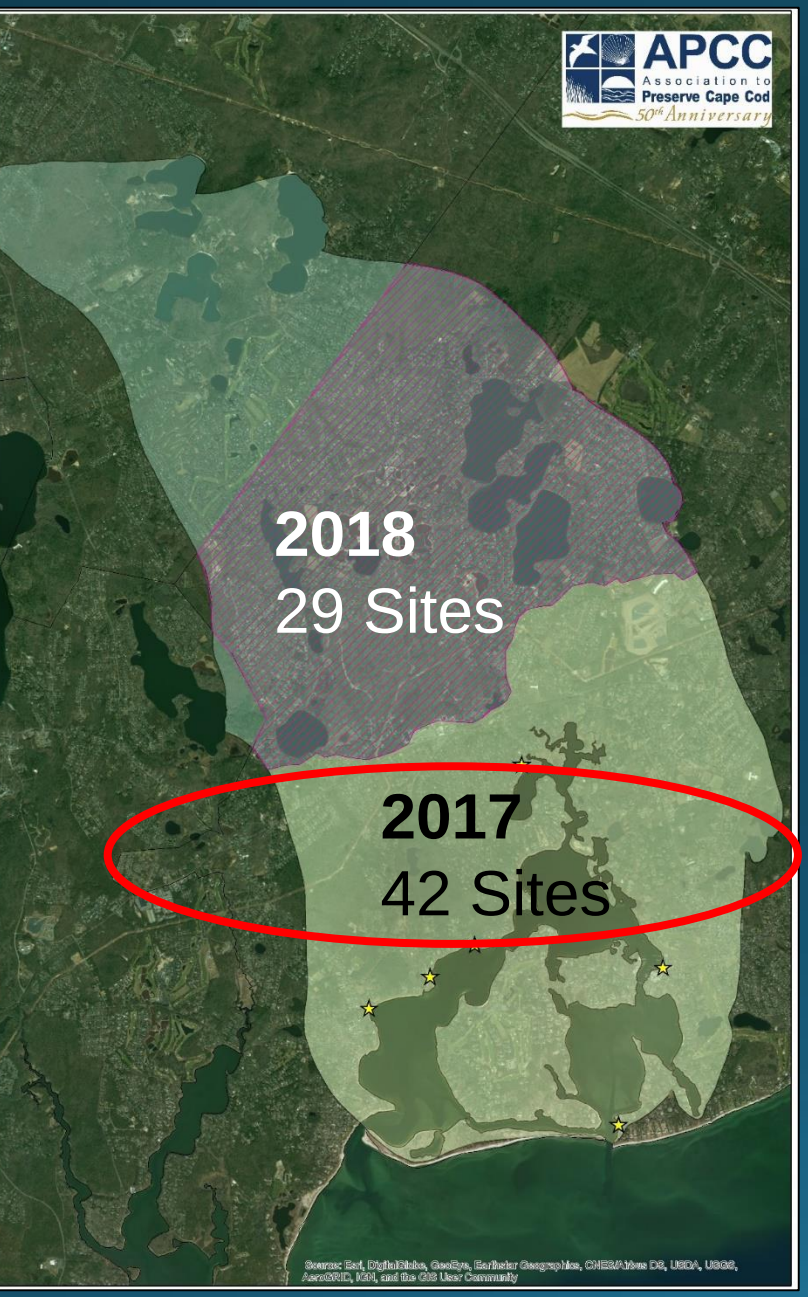
Concept:

