Shovel-Ready and Beyond!

A Green Infrastructure Case Study in the Three Bays Watershed

APCC Association to Preserve Cape Cod

United States Environmental Protection Agency

Massachusetts Office of Coastal Zone Management

Seal of the Town of Barnstable, Mass. 1639. Adopted May 4, 1989

Barnstable Land Trust

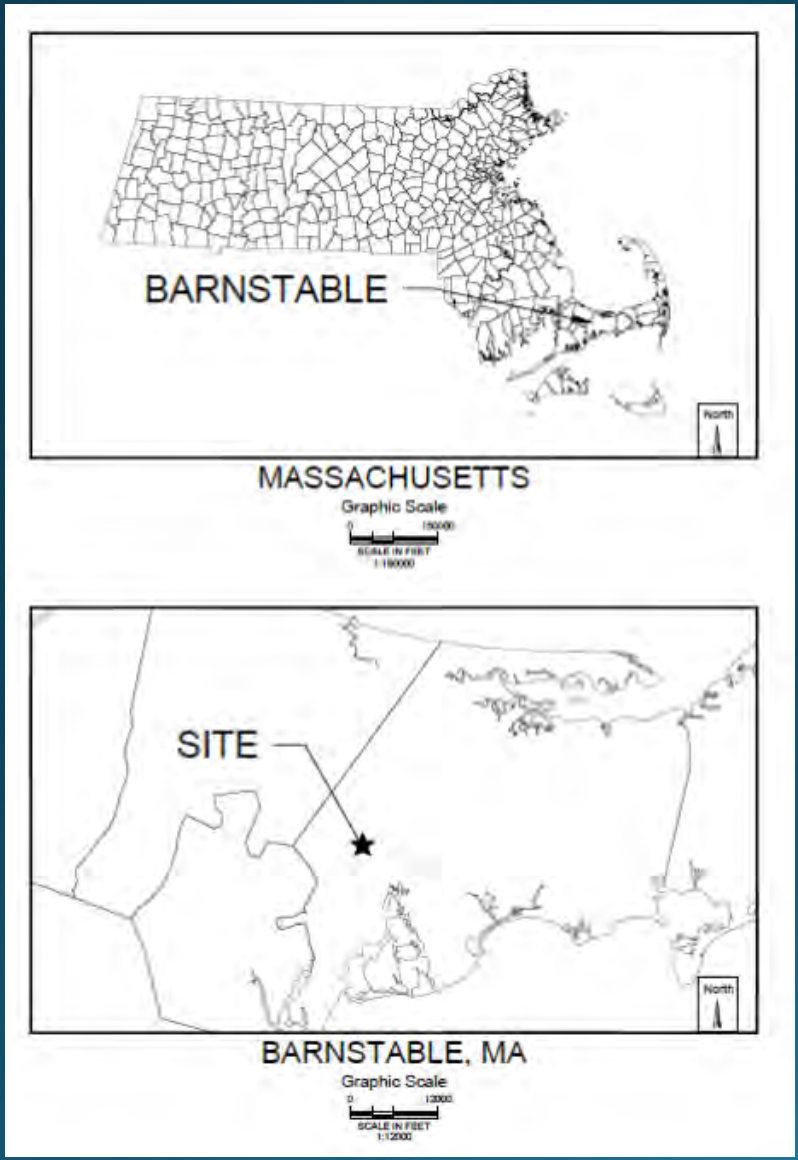
Cotuit 1874 the heart of the village Library

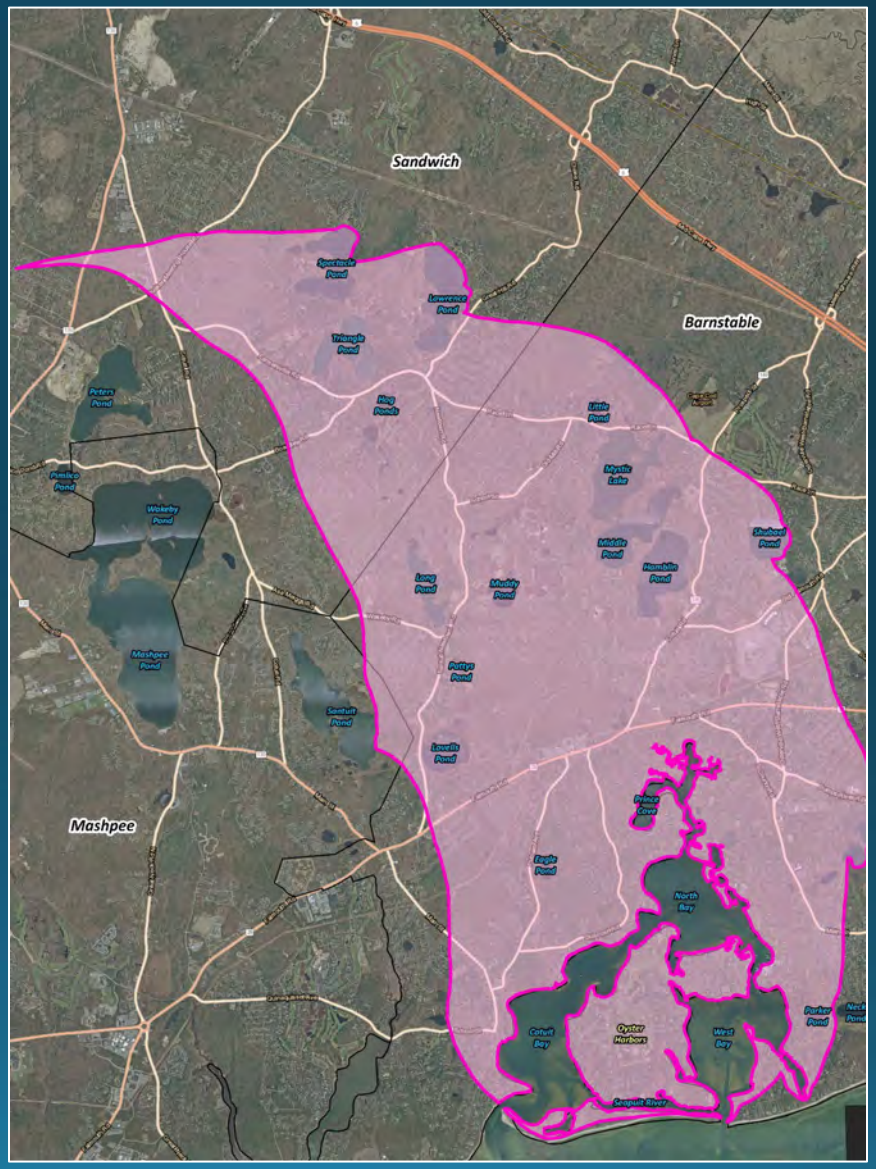
Horsley Witten Group

Barnstable Clean Water Coalition

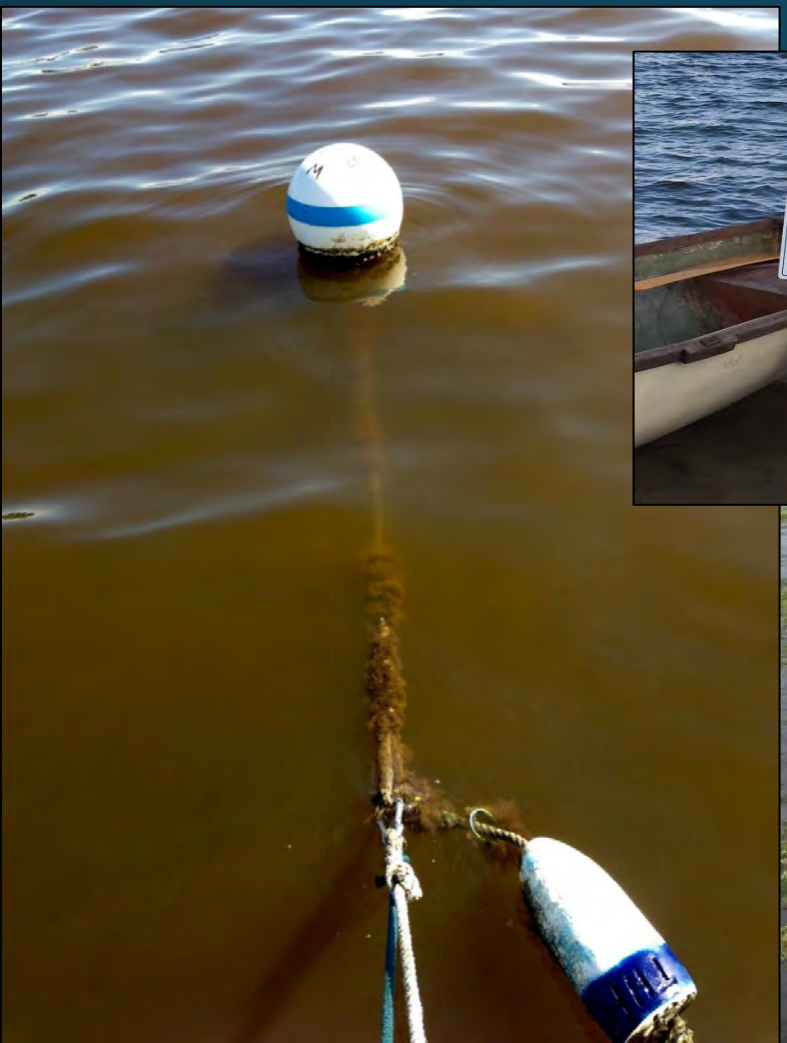
SNEP Southeast New England Program

Three Bays Watershed



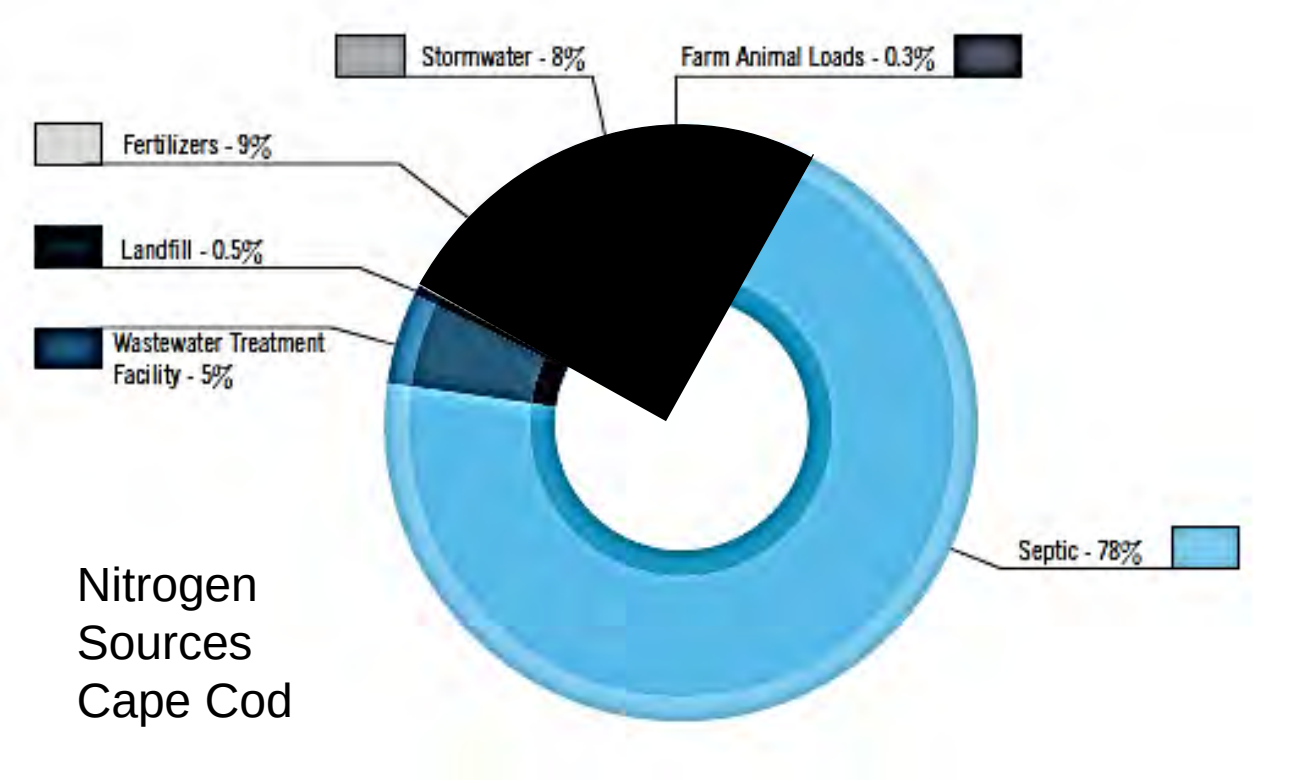


Improve Water Quality for the Environment and the Community



Nitrogen and Stormwater

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



Source: Cape Cod Commission 208 Plan

Improve Water Quality for the Environment and the Community

A “blue economy”

