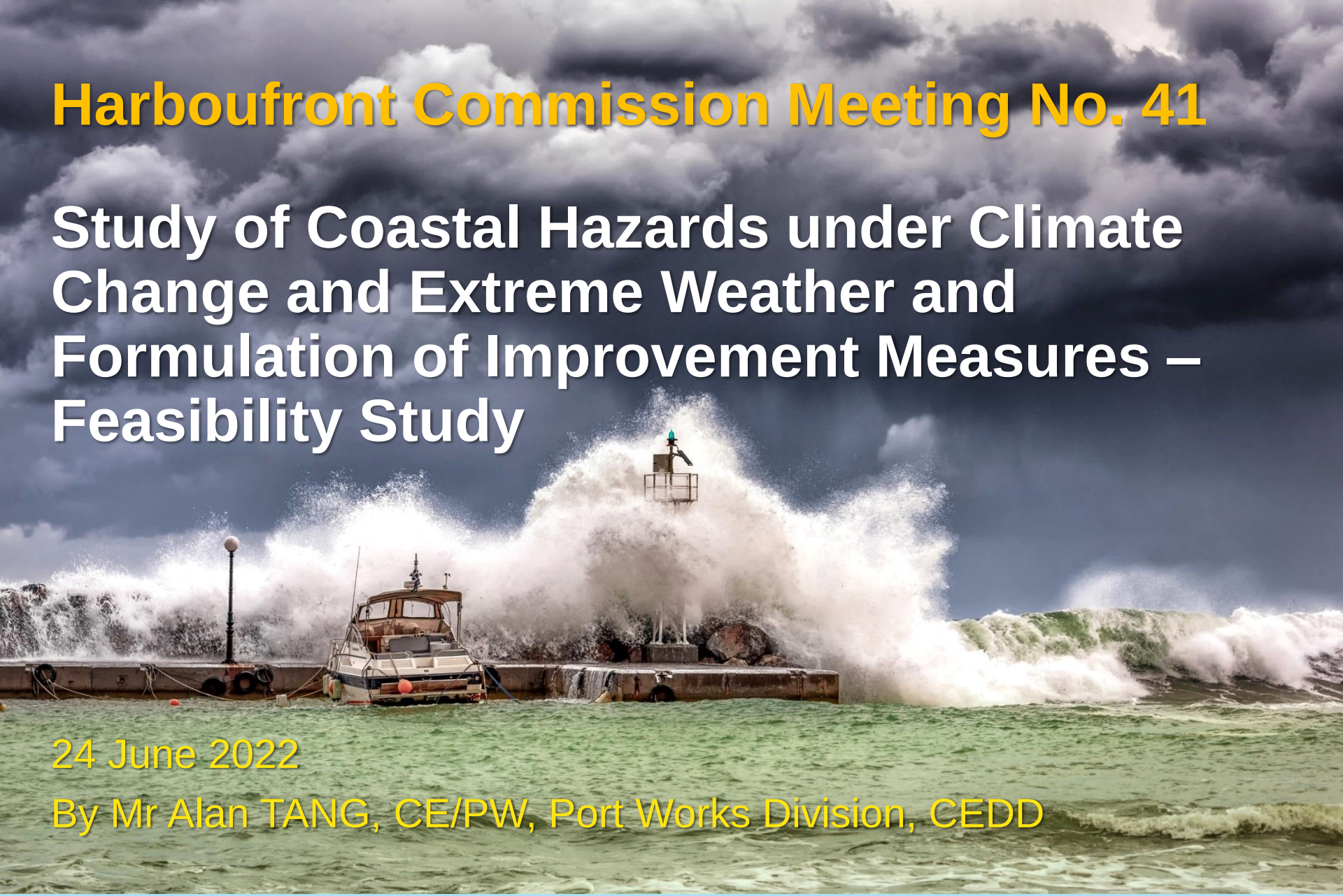
Harboufront Commission Meeting No. 41

Study of Coastal Hazards under Climate Change and Extreme Weather and Formulation of Improvement Measures – Feasibility Study



24 June 2022

By Mr Alan TANG, CE/PW, Port Works Division, CEDD

Major Comments from HC Members

To consider:

1. Multi-purpose and more appealing design of wave walls
2. Long-term and holistic planning of coastal developments
3. Overseas good practices for functional design
4. Robustness of demountable flood barriers
5. Implementation details of action plans
6. New technologies in typhoon alert system
7. Nature-based solution for coastal enhancement

Content

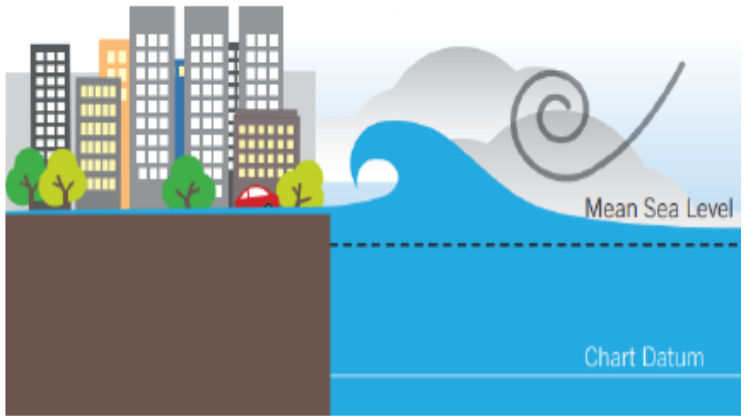
1. Strategy for Adapting to Coastal Risks
2. Identification of Coastal Areas to be Enhanced
3. Enhancement Measures
4. Way Forward

Study of Coastal Hazards under Climate Change and Extreme Weather and Formulation of Improvement Measures – Feasibility Study (Coastal Hazards Study)

- Assessing the impacts of **extreme weather and climate change** on **coastal low-lying and windy areas**

- **Risk management approach**
  - **Likelihood** of coastal hazards and severity of **consequence**
  - **Identify** coastal low-lying and windy areas more vulnerable to higher potential risks

