

Consultancy Agreement No. NEX/1050
Detailed Design for
Lee Tung Street Subway at Wan Chai Station

Deliverable D2.7A
Project Profile
Issued for MTRC
Revision E

August 2012
MTR Corporation



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1. Basic Information

1.1 Project Title

MTR Wan Chai Station Lee Tung Street Subway (hereafter called “The Project”).

1.2 Purpose and Nature of the Project

The redevelopment of the Lee Tung Street area (URA H15) has been proposed by the Urban Renewal Authority (URA) to revitalize this part of Wan Chai. The project is also seen by Planning Department, Transport Department and the community as a major opportunity to improve the pedestrian network for north-south movements from the Queen’s Road East area to Wan Chai MTR Station and beyond, for both rail and non-rail passengers. There is a particular desire to eliminate the danger caused by jaywalking across Johnston Road. A subway link, the Lee Tung Street Subway (LTS), has therefore been proposed under Johnston Road linking the URA H15 development and Wan Chai (WAC) MTR Station. The redevelopment has also been decided to ensure that it maximizes the use by non-rail passengers. The key benefits of this Project are:

- To provide a safe, attractive and the convenient means to both rail and non-rail pedestrians for crossing Johnston Road;
- To enhance accessibility to / from WAC Station;
- To enhance connectivity between northern Wan Chai district and areas south of Johnston Road; and
- To enhance passenger circulation within WAC Station and relief station congestion.

1.3 Number and Types of Designated Projects Covered by the Project Profile

The Project will involve construction of a new entrance for and associated station modifications within the existing WAC Station, construction of the proposed subway and one integrated station entrance at Site H15. The proposed subway will be fully air-conditioned and is approximately 100m long with access to the Redevelopment. The proposed LTS will form part of the WAC Station and will be gazetted under the Railways Ordinance (Cap. 519).

Under the Environmental Impact Assessment Ordinance (Cap. 499, hereafter called “EIAO”), WAC Station falls under the definition of a Designated Project (hereafter called “DP”) under Item A.2, Part I, Schedule 2 – “a railway and its associated stations” – but is exempted under Section 9(2)(g) since it has been in operation before the EIAO came into effect on 1 April 1998. Nevertheless, this Project involves physical addition or alteration to the existing WAC Station (see Section 1.7 below) which would potentially result in an adverse environmental impact as defined in the “Technical Memorandum on Environmental Impact Assessment Process” (hereafter called “EIAO-TM”). The project is considered as constituting a material change to an exempted designated project under Schedule 2 of the EIAO and consequently

should be subject to the provisions of the EIAO and require an Environmental Permit (hereafter called "EP") for the proposed modification works to proceed.

In accordance with the relevant statutory requirements under the EIAO, this Project Profile has been prepared to provide the necessary information to support direct application for an EP for this Project.

1.4 Name of Project Proponent

MTR Corporation Limited (MTRCL)

1.5 Location of the Project

The Project is located in Wan Chai District which is an urban area with a mixture of commercial and residential developments and recreational areas. The proposed works lie underneath a part of Southorn Playground, which is frequently used by patrons, and Johnston Road where high vehicle, tram and pedestrian volumes are anticipated. The location and alignment of the subway is shown in **Figure NEX1050/2.7A/001**. The plan and elevation of the subway are shown in **Figures NEX1050/2.7A/002** and **Figure NEX1050/2.7A/003** respectively, while the plan and elevation of the ventilation facilities is shown in **Figure NEX1050/2.7A/004**.

1.6 Name and Telephone Number of Contact Person

All queries regarding the Project can be addressed to:

Mr. Richard Kwan
Environment Manager
MTR Corporation Limited
Tel: 2688 1179
Fax: 2145 4269

1.7 Proposed Addition, Modification or Alteration

The Project aims to provide an underground pedestrian subway link that enables a direct connection between a new entrance at the western side of WAC Station and the basement level of URA H15. The Project includes the following works:

- The LTS Project consists of the pedestrian subway between the URA's Redevelopment at Site H15 (the Development) and WAC Station with Station modification works for subway and Station improvement works. All permanent works for the subway, except 2 numbers of ventilation facilities, will be below ground. There will not be any shops in the proposed subway. It is proposed that the ventilation facilities will be located within the children's playground.
- The construction of the Lee Tung Street pedestrian subway will involve approximately 8m deep excavation from the existing ground level (i.e. +3.8mPD to -4.0mPD) starting from the WAC station towards the URA Development. The subway will be constructed using open-cut construction method with a temporary pipe wall and sheet pile system supported by a series of steel lateral supports. Explosive will not be used during excavation work. Road decking will be provided after

the sheet pile installation at Johnston Road, excavation at that portion will be carried out under decking. At the portion beneath the tram tracks, underpinning method will be used to support the tram tracks during the subway construction.

2. Outline of Planning and Implementation Programme

2.1 Project Planning and Implementation

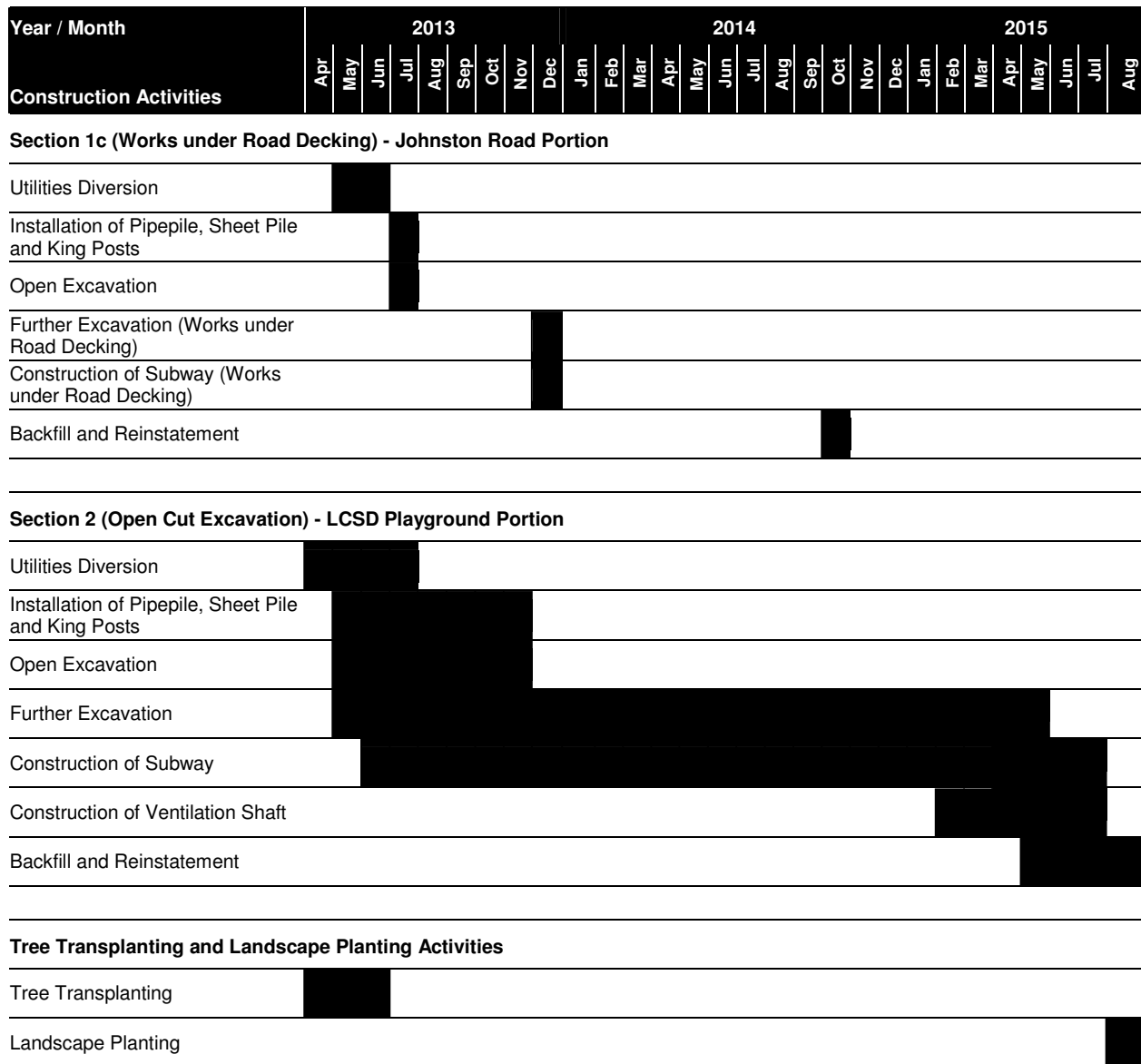
As the Project Proponent, MTRCL has overall responsibility for the planning, design, construction and operation of the Project. Mott MacDonald Hong Kong Limited (hereafter called “MMHK”) is commissioned by MTRCL as the engineering and environmental consultant. The proposed works will be implemented by the Contractor(s) to be appointed by MTRCL.

2.2 Project Programme

The construction of the proposed subway, which comprises utilities diversion, installation of piles and king posts, cut and cover excavation, backfilling and reinstatement and construction of the above-ground ventilation facilities, is scheduled to take approximately 29 months from April 2013 to August 2015. The construction works are divided into four sections. The tentative construction programme is presented in **Table 2.1**.

Table 2.1 Tentative Construction Programme

Year / Month	2013												2014												2015				
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Section 1a (Works under Road Decking) - Johnston Road Portion																													
Utilities Diversion																													
Installation of Pipepile, Sheet Pile and King Posts																													
Open Excavation																													
Further Excavation (Works under Road Decking)																													
Construction of Subway (Works under Road Decking)																													
Backfill and Reinstatement																													
Section 1b (Mucking out area) - Johnston Road Portion																													
Utilities Diversion																													
Installation of Pipepile, Sheet Pile and King Posts																													
Open Excavation																													
Further Excavation																													
Construction of Subway																													
Backfill and Reinstatement																													



2.3 Interfaces with Other Projects

Major concurrent project in the vicinity which would interface with this Project is presented in **Table 2.2**. Potential cumulative impacts from the concurrent project would be reviewed where appropriate.

Table 2.2 Major Interface Projects

Project	Project Proponent / Responsible Party	Anticipated Construction Period
Urban Renewal Authority Redevelopment H15 (Site A) URA H15	Urban Renewal Authority	H15 Redevelopment foundation works started in 2010 whilst their superstructure building works will start in Q3 2011 for completion in Q1 2014
Development next to the Hang	Private	No information

Project	Project Proponent / Responsible Party	Anticipated Construction Period
Seng Johnston Road Building		

The construction programme for the redevelopment of URA H15 located near to the proposed works area of this Project would be carried out concurrently starting from April 2013. According to the latest progress as in May 2012, the foundation works were completed at Redevelopment of H15 (Site A) URA H15 and the site is undergoing excavation works. Based on URA H15 developer's construction programme, the foundation and substructure works will be completed prior to LTS construction commencement and only light-duty construction work will be undertaken at the time. Hence, cumulative environmental impacts generated from this development are not anticipated.

In a site visit conducted on 20 May 2011, the development next to the Hang Seng Johnston Road Building was observed. According to the recent site visit on 3 May 2012, the superstructure building work is in progress. In the absence of the programme of this development but in view of the construction activities which will be shielded by the nearby buildings' structures, i.e. no direct line of sight to the identified noise sensitive receivers. Hence, cumulative environmental impacts generated from this development are not anticipated.

According to the latest Outline Zoning Plan (OZP) for Wan Chai (S/H5/26), no new planning applications were identified adjacent to the works area. Hence, no planned environmental sensitive receiver was identified for the environmental assessment.

3. Major Elements of the Surrounding Environment

3.1 Introduction

The potential impacts associated with the construction of subway and associated works of the Project as well as its future operation are assessed according to the criteria listed in Annexes of the Technical Memorandum on Environmental Impact Assessment (EIAO-TM). Potential environmental issues during the construction and operational phases including noise, air quality, water quality, waste management and landscaping and visual outlook were assessed and described as follows.

3.1.1 Site History and Existing / Past Land Use

According to the historical aerial photographs, as shown on the 1859 historical map, it is evident that the site of LTS had not undergone reclamation at that time. The land area to the south of Johnston Road had been formed before 1866 and this also correlates with the reclamation boundary. More areas of land were being reclaimed thereafter within and near the LTS site area to allow for further development along the northern shore of Hong Kong Island. As revealed from the available aerial photographs, in 1945, it was evident that the Southorn Playground had already been formed since then. Both Johnston Road and Hennessy Road were also formed. By 1963, two buildings had been constructed to the east of the LTS site area and these were demolished in 1982. Based on the aerial photographs in 1977, Chiu Hin Mansion had been built to the south of the LTS site area at that time. In 1982, part of the Southorn Playground was closed for the construction of the MTRC Island Line. A temporary site office had been constructed on the study site area and shallow excavation was observed in the 1982 aerial photographs. The temporary structure was no longer visible in the 1988 aerial photographs. By 1988, the construction of Southorn Garden, Southorn Centre and Southorn Stadium had been completed. In 1992, the Children's Play Area of Southorn Playground had been constructed and the existing children's playground comprises children's play equipments, trees, planters, safety mat, boundary wall, trellis and bench. No significant changes are apparent in the available photographs from 1995 onwards.

