ENVIRONMENTAL OUTCOMES AND GAINS THROUGH THE STATUTORY ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

法定環境影響評估程序的環境成果與增益

Desalination Plant at Tseung Kwan O

將軍澳海水化淡廠

Minimise impact to Country Park by mixed use of flexible barriers, soils nails and rock slope stabilization in slope work

斜坡工程混合採用泥釘、礫石加固和擋石屏

Desalination plant not encroach directly upon any ecologically important habitats including country parks, natural woodlands and stream courses

海水淡化廠不會直接侵占任何重要的生態，包括郊野公園，天然林地和溪流

Adequate buffer distances of submarine utilities alignment from water / ecologically sensitive areas (e.g. coral communities)

海底設施與水/生態敏感區域（如珊瑚群）有足夠緩衝距離

Arrange mainlaying works along existing roads to reduce ecological impact

沿現有道路舖設輸水管，以減少對生態影響

Flexible barriers locate minimum 1.5m away from critically endangered plant *Marsdenia lachnostoma*

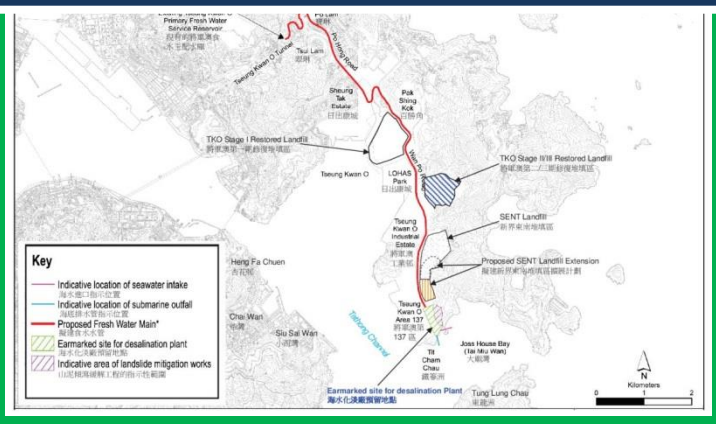
擋石屏障相距極度瀕危植物毛喉牛奶菜至少 1.5 米

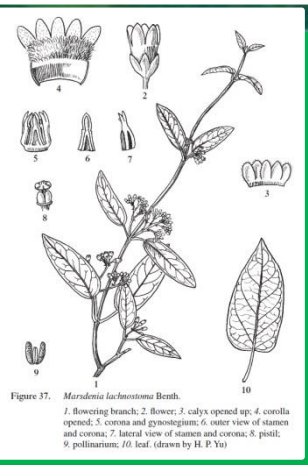
Locate chlorine store around the centre of the site to avoid risk from nearby explosive off-loading pier and to minimize risk to surrounding population at TKO

氯氣儲存倉約位於工程項目的中心位置，以避免來自附近爆炸品卸載碼頭的風險，及儘量減少對周邊將軍澳人口的風險

Trenchless method for construction of the submarine utilities to reduce extent and volume of seabed dredging (from 18,000m³ to 6,330m³)

