

Thursday 28 March

InterFlood 5: Putting Water at the Heart of Urban Planning

Cloudburst resiliency: Innovative solutions to heavy rainfall and coastal flooding

Henrik Søgård Olsen, Global Spearhead Director (Climate Adaptation & Landscape), Ramboll



CLOUDBURST RESILIENCY

INNOVATIVE SOLUTIONS TO HEAVY RAINFALL AND COASTAL FLOODING

HENRIK SØGÅRD OLSEN, GLOBAL DIVISION DIRECTOR



INTRODUCTION

STORM SURGE EVENTS IN CITIES



02/07/2011

CLouDBURST IN COPENHAGEN



INTRODUCTION

OUTSET AT BUZZARD POINT

I Existing urban plan includes flood mitigation vision, but no measures

- Areas of Buzzard Point were identified as high risk flood zones in the Flood Insurance Rate Map (FIRM)
- Current district regulations require that the lowest floors of residential structures be 1.5 feet above the 100 year storm surge flood level
- Vision to maintain first floor elevations above the level of the 500 year storm surge flood level for residential buildings

The vision for Buzzard Point focuses on four key concepts:

- A vibrant mixed-use neighborhood
- Dynamic parks and public spaces
- An improved multi-modal transportation system
- A living and sustainable environment

This document outlines the vision, key design concepts and strategies, the planning context, regional influences, and implementation measures to make the vision a reality.

Source:
https://dmped.dc.gov/sites/default/files/dc/sites/config/publication/attachments/Draft%20Buzzard_Point_Vision_Frameworkork_%26%20Implementation%20Plan.pdf



INTRODUCTION

APPROACH TO RESILIENT URBAN PLAN

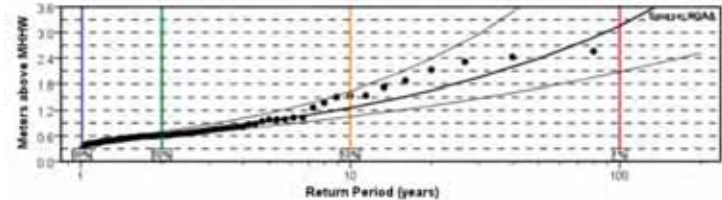
I Building resilience

Phase I builds on current development visions integrating flood risk management initiatives

Information is extrapolated from current climate statistics, hydraulic modeling, spatial analysis and conceptual sketches

The conceptual sketches include recommendations for both riverine flood protection and stormwater management