3.2 Noise

For purpose of this assessment, representative Noise Sensitive Receivers (NSR)s situated closest to works locations have been identified and selected for prediction of the worst-case levels of noise impact. Two representative NSRs, which are located nearest to the proposed subway alignment and immediately facing the Project site have been selected to assess the noise impact in the study area due to Project works. These representative NSRs are tabulated in **Table 3.1** and shown in **Figure NEX1050/2.7A/005**.

Table 3.1 Representative Noise Sensitive Receivers

Noise Sensitive Receiver	Description	Approximate Shortest Horizontal Distance to Works Site Boundary (m)	Use
N1	Hennessy Building (117-123 Hennessy Road)	48	Mixed commercial / residential
N2	Chiu Hin Mansion (94-102 Johnston Road)	10	Mixed commercial / residential

3.3 Air Quality

The Environmental Protection Department (EPD) is operating a fixed air quality monitoring station in Central/Western, which is the station situated nearest to the Project Site. The 5-year average concentrations of total suspended particulate (TSP) were calculated from the annual average pollutant concentrations at the Central/Western air monitoring station published in EPD's Air Quality in Hong Kong from 2006 to 2010. This is presented in **Table 3.2** below.

Table 3.2 5-year average pollutant concentrations monitored at Central/Western Air Quality Monitoring Station

Pollutant	5-Year Average ($\mu\text{g}/\text{m}^3$)	Air Quality Objective for Annual Average ($\mu\text{g}/\text{m}^3$)
TSP	76	80

The representative sensitive use associated with air quality and the Air Sensitive Receiver (ASR) is that situated closest to the works area. The worst-affected ASRs are those situated closest to the project boundary, and these representative ASRs are selected and tabulated in **Table 3.3** and shown in **Figure NEX1050/2.7A/006**.

Table 3.3 Representative Air Sensitive Receivers

Air Sensitive Receiver	Description	Approximate Shortest Horizontal Distance to Works Site Boundary (m)	Use
A1	Chiu Hin Mansion (94-102 Johnston Road)	10	Mixed commercial/ residential
A2	Hennessy Building (117-123 Hennessy Road)	48	Mixed commercial/ residential
A3	Ball Courts in Southorn Playground	14	Recreational – for sports and other activities

3.4 Water Quality

As the construction activities will be land-based and the scale of this Project is limited, direct water quality impact on the Water Control Zone (WCZ) is not anticipated.

3.5 Landscape and Visual

Part of the Project site is located in the south-eastern corner of the Southorn Playground, which currently consist of children's playground and basketball courts. There are 13 trees located in this children's playground currently, of which some trees would be affected during the construction period. As the Project is proposed in an urban area with a mixture of commercial and residential developments and recreational areas, visual quality of existing views is not high due to the heavy road traffic and high level of anthropogenic activities in Wan Chai area.

3.6 Cultural Heritage

Based on the studies in Section 3.1.1, it is considered that the project site is a highly developed area and has no archaeological potential. The following graded buildings are located near the Project Site as presented in **Table 3.4** and their locations are shown in **Figure NEX1050/2.7A/009**.

Table 3.4: Graded Historical Buildings (GHB) in the Vicinity of the Project Sites

GHB ID	Built Heritage Resources	Grading Information	Approximate Distance from Project
H1	No. 60A, 62, 64 and 66 Johnston Road	Grade 2 (grading confirmed on 18 Dec 2009)	140m east of Project Site
H2	No.18 Ship Street	Grade 2 (grading confirmed on 18 Dec 2009)	90m south of Project Site
H3	No. 186, 188 and 190 Queen's Road East	Grade 3 (grading confirmed on 31 Aug 2010)	160m south of Project Site

4. Possible Impact on the Environment

4.1 Construction Phase

4.1.1 Noise

No construction activity is currently scheduled outside 7am – 7pm. Whenever construction work is to be carried out from 7pm to 7am, the Contractor must obtain a Construction Noise Permit (CNP) and ensure full compliance with the Noise Control Ordinance requirements. All construction works should be prohibited during 11pm to 7am unless the Engineer Representative considers that it is unavoidable and necessary.

The construction works will involve different activities as mentioned in **Table 2.1**. The proposed subway will be constructed by cut and cover excavation under road decking in Sections 1a and 1c after open excavation, cut and cover excavation at mucking out point without road decking in Section 1b at Johnston Road Portion, and by open cut and cover excavation in Section 2 at LCSD Playground Portion, as shown in **Figure NEX1050/2.7A/005**. Each section will have one set of Powered Mechanical Equipment (PME) for the works activities.

During construction, on-site PME will be the main source of potential noise impacts on Noise Sensitive Receivers (NSRs). The PME to be employed for this Project is presented in **Appendix I**, together with the Sound Power Levels (SWLs) for PME without environmental protection measures. Accordingly, the maximum SWLs for each construction activity are calculated and tabulated in **Table 4.1**.

Table 4.1 Maximum SWLs for each Construction Activity

Construction Activity	Maximum SWL, dB(A)
Section 1a - Johnston Road Portion	
Utilities Diversion	114
Installation of Pipepile, Sheet Pile and King Posts	116
Open Excavation	111
Further Excavation (Works under Road Decking)	111
Construction of Subway (Works under Road Decking)	104
Backfill and Reinstatement	114
Section 1b - Johnston Road Portion	
Utilities Diversion	114
Installation of Pipepile, Sheet Pile and King Posts	115
Open Excavation	111
Further Excavation	117
Construction of Subway	113
Backfill and Reinstatement	114
Section 1c - Johnston Road Portion	
Utilities Diversion	114

Construction Activity	Maximum SWL, dB(A)
Installation of Pipepile, Sheet Pile and King Posts	115
Open Excavation	111
Further Excavation (Works under Road Decking)	110
Construction of Subway (Works under Road Decking)	104
Backfill and Reinstatement	114
Section 2 - LCSD Playground Portion	
Utilities Diversion	115
Installation of Pipepile, Sheet Pile and King Posts	116
Open Excavation	114
Further Excavation	119
Construction of Subway	114
Construction of Ventilation Shaft	112
Backfill and Reinstatement	114

Construction noise impact assessment at the two representative NSRs has been conducted in accordance with the methodology specified in the “Technical Memorandum on Noise from Construction Work Other than Percussive Piling” (GW-TM). Detailed assessment calculations are presented in **Appendix II**. The assessment results have indicated that the predicted noise levels at the representative NSRs would exceed the daytime noise criterion of 75 dB(A) for most of the construction stages, as shown in **Table 4.2**. Therefore, noise control measures will be required to reduce the construction noise to acceptable levels.

Table 4.2 Predicted Noise Levels at Representative Noise Sensitive Receivers (Unmitigated Scenario)

Noise Sensitive Receiver	Predicted Noise Levels during Construction Stage, dB(A)	EIAO-TM Daytime Noise Assessment Criterion, dB(A)
N1	74 - 83	75
N2	78 - 93	75

4.1.2 Air Quality

Potential air quality impact during the construction phase is expected to be generated mainly from excavation works along the subway alignment and backfilling, wind erosion of open sites, and transportation/handling of construction and demolition (C&D) materials. As the construction site is small, excavated C&D materials will mostly need to be transported away for disposal, with minimal amount for on site storage. The Contractor shall follow all relevant requirements in the Air Pollution Control (Construction Dust) Regulation (Cap. 311R) and implement the stipulated dust suppression measures. When all of these measures are in place, the adverse impacts on air quality would be insignificant.

During construction, in the event that diversion / removal of asbestos cement pipes are necessary, the requirements for any asbestos cement pipes treatment / removal and the relevant requirements under the Air Pollution Control Ordinance (APCO) shall be followed.

4.1.3 Water Quality

During construction, the excavation and lateral support (ELS) system will be consisted of pipe pile and sheet pile. Sheet pile is impermeable barrier while grout curtain will be installed behind pipe pile wall, both of them can resist the ground water drawdown during excavation. A pumping test will also be carried out to ensure the performance of sheet pile / grout curtain prior to the excavation works. Therefore, the potential groundwater drawdown due to excavation will be minimized. Potential major sources of water quality impacts during the construction phase are expected to originate from the discharge of construction run-off and effluent from dewatering activities into stormwater drains during excavation works. Other potential sources of water quality impacts include drainage from dust suppression measures, sewage effluent from the construction workforce and accidental liquid spillage. Wastewater treatment facilities will be necessary to provide treatment before discharge. The Contractor should ensure that the effluent discharged from the desilting facilities will comply with the relevant requirements under the Water Pollution Control Ordinance (WPCO) and its associated Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS).

The Contractor is required to implement good site practices to comply with the following statutory requirements:

- Water Pollution Control Ordinance and its subsidiary regulation; and
- Environmental Protection Department's Professional Persons Environmental Consultative Committee Practice Note ProPECC PN 1/94 'Construction Site Drainage'

With the implementation of general pollution control measures as good site practice during construction phase, adverse water quality impact is not anticipated.

4.1.4 Waste Management

Waste generated from the construction works will include C&D materials, chemical waste and general refuse, with C&D materials being the dominant waste source. Review was undertaken based on the observation and analysis of available historical aerial photographs (see Section 3.1.1). Based on the review, the LTS site is a piece of reclaimed land and the major historical land uses include playground, buildings and without industrial activities. Therefore, the LTS site is not expected to have any potential land contamination issues.

It is estimated that approximately 7,250m³ C&D material will be excavated from underground works. Given that the construction site is small, reuse of part of these materials for subsequent backfilling is considered not practicable. Storage of excavated material on-site is not considered practicable as the site area is limited and could become a source of nuisance to the public. As long as the excavated material is suitable for public filling, excavated material will be delivered to and disposed of at public filling areas. Appropriate measures such as dust suppression measures as required under the Air Pollution Control (Construction Dust) Regulation and good site practices outline in ProPECC Note PN 1/94 Construction Site Drainage to minimise washing away of temporary stockpiled C&D material should be followed as far as practicable. Confirmation has been made with Public Fill Committee of Civil Engineering and Development Department (CEDD) for disposal of inert C&D material generated from this project. For inert C&D material, excluding asphalt generated from this project could be delivered to and disposal of at Chai Wan Public Fill Bargaining Point and all asphalt generated from this project could be

delivered to and disposal at Tseung Kwan O Area 137 Fill Bank. The generation of C&D material is considered to be small and is not envisaged to have any adverse impact.

Initial site investigation has been undertaken in January 2011 at the proposed subway for this Project where deep excavation works are required. Based on the field investigation results, marine deposit was not found underneath the fill material used for those reclamation works. The drillhole record is shown in **Appendix III**. This drillhole is considered representative of the site by virtue of its close proximity. Nevertheless, in the event that any marine sediment is encountered during the construction works and offsite disposal is required, a proposal for sampling and testing of the sediment shall be prepared accordingly for estimation of the quantity and quality of sediment. The proposal shall be submitted to EPD for approval in accordance with the procedures set out in PNAP No. 252 Management Framework for Disposal of Dredged/Excavated Sediment.

The quantity of chemical waste will be dependent on the amount of plant utilised by the Construction Contractor and the site maintenance requirements. Actual quantity of chemical waste is therefore difficult to estimate but given the small scale of the Project, the quantity will be small and less than a few cubic metres per month.

The quantity of non-inert C&D material (i.e. top soil) generated during site clearance is anticipated to be minimal, provided the generated non-inert C&D material is transported off site as soon as it is generated in order to minimise the potential for adverse environmental impacts, no significant waste impact would be envisaged. These non-inert C&D material will be disposed of at West New Territories (WENT) Landfill.

General refuse generated during the construction will be dependent on the number of workers on site. It is anticipated that the amount of general refuse will also be minimal. Provided that the wastes generated from the Project are properly handled, stored, recycled as far as possible, and disposed of in accordance with good waste management practices and relevant regulations and requirements under the Waste Disposal Ordinance, no significant waste impact arising from the construction stage of the Project would be envisaged.

4.1.5 Landscape and Visual

As the proposed site will be located in the children's playground and basketball courts in Southorn Playground, and two ventilation facilities will be located within the boundary of the existing planters at the Children's playground, potential landscape impacts during the construction phase would be the permanent relocation of 3 trees and the removal of 1 tree within the children's playground of Southorn Playground.

A tree condition survey for the project was conducted in February 2011. There are 13 trees located in the Southorn Playground currently (**Appendix IV**), of which 4 trees are found in direct conflict with the proposed construction works. No registered Old & Valuable Trees (OVTs) are identified. All are common species widely used in garden greenery. Species of affected trees include *Bauhinia blakeana*, *Cassia surattensis*, *Ficus microcarpa* and *Spathodea campanulata*. These affected trees are proposed to be preserved by temporary holding nursery before being taken to their final recipient locations at the later stage in the Project except one tree (*Spathodea campanulata*) is proposed to be felled due to its poor health condition and which is not viable to be transplanted. Taking into account the limited scale and reversibility of impact, the landscape impact is considered as insubstantial and acceptable.

Potential visual impacts during the construction phase would be the temporary views of construction site, construction plants and equipment perceived by the residents from their homes along Johnston Road, Hennessy Road and Luard Road and visitors of the affected playground. However the visual quality of existing views is not high due to the heavy road traffic and high level of anthropogenic activities in Wan Chai area. Taking into account the existing quality of views and temporary and reversible nature of the impact, the visual implication is considered as insubstantial and acceptable.

4.1.6 Cultural Heritage

Construction works will only be conducted within the Project site boundary, direct physical disturbance of these graded buildings is not expected. Furthermore, construction works is small scale with minimum number of construction equipment, vibration impact on the graded buildings is therefore not anticipated given with the sufficient buffer distance (i.e. at least 90m). Hence, vibration impact from the construction works to the identified graded historical buildings is not expected.