livelihood and sustenance brought forth from the sea

Solution: Green Infrastructure

Project Summary

Watershed Plan

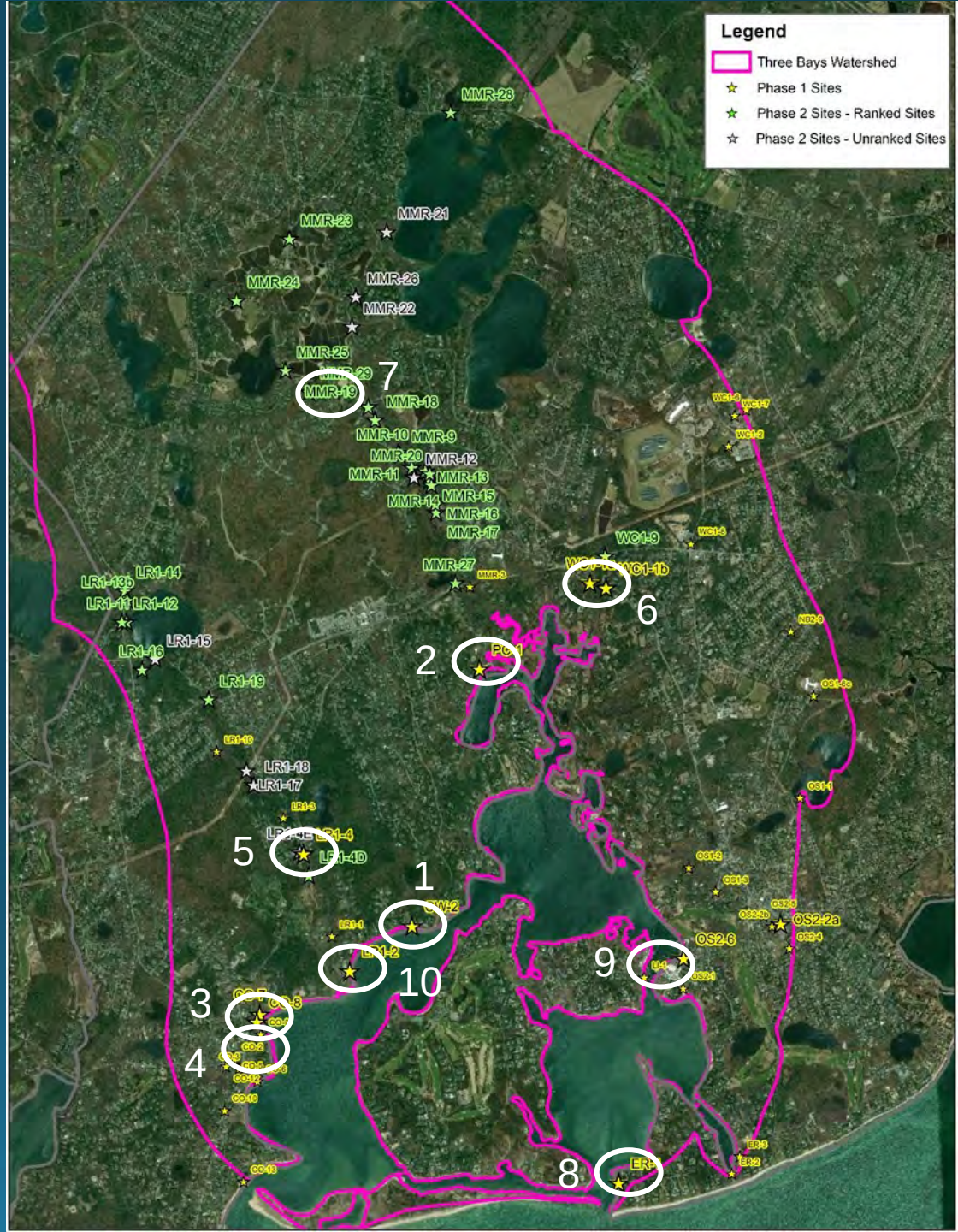
71 ranked and prioritized sites

Completed Sites

1. Cordwood Landing
2. Prince Cove
3. Ropes Beach
4. Cotuit Library
5. Putnam Avenue
6. South County Rd
7. River Road*

Design and Permitting

8. Eel River
9. Bridge Street
10. Little River



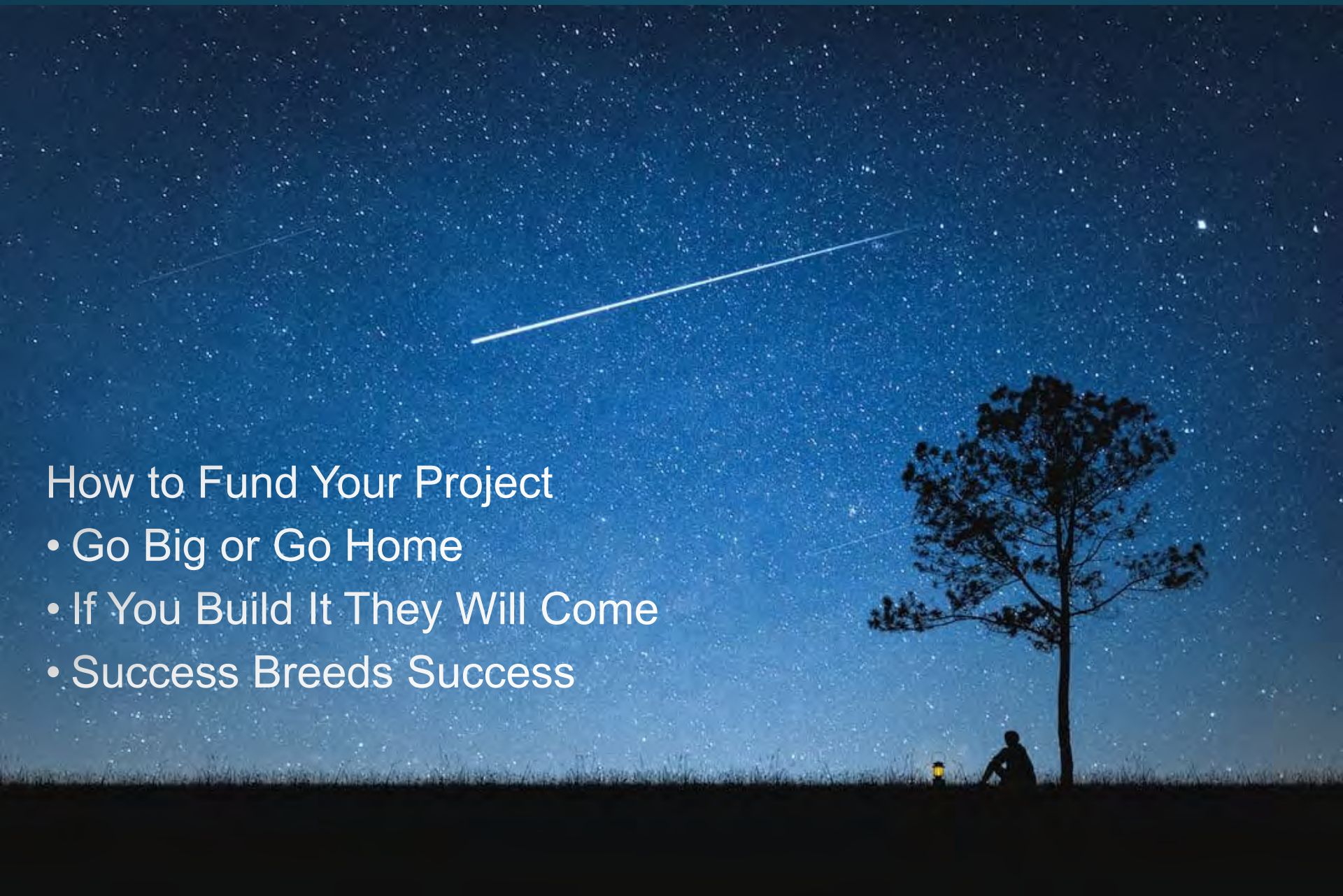
SHORT-TERM RESULTS

- 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

Lesson 1: Shoot for the Stars

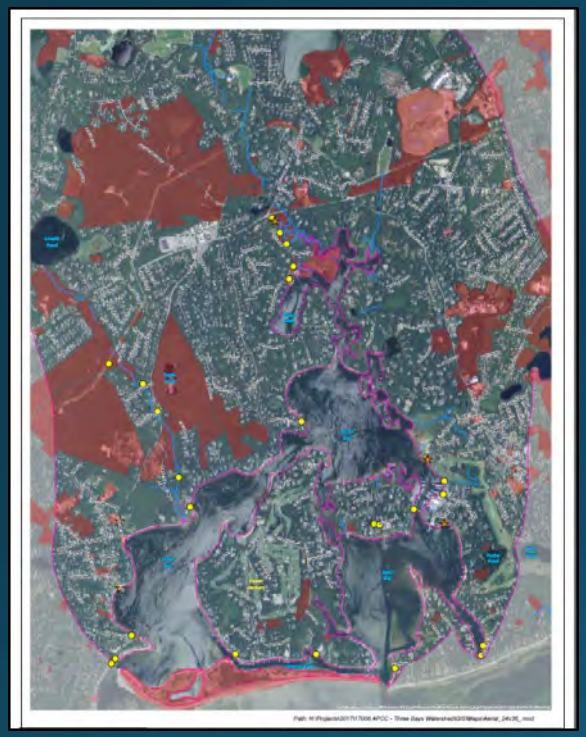


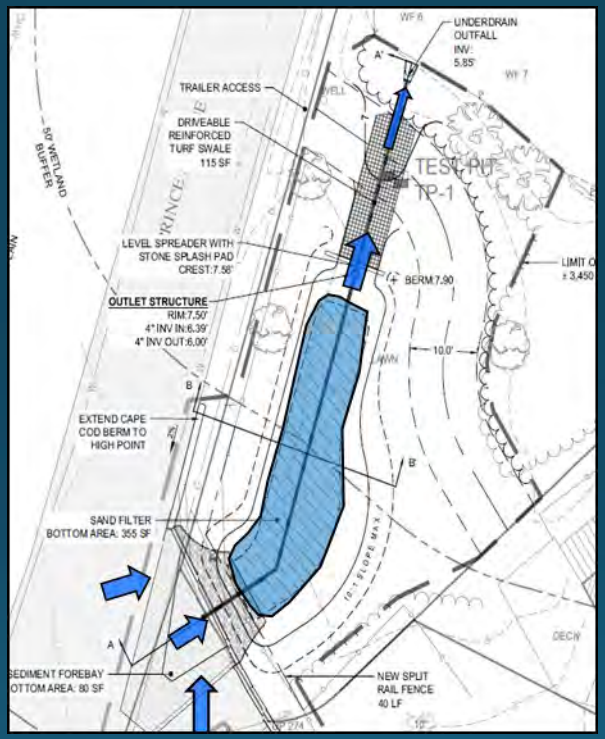
How to Fund Your Project

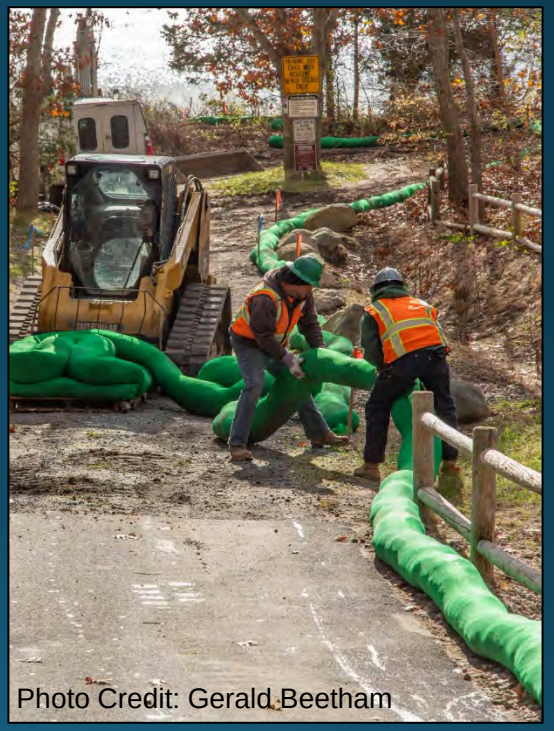
- Go Big or Go Home
- If You Build It They Will Come
- Success Breeds Success

