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1. INTRODUCTION

1.1 Project Background

- 1.1.1 In 2002, the Environmental Protection Department (EPD) carried out the Outlying Islands Sewerage Master Plan Stage 2 Review, and completed the Preliminary Project Feasibility Study for Outlying Islands Sewerage Stage 2 (hereinafter referred to as “PPFS”).
- 1.1.2 In February 2008, Drainage Services Department (DSD) commenced the Investigation Stage of “Upgrading of Cheung Chau and Tai O Sewage Collection, Treatment and Disposal Facilities” under Agreement No. CE 31/2007 (DS) by commissioning a consultant to carry out review on the conclusions and recommendations of the PPFS report, surveys, investigations, impact assessments, preliminary environmental review and preliminary design of the recommended works (hereinafter referred to as “Investigation Consultancy”).
- 1.1.3 In December 2010, DSD commissioned Atkins China Limited (ACL) to undertake Design and Construction of “Upgrading of Cheung Chau and Tai O Sewage Collection, Treatment and Disposal Facilities” under Agreement No. CE 15/2010 (DS).
- 1.1.4 An Environmental Impact Assessment (EIA) Study Brief No. ESB-212/2009 was issued to cover the Upgrading of Cheung Chau Sewage Collection, Treatment and Disposal Facilities (hereinafter refers to as “the Project”). The EIA Study covers the following main works elements:
- Expansion of the sewage treatment capacity and upgrading of the treatment level of the existing Cheung Chau Sewage Treatment Works (STW);
 - Expansion of the pumping capacity of the existing Pak She Sewage Pumping Station (SPS) and construction of a new SPS at Kwun Yam Wan;
 - Upgrading of some existing sewers and construction of some new sewers in various necessary locations in Cheung Chau; and
 - Construction of effluent reuse facilities within the Cheung Chau STW.
- 1.1.5 The purpose of this EIA study is to assess the environmental issues arising from the construction and operational phases of the Project, and to recommend appropriate mitigation measures for all identified adverse environmental impacts.

2. PROJECT DESCRIPTION

2.1 Project Location and Brief Description

- 2.1.1 The Cheung Chau STW is located at the western side of the Cheung Kwai Estate. It is currently a primary treatment works with design capacity of 4,000 m³/day. Upon completion of the Project, it will be increased to a capacity of 9,800 m³/day with secondary treatment level. A Membrane-bioreactor (MBR) type sewage treatment plant will be adopted. Effluent reuse would be proposed for non-potable use within the Cheung Chau STW including toilet flushing and process cleansing.
- 2.1.2 Existing Pak She SPS was commissioned in 1984 and is located at the junction of Pak She Praya Road and Ping Chong Road, opposite to the Cheung Chau Fire Station. The current pumping capacity of Pak She SPS is 29,376 m³/day (340 L/s). Upon completion of the Project, it will be increased to a capacity of 42,336 m³/day



(490 L/s).

2.1.3 The original Kwun Yam Wan SPS scheme proposed under the Investigation Consultancy is not recommended due to potential adverse environmental impacts arising from close proximity of the proposed SPS to the adjacent Kwun Yam Wan Beach. The land resumption required and the operation and maintenance difficulties of the Kwun Yam Wan SPS also made it not preferable. Therefore, the proposed Kwun Yam Wan SPS has been eliminated under the Project. A Deep Sewer Option has been proposed to replace the SPS scheme by constructing a 700 m long underground gravity sewer to collect sewage from Kwun Yam Wan to the existing sewerage along Cheung Chau Praya Street.

2.1.4 Sewers works in Cheung Chau includes:

- Upgrading of approximately 120 m long existing sewer of size 150 mm to 400 mm diameter;
- Rehabilitation of approximately 160 m long existing sewer of size 525 mm diameter;
- Construction of approximately 7,500 m long of new sewer with size 150 mm to 400 mm diameter in village areas by open cut method; and
- Construction of approximately 300 m long of new deep sewer with size Twin 400 mm to Twin 500 mm diameter along Cheung Chau Sports Road and Tung Wan Road by trenchless method.

2.1.5 Under Part I, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO), the Project consists of the following Designated Projects (DP):

- (a) Upgrading of the existing Cheung Chau STW – under Item F.2 which is *Sewage Treatment Works with an installed capacity of more than 5,000 m³/day and a boundary less than 200 m from the boundary of a residential area*;
- (b) Upgrading of the existing Pak She SPS – under Item F.3 which is *Sewage Pumping Station with an installed capacity of more than 2,000 m³/day and a boundary less than 150 m from the boundary of a residential area*; and
- (c) Upgrading of the existing Cheung Chau STW – under Item F.4 which includes *an activity for the reuse of treated sewage effluent from a treatment plant*.

2.1.6 The works for this Project in Cheung Chau are shown in Layout Plan of **Figure 2.1**.

2.2 Purpose and Objectives of the Project

2.2.1 Currently there are areas in Cheung Chau not provided with public sewerage system. Sewage and greywater generated from most of these village houses are disposed of at septic tanks that regular maintenance is required, and in some occasions they are even discharged directly into surface drainage system. In addition, the existing Cheung Chau STW is a primary treatment facility which would be inadequate to cope with the population growth and future development. In this regard, there is a need to improve this situation.

