

# Flood Prevention Projects in Hong Kong as Climate Change Resilience Measures

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# Acknowledgement

- **Environment Bureau, Hong Kong Special Administrative Government**



Environment Bureau  
The Government of the Hong Kong Special Administrative Region

- **Drainage Services Department, Hong Kong Special Administrative Government**



Drainage Services  
Department

as main sources of content for this presentation

- **Hong Kong Institute of EIA**



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香港環境影響評估學會

for partial funding support for my attendance at IAIA2016

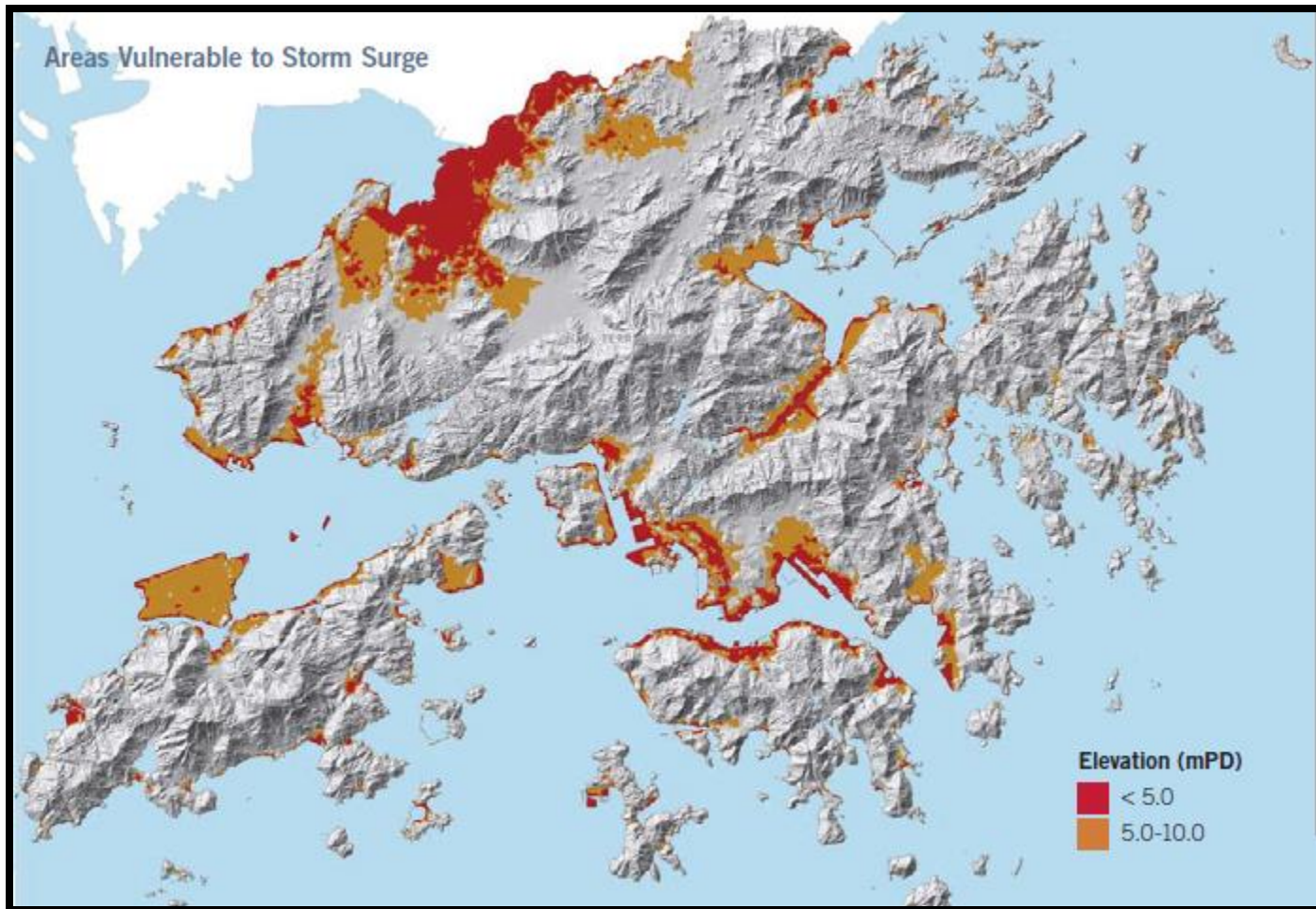
# Sources and References

- **Hong Kong West Drainage Tunnel**  
<http://www.dsd.gov.hk/others/HKWDT/eng/background.html>
- **Happy Valley Underground Storm Water Storage Scheme, Hong Kong**  
<http://hvusss.eksx.com/index.html>
- **Hong Kong Climate Change Report 2015**  
Environment Bureau in collaboration with other  
Policy Bureaux

