Agreement No. CE 42/2005(WS)
Laying of Western Cross Harbour Main and Associated Land Mains from West Kowloon to Sai Ying Pun
– Investigation
合約編號：CE 42/2005(WS)
敷設由西九龍至西營盤之西區過海海底水管及與其相關的地下喉管
－勘測

Executive Summary
行政摘要

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1. INTRODUCTION

1.1 Background

The need for a new cross-harbour pipeline on the western part of the harbour has evolved from the requirement to provide security of water supply between Hong Kong and Kowloon. Specifically, it has been determined that 10 years' time, two of the existing four cross-harbour pipelines transferring portable supplies to Hong Kong Island will reach their design life of 50 years. There will be increasing risk of having one cross-harbour pipeline under maintenance while another pipeline has to be taken out of service without warning. It is therefore strategically important to lay a new cross-harbour pipeline on the western part of the harbour for maintaining the reliability of cross-harbour water transfer to Hong Kong Island.

The Project involves construction and operation of a new western cross harbour main and associated land mains. The route of the proposed Project is shown in **Figure 1.1**. The scope of the proposed Project comprises the following:

(i) approximately 2100-metre section of 1200mm nominal diameter of submarine watermain across Victoria Harbour from its connection at Lin Cheung Road in West Kowloon to the existing Sai Ying Pun Fresh Water Pumping Station in Sheung Wan (a designated project under EIA Ordinance);
(ii) approximately 2200-metre section of 1200mm nominal diameter of associated land mains (Not a designated project under EIA Ordinance).

The submarine watermain component (referred in Section 1.1(i) above) of the Project is a Designated Project under Schedule 2, Part I(E3) of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499) and an Environmental Permit (EP) issued under the EIAO is required for the construction and operation of the designated project.

An Environmental Impact Assessment (EIA) Study has been undertaken to provide information on the nature and extent of environmental impacts arising from the construction of the proposed designated project and related activities taking place concurrently and to contribute to decisions on the overall environmental acceptability of the Project.

This Exercutive Summary provides the key findings of the EIA Report, including an assessment of potential water quality, marine ecology, noise, waste, air quality, cutltural heritage and fisheries impacts from the construction and operation of the Project, and recommendations for mitigation measures to comply with environmental legislations and guidelines.

1.2 Consideration of Alternatives

1.2.1 Physical and Routing Constraints to the Alignment

Major installations and underground structures within the study area which are considered to be the physical constraints to the alignment of the proposed submarine watermain include the Kowloon South Salt Water Pumping Station and associated existing seawater intake culvert; tunnel structure and toll plaza of the Western Harbour Crossing; DSD's drainage

culvert next to Sai Ying Pun Fresh Water Pumping Station; and proposed submarine gas main between West Kowloon and Sai Ying Pun. The choice of landing points of the submarine watermain is limited by the locations of connection point to the existing water supply network in West Kowloon and the Fresh Water Pumping Station at Sai Ying Pun.

As shown in **Figure 1.1**, the proposed submarine watermain is bounded by the Western Cross Harbour Tunnel and the proposed submarine gas main to the east. The existing seawater intake culvert for Kowloon South Salt Water Pumping Station, Yau Ma Tei Typhoon Shelter and proposed West Kowloon Cultural District development at West Kowloon and the Western AFCD Wholesale Food Market at Sai Ying Pun also affect the land availability for the landing point of the submarine watermain. By considering the physical constraints discussed above, the most feasible landing points are at the waterfront area next to the Kowloon South Salt Water Pumping Station at West Kowloon and the waterfront area next to the existing AFCD Western Wholesale Food Market at Fung Mat Road of Sai Ying Pun, which would lead to the shortest alignment across the Victoria Harbour with the least marine traffic impact.

The submarine watermain is proposed to be laid across the Victoria Harbour at a minimum depth of approximately 6m below the dredged seabed level and to interface with land mains at the landing points in West Kowloon and Sai Ying Pun. The proposed horizontal alignment will keep a minimum separation distance of 50m as far as practicable from the existing or planned marine installations. As the alignment of the submarine watermain is mainly dictated by the locations of the landing points, where constraints have been illustrated and discussed above, therefore, the shortest and the most feasible route for this portion is straight between the dictated landing points as shown in **Figure 1.1** such that the impact on water quality would be minimized and impact on marine traffic is minimal.

1.2.2 Construction Methods

The methods commonly used to install submarine watermains include dredging to form the trench followed by “bottom pull”, “lay barge”or “float and sink” followed by backfilling to protect the pipeline or “horizontal directional drilling”.

