

環境管理

Managing the Environment



560,000

種植灌木數量

No. of Shrubs Planted



我們和合作夥伴承諾攜手共同努力實施各種環保措施，創造更環保、更可持續發展的環境。

We and our working partners commit to putting concerted efforts in implementing a variety of green initiatives to achieve a greener and more sustainable environment.

綠化與生態保育

Greening and Conserving Ecology

「淨化海港計劃」二期甲的昂船洲 污水處理廠綠化及美化工程

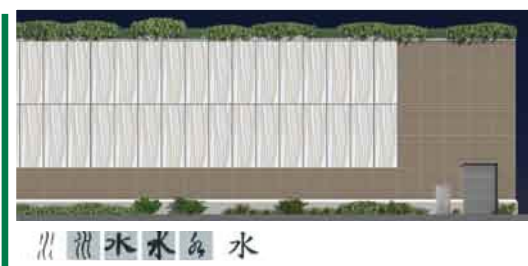
昂船洲污水處理廠位於西九龍當眼位置，從北面的荔枝角和東面的大角咀高樓大廈，可俯瞰污水處理廠的面貌，西南面則有植被豐茂的綠林作屏障。為改善污水處理廠的視覺景觀，我們已展開以下的環境改善工程。

立面設計

立面設計的主要面貌包括利用仿木材覆蓋板牆、綠化道路兩旁及天臺及利用3種不同顏色的組合式鑲板以改善視覺感觀。當中的組合式鑲板特別仿倣中國古字「水」為題材。

綠化道路兩旁及天臺，加強綠化效果

道路兩旁將放置不同形狀及組合的花槽，種植一些本地植物。天臺亦會以不同組合的灌木、地被植物及碎石綠化環境。



◆ 仿倣中國古字「水」的組合式鑲板
Render modular panels reflecting the ancient Chinese pictogram for water



◆ 綠化道路兩旁模擬圖
An image of soft landscaping along site roads

Upcoming Greening and Beautification Works in Stonecutters Island Sewage Treatment Works under HATS 2A

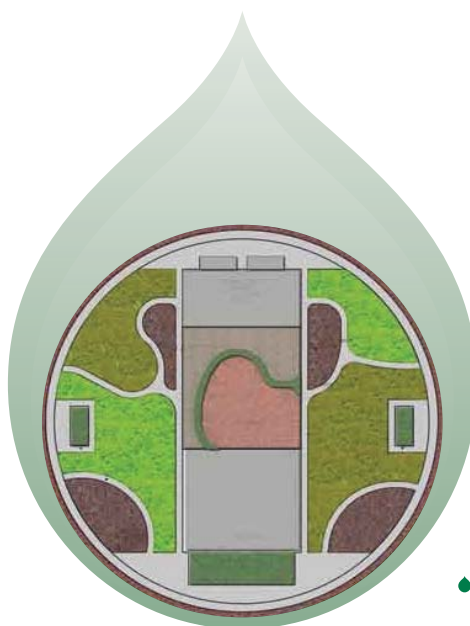
Stonecutters Island Sewage Treatment Works (SCISTW) is in a prominent location close to western Kowloon. It is overlooked by the public from the high rise developments around Lai Chi Kok and Tai Kok Tsui from its North and East. The Southwest of the site is screened by a lushly vegetated woodland. Environmental improvement works have been introduced to reduce the visual impact of the site as follows.

Elevation treatments

The elevation treatment consists of three main features, namely synthetic timber cladding, green vegetation at ground and roof levels, and a signature series of tricolor render modular panels reflecting the ancient Chinese pictogram for water, which improve the appearance of the buildings.

Soft landscaping along site roads and roofs to strengthen the greening effect

Site roads will be enhanced by the introduction of local plant species in a combination of planting boxes and beds next to the existing tanks. Roofs will be turned into a series of vividly green landscapes with a mixture of shrubs, groundcover plants and gravelled paths.



◆ 綠化天臺模擬圖
An image of green roofs

以不同顏色及圖案覆蓋沉澱池

為沉澱池安裝不同色彩的密封式玻璃纖維強化塑膠蓋面，這樣不但能提升視覺效果，同時亦能有效控制污水處理過程中所產生的氣味。



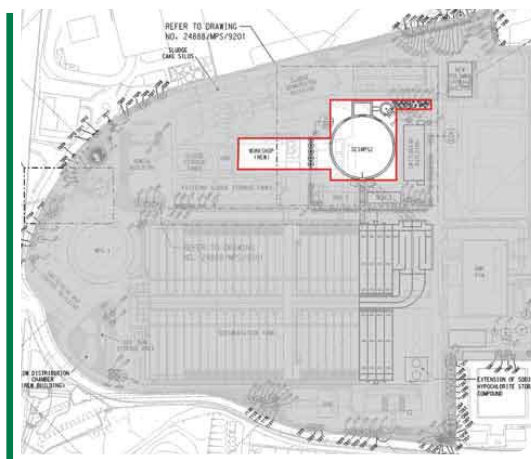
已覆蓋的沉澱池
Covered sedimentation tanks

Covering of the sedimentation tanks with randomly coloured pattern

The sedimentation tanks have been covered with a random pattern of multi-coloured units which enhances the appearance of the tanks and forms part of the odour control system.

除此之外，我們矢志推進可持續發展，昂船洲污水處理廠新建的工場及主泵房現正進行綠色建築環境評估認證(BEAM Plus)評核，參與綠色建築環境評估認證計劃的建築物會獲得一個標籤，顯示樓宇的整體質素。為展示我們致力保護環境的決心，我們在現有建造合約上對樓宇效能作出多項調改和提升。改善工程包括設置廢物回收室、利用玻璃混凝土作鋪路物料、重用拆卸工程廢物、增設太陽能光伏板和使用發光二極管(LED)燈具節省能源、選用分槽式沖水廁所節約用水，以及加裝通風機改善室內空氣質素。

In addition, a BEAM (Building Environmental Assessment Method) Plus assessment is being carried out for a designated area of the SCISTW site in order to demonstrate our commitment to sustainability. The assessment covers the new workshop and the new main pumping station building. BEAM Plus provides building users with a single performance label that demonstrates the overall quality of a building. To demonstrate our commitment in protecting the environment, we are planning to implement number of enhancements of building performance through the current construction contracts. The enhancement works include the provision of refuse recycling rooms, use of glasscrete as porous pavement, reuse of demolition waste, addition of solar panels and use of LED lighting for energy saving, use of WC split-tanks for water conservation, and addition of intake ventilation-fans for improving indoor air quality.