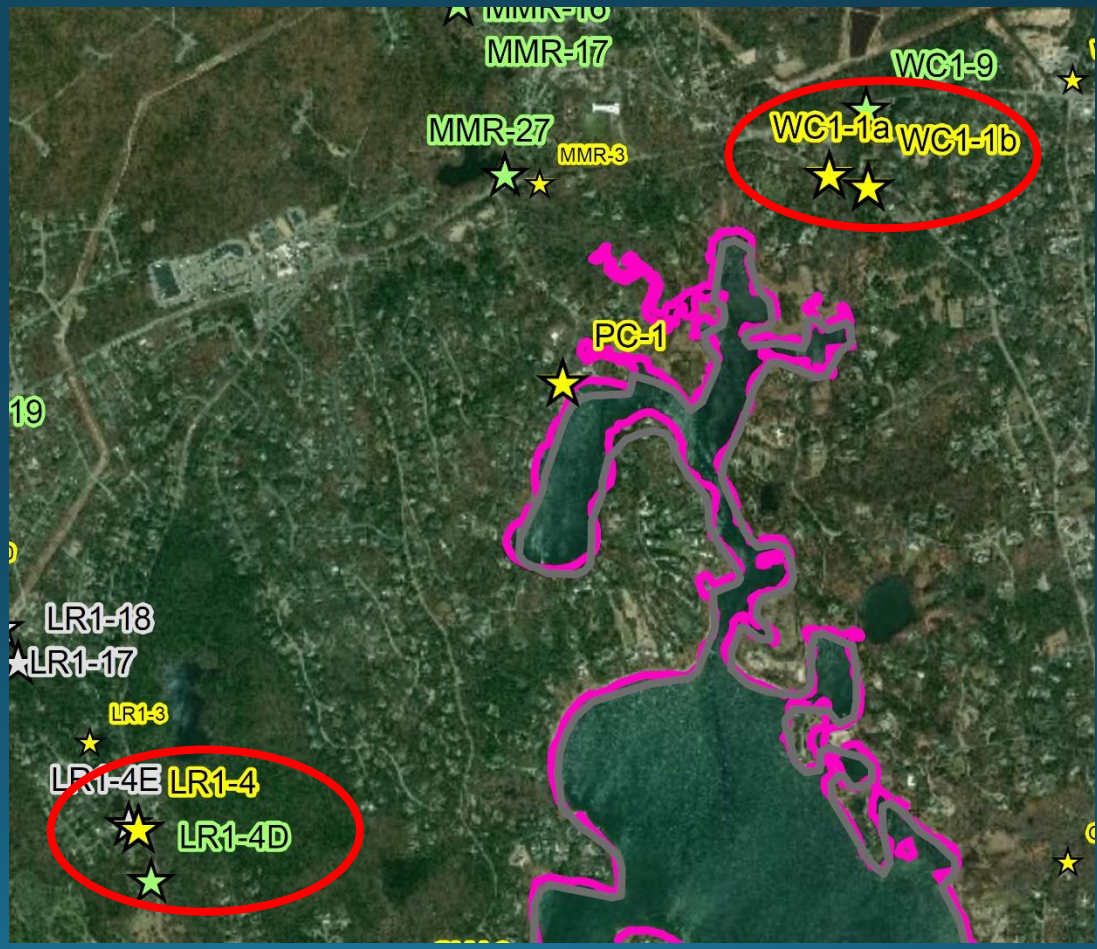
- Cleanout/repair/enhance system as needed
- 0.7-acre Drainage Area, 0.3 acres impervious
- 55% Nitrogen Removal
- 85% Bacteria Removal



