

HATS Stage 2A - Having a finger in every pie of it

HKIE-YMC Technical Seminar
31 March 2017
Ir Harry Lee
harry.lee@member.hkie.org.hk

1

香 Hong = Fragrant
港 Kong = Harbour



2

Agenda

Introduction

Experience in Project Delivery
Stories and Achievements

HATS

- HATS = Harbour Area Treatment Scheme
- 2-stage project
- improve the water quality of Victoria Harbour
- originated from SSS (Sewage Strategy Study)
- [formerly SSDS (Strategic Sewage Disposal Scheme)]



Drainage
Services
Department
(DSD)



Environmental
Protection
Department
(EPD)

HATS Timeline



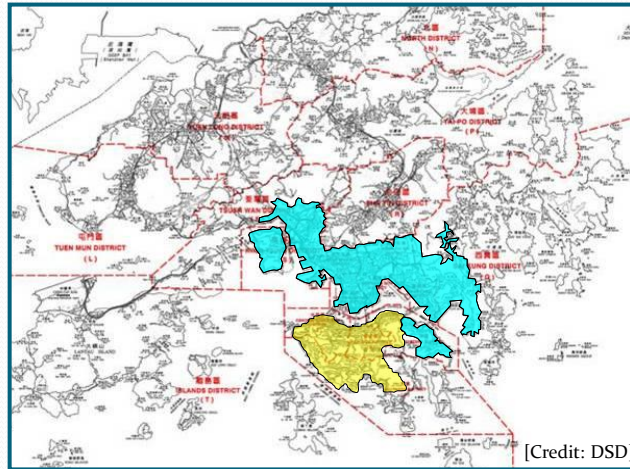
5

HATS Components

- 16 Preliminary Treatment Works (PTWs)
- 44 km deep sewage tunnel
- Stonecutters Island Sewage Treatment Works (SCISTW)
 - 10.6ha | 2.45Mm³/day ADWF | serving 5.7M people
 - chemically-enhanced primary treatment (CEPT)
 - disinfection
 - [sludge cake delivery to sludge treatment facility, STF (now named "T-Park")]
- 1.8km offshore marine outfall

6

HATS Catchment



Stage 1 catchment

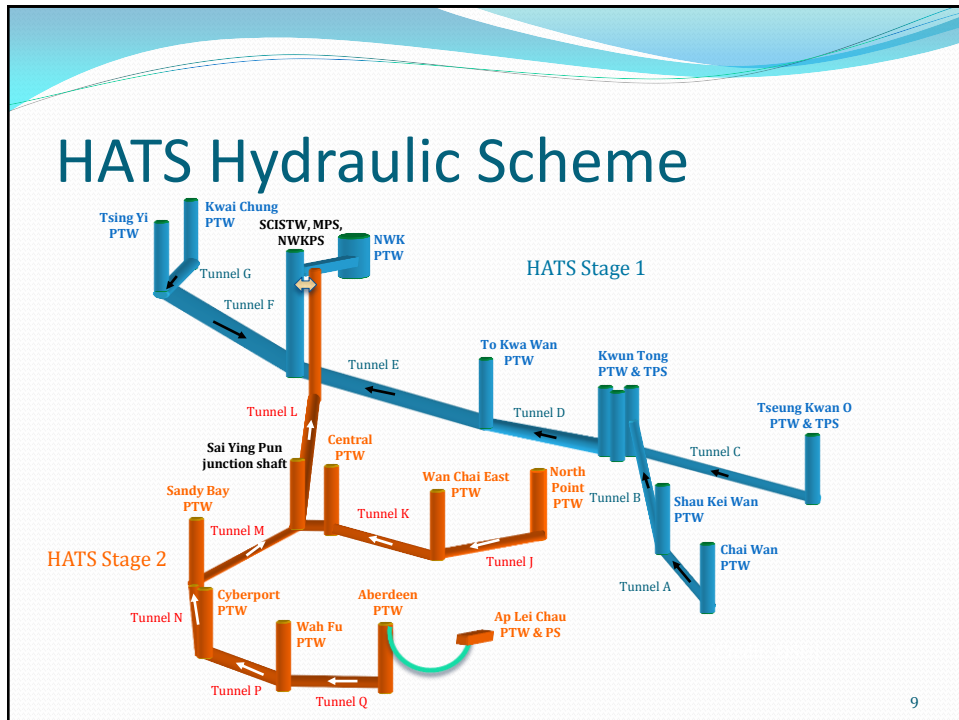
Stage 2 catchment

7

HATS Layout (Stages 1 & 2A)



8



Agenda

Introduction

Experience in Project Delivery

Stories and Achievements

Before Stage 2A of HATS



[Credit: DSD]