綠色建築環境評估認證評估範圍
BEAM Plus Assessment Area



昂船洲污水處理廠外貌
An Overview of SCISTW

建議於啟德河改善工程工地進行綠化及生態保育工程

啟德河是東九龍的主要排水道之一，起點位於黃大仙蒲崗村道，經彩虹道及毗鄰東頭邨和東匯邨的東光道流至太子道東轉入地底，橫越啟德發展區，最後流入維多利亞港。啟德河全長約2.4公里，早於數十年前配合前啟德機場一同興建，已不足以符合現行的防洪標準。在暴雨期間，彩虹道經常發生水浸，嚴重影響黃大仙和鄰近地區的交通。啟德河改善工程現正進行中，目的是提高啟德河的排洪能力，紓緩鄰近地區的水浸風險。

為鼓勵公眾參與啟德河的規劃，我們於2010年及2011年先後舉行兩個階段的「共建啟德河」公眾參與活動。從諮詢結果可見，公眾冀盼啟德河在發揮重要的防洪作用之餘，也可活化為翠綠宜人的河道及優美的城市特色。為達到市民的期望，我們在啟德河改善工程加入了多項園境、綠化及生態環境保育元素，希望活化啟德河成為一條富吸引力的城市綠化河道。有關的綠化工程包括沿着河堤裝設花槽及人工仿石，並於河床種植經

挑選的水生植物，以營造自然景致。河道兩旁上現有的花崗石矮牆將盡量保留作文物保育。雖然現有的河岸環境生態價值較低，但我們準備在啟德河河床加設魚洞穴和天然石塊，藉此改善微生境及優化物種的多樣性。西貢蠔涌河進行河道改善工程時亦有加設這類設施，成效甚佳。

Proposed Greening and Ecological Conservation Works in Kai Tak River Improvement Works

Kai Tak River is one of the major drainage channels in East Kowloon. It originates from Po Kong Village Road at Wong Tai Sin, flows parallel to Choi Hung Road and Tung Kwong Road adjacent to Tung Tau Estate and Tung Wui Estate, runs underneath Prince Edward Road East before traversing the Kai Tak Development (KTD) area and finally discharges into Victoria Harbour. The total length of Kai Tak River is about 2.4 kilometres. It was built in tandem with the former Kai Tak Airport some decades ago and found inadequate to meet the current flood protection standard. Flooding incidents have occurred along Choi Hung Road during heavy rainstorms and severely affected the traffic of Wong Tai Sin and its adjacent districts. The Kai Tak River Improvement Works are being implemented, which aim to improve its drainage capacity and mitigate flooding risk to the surrounding areas.

To engage the public on the planning of Kai Tak River, we conducted a two-stage public engagement exercise on "Building our Kai Tak River" in 2010 and 2011. According to the engagement results, there are strong public aspirations for revitalising Kai Tak River into an attractive green river and townscape feature to enhance its visual quality and image, in addition to its prime objective for flood protection. To meet such aspirations, we have incorporated various landscape, greening and ecological elements in the Kai Tak River Improvement Works with a view

to rehabilitating the Kai Tak River into a green river corridor in urban areas. Greening works include installation of planters and artificial rock along the river walls. Selected species of submerged plants will also be cultivated at river bed to foster a natural environment. The existing granite parapets along the river walls will be retained in general for heritage conservation purpose. Though the ecological value of the existing riparian habitat is relatively low, we will introduce fish shelters and boulders on river bed to enhance the micro-habitat and species diversity. These have been proven successful in the river improvement works at Ho Chung River in Sai Kung.



● 啟德河位置
Location of Kai Tak River

啟德河改善工程現正分階段進行。啟德河上游(蒲崗村道至東光道)的建造工程已於2011年10月動工，預計於2017年完竣。此外，我們亦計劃於2013年年底展開中游(東光道至太子道東)的建造工程。土木工程拓展署已於2013年年初展開位於啟德發展區的下游改善工程，預計於2018年竣工。

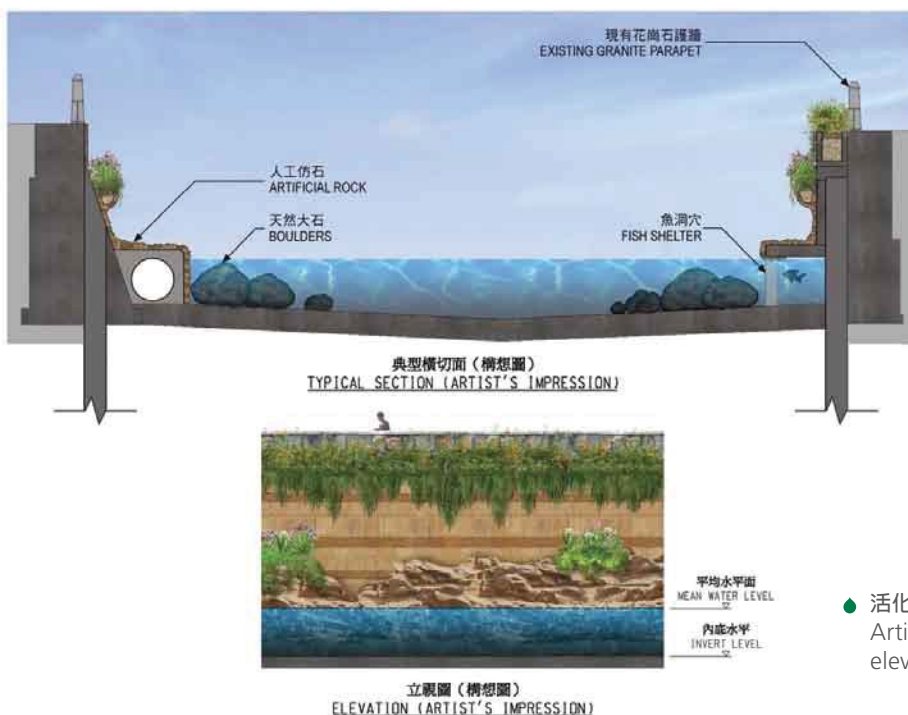
Kai Tak River Improvement Works are being carried out in stages. We have commenced the construction works for Kai Tak River's upstream (from Po Kong Village Road to Tung Kwong Road) since October 2011 for completion in 2017. We have also planned to commence the construction works for the midstream (from Tung Kwong Road to Prince Edward Road East) in end of 2013. The Civil Engineering and Development Department has commenced the downstream upgrading works within KTD in early 2013 for completion in 2018.



