



渠務署

Drainage Services Department



» 跑馬地

地下蓄洪計劃

Happy Valley

Underground Stormwater Storage Scheme



跑馬地地下蓄洪計劃是渠務署一項主要防洪工程，其蓄洪量達60,000立方米，旨在紓緩跑馬地及灣仔一帶的水浸風險。

The Happy Valley Underground Stormwater Storage Scheme (HVUSSS) is a key flood prevention project of the Drainage Services Department (DSD). With a storage capacity of 60,000m³, the HVUSSS aims at relieving the flooding risks in the Happy Valley and Wan Chai areas.

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工程背景 Project Background

在2000年8月、2006年4月和2008年6月，灣仔及跑馬地一帶區域，包括成和道、黃泥涌道、摩利臣山道、立德里、跑馬地馬場和跑馬地遊樂場等，在暴雨時出現嚴重水浸。

像灣仔這樣交通繁忙和人口稠密的地區，要以傳統方案提升防洪能力，需大規模加建或擴大地下排水系統，並涉及大量開路工程，對公眾及商業活動造成滋擾，而密集的地下公用設施亦會影響傳統方案的可行性。

地下蓄洪池可於暴雨期間暫存流進上游排水系統的部分雨水，從而減低洪峰流量，不致超越下游市區排水管道的排洪能力，大大減低灣仔及跑馬地低窪地區的水浸風險。

暴雨過後，暫存在蓄洪池內的雨水會再經由下游市區的排水系統排放。



In August 2000, April 2006 and June 2008, severe flooding occurred during heavy rainstorms in Wan Chai, Happy Valley and its adjacent areas including Sing Woo Road, Wong Nai Chung Road, Morrison Hill Road, Lap Tak Lane, Happy Valley Racecourse and Happy Valley Recreation Ground.

In such busy and densely populated areas as Wan Chai, conventional drainage improvement schemes would require extensive upsizing of existing drains or laying of new drains, which will involve extensive road opening works, leading to disruption to the public and commercial activities. Congested underground utilities will also jeopardize the viability of the schemes.

An underground flood storage tank will serve to temporarily store part of the stormwater entering the upstream drainage system, thereby attenuating

the peak flow and keeping the flow to downstream within the drainage capacity and greatly reducing the risk of flooding to low-lying areas like Happy Valley.

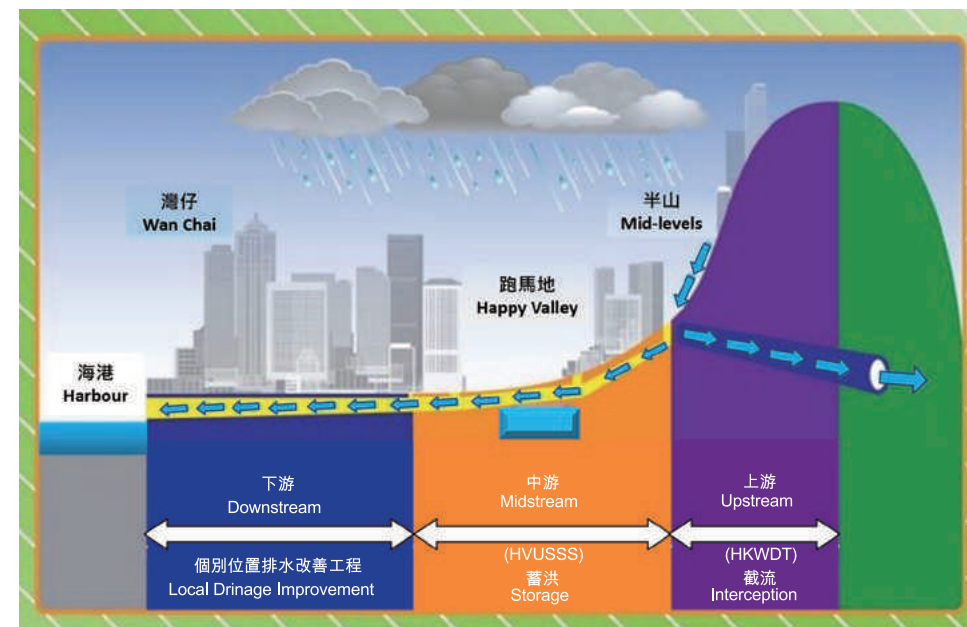
After heavy rain, the temporarily stored stormwater will be discharged back into the downstream drainage system.