以無坑挖掘法建造海底設施，減少海床挖掘的範圍和挖掘量（由 18,000m³ 減到 6,330m³）





QUICK LINKS 快速連結

Desalination Plant at Tseung Kwan O 將軍澳海水化淡廠

EIA Study Brief (No. ESB-266/2013) issued on 16 January 2014

EIA Report (No. AEIAR-192/2015) approved on 4 November 2015

EP (No. EP-503/2015) was granted on 4 December 2015

EP (No. EP-503/2015/A) was granted on 26 January 2018

環境影響評估研究概要 (編號：ESB-266/2013) 發出日期: 2014 年 1 月 16 日

環境影響評估報告 (編號：AEIAR-192/2015) 批准日期: 2015 年 11 月 4 日

環境許可證 (編號: EP-503/2017) 獲發日期: 2015 年 12 月 4 日

環境許可證 (編號: EP-503/2017/A) 獲發日期: 2018 年 1 月 26 日

Project Description 工程項目詳情

The Water Supplies Department proposes to develop a desalination plant using Reverse Osmosis (RO) at a site in Tseung Kwan O Area 137, which will produce potable water with an initial capacity of 135 million litre per day (MLD), expandable to an ultimate capacity of 270MLD in future. Comparing to the western waters in Hong Kong, the selected site locates at eastern waters in Hong Kong is oceanic in nature with less turbidity, lower SS levels and relatively consistent in quality with relatively less variation in salinity, which is beneficial to the operations of the desalination plant. The Project also includes the construction of an about 9 km of 1200 mm diameter fresh water mains along Wan Po Road, Po Hong Road and Tsui Lam Road, a new treated water pumping station and new treated water storage tank with estimated size about 22,500m^3.

水務署計劃在將軍澳 137 區建造一座海水化淡廠，採用逆滲透技術。海水化淡廠每日可生產 13.5 萬立方米食水，並可擴充至每日生產 27 萬立方米食水。位址選取香港的東部海域，相較於香港的西部海域，混濁度偏低、懸浮固體水平較低、水質和鹽度變化相對較少及水域屬海洋性，均有利海水化淡廠運作。工程項目亦會沿環保大道、寶康路和翠琳路鋪設約長 9 公里直徑 1200 毫米的輸水管道作；建造一個抽水站；一個能容納 22,500 立方米的淨水儲水池。

Nature of the Designated Project under EIA Ordinance“環境影響評估條例”指定工程項目的性質

The Project includes the following Designated Projects (DPs) under the Environmental Impact Assessment Ordinance (EIAO):

本工程項目包含以下《環境影響評估條例》(《環評條例》)的指定工程項目:

Schedule 2, Part I 附表 2 第 I 部分	● Item E.2- 項目 E.2-	Water treatment works with a capacity if more than 100,000 m^3 per day 濾水能力超過每天 100,000 立方米的濾水廠
	● Item K.13- 項目 K.13	A dangerous good godown with a storage capacity exceeding 500 tonnes 儲存容量超過 500 公噸的危險品倉庫
	● Item Q.1- 項目 Q.1-	Earthworks partly in an existing country park 部份位於現有的郊野公園內的土木工程

Key Environmental Issues 主要環境問題

Impacts 影響	Concerns 關注
Water Quality 水質	- Release of Suspended solid, organic sediment and from sea bed during dredging - Discharge of chemicals from RO concentrate including iron trichloride , sodium met bisulfite and anti-scalant , which increase oxygen demands - Rise in salinity due to discharge of reverse osmosis concentrate - 挖掘海牀釋放懸浮固體、擾動海牀有機沉積物 - 化學物包括三氯化鐵、偏亞硫酸氫鈉等化學藥劑及逆滲透薄膜的防水垢劑會隨逆滲透濃縮液排出大海, 增加需氧量 - 排放逆滲透濃縮液，增加鄰近海水鹽度
Ecology 生態	- Loss of 0.49 ha natural habitat inside Country Park Area - Loss of 0.11 ha seabed habitat due to dredging - A critically endangered species, *Marsdenia lachnostoma* , will be affected by slope maintenance flexible barrier - Interfere habitats of 5 birds species of conservation interest (Black Kite,