# Hong Kong's cityscape



# Coastal areas at risk



# Flooding problems: Hong Kong Island North/West

2005 at Hillier Street



2008 at Connaught Road Central



# Flooding problems: Hong Kong Island North/Happy Valley

## Main Causes of Flooding:

- **Geographic: subtropical & oceanic; heavy rainfall especially in summer under tropical cyclone influence**
- **High annual rainfall: ~2,200mm per annum**
- **Intensive and rapid urbanization: increasing urban runoff during heavy rain**
- **Tidal influx on low lying area**
- **Aging drainage system**
- **Further exacerbation due to climate change & rising sea level**

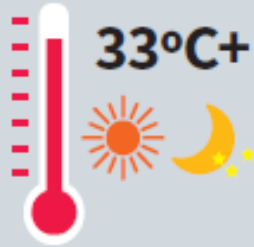


2000

n Area



# Hong Kong's Climate in 21<sup>st</sup> Century



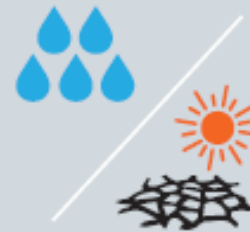
More very hot days  
and hot nights



Fewer rain days but  
average rainfall intensity  
will increase



More extreme  
rainfall events



More extremely wet years  
but risk of extremely  
dry years will remain



Global sea level rise will lead to  
coastal changes all over the world,  
including Hong Kong