For submarine watermain installations, dredging involves the removal of marine sediments from the seabed to form the trench, into which the submarine watermain are laid by possible methods including Bottom Pull, Lay Barge or the Float and Sink Method. Backfill material will be placed on top to protect the pipeline and minimize the cross section of dredging and backfilling works. The longitudinal profile and a typical cross section of the submarine watermain are provided in **Figure 1.2**. Design of the cross section and the resulting amount of marine sediments to be dredged from the seabed to form the trench will be the same no matter the Bottom Pull, Lay Barge or the Float and Sink Method is adopted for submarine watermain laying. Horizontal directional drilling involves taking the pipeline directly from the start to end point by underground drilling with no surface disturbance being necessary.

An analysis of different construction methods and techniques to minimise impacts on water quality, marine ecology, fisheries and waste was carried out.

Trench Excavation

Dredging techniques including grab dredging, cutter suction and trailer suction dredging are considered and chosen depending on the engineering, environmental and risks conditions. As the submarine watermain will be located across the Yau Ma Tei, Central and Southern Fairway, grab dredging is selected, as cutter suction and trailer suction dredging which requires a working area of over 150m in width, will result in an unacceptable impact on marine traffic and thus are not feasible. Suction dredging will also produce more marine sediment by volume when compared with grab dredging. Grab dredging is therefore the best practicable and feasible method to minimize dredging and dumping requirements and demand for fill sources.

Submarine Pipeline Installation

In the bottom pull method, pipes are joined to form pipe strings which are progressively pulled from a landfall site into a pre-dredged trench underwater by a winch set up at the landfall site at the other side of the waters until the crossing is complete. This method is one of the most common method for installation of medium to large diameter pipelines.

In the lay barge method, while the work barge moves along the pipeline, the pipes are progressively added to form a string, which are hung in a catenary from at the back of the barge, and are gradually lowered into the pre-dredged trench. As the lay barge method will introduce intolerable marine traffic impact due to its long suspended pipeline at sea during the installation, this method is considered not a feasible option.

In the float and sink method, lengths of pipe are made up into strings at a fabrication yard and these strings are launched to seabed from one of the landfall sites. These prefabricated pipe strings are temporarily stored on the seabed before towed by work barge at or below the water surface to the pre-dredged trench. By removing or filling water to the supporting buoyancy tanks, the pipe strings are sunk to its final position. This method is also one of the most common method for installation of medium to large diameter pipelines.

Backfilling

Cover of pipeline is required to provide adequate anchor protection. Backfilling material considered for the submarine pipeline trench include marine deposit 8 m or deeper or sand filling 5 m or deeper or armour rock layer 4.5 m thick with a 0.3 m thick grade 75 bedding. Pre-dredged trench is required for the pipe laying works, storage of dredged marine deposit for trench backfilling is considered not practicable. Moreover, the overall trench depth for marine deposit backfilling will be up to 9.5 m, this will also significantly increase the quantity of contaminated mud when compared with the armour rock option. Backfilling the trench with sand will induce significant disturbance on the existing marine environment and is considered environmentally unacceptable. Armour rock option is recommended as it can provide a strong protection to the pipeline away from the anchoring damage and requires the smallest pre-dredged trench which can minimize the disposal of both contaminated and uncontaminated dredged marine mud.

1.2.3 The Preferred Option

By comparing the pros and cons of the various construction methods, the preferred option is

trench excavation by grab dredging by one grab dredger and install the submarine watermain by the "bottom-pull method" followed by protection of the submarine piepeline by backfilling with 4.5m thick armour rock layer with a 0.3m thick grade 75 bedding layer.

2. PROJECT DESCRIPTION

The Project comprises the following:

(i) approximately 2100-metre section of 1200mm nominal diameter of submarine watermain across Victoria Harbour from its connection at Lin Cheung Road in West Kowloon to the existing Sai Ying Pun Fresh Water Pumping Station in Sheung Wan (a designated project under EIA Ordinance);

(ii) approximately 2200-metre section of 1200mm nominal diameter of associated land watermains (Not a designated project under EIA Ordinance).

The site boundary of the proposed Project covers three main areas, namely: Victoria Harbour, West Kowloon and Sai Ying Pun.

The works for Victoria Harbour (a designated project under EIA Ordinance) is envisaged to comprise an approximately 50m wide corridor across Victoria Harbour linking West Kowloon with Sai Ying Pun.

The works in West Kowloon (Not a designated project under EIA Ordinance) generally comprise the West Kowloon Reclamation Area adjacent to the Western Harbour Tunnel Toll Plaza, and are bounded by Jordan Road to its north and Lin Cheung Road to its east. The land uses in this portion include the land reserved for the West Kowloon Cultural District, the Kowloon Station Development, the Wui Cheung Road Bus Terminus, the Yau Ma Tei Public Cargo Working Area, and the Western Harbour Tunnel Toll Plaza. The proposed 1200mm diameter fresh watermain will be laid in this portion for connection to the existing 1200mm diameter fresh watermain at the junction of Lin Cheung Road or Wui Cheung Road.

