

# AN INTERSECTION AND OPPORTUNITY: ENHANCING CLIMATE ADAPTATION AND ECOSYSTEM SERVICES

## Living in the Norm and With the Storm

ACES, 2018

A Community on Economic Services

4 December 2018

RAMBOLL



# The Challenges Facing Coastal Communities



# EXTREME WEATHER AND PRECIPITATION

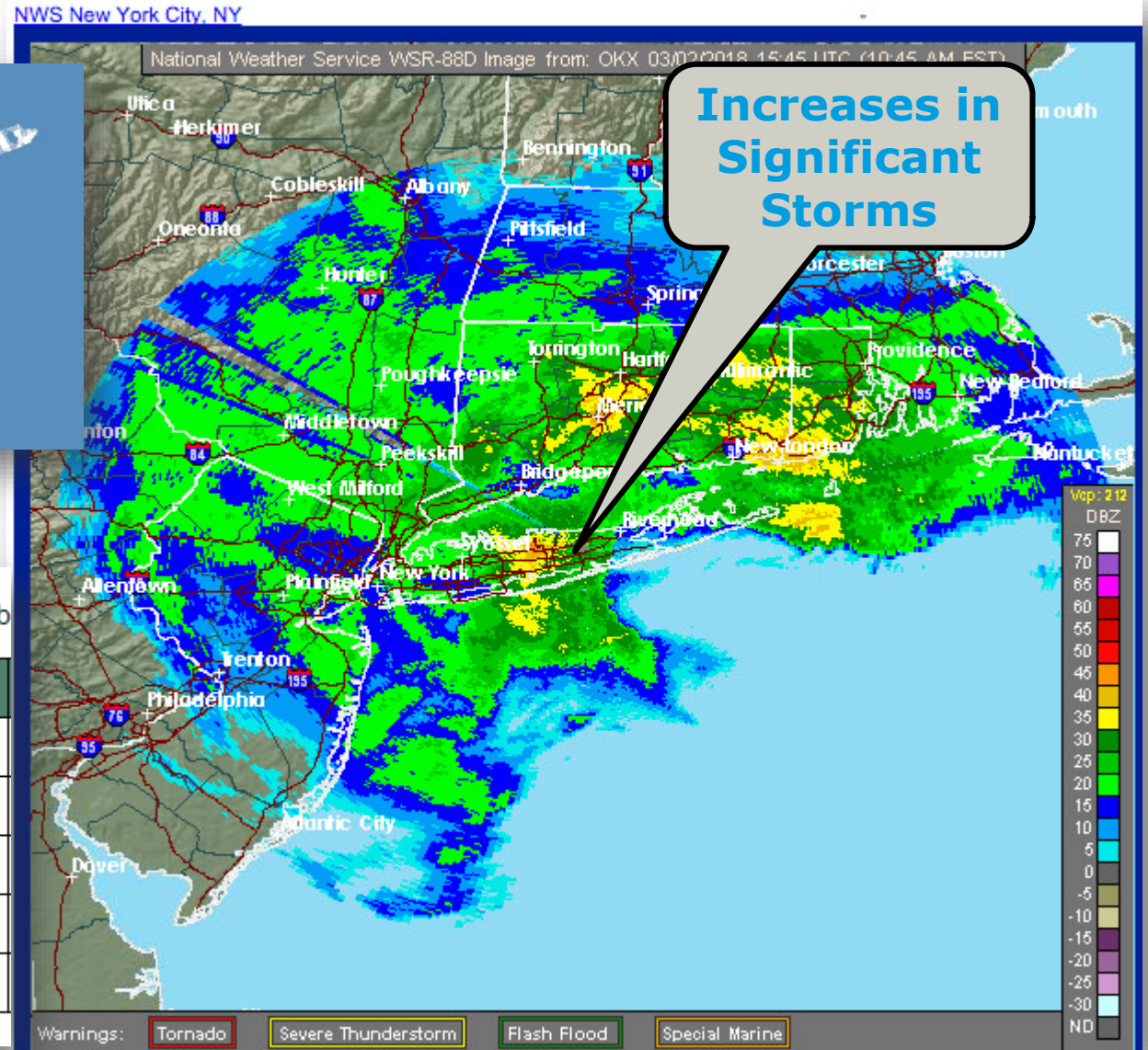


# CLIMATE ADAPTATION IN 21<sup>ST</sup> CENTURY LONG ISLAND AND NYC

**Predicted  
Sea Level  
Rise**



**Increases in  
Significant  
Storms**



6 NYCRR Part 490, Projected Sea-level Rise. Inches of rise relative to 2000-2004 base

	Region	Long Island				
	Descriptor	Low	Low- Medium	Medium	High- Medium	High
Time Interval	2020s	2	4	6	8	10
	2050s	8	11	16	21	30
	2080s	13	18	29	39	58
	2100	15	21	34	47	72