4.2 Operational Phase

4.2.1 Noise

As the proposed subway alignment includes two above-ground ventilation facilities located within the existing planter area at Southorn Children’s Playground next to Southorn Stadium on Johnston Road, as shown in **Figure NEX1050/2.7A/004**, potential noise impact during the operational phase is expected. The dominant noise source of the ventilation facilities is vibration at the duct fall and fan noise from the louvers for fresh air intake, emergency smoke extraction, and routine maintenance. Assessment of the operation noise level emanating from the fixed plant at the NSRs was carried out in accordance with the Noise Control Ordinance (NCO) and the “Technical Memorandum on Noise from Places other than Domestic Premises, Public Places or Construction Sites” (IND-TM). The shortest horizontal distance of each Noise Sensitive Receiver (NSR) to the proposed ventilation facility is shown in **Table 4.3** below.

Table 4.3 Proposed Ventilation Facilities and Distance to the Noise Sensitive Receivers

Source Location	Direction of Opening’s of Ventilation Facilities	Approximate Shortest Horizontal Distance to NSR (m)	
		N1	N2
Opening of Ventilation Facility (Fresh air intake) - Southorn Children’s Playground	North (Southorn Children’s Playground)	110	29
	West (Southorn Children’s Playground)	111	27
	South (Johnston Road)	113	26
Opening of Ventilation Facility (Smoke extraction) - Southorn Children’s Playground	South (Johnston Road)	113	23

Fixed plant noise such as ventilation facility shall comply with the Acceptable Noise Levels (ANLs) specified in the IND-TM. As stipulated in Annex 5 of the EIAO-TM, the noise standard for planning purposes for fixed noise should be either (a) 5 dB(A) below the appropriate Acceptable Noise Level (ANL) or (b) the prevailing background noise levels (For quiet areas with level 5 dB(A) below the ANL). The

ANLs laid down in the IND-TM based on the Area Sensitive Rating (ASR) are tabulated in **Table 4.4** below.

Table 4.4 Acceptable Noise Levels (ANLs)

Time Period	Area Sensitivity Rating		
	A	B	C
Day (0700 to 1900 hours)	60 dB(A)	65 dB(A)	70 dB(A)
Evening (1900 to 2300 hours)			
Night (2300 to 0700 hours)	50 dB(A)	55 dB(A)	60 dB(A)

The IND-TM considers a “major road” as an Influencing Factor (IF) when a road has an annual average daily traffic (AADT) flow in excess of 30,000. The N1 and N2 are located in urban area along Hennessy Road with an AADT flow of 27,200 and along Johnston Road with an ADDT flow of 11,220 respectively in those road sections according to Annual Traffic Survey 2010 issued by Transport Department. Therefore, the roads adjacent to the NSRs are not considered as an IF.

According to the area type categories as stipulated in the IND-TM, the subject site shall be classified as urban area. As the Project’s NSRs will not be affected by any IF, the ASR for the NSRs shall be ‘B’. Based on site inspection during May 2011, the existing environment was found dominated by road traffic noise. It is expected that the background noise level in the area are not likely lower than the regarding ANL – 5 dB(A), hence the 5 dB(A) below the appropriate ANL set out in the IND-TM has been adopted for the fixed plant noise assessment criteria for the NSRs. Therefore, the noise criteria to be adopted for this assessment are 60 dB(A) during Day and Evening time (0700 to 2300 hours) and 50 dB(A) during Night time (2300 to 0700 hours) respectively.

The maximum permissible noise emission levels at the openings of ventilation facilities have been determined for future detailed design of the fixed plant. Assumptions adopted in this assessment are listed below:

- All ventilation openings are in operation;
- Screening corrections from the surrounding buildings / structures are excluded; and
- A 10 dB(A) attenuation is applied for openings without direct line of sight.

If exceedance of the noise criteria is found for one NSR, the initial SWL of the dominant sources to that NSR would be gradually lowered until the corrected sound pressure level (SPL) at that NSR meets the acceptable level. The process would be repeated for other representative NSRs with exceedance of the noise criteria until all corrected SPLs at the representative NSRs meet the noise criteria. The maximum allowable SWLs of the proposed fixed plants have been predicted by this approach.

The results of assessment for the Area Sensitivity Rating of ‘B’ in accordance with the methodology mentioned above are shown in **Table 4.5** below. Detailed assessment calculations are presented in **Appendix V**.

Table 4.5 Maximum Allowable SWLs of the Fixed Plant Noise Sources

Opening ID	Maximum SWL (dB(A))	
	Day & Evening Time	Night time
North (Southorn Children's Playground)	90	80
West (Southorn Children's Playground)	90	80
South (Johnston Road)	88	78
South (Johnston Road)	88	78

The fixed plant sources would operate during the operation of the station which also cover restricted hours (i.e. 23:00 – 07:00), no adverse operation noise impact are envisaged if the noise emissions from the proposed fixed plant are designed to meet the night time maximum allowable sound power level with appropriate noise reduction measures in place.

4.2.2 Air Quality

As the subway will be for pedestrian use only, the function of the ventilation facilities is to supply and exhaust air inside the subway, there will be no air pollution emissions during operation of the Project. Hence, adverse impacts on air quality would not be expected.

4.2.3 Water Quality

There will be no generation of wastewater during operation of the Project. It is therefore anticipated that there will be no adverse water quality impact..

4.2.4 Waste Management

There is no generation of wastes arising from operation of the subway except general refuse from pedestrians using the subway, which will be properly collected and removed by licensed waste collector on a regular basis to minimise odour, pest and litter impacts. No adverse waste impact is therefore anticipated.

4.2.5 Landscape and Visual

Transplanted trees will be taken to a temporary holding nursery before permanently relocated to the reinstated playground after the completion of works. One tree is proposed to be removed due its poor condition. Therefore, adverse landscape impact due to the Project during the operational phase is not expected.

The construction is proposed to be carried out by cut and cover method. The facilities located in children's playground and basketball courts in Southorn Playground affected by construction works including children's play equipments, planter, safety mat, part of boundary wall and trellis and bench will be reinstated to the satisfactory of the authority after the completion of works. Potential operational visual impact would be the introduction of the ventilation facilities at the south-eastern corner of the Southorn Playground. It is proposed that two ventilation blocks will be erected in the reinstated planter as illustrated

in **Figure NEX1050/2.7A/004**. According to MTR Design Standards Manual Clause 5.6.4.8, smoke extraction duct should have 5m clearance from the existing building and therefore swapping the locations of the two ventilation facilities is not feasible. Nevertheless, part of their views will be screened by the existing boundary wall of the playground. While these structures are not robust, screening measure by means of vertical greening to soften the physical appearance is recommended. Details of measures are provided in **Section 5**. With implementation of the recommended measures, the landscape and visual impact would be within acceptable level.

4.2.6 Cultural Heritage

Potential impact on the identified built heritage is not envisaged during the operation of the Project as the LTS will only serve as the pedestrian subway between the URA's Redevelopment at Site H15 (the Development) and WAC Station.

5. Environmental Protection Measures and Any Further Environmental Implication

5.1 Measures to Minimize Environmental Impacts

5.1.1 Noise

5.1.1.1 Construction Phase

To minimize the noise emissions during the construction phase of the Project, the following environmental protection measures are proposed:

- Use quieter plants and working methods; and
- Use movable barrier, noise enclosure and silencer.

Use of Quieter Plant

The use of quieter plants to minimize the noise emission at sources is the most effective measures to reduce the construction noise impacts. A list of plants that are quieter than the standard types given in GW-TM and that has been used in the assessment of construction noise is shown in **Table 5.1** below. It should be noted that the use of the quieter PME adopted in this assessment is not a must for the Contractors to carry out the construction operations. The Contractors are allowed to use other types of quiet PME to meet their needs, provided that the types of PME they use have SWL equal to or lower than those of the types used in this assessment.

Table 5.1 List of Quieter Plant

Quieter Plant	Reference ¹	SWL, dB(A)
Breaker	BS Table D8 Ref 12	106
Circular Saw	BS Table D7 Ref 78	106
Concrete Lorry Mixer	BS Table D6 Ref 33	96
Concrete Pump Truck	BS Table D6 Ref 36	106
Crane Lorry	BS Table D7 Ref 101	94
Excavator	BS Table D8 Ref 15	103
Lorry	BS Table D9 Ref 19	102
Pipe Piling Rig	BS Table D4 Ref 46	102
Poker	BS Table D6 Ref 40	98
Road Roller	BS Table D8 Ref 30	101
Silent Piler Machine	GIKEN ²	94
Truck	BS Table D9 Ref 39	103

Remarks: 1) British Standard 5228:2009 - Noise and vibration control on construction and open sites
 2) Reference was made to VEP Application No. VEP-072/2002 for Modifications to MTRC TST Station

Use of Movable Barrier, Noise Enclosure and Silencer

To further reduce the construction noise impacts, movable barrier and noise enclosure should be used to impede the noise transmission from the sources to the NSRs. Schematic configuration of the movable barrier and noise enclosure is shown in **Figures NEX1050/2.7A/007** and **NEX1050/2.7A/008** respectively. The environmental protection measures for various types of PME are tabulated in **Table 5.2** below. In general, movable barrier can achieve a 5 dB(A) reduction for movable PME and 10 dB(A) reduction for stationary PME whereas noise enclosure can achieve a 15 dB(A) reduction for PME, depending on the actual design of the movable noise barrier and the noise enclosure. In order to further mitigate the noise impact from mucking out area at Section 1b of Johnston Road Portion as shown in **Figure NEX1050/2.7A/005**, a noise enclosure is proposed to be built after open excavation in order to minimize the noise impact due to further excavation work and construction of subway. The enclosure should either be provided with acoustic door for access purpose which should be kept closed during the construction works or should be designed with no direct line of sight from the open side to the NSRs.

Table 5.2 Environmental Protection Measures for different PMEs

PME	Proposed Measures	Reduction, dB(A)
Air Compressor	Noise Enclosure	15
Breaker	Movable Barrier	10
Circular Saw	Movable Barrier	10
Concrete Pump Truck	Movable Barrier	10
Excavator	Movable Barrier	5
Generator	Noise Enclosure	15
Grouting Machine	Movable Barrier	10
Pipe Piling Rig	Movable Barrier	10
Poker	Movable Barrier	10
Silent Piler Machine	Movable Barrier	10
Crane Lorry / Lorry	Movable Barrier	5
Ventilation Fan	Silencer	15
Water Pump	Movable Barrier	10
Concrete Lorry Mixer	Movable Barrier	5
Road Roller	Movable Barrier	5
Dump Truck	Movable Barrier	5

A typical design barrier with a steel frame of vertical / cantilever type would be adopted and located close to the noise generating part of PME. Barrier material of surface mass density in excess of 7kg/m^2 is desirable to achieve the maximum screening effect (and minimum 10kg/m^2 for noise enclosure). The length of barrier should generally be at least five times of its height and the minimum height of a barrier should be such that no part of the noise source will be visible from the noise sensitive receiver being protected. Noise reduction fabric KYOWA#1000 (hereinafter “the Fabric”) which was identified as practical to use in the Tsim Sha Tsui Station Modification Work would also be used. The Contractor could select different noise reduction fabric with similar function and effectiveness to achieve the noise alleviation.

Residual Construction Noise Assessment

The maximum SWLs for each construction activity and the residual construction noise at the two representative NSRs, after implementation of the proposed environmental protection measures, has been assessed in accordance with the methodology specified in the Technical Memorandum on Noise from Construction Work Other than Percussive Piling, as shown in **Tables 5.3** and **5.4**. The assessment results have revealed that the construction noise ranged from 57 to 75 dB(A) during the construction period. Lists of plant inventory and detailed assessment calculations are presented in **Appendix VI** and **VII** respectively.

Table 5.3 Maximum SWLs for each Construction Activity - With Environmental Protection Measures

Construction Activity	Maximum SWL, dB(A)
Section 1a - Johnston Road Portion	
Utilities Diversion	98
Installation of Pipepile, Sheet Pile and King Posts	96
Open Excavation	95
Further Excavation (Works under Road Decking)	95
Construction of Subway (Works under Road Decking)	93
Backfill and Reinstatement	97
Section 1b - Johnston Road Portion	
Utilities Diversion	98
Installation of Pipepile, Sheet Pile and King Posts	87
Open Excavation	95
Further Excavation (Full enclosure provided)	97
Construction of Subway (Full enclosure provided)	97
Backfill and Reinstatement	94
Section 1c - Johnston Road Portion	
Utilities Diversion	98
Installation of Pipepile, Sheet Pile and King Posts	87
Open Excavation	95
Further Excavation (Works under Road Decking)	94
Construction of Subway (Works under Road Decking)	93
Backfill and Reinstatement	97
Section 2 - LCSD Playground Portion	
Utilities Diversion	99
Installation of Pipepile, Sheet Pile and King Posts	93
Open Excavation	95
Further Excavation	104
Construction of Subway	100
Construction of Ventilation Shaft	96
Backfill and Reinstatement	97

Table 5.4 Predicted Noise Levels at Representative NSRs – With Environmental Protection Measures

Noise Sensitive Receiver	Predicted Noise Levels during Construction Stage, dB(A)	EIAO-TM Daytime Noise Assessment Criterion, dB(A)
N1	57 – 67	75
N2	61 – 75	75

General Construction Noise Control Measures

Although no adverse noise impact would be generated after the proposed environmental protection measures are in place, the Contractor should adopt general construction noise control measures, as stated below, in order to minimise noise impacts during the construction phase:

- The Code of Practice on Good Management Practice to Prevent Violation of the Noise Control Ordinance (Chapter 400) (for Construction Industry) published by EPD shall be adopted;
- The statutory and non-statutory requirements and guidelines shall be complied with;
- Approval for the method of working, equipment and noise protection measures intended to be used at the site shall be obtained from the Project Engineer before commencing any work;
- Working methods to minimize the noise impact on the surrounding NSRs shall be formulated and executed, and the implementation of these methods shall be monitored by experienced personnel with suitable training;
- Noisy equipment and noisy activities shall be located as far away from the NSRs as is practical;
- Unused equipment shall be turned off;
- PME should be kept to a minimum and the parallel use of noisy equipment / machinery should be avoided;
- All plant and equipment shall be maintained regularly; and
- Material stockpiles and other structures shall be effectively utilized as noise barriers, whenever practicable.