In Sai Ying Pun (Not a designated project under EIA Ordinance), the works comprise Sai Ying Pun area adjacent to Western Wholesale Food Market and is bounded by the approaches of Western Harbour Crossing Interchange. The proposed 1200mm diameter fresh watermain will be laid in this portion for connection to the existing Sai Ying Pun Fresh Water Pumping Station situated at the junction of Water Street/Fung Mat Road.

This EIA report covers the designated project component of the Project.

The construction of the proposed Project is scheduled to commence in September 2008 for completion by May 2012.

3. ENVIRONMENTAL IMPACTS

The environmental impacts associated with the construction and operation of the submarine watermain are summarised in the following sections.

3.1 Water Quality

Key water sensitive receivers identified for construction phase of the submarine watermain include the New Yau Ma Tei Typhoon Shelter, coral communities at Green Island and Water Supplies Department's seawater intakes at the waterfront of Victoria Harbour. Water quality impact during dredging works for the installation of the submarine watermain was quantitatively assessed by water quality modelling. Suspended sediment was identified as the key water quality parameter during dredging. Water quality impact on the sensitive receivers during the entire duration of the dredging works and along the entire alignment with the maximum possible instantaneous working rate of $0.0463m^3s^{-1}$ (i.e. one grab dredger with a maximum production rate of $4,000m^3$ per day, 7 days per week, 24 hours per day for the complete simulation period of 90 days) for the dry and wet seasons was assessed and it was predicted that potential water quality impact would occur at the WSD Sea Water Intake at Kowloon South Salt Water Pumping Station.

With the implementation of the proposed mitigation measures in particular, the use of one grab dredger only with a maximum production rate of $4,000m^3$ per day for dredging, deployment of frame type silt curtain to fully enclose the grab while dredging works are in progress and deployment of silt screen at the sea water intake at Kowloon South Salt Water Pumping Station while dredging works are in progress and various good site practices associated with dredging, the potential water quality impact upon the sea water intake would be effectively minimised and there would be no unacceptable residual cumulative water quality impact due to the dredging works of the submarine watermain as well as the other concurrent marine works. The assessment predicted that the dredging works would have negligible impact upon the coral communities near Green Island.

High level of contamination in terms of arsenic (As), copper (Cu), lead (Pb), mercury (Hg), silver (Ag), polyaromatic hydrocarbons (PAHs) and polychlorinated biphenols (PCBs) were found at a couple of vibrocores along the alignment of the proposed submarine watermain. These contaminants pose a higher risk of water quality impact as they would be released into the marine water when the sediment was disturbed during dredging. Elutriate tests were carried out for these parameters and the results indicated their content fall within the relevant water quality standard except for As for 2 samples and Ag for one sample. As water quality sensitive receivers were not identified within the mixing zones, adverse water quality impacts are therefore not anticipated. Moreover, it is expected that any release of heavy metals during dredging will be quickly diluted by the large volume of marine water within the construction site. The release of pollutants will also be minimised by the use of closed grab dredger and the dispersion of pollutants will be confined within the construction site by the silt curtains. Thus, it is considered that long-term off-site water quality impact is unlikely and any local water quality impact will be transient and localised.

Minor potential water quality impacts from hydrostatic tests of the water mains systems and construction activities associated with the construction of the proposed submarine

watermain were associated with effluent, sewage, wastewater and surface runoff. Impacts could be controlled to comply with the WPCO standards by implementing the recommended mitigation measures. No unacceptable residual impact on water quality was expected.

No maintenance dredging is required for the future operation of the proposed submarine watermain. There would be no hydrodynamic impact as the operation of the submarine watermain would not involve reclamation or filling that affect the flow volume within the Victoria Harbour. There would also be no water quality impact during operation of the submarine watermain as no effluent due to operation of the submarine watermain is anticipated. Thus, no mitigation measures would be needed during operation of the proposed submarine watermain and no hydrodynamic and water quality impact is expected.

3.2 Marine Ecology

A desktop literature review was conducted to establish the baseline conditions and the general ecological profile. Information from the water quality assessment was also used to identify the effects of change in water quality on the marine ecology. Habitats including those in the intertidal zone (artificial seawalls and rocky shores), sub-tidal zone (soft-bottom and hard-bottom habitats), and the open sea (Victoria Harbour) within the assessment area together with the marine ecology around Green Island were described.

