Overview of Drainage Master Planning in Hong Kong

August 2013

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Special Administrative Region of China

Area ≈ 1100 km²

Population_{2010} ≈ 7M

Climate:
- Sub-tropical
- Wet Season: April-Sept
- Mean Annual Rainfall ≈ 2,380mm
- Rainfall Depth_{(100-year, 24-hour)} = 565mm
Typical nullah drainage in Hong Kong
Causes of flooding problems in HK

Usual suspects
- Intense rainfall
- Storm surge

Old Urban Districts
- Insufficient drainage capacity
- Dense land development

New Territories
- Low lying areas:
  - Wide floodplain
  - Urbanisation in floodplain
DSD Objectives

Resolve flooding problems

Flood protection level to meet societal expectation
  • 200 year flood protection in urban areas
  • Environmentally sensitive

Allow future development
**Territorial Land Drainage & Flood Control Strategy Study (TELADFLOCOSS)**

- **TEL-1 (1988-1990)**
  - Flood Control Policies & Measures
  - Legislation/ Ordinances : Passed in 1990
  - 5 Basin in NNT
  - Basin Management Policies
  - Structural / Non-structural Measures
- **TEL-3 (1995-1997)**
  - Sedimentation Study
  - Channel sedimentation modelling
  - Channel maintenance strategy
### Milestones in flood control (2/2)

#### Drainage Master Plan Studies (1996-2004)
- Yuen Long, Kam Tin, Ngau Tam Mei & Tin Shui Wai
- Northern Hong Kong Island
- Tsuen Wan, Kwai Chung & Tsing Yi
- Tuen Mun & Sham Tseng
- Northern New Territories
- Sha Tin & Tai Po
- Sai Kung, East Kowloon & Southern Lantau
- Southern Hong Kong Island

#### DMP Implementation Works (1998-2007)
- Same 8 catchments

#### Drainage Master Plan Reviews (2008-ongoing)
- Same 8 catchments
DMP Catchments

Drainage Master Plan Areas

1. Yuen Long, Kam Tin, Ngau Tam Mei & Tin Shui Wai
2. Northern Hong Kong Island
3. Tsuen Wan, Kwai Chung & Tsing Yi
4. Tuen Mun, Sham Tseng
5. Northern New Territories
6. Sha Tin & Tai Po
7. Sai Kung, East Kowloon & Southern Lantau
8. Southern Hong Kong Island

Source: DSD via AECOM(HK)
### Hydraulic models: then and now

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## Linking hydraulic models: then and now

|------------------|-----------------------------|
| • HydroWorks + MIKE11  
• Manual linkage | • InfoWorks-ICM  
• Automated |

- **Q(t) as u/s BC for M11 → H(t)**
- **H(t) as d/s BC for HW → Q(t)**
Overland flow: then and now

DMP (1996-2004):
- InfoWorks-CS with 1D schematisation of overland flow

DMP Review (2010):
- InfoWorks-ICM with 2D representation of overland flow

Why?
More realistic representation of above ground storage and conveyance
Hydrological models: then and now

DMPs (1996-2004)
- Lumped hydrology (traditional approach)

DMP Review (2013 for Sai Kung)
- 2D distributed hydrology (Pilot study)
  - Rainfall directly on 2D catchment surface
  - Distributed rainfall losses
  - Better reproduction of various response times within the catchment
  - Better reproduction of faster response with more extreme rainfall
  - Better spatial representation of within-catchment flooding
Wastewater models: then and now

Sewerage Master Plans (SMPs)

1980s: WALLRUS & SPIDA

1990s: SPIDA & HydroWorks

2000s: InfoWorks-CS

2010s: InfoWorks-CS & InfoWorks-ICM
Conclusions

Hydraulic modelling software
- Continually being improved

Stormwater in HK
- InfoWorks-ICM well-suited to Hong Kong conditions of
  - Closed conduits linked with non-prismatic open channels
  - Complex overland flow

Wastewater in HK
- InfoWorks-ICM (or its predecessor) the only model used

Which hydraulic modelling software
- Maintain into future ($ & quality)
- What do their consultants possess ($$)
- What are their consultants fully trained in (quality)
Thank you

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