2.2.2 The Project is to improve the coastal water quality to the northwest of Cheung Chau by upgrading of existing sewers and provision of new sewers where practicable within the catchment, upgrading of the existing primary treatment plant to a secondary STW and expand the STW to cope with the population growth and future developments to improve the hygiene conditions at Cheung Chau.



2.3 Project Implementation Programme

2.3.1 The tentative implementation schedule for different works packages is presented in **Table 2.1** below.

Table 2.1 : Tentative Implementation Schedule for Different Works Packages

	Package 1 Cheung Chau STW and Pak She SPS Upgrading	Package 2 Cheung Chau Sewers Works
EIA Endorsed	Nov 2013	
Scheme Gazette under WPC(S)R	-	May 2014
Scheme Authorization	-	Aug 2014
Tender Gazette	May 2014	Apr 2015
Contract Commencement	Sep 2014	Aug 2015
Contract Completion	Mar 2019	Mar 2019

3. KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Air Quality

3.1.1 Construction dust generating activities were identified and evaluated. Mitigation measures including proper watering of on-site construction area and good practices on dust control measures are recommended. Model simulation results show that the fugitive dust emissions are minimized and the dust levels are limited to acceptable levels by implementing the recommended mitigation measures.

3.1.2 The operation of Cheung Chau STW and Pak She SPS are the main potential odour emission sources. The upgrading works will include the installation of better odour control for these facilities to avoid or minimize potential odour nuisance. Upon completion of the upgrading works, all potential odour generating components of the facilities will be enclosed, and odourous gas will be ventilated to the deodorization units for further treatment before discharge. During sludge transportation, it is recommended that the sludge should be carried by closed container to avoid or minimise odour nuisance.

3.1.3 With the above measures, odour impact should be insignificant. An Environmental Monitoring and Audit (EM&A) programme will be implemented to ensure the continuing effectiveness of the odour control installations.

3.2 Noise

3.2.1 Concurrent construction noise impacts from the Project, including the Cheung Chau STW and Pak She SPS upgrading works and sewers works have been assessed. A theoretical worst case in construction noise assessment has been undertaken with consideration of cumulative impacts arising from other projects proposed in the vicinity of the study area.



- 3.2.2 Construction noise control measures such as adopting quiet plant, use of temporary barriers along site boundary of the Cheung Chau STW and Pak She SPS, employing movable barrier close to construction plants and good scheduling of works, etc., have been recommended to minimise construction noise.
- 3.2.3 With the above measures, noise impact is not anticipated during the Cheung Chau STW and Pak She SPS upgrading works. However, for the sewers works, predicted noise level would exceed the noise criteria at some isolated occasions for certain NSRs that are in close proximity to the proposed sewers works. This residual impact is expected to be localised, temporary, reversible, and the actual impact can be minimized through proper phasing of works and properly managed construction schedule. A systematic EM&A programme will be carried out to ensure proper implementation of both construction phase mitigation measures and the construction schedule of the sewers works.
- 3.2.4 Noise impacts due to the upgraded Cheung Chau STW and Pak She SPS during the operational phase are not anticipated as proper acoustic treatment, including silencer and acoustic louvre would be provided. Basic building design such as avoiding opening or louvres facing the nearest NSR would also be adopted. Noise commissioning test for all major fixed noise sources is recommended and the requirements would be included in the contract documents.

3.3 Water Quality

- 3.3.1 Potential water quality impacts during construction phase will be mainly associated with land-based construction that may result from site runoff and sewage from the construction workforce. Effluent will be controlled to comply with the WPCO standards by implementing the mitigation measures recommended on the basis of ProPECC Note (PN1/94) for Construction Site Drainage. Adverse water quality impact is not expected.
- 3.3.2 Improvement in water quality of surrounding water body due to the operation of the Project is anticipated. Assessment of water quality impact was made using the Delft3D model. Generally, the proposed Cheung Chau STW upgrading would result in a reduction in concentration of TIN, UIA, SS, BOD5 and *E. coli*. under normal operation of the Cheung Chau STW. This is mainly attributable to the improved treatment efficiency of upgraded facility and better quality of the upgraded Cheung Chau STW effluent, resulting in a reduction in pollutant loads into the marine water.
- 3.3.3 Upon upgrading of the Pak She SPS, emergency overflow of raw sewage from the Pak She SPS will be diverted to Cheung Chau STW. Therefore, the potential water quality impact on Cheung Chau receiving water body due to emergency overflow of Pak She SPS will be eliminated.
- 3.3.4 The assessment of potential impacts associated with the emergency discharge from the Cheung Chau STW was conducted although emergency discharge is rare. The prediction results show that the impact of emergency discharge would be limited only to local areas. The potential impact would disappear rapidly and sharp concentration of water quality variables such as *E. coli* would return to their normal levels in less than 12 hours after the emergency discharge of 9,800 m³/day flow for 6 hours. Impact to more distant WSRs would be extremely small and insignificant.

3.4 Waste Management

- 3.4.1 Waste types generated by the construction activities include C&D materials, general refuse from the workforce, and chemical wastes from the replacement of



construction plants and equipments. Wastes generated during the operation activities include screenings, silt and debris, grits and dewatered sludge and chemical waste. Provided that these wastes are handled, transported and disposed of using approved methods and that the recommended good site practices are followed, adverse environmental impacts are not anticipated during the construction and operation phases.