5.1.1.2 Operational Phase

As long as the proposed fixed plant are designed to comply with the maximum allowable sound power levels as specified in **Table 4.5**, no adverse operational phase noise impacts are anticipated.

5.1.2 Air Quality

5.1.2.1 Construction Phase

Relevant dust control measures as stipulated in the Air Pollution Control (Construction Dust) Regulation (Cap. 311R) will be implemented to keep potential air quality impacts to a minimum. The following key dust suppression measures are recommended:

- Regular watering of all exposed site surfaces to reduce dust emissions, particularly during dry weather;
- Frequent watering of particularly dusty construction areas and areas close to air sensitive receivers;
- Covering of stockpile of excavated dusty materials, if any, with impervious sheeting or spraying with water to maintain the entire surface wet;
- Provision of vehicle washing facilities at the entry and exit points of site;
- Tarpaulin covering of any dusty materials being transported to and from site by vehicle;
- Positioning of construction plant at the maximum practicable distance from air sensitive receivers; and
- Due to the small size of the works sites and lack of space for stockpiling, excavated materials should be hauled off-site almost immediately. However, in the event of any stockpiled excavated materials, they should be covered with tarpaulin and be removed off-site as soon as practicable to avoid any dust nuisance arising.

With implementation of the above measures, no adverse air quality impacts during construction phase are anticipated.

5.1.2.2 Operational Phase

As no air quality impacts during the operational phase are anticipated, no mitigation measures will be required.

5.1.3 Water Quality

5.1.3.1 Construction Phase

The Contractor should comply with the Water Pollution Control Ordinance (WPCO) and its subsidiary regulation to minimise construction runoff and the chance of erosion. The Contractor should design and implement all the control measures and practices specified in the ProPECC PN 1/94 "Construction Site Drainage" and "Recommended Pollution Control Clauses for Construction Contracts" issued by EPD. The key control measures are as follows:

- Collection of wastewater into a sedimentation tank for treatment before discharge into the public drainage system;
- Provision of silt trap and oil interceptor to remove the oil, lubricants, grease, silt, grit and debris from the wastewater prior to discharge to the public stormwater system. The silt traps and oil interceptors should be cleaned and maintained regularly;
- Installation of wheel washing facilities to minimise muddy runoff;
- Regular maintenance and inspection of drainage systems and erosion control and silt removal facilities;
- Management and monitoring of sewage treatment facilities (if any);
- Any foul effluent should not be discharged into any public sewer and stormwater drain, unless an effluent discharge permit is obtained under the WPCO by the Contractor;
- Coverage of stockpiles of C&D materials (if any) during rainstorms; and
- Site toilet facilities, if needed, should be chemical toilets or should have the sewage discharge directed to a foul sewer.

With the implementation of above general pollution control measures as good site practice during construction phase, adverse water quality impact is not anticipated.

5.1.3.2 Operational Phase

As no water quality impacts during the operational phase are anticipated, no mitigation measures will be required.

5.1.4 Waste Management

5.1.4.1 Construction Phase

Proper waste management in the way of avoiding, minimising, reusing and recycling should be adopted in order to minimise the generation of various wastes and associated environmental impacts during the construction stage. The Contractor shall comply with the Waste Disposal Ordinance and its subsidiary regulations, and implement the necessary waste management measures. The following control measures are recommended:

- Scrap metals or abandoned equipment should be recycled if possible;
- Waste arising should be kept to a minimum and be handled, transported and disposed of in a suitable manner;

- The Contractor should adopt a trip ticket system for the disposal of C&D materials to any designated public filling facility and/or landfill. Independent audits of the Contractor and resident site staff will be undertaken to ensure that the correct procedures are being followed;
- Chemical waste shall be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes; and
- All general refuse should be segregated and stored in enclosed bins or compaction units and waste separation facilities for paper, aluminium cans, plastic bottles etc. should be provided to facilitate reuse or recycling of materials and their proper disposal.

5.1.4.2 Operational Phase

With proper collection and removal of general refuse from pedestrians using the subway, no adverse waste impact is anticipated during the operational phase. Hence, no mitigation measures will be required.

5.1.5 Landscape and Visual

5.1.5.1 Construction Phase

To minimise potential landscape and visual impacts during the construction phases, the following measures are recommended:

- Clear demarcation of works area to prevent damages to existing trees in close proximity;
- Protection of all trees planned to be retained onsite;
- Preserving all affected trees by transplanting where practical. Tree transplanting application and tree removal application shall be submitted for approval in accordance with ETWB TCW 3/2006; and
- Screening of construction works by hoardings/noise barriers around Works area in visually unobtrusive colours.

5.1.5.2 Operational Phase

To minimise potential landscape and visual impacts during the operational phases, the following measures are recommended:

- Reinstating the children's playground and basketball courts after the completion of works;
- Using appropriate (visually unobtrusive and non-reflective) building materials and colours in built structures; and
- Greening of vertical walls of ventilation blocks with climbers. The proposed treatment is illustrated in **Appendix VIII**. Climbing plant species of *Parthenocissus dalzielii*, *Hedera helix* and *Bauhinia glauca* are recommended for their high amenity and low maintenance requirements.

With implementation of the recommended measures, the landscape and visual impact during both construction and operational phase would be within acceptable level.

5.1.6 Cultural Heritage

As no cultural heritage impacts are anticipated during both construction and operational phases of the Project, no associated mitigation measures will be required.

5.2 Environmental Monitoring and Audit (EM&A) Requirements

Although all construction impacts are short-term effects and no adverse effect would be anticipated on the environment with proposed mitigation measures in place, the project proponent has taken the initiative to implement a monitoring and audit programme during the construction phase to check on the implementation of the control measures.

An EM&A programme is recommended to include the monitoring of construction noise and dust on a regular basis. Noise monitoring locations will be set up at Hennessy Building and Chiu Hin Mansion and weekly audits will be carried out. Dust monitoring locations will also be set up at Hennessy Building, Chiu Hin Mansion and Ball Courts in Southorn Playground. 24-hr dust monitoring will be conducted. EM&A requirements for tree preservation and landscape planting works are included in the EM&A plan. The Contractor is required to implement the EM&A plan. The plan addresses all environmental aspects of concern during construction. Site inspection/audit would also be carried out. Details of the monitoring procedures, methodology and action plans as well as complaint handling procedures is made reference to approved EM&A Manual for the 'Tsim Sha Tsui Station Northern Subway Environmental Impact Assessment'. All the details in an EM&A plan will be included as **Appendix IX**.

5.3 Implementation Schedule

An Implementation schedule summarizing all proposed environmental mitigation measures are presented in **Appendix X**. For the recommended mitigation measures of each key environmental issue, the location and timing for the measures have been clearly identified as well as the parties responsible for implementing the measures.

5.4 Possible Severity, Distribution and Duration of Environmental Effects

Construction works would only affect a localized area, with the proposed project scope and the implementation of good site practices, adverse environmental impact is not anticipated.

5.5 Further Implications

Operation of the subway will follow the O&M Manuals to be prepared by MTRCL in accordance with relevant ordinances, regulations and standards. Further implication of project is not anticipated.

6. Use of Previously Approved EIA Reports

Reference has been made to the following previous DIR applications:

- Mass Transit Railway - Lai Chi Kok Station Cheung Lai Street Pedestrian Subway and Entrances Works (DIR-132/2005)
- Prince Edward Station Pedestrian Subway Extension and Entrance Modification Works (DIR-124/2005)
- Modification to MTRC Mong Kok Station Entrances C3 and C4 (DIR-078/2003)

The abovementioned projects, which have successfully gone through the direct Environmental Permit application route, are similar to this Project in terms of scale and works involved.

Further reference on sound power levels of silenced equipment is drawn from the 'Tsim Sha Tsui Station Northern Subway Environmental Impact Assessment' Register No. AEIAR-127/2008, approved on 31 December 2008 under EIAO.

7. Conclusion

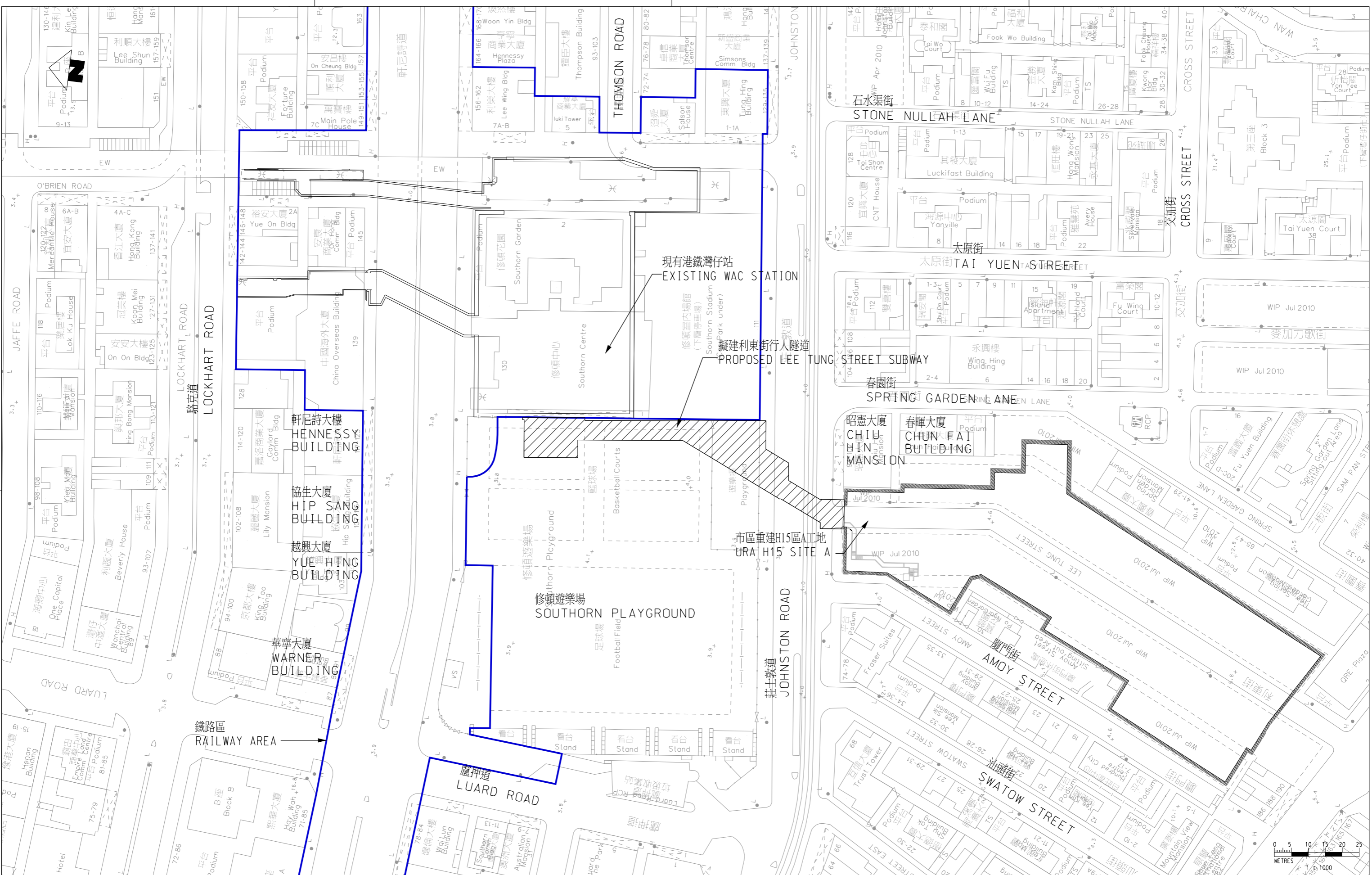
The proposed Project involves physical alternation to the existing Wan Chai Station and it would be considered as a project constituting a material change to an exempted Designated Project under the EIAO. Hence, this Project Profile is submitted under the EIAO to provide sufficient information for direct application of a Environmental Permit.

Potential environmental impacts in terms of air, noise, water, waste management, landscape and visual and cultural heritage associated with this project have been examined. Adverse environmental impacts are not anticipated during both construction and operation stages, given that the recommended environmental protection measures and good site practices are properly implemented.

An EM&A programme is also recommended to ensure the proper implementation of control measures and to monitor regularly the environmental impacts on the neighbouring areas throughout the construction period.

