























Multi-Functional Design Concepts for Coastal Stormwater Management Master Plan

The Place: Oakland Beach, Warwick RI

Oakland Beach overlooks Narragansett Bay and is an important recreational, historical, and economic hub in Warwick. Popular for saltwater swimming and fishing, this public beach is a destination with neighboring attractions such as restaurants and a boat access ramp.



The Problem: Water Quality, Beach Closures, and Flooding

Oakland Beach has impaired water quality and is vulnerable to coastal flooding, storm surge, and sea level rise. Rain runoff from residential and commercial development upland of Oakland Beach contribute to stormwater and water quality problems, resulting in frequent beach closures that in turn raise health, safety, and economic concerns.

The Solution: Green Infrastructure/Multi-functional **Stormwater Management**

- Green Infrastructure is a nature-based adaptation tool for:
 - Stormwater filtration and infiltration
 - Addressing shoreline erosion and supplementing existing grey infrastructure
 - Restoration and enhancement of habitats
- Uses designed or engineered systems that allow soil and vegetation to capture water where it falls
- Aims to preserve natural hydrology of watershed
- Reduces stress on and need for traditional "grey" or "hard" design solutions
- Is applied and adaptable at different scales

Opportunities and Benefits: Community

Implementing elements of nature-based solutions with engineered solutions on Oakland Beach will:

- Decrease beach closures from pollution
- Increase economic vitality of local business with fewer beach closures
- Reduce and manage storm water flooding
- Provide habitat for native plant communities and pollinators
- Create opportunities for public education and awareness
- Enhance aesthetics of the area and the beach/park user's experience
- Increase public health and safety
- Recognize, support, and enhance historic uses

Opportunities and Benefits: Municipal

- Provide cost effective and practical solutions
- Reduce number of beach closures
- Reduce contaminants to impaired coastal waters & shellfish habitats
- •Support goals of Phase 2 stormwater regulations
- Preserve important habitat and natural areas
- Reduce pressure on aging grey infrastructure
- Create health and social benefits
- Support for jobs, local business hubs, and economic vitality
- Encourage more efficient maintenance requirements

NFWF









Design Consideration: • 1' Sea Level Rise + 25 Year Storm Event • 4% chance of occurrence per year

Marley's

On the Beach

Design Consideration: • 1' Sea Level Rise + 10 Year Storm Event • 10% chance of occurrence per year

Infrastructure Improvements:

- Repair and relocate existing bike path
- Offers a more convenient travel pattern
- Controls foot traffic, preserving native planting enhancements
- Repair existing wooden boardwalk
- Improve user safety
- Cost effective to replace if damaged in storm event
- Support adaptive management of infrastructure and coastal buffer by designing for current conditions with the flexibility to allow for
- the natural environment

Coastal Buffer

Native Grasses

..... **Design Consideration:** Setback improvements to 3' above Mean Higher High Water (equal to common Nor'easter flood level)

Coastal Buffer Improvements:

 Coastal buffer and native grass plantings - Reduce erosion from upland runoff

- and coastal flooding
- Allows future landward migration of dune as sea rises
- Enhance filtration and infiltration of stormwater
- Restore native plant and pollinator habitat
- See Appendix A for recommended seed mix guide and plant community

information and RI coastal plant guide







Scale: NTS

Coastal Design Consideration: • Plan for potential coastal flooding, incorporating rising seas with a 20-year design life anticipating 1' sea level rise • Accommodates 3' tide/surge combination today, or a future 1' sea level rise potential within 20 year design life plus a 2' tide/surge

Top of the Bay Restaurant and Lounge

Parking (Shell Surface)

Beach Area

Oakland Beach Avenue

lggy's

Restaurant

Infrastructure Improvements:

- Proposed Plaza Area with permeable pavers
 - Allow water to infiltrate rather than runoff
 - Creates a destination space to help preserve vegetative enhancements in other areas
- Install high capacity solar compacting waste receptacles throughout area - More effectively manage public trash and encourage recycling
 - Reduce open and overflowing receptacles which attract seagulls
 - animals that produce waste impacting water quality
- Educate visitors on linkages between solid waste and water quality
- See Appendix B

Green and Resilient Infrastructure Planning (GR/P): Get a GR/P on RI's Coastline Funding for this project is provided by the Department of the Interior through a grant from the National Fish and Wildlife Foundation's Hurricane Sandy Coastal Resiliency Competitive Grant Program







-Bioretention Stormwater System: Install a bioretention basin - Retrofit existing grassed island to better manage stormwater - Provides attractive and functional landscape for beach entrance - Potential for enhancement of pollinator habitat Re-purpose existing lawn - Plant coastal pollinator meadow, as attractive lawn alternative - Create a low maintenance mowing plan - Discourage geese See Bioretention Basin and Pollinator Habitat Plan















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Multi-Functional Design Concepts for Coastal Stormwater Management