11

Involvement in HATS

- DSD Agreement No. CE 8/2006 (DS)
 - HATS Stage 2A upgrading works – investigation, design and construction (IDC) assignment
- role?
 - project coordinator
- why?
 - significant (positive) impact
 - high-profile
 - world-class
 - once-in-a-lifetime

12

Stonecutters Island Sewage Treatment Works (SCISTW) in 2008



13

“Finger in Every Pie of It”

- flow & load projections
- environmental
- planning statement for S16 application
- preliminary design, design memorandum
- value management, risk management
- ...
- coordinate among disciplines / functions

14

Stonecutters Island Sewage Treatment Works (SCISTW)

My major responsibility:
upgrading layout



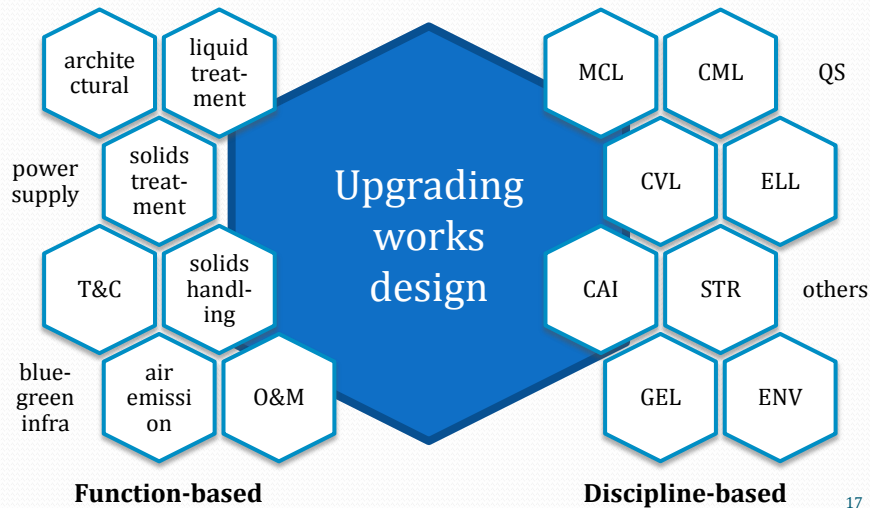
15

Upgrading Works Components

- new main pumping station including control centre
- new sedimentation capacity
- replacement sludge dewatering and sludge cake silos
- new sludge disposal arrangement
- new odour control
- new effluent conveyance (tunnel)
- new disinfection facility