3.5 Land Contamination

- 3.5.1 The land contamination assessment was undertaken by reviewing historical and current land uses and site reconnaissance. Based on the findings of the site appraisal, there were potential contaminated sites at the shipyard and the machinery repairing and recycling workshops for ship along Ping Chong Road and Pak She Praya Road. However, as there are no excavation works within the contaminated site, no potential contaminated soils would be disturbed. The impacts of land contamination are not expected during the construction phase of the Project.
- 3.5.2 The operation of the Project will not cause potential land contamination. No operational contamination impacts are anticipated.

3.6 Ecology

- 3.6.1 No important habitat or optimal habitats of fauna species of conservation importance will be lost due to the Project as all works will be located within developed land. The overall ecological impact is ranked as minimal and the residual impact is considered acceptable with respect to EIAO-TM.
- 3.6.2 Besides good site practices, no other major mitigation measure for ecology is required. With the regular site inspection performed under the Environmental Monitoring and Audit Programme, no specific ecological monitoring programme is needed.

3.7 Fisheries

- 3.7.1 The fisheries baseline condition has been established within the assessment area and assessment of potential impacts has been conducted in accordance with the EIAO-TM requirements. All construction works would be land-based and no works would be carried out in the marine or intertidal environment. No significant adverse fisheries impacts are anticipated and no specific fisheries EM&A programme would be required. Upon completion of this Project, the water quality and hence the habitat quality for fisheries resources is expected to be improved.

3.8 Cultural Heritage

- 3.8.1 No impacts on archaeology or built heritage will occur due to the Cheung Chau STW and Pak She SPS upgrading works. Thus, no specific mitigation measures are required.
- 3.8.2 An Archaeological Watching Brief programme during construction phase was recommended for the sewers works within Tung Wan Site of Archaeological Interest. In order to better protect the Cheung Chau Rock Carving which is a Declared Monument, a buffer zone is required to ensure that the Declared Monument and its environs are not infringed upon during the construction works.
- 3.8.3 There are graded and non-graded historical buildings identified near the proposed sewers works. None of the buildings will be infringed upon during the construction works. Protective measures include condition survey, vibration monitoring, provision



of buffer zone, protective covering, and safe public access.

3.9 Landscape and Visual

- 3.9.1 Landscape and visual impact assessment has been carried out for the proposed upgrading of the Cheung Chau STW to be constructed within the boundary of the existing Cheung Chau STW.
- 3.9.2 Landscape Resources (LRs), Landscape Character Areas (LCAs) and Visually Sensitive Receivers (VSRs) have been identified within the study area to assess the landscape and visual impacts arising from the proposed expansion and upgrading of the Cheung Chau STW. After mitigation, residual landscape and visual impacts are considered to be “Slight” and “Insubstantial”. With reference to the criteria defined in EIAO-TM, landscape and visual impacts in the construction and operation phases arising from the proposed works is considered as acceptable.
- 3.9.3 All the upgrading works of Pak She SPS will be constructed within the existing superstructure of the SPS. Landscape and visual impact during construction and operation stage is therefore considered to be negligible.
- 3.9.4 For the sewers works, the proposed new and upgrading of sewers will mainly be laid underground along the existing carriageway, footpaths and paved tracks. The construction works will be carried out section by section in a local area with a short period of time, in order to reduce the disturbance to the surrounding areas and nearby residents. The works area will be reinstated to its original conditions. Residual landscape and visual impact is considered to be negligible.

3.10 Environmental Monitoring and Audit

- 3.10.1 An Environmental Monitoring and Audit (EM&A) Manual and an Environmental Mitigation Implementation Schedule (EMIS) have been prepared to monitor and audit the relevant air quality, noise, water quality, waste management, cultural heritage impacts, and landscape and visual impacts. Event and action plan for the potential environmental impacts has been formulated and stated in the EM&A Manual.

4. KEY ENVIRONMENTAL OUTCOMES OF THE PROJECT

4.1 Environmental Benefits of the Project and the Environmental Protection Measures Recommended

- 4.1.1 The sewage treatment level of the Cheung Chau STW will be upgraded from primary to secondary and the capacity will be expanded to cope with the population growth and future developments. Discharge of low quality effluent to the receiving water body will be reduced and hence will improve the coastal water quality of Cheung Chau. Furthermore, hygiene problems within the catchment areas arising from the use of septic tanks will be largely relieved with provision of public sewers to currently unsewered villages, where practicable.

4.2 Population and Environmentally Sensitive Area Protected

- 4.2.1 The marine waters near Cheung Chau are protected by the improved treatment standard and treatment capacity of the Cheung Chau STW and the elimination of overflow from Pak She SPS. The residential areas and village houses which are currently unsewered are also protected by provision of new sewers under this Project.



4.3 Environmentally Friendly Designs Recommended

- 4.3.1 The Deep Sewer Option instead of Kwun Yam Wan SPS would eliminate any potential environmental impacts arising from the construction of a new SPS adjacent to Kwun Yam Wan Beach and the need of private land resumption.
- 4.3.2 For Cheung Chau STW and Pak She SPS, the provision of standby parts and standby power sources improve the reliability of the sewage treatment and disposal system, while the provision of deodorizing units could reduce the possible odour impact to adjacent sensitive receivers. In the design of Cheung Chau STW, non-potable reuse of treated effluent within the STW site will be proposed to reduce the consumption of potable water. The facilities of the upgraded Cheung Chau STW are so arranged as to minimize disturbance to the existing trees within the STW and more trees will be planted within the upgraded STW to enhance greenings and improve the visual appearances.