The marine ecological resources within the dredging area consist of pollution tolerant soft benthos in low diversity and typical to benthos recorded in poor quality sediments. Inter-tidal species along Victoria shorelines are common fouling organisms recorded at artificial seawall. Both the species diversity and abundance recorded are lower than those recorded in semi-exposed shore in Hong Kong. The marine ecology in Green Island is of moderate ecological value, with soft coral assemblages and larger size inter-tidal species recorded.

Direct impacts of permanent habitat loss and temporary disturbances to marine ecological resources from dredging and backfilling activities at the seabed and installation of pipeline by “bottom pull” method during construction phase will be of low to negligible significance, due to no rare species recorded within the affected area and in vicinity and the low ecological value of the marine benthos and the re-creatable artificial structures along the Victoria Harbour.

Indirect impacts through the changes to water flow regime, and perturbations of the surrounding water quality on the medium ecological value habitats at Green Island are anticipated to be negligible as the results of water quality modelling showed that the elevation of SS concentration and sedimentation rate around the Green Island waters is predicted to be less than $0.1 mgL^{-1}$ and $0.001 kgm^{-2}$ per day respectively, which are much lower than the tolerant levels for coral communities. In addition, due to the remoteness from the works area, the impacts to the marine environment in vicinity to Green Island are anticipated to be negligible.

The proposed dredging works will be confined in the works area within 25m at either side of the proposed alignment and the use of closed type grab dredger will reduce sediment and contaminants runoff to the water column. The trench will be backfilled with armour rock or decomposed granite and allow natural sedimentation on the substrates to provide protection

of the pipeline from damage by ship anchors. Benthic fauna is expected to be recolonized to the seabed after construction. Other mitigation measures suggested in the water quality impact assessment such as the use of one grab dredger only with a maximum production rate of 4,000m^3 per day for dredging, deployment of frame type silt curtain to fully enclose the grab while dredging works are in progress, deployment of silt screen at the sea water intake at Kowloon South Salt Water Pumping Station while dredging works are in progress and good site practices to avoid silt runoff from construction works associated with the construction of the submarine watermain could also further reduce the impact on the marine ecology. No other specific mitigation measures for marine ecology are considered necessary, as no adverse impact was identified.

The Study Area is not the distribution range of marine mammals and as low ecological value species are encountered in the region, the implementation of good site practices and mitigation measures for water quality impact are considered to be sufficient to minimize the impacts on the marine ecology. Thus, no specific mitigation measures are necessary for ecological sensitive receivers.

3.3 Noise

An assessment was undertaken to define the nature and scale of the potential noise impact to sensitive receivers at Sai Ying Pun and West Kowloon associated with the construction of the submarine watermain. The construction noise levels associated were predicted based on the plants likely to be used for trench dredging, laying of submarine watermain and backfilling and, the phasing of the construction programme were also considered.

The assessment predicted that the major construction activities associated with dredging, laying of watermains and backfilling may cause temporary noise impacts to the residential buidilngs in the Study Area. During normal daytime working hours, noise generated from the construction works fully comply with the noise criteria stipulated in the EIAO-TM and NCO. Without mitigation measures, it can be concluded that there will not be any adverse noise impact from the marine construction activities during daytime and evening (1900 to 2300 hours). No mitigation measure is therefore required but it is recommended that the Contrtactor shall take initiatives to further reduce the noise generated from the construction activities, including better management of work schedule, use of movable noise barriers, quality powered mechanical equipment (PMEs) and good site practices.

However, the predicted noise level at noise sensitive receivers including the Union Square and the Richwealth Mansion exceeds the Noise Criteria at night time (2300 to 0700 hours) for dredging works to be carried out close to the landfall sites. Dredging works are recommended not to be carried during night time as far as practicable. If night time dredging is deemed necessary and a Construction Noise Permit (CNP) was granted, the works should be scheduled to carryout at a location 750m away from the Sai Ying Pun landfall site and 450m from the West Kowloon landfall site along the pipeline trench as shown in **Figure 1.3**. Under such condition, the separation distances to the noise sensitive receivers are increased to more than 900m. The Noise Criteria at night time could then be complied with. The Contractor should strictly adhere to the restricted locations of dredging works at night time to ensure compliance with the relevant noise criteria. Better management of work schedule, use of movable noise barrier, quality PMEs and good site practices are recommended to

further reduce noise generated from the construction activities.

3.4 Waste Management

An assessment of the dredged marine sediment was carried out. A review of the sediment quality data from the marine site investigation indicated that the majority of the marine sediments to be dredged along the proposed submarine watermain were classified as Category L. The total dredged volume for the Project was estimated as 543,000m^3, of which 212,000m^3 of sediment was classified as requiring confined marine disposal. With the implementation of the recommended mitigation measures and procedures for management of dredged or excavated sediment are strictly followed, no residual waste impact was predicted.