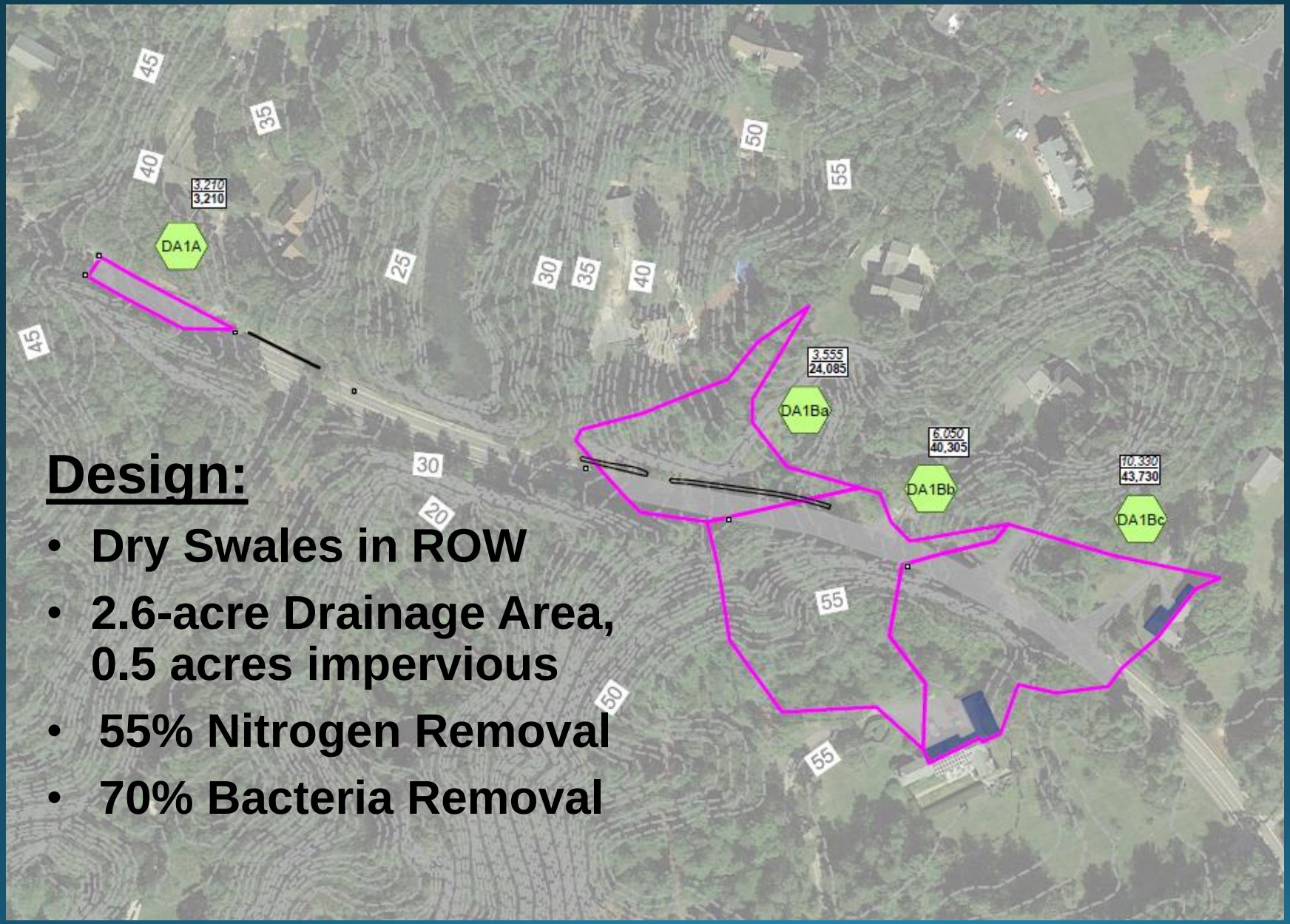


25%-Level Designs



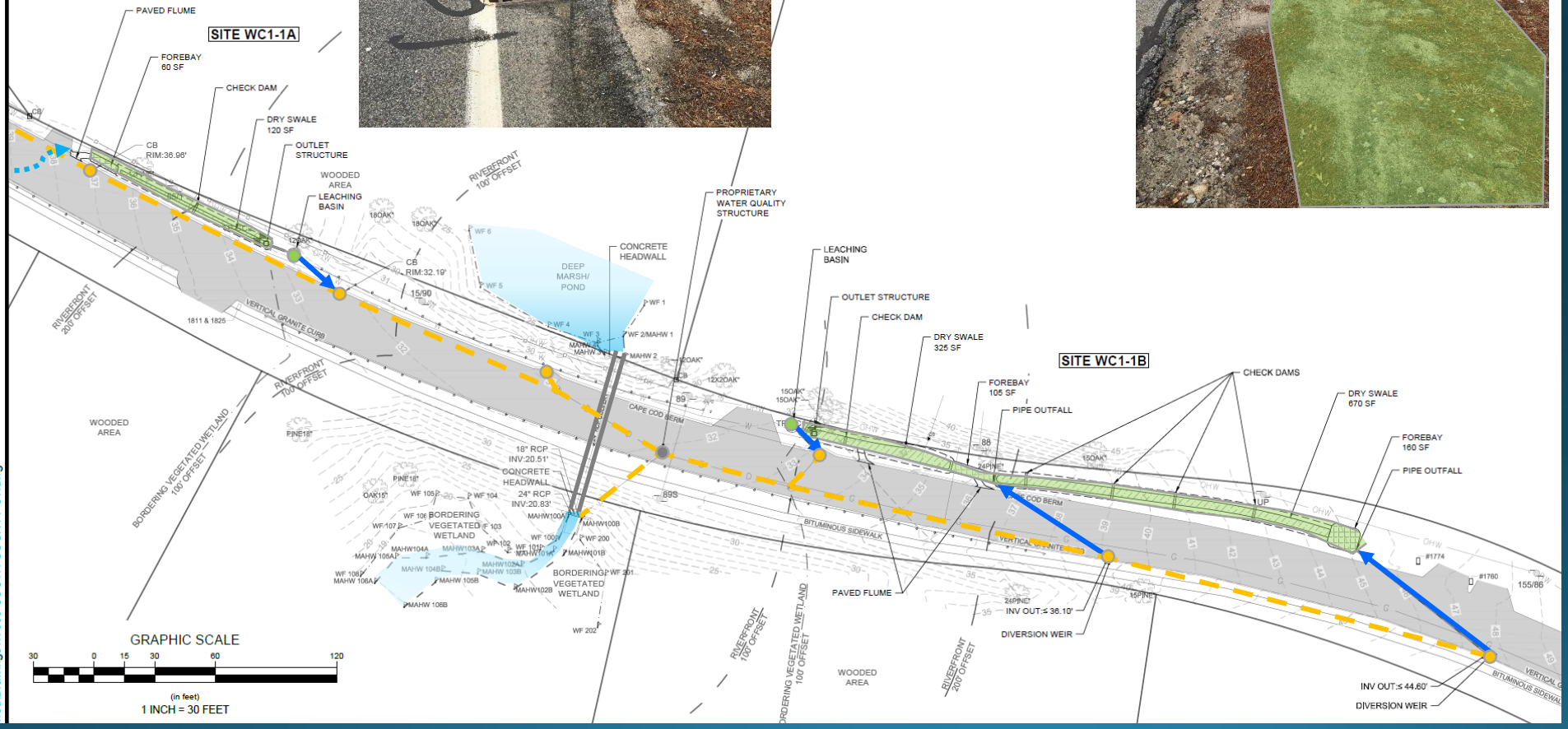


WC1-1A/1B South County Road

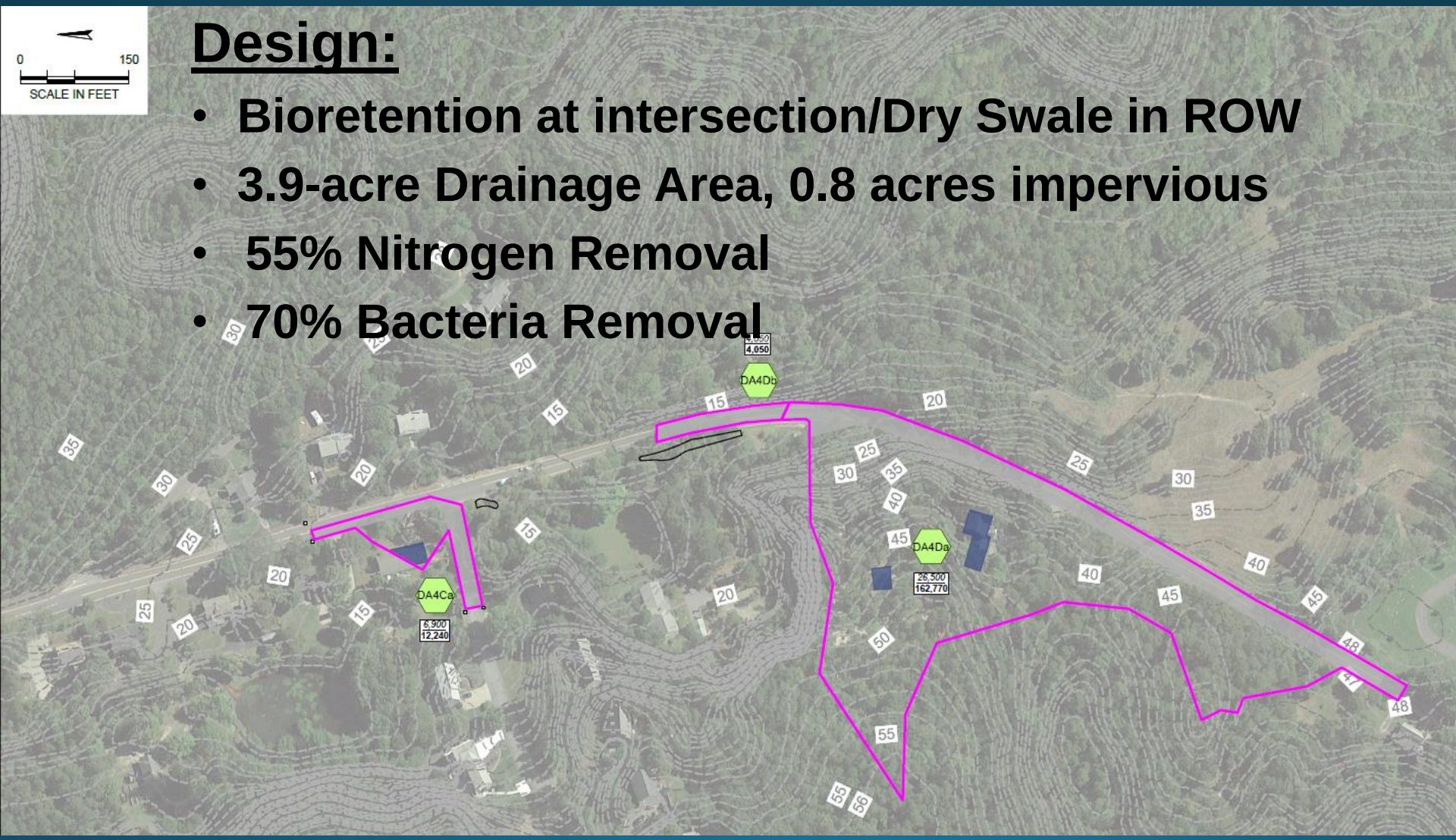


Design:

- **Dry Swales in ROW**
- **2.6-acre Drainage Area, 0.5 acres impervious**
- **55% Nitrogen Removal**
- **70% Bacteria Removal**

