The Government of the Hong Kong Special Administrative Region

Drainage Services Department

Agreement No. CE 1/2006 (DS)

Upgrading of North District and Tolo Harbour Regional Sewerage - Investigation, Design and Construction

Project Profile
for
Upgrading of Chinese University Sewage Pumping Station

September 2008

Maunsell- Metcalf & Eddy Joint Venture

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1 BASIC INFORMATION

1.1 Project Title

1.1.1 This Project Profile is prepared for "Upgrading of Chinese University Sewage Pumping Station (CUSPS)" hereinafter referred to as the "Project".

1.2 Purpose and Nature of the Project

1.2.1 The Project is part of Public Works Programme Item 4348DS – North District and Tolo Harbour sewerage, sewage treatment and disposal – regional sewerage works, part 1 – sewerage upgrade, which originates from the findings of the Study "*Review of North District and Tolo Harbour Sewerage Master Plan*" completed by Environmental Protection Department in 2002. The purpose of the Project is to upgrade the existing CUSPS to cope with the sewerage needs of both existing and future developments in Chinese University of Hong Kong (CUHK).

1.3 Name of Project Proponent

1.3.1 Drainage Services Department (DSD) is the works department and Environmental Protection Department (EPD) is the client department.

1.4 Location and Scale of Project

1.4.1 The site of the Project is located at the south-eastern side of the campus of the CUHK. It is located within "Government, Institution or Community" zone on the Sha Tin Outline Zoning Plan (OZP) No. S/ST/23 approved in 2007. The location of the Project is shown in **Drawing No. 60023109/PP/1001**.

1.4.2 The design flow of the existing CUSPS is projected to increase to 9,500 m^3/day (average dry weather flow). The scope of works of the Project comprises:

- Construction of temporary pumping facilities during construction phase;
- Demolition of the existing facilities, including the transformer room, existing CUSPS and associated sewers and chambers;
- Construction of a new pumping station of an installed capacity of 9,500 m^3/day (average dry weather flow); and
- Demolition of the temporary facilities upon commissioning of the new pumping station.

1.5 Number and Type of Designated Project

1.5.1 The installed capacity of the existing CUSPS is equivalent to an average dry weather flow of approximately 3,200 m^3/day and the nearest sensitive receiver, i.e. Physical Geography Experimental Station, is at about 50m away from the boundary of the CUSPS. As such, the existing CUSPS constitutes a Designated Project under Item F.3(b), Part 1 of Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (i.e. i.e. a sewage pumping station with an installed capacity of more than 2,000 m^3/day and a boundary of which is less than 150 from an existing or planned education institution). Since the existing CUSPS has been in operation before the EIAO came into operation on 1 April 1998, it is an exempted Designated Project under Section 9(2)(g) of the EIAO.

1.5.2 However, since the proposed works, in which the installed capacity (average dry weather flow) of the CUSPS would be increased from 3,200 to 9,500 m^3/day, would constitute a material change to an exempted designated project under Schedule 2 of the EIAO, the procedures under the EIAO should be followed and an environmental permit is required prior to the commencement of the upgrading works.

1.6 Name and Telephone Number of Contact Person(s)

Mr. LEUNG Hon Wan, David
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2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1.1 The Consultants, which was engaged by the Consultants Management Division of DSD, and the Electrical & Mechanical Projects Division of DSD will carry out the design and construction supervision of the Project. The Sewage Treatment Division 1 and Hong Kong & Islands Division (Buildings/ Civil Maintenance Team) of DSD will operate and maintain the completed works.

2.1.2 Planning and design of the proposed works has been in process since January 2007. Construction is scheduled to commence in April 2009 for completion in 2012.

2.1.3 There are no major projects in the vicinity of the Project with overlapping implementation programme that will cause significant environmental impacts due to cumulative effects.

3 POSSIBLE IMPACTS ON THE ENVIRONMENT

3.1 Possible Environmental Impacts During Construction Phase

Air Quality

3.1.1 Dust would be generated from construction activities such as earthworks, excavation, construction of concrete structures and demolition of the existing structures.

Water Quality

3.1.2 Potential impacts would be arisen from surface runoff and erosion of exposed soil, earthworks and stockpiles during storm events. Muddy water may also be generated from the construction activities such as dust suppression sprays, dewatering during excavation and washing of construction equipment.