# TOWN OF BROOKHAVEN, NY

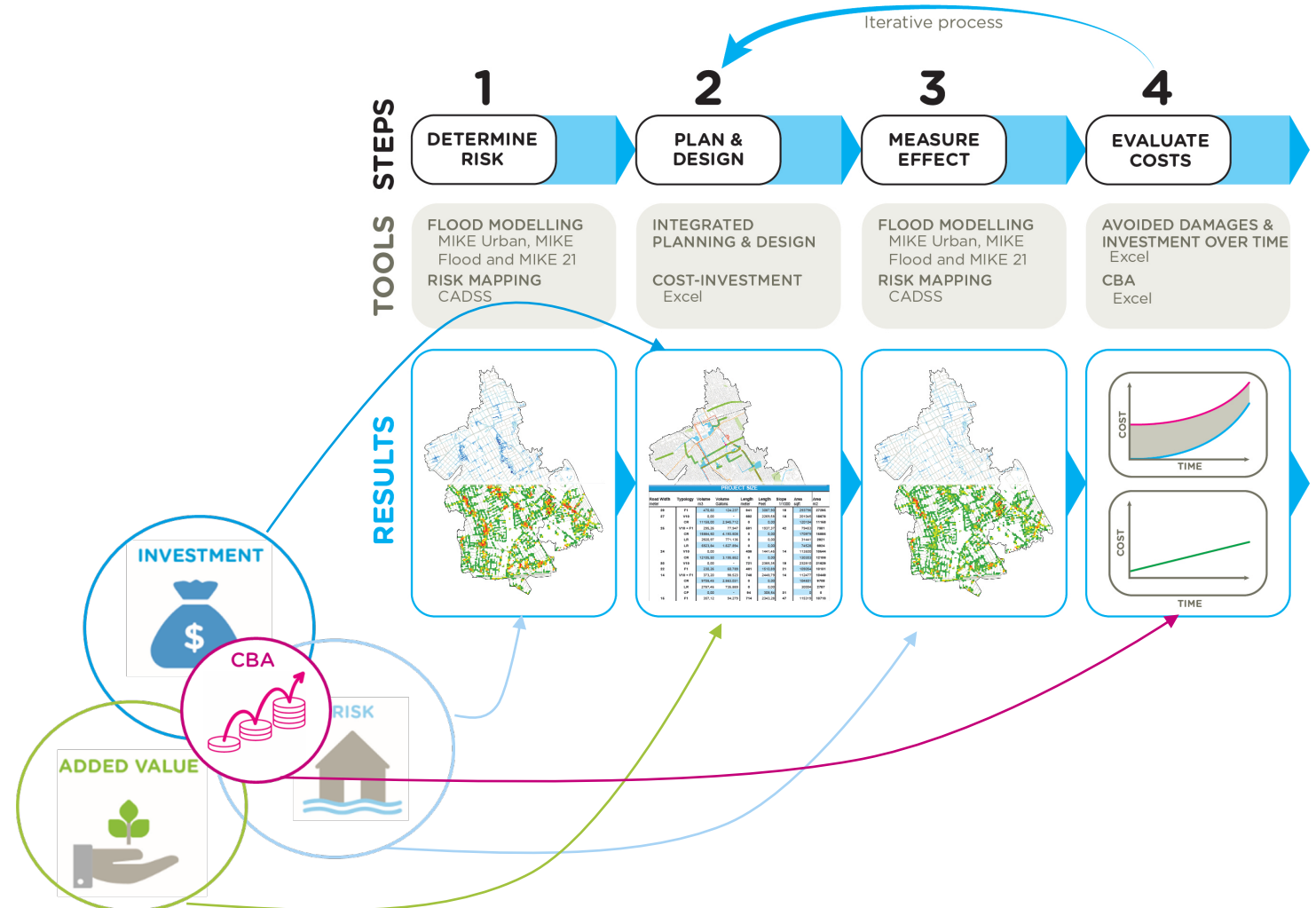


# OUR MASTER PLAN APPROACH

Three overall components to the approach

- Risk
- Investment
- Added value

In the **Cost-benefit Analysis** costs and benefits (the three components) are evaluated over time into a Net Present Value (NPV)