渠務署防洪三招 DSD's Three-pronged Approach in Flood Protection



防洪三招：
The Three-pronged Approach in flood protection:

- 1 上游：截流 - 港島西雨水排放隧道
Upstream: Interception - Hong Kong West Drainage Tunnel (HKWDT)
- 2 中游：蓄洪 - 跑馬地地下蓄洪池
Midstream: Storage - HVUSSS
- 3 下游：個別位置排水改善工程
Downstream: Local Drainage Improvement



工程範圍 Project Scope

- 地下蓄洪池 Underground Stormwater Storage Tank
容量6萬立方米，相等於24個奧運標準游泳池
Storage capacity of 60,000 m³, equivalent to 24 Olympic-size swimming pools
- 泵房 Pump House
最高排洪量每秒1.5立方米
Peak discharge capacity 1.5 m³/s
- 雙管道箱形暗渠 Twin-cell Box Culvert
長約650米，每管道內缸高2米、闊4米
Approximately 650m long, internal cell dimensions 2m (H) x 4m(W)
- 球場草坪復修及園藝工程
Re-provision of Sports Pitches and Landscaping Works

工程合約編號 Contract No.	DC/2012/03
核准工程預算 Approved Project Estimate	港幣 10 億 6,580 萬元 HK\$ 1,065.8 million
總承建商 Main Contractor	俊和建築工程有限公司 Chun Wo Construction and Engineering Company Limited

時間表 Timeline



第一期工程 Phase 1 Works

2012年9月至 2015年3月 September 2012 to March 2015

第一期地下蓄洪池、雙管道箱形暗渠、靜水池、泵房、風扇房以及為三個球場重鋪草坪。

Phase 1 Underground Stormwater Storage Tank, Twin-cell Box Culvert, Stilling Basin, Pump House, Fan Room and returfing for 3 sport pitches.



第二期工程 Phase 2 Works

2015年4月至2017年10月 April 2015 to October 2017

第二期地下蓄洪池、泵房上蓋綠化工程、風扇房外牆工程以及為兩個球場重鋪草坪。

Phase 2 Underground Stormwater Storage Tank, greenery works at Pump House, exterior works at Fan Room and returfing for 2 sport pitches.

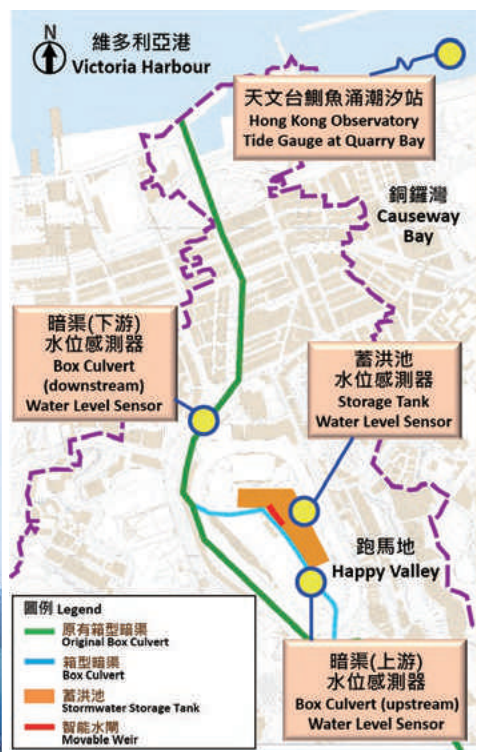


創新措施 Innovative Features

可調式溢流堰 (智能水閘) Movable Weir

跑馬地地下蓄洪計劃是香港首個結合「可調式溢流堰」及「數據採集與監控」系統的蓄洪設施，其設計可有效降低建築成本和時間，及節省操作耗能，防洪與環保並重。

The HVUSSS is Hong Kong's first flood storage tank provided with a "Movable Crest Weir" that works in connection with a "Supervisory Control and Data Acquisition" (SCADA) system. This design effectively lowers construction cost and time, as well as operation power consumption, addressing flood prevention and environmental initiatives in tandem.