Noise

3.1.3 Noise would be generated from construction activities such as demolition, concreting and excavation works. The detailed noise impact assessment is shown in **Appendix A**.

Waste Management

3.1.4 Construction and demolition (C&D) material and waste such as excavated spoil (soil and rock), unusable concrete and grout, wood, metal scraps, equipment parts and packaging materials would be generated.

3.1.5 Asbestos might be present in the existing transformer room. Asbestos waste, which is classified as chemical waste under the Waste Disposal (Chemical Waste) (General) Regulation, might be generated during demolition of the existing transformer room.

3.1.6 In addition, the existing transformer room contains sulfur hexafluoride (SF_6) gas-filled equipment. Potential impact to the surrounding environment might be arisen if it is not properly handled.

Landscape and Visual

3.1.7 The proposed pumping station will be situated at the site of the existing CUSPS. A few number of existing trees identified in the vicinity of the site might be affected by the proposed works. In addition, potential landscape and visual impacts during the construction phase may arise from the construction plant, materials and site traffic.

Ecology

3.1.8 No impact on ecology is expected during construction phase as the project site is located in disturbed area.

Cultural Heritage

3.1.9 No impacts on historic monuments or buildings are expected during the construction phase.

3.2 Possible Environmental Impacts During Operation Phase

Air Quality

3.2.1 The inlet chamber, coarse screen channels and wet wells of the pumping station have the potential to become the sources of odour nuisance.

Water Quality

3.2.2 Implementation of the Project would enhance the water quality of Tolo Harbour. It is anticipated that the project would not cause any adverse water quality impact during normal operation. Under emergency situation, such as prolonged power failure, sewage overflow via the nearby stormwater drainage system into the Tolo Harbour would occur.

Noise

3.2.3 Electrical and mechanical equipments, such as mechanical screens and sewage pumps are the potential noise sources during operation of the proposed pumping station. Potential noise impact may arise if no mitigation measures are incorporated into the design of the pumping station. A detailed noise assessment is shown in **Appendix A**.

Waste Management

3.2.4 Sewage would pass through the mechanical screens, which prevent large solid materials from entering the pumps and causing damage to the pumping station. Large solid materials in the sewage would be retained by the mechanical screens of the pumping station. A small quantity of screenings would be generated.

Landscape and Visual

3.2.5 A few numbers of existing trees might be affected by the Project. No major visual impact is anticipated to arise from the Project due to the modest size of the pumping station and the incorporation of landscape and aesthetics considerations in the design.

Ecology

3.2.6 No ecology impact is anticipated during operation phase.

Cultural Heritage

3.2.7 No impacts on historic monuments or buildings are expected during the operation phase.

4 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

4.1.1 The project site is located at the south-eastern side of the campus of CUHK. The surrounding environment of the Project site is vacant area except a slip road of the Tolo Highway is located to the east of the site. The existing and planned sensitive receivers are summarised in **Table 4.1** and shown in **Drawing No. 60023109/PP/1001**.

Table 4.1 Representative Sensitive Receiver in the Vicinity of the Project

Sensitive Receiver Number	Description	Nature of Sensitive Receiver	Type of Sensitive Receiver
N12a [(i)]	Physical Geography Experimental Station	Educational Institution for research	ASR
N12b	Pine Lodge, Chinese University	Residential	ASR & NSR
R12b	Vacant Area	Government, Institution or Community	Planned ASR & NSR

Note:
(i) The experimental station is a greenhouse equipped with ventilation system and computerized environmental controller. It does not rely on opened windows for ventilation. Hence, it is considered not a NSR in accordance with EIAO-TM.

5 ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND FURTHER ENVIRONMENTAL IMPLICATIONS

5.1 Construction Phase

Air Quality

5.1.1 The extent of dust generation from the construction works is expected to be insignificant with the implementation of dust suppression measures as stipulated in the Air Pollution Control (Construction Dust) Regulation of Air Pollution Control Ordinance (APCO). These measures would be incorporated into the specifications for the works contract.

5.1.2 The current odour mitigation measures adopted for existing CUSPS would be maintained throughout the entire construction period. No additional odour emission is expected during construction phase.