Approach: Go Big or Go Home

$472K initial EPA SNEP16 grant – 2 Projects Soup to Nuts







Assessment and Prioritization

Phase 1: March – Aug. 2017

Design and Permitting

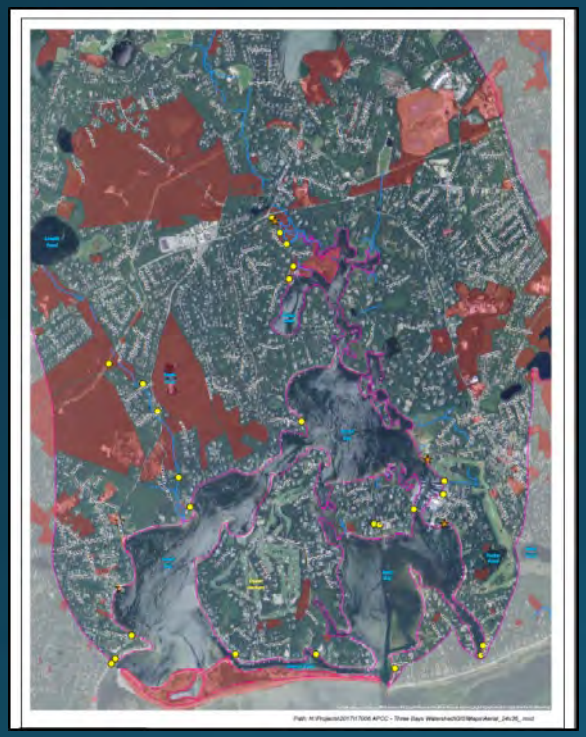
Phase 1: 2017 – 2018

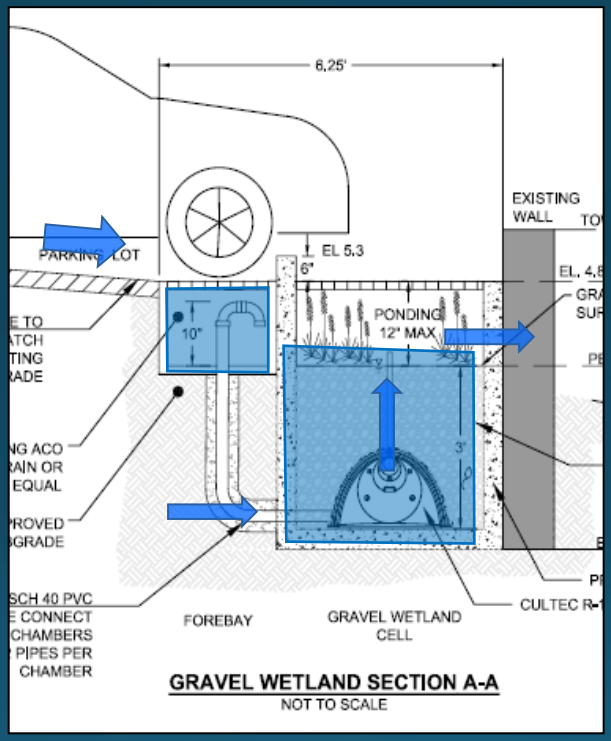
Installation

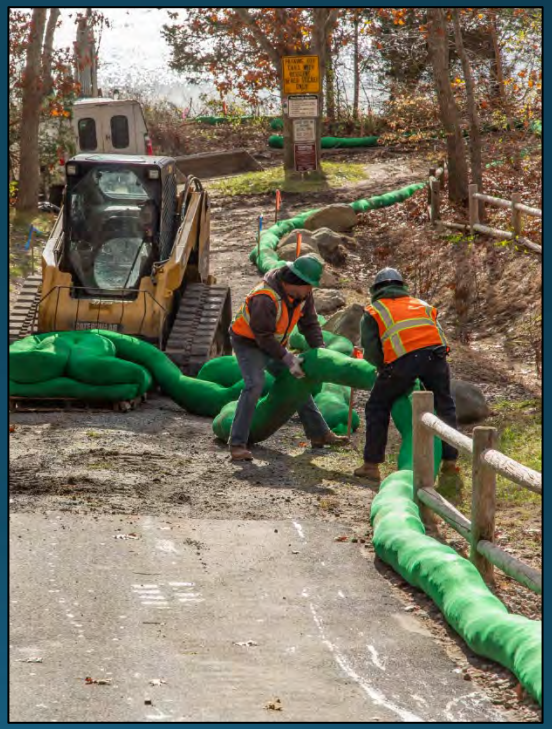
Phase 1: Fall 2018 - Spring 2019

If You Build It They Will Come

$472K initial EPA SNEP grant → **State CZM18 Grant**







Assessment and Prioritization

Phase 1: March – Aug. 2017

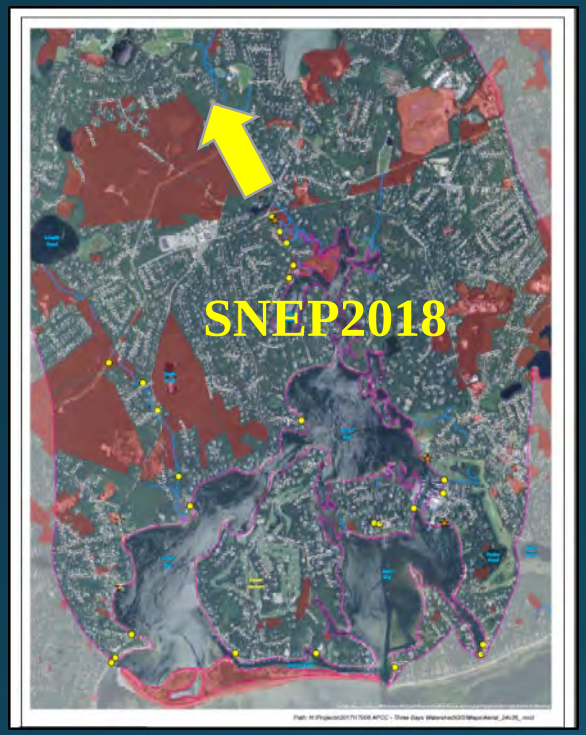
Design and Permitting

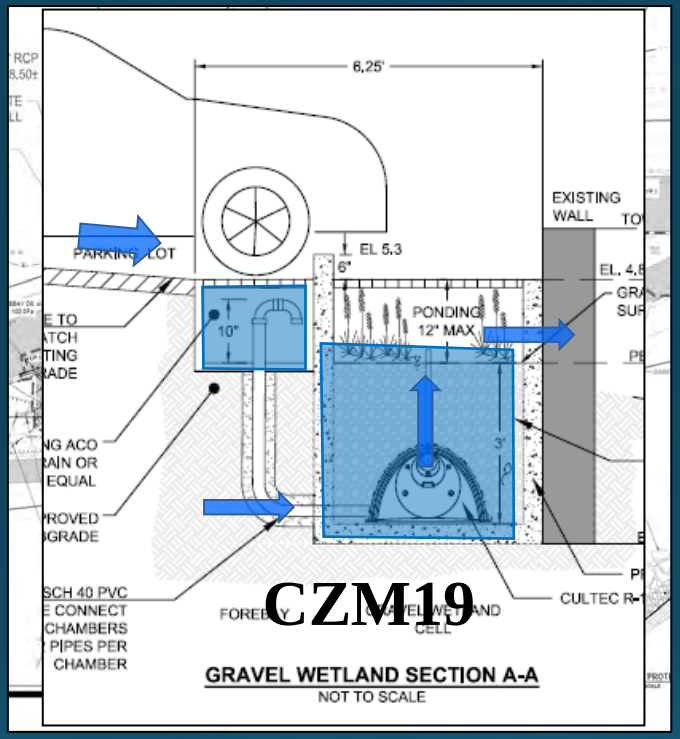
Phase 1b: 2017 – 2018

Installation

Phase 1: Fall 2018 - Spring 2019

Success Breeds Success





Assessment and Prioritization

Phase 1: March – Aug. 2017