- 在蠔涌河建造溪內保護區，供魚類、無脊椎動物和其他水生動物在河水流速高時棲身
In-stream refugia are provided at Ho Chung River for providing shelters for fishes, invertebrates and other aquatic animals when the flow at the River is fast



- 沿蠔涌河裝置導流石塊，以改變下游的流向和流速，藉此創造多元化生境 / 保護區
Flow deflectors are provided along Ho Chung River to alter flow direction and velocity downstream thus providing a variety of habitat/refugia

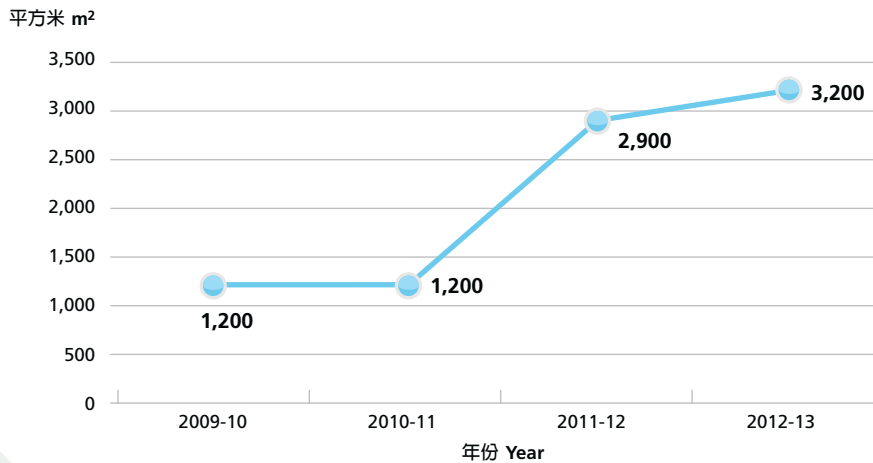


- 活化後啟德河的切面及立視構想圖
Artist's impression of typical section and elevation of the revitalised Kai Tak River

渠務署設施的綠化工作

在2012-13年度，本署繼續在各工程項目積極進行綠化工作，當中包括在新項目及現有設施加入天臺綠化。年內，我們共種植了超過3,300棵喬木和56萬棵灌木，並增設3,200平方米的綠化天臺。

增設的綠化天臺面積
Area of Green Roof Added



於2012年落成的綠化天臺工程包括大元污水泵房、長沙灣污水泵房、水船街污水泵房及土瓜灣基本污水處理廠。這些綠化天臺不僅美化環境，更能在夏季時降低建築物頂層的溫度，有助緩減熱島效應。

Overall Greening Works in DSD Facilities

In 2012-13, our Department continued to make all efforts in carrying out greening works in various projects, including the incorporation of green roofs in new projects and existing facilities. During the year, we planted more than 3,300 trees and 560,000 shrubs, and provided an additional 3,200 square metres of green roofs in various facilities.

The most recent examples of completed green roofs in 2012 were Tai Yuen Sewage Pumping Station (SPS), Cheung Sha Wan SPS, Waterboat Dock SPS and To Kwa Wan Preliminary Treatment Works (PTW). These green roofs not only help create a pleasant environment, but also lower the building temperature and alleviate the heat island effect during summer.



● 土瓜灣基本污水處理廠的綠化天臺
Green roof at To Kwa Wan Preliminary Treatment Works



● 沙田污水處理廠的綠化天臺
Green roof at Shatin Sewage Treatment Works



● 舊墟污水泵房的綠化天台
Green roof at Kau Hui Sewage Pumping Station Compound



● 兆康污水泵房的綠化天台
Green roof at Siu Hong Sewage Pumping Station



● 水船街污水泵房的綠化天台
Green roof at Water Boat Dock Sewage Pumping Station

渠務署設施的垂直綠化與相關的研究和發展

本署自2009年6月起與香港大學合作，於沙田污水處理廠內的4個污泥貯存缸外牆進行垂直綠化研究，探討不同攀緣植物的綠化表現及它們對外牆散熱的成效。研究成功於2013年3月完成，結果顯示被植物覆蓋的外牆表面，在夏天的溫度可減低攝氏7度。此研究項目榮獲「香港園境師學會設計大獎2012」規劃與綠化研究組別優異獎。

此外，我們有系統地研究了以兩種攀緣模式生長的20種攀緣植物，即依靠鋼網支架生長的模式與自行在混凝土上攀爬的模式。研究顯示，依靠鋼網支架生長的垂直綠化模式與自行攀爬模式的綠化效果非常理想。研究為期30個月，期間記錄了20種攀緣植物的生長特性及表現，這些資料對日後的綠化項目有很大幫助。由於安裝簡單、保養容易、安裝成本較低及有良好的綠化效果，我們會鼓勵工程人員在新工程及現有的設施加設以上兩類攀緣植物。

Vertical Greening in DSD Facilities and related Research and Development Work

Our Department has collaborated with the University of Hong Kong since June 2009 to carry out a vertical greening study on the external walls of four sludge storage tanks at Shatin Sewage Treatment Works (STSTW). The objective is to study the greening effects of different climber species and their effects on temperature reduction. The study was successfully completed in March 2013 and the result revealed that the temperature of exterior green wall with vegetation cover could drop by seven degree Celsius in summers. The study received the Merit Award under Landscape Planning/Research Category of "Landscape Design Awards 2012" organised by the Hong Kong Institute of Landscape Architects.

20 climber species of two different climbing modes i.e. trailing plants in mesh mode (mesh climbers) and self-climbing plants in concrete mode (concrete climbers) were systematically assessed in the study. The overall result shows that the greening effects of the tested mesh climbers and concrete climbers are very promising. With 30 months of growth monitoring, the growing characteristics and performances of the 20 climber species were recorded and will provide a good reference in our future projects. We will encourage project officers to introduce mesh climbers and concrete climbers in new projects and retrofit existing facilities, as they are simple for installation, easy to maintain, with low initial set up cost and good greening effect.