Water Quality

5.1.3 The construction activities in the Project would include excavation, earthworks and general concrete building works. Necessary silt removal facilitates will be provided so as to remove any silt before discharge of site runoff into the nearby stormwater drains. The mitigation measures would be provided prior to the commencement of excavation. The design of temporary on-site drainage and silt removal facilities would follow the guidelines stipulated in EPD's Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN 1/94). The above measures would be incorporated into the specifications of the works contract. With the adoption of such mitigation measures, no adverse impacts on water quality are expected during construction phase.

Noise

5.1.4 A quantitative construction noise assessment is shown in **Appendix A**. The predicted unmitigated noise level would comply with the daytime noise criterion of 75dB(A) for domestic premises. The relevant regulations and the Noise Control Ordinance (NCO) will be complied to limit the construction noise within acceptable limits during the construction phase. A Construction Noise Permit is required under the NCO in case the construction works to be carried out during nighttime (1900 – 0700), Sundays and public holidays.

5.1.5 Although no adverse noise impact is anticipated during construction, it is still recommended to carry out the good site practices listed below during the construction phase of the Project.

- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction phase;
- Silencers or mufflers on construction equipment, if applicable, should be utilized and should be properly maintained during the construction program;
- Powered mechanical equipment that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;
- Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and
- Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

Waste Management

5.1.6 The Contractor would be required to sort all C&D material and waste into different categories for reuse on site and disposal at public filling, landfills, or recycling facilities as appropriate. The total C&D material generated is estimated to be about 1,600m^3 of which approximately 100 m^3 can be reused on site. The rest would be disposed of at Public Filling Facility.

5.1.7 Asbestos might be present in the existing transformer room. Should asbestos be identified, asbestos waste, which is classable as chemical waste, will be handled, collected, transported and disposed in accordance with the Regulation and the Code of Practice on the Handling, Transportation and Disposal of Asbestos Waste.

5.1.8 The SF_6 gas-filled equipment, in the existing transformer room will be removed from the site by the CLP Power Hong Kong Ltd for reuse and recycling. The materials will be handled in accordance with the Dangerous Goods (General) Regulations, where appropriate.

5.1.9 Provided that these wastes are handled, transported and disposed of properly in accordance with the appropriate Regulations, adverse environmental impacts are not expected.

Landscape and Visual

5.1.10 The trees in the vicinity of the Project site are of common species and no endangered tree species have been identified. Tree protection measures and transplanting, if necessary, will be adopted as far as practicable to prevent damage to existing trees during the construction phase. Proposals for tree felling, if necessary, will be submitted to District Lands Officer/Sha Tin and other relevant authorities for approval.

5.1.11 To avoid visual impacts, surplus C&D materials will be removed off site promptly. In addition, site hoardings will be erected around the site area to minimize potential impacts to the nearby sensitive receivers and pedestrians.

5.2 Operation Phase

Air Quality

5.2.1 The potential odour generating units such as the inlet chamber, coarse screen channels, wet wells etc. would be located underground with cover.

5.2.2 Forced ventilation will be provided for the above enclosed areas and a deodorizer will be installed to remove the odour from the extracted air. As for similar installations adopted in other sewage pumping stations, e.g. Tai Po Tai Wo Road Sewage Pumping Station, Ma On Shan Area 108 Pumping Station, etc, the removal efficiency of H_2S by the proposed deodorizer to be installed will be 99.5%. The capacity of the proposed deodorizer would be based on ventilation rates of 3 to 6 air change per hour (ACH) for covered chambers and wet wells and 15 ACH for areas where man access. The exhaust of the deodourizer would be located in a direction away from the sensitive receivers, i.e. on the eastern side or western side of the pumping station. Regular maintenance of the deodorizer will be carried out to maintain

the odour removal efficiency. With implementation of the above mitigation measures, adverse odour impact is not expected.

Water Quality

5.2.3 To minimize potential impacts on water quality arising from bypass of sewage, one standby sewage pump and one standby mechanical screen would be provided in addition to the two duty pumps and one duty mechanical screen. Dual-transformer with dual power supply from the CLP Power Hong Kong Ltd. will be provided in order to minimize the risk of power failure. In addition, a Supervisory Control and Data Acquisition system (SCADA) would be provided to alert operators of any irregularities or operation problems of the pumping station, such that immediate actions can be taken in case of emergency. With incorporation of these measures into the design of the pumping station, it is expected that the chance of emergency sewage bypass would be extremely remote.