# "TOOL BOX" APPROACH TO INTERVENTION MEASURES

## Blue / Green Infrastructure

- Placement of Dunes
- Smart Street
- Bioswales
- Living Reefs
- Littoral Sand Replenishment / Management
- Marsh Islands
- Sculpted Land
- Blue-Green Parks / Public Facilities
- Wetlands

## Built Infrastructure

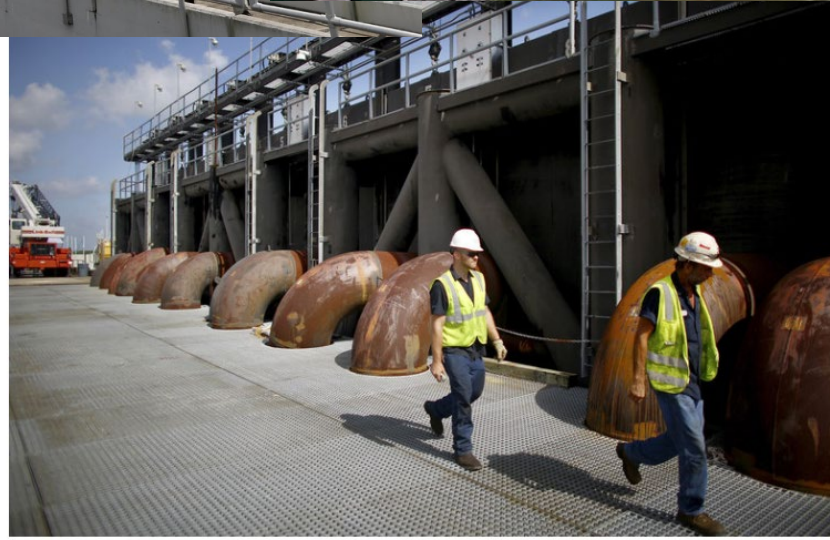
- Floodgates
- Elevated Structures
- Outfall Invert Flaps
- Deployable Flood Barriers / Gates
- Integration with Inland Storm Water BMPs
- Pond / Lake / Stream Management
- Raised Streets / Barriers
- Legislation and Planning
- Retreat and Land-use Planning



