Drainage Services Department
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Agreement No. CE 66/2001(EP)

EIA and TIA Studies for the Stage 2 of PWP Item No. 215DS - Yuen Long and Kam Tin Sewerage and Sewage Disposal (YLKTSSD)

元朗及錦田污水收集及排放計劃第二階段之交通及環境評估– PWP 215DS 項目

Final Executive Summary (EIA)
行政摘要
(環境影響評估研究)

Chinese & English Version
中文及英文版

Agreement No. CE 66/2001(EP)

EIA and TIA Studies for the Stage 2 of PWP Item No. 215DS - Yuen Long and Kam Tin Sewerage and Sewage Disposal (YLKTSSD)

Final Executive Summary (Environmental Impact Assessment)

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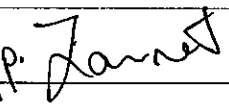
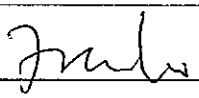
		Signature			
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CONTENT

ABBREVIATIONS

AAB	Antiquities Advisory Board
AMO	Antiquities and Monuments Office
ANLs	Acceptable Noise Levels
APCO	Air Pollution Control Ordinance
AQOs	Air Quality Objectives
Arup	Ove Arup and Partners
ASR	Air Sensitive Receptors
BNLs	Base Noise Levels
BOD5	5 day Biochemical Oxygen Demand
CNP	Construction Noise Permit
COD	Chemical Oxygen Demand
dB	Decibels
DEP	Director of Environmental Protection
DO	Dissolved Oxygen
DPWCZ	Deep Bay Water Control Zone
DSD	Drainage Services Department
ES	Environmental Study
ESO	Environmental Impact Assessment Ordinance
EM&A	Environmental Monitoring and Audit
EP	Environmental Permit
EPD	Environmental Protection Department
FMC	Fill Management Committee
HKPSG	Hong Kong Planning Standards and Guidelines
NWWCZ	North Western Water Control Zone
NCO	Noise Control Ordinance
NSRs	Noise Sensitive Receivers
OZP	Outline Zoning Plan
PCW	Prescribed Construction Work
PME	Powered Mechanical Equipment
ProPECC PN	Practice Note for Professional Person
PRCRG	Peoples' Republic of China Regulations and Guidelines
RPCC	Recommended Pollution Control Clauses for Construction Contracts
RSP	Respirable Suspended Particulates
SPME	Specified Powered Mechanical Equipment
SPS	Sewage Pumping Station
SWL	Sound Power Level
SWSTW	San Wai Sewage Treatment Works
TIN	Total Inorganic Nitrogen
TMs	Technical Memoranda
TM-CW	Technical Memorandum on Noise from Construction Work other than Percussive Piling
TM-DA	Technical Memorandum on Noise from Construction Work in Designated Areas
TM-PP	Technical Memorandum on Noise from Percussive Piling
TM-ESO	Technical Memorandum on Environmental Impact Assessment Process
TM-IND	Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites
TM-Water	Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
TOC	Total Organic Carbon
TSP	Total Suspended Particulates
VSR	Visually Sensitive Receivers
WCZ	Water Control Zone
WDO	Waste Disposal Ordinance
WPCO	Water Pollution Control Ordinance
WQI	Water Quality Index
WQO	Water Quality Objectives
WSRs	Water Sensitive Receivers
YLSTW	Yuen Long Sewage Treatment Works
YLKTSSD	Yuen Long and Kam Tin Sewerage and Sewage Disposal

1 INTRODUCTION

1.1 The Consultancy

Ove Arup & Partners Hong Kong Ltd (Arup) was commissioned by the Drainage Services Department (DSD) of the Government of the Hong Kong Special Administrative Region to provide consultancy services in respect of the environmental and traffic impacts arising from the Stage 2 of PWP Item No. 215DS - Yuen Long and Kam Tin Sewerage and Sewage Disposal (YLKTSSD) under Agreement No CE 66/2001(EP), on 30 April 2002 for an extended study period of about 24 months.