Climate statistics



Hydraulic modeling



Conceptual masterplan

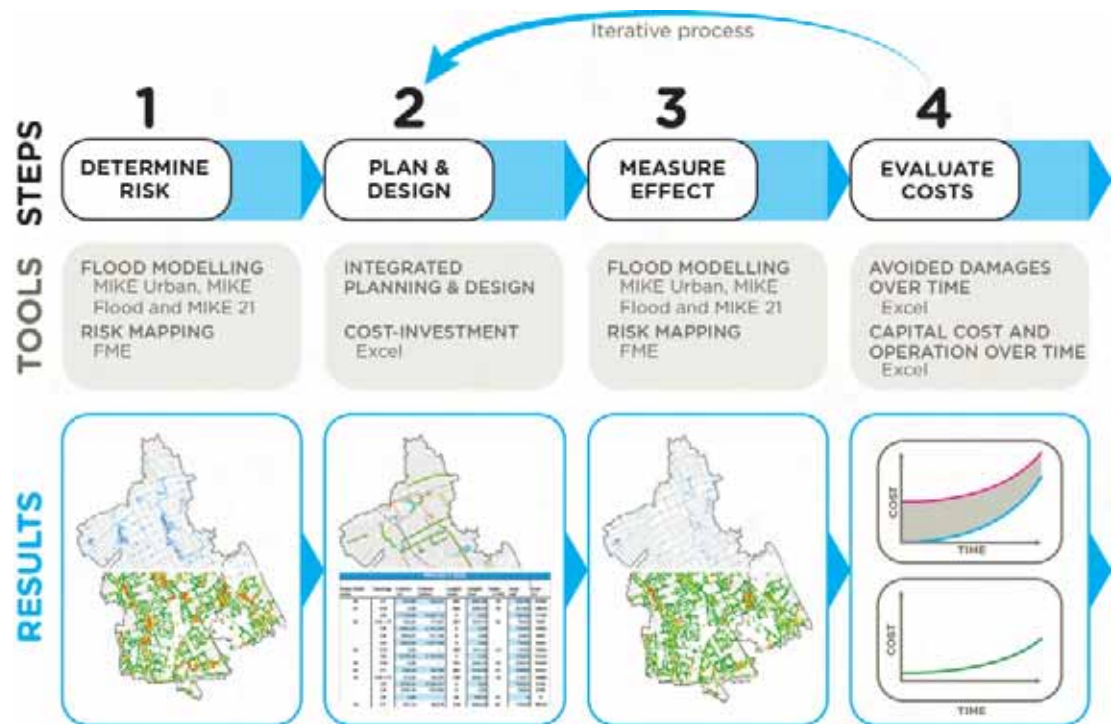


METHODOLOGY

4-STEP PROCESS

4-step resiliency planning approach

- Spatial analyses help to identify potential synergies and cumulative effects
- Iterative process from initial determination of risks to development of a resiliency plan and documenting adaptation effect
- Estimation of optimum protection level



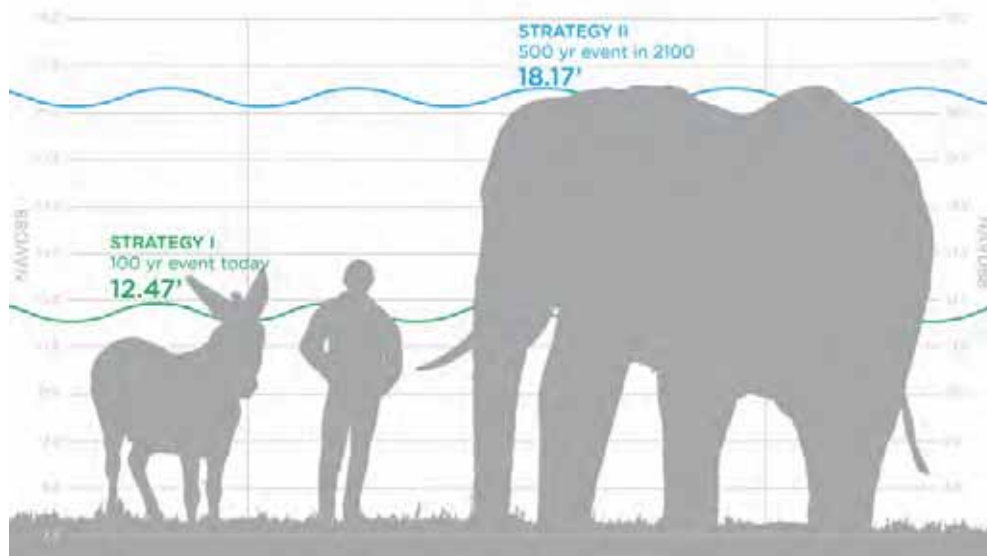
INTRODUCTION

PROTECTION LEVELS

I Building resilience

Phase II of the resiliency study for Buzzard Point builds a high-level business case for riverine flood protection for three scenarios:

- Baseline (“do-nothing”)
- Strategy I: Protecting to current 100 year storm surge event *12.47' NAVD88*
- Strategy II: Protecting to a 500 year storm surge event in 2100 *18.17' NAVD88*