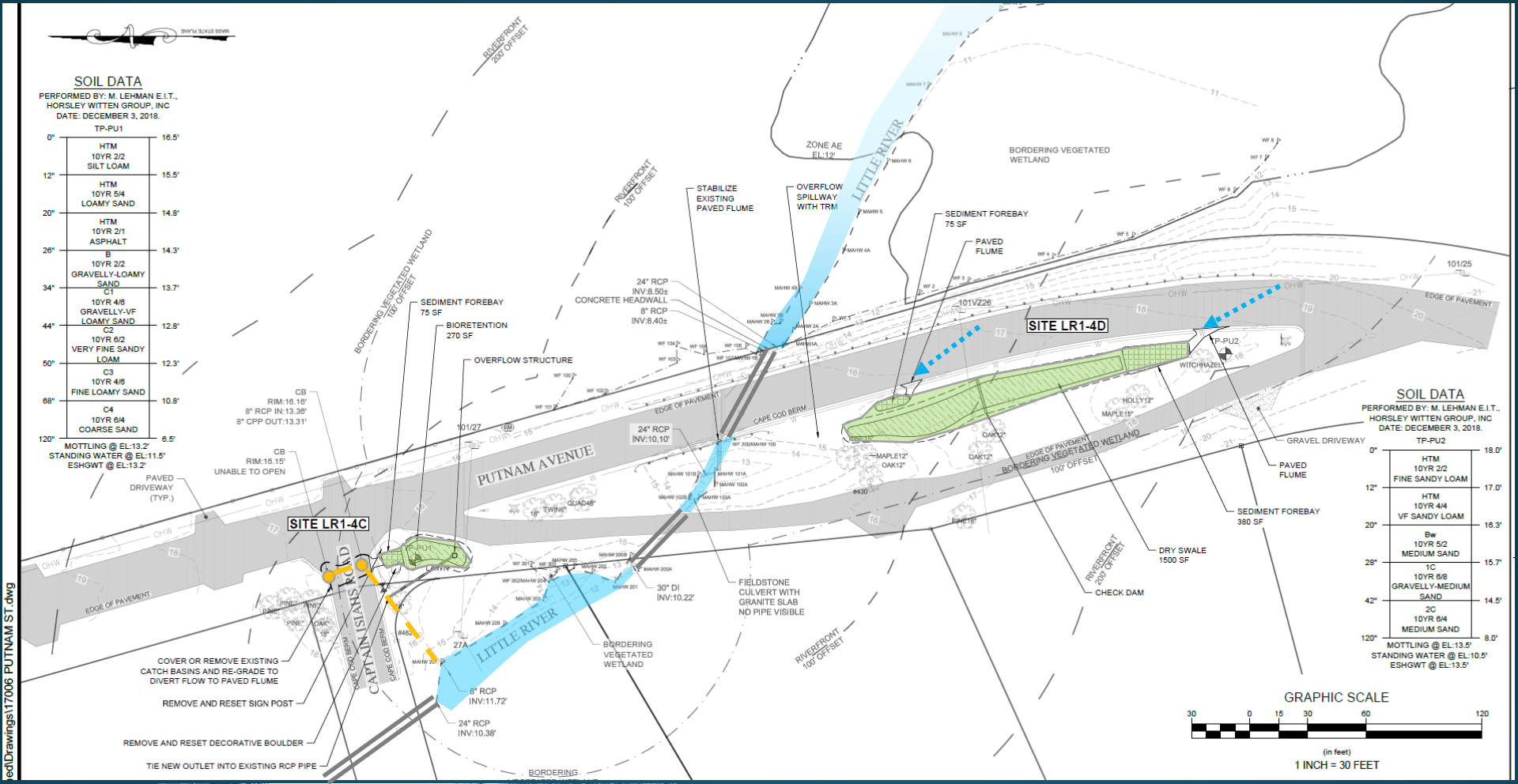

SITE WC1-1A
PAVED FLUME
FOREBAY
60 SF
CHECK DAM
DRY SWALE
120 SF
OUTLET
STRUCTURE
CB
RIM:36.96'
WOODED
AREA
LEACHING
BASIN
RIVERFRONT
100' OFFSET
CB
RIM:32.19'
DEEP
MARSH/
POND
CONCRETE
HEADWALL
PROPRIETARY
WATER QUALITY
STRUCTURE
LEACHING
BASIN
OUTLET STRUCTURE
CHECK DAM
DRY SWALE
325 SF
SITE WC1-1B
CHECK DAMS
FOREBAY
105 SF
PIPE OUTFALL
DRY SWALE
670 SF
FOREBAY
160 SF
PIPE OUTFALL
RIVERFRONT
200' OFFSET
VERTICAL GRANITE CURB
RIVERFRONT
100' OFFSET
WOODED
AREA
BORDERING VEGETATED WETLAND
100' OFFSET
18" RCP
INV:20.51'
CONCRETE
HEADWALL
24" RCP
INV:20.83'
BORDERING
VEGETATED
WETLAND
CAPE COD BERM
BITUMINOUS SIDEWALK
PAVED FLUME
24PINE
INV OUT:≤ 36.10'
DIVERSION WEIR
INV OUT:≤ 44.60'
DIVERSION WEIR
RIVERFRONT
100' OFFSET
BORDERING VEGETATED WETLAND
100' OFFSET
WOODED
AREA
RIVERFRONT
200' OFFSET
GRAPHIC SCALE
30 0 15 30 60 120
(in feet)
1 INCH = 30 FEET

LR1-4C/4D Putnam Avenue



Design:

- Bioretention at intersection/Dry Swale in ROW
- 3.9-acre Drainage Area, 0.8 acres impervious