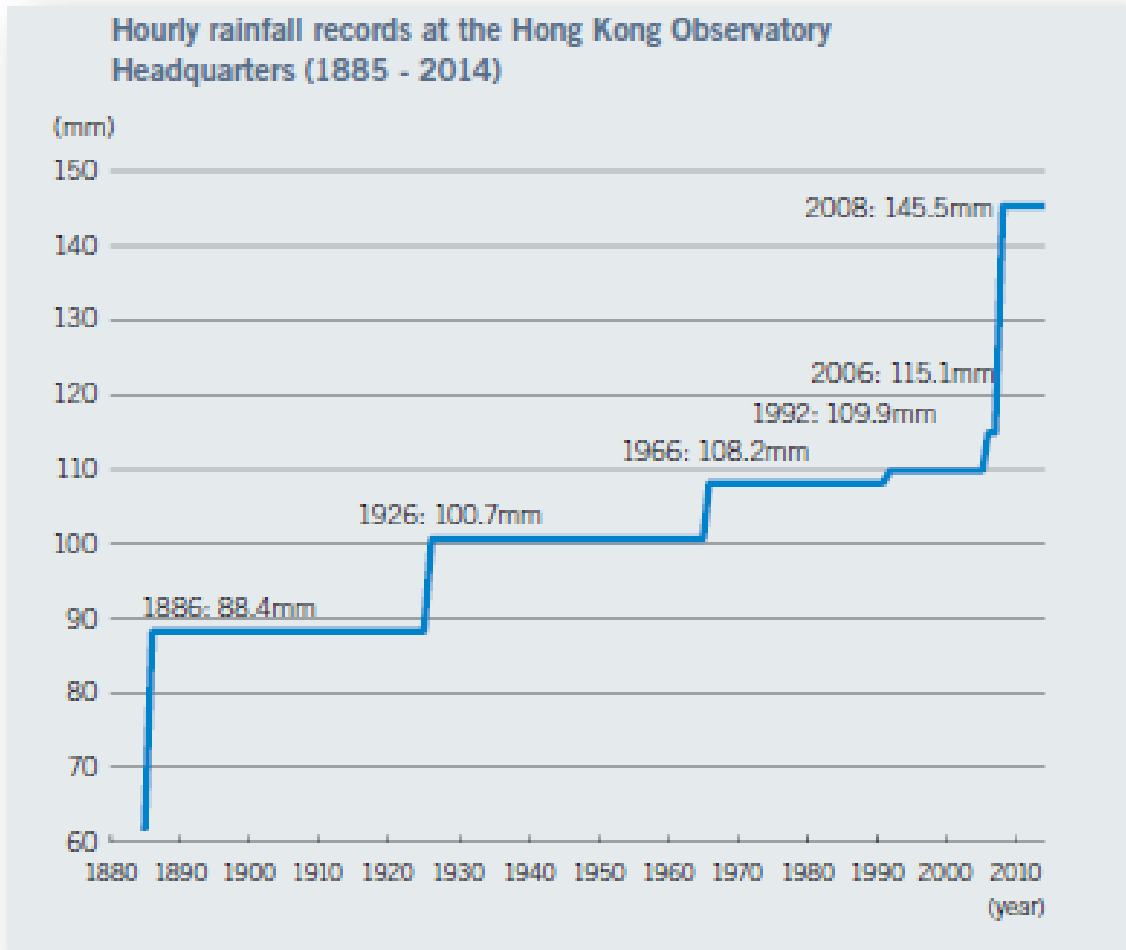


Threat of storm surges associated  
with tropical cyclones will rise

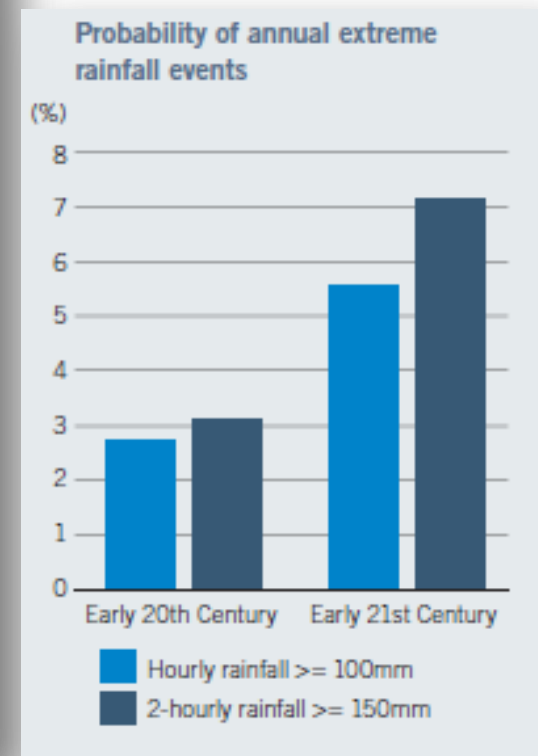


