



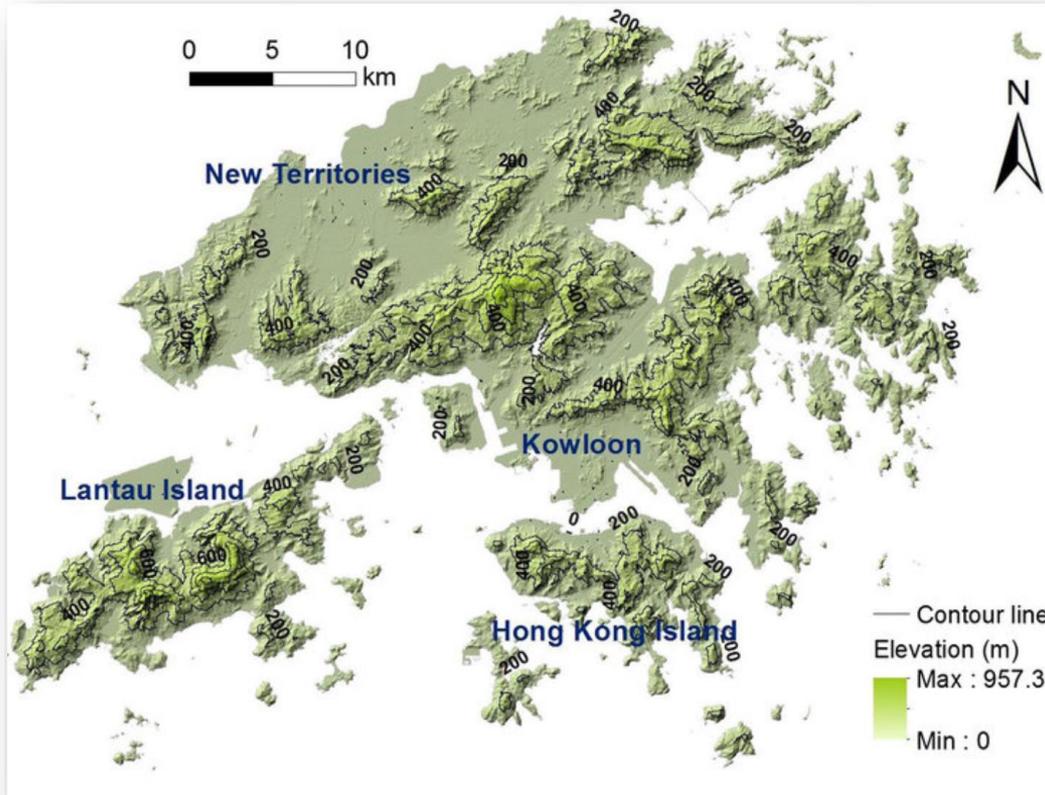
THE HONG KONG  
INSTITUTION OF ENGINEERS  
香港工程師學會

## Land Use Planning To Build Disaster Resilience

## WFEO-CDRM Webinar Toward Resilient Societies: The Engineering Contribution

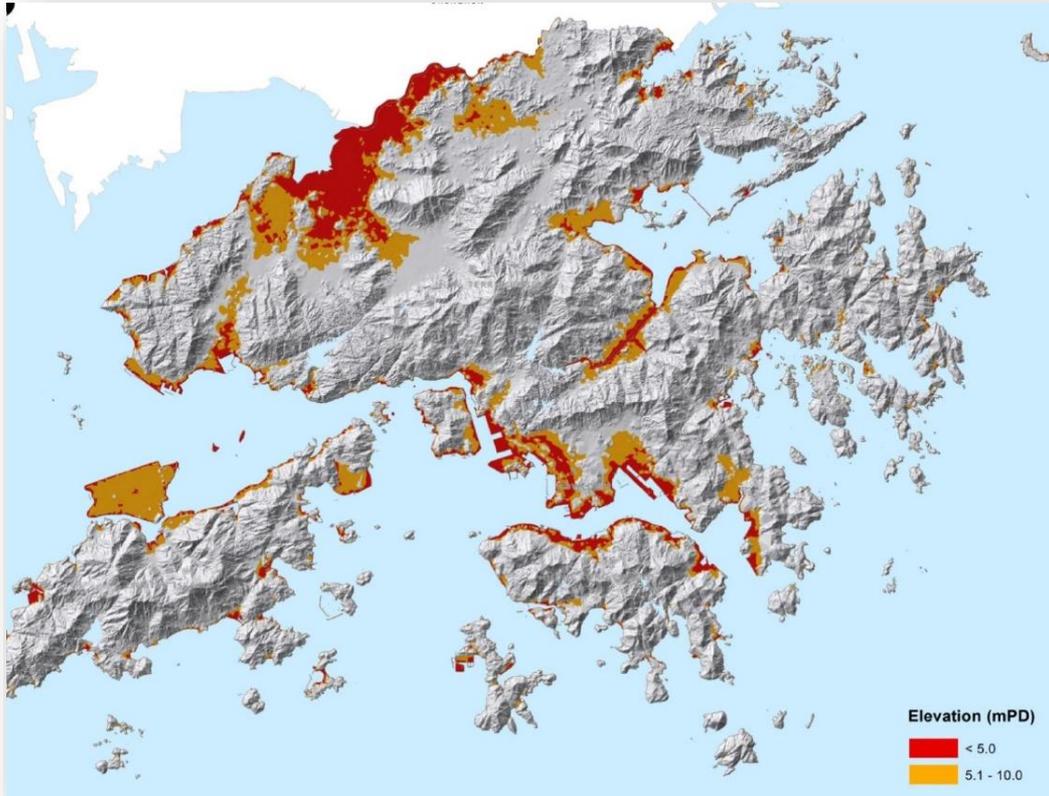
**Eric S.C. Ma**, CEO, NWS Holdings Ltd  
Former Secretary for Development, HK SAR Government