1.2 The Project Background

The design and construction supervision of the Project are/will be undertaken by the in-house staff of DSD. The Chief Engineer/Sewerage Projects, DSD, is responsible for the civil engineering works and site selection while the Chief Engineer/Electrical and Mechanical Projects, DSD, is responsible for the electrical and mechanical works. Constructoin is anticipated to commence in 2005 for completion at end 2007.

The Project is part of the "Yuen Long and Kam Tin Sewerage and Sewage Disposal" (YLKTSSD) scheme as recommended in the "Review of Yuen Long and Kam Tin Sewerage and Sewage Treatment Requirements" study. The YLKTSSD scheme is aimed at phased implementation of sewerage extension in the Northwest New Territories to cope with the existing and planned developments. This Stage 2 Project involves the following key items of works: -

- to provide a pumping system for conveying treated effluent from Yuen Long Sewage Treatment Works (YLSTW) to San Wai Sewage Treatment Works (SWSTW);
- to provide a trunk sewerage system consisting of gravity sewers, rising mains and pumping stations for San Tin areas, for conveying sewage to the YLSTW via another downstream trunk sewerage system;
- to provide a trunk sewerage system consisting of gravity sewers, rising mains and pumping stations for conveying sewage generated from Lau Fau Shan areas, to SWSTW; and
- to provide a trunk sewerage system consisting of gravity sewers, rising mains and pumping stations for Yuen Long South areas for collection and conveyance of sewage generated from the areas to SWSTW via another trunk sewerage system and the existing Ha Tsuen Pumping Station.

1.3 The Site Location and Works

The general overview of the sewerage system in the North NT is illustrated in Figure 1.0. The Project is divided into several works packages (Figure 1.0a). The overall study area and the interfacing boundary for each works package are shown in Figures 1.1 to 1.4.

Works Package	Works Item	Location
Works Packages and Works Items for Stage 2 Works		
Tin Shui Wai and San Wai Areas		
2A-1T (Figure 1.4)	OP1	Pumping station in the north of YLSTW (Yuen Long Effluent Pumping Station) where treated effluent will be handled
	OS1	Twin rising mains from item OP1 to Tin Tsz Road in Tin Shui Wai
	OS2	Twin rising mains from Tin Tsz Road via Tin Wah Road to Tin Ying Road in Tin Shui Wai
	OS3	Twin rising mains along Tin Ying Road in Tin Shui Wai
	OS4	Twin rising mains from Tin Ying Road to Ping Ha Road
	OS5	Twin rising mains from Ping Ha Road via Tin Ha Road to SWSTW
Tin Shui Wai and San Wai Areas		
Alternative scheme of 2A-1T (Figure 1.1)	AP1	Pumping station in the north of YLSTW (Yuen Long Effluent Pumping Station) where treated effluent will be handled
	AS1	Twin rising mains in the northwestern side of YLSTW
	AS2	Twin rising mains from item AS1 to Fuk Shun Street
	AS3	Twin rising mains from Fuk Shun Street to Tin Wah Road in Tin Shui Wai
	AS4	Twin rising mains between Tin Wah Road and Tin Ying Road in Tin Shui Wai
	AS5	Twin rising mains from item AS4 to Ping Ha Road
	AS6	Twin rising mains from Ping Ha Road to SWSTW
Ngau Tam Mei and San Tin Areas		
2A-2T and 2B-1T	P1	Ngau Tam Mei sewage pumping station
	S1	Sewers along Ngau Tam Mei Main Drainage Channel Phase 1 from P1 to Nam San Wai sewage pumping station (SPS)