FIGURES

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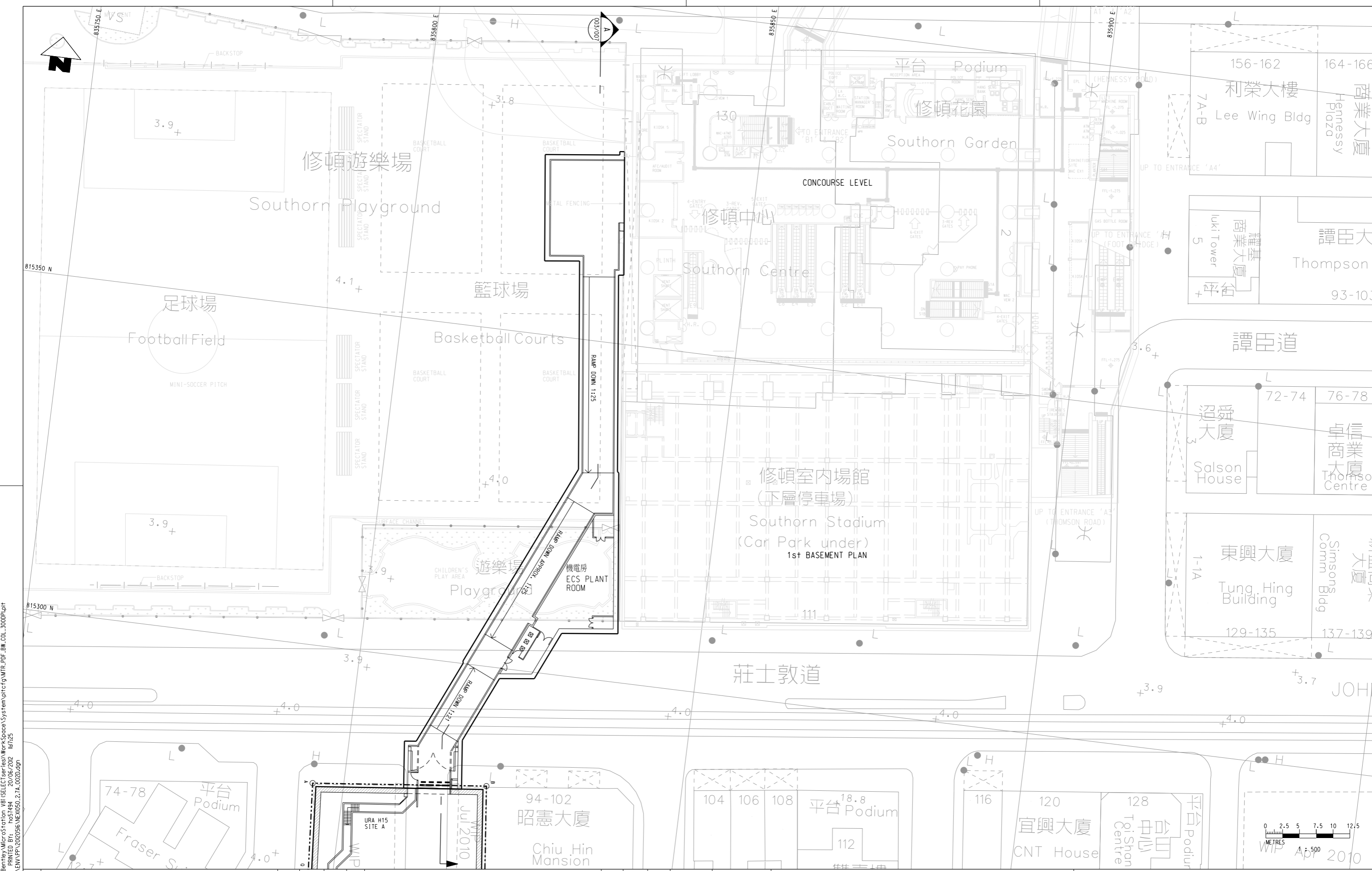
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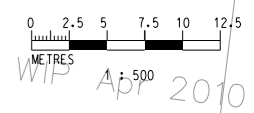
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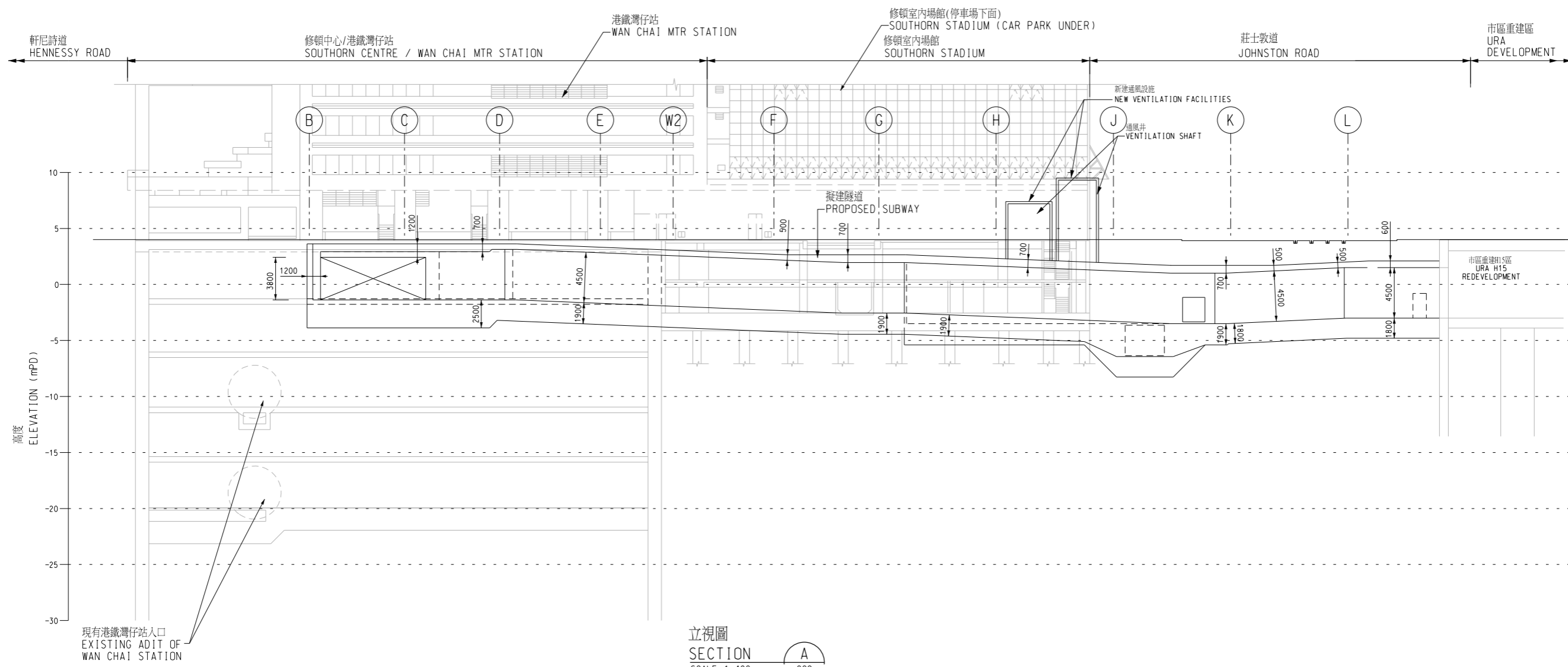
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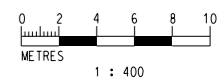
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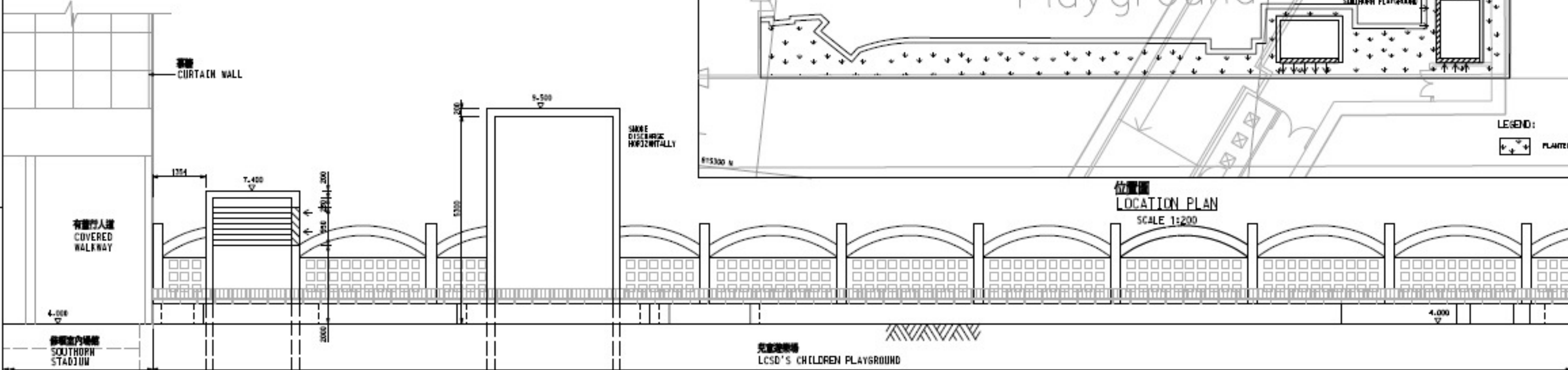
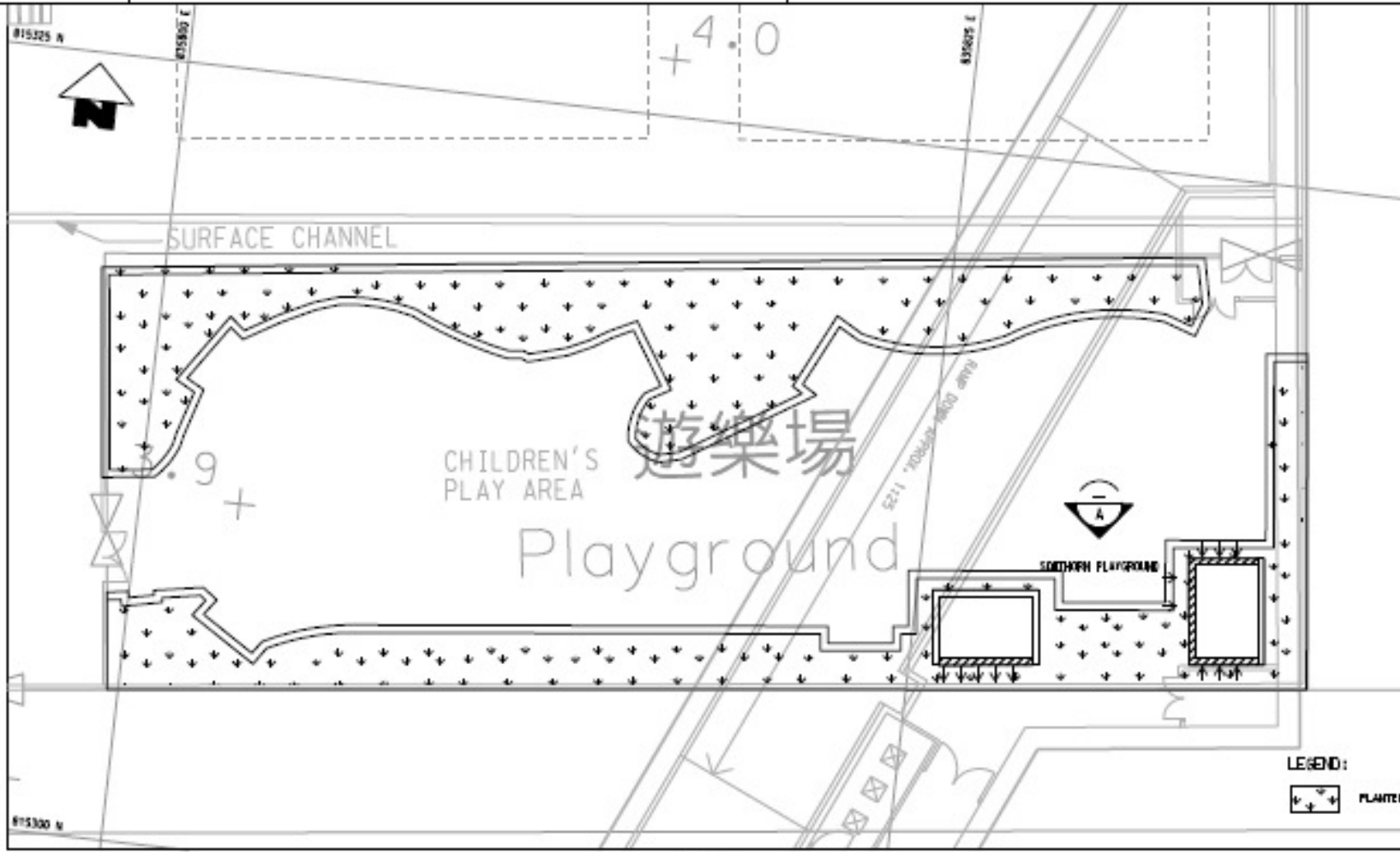
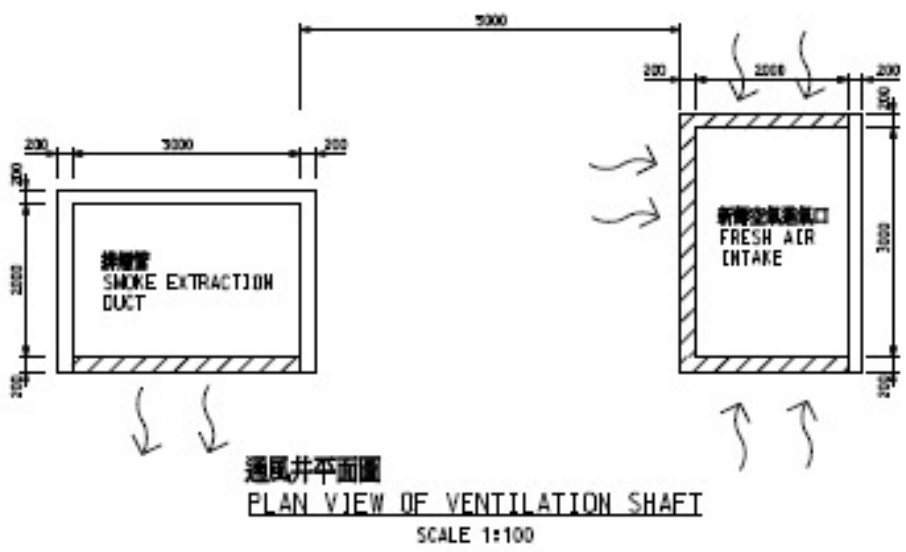
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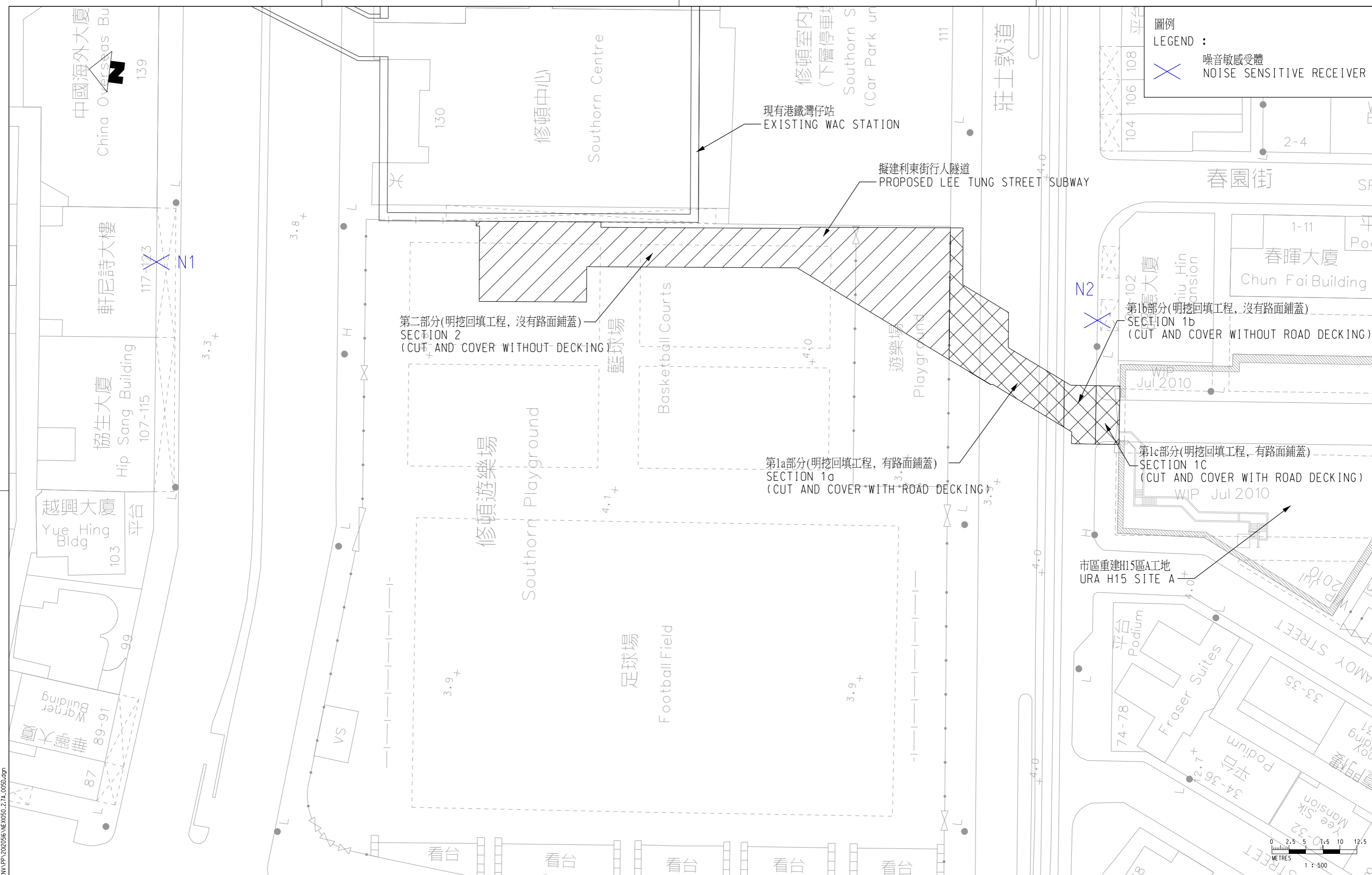
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圖例
LEGEND :