● 沙田污水處理廠的垂直綠化
Vertical greening at Shatin Sewage Treatment Works





● 赤柱污水處理廠的室內垂直綠化
Indoor vertical greening at Stanley STW

除了以上兩種垂直綠化植物攀緣模式外，我們亦嘗試探索利用專屬垂直綠化系統於室內進行垂直綠化的可行性。2013年1月，我們在位於岩洞內的赤柱污水處理廠嘗試種植了逾60米長的室內垂直綠化牆，並安裝了5款不同的垂直綠化系統。我們將與香港中文大學共同研究所安裝的室內垂直綠化系統，測試它們的表現及其成本效益。有關研究預計於2014年完成。

Apart from these two climbing modes, we have also explored the opportunity of indoor vertical greening using proprietary vertical greening (VG) systems. A trial planting of over 60 metres long indoor vertical green wall with five different VG systems was installed at our cavern facility, the Stanley STW, in January 2013. We will conduct research with the Chinese University of Hong Kong to study the performance and cost-effectiveness of these VG systems. The research is expected to be completed by 2014.

大埔的綠化工程及生態保育措施

Greening Works and Ecological Conservation Measures at Tai Po

於大埔區的雨水排放改善工程不單紓緩區內的水浸風險，同時亦在區內進行具價值性的綠化工作。為保育原有河道的生態價值，我們的工程師所設計的雨水排放設施均注入以下所列舉的不同環保元素。

The drainage improvement works at Tai Po not only alleviate the local flooding risk but also make valuable contribution to the local greening efforts. To preserve the ecological values of existing rivers, our engineers have integrated various environmentally friendly elements into our drainage facilities, which are outlined below.

模仿原有河道特徵

Simulation of Existing River Characteristics

為紓緩當區的水浸風險，我們在現有的大埔河道進行改善工程以增加河道的排水流量，而河道堤岸兩旁均鋪設石籠或混凝土草格，模仿原有河道環境。

To alleviate the local flooding risk, the existing rivers at Tai Po have been trained for enhancing their drainage capacity. The banks of the widened rivers were paved with rockfill mattresses/gabion units or grasscrete aiming to simulate the riparian environment in existing rivers.



● 在河道內兩旁鋪設石籠
Rockfill mattresses at embankments of the trained river channel

有些天然河道的河床是以石塊為主。在進行河道改善工程後，我們採用了亂石基底，模仿原有天然溪澗的環境，促使生物繁衍。亂石基底由不規則的石塊和卵石組合而成，取替單一大小的河床石塊，能使河道形成深池和淺灘，為土生的大小魚類提供棲息空間。

Some of the existing river stream beds were of stony substratum. After river training works, we put rip-rap at the bottom to mimic the profile of a natural stream course. This was to facilitate the re-colonisation of the stream after completion of the drainage improvement works. Instead of placing single-sized rip-rap at channel base, both boulders and cobbles of varied dimensions were laid to form series of pools and riffles for creation of favorable habitats for both adult and juvenile local fish species.



- 在河床內放置不規則的石塊和卵石
Rip-rap (boulders and cobbles) laid at the channel base

保留原有河道的基底

在水浸風險較低的地區進行河道改善工程時，我們沒有採用掘深和擴闊河道的方案。取而代之，我們會在河岸兩旁加建防洪牆，保留原有河道的基底，從而保育原有河道的生態功能。在條件許可的情況下，我們更會將一段原有河道保留，以保育河中生態及減低工程對自然環境的影響。

Retaining the Existing River Bed

For drainage improvement works in areas with lower risk of flooding, we chose to construct flood protection walls at both sides of the stream instead of conducting deepening and widening works for the streams. This will preserve the existing natural stream bed so that the ecology in the existing stream could be preserved. When condition warrants, a particular section of the existing river would be retained for preserving the habitat and minimising disturbance to the natural environment arising from the works.



- 保留一段約二百米長的原有河道
Retaining a section of approximately 200m long existing stream course

- 在河岸兩旁加建一米高的防洪牆
Precast panels of one metre height erected as flood protection wall at both sides of the stream course

河岸綠化

為促進河道綠化，我們的工程師及園境師沿河岸兩旁廣植經挑選的植物，以改善河岸景觀及生物多樣性。我們亦小心保護在原有河道四周的樹木，減低河道改善工程對天然環境的影響。

Planting along River Channel

Our engineers and landscape architects have contributed to the establishment of riparian vegetation in local areas by cultivating selected plant species along both sides of the river to enhance its visual appeal and biodiversity. We have also protected and preserved the existing trees and vegetation to minimise disturbance to natural environment.



● 河岸兩旁廣植經挑選的樹木
Selected plant species cultivated along trained river channel



● 保護河岸原有的樹木
Preserving existing riparian vegetation



● 修改河道岸線以保育原有樹木
Re-alignment of river for preserving existing trees

在九龍坑村的生態保育工作

我們在九龍坑河溪發現了一種稀有的淡水魚，名為「側條光唇魚」。為了保育這珍貴的生態資源，我們在進行河道改善工程前於上流區域建造了一組臨時魚池，遷移河溪中的側條光唇魚至魚池內暫時棲息。在完成河道改善工程及恢復棲息地後，側條光唇魚會從臨時魚池遷回完成治理工程後的河道，繼續繁衍。

Protection of Existing Ecological System at Kau Lung Hang

A rare species of freshwater fish, *Acrossocheilus parallens*, was identified in the streams at Kau Lung Hang during our works. To preserve this important species, we have constructed a set of fish holding tanks at the upstream for temporary accommodation of the *Acrossocheilus parallens* before commencing the drainage improvement works. With the completion of river channels and re-creation of suitable habitats, we will translocate the *Acrossocheilus parallens* from the temporary tanks back to the engineered river channels for re-colonisation.



- 河道改善工程進行前在河溪捕捉側條光唇魚

Collecting fish (*Acrossocheilus parallens*) before commencement of drainage improvement works



- 側條光唇魚的特徵為軀幹上有一條深色橫帶及6至7條黑色直條紋

Acrossocheilus parallens is distinguished by the presence of a dark lateral stripe and 6 to 7 short blackish vertical stripes



- 臨時魚池設有上蓋，防止魚池受陽光暴曬，魚池周邊亦設有圍網，避免人為騷擾
- Temporary fish holding tanks with shelters for prevention of overheating; and security fence for avoidance of human disturbance

在林村谷的生態保育工作

林村河是受保護兩棲類動物香港蠃螈的棲息地。為了保育這珍貴的生態資源，在進行河道改善工程前及每年旱季工程重新開展前，我們捕捉工程範圍河道內的香港蠃螈，然後隨即將牠們遷往工程範圍以外的上游河道。

Protection of Existing Ecological System at Lam Tsuen Valley

Lam Tsuen River is the home of a protected freshwater amphibian species namely *Paramesotriton hongkongensis*. To preserve this valuable ecological resource, we have relocated the species to the upstream of the stream course within the construction site prior to the commencement of the river improvement works and before we resume works at the beginning of each dry season. Once captured, the species were immediately released at the river upstream of the construction site.