Works Package	Works Item	Location
2A-2T And 2B-1T (Figure 1.3)	S2	Branch sewers from Fairview Park to S4 along Ngau Tam Mei Main Drainage Channel Phase 1 opposite to S1
	P2	Tam Mei Barracks SPS (Tam Mei Camp SPS)
	S3	Branch sewers from P2 to P1 along Main Drainage Channel for Ngau Tam Mei Phase 2
	S4	Sewers from P3 to P1 along Castle Peak Road-San Tin near Yau Mei San Tsuen, Mai Po San Tsuen and Mai Po Lo Wai
	P3	San Tin SPS
	S5	Sewer upstream of P3 near Tsing Lung Tsuen
	P4	San Lung Tsuen SPS
	S6	Branch sewers from P4 to S5 along the village tracks in Fan Tin Tsuen
	P5	San Tin Barracks sewage pumping station (Cassino Line SPS)
	S7	Sewer from P5 to S5
Lau Fau Shan and Mong Tseng Areas		
2A-3T (Figure 1.1)	A1	Lau Fau Shan SPS
	G1	Sewers from A1 to Tin Shui Wai Reserved Zone pumping station (TSWRZPS)
	A2	Mong Tseng SPS
	G2	Sewers along Lau Fau Shan Road from A2 to TSWRZPS
Shap Pat Heung Area		
2B-2T (Figure 1.2)	B1	Shan Ha Tsuen SPS
	H1	Sewers from B1 to the connection sewer at Yuen Long Highway
	B2	Muk Kiu Tau Tsuen SPS
	H2	Sewers along Kung Um Road from B2 to the connection sewer at Yuen Long Highway
	B3	Sham Chung Tsuen SPS
	H3	Sewers from B3 to the connection sewer at Yuen Long Highway
	B4	Shui Tsiu San Tsuen SPS
	H4	Sewers from B4 to B3
	H5	Sewers from Tai Tong Tsuen to B4
	B5	Shung Ching San Tsuen SPS
	H6	Sewers along Tai Tong Road from Hung Tso Tin Tsuen to B5
	H7	Sewers from B5 to the connection sewer at Yuen Long Highway
	B6	Nga Yiu Tau SPS
	H8	Sewers along Tai Shu Ha Road East from Tong Tau Po Tsuen to B6
	H9	Sewers along Tai Shu Ha Road East from B6 to the connection sewer at Yuen Long Highway
	B7	Pak Sha Tsuen SPS
	H10	Sewers along Kung Um Road from Wong Nai Tun Tsuen to B7
	H11	Sewers from B7 to B2

Legend: - Designated Elements

- Non-Designated Elements

The findings of the environmental impact assessment study is summarised below.

2 AIR QUALITY ASSESSMENT

Only limited number of powered mechanical equipment (PME) will be used for this project and all works will be carried out in small section areas within a short period. These activities would not generate large amount of construction dust. To minimise cumulative impact from the concurrent projects, it is recommended to stagger the construction programme and limit the site area to 50m segment. The Contractor is also obliged to follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation. Mitigation measures have also been detailed in the EIA report to ensure the construction dust impacts are controlled within the Hong Kong Air Quality Objectives. An effective monitoring and auditing programme has also been proposed such that the potential construction dust impacts are minimized.

In operational phase, the odour impact can be kept within the relevant criterion with the implementation of the precautionary measures, including ventilating system and odour removal filtering system. For the Designated Elements at YLEPS (AP1/OP1 of 2A-1T) and Ngau Tam Mei SPS (P1 of 2A-2T/2B-1T), a filter with H_2S removal efficiency of not less than 99.5% has been recommended. For other Non-designated Elements, an odour removal filter with the following H_2S removal efficiency shall be provided:

- of not less than 99.5% for P2 to P5 SPS of 2A-2T and 2B-1T.
- of not less than 95% for all SPS at 2A-3T (A1 to A2); and
- of not less than 95% for all SPS at 2B-2T (B1 to B7).

3 NOISE ASSESSMENT

Concurrent construction noise impacts from both pumping station and sewers have been assessed. A theoretical worst case in construction noise assessment has been undertaken with the consideration of cumulative impacts arising from other projects proposed in the vicinity of the study area. Unmitigated construction noise would cause exceedance of the daytime construction noise criterion.

Mitigation measures such as adopting quiet plant, limiting the use of PME, using of temporary barriers along site boundary, and employing movable barrier close to construction plants have been recommended. It is also recommended that sewers and the rising mains shall be constructed in segments of up to a maximum of 50m in length at any one time in order to reduce the time of noise impact.