Phase 2a: 2018 – 2019

Design and Permitting

Phase 1b: 2017 – 2018

Phase 2a: 2019

Installation

Phase 1: Fall 2018 - Spring 2019

Phase 2a: 2020

Lesson 1: Shoot for the Stars

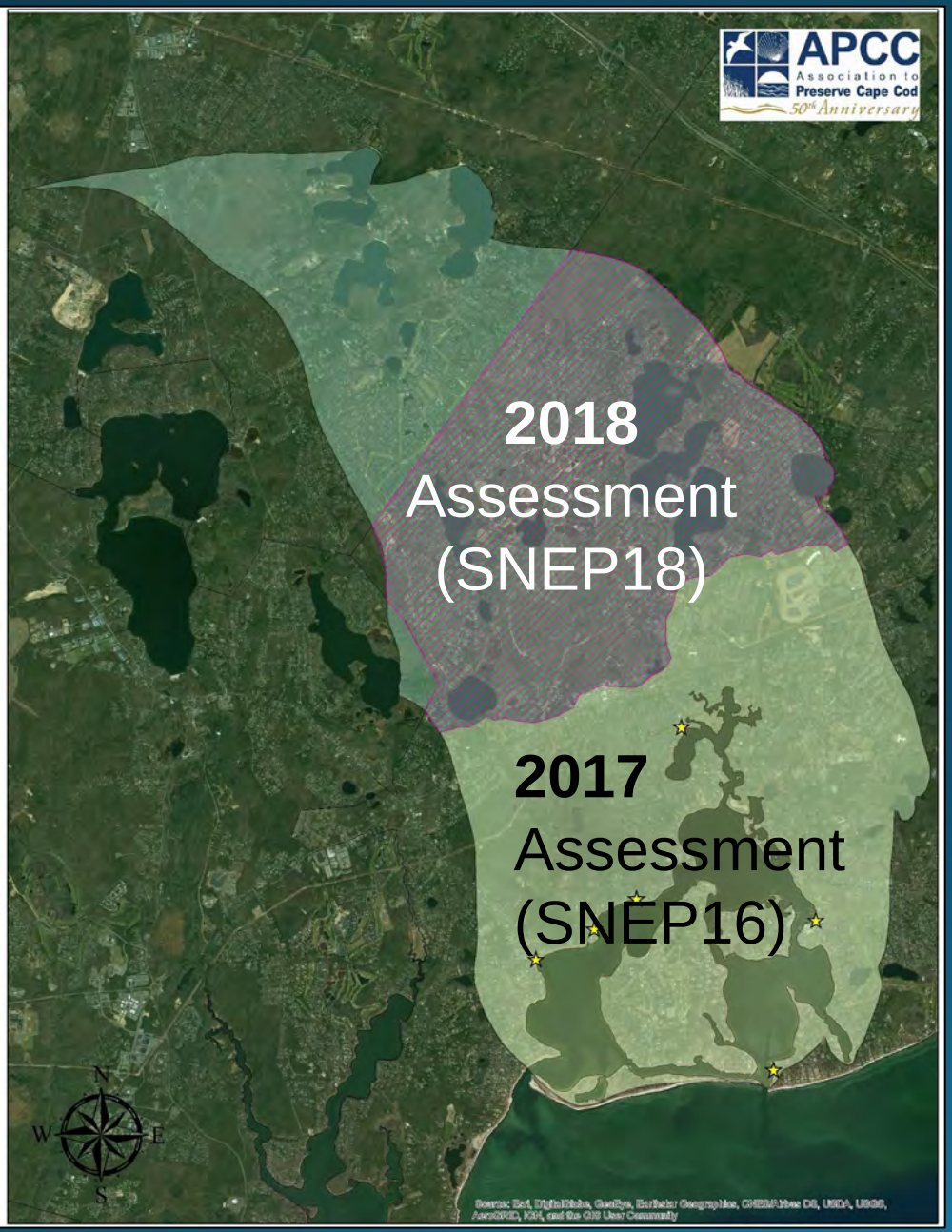
Started with $472K – 2 Projects

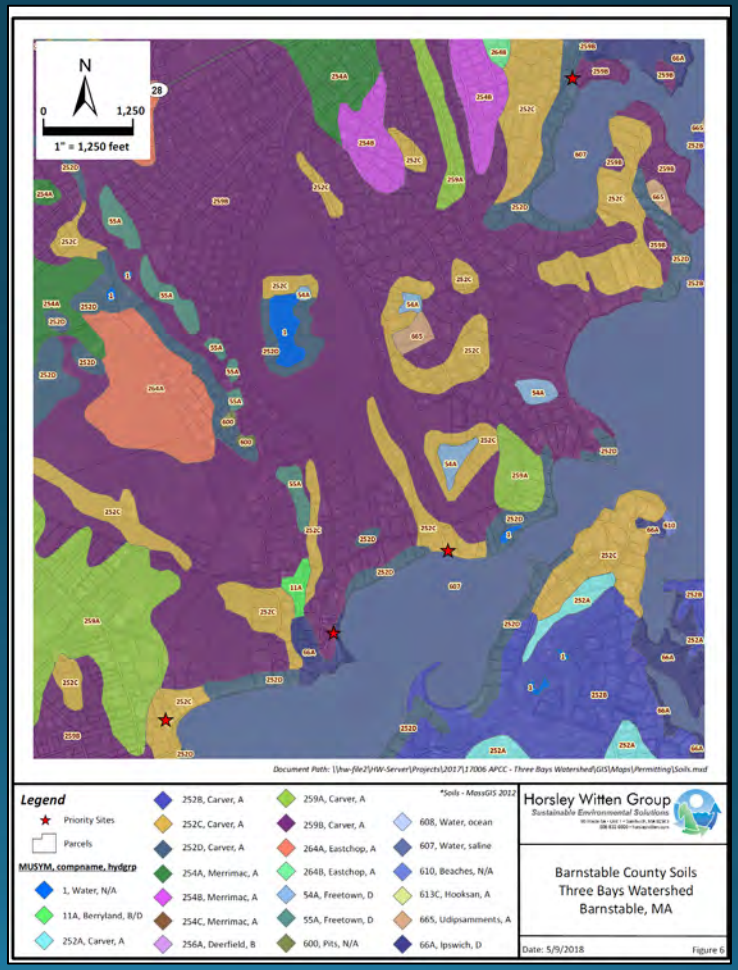
Finished with 3 federal grants, 5 state grants

$2million and 7 New BMP Installations

Lesson 2: Get Dirty from the Beginning

Desktop Assessments Aren't Enough…

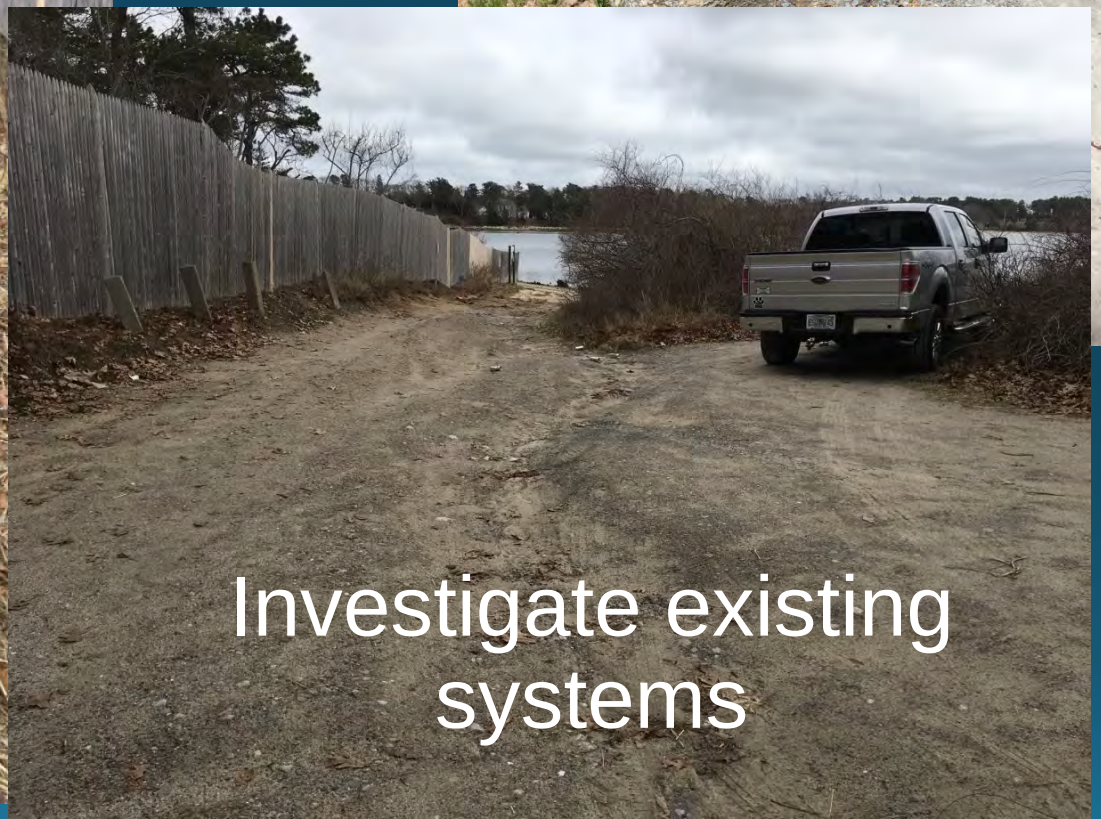




Field Assessments

- Collect data on tablets loaded with existing GIS info
- Visit pre-identified areas
- Talk to the local experts

Cordwood Landing



Investigate existing systems

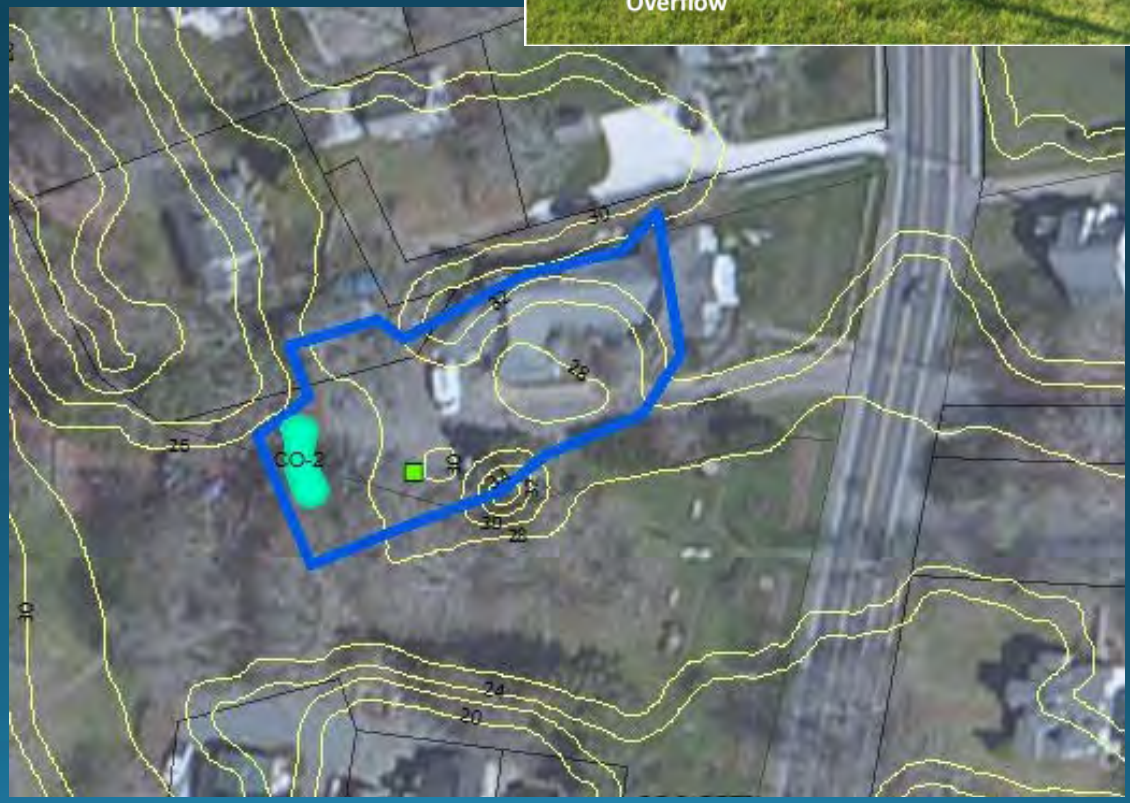
Prince Cove Marina

Follow the signs!