	Black-crowned Night Heron, White-throated Kingfisher, Collared Scops Owl and Lesser Coucal) - Inhibit growth of coral due to increase in salinity caused by discharge of RO concentrate - 失去 0.49 公頃位於郊野公園土地的自然生態 - 因挖掘而損失 0.11 公頃海牀原有生態 - 極度瀕危(CR)植物(毛喉牛奶菜)，會受建造擋石屏障影響 - 對五種具保育價值鳥類(包括黑鳶、夜鷺、白胸翡翠、領角鴞、小鴉鵑)的生態靠成滋擾 - 滲透濃液排放帶來的鹽度上升，影響珊瑚生長
Fisheries 漁業	- Impact on fishery ecology due to dredging - Loss of 0.11 Ha seabed habitat - Impact of high salinity from discharge of RO concentrate - Impingement and entrainment of fish larvae and egg at seawater intake - 施工期間因挖掘海牀，對海洋生態資源和漁業的影響 - 損失 0.11 公頃的海牀漁業生態環境 - 高鹽度的逆滲透濃縮液影響漁業生態 - 魚卵及魚苗被困於海水進水口的濾網或管道
Air Quality 空氣質素	- Odour from chemical sludge - 化學污泥的氣味
Noise 噪音	- Construction noise of mainlaying works along Wan Po Road, Po Hong Road and Tsui Lam Road impact on residence, schools and churches - Operation noise of the two pumping station in the plant - 沿環保大道、寶康路和翠琳路鋪設的食水輸水管的施工噪音影響住宅、學校及廟宇 - 海水化淡廠內兩個泵房的運作噪音
景觀及視覺影響	- 200 trees within the direct footprint of the desalination plant facilities will require felling - Visual Impact of permanent building on hikers and neighbor residents

	- 200 棵位於海水化淡廠設施範圍內的樹木會被砍伐 - 永久建築物影響遠足人士及鄰近居民的景觀
Hazard to Life 生命危害	- Chlorine leakage accident - 氯氣洩漏意外

Key Environmental Mitigation Measures 主要環境緩解措施

Impacts 影響	Measures 措施
Water Quality 水質	- Use micro-tunnelling machine for construction of the submarine utilities to reduce the extent of seabed dredging - Install silt curtains around closed grab dredgers to avoid suspended solid release - Choose anti-scalant with low toxicity, low phosphorus and low decomposition rate to avoid oxygen depletion or ecological damage - Maximum allowed dredging rate of the submarine outfall at 3,500 m3/day and that of seawater intake at 750 m3/day - 採用微型隧道鑽挖機來建造海底設施，減少挖掘海牀面積 - 安裝隔泥幕圍繞密封式抓斗挖泥機，避免懸浮物釋放 - 控制最高海牀挖掘速度，於出水口為每天 3500 立方米，入水口為每天 750 立方米 - 選用低毒性、低磷量、低分解速度的防水垢劑，避免海水缺氧，或影響生態
Ecology 生態	- Retain all individuals of *Marsdenia lachnostoma in-situ*, by positioning the alignment of flexible barriers at a minimum 1.5m in a radius away from these individuals. - Localized slope mitigation works with mixed use of flexible barrier, soil nail and rock slope stabilization to minimize the area damaged at the Clear Water Bay

	Country Park - Optimise the length and alignment of the submarine facilities to avoid key ecologically sensitive areas for coral communities and by applying the trenchless method with localised minor dredging for installing submarine intake and outfall to reduce potential impact on ecology and fisheries at Joss House Bay - 所有毛喉牛奶菜均會被保留於原地，擋石屏障會與該物種的半徑範圍相隔至少 1.5 米 - 採用局部斜坡鞏固工程方法配合泥釘、礫石加固和擋石屏障的混合工法，令清水灣郊野公園受損面積減至最少 - 改良海底設施的長度及走線以避開重要的珊瑚群敏感區域，並以無坑法裝設海底進出水管道，避免影響海洋生態及西貢大廟灣漁業
Fisheries 漁業	- Controlled water intake velocity at ≤ 0.5 feet per second - Adopt coarse screen size of 20 mm to 150 mm followed by fine screen size of 0.5 mm to 10 mm. - Seawater intake is located more than 2km away from recognised fish spawning and nursery grounds - 控制進水流速每秒 0.5 英尺或以下 - 進水口裝設網眼為 20 至 150 毫米的粗篩，隨後為 0.5 至 10 毫米的幼篩 - 進水口與最近的漁類養殖場，相距 2 公里以上，避免影響漁業生態
Air Quality 空氣質素	- Proper odour control measures , e.g. forced ventilation system - 妥善的氣味控制措施如通風系統
Noise 噪音	- Schedule construction work during long school holidays for those near educational institutions - Construct the freshwater mains in multiple works packages with restricted 40m per workfront (not more than 4 concurrent workfronts) - 受影響地區內教育設施敏感受體附近的建築工序會盡可能安排於學校長假期(例如暑假、復活節假期、聖誕假期等)