# Topography & Challenges of Hong Kong (1)



- 7.3M population
- 1,110 km<sup>2</sup>

## Topography & Challenges of Hong Kong (2)



### Features:

260km<sup>2</sup> developed areas

- 70km<sup>2</sup> reclaimed land
- 60,000 man-made slopes
- High density developments at low-lying area
- Medium density development at mid-levels in particular the steep north shore of Hong Kong Island

# Building Jungle



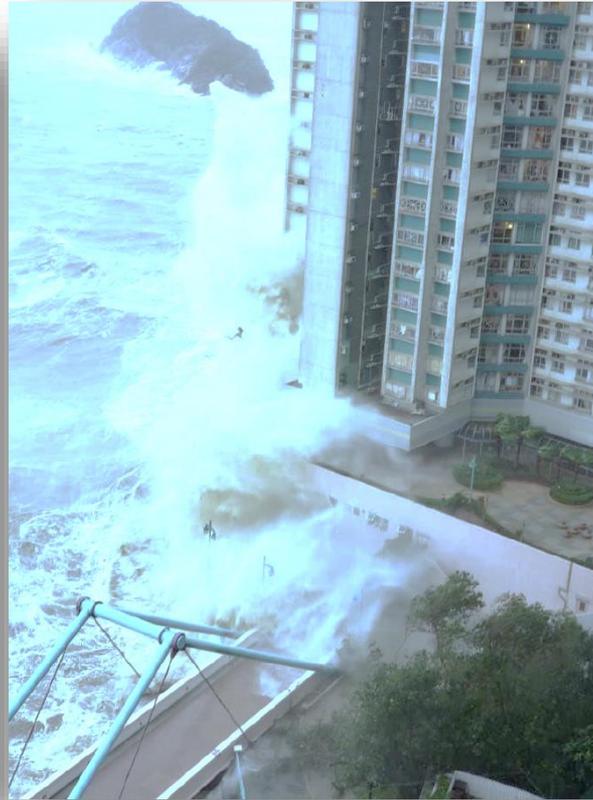
- A city with borders
- 500+ buildings taller than 150m
- Average building height - 120m (40-storey)
- Super high-rise buildings in steep slopes and reclaimed land

# Types of Natural Disasters in Hong Kong

- Exceptionally heavy rainfall
  - Storm surge
  - Thunderstorms
  - Tropical cyclone
  - Heat wave
  - Droughts
  - Rise in sea levels
- Flooding
  - Coastal Erosion
  - Natural Landslides
  - Man-made slope failures
  - Building/structure damages
  - Transport incidents
  - Portable water shortages