- **Enhancement measures**

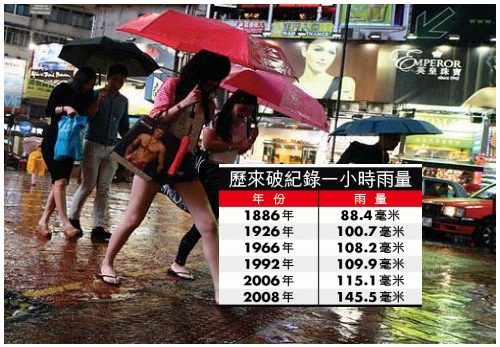



Strategy for Adapting to
Coastal Risks

Climate Hazards - Extreme weather events

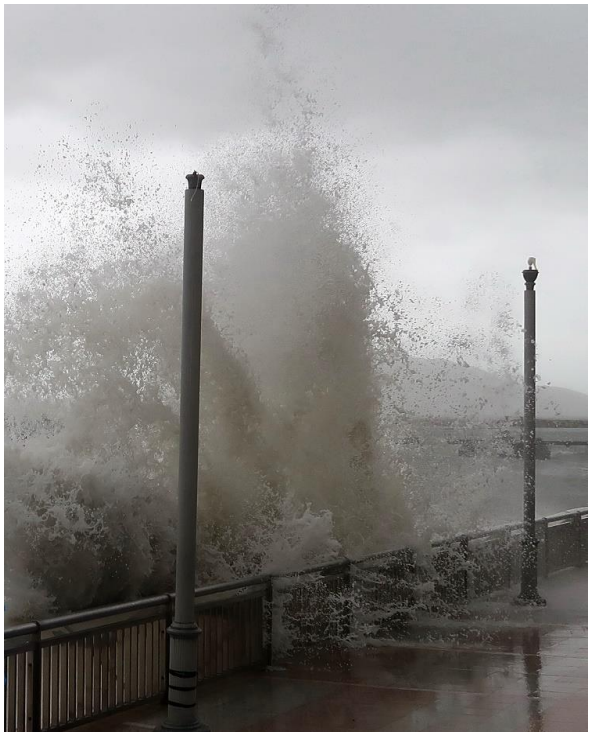
Temperature Rise

Sea Level Rise



Rainfall Increase

Storm Surges



Extreme Weather Events

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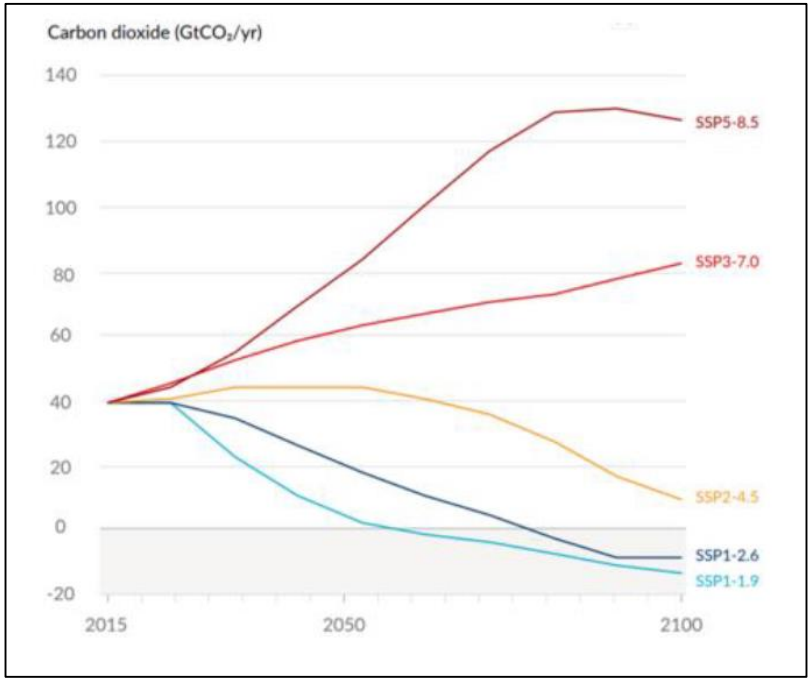
Climate Change Projection

- Intergovernmental Panel on Climate Change (**IPCC**)
- IPCC's Fifth and Sixth **Assessment reports** (AR5, 2013 & AR6, 2021)
- **Paris Agreement (2015)** - to keep the increase in global average temperature to well below 2°C above pre-industrial levels
- **COP26 meeting (2021)** pledged to achieve the Paris Agreement target

	2081-2100 *Very likely* range (°C)
SSP1-1.9	1.0-1.8
SSP1-2.6	1.3-2.4
SSP2-4.5	2.1-3.5
SSP3-7.0	2.8-4.6
SSP5-8.5	3.3-5.7