 噪音敏感受體
 NOISE SENSITIVE RECEIVER

REV	DESCRIPTION	BY	DATE	APPROVED
D	GENERAL REVISION	HO	16MAY12	AFK
C	GENERAL REVISION	HO	12AUG11	AFK
B	GENERAL REVISION	MING	18JUL11	AFK
A	PROJECT PROFILE	MING	04MAY11	AFK

REV	DESCRIPTION	BY	DATE	APPROVED
D	GENERAL REVISION	HO	16MAY12	AFK
C	GENERAL REVISION	HO	12AUG11	AFK
B	GENERAL REVISION	MING	18JUL11	AFK
A	PROJECT PROFILE	MING	04MAY11	AFK

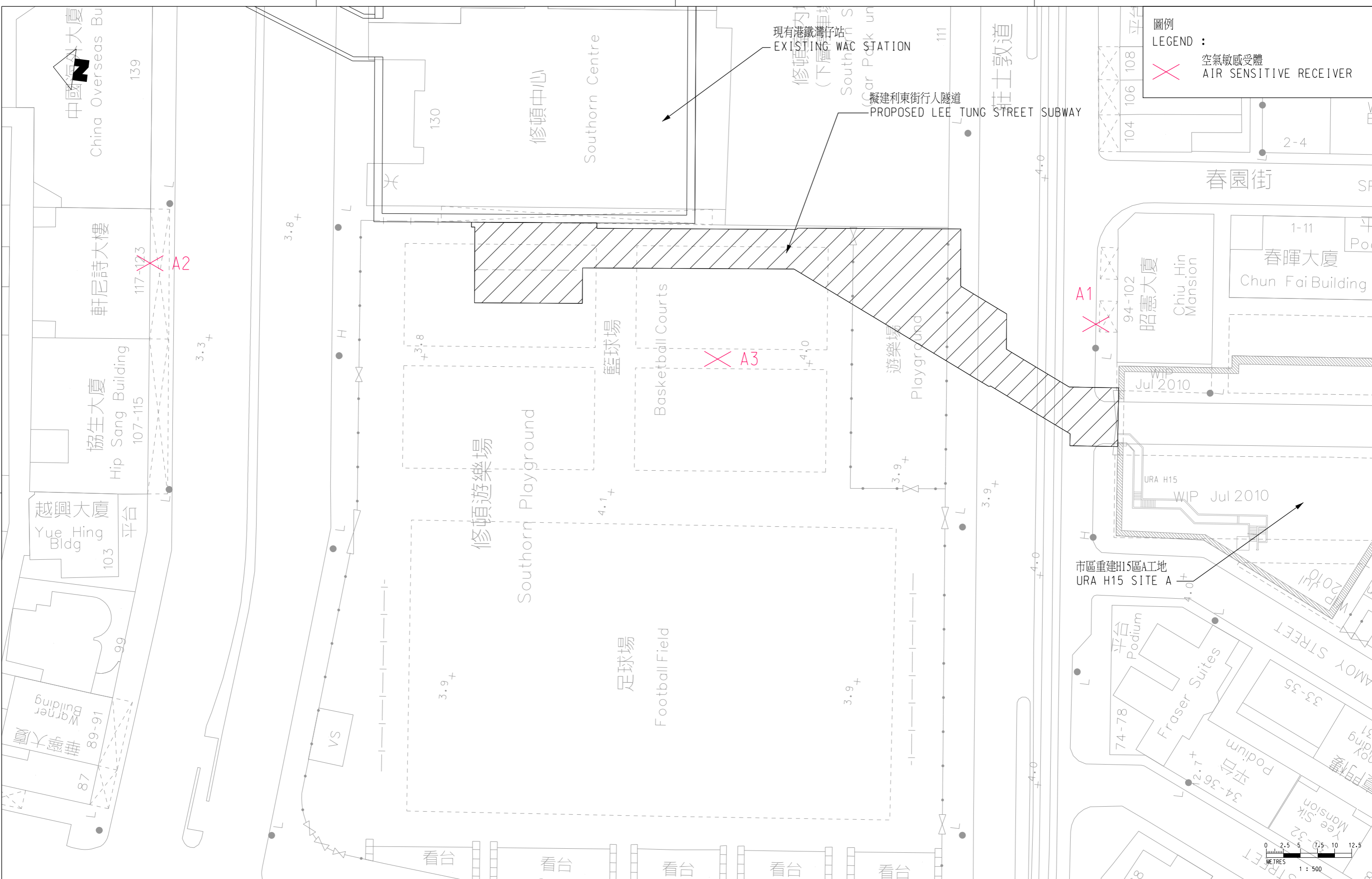
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TITLE
 CONSULTANCY AGREEMENT NO. NEX/1050
 DETAILED DESIGN FOR LEE TUNG STREET SUBWAY
 LOCATIONS OF NOISE SENSITIVE RECEIVERS
 噪音敏感受體位置圖

SCALE: 1:500 (A3)
 DRAWING NO.: NEX1050/2.7A/005
 REV.: D

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圖例
 LEGEND :
 ✕ 空氣敏感受體
 AIR SENSITIVE RECEIVER

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED
E	GENERAL REVISION		16MAY12	AFK					
D	GENERAL REVISION		27MAR12	AFK					
C	GENERAL REVISION		12AUG11	AFK					
B	GENERAL REVISION		18JUL11	AFK					
A	PROJECT PROFILE		04MAY11	AFK					

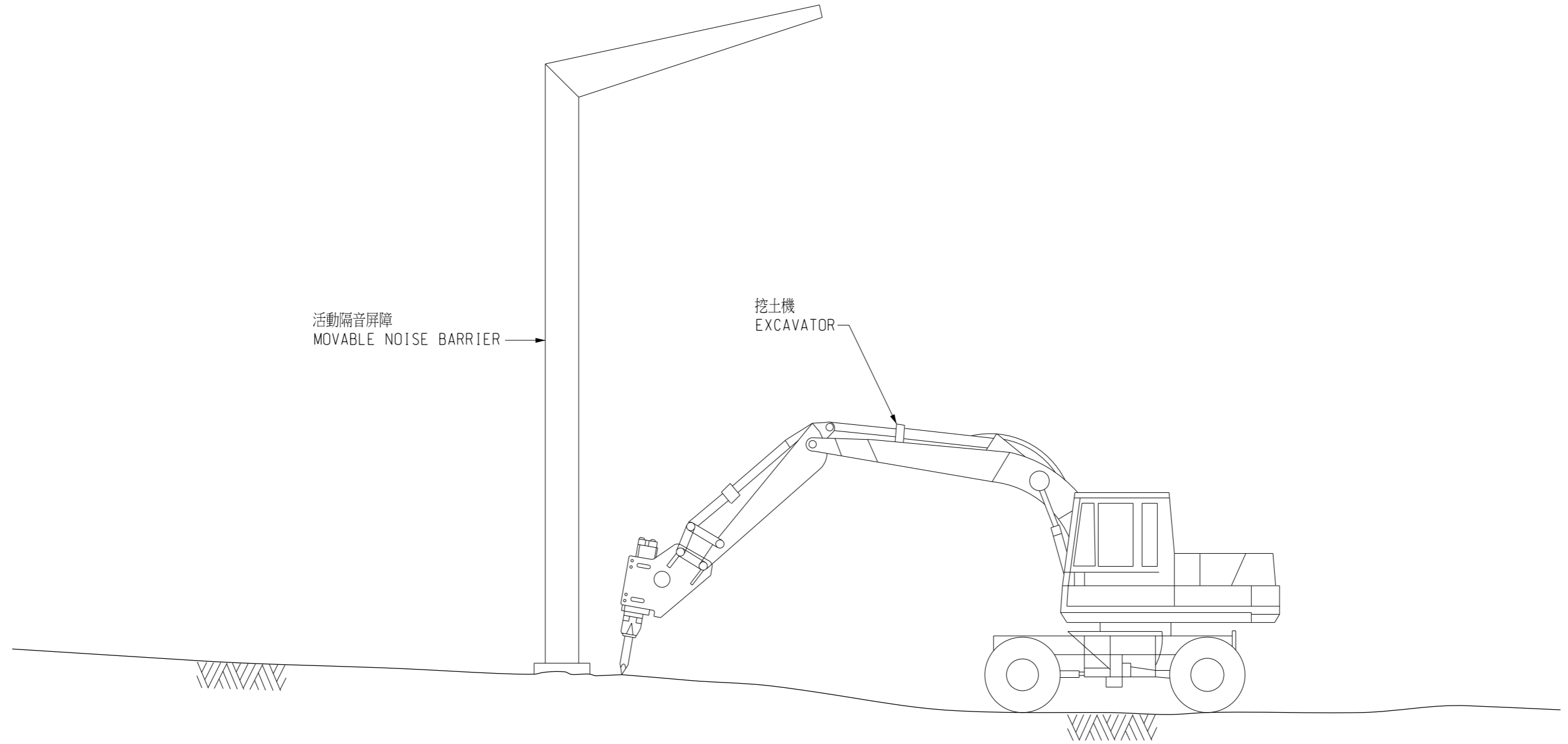
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TITLE
 CONSULTANCY AGREEMENT NO. NEX/1050
 DETAILED DESIGN FOR LEE TUNG STREET SUBWAY
 LOCATIONS OF AIR SENSITIVE RECEIVERS
 空氣敏感受體位置圖