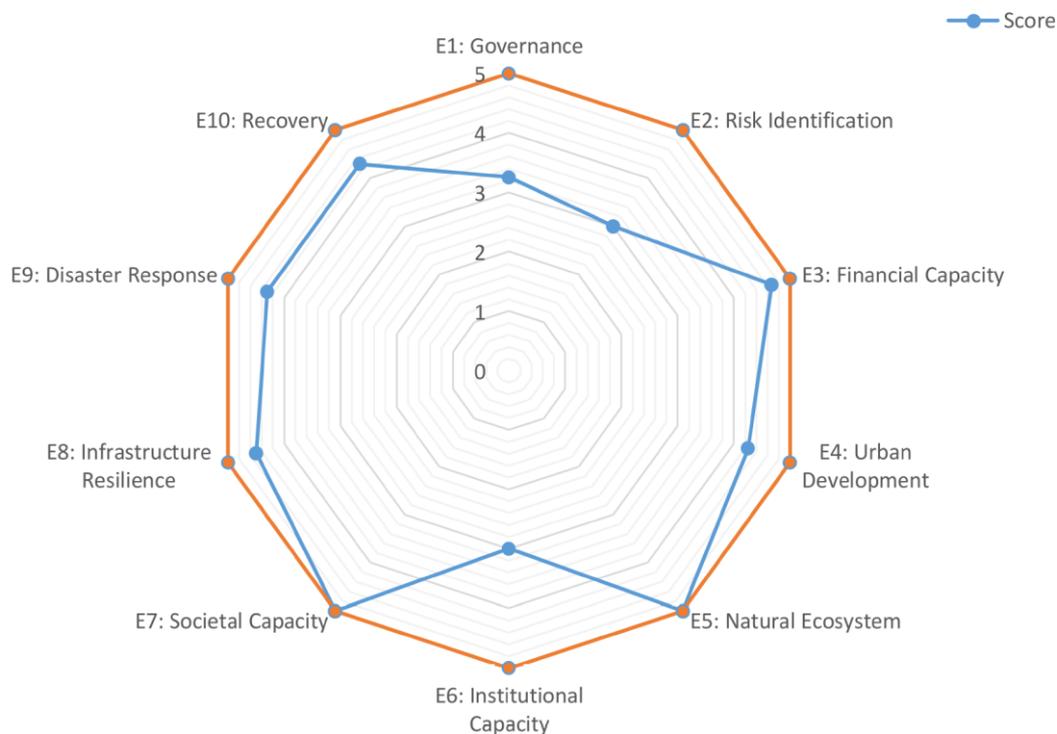
# Natural Disasters

Landslide after severe rainstorms in 1972



Storm Surge during Mangkhut in 2018

# Hong Kong Resilience Performance



UNISDR (United Nation Office for Disaster Risk Reduction) 's 10 aspects for disaster resilience

**E8: Infrastructure Resilience**  
4.5 out of 5

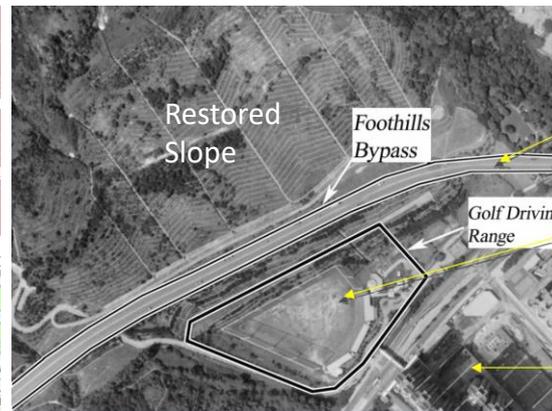
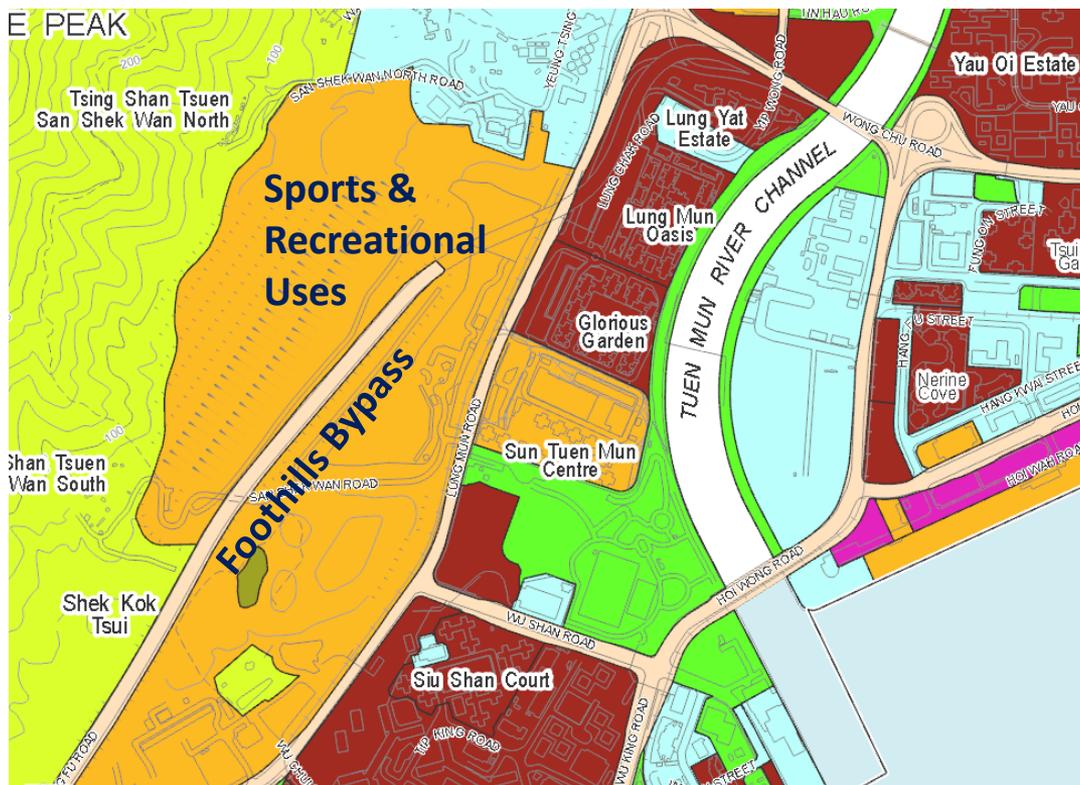
# Town Planning Process