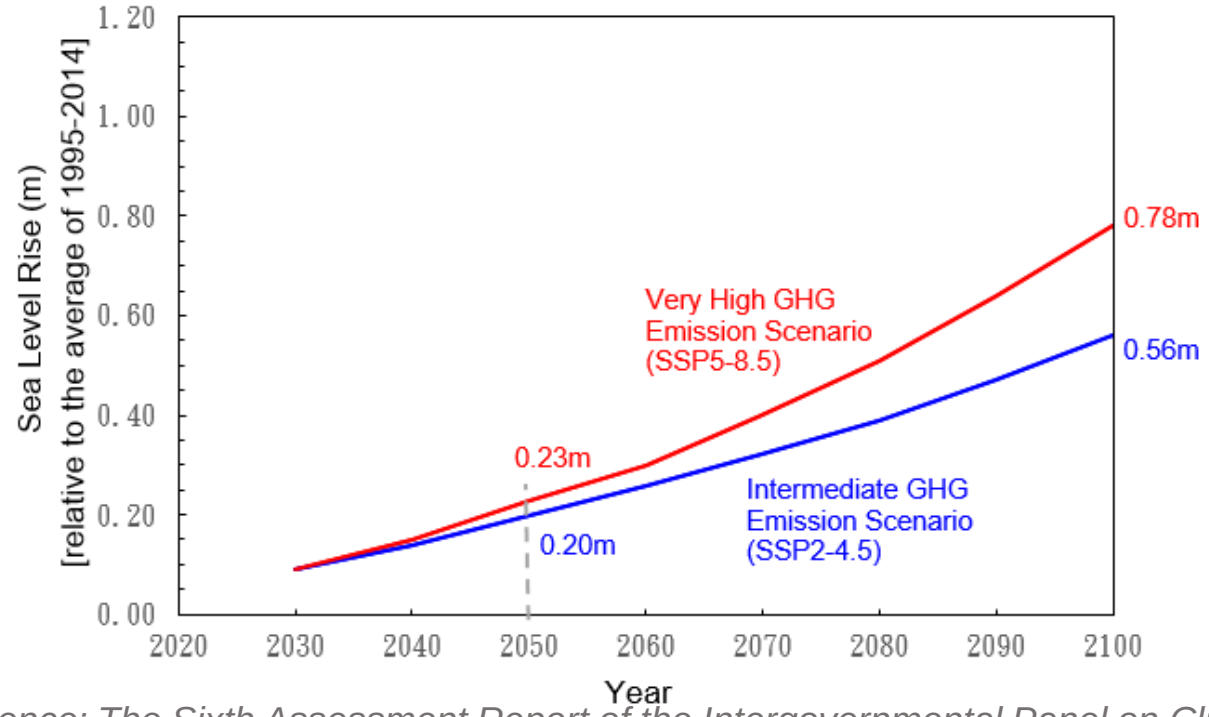


Projection of CO_2 Emissions in Different Scenarios (IPCC AR6)

Strategy For Adapting To Coastal Risks

Evaluation Method

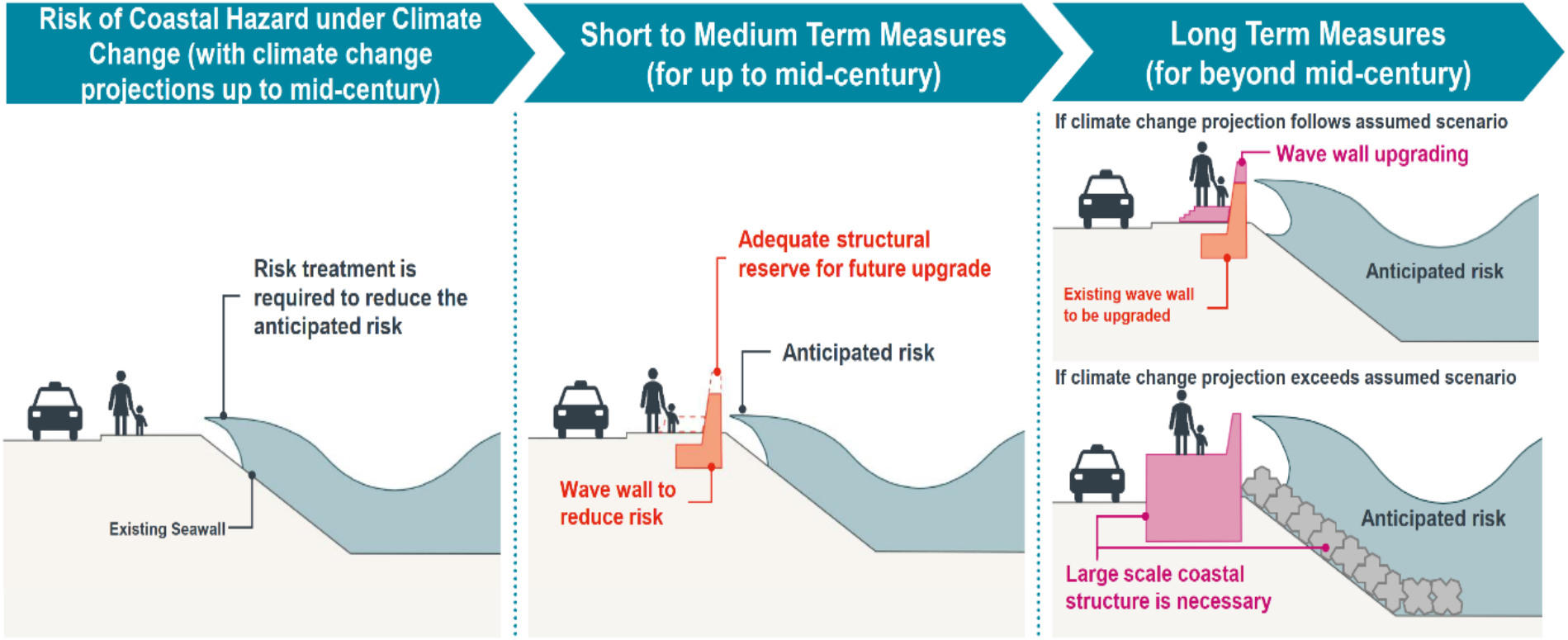
- Extreme weather (100-year return period) + Climate change effect (Sea level rise up to 2050 under intermediate greenhouse gas emission scenario)



Significant difference

Reference: The Sixth Assessment Report of the Intergovernmental Panel on Climate Change

Progressive Adaptive Approach



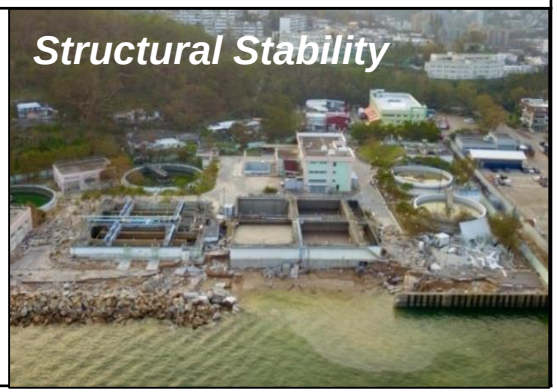
* Remark: Drainage enhancement, such as pumping station, might be needed at the back of the wall