Noise

5.2.4 In order to minimize the potential noise impacts from operation of the CUSPS, all the pumps and mechanical screens would be enclosed inside the pumping station building. With implementation of the above measures, adverse noise impacts are not anticipated in accordance with the detailed quantitative assessment as shown in **Appendix A**.

Waste Management

5.2.5 The screenings collected by the screens of the pumping station would be stored in enclosed containers and transported to landfill for disposal regularly. The waste packaging would be conducted inside the pumping station building. No adverse waste impact is anticipated.

Landscape and Visual

5.2.6 Landscape and aesthetics would be the major consideration in the design of the pumping station. Landscaping work and green roofing, if applicable, will be provided to enhance the outlook of the pumping station.

5.2.7 In addition, architectural aspects including colour scheme, types of external finishing and layout of the infrastructures will be designed so as to achieve a visual harmony between the pumping station and the surrounding environment. The structure will also be restricted to two storeys high.

5.3 Summary of Potential Environmental Impacts and Mitigation Measures

5.3.1 The potential environmental impacts and proposed mitigation measures to be incorporated into the design and construction of the upgrading of CUSPS are summarised in **Table 5.1**.

Table 5.1 Summary of Environmental Impacts and Mitigation Measures During Construction and Operation Phases

Potential Environmental Impact	Mitigation Measures	Relevant Section in the Project Profile
Construction Phase		
Air Quality	(1) Control measures stipulated in the Air Pollution Control (Construction Dust) Regulation; and (2) Control by contract specifications.	5.1.1

Potential Environmental Impact	Mitigation Measures	Relevant Section in the Project Profile
Water Quality	(1) Control of construction surface run-off as stipulated in the measures stipulated in the ProPECC PN 1/94 (Construction Site Drainage); and (2) Control by contract specifications.	5.1.3
Noise	(1) Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction phase; (2) Silencers or mufflers on construction equipment, if applicable, should be utilized and should be properly maintained during the construction program; (3) Powered mechanical equipment that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; (4) Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; (5) Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities; and (6) Control by contract specifications.	5.1.5
Waste Management	(1) C&D material and waste would be sorted on site; (2) C&D material would be disposed of at public fill; (3) Should asbestos be identified in the existing transformer room, asbestos waste would be handled, collected, transported and disposed in accordance with the Regulation and the Code of Practice on the Handling, Transportation and Disposal of Asbestos Waste; (4) The SF_6 gas-filled equipment, in the existing transformer room will be removed from the site by the CLP Power Hong Kong Ltd and will be handled in accordance with the Dangerous Goods (General) Regulations, where appropriate. (5) Control by contract specifications.	5.1.6 to 5.1.8
Landscape and Visual	(1) Tree protection measures and transplanting if necessary will be incorporated in contract specifications; (2) Surplus C&D material will be removed off site promptly; (3) Site hoarding will be erected; and (4) Control by contract specifications	5.1.10 & 5.1.11

Potential Environmental Impact	Mitigation Measures	Relevant Section in the Project Profile
Operation Phase		
Air Quality	(1) All odour sources, i.e. inlet chamber, coarse screen channels and wet wells would be enclosed; and (2) Deodourizer with H_2S removal efficiency of not less than 99.5% would be installed to remove odour.	5.2.1 & 5.2.2
Water Quality	(1) Standby pump and mechanical screen would be provided; (2) Dual power supply would be provided; and (3) SCADA system would be installed to alert operators of any irregularities or operation problem.	5.2.3
Noise	(1) Pumps and mechanical screens would be enclosed inside the pumping station building.	5.2.4
Waste Management	(1) Screenings would be stored in enclosed containers and transported to landfill for disposal regularly; and (2) Waste packaging would be conducted inside the pumping station building.	5.2.5
Landscape and Visual	(1) Greening and planting works; (2) Architectural details of the pumping station, including colour scheme, types of external finishing and layout of the pumping station will be carefully designed taking into account the surrounding environment; and (3) The structure will be restricted to 2 storeys high.	5.2.6 & 5.2.7