STRATEGY I: 100 YEAR STORM SURGE IN 2017

STRATEGY II: 500 YEAR STORM SURGE IN 2100

PROPOSED SOLUTIONS



A



B



C



D

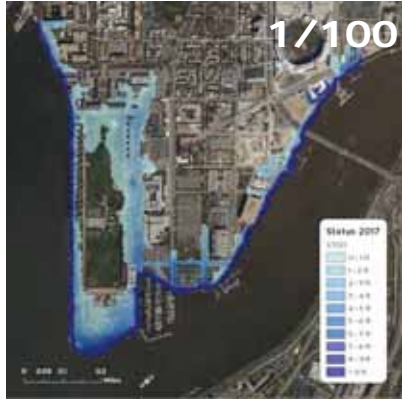


E

INITIAL SITE ANALYSIS

BASELINE SCENARIO + RISK MAPPING

2017

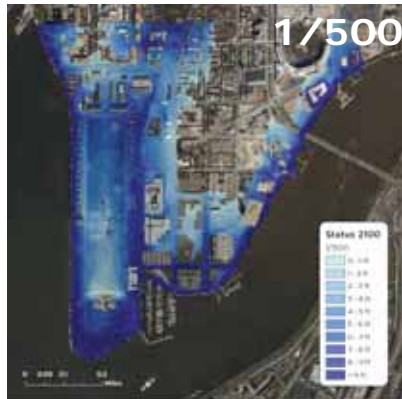
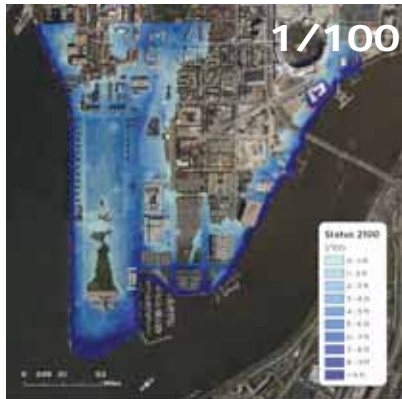


Fluvial and tidal storm surge events today



Risk Mapping in an average storm surge event today

2100



Fluvial and tidal storm surge events in the future

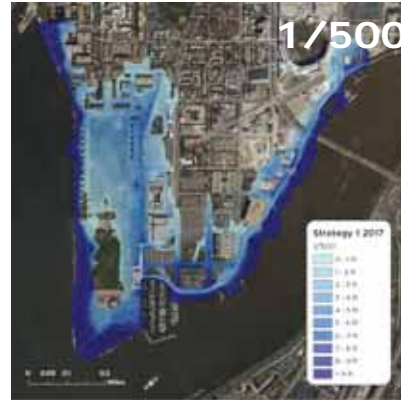


Risk Mapping in an average storm surge event in the future

STRATEGY I

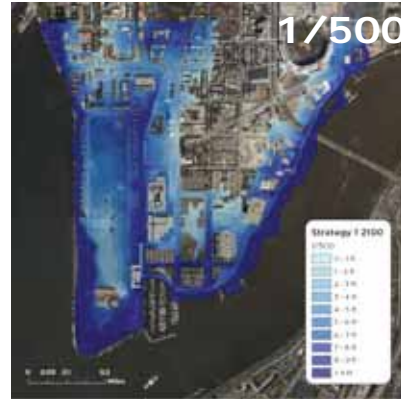
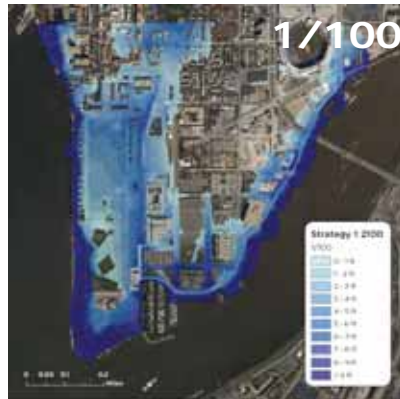
FLOODING + RISK MAPPING FOR STRATEGY I

2017



Fluvial and tidal storm surge events today

2100



Fluvial and tidal storm surge events in the future



Risk Mapping in an average storm surge event today



Risk Mapping in an average storm surge event in the future

STRATEGY II

FLOODING + RISK MAPPING FOR STRATEGY II

2017



Fluvial and tidal storm surge events today



Risk Mapping in an average storm surge event today

2100



Fluvial and tidal storm surge events in the future



Risk Mapping in an average storm surge event in the future

METHODOLOGY

STEP 4: CBA

4 Evaluating costs

- Evaluate costs and benefits over time
- Evaluate Net Present Value (NPV) and benefit-cost ratio between masterplans and in relation to baseline
- Building the business case for adaptation



CONCLUSIONS

COMPARING LIVING SHORELINE STRATEGIES

100 YE 2017



Scenarios	Baseline	Strategy I
NPV (\$ Million)	-136.02	-27.62
Benefit-cost ratio	0.40	0.83



500 YE 2100



Scenarios	Baseline	Strategy II
NPV (\$ Million)	-136.02	14.76
Benefit-cost ratio	0.40	1.11

LIVING SHORELINE VISUALIZATION DAY WITHOUT STORM SURGE EVENT



LIVING SHORELINE VISUALIZATION DAY WITH STORM SURGE EVENT



BLUE-GREEN INFRASTRUCTURE VISUALIZATION DAY WITHOUT STORM SURGE EVENT



BLUE-GREEN INFRASTRUCTURE VISUALIZATION DAY WITH STORM SURGE EVENT



Findings from the Buzzard Point Resiliency Study and Cost-Benefit Analysis conducted by Rambøll