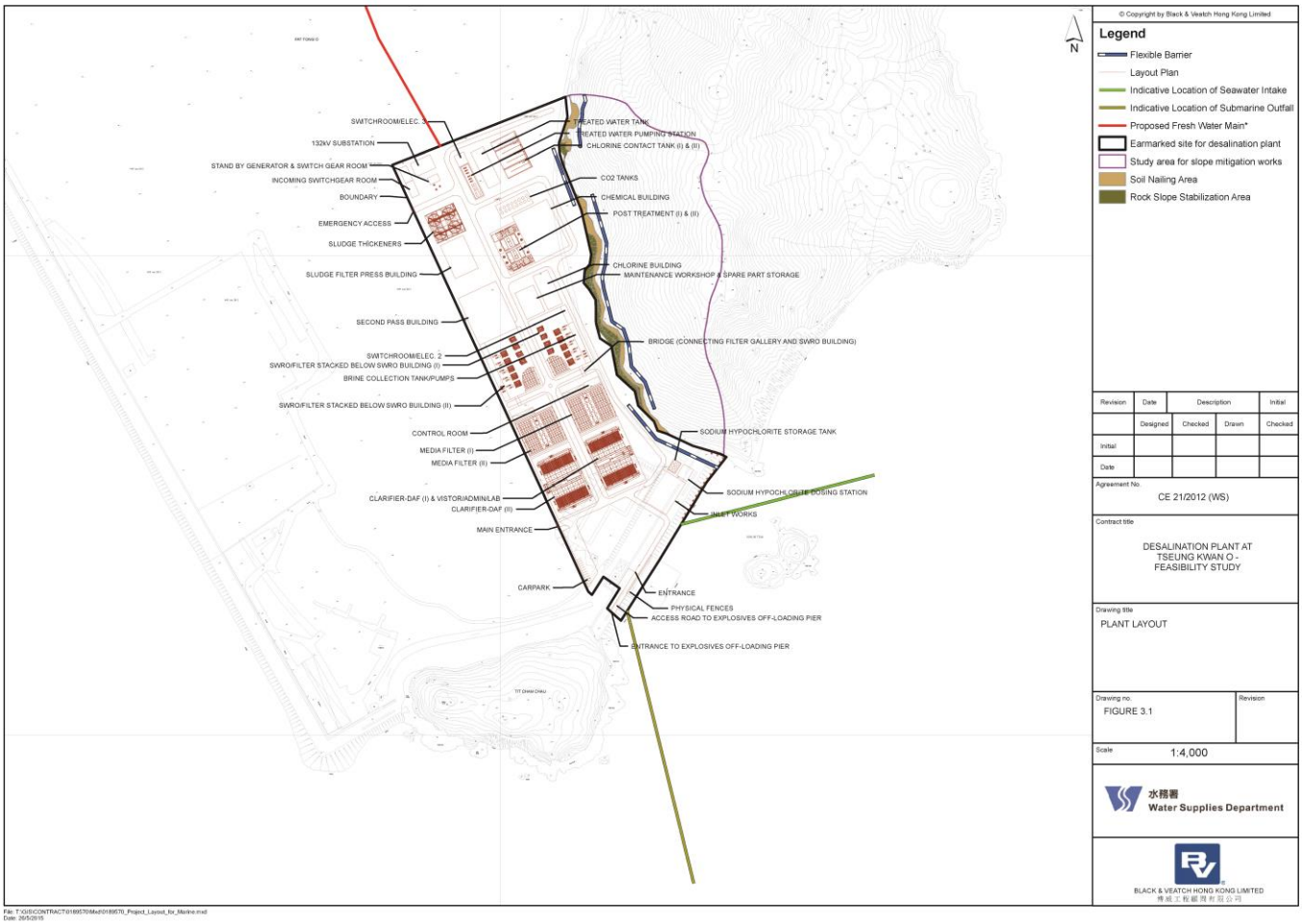
	- 食水水管須以多個工程組合分期施工，並限制每工程據點需相隔 40 米（不超過 4 個工程據點同時進行） - 海水化淡廠的全部設備都會放置於廠房內，並會完全封閉
Hazard to Life 生命危害	- Locating chlorine store around the centre of the site to avoid risk from nearby explosive off-loading pier and to minimize risk to surrounding population at TKO - 氯氣儲存倉約位於項目的中心位置，以避免來自附近爆炸品卸載碼頭的風險，及儘量減少對周邊將軍澳人口的風險
Landscape and Visual Impact 景觀及視覺影響	- Plant 300 numbers of heavy standard trees and light standard trees at the desalination plant site to compensate - Design facilities to blend with the existing landscape, conserve existing greenery and provide some soft landscaping, e.g. roadside planting - 在海水化淡廠內種植合共約 300 棵重標準樹及輕標準樹，以補償被砍伐的樹木 - 建築物的設計盡可能融合四周景觀；保留現有的草木或提供花卉樹林種植如路旁種植，以及採用與附近環境配合的顏色