Due to the proximity of some NSRs to the works site, noise exceedances are predicted even with the adoption of the best practical mitigation measures for some isolated occasions.

The exceedances are resulted from the construction activities along the pipework segment, which will have impact on the following NSRs at:

- Tin Shui Wai Area (2A-1T): NT16 – 18, NT20 – 22, NT24, NT22a and NT24a. A maximum noise level of 85.9dB(A) is found at NT22a.
- Ngau Tam Mei and San Tin Areas (2A-2T and 2B-1T): NN02, NN09, NN13-14, NN17, NN21- 22, NN24-27, NN43, NN45-47, NN50-52, NN19a and NN26a. With a maximum noise level of 89.4dB(A) close to NN46-47.
- San Lung Tsuen Area (2B-1T): NN31a, NN32-33, NN35-36, and NN38-40. Maximum noise level is 86.8dB(A) at NN40.
- Shap Pat Heung Area (2B-2T): NS01, NS11, NS13, NS16-17, NS24-28, NS31, NS34-36, NS40, NS42, NS45-48, NS51-57, NS59-61, NS64, NS66, NS68-70, NS72, NS19a&b, NS37a&b, NS39a, NS42a, NS49a, NS52a, NS70a, NS76 and NS76b. Maximum noise level is 89.4dB(A) at NS66.
- Lau Fau Shan Area (Alternative 2A-3T): NL13, NL22, NL29 and NP01. With a maximum noise level of 81.4dB(A) at NP01.

The maximum predicted noise level will occur during road pavement and finish works, which is 14.4 dB (A) greater than the day-time noise criteria. However, the period of such an exceedance is expected to last no more than 2 days. For other construction activities, minor exceedance will be experienced for a period of 1-2 weeks on sewage laying works and half month on site preparation, respectively. The affected periods for each work packages and items have been detailed in Section 8.9 of the EIA report. Also, a systematic event and action plan on noise impact monitoring should be undertaken as the core part of the EM&A programme in order to minimize the potential complaint.

In the operational phase, noise impacts due to the proposed sewage pumping stations will not be anticipated provided that proper acoustic treatment, including silencer or acoustic louvre is incorporated. In addition, absorptive wall linings could also be used to further reduce the internal reverberant noise. Basic building design such as to avoid any opening or louvres facing the nearest NSR should also be adopted. Noise commissioning test at the site boundary and louvers of the proposed SPS is recommended by the Contractor.

4 WATER QUALITY ASSESSMENT

The water quality impacts such as construction runoff and sewage effluent are generally temporary and localized. Mitigation measures will include the minimisation of exposed soil areas to reduce runoff and erosion, and the adherence to the best management practices (as stated in ProPECC PN1/94). Pipe Jacking method will also be adopted in stream-crossing areas in order to prevent adverse impacts on water quality. If these mitigation measures are properly implemented, adverse water quality impacts is not anticipated.

5 WASTE MANAGEMENT IMPLICATIONS

Good waste management practices are recommended in the EIA report. Excavated inert material will be reused on-site. Relatively small amount of C&D waste and chemical waste will be generated from the construction activities.

The potential impacts can be avoided or controlled through waste management hierarchy, effective management of chemical waste, and proper storage of reusable materials. It is therefore expected that the storage, handling, collection, transport and disposal of waste should present minimal environmental impacts.

6 LAND CONTAMINATION

Based on the available information and the findings of the site inspections, there is no evidence to suggest that the potentially contaminated areas adjacent to the site would be sources of significant off-site migration of contaminants to the proposed alignment of the sewers. Should any of the excavated soils be found to be contaminated, they could be treated by standard methods prior to disposal at the strategic landfills. It is therefore not considered that the presence of potentially contaminated sites adjacent to the proposed works areas will cause any insurmountable environmental impacts.

A small number of confirmatory samples are recommended to be collected at the proposed locations as stated in the EIA report to evaluate any potential contamination. Precautionary measures are recommended for the construction stage to minimise any potential hazard to the workers. The list of procedures on any suspected contaminated soils, in case identified, shall be implemented as recommended in the EIA report.