Bioretention Basin and Pollinator Habitat Plan

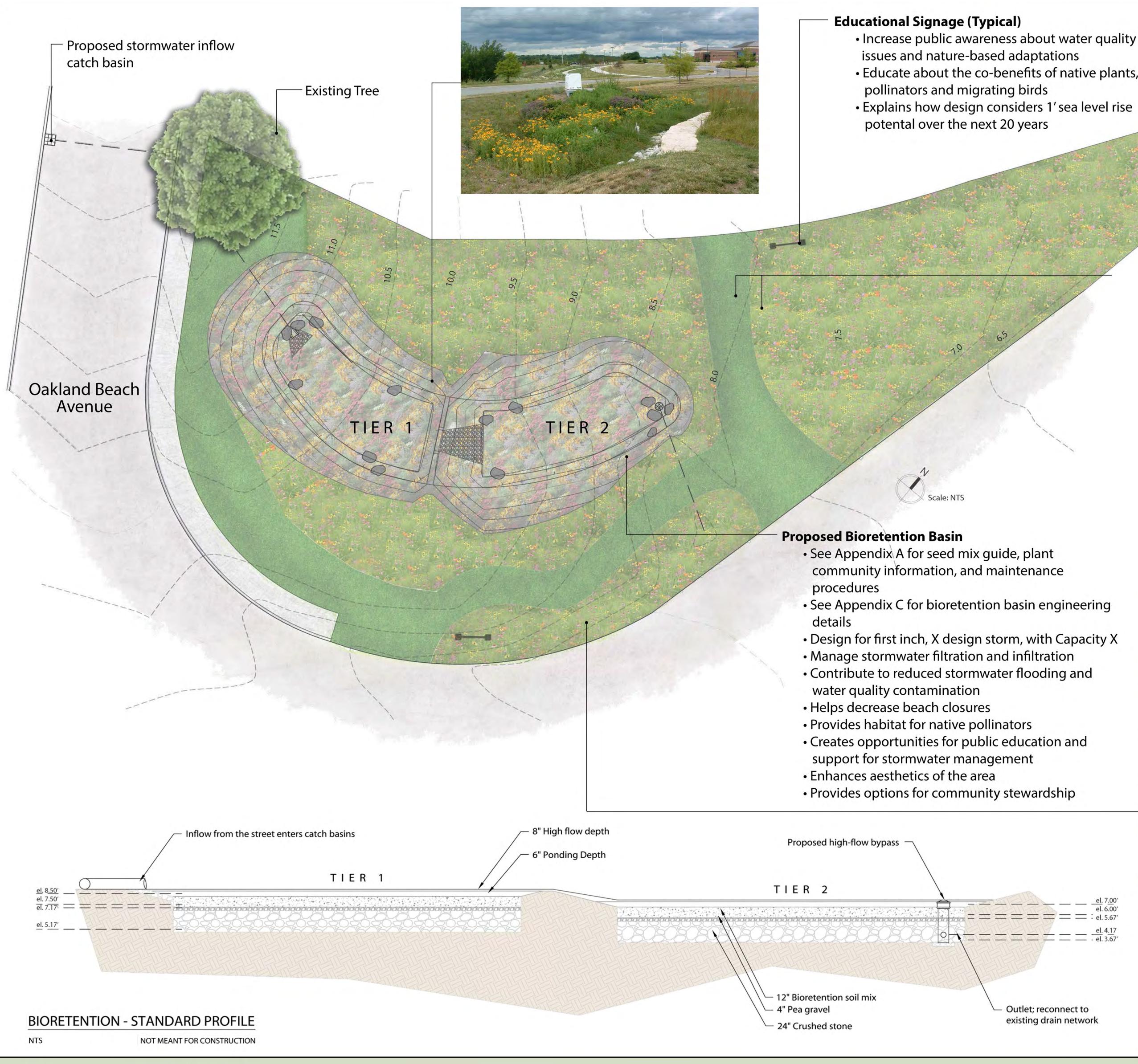


The stormwater runoff from the watershed is captured in the proposed bioretention basin and pollinator meadow.

Value of Native Pollinators:

- Contribute to the success of diverse and healthy plant communities
- Contribute to pollination for farm and garden harvests
- Key to a number of environmental services and food webs





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- Increase public awareness about water quality
- Educate about the co-benefits of native plants,

Proposed Mix Meadow with Mowed Path Maintain pathways by mowing • Attractive and functional alternative to grass, with minimal mowing maintanence • See appendix A for seed mix guide, plant community information, and maintenance

- procedures

Value of Native Plants:

- our natural landscape heritage
- Provide food and habitat for native pollinators and migrating birds
- when properly planted and established





- Design for first inch, X design storm, with Capacity X







• Protect water quality by controlling soil erosion and moderating floods and droughts Add beauty to the landscape and preserve Require very little long-term maintenance