- Started in 1970s to facilitate new town developments
- Multi-disciplinary approach with professional engineers as Study Director or Design Director
- Land Use proposals supported by a series of environmental and engineering studies



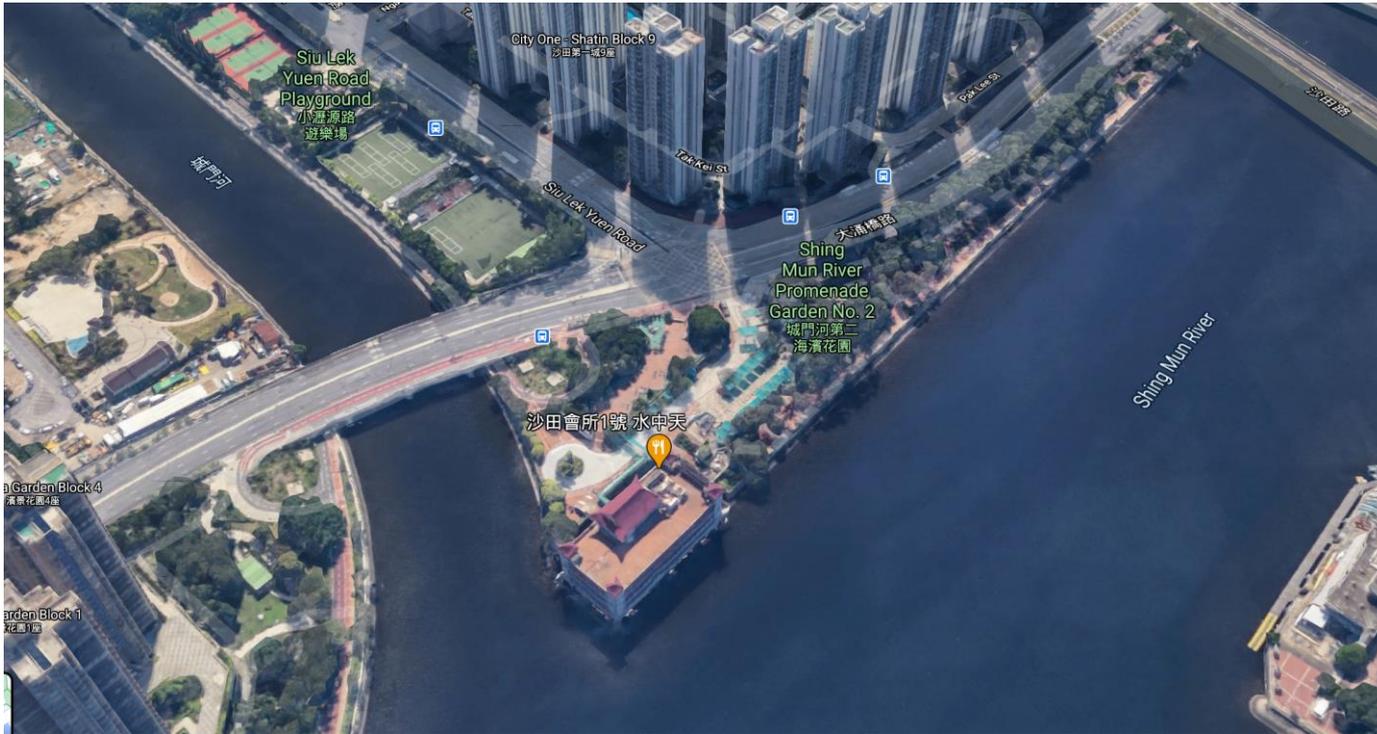


# Land Use Planning



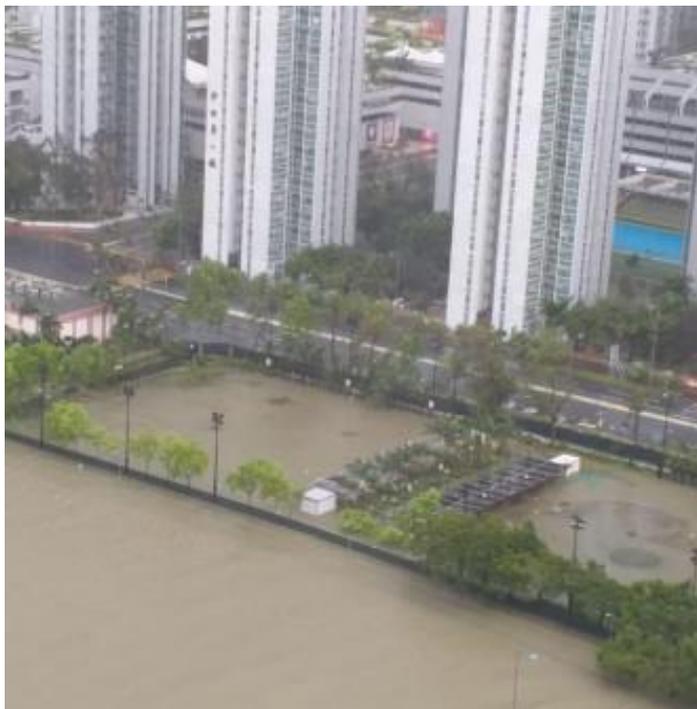
Provision of Buffer with Unstable Slope

# Land Use Planning



Drainage Buffer  
for Amenity

# Land Use Planning



Under Severe  
Storm Mangkut

# Resilient Infrastructure

Incorporate disaster-resilience in land use planning and building designs

- Material capacities to enforce hazard-resistant building standards
- Building practices regularly updated to meet international standards, e.g. steel structures in HK are designed to be resilient to disasters
- Seismic-resistance design
- Using natural ecosystem to protect against hazards
- Different designing solutions to reduce cyclone impacts



# Disaster Management

- Effective emergency response system addressing different levels of threats
- Contingency plan for natural disasters adopting a dynamic and proactive strategy which is a cycle of preparedness, response, recovery and post-disaster review

## Tier 1

Emergency Services Dept

## Tier 2

Security Bureau

## Tier 3

Chief Secretary Steering Com

## To Conclude...

- ✓ formulate planning processes
- ✓ undertake hazard assessments