- 於河道改善工程進行前在河道捕捉香港蠃螈

Capturing *Paramesotriton hongkongensis* before commencement of river improvement works



- 香港蠃螈腹部橙色的不規則斑紋
- The irregular orange pattern at the abdomen of *Paramesotriton hongkongensis*



- 於工程範圍以外的上游河道將捕獲的香港蠃螈放生

Releasing *Paramesotriton hongkongensis* at the upstream of the construction site

能源管理及排放控制

Energy Management and Emission Control

進行碳審計

碳審計是一套方法，為實體範圍內進行的不同程序的溫室氣體(以二氧化碳為主)排放及減除作出識別、核算及報告。進行碳審計可確定主要排放源，並藉減少消耗量、提高效率、使用可再生能源等，以減少溫室氣體排放量。

我們在2012年首次在大埔污水處理廠和昂船洲污水處理廠進行碳審計。結果顯示，兩所污水處理廠在2011年分別排放約9,207公噸和36,733公噸二氧化碳當量，即處理每立方米污水，會分別產生約0.27公斤和0.074公斤二氧化碳當量。

年內，我們繼續在沙田污水處理廠和石湖墟污水處理廠進行碳審計，結果顯示這兩所污水處理廠在2011年分別排放約25,489公噸和7,167公噸二氧化碳當量，即處理每立方米污水，會產生0.31公斤和0.24公斤二氧化碳當量。

展望未來，渠務署會為更多污水處理廠和建造工程進行碳審計，並採取碳減排措施，以減少我們的碳足跡，冀能用最環保的方法為市民提供優質的雨水排放及污水收集和處理服務。

2011年的碳足印 (以公噸二氧化碳當量計算)
Carbon Footprint in 2011 (in tonnes of CO₂ equivalent)

污水處理廠名稱 Name of plant	總排放量 Total emission	電力使用而產生的 間接排放 Indirect emissions generated from the use of electricity	除氮過程中釋放的氧化氮 (以公噸二氧化碳當量計算) N ₂ O emissions (in tonnes of CO ₂ equivalent) through nitrogen removal	直接使用燃料而產生 的排放 Emissions generated from direct combustion of fuels	其他 Others
沙田污水處理廠 Shatin STW	25,489	19,374	782	5,171	162
大埔污水處理廠 Tai Po STW	9,207	8,722	368	43	74
石湖墟污水處理廠 Shek Wu Hui STW	7,167	6,777	377	1	12
昂船洲污水處理廠 Stonecutters Island STW	36,733	36,196	0	4	533

Conducting Carbon Audit

Carbon audit is a method to identify, account and report on the emission and removal of Greenhouse Gas (GHG), mainly carbon dioxide (CO₂), from different processes within the boundary of the entity. Carbon audit enables us to identify the major sources of emission and find ways to reduce them through reduction in consumption, improvement in efficiency, use of renewable energy etc.

We conducted the first carbon audits for Tai Po STW and Stonecutters Island STW in 2012. The audit results revealed that about 9,207 and 36,733 tonnes of CO₂ equivalent were emitted respectively from these two plants in 2011. In terms of carbon intensity, it is about 0.27 and 0.074 kilogram of CO₂ equivalent emitted per cubic metre of sewage treated.

We continued to conduct carbon audits for Shatin STW and Shek Wu Hui STW during the year. The results showed that about 25,489 and 7,167 tonnes of CO₂ equivalent were emitted in 2011 respectively from these two plants, which represents 0.31 and 0.24 kilogram CO₂ equivalent emitted per cubic metre of sewage treated.

Looking forward, DSD will conduct carbon audits and adopt carbon emission reduction measures at more of its STWs and construction works with a view to reducing DSD's carbon footprint, making it more environmentally friendly while also providing high quality drainage and sewage treatment services to the public.



◆ 在沙田污水處理廠內的電動車
Electric vehicle in Shatin STW



◆ 在沙田污水處理廠內的電動車充電站
Electric vehicle charging station at Shatin STW

採用電動車

為支持新能源技術的發展及香港的可持續發展，我們把握每個機會推廣使用電動車。由於電動車是以電池驅動而不涉及汽油燃燒過程，其最大優點是完全不會排放任何廢氣，大大紓緩路面空氣污染問題。目前，我們正在使用合共8輛電動車。截至2013年3月，這些電動車合共日均行駛約600公里。我們累積了應用電動車的經驗後，會在各工程項目中推廣其應用。

Use of Electric Vehicle

To support the latest development of green transportation and sustainable development of Hong Kong, we have taken every opportunity to promote the use of electric vehicle (EV). As EV is powered by batteries without involving any combustion process, its greatest advantage is producing zero emissions and helping improve roadside air quality in Hong Kong. At present, there are eight EVs in our fleet. The total average daily mileage delivered by our EVs was about 600 kilometres per day as at March 2013. With more experience accumulated in the application of EVs, we target to promote a wider use of EVs in our projects.

實施多項節能措施

自2007年成立能源及排放管理小組後，本署在運作上的節能和碳減排表現逐漸提升。自香港特別行政區行政長官於2006年11月簽署了「清新空氣約章」後，小組隨之誕生，由一名助理署長領導，成員包括各科別的高級專業代表。

Implementing Various Energy Saving Measures

Our Department has made steady progress in saving energy and reducing emission in its city-wide operation subsequent to the formation of the Energy and Emission Management Team in 2007. The team, headed by an Assistant Director and with representatives from all branches at the senior professional level, came into being shortly after the Chief Executive of HKSAR signed the Clean Air Charter in November 2006.

過去5年，我們成功節省了超過1,100萬度電。我們採取了各項措施大幅減少能源使用，當中包括優化污水處理流程；在各污水處理廠採用熱電聯供設施；將各廠內的T8光管與戶外照明燈分別更換為T5光管和發光二極管燈；以及在我們的處理設施內使用高效率的水泵電動機。在2012-13年度，最大型的節能項目是沙田污水處理廠的污泥混合沉澱與污泥處理優化程序，以及在石湖墟污水處理廠採用生物氣供給熱電聯供設施進行操作。

We have managed to save more than 11 million kilowatt-hour (kWh) electricity over the last five years. This is achieved with the implementation of measures including the optimisation of sewage treatment processes, the use of combined heat and power (CHP) plants at various sewage treatment works, the replacing of T8 fluorescent lamps and outdoor lights with T5 lamps and LED respectively at various plants, as well as the use of high-efficiency pump motors in our treatment facilities. The largest contributors to energy saving in 2012-13 were the co-settling and optimisation of sludge treatment processes at Shatin STW and the utilisation of biogas for the CHP plants at Shek Wu Hui STW.