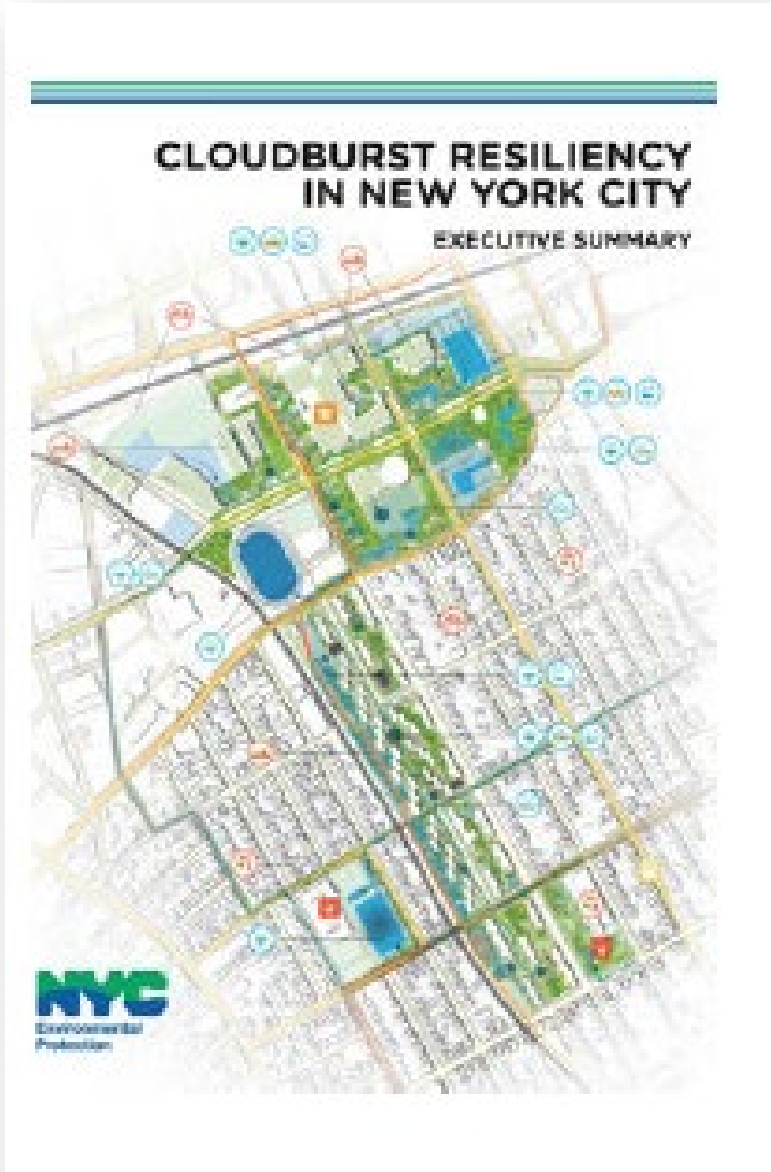




# Hard Engineering Approaches



# NEW YORK CITY, NEW YORK



CASH FLOW



DIRECT COSTS	\$M
Investment	-280
Operational	-20
Financing	-30
Avoided risk	310
<b>Total</b>	<b>-20</b>

# BLUE GREEN INFRASTRUCTURE... NORM AND THE STORM



Queens, New York



South Jamaica Houses in its current state



