Session 3: Functionality of the proposed flood measures, multi-hazard and multi-benefits design, and examples from other cities

By

Dr Luce Bassetti
Setting a baseline

What is Engineering With Nature
The intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaboration.

What are Risk Reduction Features
Risk Reduction Features are land-based or in-water features that can reduce residual coastal storm flooding prior to closure of a storm surge barrier, and to address risk behind a storm surge barrier due to interior drainage or other hydrodynamics. They are used in concert with Storm Surge Barriers and are not a stand-alone measure.

What is Multiple lines of defense strategies
Multiple solutions within a strategy to potentially obtain a unifying vision for the coast: embracing environmental habitat restoration as well as engineered flood protection.

What is a coastal system?
A system is a set of interrelated processes that are connected together to form a unit or a whole. Storms, human interventions and sea level rise can disturb the equilibrium of the system. The coastal system is a dynamic system that responds to disturbance.
Coastal flood risk design options and considerations

- Who do we protect?
  - Regional-based
  - Neighborhood/Community-based
  - Site-based

- What do we protect from?
  - Extreme flooding vs nuisance flooding

- How do we protect?
  - Passive vs Active measures

- When do we protect?

- How do we maintain our protection?
Multiple Line of Defenses – Example of Lake Pontchartrain Louisiana

- 11 lines of defense that help to reduce risk and protect communities from storm surges.
- 5 -natural
- 6 – man-made
Grey-Green Spectrum

Lines of Defense

Funding and Policies

Communities Stakeholders
Why Thames Estuary Climate Adaptation?

- The estuary is changing: rising sea level, more development and people in the floodplain, and aging flood defenses.

- Flood risk to:
  - 1.4 million residents
  - 40,000 commercial properties
  - Approximately $400B property value
  - A global financial center
Thames Estuary 2100 Plan. London, UK

- Adaptive flood protection strategy
- 9 Barrier systems, 200+ miles of structures, drainage/pumps
- Nature-based solutions
- Spatial and emergency planning
- Community engagement
- Live plan

Complex Flood Protection System

- Hard infrastructure system:
  - 9 Major Tidal Barriers
  - 218 miles linear defences
  - 104 Pumping Stations
  - 290 Outfalls
  - 300+ active structures

- Intertidal habitat enhancement
- Spatial planning
- Community engagement
Major Barriers

Largest Programme Since Original Construction
Greenwich Peninsula

**Location:** Thames Estuary, UK

**Objective:** Replace sheet piled bulkhead

**Solution:** Set back defences, vegetated platform

**Alternative to:** Online replacement of piled wall

**Additional benefit:** Vegetated habitat

**Cost:** Lower

**Self-maintaining?** Period renourishment
- Who do we protect?
- What do we protect from?
- How do we protect?
- When do we protect?
- How do we maintain our protection?

- Whole system approach
- Line of defense providing multiple benefits
- Achieving physical protection, environmental enhancement and community benefits.
- Reviving the environment
Thanks
Copyright notice

Important

The material in this presentation has been prepared by Jacobs®.

All rights reserved. This presentation is protected by U.S. and International copyright laws. Reproduction and redistribution without written permission is prohibited. Jacobs, the Jacobs logo, and all other Jacobs trademarks are the property of Jacobs Engineering Group Inc.

Jacobs is a trademark of Jacobs Engineering Group Inc.