Flood Resilience for Cities of the Future – The Hong Kong Experience Singapore International Water Week 2022 April 2022



Sueann Lee Engineer Drainage Services Department

Annual Rainfall across Pacific Region (Unit: mm)

Beijing Seoul **600** 1300 **Tokyo 1500** Hong Kong 2400 Taipei 2100 Bangkok 1500 Manila 2200 Singapore 2200 Jakarta 1700 Sydney 1200

Vancouver 1200

San Francisco 600

Santiago 600

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Source:

http://worldweather.wmo.int/en/home.html

World Meteorological Organization: World Weather Information Service

Flooding in Hong Kong

Sheung Wan 2008



Traditional Three-pronged Approach for Stormwater Management Drainage Storage Interception Improvement Mid-stream Upstream Downstream

Interception – Hong Kong West Drainage Tunnel







Storage – Happy Valley Underground Stormwater Storage Scheme

Capacity 60,000m³ (equivalent to 24 standard swimming pools)

Underground Storage Tank

Drainage Improvement





Flooding Blackspots



Extreme Weather Events Aug 2017 HATO

Jun 2020 Hourly rainfall 139mm

Lei Yue Mun



Heng Fa Chuen

Climate Change in Hong Kong



Source: Hong Kong Observatory

Impact to Drainage System...

 Sea level rise
Impede discharge of stormwater

Heavy Rainfall

Increase loading to drainage system

Blue – Green Drainage Infrastructure



Revitalised river channel

Flood lake

Flood storage tank



Floodable area



Bleents

Green roof

Porous paving system



Bioretention system

Water harvesting

Flood Attenuation Lake Park – Anderson Road Quarry



Flood Storage Tank Tai Hang Tung Storage Scheme

Interactive Exhibition "After the Deluge"

Single Site, Multiple Use

Above ground: Recreation

Below ground: Flood storage



DSD'S ACTION FOR RAINSTORMS

Emergency Control Centre (ECC)



Hydrometric Information System (HIS)



Just-in-time Clearance



EMERGENCY PREPAREDNESS



Public Engagement Campaign



Briefing



Evacuation Plan





Emergency Drill



Emergency Action Plan

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POSSIBLE RESILIENCE MEASURES





Sand Bags

Demountable Flood Barrier

Gauging Station



Conventional gauging stations

- Requires installation of underground cable ducts which is costly and time consuming
- Installation locations limited

New sensors



- Government-wide Internet of Things Network (GWIN)
- LoRa technology enables reception in remote areas
- No additional power supply or data transmission cables required
- Light-weight and small

Smart Just-in-time- Clearance

Optimize "Just-in-time" clearance

- Strategically install sensors at flood-prone locations easily blocked by debris to monitor their conditions
- Allows DSD to strategically deploy personnel to clear blocked drains "just-in-time" before heavy rainstorms





Regional Rainfall Forecast

The Future of Flood Resilience

>Enhance capacity of drainage system Resilience from planning stage >Multi-purpose infrastructure >Achieve "Single Site, Multiple Use" > Soft Measures for Resilience >Drain SMART