16

Putting Pieces Together



17

Challenges of Upgrading Works



Challenge 1

- uninterrupted operation



Challenge 2

- interfaces



Challenge 3

- programme and constructability

18

Challenge 1

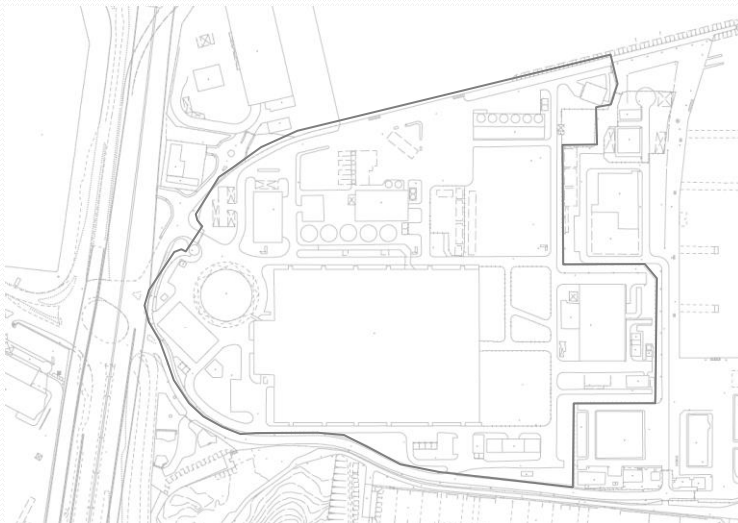
– Uninterrupted Operation



19

Challenge 1

– Uninterrupted Operation

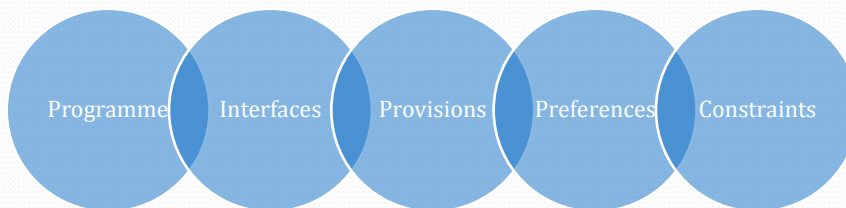


20

Challenge 2

– Design Coordination

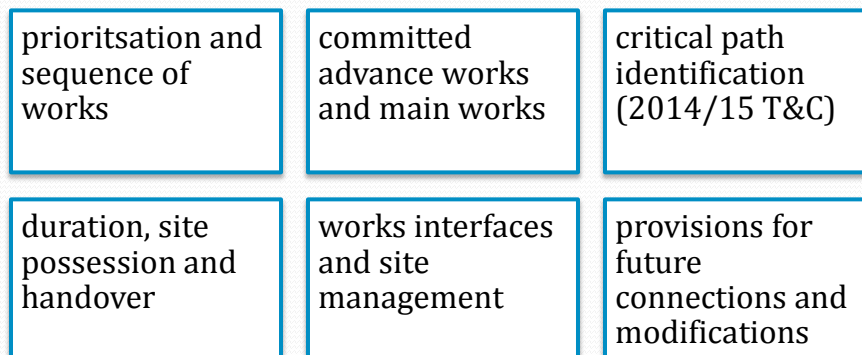
- within upgrading works project team
- with sewage conveyance system project team
- with HATS Stage 2B planning study team
- with DSD operators
- with EPD



21

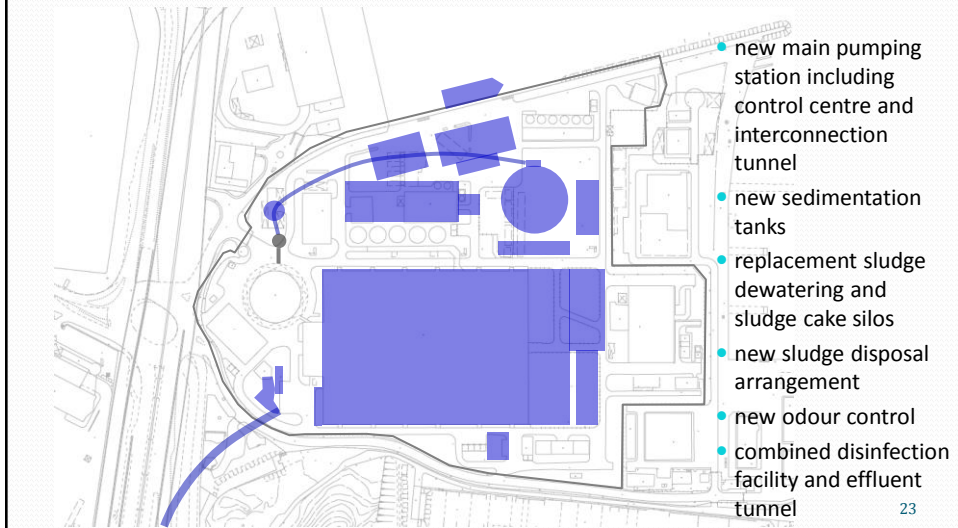
Challenge 3

– Programme & Constructability



22

Upgrading Layout - Solution



Upgrading Layout - Solution



25

As a Result...

- pave way for
 - contract scope, packaging
 - tendering programme
 - market sounding
 - cost estimates, departmental vetting
 - funding approval
 - adequate competition in tendering processes
- and constructed as planned

26





SCISTW

Stonecutters Island
Main Pumping
Station 2
(SCIMPS2)



SCISTW

Motor Hall (G/F)
@ SCIMPS2



31

SCISTW

New Control Room
@ SCIMPS2



32

SCISTW

Existing
Chemically-
Enhanced Primary
Treatment (CEPT)
tanks with sliding
covers



33

SCISTW

New Rapid Mixing
and Flocculation
(RMF) tanks and
New CEPT tanks



34

SCISTW

Sodium
Hypochlorite
(NaOCl) Storage
Tanks - Advance
Disinfection
Facility (ADF) and
Final Disinfection
Facility (FDF)



35

SCISTW

One of the
Deodourisation
Units (Biotrickling
Filter)



36

SCISTW

New Sludge
Storage Tanks



37

SCISTW

Sludge Dewatering
Facilities (SDF)
Building



38

SCISTW

Centrifuges within
SDF Building



39

SCISTW

Sludge Cake Silos



40

SCISTW

Unloading from
Sludge Cake Silo
into Container



41

SCISTW

Loading Operation
of Sludge
Containers



42

SCISTW

Clean Harbour 1
(淨港一號)



43

Agenda

Introduction

Experience in Project Delivery

Stories and Achievements

Fast Start, Continuous Learning



45

More than Engineering

- briefing to Directorates
- planning statement
- land requirements
- publicity materials
- consult and brief the District Councils (DC) members
 - Sham Shui Po
 - Tsuen Wan
 - Kwai Tsing

46

Riding through the IDC Assignment

- 2008-2016
- countless working/progress meetings and sessions
- monthly progress reports: 100+
- ...
- still, only a tiny part of the HATS project