After the Fieldwork…

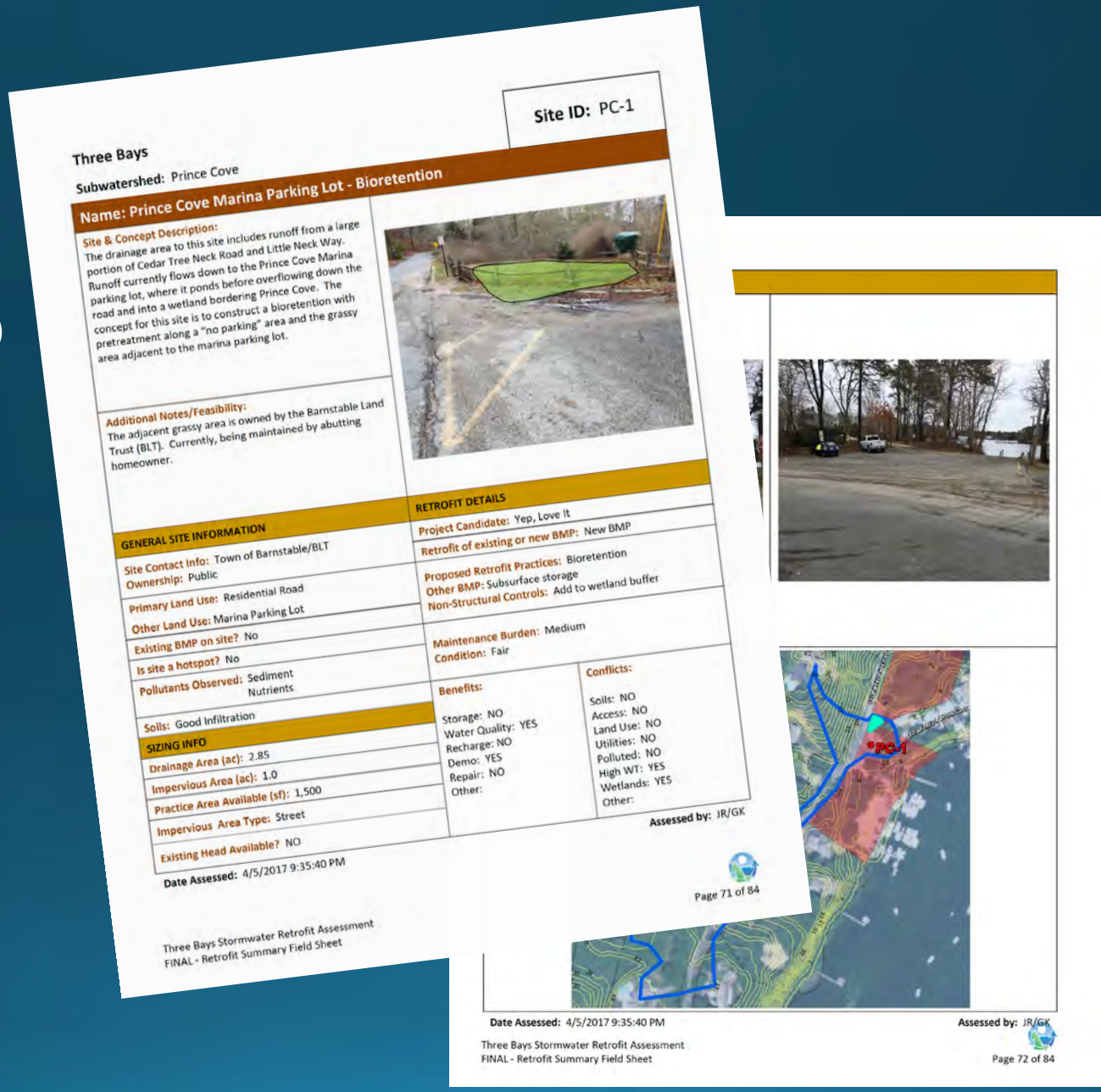
- Delineate drainage areas
- Perform sizing calculations
- Determine maintenance needs/abilities
- Estimate costs and pollutant removals
- Collect additional information if needed

Perform a Reality Check



Concept Designs

- Output from field data collection AND desktop analyses
- Includes realistic 10% concept designs
- Enough information for ranking
- 'Road map' for future projects/ funding



Three Bays

Site ID: PC-1

Subwatershed: Prince Cove

Name: Prince Cove Marina Parking Lot - Bioretention

Site & Concept Description:
The drainage area to this site includes runoff from a large portion of Cedar Tree Neck Road and Little Neck Way. Runoff currently flows down to the Prince Cove Marina parking lot, where it ponds before overflowing down the road and into a wetland bordering Prince Cove. The concept for this site is to construct a bioretention with pretreatment along a "no parking" area and the grassy area adjacent to the marina parking lot.

Additional Notes/Feasibility:
The adjacent grassy area is owned by the Barnstable Land Trust (BLT). Currently, being maintained by abutting homeowner.

GENERAL SITE INFORMATION

Site Contact Info: Town of Barnstable/BLT
Ownership: Public
Primary Land Use: Residential Road
Other Land Use: Marina Parking Lot
Existing BMP on site? No
Is site a hotspot? No
Pollutants Observed: Sediment, Nutrients
Soils: Good Infiltration

SIZING INFO

Drainage Area (ac): 2.85
Impervious Area (ac): 1.0
Practice Area Available (sf): 1,500
Impervious Area Type: Street
Existing Head Available? NO

RETROFIT DETAILS

Project Candidate: Yep, Love It
Retrofit of existing or new BMP: New BMP
Proposed Retrofit Practices: Bioretention
Other BMP: Subsurface storage
Non-Structural Controls: Add to wetland buffer
Maintenance Burden: Medium
Condition: Fair

Benefits:
Storage: NO
Water Quality: YES
Recharge: NO
Demo: YES
Repair: NO
Other:

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: YES
Wetlands: YES
Other:

Assessed by: JR/GK

Date Assessed: 4/5/2017 9:35:40 PM

Three Bays Stormwater Retrofit Assessment
FINAL - Retrofit Summary Field Sheet

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PC-1

Date Assessed: 4/5/2017 9:35:40 PM

Assessed by: JR/GK

Three Bays Stormwater Retrofit Assessment
FINAL - Retrofit Summary Field Sheet

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Credit: Three Bays Preservation, Inc.

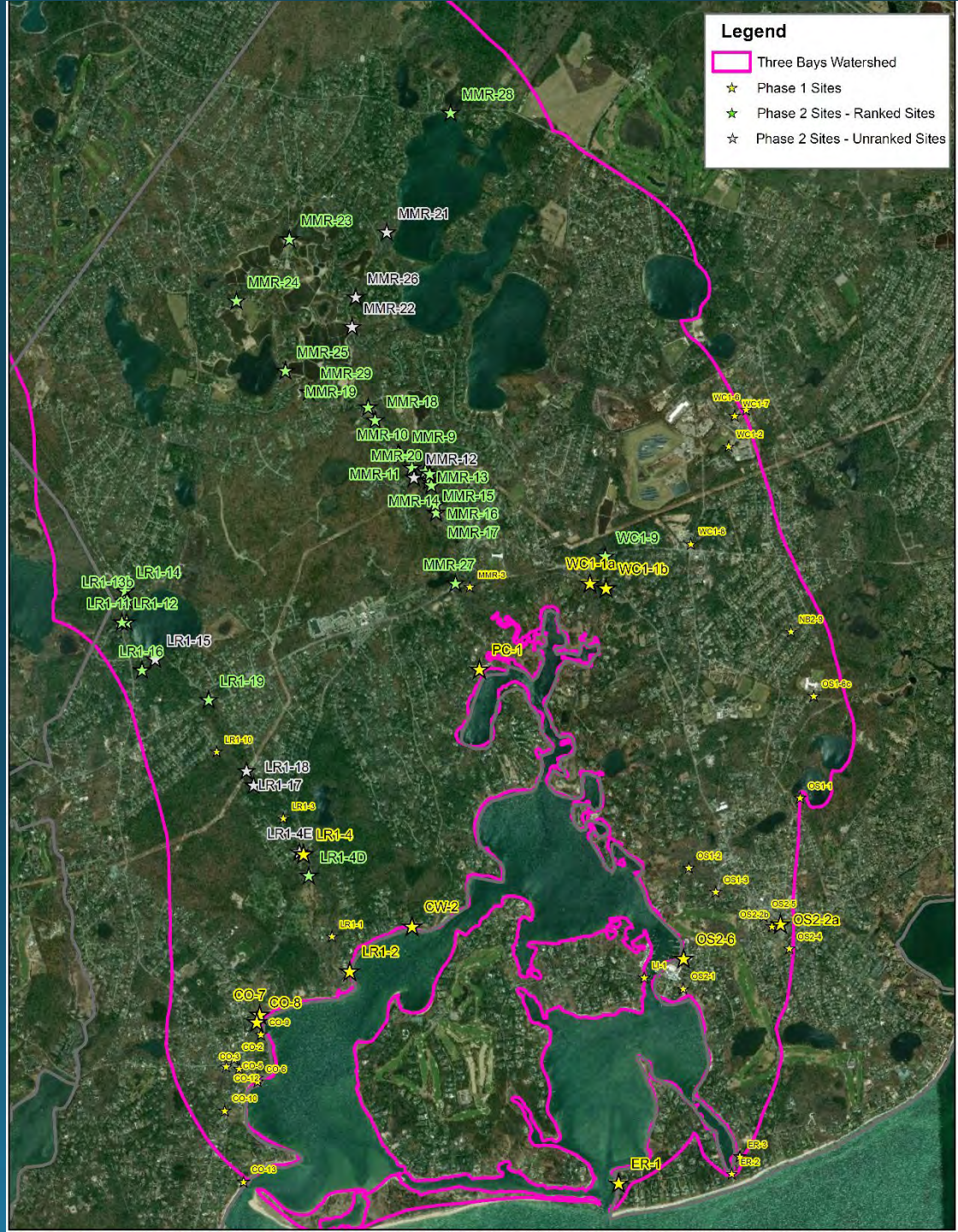
Site Prioritization

- **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 Initial Priority Sites**
- **3 Designed/Constructed in First Phase**

42 ranked sites from Phase 1 (SNEP16)

29 ranked sites Phase 2 (SNEP18)

and many more unranked project suggestions!