4.4 Key Environmental Problems Avoided

- 4.4.1 Potential deterioration of effluent quality of the existing Cheung Chau STW due to ageing problem of the facilities will be avoided by the proposed upgrading of the sewage treatment level and increasing the existing capacity of the STW. The hygiene problems arising from the use of septic tanks will also be largely relieved by the provision of public sewers to currently unsewered village, where practicable. Furthermore, potential sewage overflow to Cheung Chau receiving water body will be eliminated by the proposed upgrading works for Pak She SPS.

5. CONCLUSION



- 5.1.1 Upon completion of the proposed upgrading works, there will be improvement in water quality of the water body around Cheung Chau. The EIA study concludes that with incorporation of the recommended mitigation measures and proper implementation of the EM&A programme, the Project will not impose adverse impacts on the neighbouring environment during construction and operational phases.

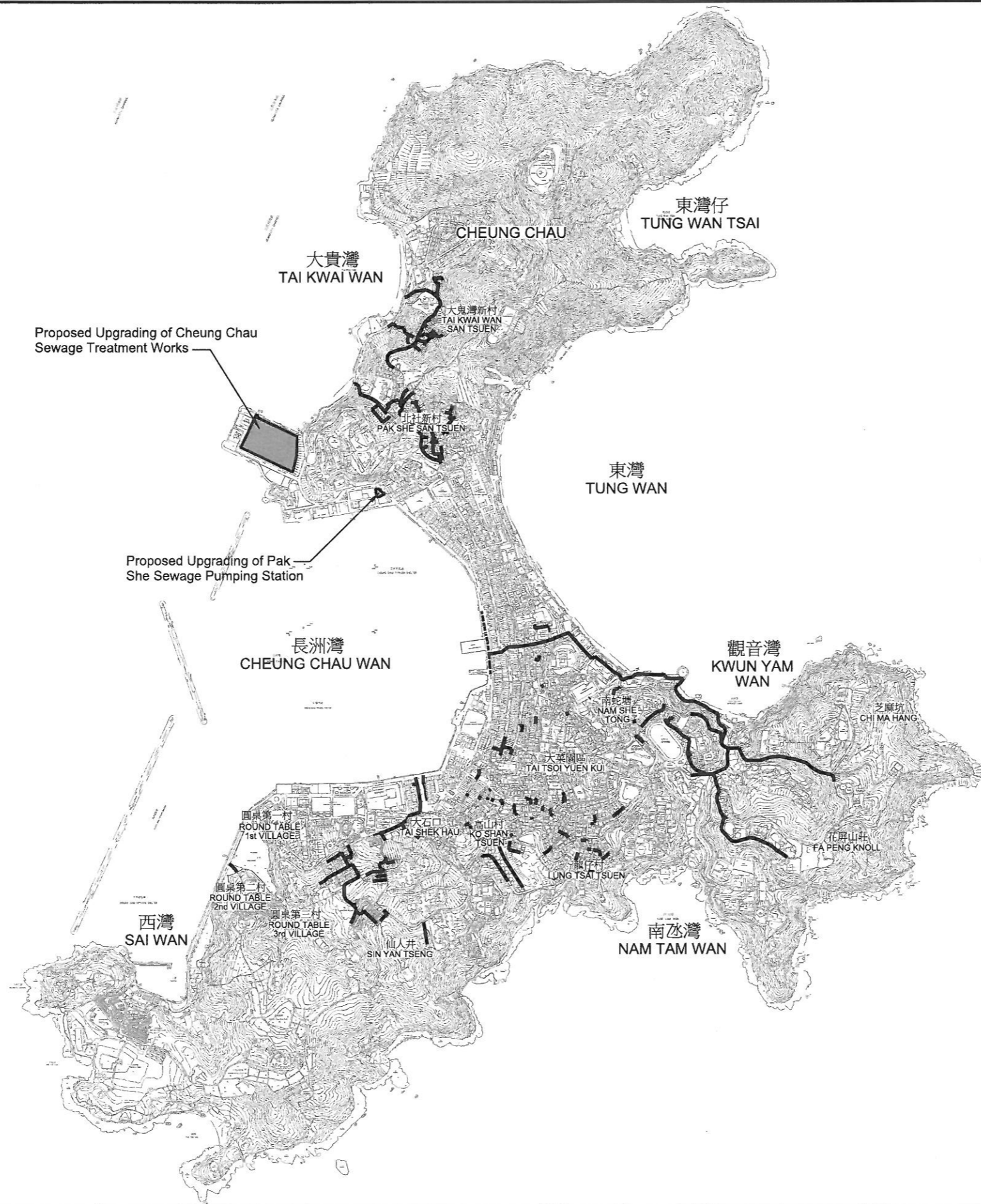


Figures





LEGEND :
 Proposed Sewer
 Proposed Sewer Rehabilitation



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 渠務署
 DRAINAGE SERVICES DEPARTMENT

ATKINS

Agreement No. CE 15/2010 (DS)
 Upgrading of Cheung Chau and Tai O Sewage Collection, Treatment and Disposal Facilities - Design and Construction
 Outlying Islands Sewerage Stage 2 -
 Upgrading of Cheung Chau Sewage Collection, Treatment and Disposal Facilities