- 55% Nitrogen Removal
- 70% Bacteria Removal



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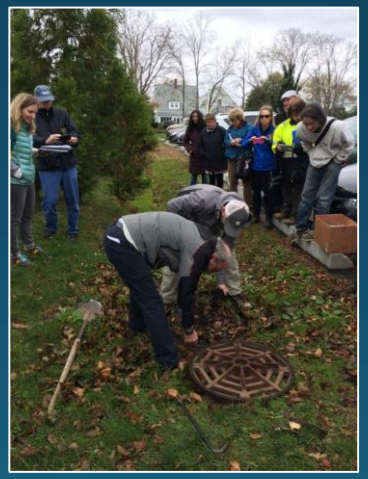
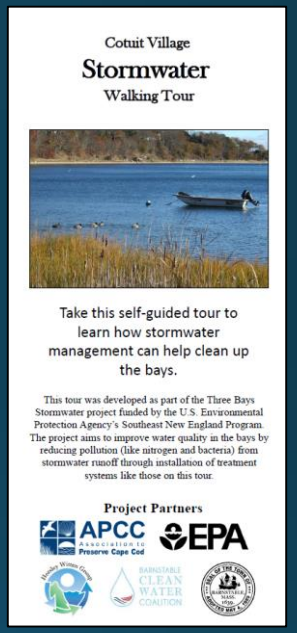
Education and Outreach

- Rain Garden Workshop
- Cotuit Stormwater Walking Tour
- O&M Workshops
- Videos
- “Green” Your Yard Campaign - Survey
- Public Meeting - August

Photo Credit: Horsley Witten Group





Eco-Landscape Lecture Series

Kill Your Lawn

Thursday, May 16th at 2pm

Mashpee Library

Mark Richardson

Director of Horticulture at Tower Hill

Pollinators

Thursday, June 13th at 2pm

Mashpee Library

Emily May

Pollinator Conservation Specialist, Xerces Society

APCC
Association to Preserve Cape Cod
Preserving the Very Nature of Cape Cod

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MASSACHUSETTS OFFICE OF COASTAL ZONE MANAGEMENT

SEAL OF THE TOWN OF BARNSTABLE, MASS. 1639. ADOPTED MAY 4, 1889

BARNSTABLE LAND TRUST

Horsley Witten Group

BARNSTABLE CLEAN WATER COALITION

SNEP
Southeast New England Program