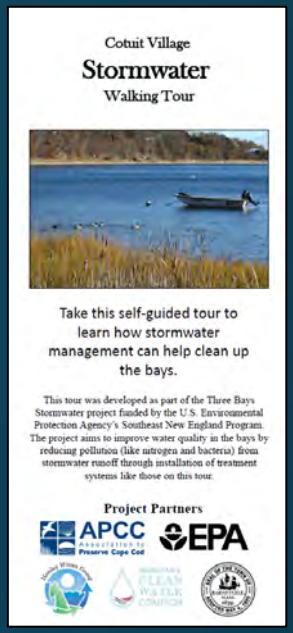
Lesson 3: Build a Fanbase

Engagement in Many Forms

Education and Outreach Summary

- Public Meetings/Presentations (12)
- Rain Garden Workshops (4)
- O&M Workshops (5)
- Educational Videos (3)
- Educational Signs (2)
- Factsheets and Brochures:
  - Homeowners Rain Garden Brochure
  - Stormwater Walking Tours and Guide
  - Native Plant Lists
  - Bioretention FAQ
- Native Plant Finder Web Tool

Photo Credit: Horsley Witten Group


Cotuit Village

Stormwater

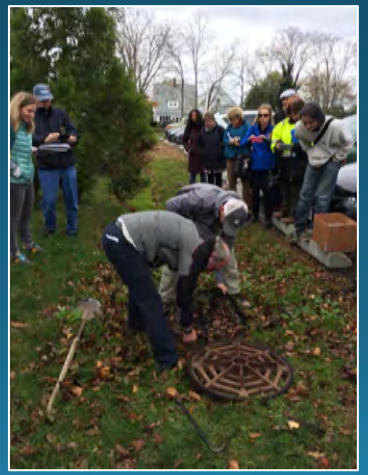
Walking Tour

Take this self-guided tour to learn how stormwater management can help clean up the bays.

This tour was developed as part of the Three Bays Stormwater project funded by the U.S. Environmental Protection Agency's Southeast New England Program. The project aims to improve water quality in the bays by reducing pollution (like nitrogen and bacteria) from stormwater runoff through installation of treatment systems like those on this tour.

Project Partners

APCC EPA



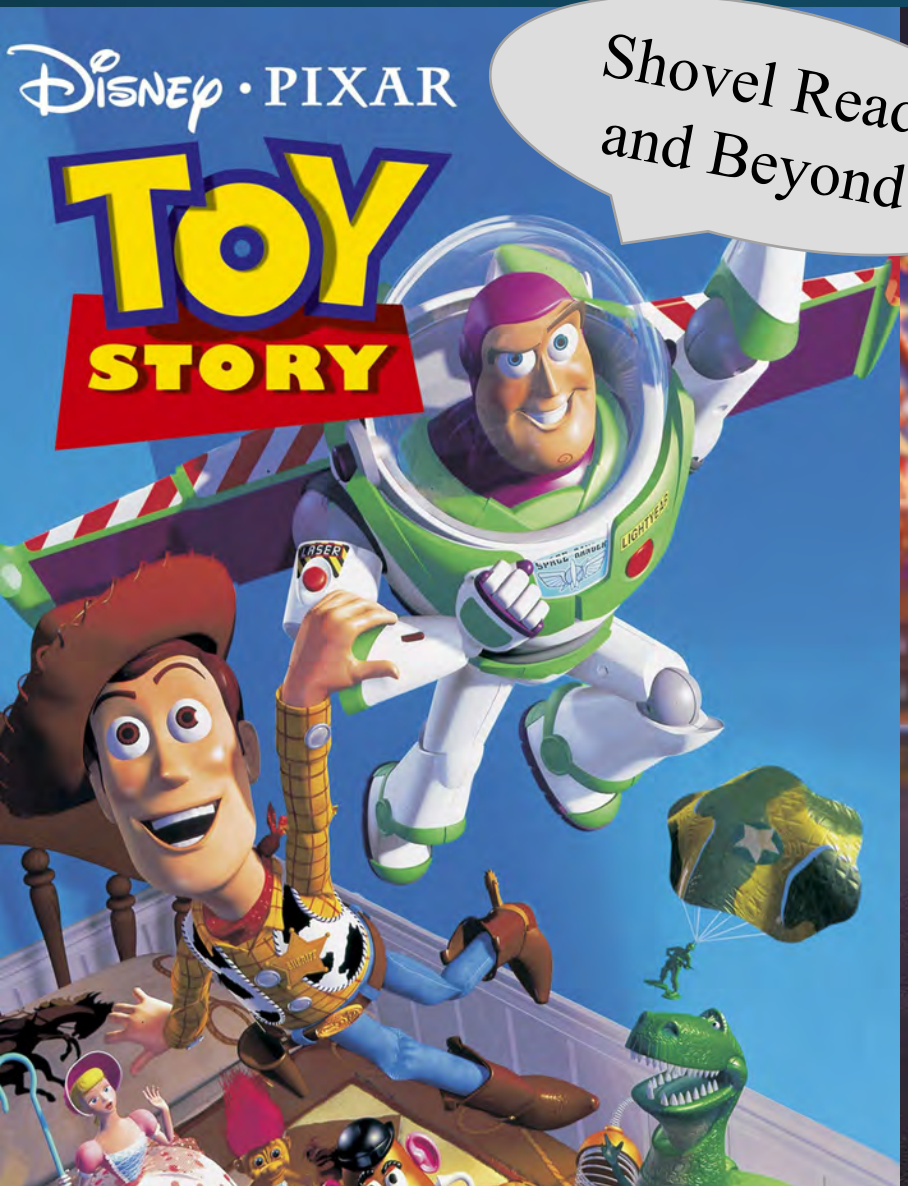
Meaningful Public Meetings

- Early and Often
  - Don’t Wait Until Permitting
- Actual Input
  - Inform Site Selection
  - Inform Design

Approach to Public Meetings

- Introduction of Project
- Top 10 Sites
- Review at 25% Design
- Living Room Meetings
- Small Group Meetings with Stakeholders

Lesson 5: Same People, Different Story



The Team

1. APCC: Non-Profit
2. Horsley Witten Group: Engineer
3. Town of Barnstable: Municipality

APCC (Non-Profit) Partner Role

1. Capacity: Project Management, Hire and Manage Engineer

2. Funding: Grant Application, Administration and Reporting

3. Outreach: Public Meetings, Hearings, Workshops, Trainings, Factsheets, Videos, Tours

Non-Profit Partner Perspective

ADVANTAGES

- Working with the Town helps expedite design and permitting
- Capitalize on existing partnerships Town has established (e.g. BARS)
- APCC able to be work directly with engineer to manage schedule
- Streamlined Process!

CHALLENGES

- Contracting
- Accounting

Horsley Witten Group (Engineer) Role

- Assessment
- Design
- **Construction Contract and Oversight**
- Workshops and Training

Stormwater Engineer Partner Perspective

ADVANTAGES

- Mini version of public/private partnership
- Streamlined process

CHALLENGES

- Brand new experience!
- More responsibility/liability
- Good partnerships are key

Good example of using all the tools the project team has to get more done on the ground!

Town of Barnstable (Municipality) Role

- Project Oversight /Management
- Review Engineer
- Construction oversight
- Public Meetings, Outreach and Coordination

Municipal Partner Perspective

ADVANTAGES

- Expedited design/bidding process
- Having Engineer-of-Record acting also as the General Contractor provides two sets of eyes on sitework contractor
- Paperwork is reduced (no certified payrolls)

CHALLENGES

- Monies are set (grant funds) so overages/change orders can be difficult to manage

Next Steps for the Town

- Continue to seek funding for design of prioritized BMP locations in the Three Bays Watershed (Shovel Ready)
- Town of Barnstable has now implemented a Town wide annual program that removes outfalls by using BMP technologies.

Total Impact of 2016-2022 Work

- Watershed Stormwater Management Plan (71 sites)
- Maintenance and improvement of two existing systems
- Installation of NINE new systems: Bioretentions (3), Gravel Wetland (1), Dry Swales (4), Sand Filter (1)
- Total of ~18 Acres of Drainage Addressed
- 55% or greater Nitrogen Removal
- 70% Bacteria Removal
- Maintenance trainings: 2017, 2019, 2020, 2021, (2022)

Photo Credits: Barnstable Clean Water Coalition and APCC

Site 1: Cordwood Landing

Existing System Improvements

Photo Credits: Gerald Beetham

Site 1 New Bioretention System – End of Cordwood Landing

Photo Credits: Gerald Beetham

Site 2: Prince Cove Sand Filter

Photo Credits: Gerald Beetham

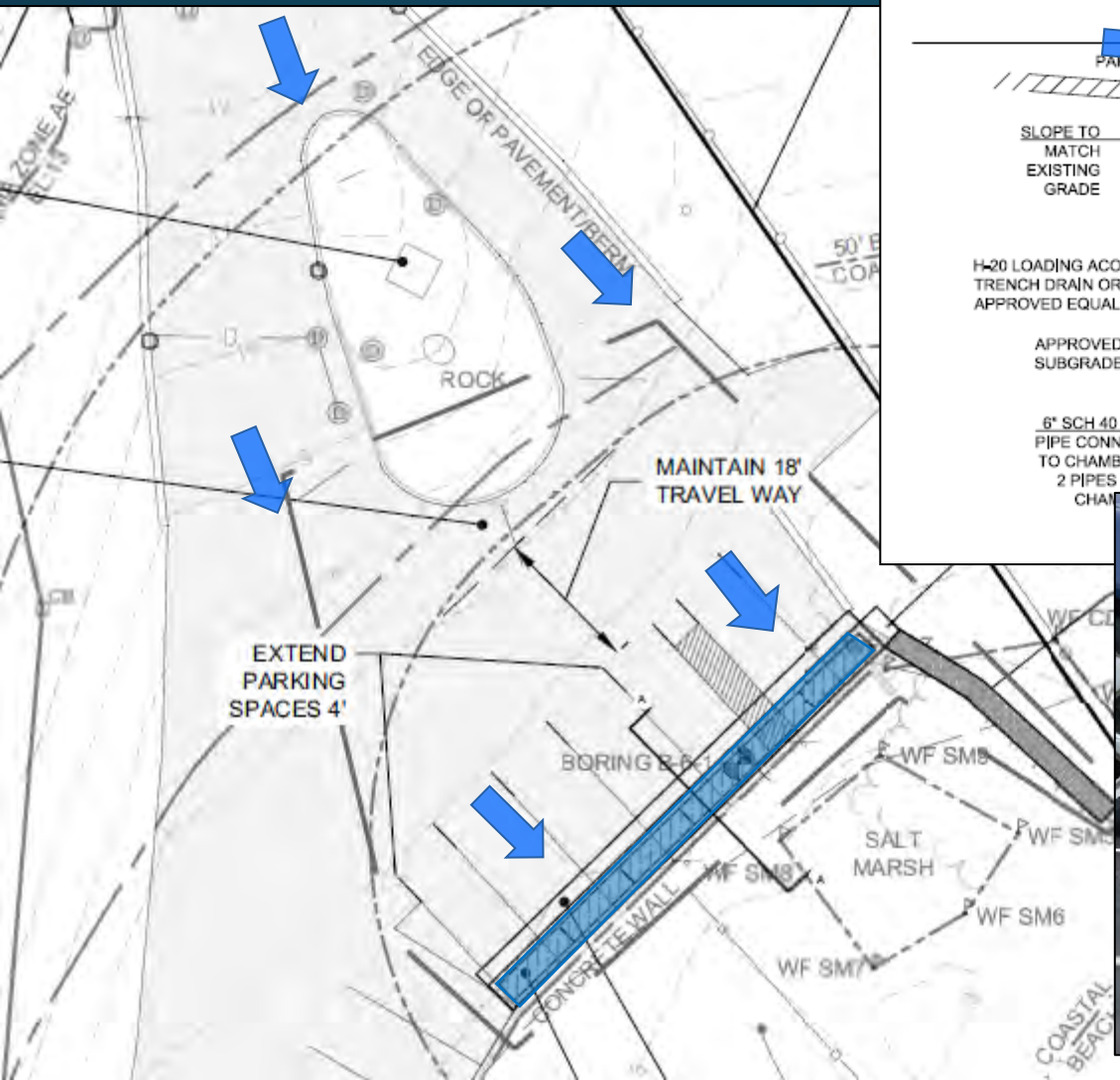
Site 3: Ropes Beach, Maintenance of Existing Systems