設計及操作

透過「數據採集與監控」系統實時監察潮水和蓄洪池內及其上下游箱形暗渠裏的水位，自動控制溢流堰升降，令蓄洪池能在最適當時間啟動儲存上游集水區的部分雨水。

對比傳統固定式溢流堰，這個設計可避免暗渠過早或過晚溢流到蓄洪池，確保蓄洪池發揮最大功能，藉此亦減少蓄洪池所需的設計容量。

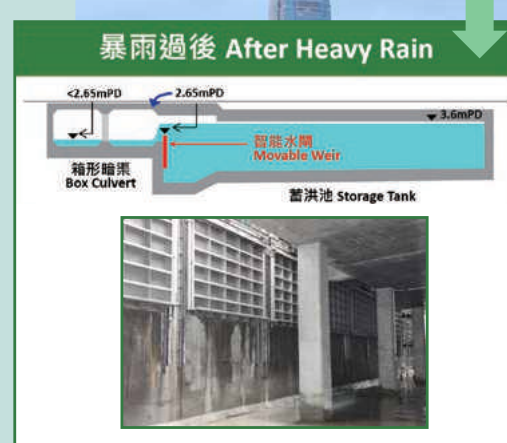
此外，蓄洪池採用了淺缸設計，暴雨過後，隨着下游暗渠水位下降，「可調式溢流堰」可進一步開啟，讓蓄洪池內逾三分之一的雨水能自然回流往暗渠排放，減少以水泵抽排的需要。

Design and Operation

Through the SCADA system, the positioning of the movable weir is controlled based on the real-time tidal and water levels inside the tank, and upstream and downstream of it in the box culvert. This allows overflowing of stormwater from the box culvert to the tank to be invoked at the most optimal time.

Compared to the conventional fixed-weir design, the real-time SCADA-controlled movable weir prevents pre-mature or belated filling of the tank, thereby maximizing the effectiveness of the storage capacity and allowing a smaller design tank volume.

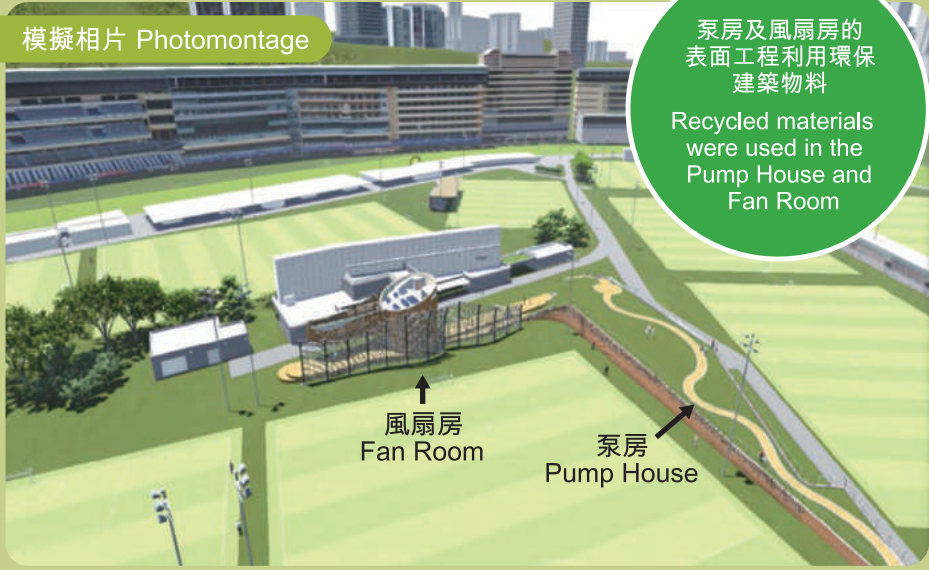
Furthermore, the tank is of a shallow-depth design. After heavy rain, as water level in the downstream box culvert subsides, the movable weir can be lowered further to allow about one-third of the stored stormwater to be discharged by gravity back to the box culvert, reducing the need for pumping.