SCALE 1:500 (A3) DRAWING NO. NEX1050/2.7A/006 REV. E

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活動隔音屏障
MOVABLE NOISE BARRIER

挖土機
EXCAVATOR

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED
A	PROJECT PROFILE	HWC	18 JUL 11	AFK					

DRAWN	HWC
DESIGNED	SC
CHECKED	BL
APPROVED	AFK
DATE	18 JUL 2011

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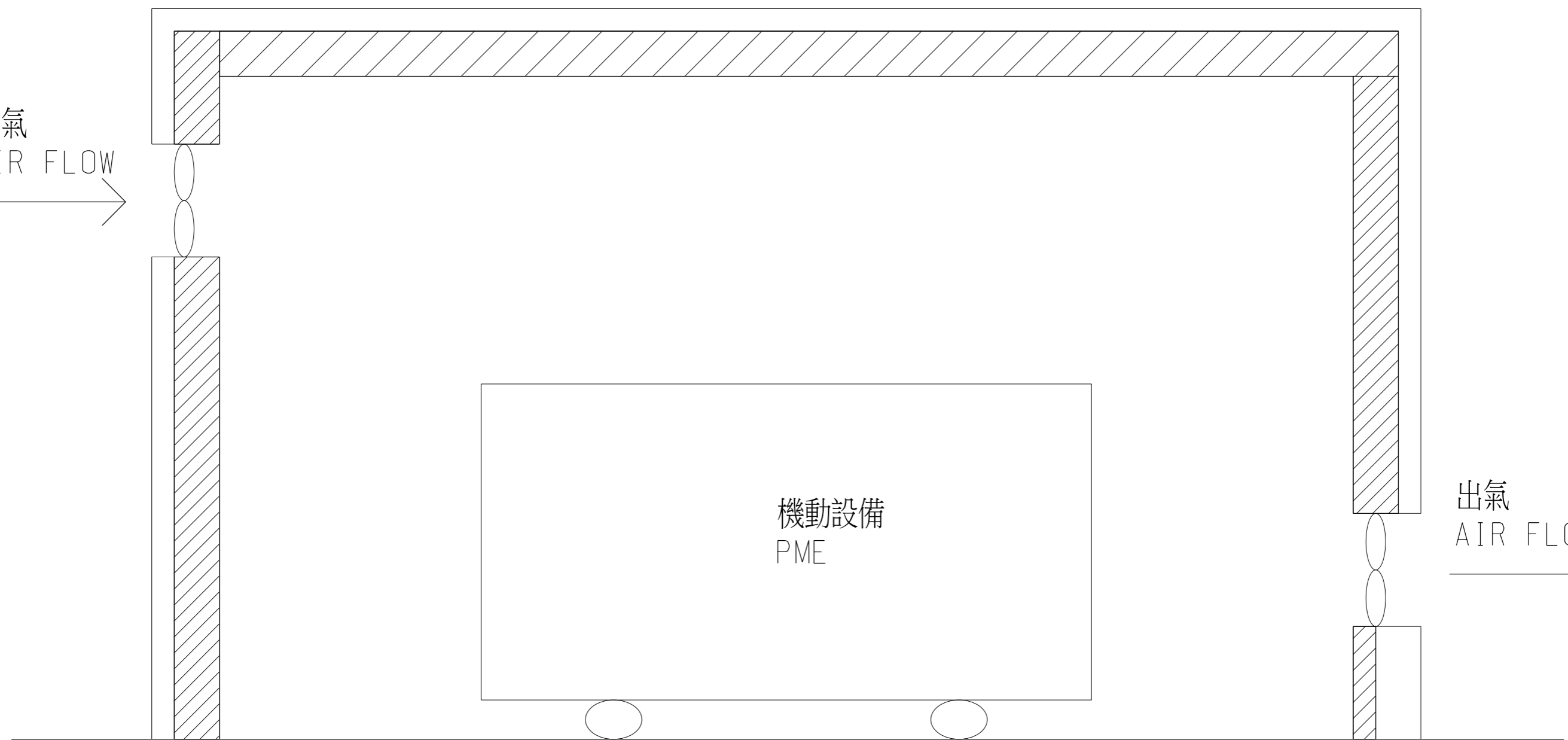
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CADD REF. NEX1050_2.7A_007A.dgn

TITLE		CONSULTANCY AGREEMENT NO. NEX/1050 DETAILED DESIGN FOR LEE TUNG STREET SUBWAY SCHEMATIC CONFIGURATION OF MOVABLE NOISE BARRIER 活動隔音屏障結構圖	
SCALE	N.T.S.	DRAWING NO.	NEX1050/2.7A/007
REV.	A		

進氣
AIR FLOW

出氣
AIR FLOW



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REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED
A	PROJECT PROFILE	HWC	18 JUL 11	AFK					

DRAWN	HWC
DESIGNED	SC
CHECKED	BL
APPROVED	AFK
DATE	18 JUL 2011

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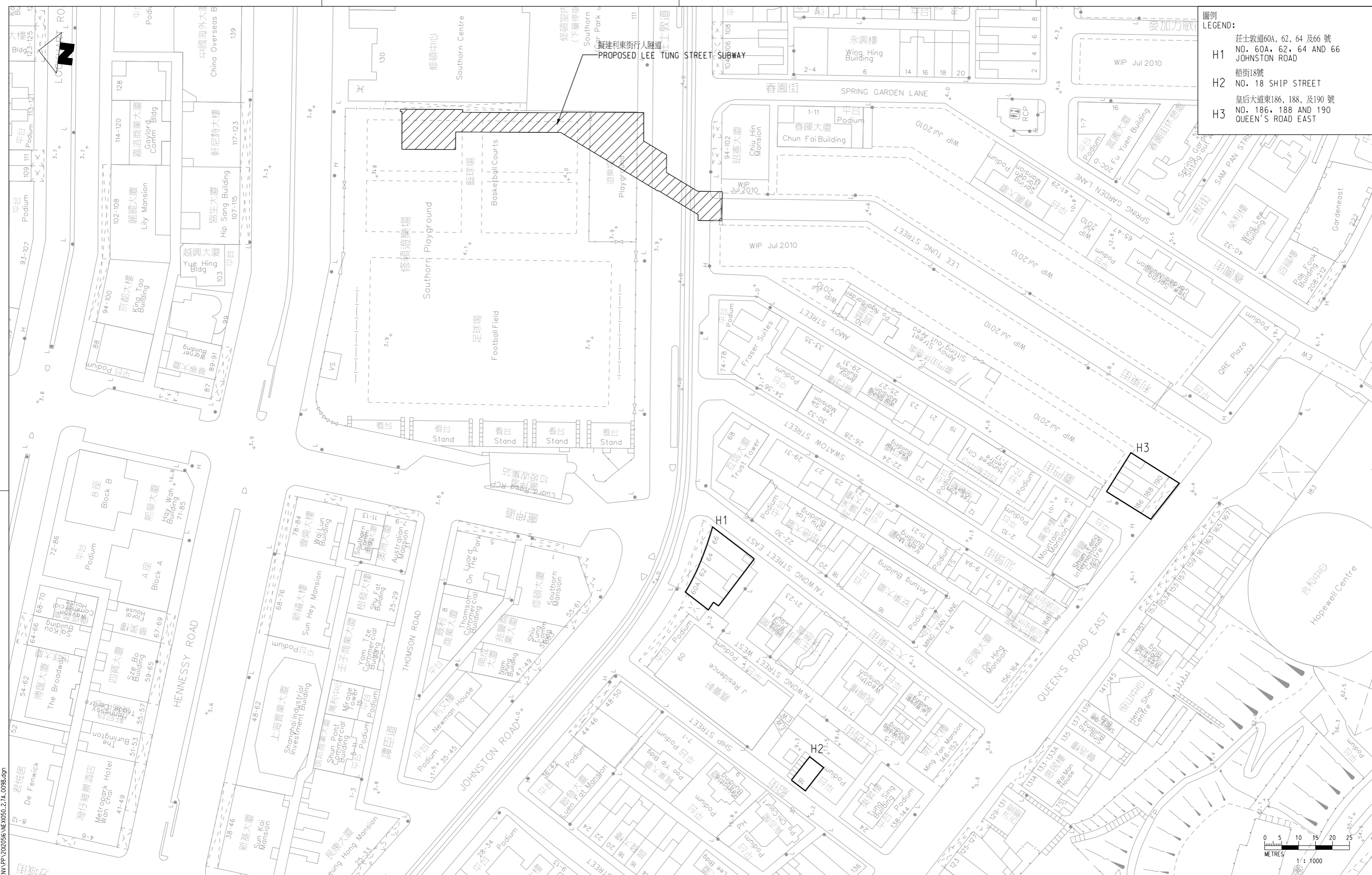
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TITLE		CONSULTANCY AGREEMENT NO. NEX/1050	
TITLE		DETAILED DESIGN FOR LEE TUNG STREET SUBWAY	
TITLE		SCHEMATIC CONFIGURATION OF FULL NOISE ENCLOSURE FOR PME	
TITLE		機動設備隔音罩結構圖	
SCALE	N.T.S.	DRAWING NO.	NEX1050/2.7A/008
REV.	A		

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 FILENAME:



圖例
 LEGEND:
 H1 莊士敦道60A, 62, 64 及 66 號
 NO. 60A, 62, 64 AND 66
 JOHNSTON ROAD
 H2 船街18號
 NO. 18 SHIP STREET
 H3 皇后大道東186, 188, 及190 號
 NO. 186, 188 AND 190
 QUEEN'S ROAD EAST

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED
B	GENERAL REVISION		16MAY12	AFK	HO				
A	PROJECT PROFILE		27MAR12	AFK	HO				

DRAWN	HO
DESIGNED	BW
CHECKED	BL
APPROVED	AFK
DATE	27MAR2012

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TITLE		SCALE	DRAWING NO.	REV.
CONSULTANCY AGREEMENT NO. NEX/1050 DETAILED DESIGN FOR LEE TUNG STREET SUBWAY LOCATIONS OF GRADED HISTORICAL BUILDINGS 已評級的歷史建築位置圖		1:1000 (A3)	NEX1050/2.7A/009	B

Appendices

Appendix I. Plant Inventory for Various Construction Activities

Appendix I
Plant Inventory for Various Construction Activities

Consultancy Agreement No. NEX/1050
Lee Tung Street Subway (Section 1)

PME	TM or other reference	No. of PME	SWL, dB(A)/unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Section 1a - Johnston Road Portion							
Activities							
Utilities Diversion							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	-	0	102
Breaker, hand-held, mass > 35kg	CNP 026	1	114	40%	-	0	110
Lorry	CNP 141	1	112	20%	-	0	105
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	40%	-	0	108
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	100%	-	0	100
Lorry	CNP 141	1	112	20%	-	0	105
						Total	114
Installation of Pipepile, Sheet Pile and King Posts							
Lorry	CNP 141	1	112	20%	-	0	105
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Grout mixer	CNP 105	1	90	100%	-	0	90
Pipe piling rig	CNP 162	2	105	100%	-	0	108
Vibrating hammer	CNP 172	1	115	100%	-	0	115
						Total	116
Open Excavation							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	-	0	111
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	100%	-	0	100
						Total	111
Further Excavation (Works under Road Decking)							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	#Underground Work	20	91
Lorry	CNP 141	2	112	15%	-	0	107
Excavator/ loader, wheeled/ tracked	CNP 081	2	112	100%	#Underground Work	20	95
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	#Underground Work	20	75
Dump truck	CNP 067	1	117	15%	-	0	109
Water pump (petrol)	CNP 282	2	103	100%	#Underground Work	20	86
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	111
Construction of Subway (Works under Road Decking)							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	#Underground Work	20	82
Saw, circular, wood	CNP 201	1	108	50%	#Underground Work	20	85
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	50%	#Underground Work	20	86
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	#Underground Work	20	75
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	104
Backfill and Reinstatement							
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	50%	-	0	109
Poker, vibratory, hand-held	CNP 170	1	113	20%	-	0	106
Road roller	CNP 185	1	108	15%	-	0	100
Dump truck	CNP 067	1	117	15%	-	0	109
						Total	114
MAXIMUM amongst the Activities							116

Appendix I
Plant Inventory for Various Construction Activities

Consultancy Agreement No. NEX/1050
Lee Tung Street Subway (Section 1)