使用可再生能源

污水處理設施裝設太陽能光伏板

本署轄下各類主要設施，例如元朗污水處理廠、石湖墟污水處理廠、沙灣基本污水處理廠、昂船洲污水處理廠等，均實施採用大規模的獨立或接駁電網太陽能光伏系統，為廠內設備供電。安裝在污水處理廠的太陽能光伏板的總發電量及每年輸出電量分別約為88千瓦及96,000度電。我們準備在未來兩年於另外5所污水處理設施安裝總發電量為39千瓦的光伏板。

現時，我們大部份的太陽能光伏系統均安裝在污水處理設施的天臺。為了探索不同光伏系統的應用方案和騰出天臺空間作其他用途，我們正在進行一項使用垂直型建築整合太陽能系統的研究。我們將在沙田污水處理廠安裝垂直型組裝式的光伏系統，並研究各種太陽能電池物料（即單晶體硅、多晶硅及非晶硅）的性能和效率。預期建議的垂直型建築整合太陽能系統不僅可善用天臺空間，每年也可節省用電量約達1,750度及減少相當於約一噸的二氧化碳排放當量。這項試驗研究為我們將來在各種污水處理設施中應用垂直型建築整合太陽能系統提供了有用的參考。

Use of Renewable Energy

Use of photovoltaic solar panels in sewage treatment facilities

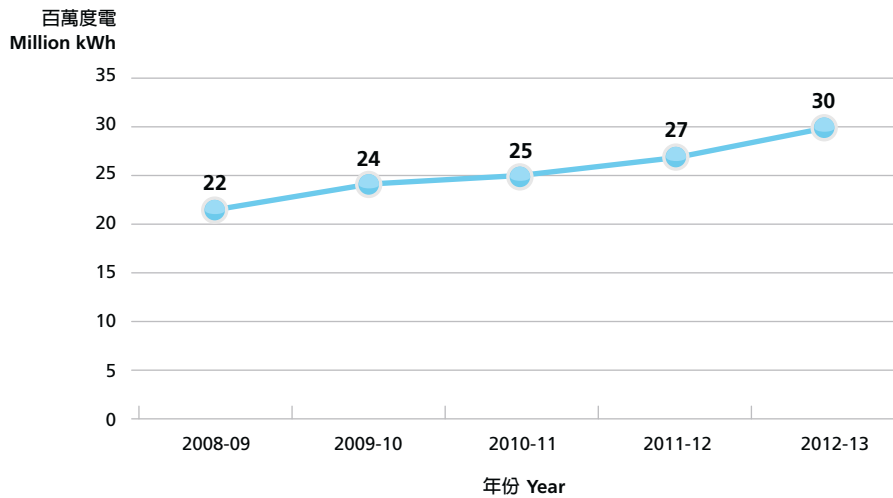
We have implemented different large-scale stand alone or grid-connected photovoltaic (PV) systems supplying electricity to part of the equipment at our various major facilities, e.g. Yuen Long STW, Shek Wu Hui STW, Sandy Bay PTW, Stonecutter Islands STW, etc. The total capacity and annual electricity output of the PV panels were about 88 kilowatt (kW) and 96,000 kWh per year respectively at these plants. In the coming two years, we are going to install PV panels in five other sewage treatment facilities with a total capacity of 39 kW.

Currently, most of our PV systems are installed at the roofs of our sewage treatment facilities. In order to explore more flexible applications of PV systems and to save the roof spaces for other uses, we are carrying out a pilot study on the application of vertical type Building Integrated Photovoltaic (BIPV) system. We will install a vertical type BIPV system at Shatin STW to investigate the system's performance and efficiency with different solar cell materials (i.e. Mono-crystallite silicon, Poly-crystalline silicon and Amorphous silicon). It is anticipated that the proposed vertical type BIPV system will not only allow better space utilisation, but will also bring around 1,750 kWh annual saving in electricity and reduce around one tonne of CO₂ equivalent per year. This pilot study will provide useful reference for our future applications of vertical type BIPV system in our various facilities.



● 在元朗污水處理廠天臺上的6.3千瓦太陽能光伏板
6.3 kW PV Solar Panel on the roof of Yuen Long Sewage Treatment Works

生物氣體所產生的電力 Electricity Generated from Biogas



將廢氣轉化為能源

我們留意到污水處理過程中所產生的污泥，在厭氧消化過程中形成的生物氣是一種可再生能源，因此，過去10年，我們均在探討如何更有效利用所產生的生物氣體，包括在我們的污水廠內安裝熱電聯供發電機和微型渦輪。熱電聯供發電機和微型燃機系統是從單一的燃料（如生物氣）以獲取能量。通過燃燒，同時產生熱能和電能，從而提高整體能源使用效率。燃燒生物氣的熱電聯供發電機和微型渦輪是碳排放量較低的清潔科技。我們正於沙田及大埔污水處理廠內安裝新的熱電聯供發電機（總容量為2.03兆瓦），而在元朗污水處理廠則安裝微型渦輪（容量為30千瓦）。加上最近在大埔污水處理廠和石湖墟污水處理廠安裝的熱電聯供發電機（大埔的發電機於2010年進行測試，容量為625千瓦；石湖墟的發電機於2011年進行測試，容量為635千瓦），我們預期於2013年可以充分利用從污水處理所產生的生物氣體。由生物氣體所產生的電力連續5年上升，而2012-13年所產生的電力上升至約3,000萬度電。

Turning Waste Gas to Energy

Taking note that biogas from anaerobic digestion of sludge generated from sewage treatment is a renewable energy source, we looked into a better way to utilise the biogas generated including installation of combined heat and power (CHP) generators and Micro-Turbine in our plants in the past decade. CHP generator and Micro-Turbine system are to obtain energy from a single fuel (for instance biogas) by means of combustion, where heat and power are generated simultaneously, thus improving the overall energy efficiency. CHP generator and Micro-Turbine fueled by biogas primarily is considered to be a cleaner technology with lower carbon emission. We are installing new CHP generators (with a combined capacity of 2.03 megawatts) in Shatin and Tai Po STWs, and Micro-Turbine (capacity of 30 kW) in Yuen Long STW. Together with other recently installed CHP generators at Tai Po STW (commissioned in 2010 and with the capacity of 625 kW) and at Shek Wu Hui STW (commissioned in 2011 and with the capacity of 635 kW), we foresee a full utilisation of all biogas generated from our sewage treatment works in 2013. We recorded an increasing trend in the electricity generated in five consecutive years and the amount of electricity generated from biogas in 2012-13 went up to about 30 million kWh.