# Rainfall... wetter and more frequent extreme events

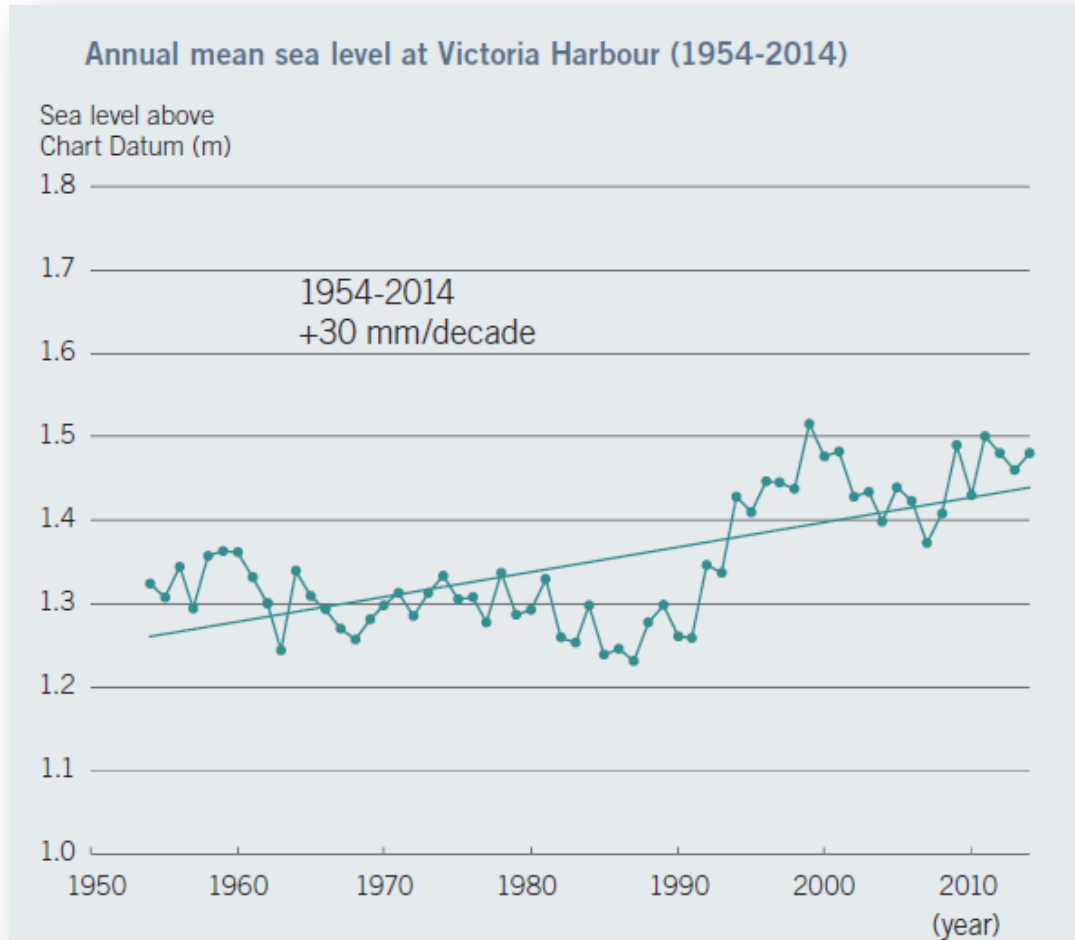
Hourly rainfall records broken much more rapidly in last 2 decades