- ✓ craft programs to manage urban development to be more resilient to natural hazards
- ✓ focuses on emergency response and building resilience physically

### *Looking forward:*

Continue to enhance disaster governance through encouraging cooperation between the Government and society to identify disaster risk and share information to prepare for any disasters and to build a livable and sustainable city.



***Resilience Capacity of HK is Solid and Reliable***

**Thank You!**

# Reference:

- Risks of Storm Surge & Extreme Waves in Hong Kong, Chan Sai Tick, HK Observatory (2019)
- Two Stories of Flooding in Hong Kong, Ir Raymond L H Woon, Senior Engineer, DSD (2019)
- Enhancing Coastal Protection in Hong Kong in response to Extreme Weather and Climate Change, Tang Kai yan, Alan (Chief Engineer/Port Works)
- Making Hong Kong A Resilient City: Preliminary Assessment, Timothy Sim, Wang Dongming, PolyU (2017)
- Assessing the Disaster Resilience of Megacities: The Case of Hong Kong, MDPI (2018)
- Contingency Plan For Natural Disasters (including those arising from severe weather condition) Emergency Support Unit Security Bureau Government Secretariat (2019)
- Model Code of Practice: Principles of Climate Change Adaptation for Engineers, WFEO (2015)
- Creating Hazard Resilient Communities through Land-Use Planning, Raymond J. Burby, Robert E. Deyle, David R Godschalk, Robert B. Olshansky (2000)