Title :		PROPOSED WORKS IN CHEUNG CHAU	
Date :	August 2013	Figure :	2.1



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圖 2.1 污水收集、處理及排放改善工程的位置平面圖 - 長洲

表

表 2.1 各工程組合的暫定施工時間表



1. 簡介

1.1 工程背景

- 1.1.1 環境保護署於 2002 年進行離島污水收集整體計劃第 2 階段審核，同時完成第 2 階段離島污水收集的初步工程可行性研究（以下簡稱「PPFS」）。
- 1.1.2 渠務署在 2008 年 2 月委任顧問進行合約編號：CE 31/2007(DS)「長洲及大澳污水收集、處理及排放改善工程」的勘查研究，包括檢討 PPFS 研究報告的總結及建議、進行測量、勘查研究、影響評估、初步環境審查和建議工程的初步設計（以下簡稱「勘查研究顧問合約」）。
- 1.1.3 渠務署在 2010 年 12 月委任阿特金斯顧問有限公司進行合約編號：CE 15/2010(DS)「長洲及大澳污水收集、處理及排放改善工程」的設計和建造。
- 1.1.4 獲環境保護署批出的環評研究概要編號：ESB-212/2009 涵蓋長洲污水收集、處理及排放改善工程（以下簡稱「本工程」）。本《環境影響評估研究》（以下簡稱「本評估」）涵蓋以下主要工作：
- 擴展現有長洲污水處理廠的污水處理能力和提升其處理級別；
 - 擴展現有北社污水泵房的泵水能力，並在觀音灣建造一座新污水泵房；
 - 在長洲有需要的地方將現有部份污水渠升級和鋪設一些新的污水渠；
 - 在長洲污水處理廠內建造污水再用設施。
- 1.1.5 本評估的目的是評估本工程於建造和營運階段可能引起的環境問題，並為所識別的負面環境影響建議合適的緩解措施。

2. 工程詳情

2.1 工程地點和概述

- 2.1.1 長洲污水處理廠位於長貴村西面，現為一座一級污水處理廠，設計污水處理能力為每天 4,000 立方米。本工程完成後，長洲污水處理廠的設計污水處理能力將可達每天 9,800 立方米，而污水處理級別將可提升至二級處理標準，並採用薄膜生物反應器系統的污水處理設施。在長洲污水處理廠內的污水再用系統將作非食用用途，包括沖洗廁所和清洗污水處理器具。
- 2.1.2 現有北社污水泵房於 1984 年建成，位於北社海傍路和冰廠路交界，面對長洲消防局。北社污水泵房的現有泵水能力為每天 29,376 立方米(每秒 340 升)。本工程完成後，北社污水泵房的泵水能力將提升至每天 42,336 立方米(每秒 490 升)。
- 2.1.3 由於擬建的觀音灣污水泵房靠近觀音灣泳灘而可能造成負面環境影響，因此並不建議進行在勘查研究顧問合約中所提出的原有觀音灣污水泵房計劃。此外，泵房的位置涉及徵收私人土地，加上此泵房的運作和維修上均存在困難，所以在觀音灣建造污水泵房並不理想。基於上述原因，擬建的觀音灣污水泵房已從本工程中刪除，改由一個深層污水渠取代。此方案是建造一條長 700 米的無壓力地下污水渠，以收集觀音灣的污水，運送至長洲海傍街的現有污水系統。
- 2.1.4 長洲污水渠工程包括：



- 將長約 120 米的現有污水渠，由直徑 150 毫米升級至 400 毫米；
- 復修長約 160 米、直徑為 525 毫米的現有污水渠；
- 在鄉村地區，以開坑挖掘方法建造長約 7,500 米、直徑介乎 150 毫米至 400 毫米的新污水渠；
- 沿長洲體育路及東灣路，以無坑挖掘方法建造長約 300 米、直徑介乎 400 毫米至 500 毫米的新深層雙管污水渠。

2.1.5 根據《環境影響評估條例》附表 2 第 1 部分，本工程涵蓋以下指定工程項目：

- (a) 提升現有長洲污水處理廠：根據第 F.2 條 - 污水處理廠 - 而其裝置的污水處理能力超過每天 5,000 立方米及其一條界線距離一個現有的住宅區的最近界線少於 200 米；
- (b) 提升現有北社污水泵房：根據第 F.3 條 - 污水泵站 - 而其裝置的泵水能力超過每天 2,000 立方米及其一條界線距離一個現有的住宅區的最近界線少於 150 米；
- (c) 提升現有長洲污水處理廠：根據第 F.4 條，對從處理廠流出並經處理的污水進行再使用的活動。

2.1.6 本工程在長洲的施工位置如圖 2.1 的平面圖所示。

2.2 本工程的目的及目標

2.2.1 現時長洲部分地區並沒有提供公眾污水收集系統。大部份由這些地區的村屋所產生的污水均排放到各戶的化糞池，而這些化糞池是需要定期的維修保養。個別村屋所產生的污水甚至排放至路面排水系統。除此以外，現有的長洲污水處理廠現為一座一級污水處理廠，及不足以應付人口增長和未來發展所需。有見及此，現時的情況是有需要改善。