Identification of Coastal Areas to be Enhanced

Risk-Management Approach

Risk Assessment - Likelihood x Consequence

Likelihood of Coastal Hazards



Severity of Consequence

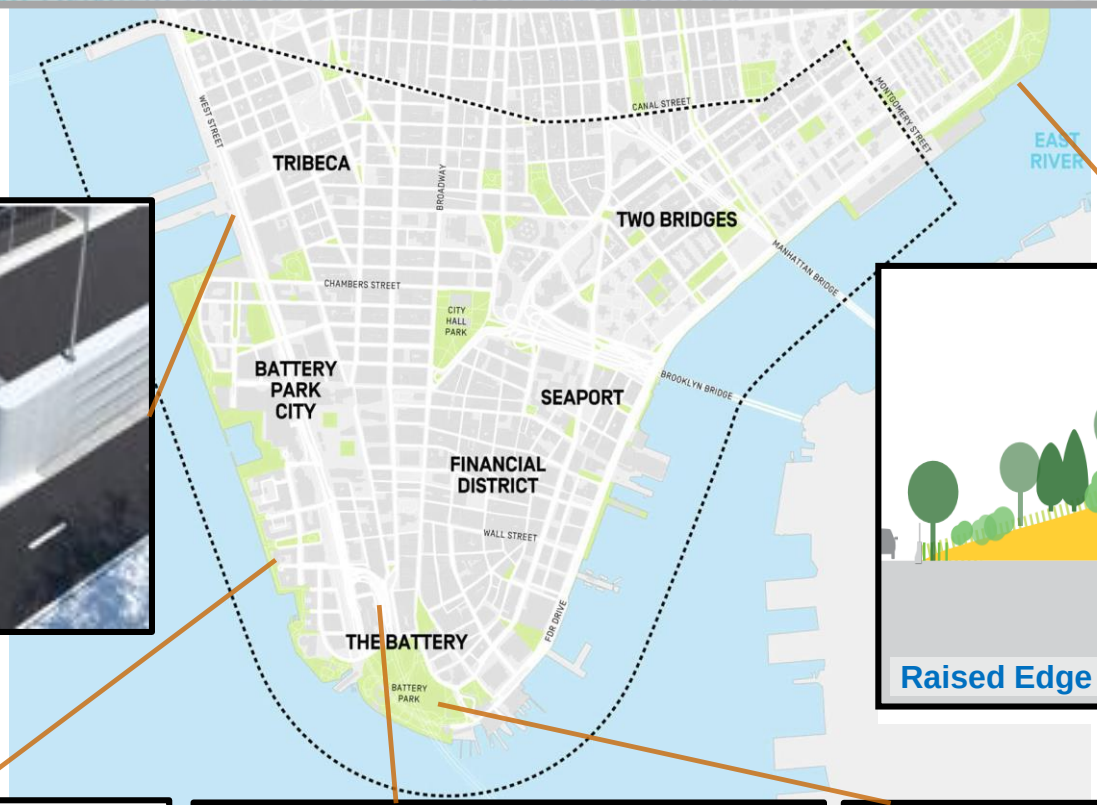
26 Residential Areas for Enhancement

Enhancement Measures

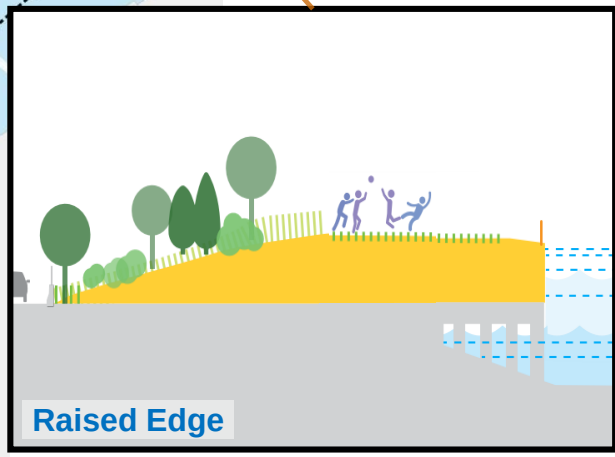
Enhancement Measures

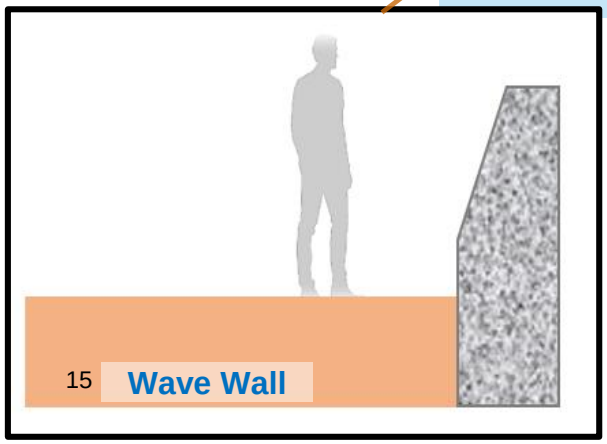
- Make reference to overseas and local experience