DRAWING

839700 E
839800 E
839900 E
840000 E
830700 N
830600 N
830500 N

N12b
N12a
R12b

CHINESE UNIVERSITY OF HONG KONG
香港中文大學

PROPOSED CHINESE UNIVERSITY SEWAGE PUMPING STATION
擬建的中文大學污水泵房

CHAK CHEUNG STREET
澤祥街

TOLO HIGHWAY
吐露港公路

Elevated Road
高架道路
Bicycle Track
單車徑
Road
道路
Car Park
停車場
Pipelines
導管
ESS
PH
RCP
Basketball Court
籃球場
Bamboo Lodge
竹苑
Fong Yun Woh Hall
方潤華堂
Fong Shu Chuen Building
方樹泉樓
Shanghai Fraternity Association Research Services Centre
上海總會科研技術中心
Physical Geography Experimental Station
自然地理實驗站
Kowloon Canton Railway
九廣鐵路
STATION ROAD
重店路
Platform
月台
TS
FP
EW
CUL
CULV

N

LEGEND:
圖例：

▲ REPRESENTATIVE AIR AND NOISE SENSITIVE RECEIVERS
具代表性的空氣及噪音敏感受體

REV. 修訂	DESCRIPTION 內容摘要	D.E.	P.E. CHECKED 核准	DATE 日期

DRAINAGE SERVICES DEPARTMENT
THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION
香港特別行政區政府渠務署

AGREEMENT No.CE 1/2006(DS) UPGRADING OF NORTH DISTRICT AND TOLO HARBOUR REGIONAL SEWERAGE - INVESTIGATION, DESIGN AND CONSTRUCTION
合約編號CE 1/2006(DS)北區及吐露港區域污水收集系統 - 勘察，設計及建造

LOCATIONS OF PROJECT SITE AND REPRESENTATIVE AIR AND NOISE SENSITIVE RECEIVERS
工程項目地點及具代表性的空氣及噪音敏感受體地點

MAUNSELL | AECOM
Maunsell– Metcalf & Eddy Joint Venture
茂盛 - 茂迪顧問聯營公司

DRG.NO. 圖紙編號 60023109/PP/1001

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APPENDIX A

Detailed Noise Impact Assessment

Appendix A – Detailed Noise Impact Assessment

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1 NOISE IMPACT

1.1 Introduction

1.1.1 This section presents the assessment on noise impact during construction and operational phases of the Project. Potential noise impacts at the noise sensitive receivers are assessed and appropriate noise mitigation measures, if required, are recommended.

1.2 Relevant Environmental Legislation and Standards

General

1.2.1 The principal legislation relating to the control of construction and operational noise is the Noise Control Ordinance (Cap. 400) (NCO). The technical memoranda (TMs) issued under the NCO to stipulate control approaches and criteria, and those which may be relevant to the Project are listed below:

(a) Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM);
(b) Technical Memorandum on Noise from Percussive Piling (PP-TM); and
(c) Technical Memorandum on Noise from places other than Domestic Premises, Public Places or Construction Sites (IND-TM).

1.2.2 Apart from the above, the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), issued under the EIAO, also provides guidelines and noise criteria for evaluating construction and operational noise impacts.

Construction Noise

1.2.3 Noise impact on general construction activities during normal working hours (i.e 0700 to 1900 hours on any day not being a Sunday or public holiday) is controlled by the *Criteria for Evaluating Noise Impact* stated in Table 1B in Annex 5 of the EIAO-TM. The noise limit is $L_{eq(30\ minutes)}$ 75 dB(A) for domestic premises, and these apply to uses which rely on opened windows for ventilation.

1.2.4 Percussive piling is prohibited between 1900 and 0700 hours on any weekday not being a general holiday and at any time on Sunday or general holiday. A CNP is required for carrying out of percussive piling between 0700 and 1900 hours on any day not being a general holiday. PP-TM sets out the working requirements and determination of the permitted hours of operations.

Operation Noise

1.2.5 Fixed plant noise is controlled under the Section 13 of NCO and IND-TM with a noise criteria of at least 5 dB(A) below the appropriate Acceptable Noise Levels (ANL) shown in Table 2 of the IND-TM or the prevailing background noise levels (for quiet areas with level 5 dB(A) below the ANL). The appropriate ANL for different Area Sensitivity Ratings (ASR) provided in the IND-TM are summarised in **Table 1.1** below.