Future concept for South Jamaica Houses (dry day)



Future concept for South Jamaica Houses (cloudburst)

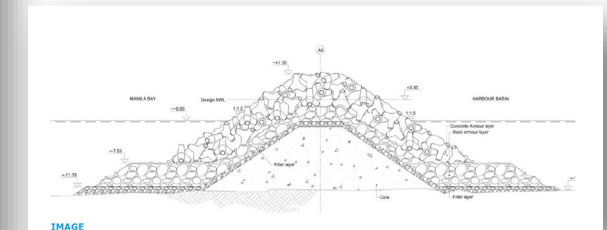
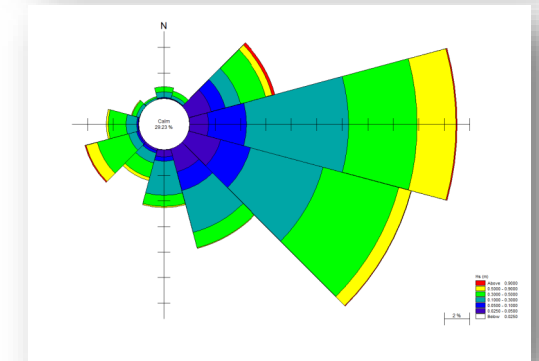
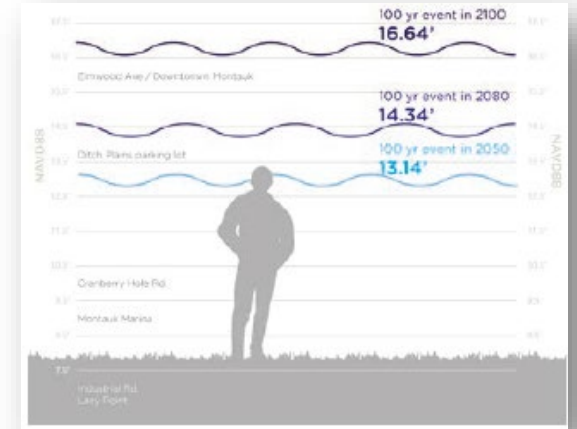
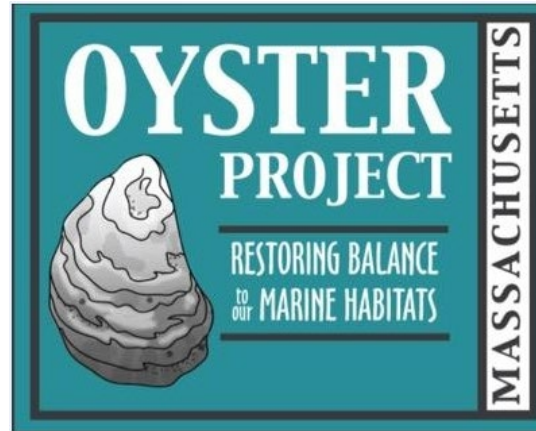
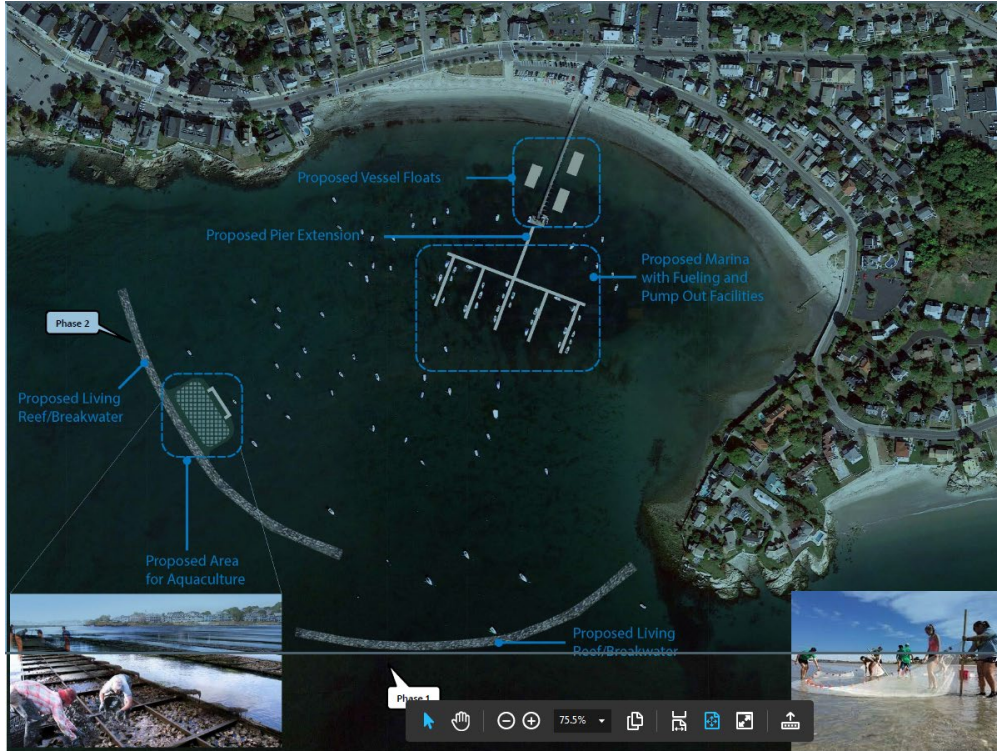