Lower Manhattan, New York - Enhancement Measures

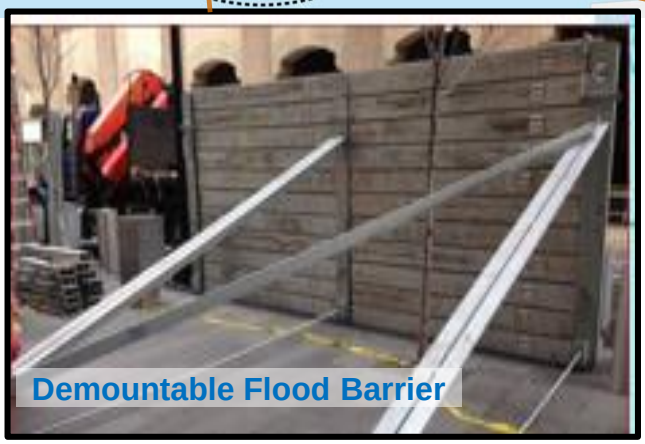


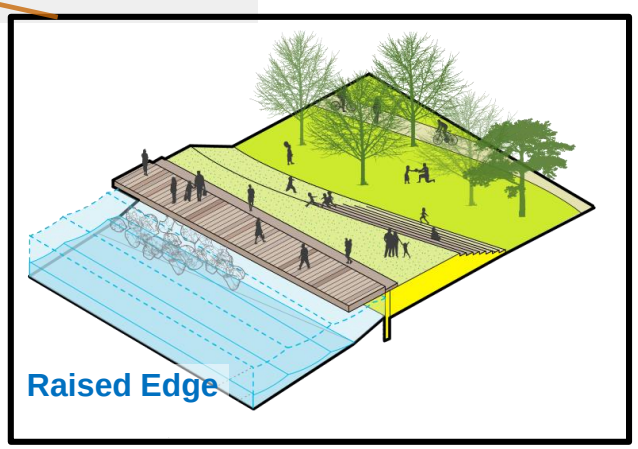

Flood Wall


Raised Edge



Wave Wall


Demountable Flood Barrier


Raised Edge

Multi-layered Enhancement Measures

Improvement Works

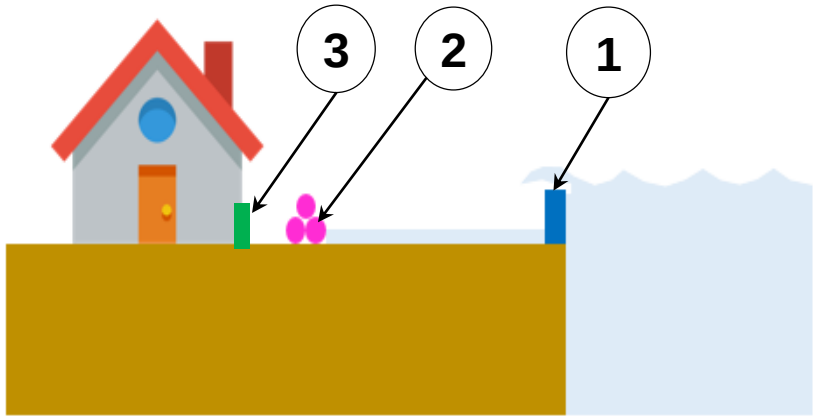
1. Constructing or raising wave walls along coastline

2. Installing fixed and/or demountable flood barriers at suitable places behind coastline

3. Installing demountable flood barriers at building frontages

Management Measures

4. Action plans with early alert system for areas with 2 / 3



Measure 1 - Constructing / Raising Wave Wall

1. Constructing or raising wave wall along coastline

- To reduce coastal hazards

Tseung Kwan O Waterfront Park

Ma Wan Tsuen, Lei Yue Mun

Storerooms along Seafront in Milford on Sea, UK

Living Seawall in Sydney Harbour

Measures 2 and 3 - Flood Barriers

2. Fixed and/or demountable flood barriers behind coastline
   - To cut off water pathway


Flood Wall


Water-filled Tube Barrier

3. Demountable flood barriers at building frontages
   - Self-protection


Demountable Flood Barrier

Examples of Demountable Flood Barriers in Hong Kong

Heng Fa Chuen Playground

Tai Ping Street, Tai O

South Horizons Resident Club

Yat Chung Riverwall, Tai O

CEDD

Management Measures

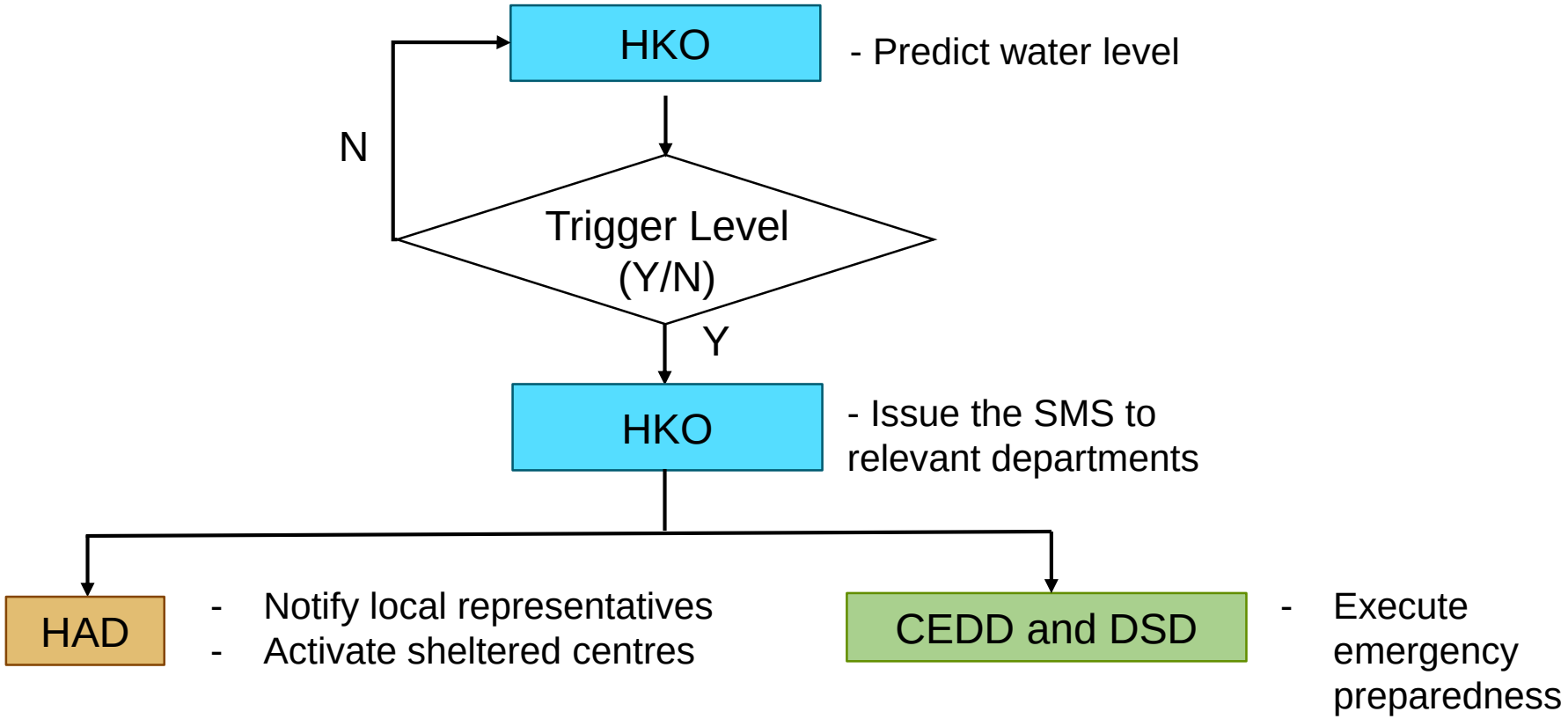
Action plans on early alert system and emergency preparedness

- Triggering level of early alert system
- Sandbags and demountable flood gates
- Opening of temporary shelters and pumping facilities
- Emergency preparedness gangs