Table 1.1 Operational Noise Criteria for Fixed Noise Sources

Time Period	ANL, dB(A)			Criteria (ANL-5), dB(A)		
	ASR A	ASR B	ASR C	ASR A	ASR B	ASR C
Day (0700 to 1900 hrs)	60	65	70	55	60	65
Evening (1900 to 2300 hrs)	60	65	70	55	60	65
Night (2300 to 0700 hrs)	50	55	60	45	50	55

1.2.6 The project site is located at the south-eastern side of the campus of the CUHK and is in close proximity to Tolo highway. A noise survey was conducted at representative NSR (N12b), which are located within 300m from the project boundary, in October 2007. The noise measurements were conducted using a B&K 2238 Sound Level Meter (Type 1), which had been calibrated using a B&K 4231 Sound Level Calibrator Type 1 with a calibration signal of

94.0 dB(A) at 1kHz. The measurements were conducted with reference to the calibration and measurement procedures stated in the IND-TM. The measured noise levels and noise criteria for fixed plant noise assessment is given in **Table 1.2**.

Table 1.2 Summary of Noise Criteria for Fixed Plant Noise Assessment

NSR ID	Description of NSR	Influencing Factor	ASR	Measured Noise Level (daytime/ nighttime) (dB(A))	ANL – 5dB(A) criterion (daytime/ nighttime) (dB(A))	Recommended Noise Criteria (daytime/ nighttime) dB(A)
N12b	Pine Lodge, Chinese University	-	A	54/54	55/45	54/45
R12b*	Vacant Area	Tolo Highway	C		65/55	54/54

Note:
* Planned Sensitive Receiver

1.3 Noise Sensitive Receivers

1.3.1 Existing and planned NSRs within 300m from the project boundary were identified in accordance with Section 3 of Annex 13 of the EIAO-TM.

1.3.2 All representative NSRs are summarized in **Table 1.3** and locations of these representative NSRs are shown in **Figures 4.1** of the project profile.

Table 1.3 Summary of Representative Noise Assessment Points

ID	Description	Use	Construction NSR	Operation NSR
N12b	Pine Lodge, Chinese University	Residential	✓	✓
R12b*	Vacant Area	GIC		✓

1.4 Assessment Methodologies

Construction Noise

1.4.1 The methodology outlined in the GW-TM was used to assess the impact of general construction works. Sound Power Levels (SWLs) of the equipment were reference from Table 3 of this TM. Where no sound power level (SWL) was given in the GW-TM, reference was made to previous similar studies in Hong Kong.

1.4.2 The assessment was based on the total SWL of PME to be used for each construction stage. It is assumed that the PME of each construction stage would be operated concurrently at any time to present the worst case scenario. The sound pressure level (SPL) of each construction stage at the NSRs was predicted based on the total SWL, barrier corrections, distance attenuation and facade correction.

Operation Noise

1.4.3 Fixed plant noise source is controlled by the NCO and IND-TM with a criteria of 5dB(A) below the appropriate Acceptable Noise Levels (ANL) shown in Table 2 of the IND-TM or the prevailing background noise levels. The following procedures were applied to the fixed plant noise assessment.

- Identify types of equipment and the number of equipment;
- Determine the SWL of each fixed plant noise source;
- Apply correction factors for distance, barrier attenuation and façade where applicable;
- Predict fixed plant noise levels at the NSRs; and
- Quantify the level of impact at the NSRs in accordance with IND-TM.

1.5 Identification of Environmental Impacts

Construction Phase

1.5.1 The potential construction noise impact may arise from the following construction activities involving the use of Powered Mechanical Equipment (PME) including excavators, breakers, generators, concreter lorry mixers, pokers, etc. The construction plant inventory is summarised in **Annex 1**. The construction noise impact assessment was conducted based on the construction plant inventory. Mitigation measures, if required, will be formulated and the residual construction noise impact will be assessed.

Operation Noise

1.5.2 The major fixed plant noise sources identified include sewage pump, mechanical screen and extraction fan of the deodourizer. A summary of the identified fixed plant noise sources to be operated with sound power level (SWL) is presented in **Annex 2**.

1.6 Prediction and Evaluation of Environmental Impacts

Construction Noise.