● 沙田污水處理廠的熱電聯供發電機
Combined heat and power generator at STSTW



● 石湖墟污水處理廠
Shek Wu Hui STW

節約資源 Resources Conservation

九龍城污水泵房具透水效能的多孔路面及雨水回用措施

我們深明水資源彌足珍貴，因此在實踐可持續發展的過程中會充分善用水資源，在轄下設施和工程項目採用最適切的節約用水措施。例如在2012-13年度，九龍城兩個污水泵房便鋪設了具透水效能的多孔路面及安裝雨水回用系統，藉此擴大綠化面積和節約灌溉用水。

多孔透水路面

九龍城兩個污水泵房的緊急救援車輛通道以高密度聚乙烯連環強化植草磚取代傳統玻璃混凝土，既可擴大污水泵房的綠化面積，亦可承受緊急救援車輛的重量。



Porous Pavement and Rainwater Harvesting at Kowloon City Sewage Pumping Stations

We understand that water is one of the most valuable resources and to make the best use of water resources in the pursuit of our sustainable development, we adopted the most appropriate water conservation measures in our facilities and projects. For example, porous pavement and rainwater harvesting system were installed in 2012-13 at the two sewage pumping stations (SPSs) in Kowloon City which enable extensive green coverage and saving of water for irrigation.

Porous Pavement

Instead of using the traditional grasscrete, HDPE Interlocked Reinforced Grass Paver was used for paving at the Emergency Vehicular Access (EVA) of the two SPSs in Kowloon City, which enhanced the green coverage of the SPS area and to withstand loading of emergency vehicles.

- 高密度聚乙烯連環強化植草磚
HDPE Interlocked Reinforced Grass Paver

雨水回用

我們在兩個污水泵房加設了雨水回用系統，收集天臺的雨水作灌溉用途，從而減少使用食水灌溉園境工程的植物。兩個污水泵房的偌大天臺可用於收集雨水以灌溉植物，有利雨水回用系統的運作。

Rainwater Harvesting

Rainwater Harvesting System was added in the two SPSs to supply rainwater collected on the roofs for irrigation, which reduced the fresh water used for irrigation of the landscape works. The large roof area in two SPSs could be used to collect rainwater for irrigation, and provided an advantage for adopting the rainwater harvesting system.



- 1號污水泵房緊急救援車輛通道的植草磚種滿植物
Grass planted on Grass Paver at the EVA of SPS No. 1



- 1號污水泵房緊急救援車輛通道鋪設植草磚
Finished Paving Works of Grass Paver at the EVA of SPS No. 1



- 由雨水回用系統供水的1號污水泵房的水景設施
Water Feature at SPS No. 1 with water supplied by Rainwater Harvesting System

我們裝設了蓄水池收集天臺的雨水，利用雨水輸送泵將雨水輸送至濾砂池，在池內隔去固體粒子，然後進入殺菌裝置以紫外光消毒，再於混合池與食水混和。混合池可確保持續有雨水或食水供應作灌溉用途，當中食水主要在雨量較少的旱季使用。混合池的水除用於灌溉，還可供應1號污水泵房的水景設施。

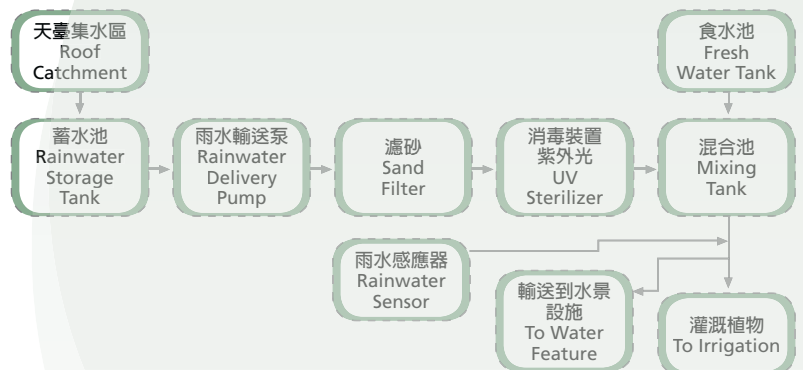
使用環保物料/產品

我們於日常營運採用多種環保物料和產品，包括：

- 回收碎玻璃製成再造玻璃磚及行人路磚、渠管墊料、地基墊層混凝土原料和多孔排水物料；
- 再造水；
- 合成沙井蓋、合成進水渠蓋(兩者均設於污水處理廠及泵房的非車輛通道/區域)及聚氯乙烯地台物料，特別是含回收再造物料的產品；及
- 回收再造木材。

下圖顯示每個污水泵房的雨水回用系統運作流程

The following flow program shows the rainwater harvesting system installed in each SPS



Rainwater storage tanks were installed to collect the rainwater from the roof. The collected rainwater would be pumped through the rainwater delivery pump to the sand filters. Solid particles would be separated from the filtrated rainwater at the sand filters. The filtrated rainwater would then be sterilised by ultra-violet rays at the steriliser, and would be mixed with the fresh water in the mixing tank. The mixing tank ensured constant supply of water for irrigation from either rainwater or fresh water, with fresh water to be used mainly in dry season when there is less rainfall. The water from the mixing tank would be used for irrigation, and also used for the water feature built in SPS No. 1.

Use of Green Materials/ Products

We are currently using a number of green materials and products during our operations. These include:

- Recycled glass cullet as recycled glass block and paving block, pipe bedding materials, ingredients of blinding concrete and porous drainage materials;
- Reclaimed water;
- Synthetic manhole covers, synthetic gully gratings (both for use in non-vehicular access/area within boundary of Sewage Treatment Works and Pumping Stations) and PVC floor materials, in particular products containing recycled materials; and
- Recycled timber.