Provision of Sandbag at Designated Locations

Setting Triggering Level of Early Alert System

Action Plan – Early Alert System



Examples of Schematic Design of Enhancement Measures

Kennedy Town, Sai Ying Pun and Sheung Wan

Super Typhoon “Hato” / “Mangkhut” attacked Kennedy Town, Sai Ying Pun and Sheung Wan

Sun Yat Sen Memorial Park, Sheung Wan

Western District Public Cargo Working Areas, Sai Ying Pun

New Praya, Kennedy Town

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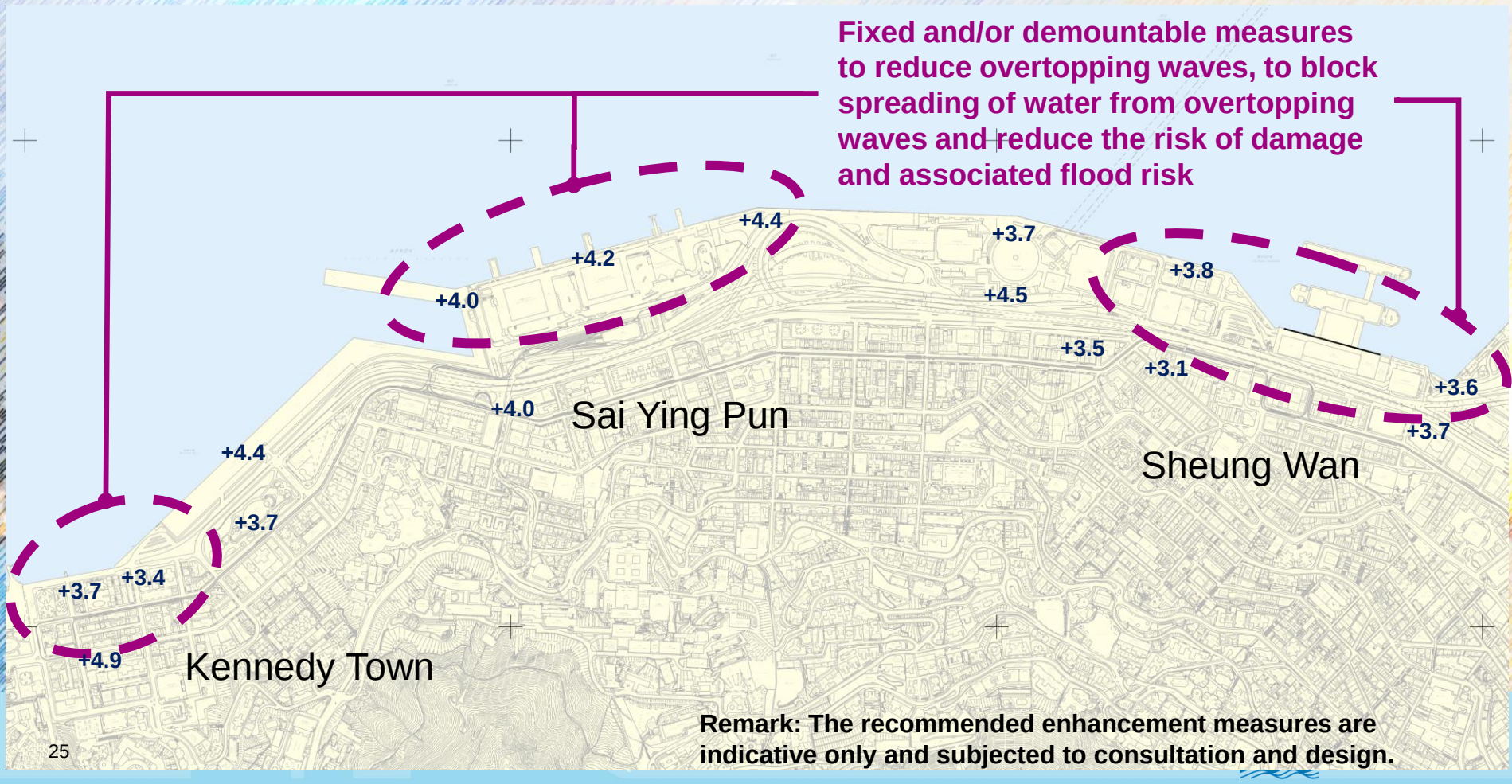
Recommended Enhancement Measures – Kennedy Town, Sai Ying Pun and Sheung Wan

1. Constructing wave wall along the coastline; and/or
2. Installing fixed and/or demountable flood barriers at suitable places behind the coastline to cut off water pathway towards inlands



Remark: The recommended enhancement measures are indicative only and subjected to consultation and design.


Lei Yue Mun

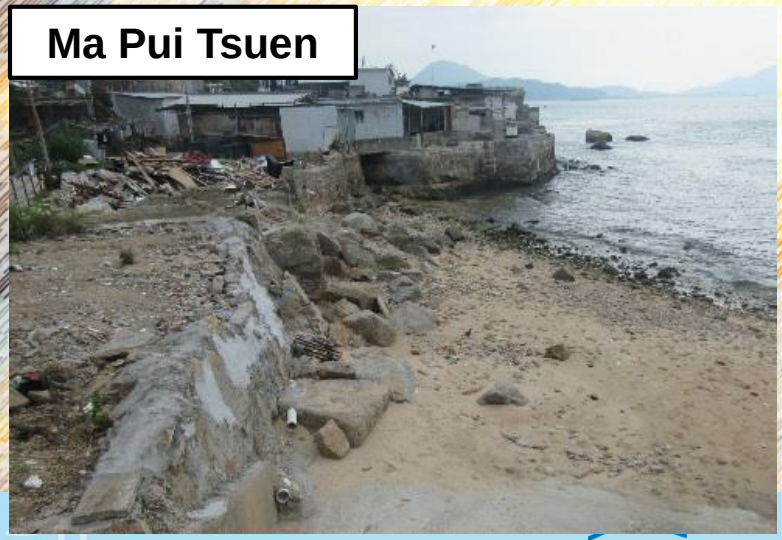
Super Typhoon “Hato” attacked Lei Yue Mun