Waste types generated by the construction activities are likely to include C&D material (from minor excavation works), general refuse from the workforce, and chemical waste from the maintenance of construction plant and equipment. Provided that these wastes are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts is not expected.

3.5 Air Quality

Potential air quality impacts arising from the construction and operation of the submarine watermain have been evaluated. As the number of construction plants involved in the submarine watermain laying activities at anytime on site would be limited, exceedance of Air Quality Objectives (AQOs) emissions of gaseous pollutants from these construction plants is not anticipated. The number of plants required on site for the construction of the landing points would also be limited. Dust impact and SO_2 and NO_2 emissions from plants and site vehicles would be minimal. With the implementation of appropriate dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation, together with proper maintenance of equipment and good site practices, adverse air quality impact is not anticipated.

No air quality impact is anticipated at the operational phase since there will not have any operational phase emissions.

3.6 Cultural Heritage

A comprehensive baseline review was undertaken to compile a comprehensive inventory of cultural heritage resources of the Study Area. No land based or a submerged cultural heritage resource was identified within the Study Area.

A Geophysical Survey which covered a 200m submarine watermain corridor was conducted to define the areas of greatest archaeological potential, assess the depth and nature of the seabed sediments to define which areas consist of suitable material to bury and preserve archaeological material and to map anomalies on the seabed which may be of archaeological potential. No indication of marine archaeological material was identified. Therefore, no impacts are expected from the installation of the cross harbour main and no mitigation measures are considered necessary.

3.7 Fisheries

Review of existing information on fisheries resources and fishing operations located within the Study Area have been undertaken. For capture fisheries, the results of Port Survey 2001/2002 shows that the waters within the Study Area are having low to medium adult fish production (>0 to 200kg/ha). The catches were at medium price in Hong Kong (HK$2000-5000/ha) in adult fish production. There is no fish fry collected within the Study Area. For the value of production, the Study Area are of low importance to capture fishing operations in Hong Kong. For culture fisheries, the closest AFCD designated Fish Culture Zone (FCZ) to the Study Area is located at Ma Wan which is approximately 10km away from the proposed cross harbour main. The Fishing Zones within the Study Area are characterised as mainly of medium to low value. The catches from these zones were composed of juvenile mixed fish species, which are used as fish feed in mariculture.

Although the submarine pipeline trench to be formed at the seabed is relatively long (approximately 2,100 metres in length), the affected area of fisheries resources is predicted to be temporary, small scale and localised to the works associated with formation of submarine pipeline trench at the seabed as a result of the "bottom-pull" and dredging operations. Although the submarine pipeline passes through areas with low to medium fisheries production and activities, impact to fishing activities in the area are not expected to be of concern due to the small area physically disrupted during the installation of the submarine pipeline and the short time frame of disturbance. Impact on future fishing operation is not anticipated as the armour rock will not protrude above the original seabed level. Ma Wan Fish Culture Zone which is the closest AFCD gazetted Fish Culture Zone to the Study Area is not predicted to be impacted by either suspended solids elevation, dissolved oxygen depletion or nutrient elevation as a result of the Project.

As potential impacts to fisheries resources and fishing operations arising from formation of the submarine pipeline trench at the seabed are predicted to be temporary, small scale and localised, they are not expected to cause adverse impacts to any fishing grounds or species of importance to the fishery. Impacts to fisheries resources and fishing operations have largely been avoided during construction through constraints on the works operations for installation of the submarine watermain. While no special mitigation measures are required for fisheries resources and fishing activities, good construction practice and associated measures were recommended in water quality assessment to control water quality impacts to within acceptable levels and are also expected to control impacts to fisheries resources.

4. ENVIRONMENTAL MONITORING AND AUDIT

An environmental monitoring and audit (EM&A programme) has been recommended for implementation during construction of the Project to ensure compliance with environmental legislation and standards during Project implementation.

Monitoring of construction noise and water quality is recommended during construction of the Project to verify the effectiveness of the mitigation measures and to obtain a robust, defensible database of baseline information of noise and water quality before construction, and thereafter, to monitor any variation of noise and water quality from the baseline conditions and exceedances of relevant noise criteria and water quality objectives (WQOs)

at the sensitive receivers during construction of the Project.

5. CONCLUSIONS

The EIA has provided information on the nature and extent of environmental impacts likely to arise from the construction and operation of the proposed submarine watermain of the Project. The EIA has, where required, proposed mitigation measures to ensure compliance with environmental legislation and standards.

Overall, the EIA Report concludes that the Project would be environmentally acceptable with the implementation of the proposed mitigation measures for construction and operation phases. An environmental monitoring and audit programme has been recommended to ensure the effectiveness of recommended mitigation measures.

