Nature-Based Solutions for Climate Resilient Design

Moakley Park Preliminary Resilience Design June 9, 2020 Presentation for ACEC

> Julie Eaton Ernst, PE Lead Resiliency Engineer Weston & Sampson

IMAGE COURTESTY OF: Stoss Landscape Urbanism

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Weston & Sampson

MOAKLEY PARK IS: ONE OF BOSTON'S LARGEST PARKS

LAY 2020

IMAGE COURTESTY OF: Stoss Landscape Urbanism



HISTORICALLY, MOAKLEY WAS A SALT MARSH & MUD FLAT (1775)

IMAGE COURTESTY OF: Stoss Landscape Urbanism

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HISTORICALLY, MOAKLEY WAS ...

a salt marsh & mud flat (1775)



filled with clay (1919)

capped with soil for ball fields (1919)

a dump (1909)

a playground (1909)

capped with sand for the beach (1919)













EVALUATING CLIMATE RISKS AT MOAKLEY PARK



CLIMATE HAZARDS OVERVIEW





SEA LEVEL RISE AND STORM SURGE



2030 SLR = 9 inches



2050 SLR = 21 inches



2070 SLR = 40 inches



SOURCE: Massachusetts Coastal Flood Risk Model



EXTREME PRECIPITATION



Existing BWSC and MWRA Infrastructure

IMAGE COURTESTY OF: Nitsch Engineering

STORM EVENT MODELLED		SOURCE
Water Quality Storm	1.25 inches	BSWC, BPDA
Current 100-yr, 24-hr Storm	8.09 inches	NOAA Atlas 14
2070 100-yr, 24-hr Storm	11.70 inches	City of Cambridge

RAINFALL FROM STORMS WILL INCREASE



"Today" baseline represents historical average from 1948-2012 Confidence intervals are not available for these projectio

so these numbers should be considered as the middle of IMAGE COURTESTY OF: Climate Ready Boston

EXTREME TEMPERATURES + URBAN HEAT ISLAND EFFECT





SOCIAL VULNERABILITY + ENVIRON. JUSTICE POPULATIONS



UNDERSTANDING EXISTING SITE CONDITIONS



PRELIMINARY SUBSURFACE EXPLORATION DATA

GENERALIZED OBSERVATIONS - NOT FOR DESIGN

SUBSURFACE EXPLORATION PROGRESS

As of September 26, 2019



NATURE-BASED SOLUTIONS AT MOAKLEY PARK



ENVIRONMENTAL, SOCIAL, & ECONOMIC BENEFITS OF NATURE-BASED SOLUTIONS



- Restored coastal habitats—increased biodiversity, habitat growth, and human-wildlife interactions
- Improved resilience against storm events—reducing damages to surroundings
- Reduced shoreline erosion
- Improved air and water quality—carbon sequestration, pollutant removal, nutrient storing



- Improved public health and wellbeing through exercise and community interaction
- Increased access to greenspace for environmental justice populations
- Increased quality of life & public realm benefits



- Reduced long-term maintenance costs in comparison with hard/gray infrastructure
- Decreased energy demands and consumption
- Reduced public health costs



COASTAL WETLANDS + LANDSCAPES



London Wetland Courtesy Of: Berkeley Homes

TOP IMAGE COURTESY OF: Berkeley Homes *RIGHT IMAGE COURTESY OF: Landscape Architecture Platform SOURCE: Naturally Resilient Communities*

- Retain and filter stormwater
- Manage future frequent seawater inundation
- Reduce erosion from increased sea-level rise/storm surge
- Reduce flood damages and resulting recovery costs
- Reduce wave heights from storm surge
- Sequester carbon & increase biomass production





STORMWATER MEADOWS AND SWALES



- Reduce stormwater runoff with increased vegetation
- Improve stormwater quality and reduce quantity entering existing infrastructure
- Restore wildlife habitat and improve biodiversity

MEADOW BIOSWALE

FREQUENTLY INUNDATED

• Stabilize soil and soil nutrients, dispersing the force of rainwater and wave splash

REQUENTLY INUNDATED

WET MEADOW

TOP IMAGE COURTESY OF: AmericanRivers.org RIGHT IMAGE COURTESY OF: Nitsch Engineering SOURCE: Low Impact Development Center & Naturally Resilient Communities



TREE TRENCHES & INCREASED TREE CANOPY



- Slow and reduce stormwater runoff
- Reduce urban heat island effect
- Stabilize soil and surrounding wildlife habitats
- Reduced cooling expenses for nearby properties
- Store and sequester carbon
- Increase air quality
- Improve soil + water quality
- Increase public health





SOURCE: Davey Resource Group, Inc. and Naturally Resilient Communities Images Courtesy of: BWSC

ADDITIONAL BENEFITS OF NATURE-BASED SOLUTIONS



- Improved public realm & open space
- Educational opportunities
- Transferability for other sites
- Reduced costs of gray infrastructure improvements
- Reduced long-term maintenance costs



Images Courtesy Of: Stoss Landscape Urbanism



NEXT STEPS – MOVING FORWARD



Image Courtesy Of: Stoss Landscape Urbanism



questions? westonandsampson.com





transform your environment

thank you

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