**PLAN & DESIGN**

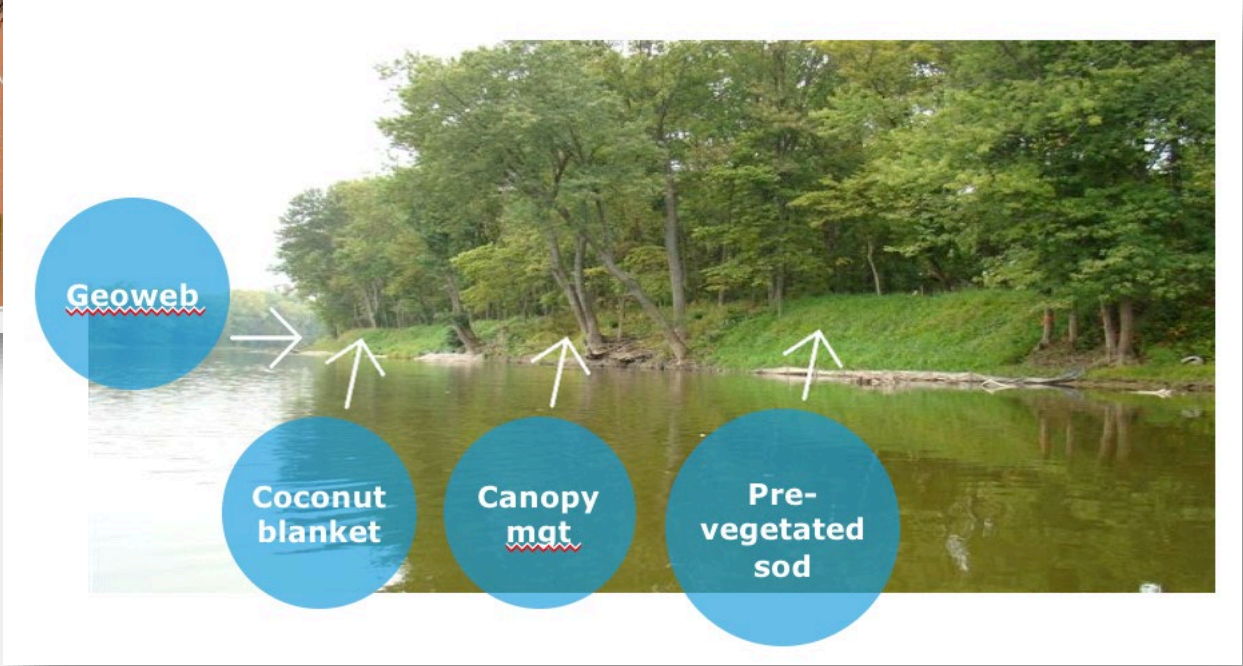
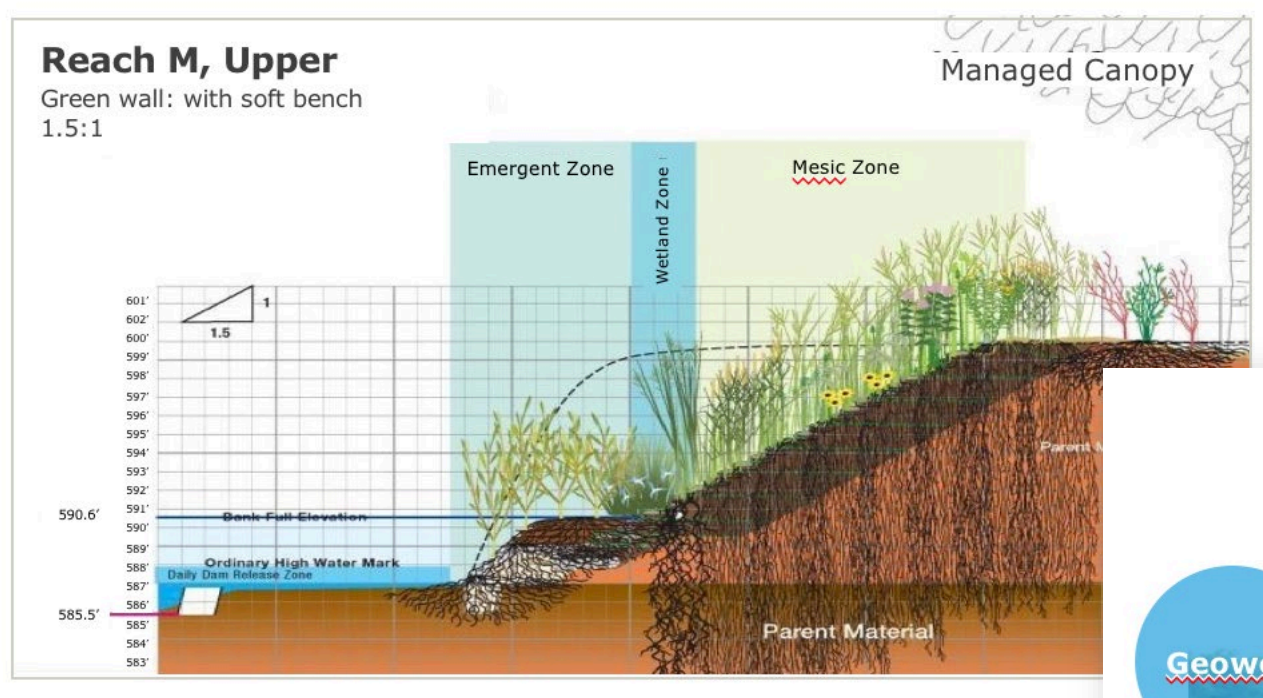
**MASTERPLANNING**

- \$ **RISK**    Where does water come from?  
Where are the risks?
- 😊 **POTENTIAL**    Where can water be stored?
- ⚡ **TERRAIN**    Where does the water flow?  
Where should it flow?
- 🔒 **FRAMES**    What can we (not) accept?
- 🚶 **SYNERGY**    Where can we improve urban connectivity?

# SWAMPSCOTT, MASSACHUSETTS



# SHORELINE GREEN ENGINEERING, MICHIGAN, USA



# A Developing Example

## Brookhaven, NY





# NFWF

## National Coastal Resilience Fund 2018 Managed Retreat and Ecological Restoration of Southern Mastic Beach, Brookhaven, NY

### PLANNING STUDY - PROJECT GOALS

- Restore the reclaimed floodplain to a native healthy salt marsh and maritime scrub-shrub/forest community
- Provide the public safe access to the waterfront via a natural walkway
- Provide a buffer from future flooding for inland residential communities



- Address precipitation impacts.
- Serve as a model that



managed retreat can employ an innovative buy-out/restoration program. Be Catalytic and Prototypical



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