2.2.2 本工程的目的是改善長洲西北部的海水質素，在可行的情況下於集水區內將現有污水渠升級和鋪設新污水渠，將現有的一級污水處理廠提升為二級污水處理廠、擴展污水處理廠以應付人口增長和未來發展，從而改善長洲的衛生狀況。

2.3 工程施工時間表

2.3.1 各工程組合的暫定施工時間表如表 2.1 所示：



表 2.1 各工程組合的暫定施工時間表

	工程組合 1 長洲污水處理廠和北社污水 泵房升級	工程組合 2 長洲污水渠
批准《環境影響評估研究》	2013 年 11 月	
根據《水污染管制條例》將計劃刊憲	-	2014 年 5 月
通過刊憲的計劃	-	2014 年 8 月
招標刊憲	2014 年 5 月	2015 年 4 月
展開建造工程	2014 年 9 月	2015 年 8 月
建造工程完成	2019 年 3 月	2019 年 3 月

3. 環境影響評估主要研究結果

3.1 空氣質素

- 3.1.1 本評估識別了產生灰塵的工序並進行評估。建議的緩解措施包括在施工工地適當地灑水和實施良好的揚塵控制措施。模型模擬結果顯示，實施建議的緩解措施可以減少灰塵排放，並能把揚塵水平降至可接受水平。
- 3.1.2 長洲污水處理廠和北社污水泵房於運作期間是主要的潛在氣味來源。有關提升工程將涵括在長洲污水處理廠和北社污水泵房設置更好的除臭裝置，避免或降低可能產生的氣味影響。當升級工程完成後，所有可能產生氣味的設施將會被覆蓋，所排放的異味氣體將會經由除臭裝置處理之後再作排放。本評估建議在污泥運輸過程中應使用密封容器裝載污泥，以避免或降低可能產生的氣味影響。
- 3.1.3 若實施上述措施，預期本工程並沒有實質氣味影響。本工程將施行環境監察及審核計劃，以確保除臭裝置的持續除臭效能。

3.2 噪音

- 3.2.1 本評估已對本工程同時施工的工序所產生的噪音影響進行評估，其中包括提升長洲污水處理廠工程、提升北社污水泵房工程和污水渠工程。本評估模擬了在施工噪音評估中理論上最差的情況，並將評估範圍附近的其他工程項目所引起的累積影響一併考慮。
- 3.2.2 建議採取的施工噪音控制措施包括；採用靜音施工機械、在長洲污水處理廠和北社污水泵房的工地範圍使用臨時性屏障、在建築機械附近採用可移動屏障和制定良好的施工程序等。
- 3.2.3 預期採取上述的措施後，長洲污水處理廠和北社污水泵房於施工期間不會產生噪音影響。然而在污水渠工程與某些敏感受體非常接近的地方，預計污水渠工程於施工期間所產生的噪音會在個別敏感受體超出相關的噪音準則。這些剩餘影響預期為局部，暫時性和可逆轉的，而實際的影響可通過恰當的分段施工安排和妥善的施工程序而減低。報告建議實施有系統的環境監察及審核計劃，以確保施工期間的緩解措施和工程的施工程序能妥善執行。



3.2.4 由於提供了適當的隔音處理，包括靜音器和隔音通風窗等設施，升級後的長洲污水處理廠和北社污水泵房於營運階段將不會構成噪音影響。同時，運用一些基本建築設計的方法亦可減少噪音的影響，例如避免將開口或通風窗朝向最近的敏感受體。本評估建議對所有主要固定噪音來源進行運作測試，並在建造合約中加入相關要求。

3.3 水質

3.3.1 施工階段時潛在的水質影響主要源自陸地上進行的工程，包括工地溢流和建築工人引致的污水排放。只要執行《專業人士環保事務諮詢委員會專業守則 - 建築工地的排水渠（專業守則 1/94）》中建議的緩解措施，有關的水質影響便可控制至合乎《水污染管制條例》定立的標準。估計本工程於施工階段不會對水質造成不良影響。

3.3.2 在本工程營運期間，附近水體的水質預期將得到改善。本評估運用 Delft3D 模型以評估水質的影響。一般情況下，升級後的長洲污水處理廠在正常運作下，可將污水的總無機氮（TIN）、非離子氨（UIA）、懸浮固體（SS）、五天的生化需氧量（BOD₅）和大腸桿菌（*E.Coli*）的濃度降低。這主要是因為升級後的長洲污水處理廠的污水處理效率和質素得到改進和提升，從而降低流入海水的污染物含量。

3.3.3 在北社污水泵房升級後，泵房的污水緊急溢流將會截流至長洲污水處理廠。所以，因北社污水泵房的污水緊急溢流而引起的水質影響將不會出現。

3.3.4 本評估對長洲污水處理廠的污水緊急排放可能引致的影響進行評估，然而此情況是非常罕見的。模擬結果顯示，長洲污水處理廠污水緊急排放的影響只限於局部地區。在連續 6 小時而每天達 9,800 立方米的緊急排放量下，有關的潛在水質影響能迅速消退，其中包括高濃度的污水成份（如大腸桿菌）也能在 12 小時內回覆至正常水準。長洲污水處理廠的污水緊急排放對較遠距離的水質敏感受體的影響會非常小和不顯著。