832000 E | 832500 E | 833000 E | 833500 E | 834000 E | 834500 E | 835000 E

819000 N
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816500 N

833998.481 E
818266.058 N

832549.097 E
816866.963 N

連接現存標稱直徑爲1200毫米的食水管道
CONNECT TO EXISTING 1.2m DIAMETER WATER MAIN

連接現存西營盤食水抽水站
CONNECT TO EXISTING WSD'S FRESH WATER PUMPING STATION

維多利亞港 VICTORIA HARBOUR

NEW YAU MA TEI TYPHOON SHELTER
油麻地 YAU MA TEI
WEST KOWLOON HIGHWAY
JORDAN ROAD
WUI CHEUNG ROAD
AUSTIN ROAD WEST
HWM
WESTERN HARBOUR CROSSING
西營盤 SAI YING PUN
SHEUNG WAN
中環 CENTRAL DISTRICT

圖例:
LEGEND:

FV 擬敷設標稱直徑為1200毫米的過海食水管道
PROPOSED DN1200 SUBMARINE WATER MAIN

擬敷設標稱直徑為1200毫米的地下管道
PROPOSED DN1200 LAND WATER MAIN
(NOTE: THE ALIGNMENT IS SHOWN FOR REFERENCE ONLY AND IT IS NOT PART OF THE DESIGNATED PROJECT COVERED UNDER THIS EIA STUDY)

Rev	Date	Drawn	Description	Ch'k'd	App'd
P3	05/06	LYK	PRELIMINARY	CMH	RH
P2	04/06	LYK	PRELIMINARY	CMH	RH
P1	04/06	LYK	PRELIMINARY	CMH	RH

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THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION
WATER SUPPLIES DEPARTMENT

Contract No. CE42/2005(WS)

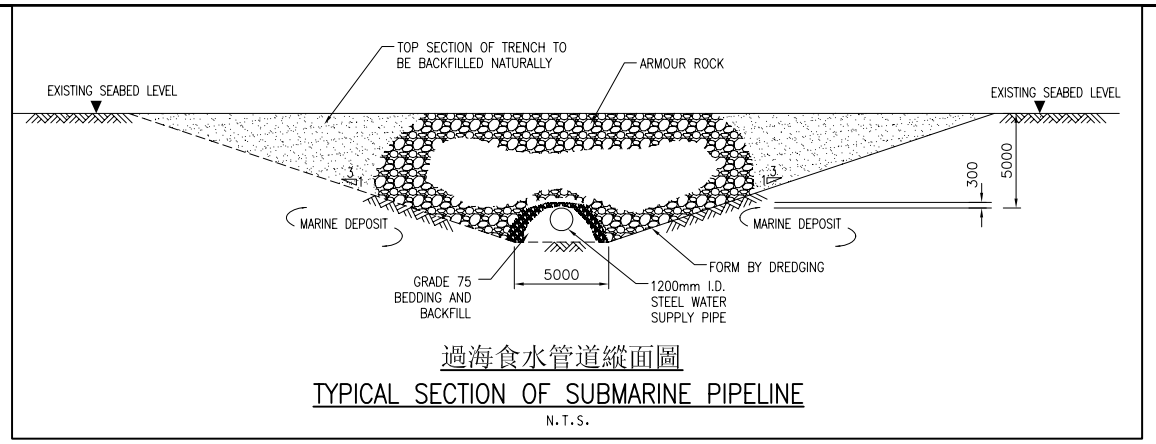
Project
敷設由西九龍至西營盤之西區過海海底水管及其相關的地下喉管
LAYING OF WESTERN CROSS HARBOUR MAIN AND ASSOCIATED LAND MAINS FROM WEST KOWLOON TO SAI YING PUN – INVESTIGATION

Title
擬建水管路線示意圖
INDICATIVE ROUTE OF THE PROPOSED WATERMAINS

Designed	RH		Eng.Chk.	CMH	
Drawn	LYK		Coordination	----	
Dwg.Chk.	----		Approved		

Scale 1 : 5000@A1
Project 226133
Status
CAD File J:\226133\SZ\070330 pm\226133\REPORT\EM\ES-REPORT(070330)\FIGURE 1.1\226133-FIG
Drawing No. 圖 1.1
FIGURE 1.1
Rev P3