Ma Wan Tsuen

Ma Pui Tsuen

Sam Ka Tsuen

Ma Pui Tsuen



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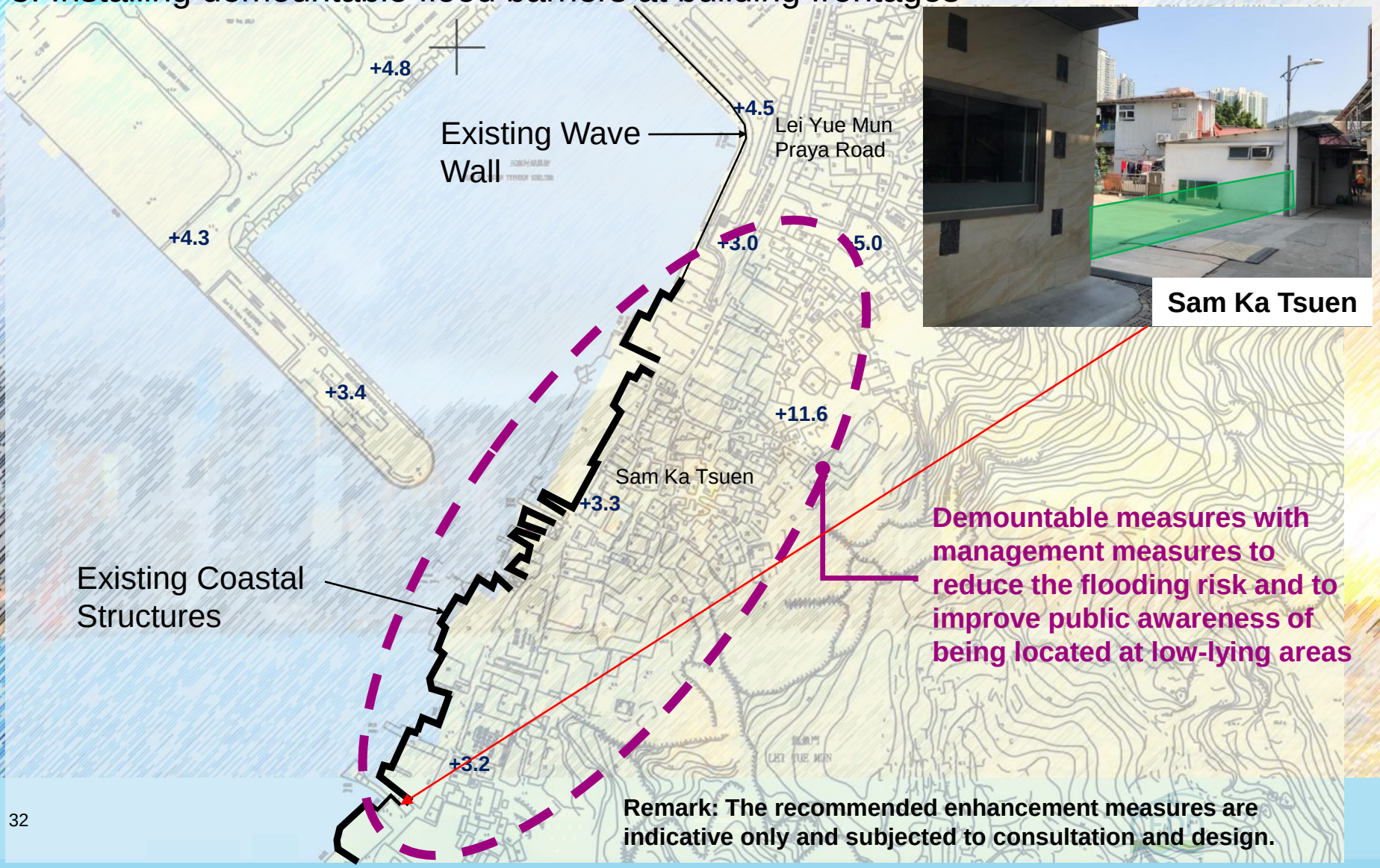
Recommended Enhancement Measures（Sam Ka Tsuen）

2. Installing demountable flood barriers at suitable places behind the coastline to cut off water pathway towards inlands; and/or
3. Installing demountable flood barriers at building frontages



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Recommended Enhancement Measures（Ma Wan Tsuen）

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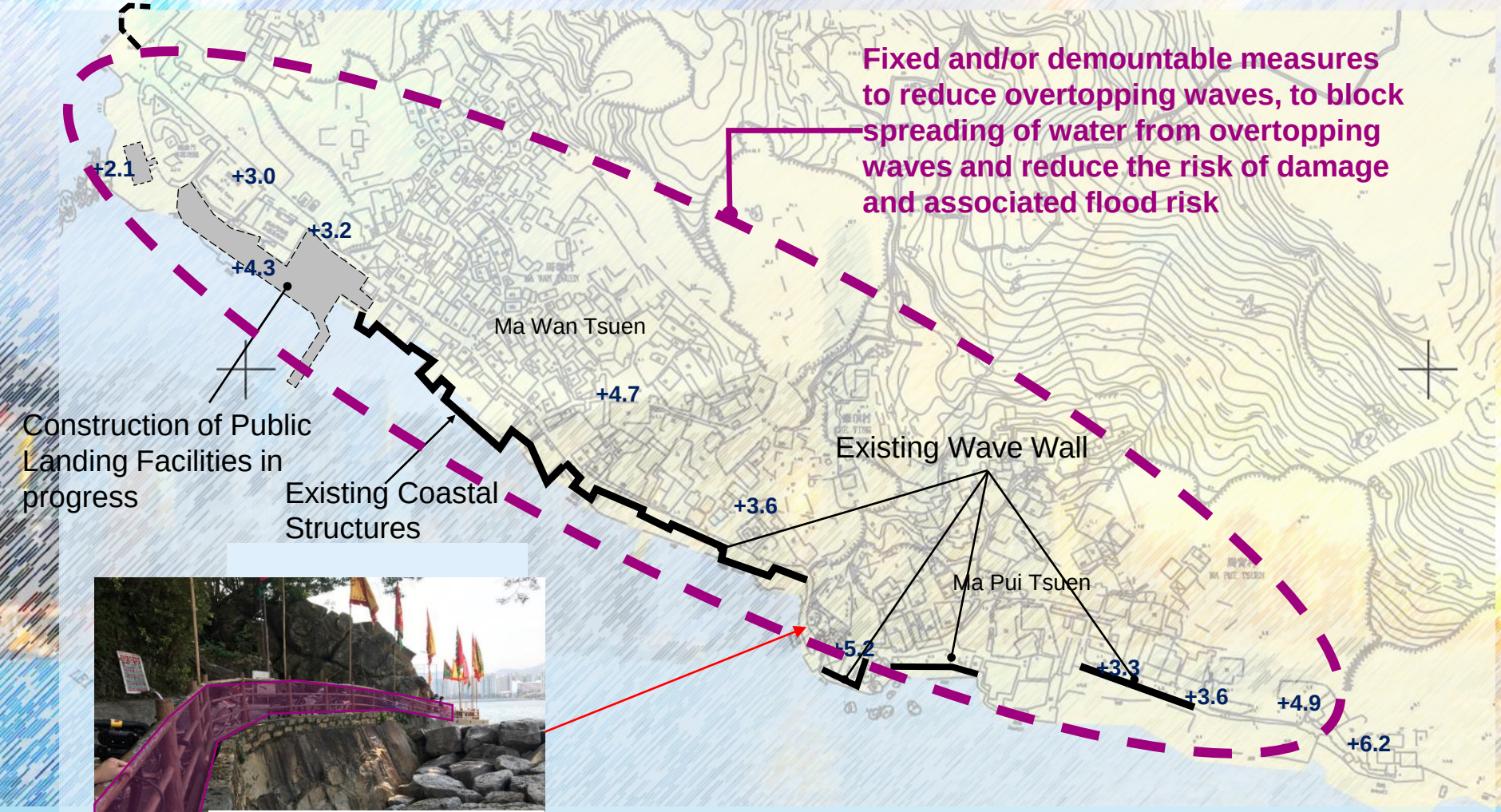