Environmental Outcomes and Gains 環境成果與增益

1. Create New Source of Fresh Water 新增食水來源

- Provide alternative potable water source and alleviate the shortage of freshwater resources
- Reduce energy consumption and cost by seawater reverse osmosis (SWRO) comparing to multi-stage flash distillation (MSF) and avoid local emission of fossil fuel consumption

- 提供另一個食水來源。
- 選用海水逆滲透法（SWRO）相對多級閃蒸法（MSF）作海水化淡，消耗較少能量，經濟上相對可行。



海水化淡廠平面圖 Desalination Plant Layout

2. <u>Reducing Environmental Impact in the Vicinity 減少對附近環境的影響</u>

- Reduce the marine footprint of this project and the potential impacts on water quality, marine ecology and fisheries by the alignment and length design of submarine utilities and the use of micro-tunnel boring machine to reduce the extent of seabed dredging and dredging volume
- 透過設計海底設施的走線和長度，並配合微型隧道鑽挖機及無坑法來建造海底設施，縮減所需挖掘海牀範圍，減少了工程項目對水質、海洋生態和漁業的潛在影響

Links and References 連結與參考

Executive Summary 行政摘要

http://www.epd.gov.hk/eia/register/report/eiareport/eia_2292015/Front%20Page.htm

Environmental Impact Assessment Report 環境影響評估報告

http://www.epd.gov.hk/eia/register/report/eiareport/eia_2292015/Table%20of%20Content.htm

Environmental Monitoring & Audit Manual 環境監察及審核手冊

http://www.epd.gov.hk/eia/register/report/eiareport/eia_2292015/4_EM&A/0189570_EM&A%20Manual_20150720.htm

Environmental Permit 環境許可證

http://www.epd.gov.hk/eia/register/permit/latest/ep5032015.htm

http://www.epd.gov.hk/eia/register/permit/latest/vep5402018.htm

Advisory Council on the Environment - Environmental Impact Assessment Subcommittee

環境諮詢委員會-環境影響評估小組會議文件

http://www.epd.gov.hk/epd/sites/default/files/epd/english/boards/advisory_council/files/EIA-Paper-2-2015.pdf

http://www.epd.gov.hk/epd/sites/default/files/epd/Confirmed_minutes_130th%20EIASC.pdf#page=2

http://www.epd.gov.hk/epd/sites/default/files/epd/english/boards/advisory_council/files/ACE-209-minutes-web.pdf#page=18

Drawing of *Marsdenia lachnostoma* 毛喉牛奶菜繪圖

Retrieved from 擷取自 http://www.herbarium.gov.hk/subpages.aspx?id=8168

Bird-eye view photo Area 137 將軍澳 137 區鳥瞰圖

Retrieved from 擷取自 https://www.devb.gov.hk/tc/home/Blog_Archives1/index_id_174.html