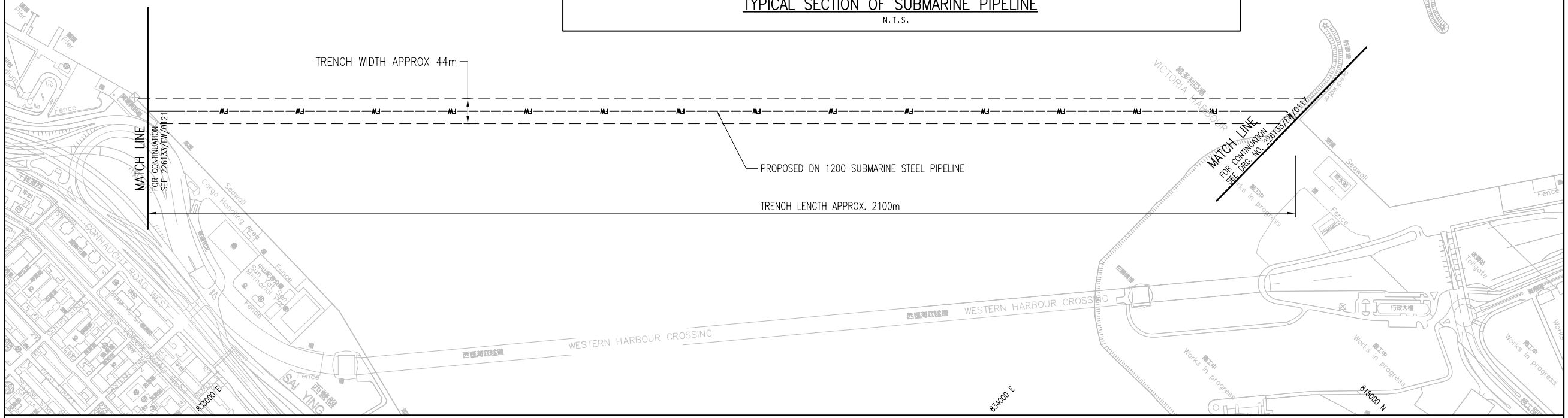
J:\226133\SZ\070330 pm\226133\REPORT\DWG\ES-REPORT(070330)\FIGURE 1.1.dwg / 02/04/2007 15:34 / wm24137

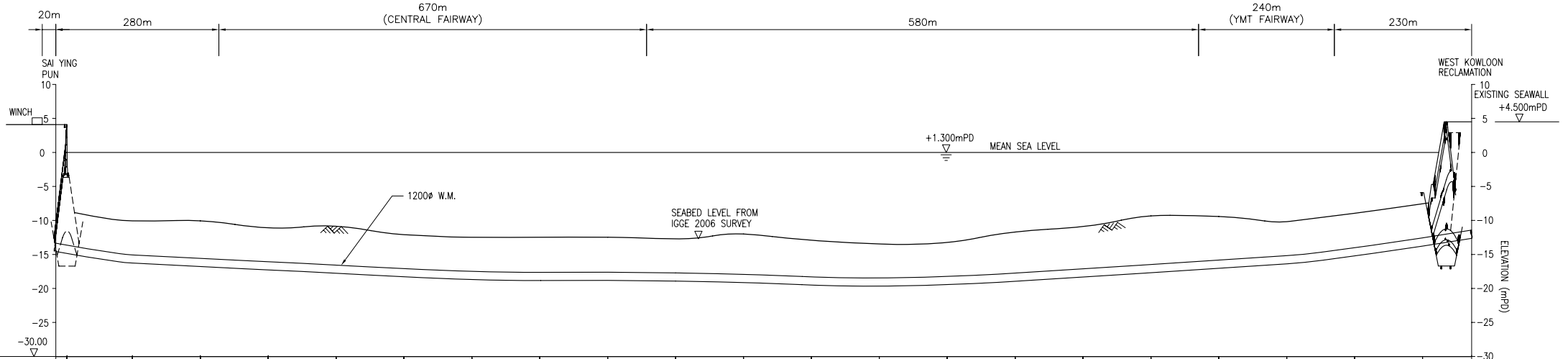


過海食水管道縱面圖

TYPICAL SECTION OF SUBMARINE PIPELINE

N.T.S.





PIPE CHAINAGE (m)	CH-S 1996	CH-S 1900	CH-S 1800	CH-S 1700	CH-S 1600	CH-S 1500	CH-S 1400	CH-S 1300	CH-S 1200	CH-S 1100	CH-S 1000	CH-S 0900	CH-S 0800	CH-S 0700	CH-S 0600	CH-S 0500	CH-S 0400	CH-S 0300	CH-S 0200	CH-S 0100	CH-S 0000
GROUND LEVEL (mPD)	4.09	-10.07	-10.06	-11.08	-10.85	-12.08	-12.48	-12.47	-12.47	-12.71	-12.00	-12.91	-13.47	-13.23	-11.70	-10.69	-9.33	-9.42	-10.18	-8.94	-7.55
PIPE INVERT LEVEL (mPD)	-14.86	-16.27	-16.78	-17.28	-17.78	-18.29	-18.69	-18.83	-18.82	-18.91	-19.13	-19.50	-19.67	-19.43	-18.94	-18.32	-17.69	-17.04	-16.38	-15.22	-13.77
PIPE FITTINGS																					
GRADIENT OF PIPE																					
TYPE AND SIZE OF PIPES	DN1200 SUBMARINE STEEL PIPE WITH CONCRETE WEIPHT COAT																				
REMARK																					