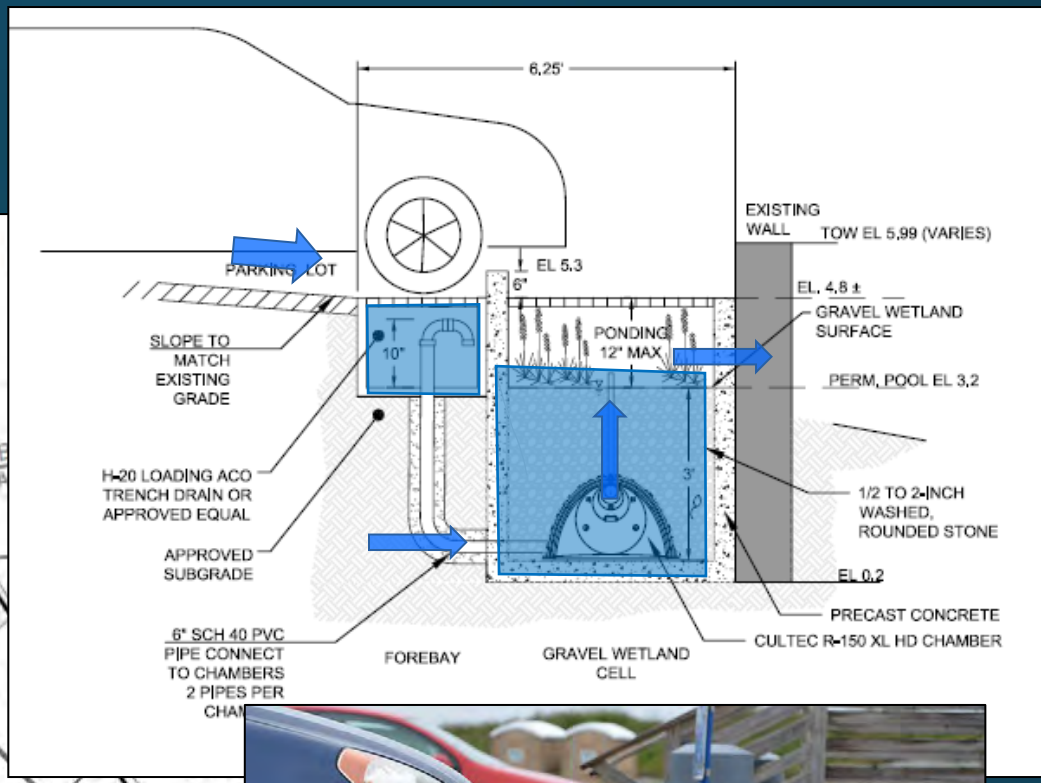
Fixed pipes and flushing underdrains of existing system

Site 3: Ropes Beach Linear Gravel Wetland

Photo Credits: Gerald Beetham

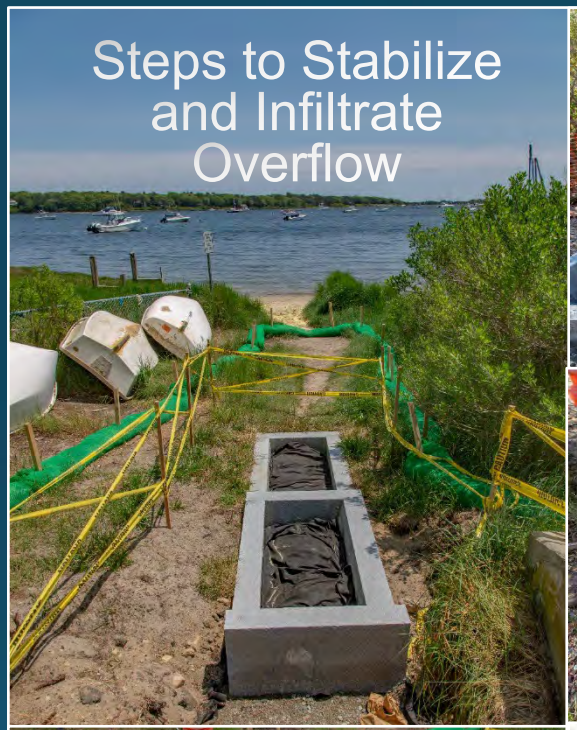
Ropes Beach: Gravel Wetland Design



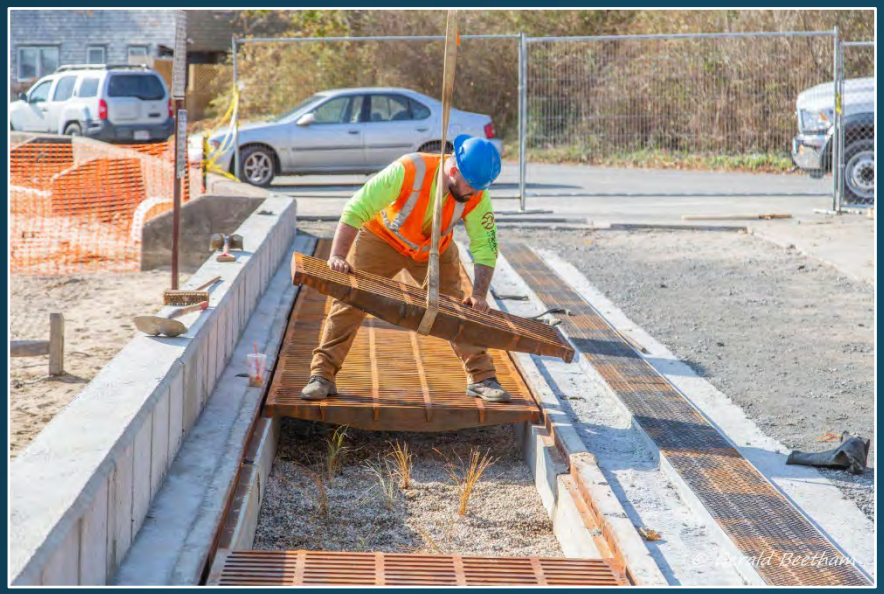


Ropes Beach Gravel Wetland Infiltrating Steps/Outlet

Photo Credits: Gerald Beetham



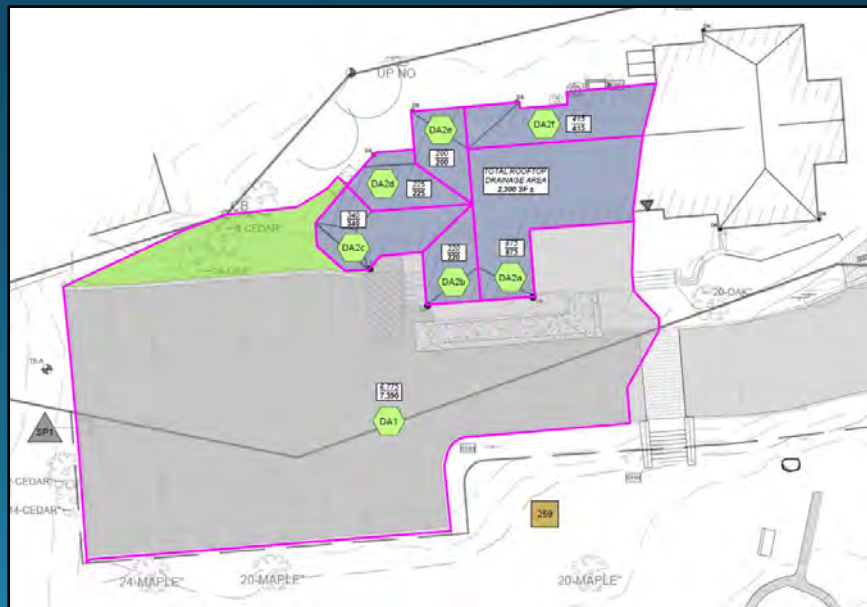
Site 3: Ropes Beach Linear Gravel Wetland



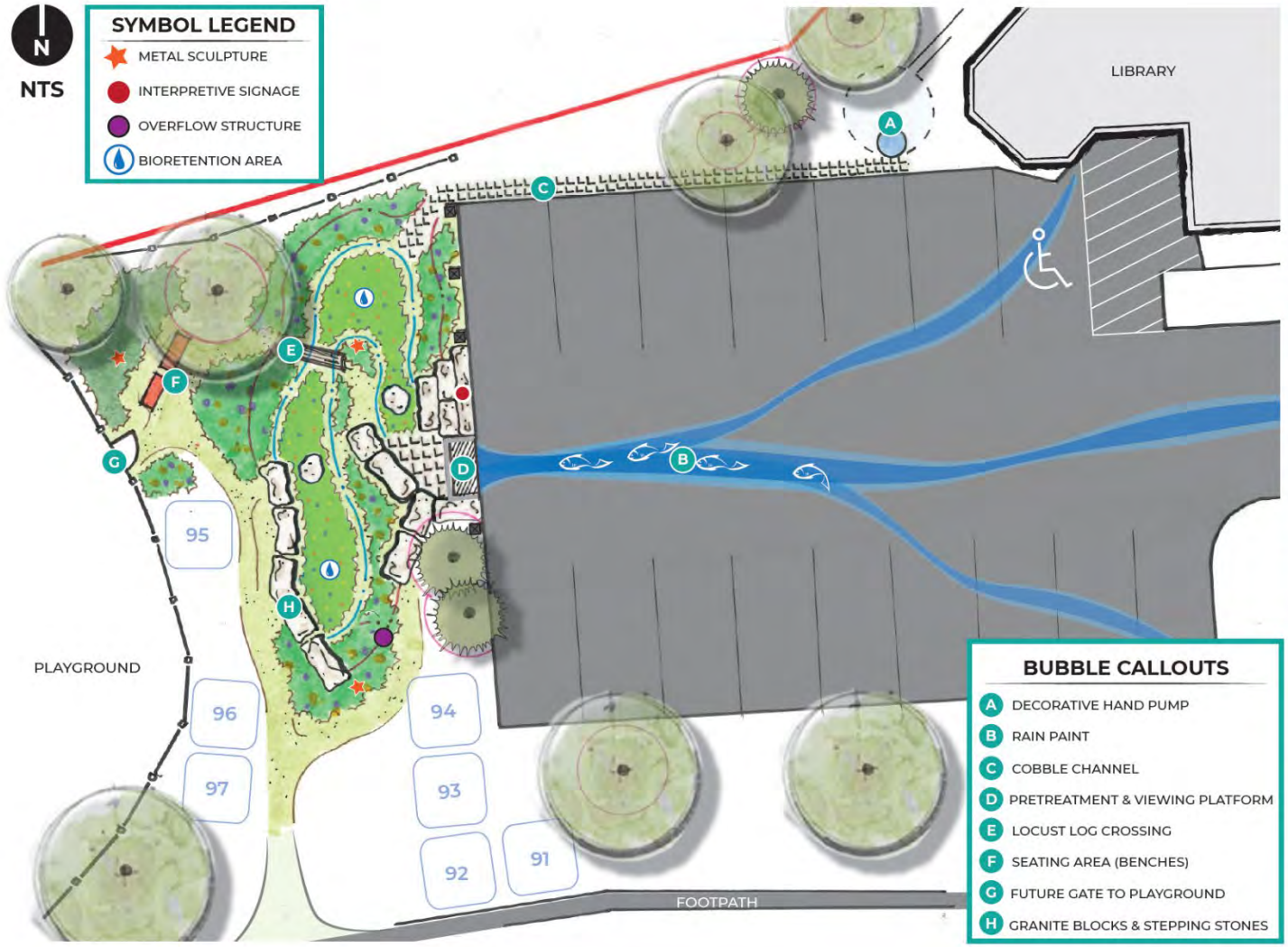
System flush to parking lot with plantings below grate to allow view, parking and beach access