Between Ma Wan Tsuen and Ma Pui Tsuen

Remark: The recommended enhancement measures are indicative only and subjected to consultation and design.


Way Forward

Innovation in Coastal Enhancement

Real-time water level monitoring

Special weather tips

Electronic panel

Real-time wave monitoring

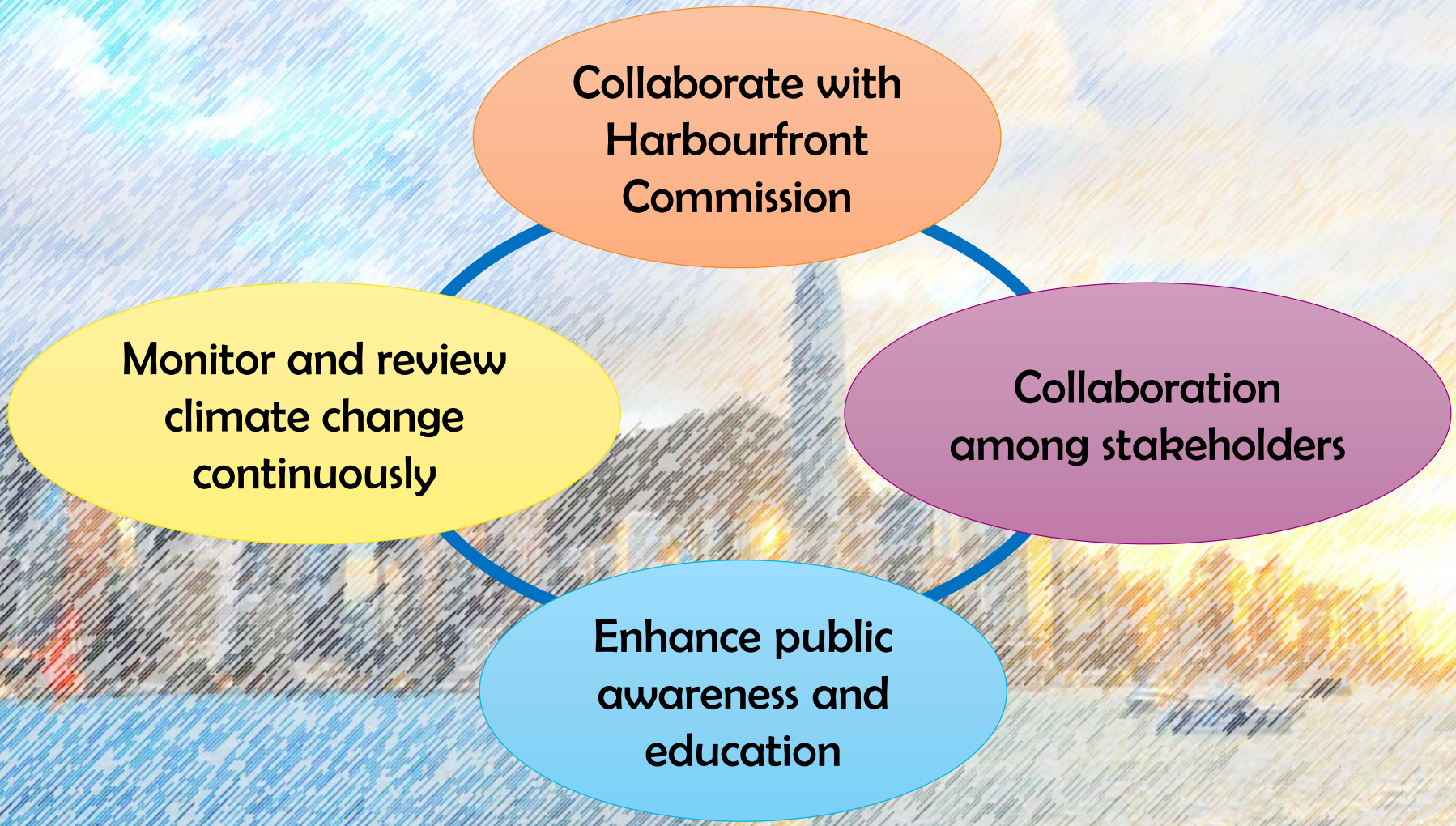
Nature-based solution

Long-term planning

Strategic Planning Study against Sea Level Rise and Extreme Rainfall

Study on Shoreline Management Plan

Way forward


Collaborate with Harbourfront Commission
Collaboration among stakeholders
Enhance public awareness and education
Monitor and review climate change continuously

Way forward

We should bear in mind !

香港邁向碳中和 Carbon Neutral@HK

Thank you

https://www.city-discovery.com/hong-kong/tour.php?id=656