可持續發展設計概念 Sustainable Design Concept



模擬相片 Photomontage



泵房及風扇房的
表面工程利用環保
建築物料

Recycled materials
were used in the
Pump House and
Fan Room

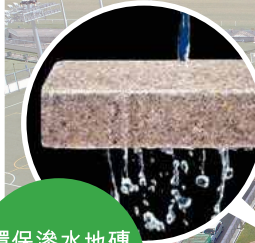
風扇房
Fan Room

泵房
Pump House

泵房 Pump House

在泵房上鋪設一個小山坡，並蓋以柔軟的真草，既為泵房隔熱，亦為公眾提供一個舒適寧靜的休閒空間，及作為欣賞跑馬地運動場內遼闊景觀的瞭望台。

A turfed slope is built on top of the Pump House, which does not only help reduce indoor temperature, but also provides a serene public space as well as an open air vantage point of the Happy Valley Recreation Ground.



環保滲水地磚
Porous Paving
Block



風扇房 Fan Room

風扇房的外牆裝飾木有助增加建築物的美感，旁邊設有休憩用地，供公眾使用。

Timber cladding mounts on the Fan Room adds to the building aesthetics. An out-door sitting area is provided for public to relax.

太陽能板
Solar Panels

有效節省
40%能源消耗
Effectively reduces
energy consumption
by 40%.

風扇房
Fan House

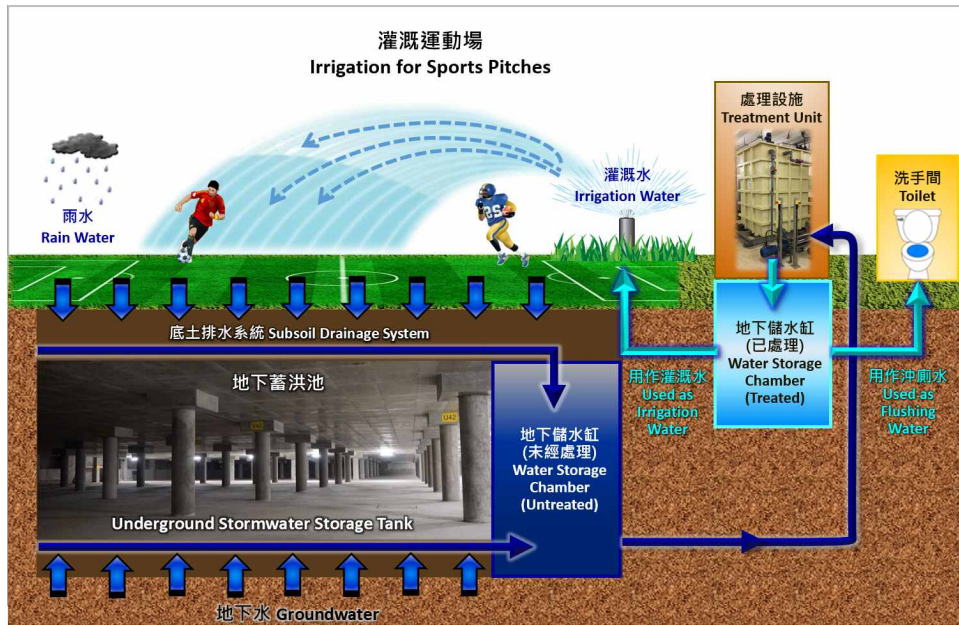
水資源採集及回用系統 Water Harvesting System



跑馬地地下蓄洪計劃的設計，提供了具備可持續發展意念的水資源契機：

The HVUSSS project fosters an opportunity for the development of sustainable sources of water supply:

- 1 收集地下水及運動場的灌溉水和雨水
Collection of groundwater under the storage tank, irrigation water and rainwater beneath sport pitches
- 2 經由地下排水管道輸送到淨化系統作適當處理
Conveyance through underground pipes to treatment unit
- 3 澆灌蓄洪池上的跑馬地運動場及用於場內的沖廁系統
Reuse as irrigation water at sport pitches and flushing water in toilets in the Happy Valley Recreation Ground



水量 Water Quantity

系統設計量
System Design Capacity:
每星期平均4,200立方米
4,200 m³ per week on average

非飲用用途
Non-potable Usage:
a) 為11個運動場的草皮澆水
Turf irrigation for 11 sports pitches
b) 沖廁用水 Toilet Flushing

水源 Sources:
a) 地下水 Ground Water
b) 灌溉水 Irrigation Water
c) 雨水 Rain Water

水質 Water Quality

主要參數 Key Parameter	單位 Unit	水質標準 Water Quality Standards
埃希氏大腸桿菌 E. Coli	菌落數/100毫升 No./100ml	不能被檢測 Non-detectable
* 氯氣殘留總量 Total Residual Chlorine	毫克/公升 mg/l	排出系統時>1；用家使用時>0.2 > 1 out of treatment system; > 0.2 at user end
總懸浮固體 Total Suspended Solids (TSS)	毫克/公升 mg/l	≤ 5



* 氯氣標準是參照水務署重用洗盥污水及集蓄的雨水技術規格 (第一版)
The chlorine standard is based on Water Supplies Departments Technical Specifications on Grey Water Reuse and Rainwater Harvesting (1st Ed)

» 新工程合約 New Engineering Contract (NEC)

跑馬地地下蓄洪計劃採用「新工程合約」模式進行，在此模式下，工程管理部門和承建商會在互助互信的基礎上，以伙伴關係合作，共同推動工程進展，及早預視與解決可能發生的問題，從而減少或避免不必要的工程糾紛和延誤，並更有效控制工程成本。

The HVUSSS adopts the "New Engineering Contract" (NEC) form of contract. Under the NEC, the project management office and the contractor foster a relationship through partnering mutual trust and co-operation. On this basis, the parties collaborate closely to foresee and early resolve potential problems, thereby minimizing disputes and avoiding delay and effectively enhancing project cost control.

「新工程合約」的優點 Merits of the NEC

團隊精神和共同目標
Team spirit and goal alignment

減少工程超支與
工程延誤風險
Reducing the risks of
cost and time overrun

盈虧與共
提升經濟效益
Pain-gain share
mechanism to enhance
cost effectiveness

「新工程合約」特點 Features of NEC



互信與合作
Mutual Trust &
Cooperation



風險管理
Risk Management



及早化解問題
Early Problem
Resolution



適時回應
Timely Reply



分包管理
Subcontracting
Management

本工程團隊以「一個團隊、一個目標」為方針，在施工期、工程費用、質量、安全及環境保護等主要範疇定下一致目標和工作方向，並舉辦「知己知彼」工作坊，協助各方了解彼此的關注，共同克服工程期間的挑戰。

The project team adopts the "One Team, One Goal" approach to establish common objectives and targets in all the key aspects of construction time, costs, quality, safety, environmental protection, etc. The "Knowing me, Knowing You" workshops were also held to help the parties understand each other's concerns and jointly overcome challenges in delivering the project.



》社區關係 Community Relations

持份者工作坊
Stakeholders Workshop



快活谷草上嘉年華
Happy Valley Green Caival



社區清潔日
Community Cleanliness Day



接待到訪團體
Visits by various organizations



與灣仔區議會緊密聯繫
Close communication with Wan Chai District Council



與公眾建立友好關係
Foster good relationships with the public



收集公眾意見，以優化施工安排
Collecting public feedback to enhance works arrangement



鼓勵 · 認同 Recognition

2017



2017年優質公務員獎勵計劃
隊伍獎 (專門服務) - 金獎
部門合作獎 - 優異獎

Civil Service Outstanding Service Award Scheme 2017
Team Award (Specialised Service) - Gold
Partnership Award - Merit