3.4 廢物管理

3.4.1 建造工程引起的廢物種類包括：建築和拆卸廢料、工人產生的普通垃圾、及因更換建造機械和器具而產生的化學廢料。營運階段所產生的廢料包括：篩除物、砂泥和碎片、脫水污泥和化學廢料。倘若這些廢料能夠採用認可方法進行處理、運輸和棄置，並遵守建議的良好工地作業守則，則本工程於建造和營運階段均不會出現負面環境影響。

3.5 土地污染

3.5.1 本評估透過研究過往和現時土地使用情況和進行工地偵察來進行土地污染評估。根據現場評估結果，位於北社海傍路和冰廠路的造船廠及船舶機械維修和循環廠的土地可能受到污染。不過，由於受污染地點內將不會進行挖掘工作，因此不會觸及可能受到污染的泥土。預計本工程於建造階段不會產生土地污染影響。

3.5.2 本工程的營運不會帶來土地污染。預計本工程在營運階段不會產生土地污染影響。

3.6 生態

3.6.1 本工程將會在已開發的土地進行，預期不會破壞受保護動物物種的重要棲息地或理想棲息地。根據《環境影響評估程序的技術備忘錄》，本工程對總體生態影響的等級被評為極微，而剩餘影響屬於可接受水平。

3.6.2 除了執行良好工地作業守則外，本工程並不需要採取其他主要的生態緩解措施。在監察方面，只需根據《環境監察及審核手冊》進行定期工地檢查，而無需進行特定生態監察計劃。



3.7 漁業

3.7.1 本評估建立了評估區域內的漁業基線情況，並根據《環境影響評估程序的技術備忘錄》對潛在影響進行評估。本工程的所有建造工作將在陸地上進行，並不涉及在海洋或潮間帶環境中進行。預計本工程將不會對漁業構成顯著的不良影響，無須就漁業方面訂立個別環境監察及審核計劃。本工程完成後，水質及漁業資源的棲息地質素預計可得到改善。

3.8 文化遺產地點

3.8.1 提升長洲污水處理廠和北社污水泵房工程不會對考古或建築文物造成影響。因此並不需要進行任何緩解措施。

3.8.2 建議在污水渠工程時，在東灣具考古研究價值的地點進行考古觀察計劃。為更好地保護長洲石刻這個法定古跡，建議設立一個緩衝區，以確保法定古跡及其周圍環境不會受到建造工程的影響。

3.8.3 本評估識別了擬建污水渠走綫附近具評級和未獲評級的歷史建築。本工程的施工將不會影響這些建築物。防護措施包括情況勘查、振動監察、設立緩衝區、防護覆蓋和設立安全公共通道。

3.9 園景及視覺

3.9.1 本評估已就現有長洲污水處理廠範圍內進行的擬議長洲污水處理廠升級工程進行園景及視覺影響評估。

3.9.2 本評估識別了在研究區域內的園景資源、園景特徵區域和視覺敏感受體，從而對擬議長洲污水處理廠升級工程所引致的園景及視覺影響進行評估。在實施緩解措施後，剩餘的園景及視覺影響被評為「輕微差別」和「沒有實質差別」。根據《環境影響評估程序的技術備忘錄》中所定立的準則，擬議工程在建造和營運階段所造成的園景及視覺影響屬於可接受水平。

3.9.3 由於所有北社污水泵房的升級工程將在污水泵房的現有建築物中進行，因此建造和營運階段所造成的園景及視覺影響是微不足道。

3.9.4 至於污水渠工程，擬議新污水渠和升級污水渠的工作主要在現有馬路、行人道和小徑進行。建造工程將在局部地區分段展開，而每段施工的工期將會是短暫的，以減少對附近地區及居民的干擾。施工地區將會恢復原貌。剩餘的園景及視覺影響是微不足道。

3.10 環境監察及審核

3.10.1 本評估已為本工程的建築工作制定《環境監察及審核手冊》和《環境緩解實施表》，以監測和審核空氣質素、噪音、水質、廢物處理、文化遺產地點，和園景及視覺影響。《環境監察及審核手冊》中已規定和說明潛在環境影響的事件和相應的行動計劃。

4. 本工程的主要環境成果

4.1 本工程對環境的好處和建議的環境保護措施

4.1.1 長洲污水處理廠的污水處理級別將由一級提升至二級處理，而處理廠的污水處理能力將會提升以應付人口增長和未來發展。這可減少對鄰近水體排出低質素的污水，從而改善長洲海岸一帶的海水質素。此外，在可行的情況下，為現時未有污水渠的鄉村提供公共污水渠後，因使用化糞池而引致於集水區內產生的衛生問題將得到大大的改善。



4.2 受到保護的人口和敏感環境地區

- 4.2.1 本工程提升長洲污水處理廠的污水處理級別及其污水處理能力，並把北社污水泵房的污水溢流消除，長洲附近的海域因而得到保護。長洲現時未有污水渠的住宅區和村屋亦會因本工程提供的新污水渠而得到保護。

4.3 建議的環保設計

- 4.3.1 採用深層污水渠設計以取代觀音灣污水泵房的方案，能消除在觀音灣海灘附近建造一座新污水泵房的潛在環境影響和徵收私人土地的需要。
- 4.3.2 於長洲污水處理廠和北社污水泵房提供備用零件和備用電源能提升污水處理和排放系統的可靠性，而提供除臭裝置可以減低對附近敏感受體可能帶來的氣味影響。在長洲污水處理廠的設計中，經處理的污水將會在處理廠內作非食用用途的循環再用，從而減少食水的消耗。升級後的長洲污水處理廠內設施的安排，將對廠內現有樹木的干擾減至最少，亦會在廠內種植更多樹木以加強綠化和改善視覺效果。