環保採購及綠化辦公室 Green Procurement and Green Office

為支持環保採購，政府於2011年列出更多供政府部門和政策局選用的環保產品。在符合經濟原則的情況下，所有部門和政策局應盡量選購環保產品，並避免使用用完即棄物品。本署積極支持政府提倡的環保採購建議。於2012-13年度，我們購買的環保產品範圍廣泛，當中包括電器產品如電腦、影印機、打印機、電風扇和雪櫃，以及辦公室耗材如再造紙、塗改帶、鉛筆、充電電池、衛生紙和垃圾袋。

- ◆ 室溫設定在攝氏25.5度
Setting the office temperature at 25.5 degree Celsius



多年來我們在辦公室推行多項節能措施，其中包括把室溫設定在攝氏25.5度、減少非必須的照明及在公用設備安裝時間掣。為保持辦公室綠化，我們更奉行減少廢物和節約資源的原則。除了訂立指引減少紙張用量外，我們又鼓勵員工重用信封，並設立回收點回收打印機碳粉盒、環保充電電池、紙品、塑膠和金屬容器等。為進一步提高員工的環保意識，我們定期發放綠色資訊以及巡查辦公室。

隨著無遠弗屆的無線通訊科技，我們推出「無紙會議」系統，使用電子產品，如平板電腦和手提電腦作簡報和討論。於2012-13年度，本署已進行大約252個無紙會議，當中以電子方式傳閱1,900多份文件。配合多項環保措施如電子傳閱和雙面打印，我們的用紙量自2009-10年度起持續下降。我們在2012-13年度的用紙量約為11,000令，較2009-10年度減少21%。



- ◆ 辦公室回收箱
Recycling bins in the office

To support green procurement, the Government expanded the list of green products commonly used by bureaux and departments in 2011. Particularly, all bureaux and departments are encouraged, as far as feasible and where economically rational, to preferentially purchase products with green specifications and avoid one-off disposable items. Our Department has actively supported the Government's initiatives on green procurement.

We have purchased a wide variety of products following the green procurement specification in 2012-13, ranging from electrical appliances such as computers, copying machines, printers, electric fans and refrigerators to office consumables including recycled paper, correction tapes, pencils, rechargeable batteries, toilet paper and garbage bags.

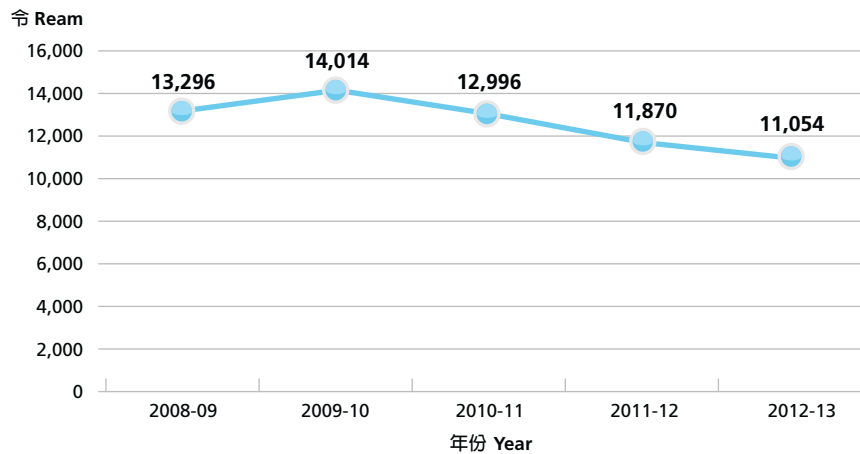
Over the years, we have implemented a number of energy saving measures in our office. These include setting the room temperature at 25.5 degree Celsius, de-lamping unnecessary lights, installing timers to switch off common office equipment after office hours. To keep our office green, we have adopted the principles of waste reduction and resource conservation. In addition to implementing guidelines on reducing the use of paper, we encourage our staff to reuse envelopes. We have also set up recycling stations to collect cartridge toners, rechargeable batteries, papers, plastic and metal containers. To further raise the awareness amongst our staff, we have regularly disseminated green tips and conducted environmental inspections in our workplace.

With the fast development of wireless communication technology, we have introduced a "paperless meeting" system, using electronic gadgets such as tablet computers and notebooks for presentations and discussions. About 252 paperless meetings were conducted in 2012-13 with 1,900-plus e-documents circulated and viewed through this system. Together with other green measures such as electronic circulation and double-sided printing, paper consumption has continued to drop since 2009-10. Paper usage in 2012-13 was about 11,000 reams, a 21 per cent reduction compared to 2009-10.

- ◆ 減少不必要的照明
De-lamping to reduce unnecessary lighting



用紙量
Paper Consumption



氣味管理 Odour Management

昂船洲污水處理廠進行環境改善工程，包括在淨化海港計劃第二期甲昂船洲污水處理廠沉澱池安裝蓋面及安裝辟味裝置

在昂船洲污水處理廠內現有沉澱池所採取的緩解氣味控制措施包括以下3個步驟：

1. 在現有沉澱池、流動水槽及分隔槽安裝密封式玻璃纖維強化塑膠蓋面；
2. 安裝抽氣系統收集已覆蓋的沉澱池、水槽和分隔槽內的空氣；及
3. 採用生物滴濾塔技術處理抽出的空氣後才排放。生物滴濾塔技術是既可靠又環保的辟味技術，其營運成本及操作和維修保養的要求皆相對較低。此技術能有效去除空氣中99%或以上的硫化氫，而硫化氫是污水處理廠內最主要的氣味來源。

Environmental improvement works in Stonecutters Island Sewage Treatment Works (SCISTW), i.e. covering sedimentation tanks, installation of deodouriser in SCISTW under HATS 2A

Three-step mitigation measures for odour control are taken at the existing sedimentation tanks of SCISTW:

1. Installation of fibreglass reinforced plastic (FRP) covers with a gas-seal design on the existing sedimentation tanks, flow channels and chambers;
2. Installation of an air extraction system to collect foul gas within the covered tanks, channels and chambers; and
3. Treatment of foul gas by "Biotrickling Filter" technology before discharge into open air. The "Biotrickling Filter" is a reliable and environmentally friendly biological odour removal technology with a low life-cycle cost and minimum operation and maintenance requirements. It can remove 99 per cent or more of hydrogen sulphide gas (H₂S), the main source of odour in STW, for effective odour control.



◆ 密封式沉澱池
Covered Sedimentation Tanks



◆ 生物滴濾塔
Biotrickling Filter