2017



英國新工程合約用戶組織
創新合約條款組別 - 大獎

UK NEC Users' Group
Contract Innovation through Additional Clauses
Category - Winner Award

2016



環保促進會 - 香港綠色企業大獎
優越環保管理獎 - 項目管理 - 大型企業 (白金獎)

Green Council - Hong Kong Green Awards
Green Management Awards - Project Management -
Large Corporation (Platinum)

2015



英國新工程合約用戶組織
大型工程項目新工程合約高度讚揚獎

UK NEC Users' Group
Highly Commended New Engineering Contract (NEC)
Large Project of the Year Award

2015



第22屆公德地盤嘉許計劃
傑出環境管理獎 - 金獎
公德地盤獎 (工務工程 - 新建工程) - 銅獎

22nd Considerate Contractors Site Award Scheme
Outstanding Environmental Management &
Performance Awards- Gold
Considerate Contractors Site Awards
(Public Works- New Works)- Bronze

第21屆公德地盤嘉許計劃
傑出環境管理獎 - 金獎
公德地盤獎 (工務工程 - 新建工程) - 銀獎

21st Considerate Contractors Site Award Scheme
Outstanding Environmental Management &
Performance Awards- Gold
Considerate Contractors Site Awards
(Public Works- New Works)- Silver

香港綠色建築議會
環保建築大獎 - 優異獎

Hong Kong Green Building Council
Green Building Award - Merit

第20屆公德地盤嘉許計劃
公德地盤獎 (工務工程 - 新建工程) - 金獎
傑出環境管理獎 - 銀獎

20th Considerate Contractors Site Award Scheme
Considerate Contractors Site Awards
(Public Works - New Works) - Gold
Outstanding Environmental Management &
Performance Awards - Silver

香港工程師學會
工程創意大獎 - 優異獎

Hong Kong Institution of Engineers
The Innovation Award for Engineering Industry - Merit

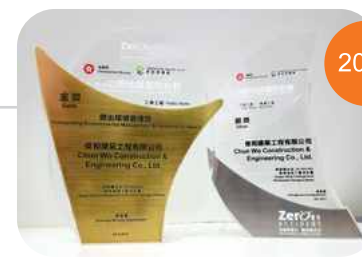
香港綠色建築議會
綠建環評新建建築暫定白金級認證

Hong Kong Green Building Council
Platinum Rating of Provisional Assessment under the BEAM Plus

國際水協會項目創新大獎
東亞地區(規劃組別)大獎

International Water Association Project Innovation Award
East Asia Regional Awards in Planning Category

2014



2014



2013



2013



2013



2012



跑馬地地下蓄洪計劃工程團隊

Happy Valley Underground Stormwater Storage Scheme Project Team

工程部門 Works Department	渠務署 Drainage Services Department
承建商 Contractor	俊和建築工程有限公司 Chun Wo Construction and Engineering Company Limited
主要分判商 Major Subcontractors	安樂工程有限公司 ATAL Engineering Limited 華強鐵器工程有限公司 Wah Keung Metal Engineering Limited 軒誠工程發展有限公司 Harvest Engineering Development Limited 海福工程有限公司 Fortune Ocean Engineering Limited 東運實業有限公司 New Lucky Industrial Limited 加穎工程有限公司 Bestwin Engineering Limited 城記土木工程建築有限公司 Shing Kee Building And Construction Limited 天鷹草運動國際有限公司 Actionsports International Limited 亞洲體育科技有限公司 Sports Technology International (Asia) Limited
新工程合約顧問 NEC Advisor	凱迪思亞洲有限公司 ARCADIS Asia Limited
財務顧問 Financial Consultants	莫特麥克唐納香港有限公司 Mott MacDonald Hong Kong Limited
建築設計顧問 Architectural Design Consultants	何文堯建築師有限公司 Ivanho Architect Limited

一個團隊 一個目標

One Team One Goal