1.6.1 For normal daytime working hours, no exceedance of the construction noise criteria ($L_{eq(30min)}$ 75 dB(A) for residential uses) is predicted at N12b in the absence of mitigation measures. Details of construction noise calculations are presented in **Annex 3**. A summary of the unmitigated construction noise levels of the representative NSRs is presented in **Table 1.4**. Noise mitigation measures would be required to reduce noise levels to the noise criteria.

Table 1.4 Summary of Unmitigated Construction Noise Levels

NSR	Predicted Unmitigated Construction Noise Levels during Normal Daytime Working Hour ($L_{eq\ (30\text{-}min)}$, dB(A))	Noise Criteria, dB(A)	Compliance (Y/N)
N12b	72	75	Y

Operation Noise

1.6.2 In order to assess the worst-case scenario, the on-site fixed plants were assumed to operate concurrently 24 hours a day.

1.6.3 All the pumps will be enclosed inside the pumping station building. The extraction fans will be located at positions with minimum disturbance to the nearby sensitive receivers, i.e. on the eastern side of the pumping station.

1.6.4 Assessment results indicate that the fixed plant noise levels at representative NSRs comply with the daytime and night-time noise criteria. The results are summarized in **Table 1.5** and the detailed calculation is shown in **Annex 4**.

Table 1.5 Predicted Façade Noise Levels

NSR	Predicted Façade Noise Level, Leq(30min), dB(A)		Criteria, dB(A)		Compliance (Y/N)	
	Day & Evening (07:00-23:00)	Night (23:00-07:00)	Day & Evening (07:00-23:00)	Night (23:00-07:00)	Day & Evening (07:00-23:00)	Night (23:00-07:00)
N12b	30	30	54	45	Y	Y
R12b	33	33	54	54	Y	Y

1.7 Mitigation of Adverse Environmental Impacts

Construction Noise

1.7.1 Although no adverse noise impact is anticipated during construction, it is still recommended to carry out the good site practices listed below during the construction stage of the Project.

- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program;
- Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction program;
- Powered mechanical equipment that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;
- Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and
- Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

1.7.2 The above measures will be incorporated into the contract specification.

Operation Noise

1.7.3 Adverse noise impacts are not anticipated during operation phase. Mitigation measures are not required.

1.8 Conclusions

1.8.1 The noise impacts associated with the construction and operation of the Project were assessed. The assessment result indicated that the unmitigated construction and operation noise levels predicted at representative NSRs would comply with the noise criteria. No adverse noise impact arising from the Project would be expected.

Annex 1
Construction Plant Inventory

Sewage Pumping Station Upgrading Works for Chinese University SPS

Activity P - Site Clearance

Powered Mechanical Equipment (PME)	TM-Reference	No.of Items	SWL / item	On time (%)	Total SWL
Backhoe (mini)	CNP 082	1	94	100%	94
Mobile crane	CNP 048	1	112	70%	110
Lorry	CNP 141	1	112	30%	107
				Total	112

Activity Q - Excavation

Powered Mechanical Equipment (PME)	TM-Reference	No.of Items	SWL / item	On time (%)	Total SWL
Piling Vibratory hammer	CNP 172	1	115	100%	115
Welding machine	other ref	1	78	100%	78
Excavator	CNP 081	1	112	100%	112
Dump Truck	CNP 067	1	117	100%	117
				Total	120

Activity R - Piling

Powered Mechanical Equipment (PME)	TM-Reference	No.of Items	SWL / item	On time (%)	Total SWL	Total SWL
Mobile crane	CNP 048	1	112	70%	110	110
Lorry	CNP 141	1	112	30%	107	107
Piling rig (large diameter bored, grab and chisel)	CNP 164	1	115	100%	115	-
Piling rig (earth auger, auger)	CNP 167	1	114	100%	-	114
Generator, super silenced	CNP 103	1	95	100%	95	95
Air Compressor	CNP 003	1	104	100%	104	104
				Total	117	116
					117	

Activity S - Concreting

Powered Mechanical Equipment (PME)	TM-Reference	No.of Items	SWL / item	On time (%)	Total SWL
Concrete lorry mixer	CNP 044	1	109	100%	109
Concrete pump, lorry mounted	CNP 047	1	109	100%	109
Poker, vibratory, hand-held	CNP 170	2	113	100%	116
				Total	117