It is therefore expected that, if the recommendations put forward in the EIA report are conscientiously acted upon, the construction works will present minimal health and environmental impacts.

7 ECOLOGY

Designated Elements

The ecological resources recorded within the study area included plantation, mixed woodland, grassland/shrubland, cultivated land, fishpond, stream/channel, mangrove, urbanised/disturbed, wasteland as well as the associated wildlife. The proposed sewerage alignment and pumping station sites are mostly located on existing or future roads/drainage channels which are classified as urbanised/disturbed/wasteland habitats of low ecological value. The designated elements would cause a permanent loss of 0.39 ha of urbanized/disturbed/wasteland and 0.23 ha of plantation for construction of pumping stations, and a temporary loss of 0.24 ha of urbanized/disturbed/wasteland and 0.20 ha of fishponds for construction of sewers. Standard site practice and recommendations to each works package are made. No residual impacts are aniticpated. There will be no-net-loss in wetland area at the WCA and CA.

Non-designated Elements

The proposed sewerage alignment and pumping station sites are mostly located on existing or future roads/drainage channels which are classified as urbanised/disturbed/wasteland habitats of low ecological value. The non-designated element would cause a permanent loss of 0.95 ha of urbanized/disturbed/wasteland, 0.05 ha of fishponds and 0.12 ha of cultivated land and a temporary loss of 25.49 ha of urbanized/disturbed/wasteland, 0.46 ha of mixed woodland, 0.28 ha of shrubland/grassland, 0.02 ha of plantation, and 0.14 ha of cultivated land. The overall ecological impacts are ranked as minor. Standard site practice and recommendations to each works package are made. No residual impacts are aniticpated.

8 LANDSCAPE AND VISUAL

Designated Elements

The following pumping stations are designated elements and are therefore, required to undertake the approved mitigation measures as stated in Section 14.9.1 of the EIA report:

- Yuen Long Effluent Pumping Station (Package 2A - 1T); and
- Ngau Tam Mei Sewage Pumping Station (Package 2A - 2T).

For the designated elements, it is concluded that in accordance with the definitions in the EIAO Annex 10, the landscape and visual impacts **will be acceptable with mitigation measures**.

Non-designated Elements

For the non-designated elements, it is concluded that in accordance with the definitions in the EIAO Annex 10, the landscape and visual impacts will be **acceptable with mitigation measures**.

9 CULTURAL HERITAGE ASSESSMENT

9.1 Archaeology

Designated Elements

No archaeological impacts will occur on Designated Elements.

Non-designated Elements

- Mong Tseng Tsuen PS

Further investigation should be carried out after the resumption of the land and prior to commencement of any works. The investigation should comprise a minimum of one test pit excavation, measuring no less than 2 by 2 meters to verify the stratigraphy and potential archaeological deposits in the Mong Tseng PPS.

- Sewer alignment on Wang Chau

The results from the field investigation indicate a lack of archaeological deposits and cultural soils. No further action is required.

- Sewer alignment north of Tung Tau Tsuen

Investigation should be carried out after the resumption of the land and prior to commencement of any works. The investigation should comprise a minimum of 20 auger hole tests and two test pit excavations measuring no less than 2 by 2 meters to verify the stratigraphy and potential archaeological deposits within the known archaeological site.

- Shan Ha Tsuen SPS

The field investigation results indicate that the area exists of sterile alluvial deposits with a high water table and is thus considered to have no archaeological potential. No further action is required.

- Shung Ching San Tsuen SPS

The field investigation results indicate that the area has been artificially raised by 1.5m fill. Sterile alluvial deposits were encountered at a depth of more than 1.5m. No further action is required.

- Sewer alignment from YLEPS to Wang Chau

Archaeological monitoring is recommended during the excavations of the sewer alignment between the historic villages of Tai Tseng Ng Uk Tsuen, Tai Tseng Wai and Shing Uk Tsuen.

9.2 Built Heritage

Designated and Non-Designated Elements

All impacts fall within non-designated elements of the project.