Projected probability of extreme rainfall events more than double



# Sea level rising

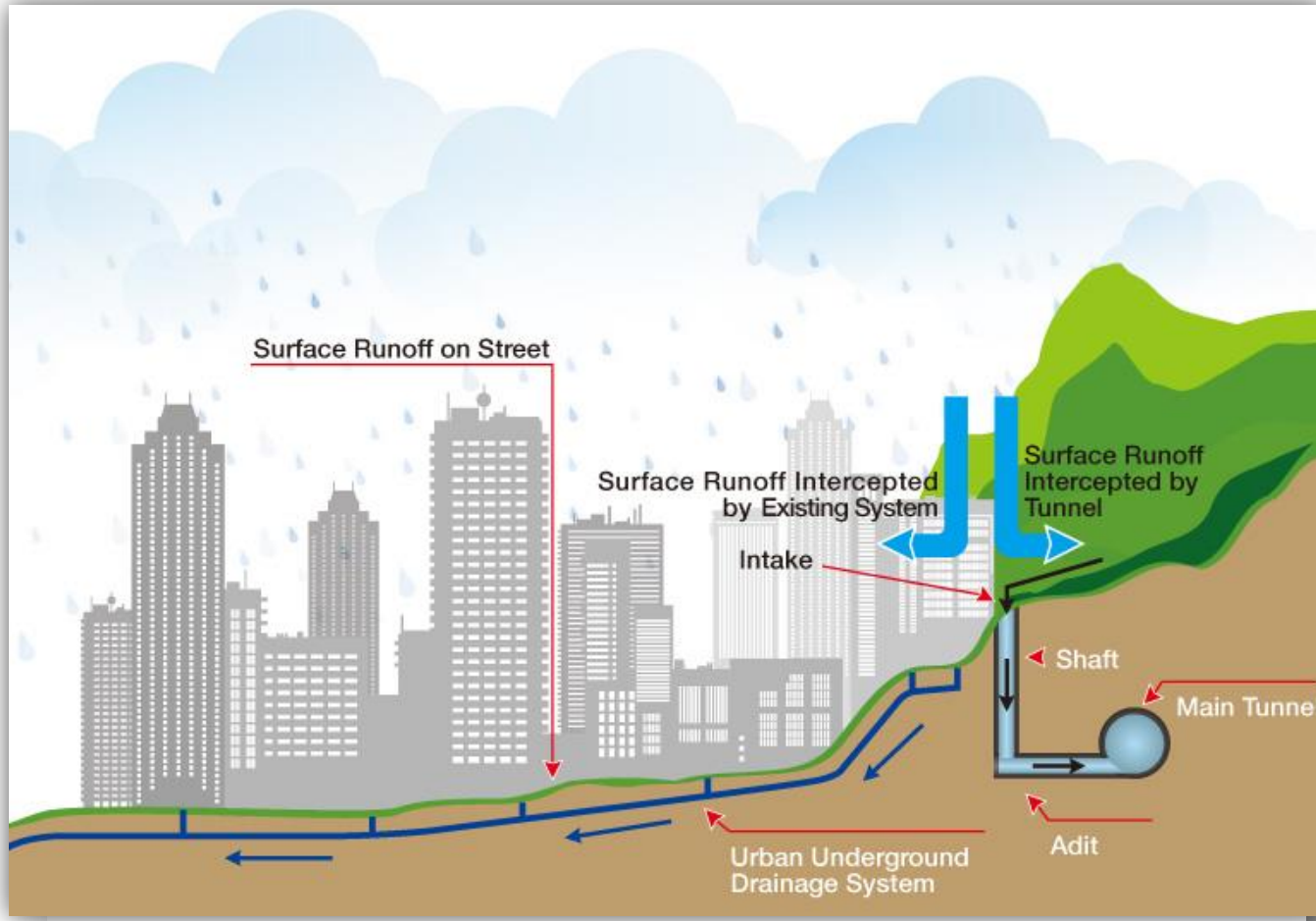


Tide gauge records in Victoria Harbor since 1954 show an unambiguous rise of mean sea level +30 mm/decade