4.4 避免主要環境問題的發生



- 4.4.1 本工程提升長洲污水處理廠的污水處理級別及其污水處理能力，可避免由於長洲污水處理廠老化而引起的潛在污水處理質素下降問題。在可行的情況下，為現時未有污水渠的鄉村提供公共污水渠後，因使用化糞池而產生的衛生問題將得到大大的改善。此外，擬議的北社污水泵房改善工程，可將污水溢流至長洲接收水體的潛在問題消除。

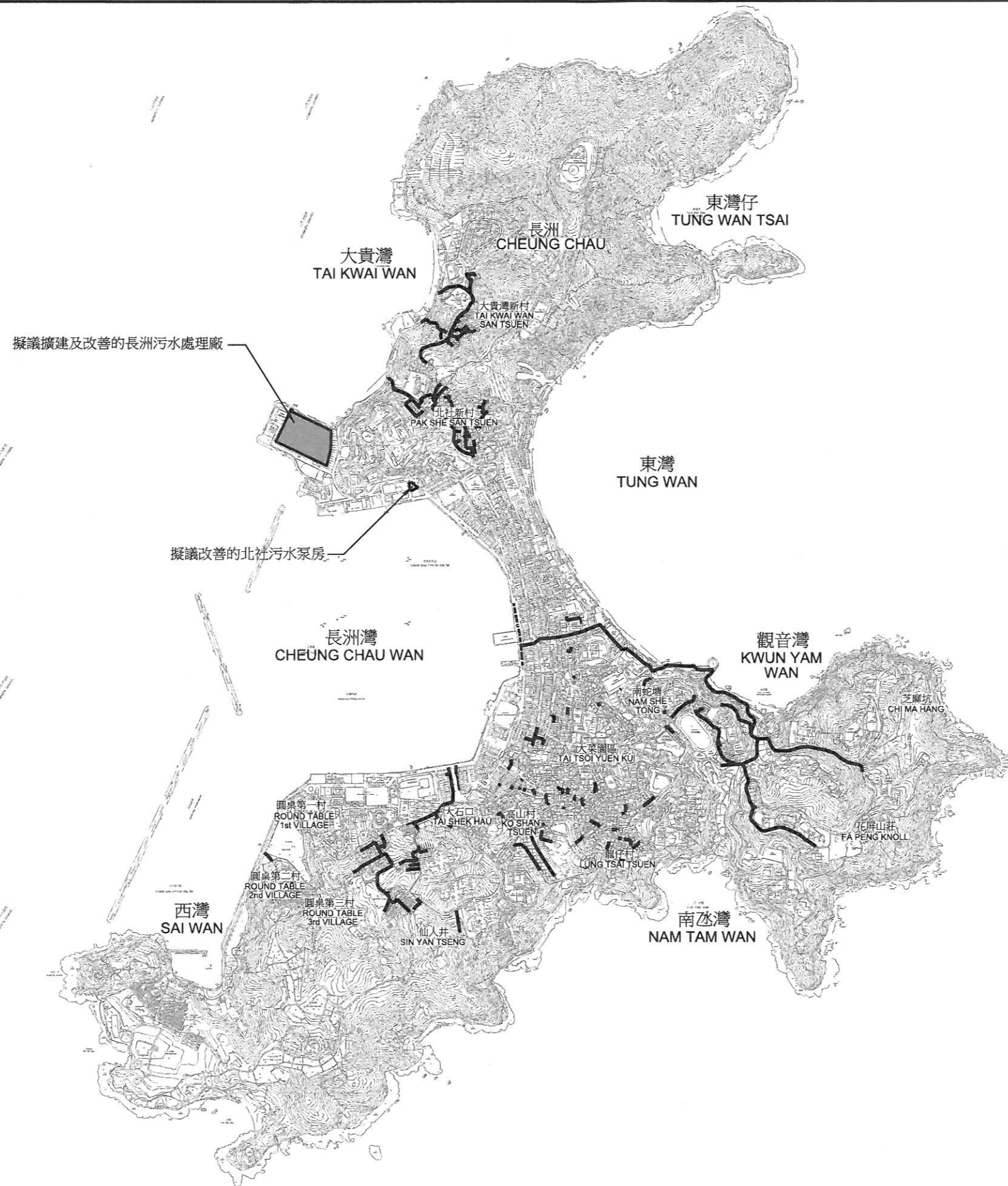
5. 總結

- 5.1.1 在擬建的改善工程完成後，長洲附近一帶的水體水質將會得到改善。本評估總結了若建議的緩解措施和建議的環境監察及審核計劃得以妥善地實施，本工程在建造和營運階段均不會對附近環境構成負面影響。





圖例:
 擬議污水管道
 擬作修復之現有污水渠



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 渠務署
 DRAINAGE SERVICES DEPARTMENT

ATKINS

工程號碼 CE 15/2010 (DS)
 長洲及大澳污水收集、處理及排放改善工程 - 設計和建造
 離島污水收集系統第2階段長洲污水收集、處理及排放改善工程

標題	污水收集、處理及排放改善工程 的位置平面圖 - 長洲		
日期	2013年8月	圖號	2.1