Photo Credits: Gerald Beetham

Site 4: Cotuit Library Bioretention

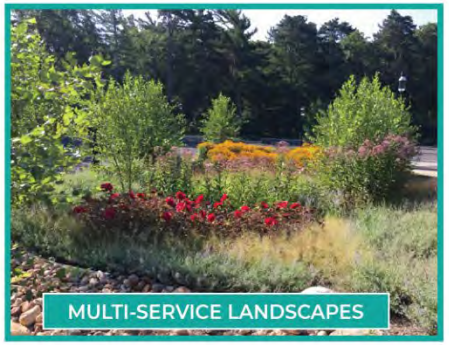


Cotuit Library Concept Design



BUBBLE CALLOUTS

- A DECORATIVE HAND PUMP
- B RAIN PAINT
- C COBBLE CHANNEL
- D PRETREATMENT & VIEWING PLATFORM
- E LOCUST LOG CROSSING
- F SEATING AREA (BENCHES)
- G FUTURE GATE TO PLAYGROUND
- H GRANITE BLOCKS & STEPPING STONES



IMMERSIVE GREEN INFRASTRUCTURE AT THE COTUIT LIBRARY

AUGUST, 2019

APCC Association to Preserve Cape Cod

Horsley Witten Group
Sustainable Environmental Solutions

Site 4: Cotuit Library Bioretention

Site 5: Putnam Avenue Bioretention

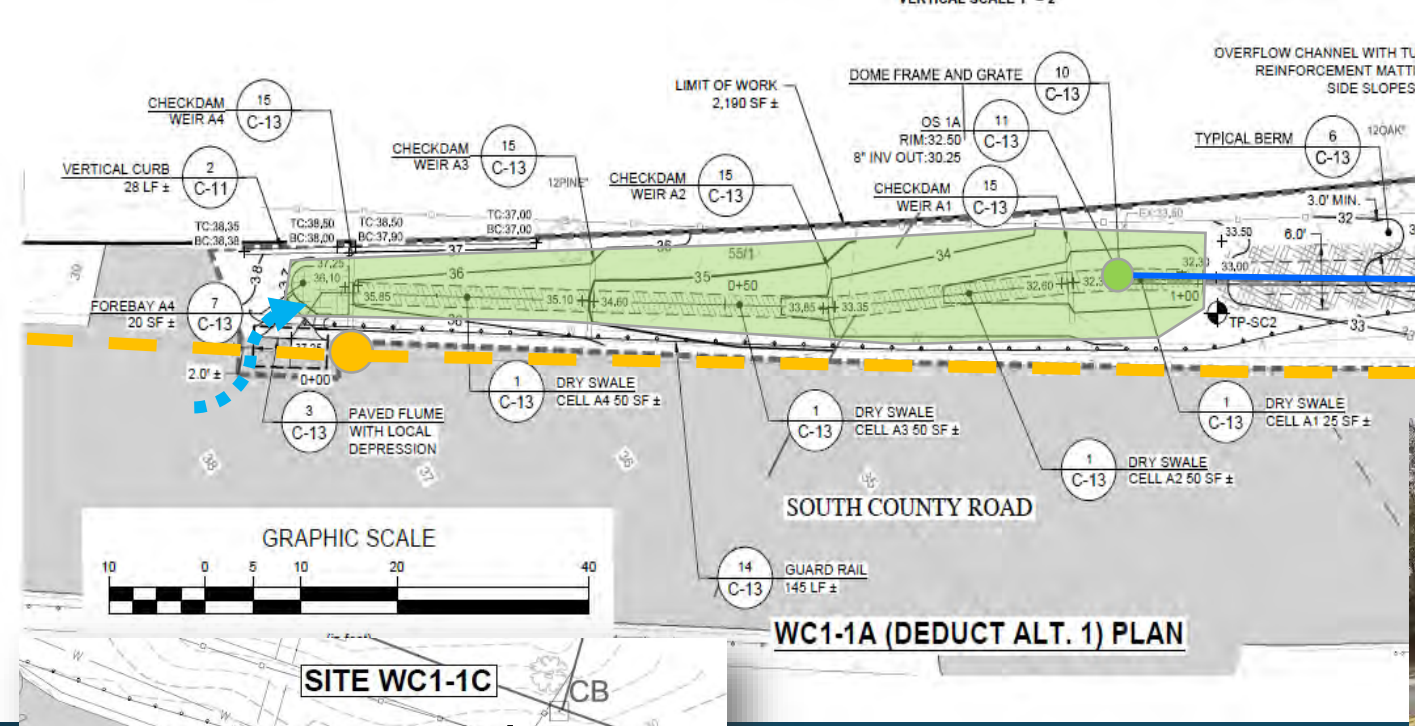
Before

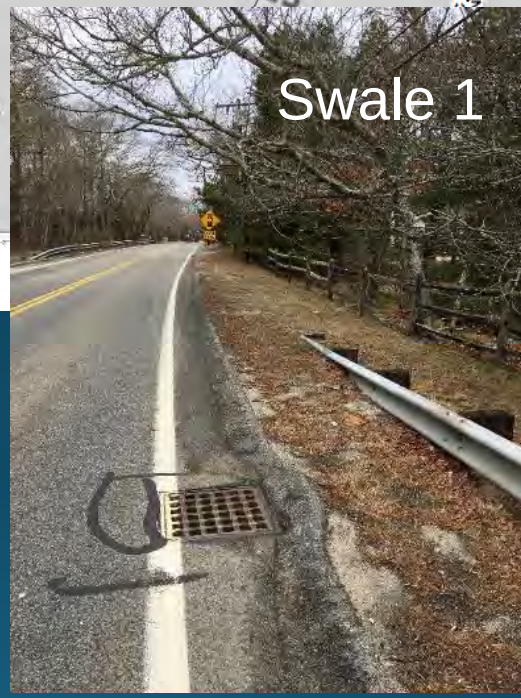
Excavation

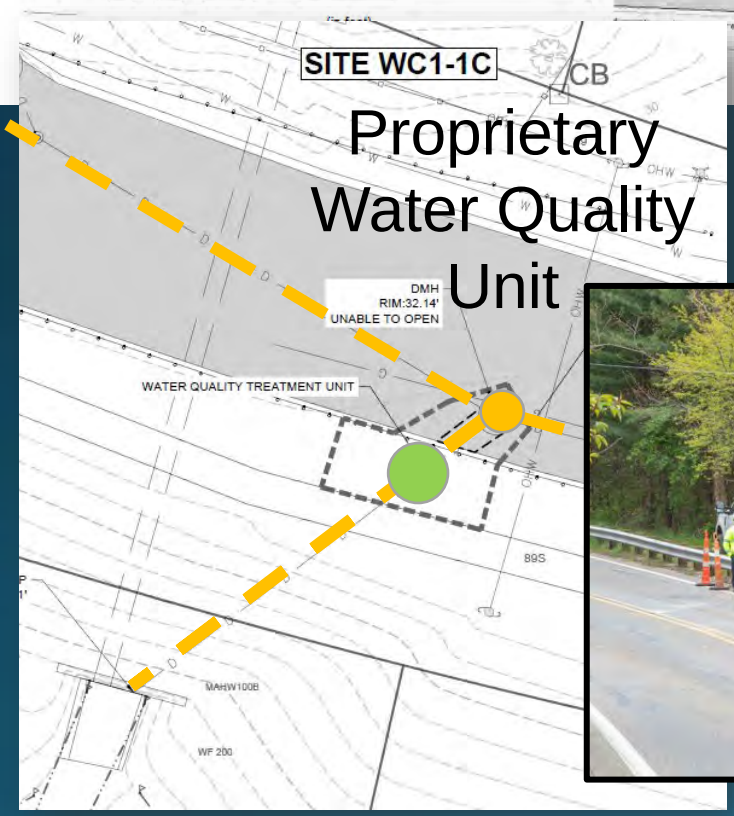
Install of forebay and bioretention

Site 5: Putnam Avenue Swale

Site 6: South County Road Swales 1





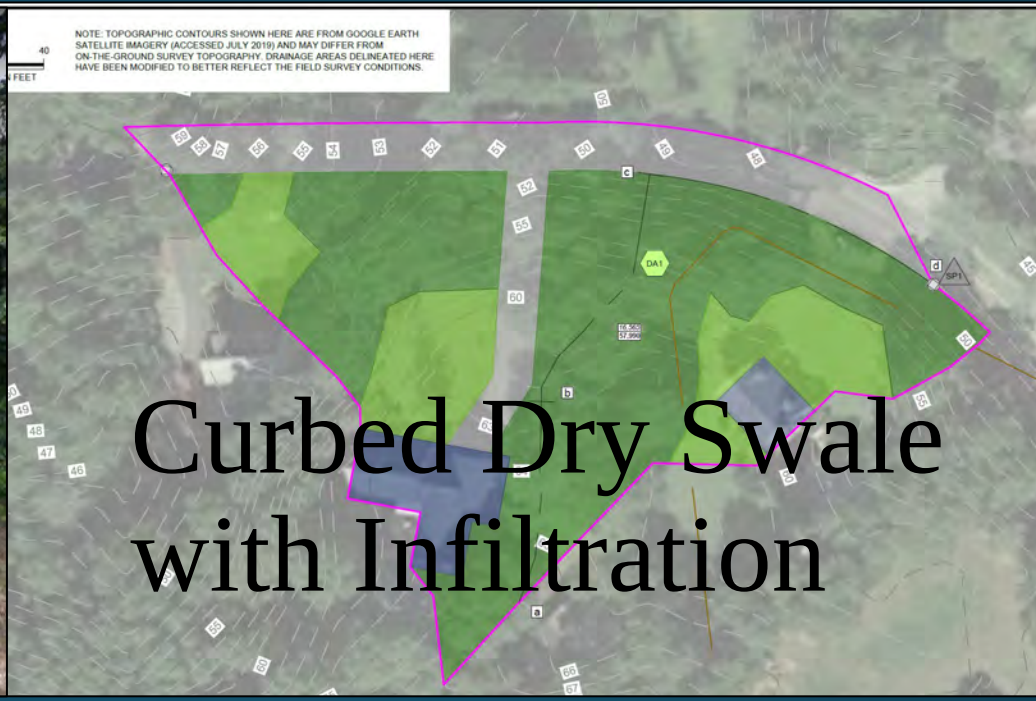


Proprietary Water Quality Unit

Site 6: South County Road Swales 2

Site 7: River Road Dry Swale

Before



Curbed Dry Swale with Infiltration

Construction Underway

Summary Lessons Learned

1. Shoot for the Stars – Ask for More and Keep Asking
2. Get Dirty from the Beginning – Boots on the Ground Assessment
3. Build a Fanbase – Talk to the Public Often and Early
4. Same People, Different Story – Unique Roles of Partnership to be Success


Questions?
More Info at:
www.apcc.org/threebays
Barnstablewaterresources.com/stormwater

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