# Some completed flood protection projects



# Hong Kong West Drainage Tunnel intake locations




# Hong Kong West Drainage Tunnel Construction

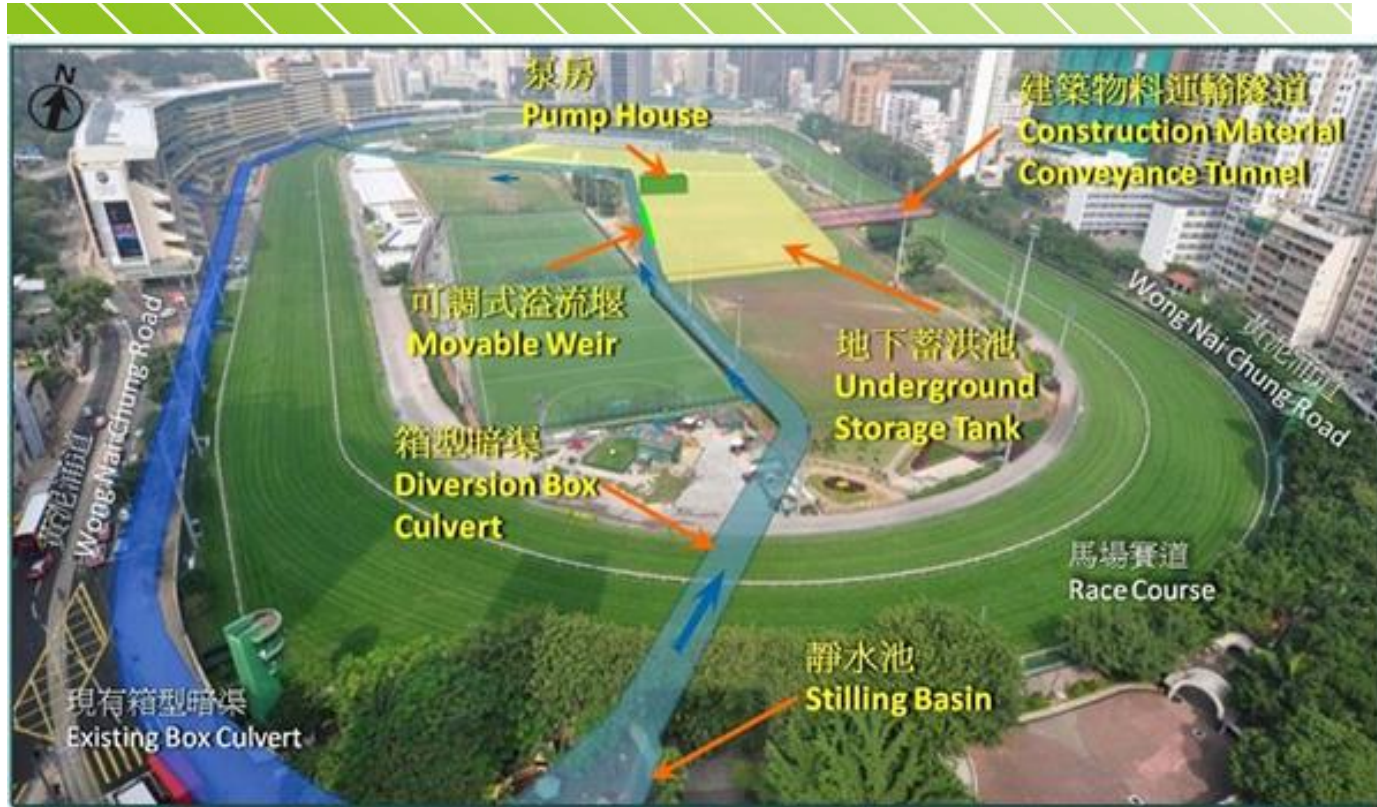


**Aim: 34 intakes intercept surface runoff via drop shaft, adits and the main tunnel to sea**

## **Benefits of Tunnel Boring:**

- **Tunnel excavation and Intake construction done underground by Tunnel Boring Machines and Raise Boring Machine**
  - **Approach to effectively minimize dust and noise pollution, and reduce construction period**
  - **Method also reduces disruption to traffic along roads by cut and cover method**
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# Happy Valley Underground Storm Water Storage Scheme



Flood Prevention Schemes

# Happy Valley Underground Storm Water Storage Scheme July 2015 status



# Happy Valley Underground Storm Water Storage Scheme...special features



The movable weirs in operation



# Happy Valley Underground Storm Water Storage Scheme...project details



**LOCATION:**

Happy Valley, Wan Chai, Hong Kong

**VALUE:**

HK\$678 million (£53 million)

**START-FINISH:**

2012 - 2018

**EMPLOYER:**

Drainage Services Department, the Government of the Hong Kong Special Administrative Region

**CONTRACTOR:**

Chun Wo Construction & Engineering Co., Ltd

**PROJECT MANAGER:**

Chief Engineer/Drainage Projects, Drainage Services Department

# Happy Valley Underground Storm Water Storage Scheme...mitigation measures (1)



Fencing and notice erected around trees

# Happy Valley Underground Storm Water Storage Scheme...mitigation measures (2)



# Happy Valley Underground Storm Water Storage Scheme...mitigation measures (3)



# Happy Valley Underground Storm Water Storage Scheme...mitigation measures (4)



Conducting noise monitoring



Pest control: anti-mosquito spray

# Awards: HVUSSS...April 2015



The Drainage Services Department (DSD)'s Happy Valley Underground Stormwater Storage Scheme (HVUSSS) received the Highly Commended New Engineering Contract Large Project of the Year 2015 award at a prize presentation ceremony held in London, the United Kingdom. Photo shows the Deputy Director of Drainage Services, Mr Mak Ka-wai (right), receiving the award on behalf of the DSD at the prize presentation ceremony held on 20 April.

# Experience Sharing: Tai Hang Tung Storage



A delegation from the Ningbo Municipal Flood Control and Drought Relief Office visited the Tai Hang Tung Underground Storm water Storage Tank in March 2013

# Experience Sharing: HVUSSS



Group photo of the Minister of Water Resources of the People's Republic of China, Mr Chen Lei (3<sup>rd</sup> right), the Governor of Guangdong Province, Mr Zhu Xiaodan (2<sup>nd</sup> left), the Permanent Secretary for Development (Works), Mr Hon Chi-keung (2<sup>nd</sup> left), the Director of Water Supplies, Mr Enoch Lam Tin-sing (1<sup>st</sup> left) and Senior Engineer of Drainage Services Department, Ms Ellen Cheng Nga-see (1<sup>st</sup> right)...May 2015



# Thank you!

Comments?

Questions?

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