9.2.1 Construction Phase

Mitigation measures for the construction stage including condition surveys and the implementation of monitoring and precautionary measures for the following resources in Fan Tin Tsuen: Man Lun Fung Ancestral Hall (AAHB-405), Ming Yuen Tong (AAHB-433) and the Shun Yue Tong and San Yeh Man Tong AAHB-486 and 487.

Shrine AAHB-21 (Lau Fau Shan Road), Shrine AAHB-419 (Fan Tin Tsuen), Shrine AAHB-262 (Kung Um Road), Shrine AAHB-224 (Tai Shu Ha Road East), Shrine AAHB-207 (Tai Tong Road), Shrine AAHB-242 (Yau Mei Tsuen) and Shrine AAHB-357 (Fuk Shun Street): a buffer zone should be provided of minimum 1 m, and access to the shrines should be maintained through the provision of walkways separated from the works area.

Temple AAHB-226: Access from Tai Shu Ha road should be maintained throughout the construction phase.

Temple and shrine AAHB 227: the contractor must carry out a condition survey of the building. This survey must be carried out in advance of works and a report must be submitted to AMO for approval before construction activities commence.

9.2.2 Operational Phase

Mitigation measures including landscaping of the area around the pumping station by planting of foliage complementary to the existing environmental setting will be required by the following resources:

- Lau Fau Shan to Mong Tseng : Village structures (AAHB-29 – 53) in Mong Tseng Tsuen
- San Tin to Ngau Mei Tsuen : Man Lung Fung Ancestral Hall (AAHB-528) and Ming Yuen Tong (AAHB-433) in Fan Tin Tsuen
- Tai Shu Ha Road: Temple (AAHB-226) in Tai Shu Ha Road East

9.2.3 Buddhist Blessing Stones, Graves, and Cultural and Historical Landscape Features

There will be no impacts during either the construction or operational phases, therefore no mitigation measures will be necessary.

10 FISHERY

Designated Elements

0.2 ha of temporary fish pond loss (mainly earth bunds) would be caused by the Designated Elements of this project. The fish pond areas will be reinstated after construction.

Indirect impacts might be caused by site runoff from the works areas. The impact is ranked as minor in nature. Good site practice would be sufficient to mitigate this potential impacts.

Non-designated Elements

Though Grade A active fishponds were identified within the assessment area with the majority concentrated to the Shan Pui, Nam Sang Wai, Tai Sang Wai and San Tin, the majority of assessment area appears to be degraded through urbanisation and development. None of the sewer alignment or the pumping station locations would constitute permanent direct impacts to any Grade A active fishponds. Only a fraction (0.05 ha) of a Grade C fishpond in San Wai would be subject to direct loss. Potential impacts to fisheries resources and operations may arise from permanent loss of fishponds. Due to the small percentage compared to the overall resources in Hong Kong, permanent losses of fisheries resources due to the project are predicted to cause minimal impacts to HKSAR fisheries. The impact is minimal and acceptable.

A total area of 0.20 ha will be temporarily occupied at four Grade A fishponds (mainly earth bunds) at at Shan Pui Areas during the construction phase. These fishponds will be reinstated after the construction works and thus the impact is minor and acceptable.

Indirect impacts might be caused by site runoff from the works areas. The impact is ranked as minor in nature. Good site practice would be sufficient to mitigate this potential impact.

11 ENVIRONMENTAL MONITORING AND AUDITING PROGRAMME

An Environmental Monitoring and Audit (EM&A) Manual and an Implementation Schedule (IS) have been prepared for the construction work to monitor and audit construction noise, air quality, land contamination,

cultural heritage, waste management, water quality and ecological impacts. A detailed event and action plan has been formulated and is stated in the EM&A Manual.

12 CONCLUSION

Except for some short duration construction noise impact at several sensitive receivers, the EIA study concludes that with the incorporation of the recommended mitigation measures and implementation of the EM&A programme, the project will not impose adverse impacts on the neighbouring environment during construction and operational phases.

Owing to the site constraint, with the introduction of the Best Practical Means to reduce the construction noise impact, the residual impacts will only be short-term and would not be insurmountable.