圖例:

LEGEND:

FW 擬敷設的過海食水管道
PROPOSED SUBMARINE WATER MAIN

管槽挖泥工作的範圍
EXTENT OF TRENCH DREDGING WORK

Rev	Date	Drawn	Description	Ch'k'd	App'd

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客戶 Client

香港特別行政區政府水務署
THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION WATER SUPPLIES DEPARTMENT

合約編號 Contract No. CE42/2005(WS)

工程項目 Project

敷設由西九龍至西營盤之西區過海海底水管及其相關的地下喉管
LAYING OF WESTERN CROSS HARBOUR MAIN AND ASSOCIATED LAND MAINS FROM WEST KOWLOON TO SAI YING PUN – INVESTIGATION

名稱 Title

擬建海底水管之平面圖,縱面圖及橫面圖
PLAN VIEW PROFILE AND CROSS SECTION OF PROPOSED SUBMARINE WATERMAIN

Designed	JY		Eng.Chk.	MT	
Drawn	LYK		Coordination	SHC	
Dwg.Chk.	MT		Approved	SHC	

比例尺 Scale 1 : 4000@A1

Project 226133

CAD File J:\226133\REPORT\ENV\ES-REPORT(070330)\FIGURE 1.2 & 1.3\226133-figure-1.2.dwg

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Drawing No. 圖 1.2
FIGURE 1.2

Rev

J:\226133\REPORT\ENV\ES-REPORT(070330)\FIGURE 1.2 & 1.3\226133-figure-1.2.dwg / JU/03/2007 12:26 / ACAD

832000 E
832500 E
833000 E
833500 E
834000 E
834500 E
835000 E
819000 N
818500 N
818000 N
817500 N
817000 N
816500 N

833998.481 E
818266.058 N

832549.097 E
816866.963 N

450m
750m

維多利亞港 VICTORIA HARBOUR

NEW YAU MA TEI TYPHOON SHELTER
油麻地 YAU MA TEI
WEST KOWLOON HIGHWAY
Pump House
MA TAU CHUNG STREET
JORDAN ROAD
Kowloon Station
City Golf Club
WUI CHEUNG ROAD
AUSTIN ROAD WEST
Tollgate
Seawall
Fence
Works in progress
HWM
Pier
TYPHOON SHELTER
Floating Ferry Pier
China Ferry Terminal
Pacific Club Kowloon
Pumping Station
Wharf
Ocean Terminal
WESTERN HARBOUR CROSSING
Cargo Handling Area
Sun Yat Sen Memorial Park
SAI YING PUN
KING MAY ROAD
GONNAUGHT ROAD WEST
Whole Sale Food Market
Podium
Shun Tak Centre
HK-Macau Ferry Terminal
Sea
Government Pier
Pier 3
Pier 4
Pier 5
Pier 6
Pier 7
SHEUNG WAN
CENTRAL DISTRICT
Wing On Centre
Ferry Piers

圖例:
LEGEND:

FV 擬敷設標稱直徑為1200毫米的過海食水管道
PROPOSED DN1200 SUBMARINE WATER MAIN

晚間挖泥區
NIGHT-TIME DREDGING ZONE

Rev	Date	Drawn	Description	Ch'k'd	App'd

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WATER SUPPLIES DEPARTMENT

合約編號 Contract No. CE42/2005(WS)

工程項目 Project
敷設由西九龍至西營盤之西區過海海底水管及其相關的地下喉管
LAYING OF WESTERN CROSS HARBOUR MAIN AND ASSOCIATED LAND MAINS FROM WEST KOWLOON TO SAI YING PUN – INVESTIGATION

名稱 Title
晚間挖泥區位置圖
LOCATION OF NIGHT-TIME DREDGING ZONE

Designed	RH		Eng.Chk.	CMH	
Drawn	LYK		Coordination	----	
Dwg.Chk.	----		Approved		

比例尺 Scale 1 : 5000@A1

Project 226133

Status

CAD File J:\226133\REPORT\ENV\ES-REPORT(070330)\FIGURE 1.2 & 1.3\226133-FIGURE-1.3.dwg

Drawing No. 圖 1.3
FIGURE 1.3

Rev

J:\226133\REPORT\ENV\ES-REPORT(070330)\FIGURE 1.2 & 1.3\226133-FIGURE-1.3.dwg / 30/03/2007 12:21 / WCJS