Activity T - E&M Installation

Powered Mechanical Equipment (PME)	TM-Reference	No.of Items	SWL / item	On time (%)	Total SWL
Mobile crane	CNP 048	1	112	70%	110
Lorry	CNP 141	1	112	30%	107
				Total	112
					112

Activity U - Demolition of existing structure

Powered Mechanical Equipment (PME)	TM-Reference	No.of Items	SWL / item	On time (%)	Total SWL
Breaker, excavator mounted (hydraulic)	CNP 028	1	122	100%	122
Breaker, hand-held	CNP 026	1	114	100%	114
Air Compressor	CNP 003	1	104	100%	104
				Total	123

Activity V - Backfilling & reinstatement of road surface

Powered Mechanical Equipment (PME)	TM-Reference	No.of Items	SWL / item	On time (%)	Total SWL
Dump Truck	CNP 067	1	117	100%	117
Excavator	CNP 081	1	112	100%	112
Concrete lorry mixer	CNP 044	1	109	100%	109
Poker, vibratory, hand-held	CNP 170	1	113	100%	113
Mobile crane	CNP 048	1	112	70%	110
Lorry	CNP 141	1	112	30%	107
Road planner or miller	CNP 184	1	111	100%	111
Road roller	CNP 185	1	108	100%	108
				Total	121

Remarks:
Other ref: The SWL of welder was made reference to the Spur Line EIA

Annex 2

Fixed Plant Inventory

Equipment Item	No. of Items	Remarks (1)	SWL/Item, dB(A) (2)	Total SWL, dB(A)
Sewage Pump	3	2 duty + 1 standby	92	95
Air Extraction Fan	3	-	73	78
Mechanically rake fine screen	2	1 duty + 1 standby	89	89

Note:

(1) Standby item was not included in noise assessment.

(2) The SWL of fixed plant was made referene to Project Profile for "Tai Po Tai Wo Road Sewage Pumping Station" (DIR-161/2007)

Annex 3

Construction Phase Noise Assessment

NSR ID	Approximate Notional Source Distance (m)	SPL at NSR, dB(A)							Predicted Maximum Construction Noise Level, dB(A)	EIAO-TM Criterion	Noise Exceedence, dB(A)
		Activity P (SWL=112, dB(A))	Activity Q (SWL=120, dB(A))	Activity R (SWL=117, dB(A))	Activity S (SWL=117, dB(A))	Activity T (SWL=112, dB(A))	Activity U (SWL=123, dB(A))	Activity V (SWL=121, dB(A))			
N12b	177	62	70	67	67	62	73	71	73	75	-

Annex 4

Operation Phase Noise Assessment

N12b

Equipment Item	No. of Items	Remarks (1)	SWL/Item, dB(A) (2)	Total SWL, dB(A)	Distance from NSR to source (m)	Correction			Predicted Noise Level
						Distance	Enclosure (3)	Façade	
Sewage Pump	3	2 duty + 1 standby	92	95	172	-53	-20	3	25
Air Extraction Fan	3	-	73	78	172	-53		3	28
Mechanically rake fine screen	2	1 duty + 1 standby	89	89	172	-53	-20	3	19
								SPL =	30
								Noise criteria (daytime / nightime), dB(A)	54 / 45

R12b

Equipment Item	No. of Items	Remarks (1)	SWL/Item, dB(A) (2)	Total SWL, dB(A)	Distance from NSR to source (m)	Correction			Predicted Noise Level
						Distance	Enclosure (3)	Façade	
Sewage Pump	3	2 duty + 1 standby	92	95	130	-50	-20	3	28
Air Extraction Fan	3	-	73	78	130	-50		3	31
Mechanically rake fine screen	2	1 duty + 1 standby	89	89	130	-50	-20	3	22
								SPL =	33
								Noise criteria (daytime / nightime), dB(A)	54 / 54

Note:

(1) Standby item was not included in noise assessment.

(2) The SWL of fixed plant was made referene to Project Profile for "Tai Po Tai Wo Road Sewage Pumping Station" (DIR-161/2007)

(3) With reference to “Good Practices on Pumping System Noise Control” published by Environmental Protection Department, facilities that would be enclosed in a concrete structure were assumed to have a 20 dB(A) reduction of noise emitted from the source due to transmission loss of the wall.
Enclosure Reduction for the mechanical screen is the reduction of SWL due to the enclosure for the equipment in reinforced concrete structure.