47

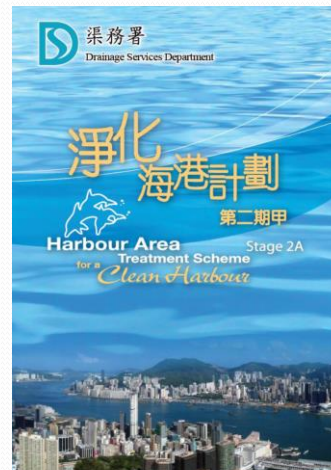
Design Development (and R&D)

- Infoworks CS model (hydraulic design)
- integrating 2D and 3D process/hydraulic models for CEPT
- physical model of SCIMPS2 and ICT (@HKU)
- disinfection R&D studies (HKUST)
- green and sustainable features (on-site trials)

48

Fact-check

- one of the top 10 largest sewage treatment works in the world?
- pumping station capacity? dimensions?
- population served?
- unique features?
- first-of-its-kind?
- see this booklet [[link](#)]



[Credit: DSD]

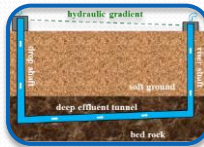
49

Conferences, Papers and Visits

- re-visit and showcase designs
- in-house forum and experience-sharing
- technical seminars and visits
- local and overseas conferences
- journal articles and manuscripts
 - 2011.09 Hong Kong Engineer (cover story)
 - 2015.04 Water21 (cover story) [legacy magazine of IWA]
 - 2015.12 Nikkei Architecture [[link](#)]
 - 2016.09 Proceedings of ICE - Civil Engineering [[abstract](#)]

50

Conferences, Papers and Visits



51

Project Interview

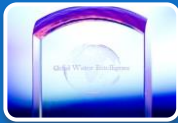
[Credit: HKIE, [Link](#)]

52

Recognitions and Awards



Hong Kong People Engineering Wonders
in the 21st Century, HKIE, 2013



Global Water Awards (GWA) 2016 –
Wastewater Project of the Year
(Distinction)



British Construction Industry
Association (BCIA) 2016 – International
Project of the Year (Highly commended)

53

Milestones and Ceremonies

- 2011.11 TBM launching
- 2014.06 SCIMPS2 topping-out
- 2015.03 Maiden voyage of Clean Harbour 1 and 2
- 2015.09 Flow-turning
- 2015.12 Grand ceremony



54

What I've Learnt

oversee multi-disciplinary works

a living plant - ever-evolving sewage services

design and O&M - equally important

resolve difficulties together

provisions for the future

55

Achievement of HATS Stage 2A

- on time
- within budget
- welcomed by public
- quality design and work
- satisfy the project objectives

- proud to be involved in designing the core component (SCISTW) and coordinating with different parties in this project for...

56

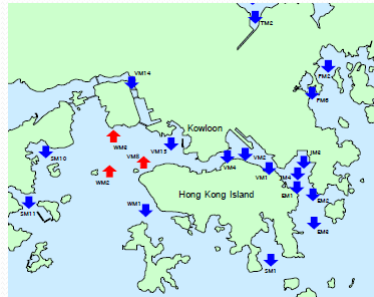
Marine Water Quality Improvement

**Long-term Trend of
E. Coli (1986-2008)**



[Credit: EPD]

**Long-term Trend of
E. Coli (1986-2015)**



57

Marine Water Quality Improvement

**Long-term Trend of
DO (1986-2008)**



[Credit: EPD]

**Long-term Trend of
DO (1986-2015)**



58

Marine Water Quality Improvement

Long-term Trend of BOD₅ (1986-2008)



[Credit: EPD]

Long-term Trend of BOD₅ (1986-2015)



59

Re-opening of Gazetted Beaches

Beach Water Quality in Hong Kong 2008



[Credit: EPD]

Beach Water Quality in Hong Kong 2015



60

Cross Harbour Swimming

1967



[Credit: wikiwand]

2011



[Credit: EPD]

61

Water Sporting & Recreation

- Harbour Regatta 維港賽艇賽
 - 相隔60載，賽艇比賽再次在**香港極具標誌性的維多利亞港**進行。首屆維港賽艇賽周六（3月11日）舉行。
 - 香港正申辦成為**2019世界海岸賽艇錦標賽**的舉辦城市。
 - 若成功申辦，**香港這片美麗的海港**亦會用作比賽場地，成為世界上最繁盛的水上運動城市之一。



[Credit: www.hkharbourregatta.com]

62

2008/09

My son and I




63

2015/16

In front of my work
at SCISTW



64



Engineer a better Hong Kong
Cleaner Victoria Harbour

- for ourselves
- for our environment
- for our future generations

65

Thanks for your attention
Any questions?