PME	TM or other reference	No. of PME	SWL, dB(A)/unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Section 1b - Johnston Road Portion							
Activities							
Utilities Diversion							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	-	0	102
Breaker, hand-held, mass > 35kg	CNP 026	1	114	40%	-	0	110
Lorry	CNP 141	1	112	20%	-	0	105
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	40%	-	0	108
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Lorry	CNP 141	1	112	20%	-	0	105
						Total	114
Installation of Pipepile, Sheet Pile and King Posts							
Lorry	CNP 141	1	112	20%	-	0	105
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Vibrating hammer	CNP 172	1	115	100%	-	0	115
						Total	115
Open Excavation							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	-	0	111
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
						Total	111
Further Excavation							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	-	0	111
Lorry	CNP 141	1	112	15%	-	0	104
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	100%	-	0	112
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Dump truck	CNP 067	1	117	15%	-	0	109
Water pump (petrol)	CNP 282	1	103	100%	-	0	103
Ventilation fan	CNP 241	1	108	100%	-	0	108
						Total	117
Construction of Subway							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	-	0	102
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	50%	-	0	106
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Ventilation fan	CNP 241	2	108	100%	-	0	111
						Total	113
Backfill and Reinstatement							
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	50%	-	0	109
Poker, vibratory, hand-held	CNP 170	1	113	20%	-	0	106
Road roller	CNP 185	1	108	15%	-	0	100
Dump truck	CNP 067	1	117	15%	-	0	109
						Total	114
MAXIMUM amongst the Activities							117

Appendix I
Plant Inventory for Various Construction Activities

Consultancy Agreement No. NEX/1050
Lee Tung Street Subway (Section 1)

PME	TM or other reference	No. of PME	SWL, dB(A)/unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Section 1c - Johnston Road Portion							
Activities							
Utilities Diversion							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	-	0	102
Breaker, hand-held, mass > 35kg	CNP 026	1	114	40%	-	0	110
Lorry	CNP 141	1	112	20%	-	0	105
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	40%	-	0	108
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Lorry	CNP 141	1	112	20%	-	0	105
						Total	114
Installation of Pipepile, Sheet Pile and King Posts							
Lorry	CNP 141	1	112	20%	-	0	105
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Vibrating hammer	CNP 172	1	115	100%	-	0	115
						Total	115
Open Excavation							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	-	0	111
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
						Total	111
Further Excavation (Works under Road Decking)							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	#Underground Work	20	91
Lorry	CNP 141	1	112	15%	-	0	104
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	100%	#Underground Work	20	92
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	#Underground Work	20	75
Dump truck	CNP 067	1	117	15%	-	0	109
Water pump (petrol)	CNP 282	1	103	100%	#Underground Work	20	83
Ventilation fan	CNP 241	1	108	100%	#Underground Work	20	88
						Total	110
Construction of Subway (Works under Road Decking)							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	#Underground Work	20	82
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	50%	#Underground Work	20	86
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	#Underground Work	20	75
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	104
Backfill and Reinstatement							
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	50%	-	0	109
Poker, vibratory, hand-held	CNP 170	1	113	20%	-	0	106
Road roller	CNP 185	1	108	15%	-	0	100
Dump truck	CNP 067	1	117	15%	-	0	109
						Total	114
						MAXIMUM amongst the Activities	115

Appendix I
Plant Inventory for Various Construction Activities

Consultancy Agreement No. NEX/1050
Lee Tung Street Subway (Section 2)

PME	TM or other reference	No. of PME	SWL, dB(A)/ unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Section 2 - LCSD Playground Portion							
Activities							
Utilities Diversion							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	-	0	102
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	-	0	111
Lorry	CNP 141	1	112	30%	-	0	107
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	50%	-	0	109
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Lorry	CNP 141	1	112	30%	-	0	107
						Total	115
Installation of Pipepile, Sheet Pile and King Posts							
Lorry	CNP 141	1	112	20%	-	0	105
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Grout mixer	CNP 105	1	90	100%	-	0	90
Pipe piling rig	CNP 162	1	105	100%	-	0	105
Vibrating hammer	CNP 172	1	115	100%	-	0	115
						Total	116
Open Excavation							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	-	0	111
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Dump truck	CNP 067	1	117	20%	-	0	110
						Total	114
Further Excavation							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	-	0	111
Lorry	CNP 141	2	112	15%	-	0	107
Excavator/ loader, wheeled/ tracked	CNP 081	2	112	100%	-	0	115
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Dump truck	CNP 067	1	117	15%	-	0	109
Water pump (petrol)	CNP 282	2	103	100%	-	0	106
Ventilation fan	CNP 241	2	108	100%	-	0	111
						Total	119
Construction of Subway							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	-	0	102
Saw, circular, wood	CNP 201	1	108	50%	-	0	105
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	50%	-	0	106
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Ventilation fan	CNP 241	2	108	100%	-	0	111
						Total	114
Construction of Ventilation Shaft							
Saw, circular, wood	CNP 201	1	108	50%	-	0	105
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	30%	-	0	104
Crane, mobile/ barge mounted (diesel)	CNP 048	1	112	30%	-	0	107
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	-	0	95
Poker, vibratory, hand-held	CNP 170	1	113	20%	-	0	106
						Total	112
Backfill and Reinstatement							
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	50%	-	0	109
Poker, vibratory, hand-held	CNP 170	1	113	20%	-	0	106
Road roller	CNP 185	1	108	15%	-	0	100
Dump truck	CNP 067	1	117	15%	-	0	109
						Total	114
MAXIMUM amongst the Activities							119

Appendix II. Construction Noise Assessment for Representative NSRs

Appendix II
Construction Noise Assessment for Representative NSR

Consultancy Agreement No. NEX/1050
Lee Tung Street Subway

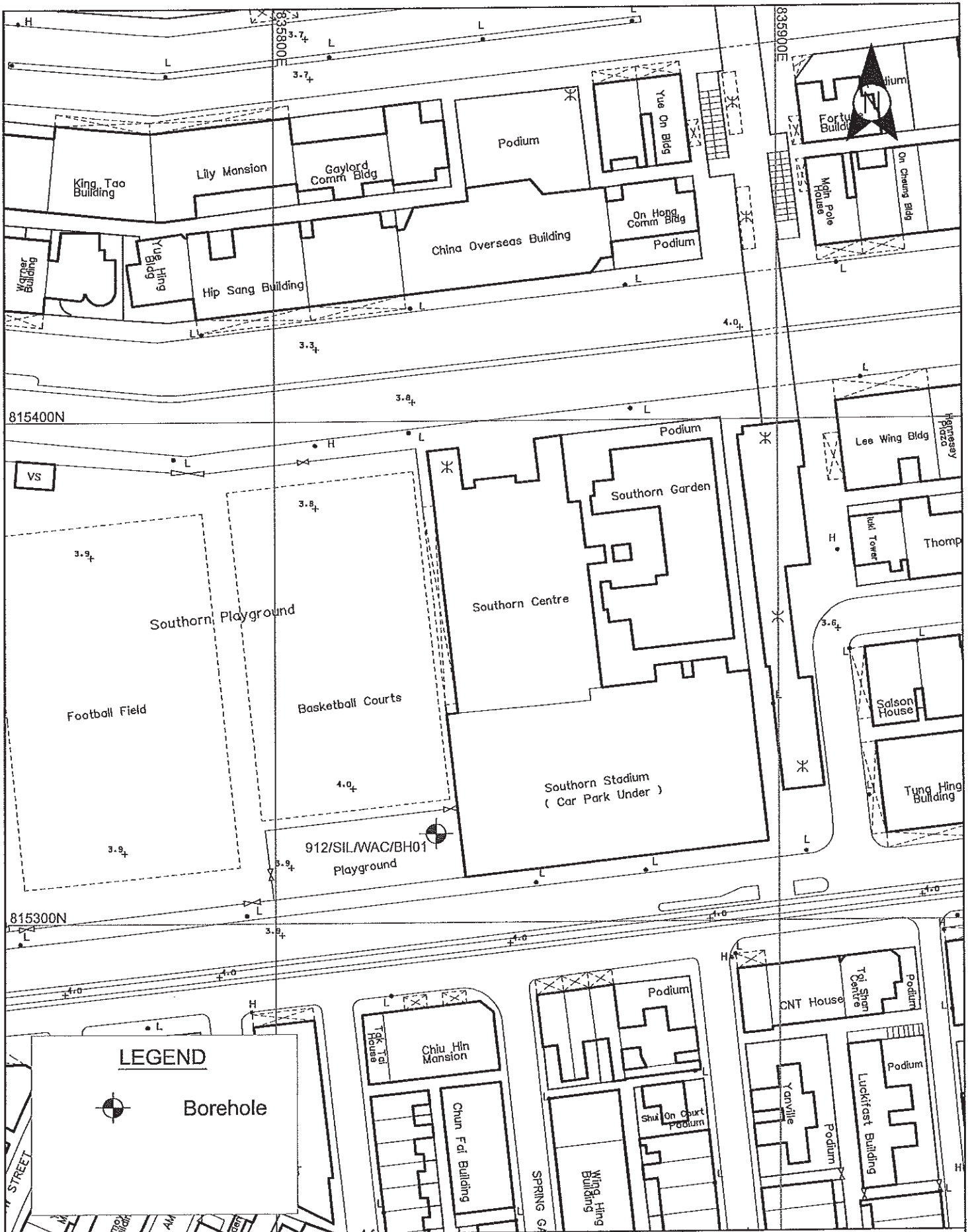
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N1 - Hennessy Building																																									
Section 1a - Johnston Road Portion																																									
Utilities Diversion	114	117	49	3	68		68	68						68		68																									
Installation of Pipepile, Sheet Pile and King Posts	116	117	49	3	70				70	70					70		70																								
Open Excavation	111	117	49	3	65						65	65	65	65				65																							
Further Excavation (Works under Road Decking)	111	117	49	3	65														65	65	65																				
Construction of Subway (Works under Road Decking)	104	117	49	3	58																	58	58																		
Backfill and Reinstatement	114	117	49	3	68																				68	68															
Section 1b - Johnston Road Portion																																									
Utilities Diversion	114	133	50	3	67				67	67																															
Installation of Pipepile, Sheet Pile and King Posts	115	133	50	3	68					68	68																														
Open Excavation	111	133	50	3	64								64																												
Further Excavation (Full enclosure provided at this mucking out area)	117	133	50	3	70								70										70																		
Construction of Subway (Full enclosure provided at this mucking out area)	113	133	50	3	66																															66					
Backfill and Reinstatement	114	133	50	3	67																															67					
Section 1c - Johnston Road Portion																																									
Utilities Diversion	114	137	51	3	66		66	66																																	
Installation of Pipepile, Sheet Pile and King Posts	115	137	51	3	67					67																															
Open Excavation	111	137	51	3	63					63																															
Further Excavation (Works under Road Decking)	110	137	51	3	62								62																												
Construction of Subway (Works under Road Decking)	104	137	51	3	56								56																												
Backfill and Reinstatement	114	137	51	3	66																																66				
Section 2 - LCSD Playground Portion																																									
Utilities Diversion	115	57	43	3	75	75	75	75	75																																
Installation of Pipepile, Sheet Pile and King Posts	116	57	43	3	76	76	76	76	76	76	76	76	76	76																											
Open Excavation	114	57	43	3	74	74	74	74	74	74	74	74	74	74																											
Further Excavation	119	57	43	3	79	79	79	79	79	79	79	79	79	79																											
Construction of Subway	114	57	43	3	74																																				
Construction of Ventilation Shaft	112	57	43	3	72																																				
Backfill and Reinstatement	114	57	43	3	74																																				
Total						75	82	83	83	83	82	82	82	81	80	80	80	80	80	80	80	80	80	80	80	81	80	80	80	81	80	80	80	81	81	81	81	78	78	74	
Remarks:																																									
1. Slant distance is adopted for the construction noise assessment																																									
2. Distance correction in dB(A)																																									
3. Facade correction in dB(A)																																									

Appendix II
Construction Noise Assessment for Representative NSR

Consultancy Agreement No. NEX/1050
Lee Tung Street Subway

Noise Sensitive Receiver	SWL	Dist.(m) ¹	DC ²	FC ³	CNL	2013												2014												2015							
						04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08			
Section 1a - Johnston Road Portion																																					
Utilities Diversion	114	17	33	3	84		84	84						84		84																					
Installation of Pipepile, Sheet Pile and King Posts	116	17	33	3	86				86	86					86		86																				
Open Excavation	111	17	33	3	81						81	81	81	81				81																			
Further Excavation (Works under Road Decking)	111	17	33	3	81														81	81	81																
Construction of Subway (Works under Road Decking)	104	17	33	3	74																	74	74														
Backfill and Reinstatement	114	17	33	3	84																				84	84											
Section 1b - Johnston Road Portion																																					
Utilities Diversion	114	15	32	3	85				85	85																											
Installation of Pipepile, Sheet Pile and King Posts	115	15	32	3	86					86	86																										
Open Excavation	111	15	32	3	82								82																								
Further Excavation (Full enclosure provided at this mucking out area)	117	15	32	3	88									88									88														
Construction of Subway (Full enclosure provided at this mucking out area)	113	15	32	3	84																						84										
Backfill and Reinstatement	114	15	32	3	85																						85										
Section 1c - Johnston Road Portion																																					
Utilities Diversion	114	15	32	3	85		85	85																													
Installation of Pipepile, Sheet Pile and King Posts	115	15	32	3	86				86																												
Open Excavation	111	15	32	3	82					82																											
Further Excavation (Works under Road Decking)	110	15	32	3	81								81																								
Construction of Subway (Works under Road Decking)	104	15	32	3	75								75																								
Backfill and Reinstatement	114	15	32	3	85																							85									
Section 2 - LCSD Playground Portion																																					
Utilities Diversion	115	34	39	3	79	79	79	79	79																												
Installation of Pipepile, Sheet Pile and King Posts	116	34	39	3	80		80	80	80	80	80	80	80																								
Open Excavation	114	34	39	3	78		78	78	78	78	78	78	78																								
Further Excavation	119	34	39	3	83		83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83		
Construction of Subway	114	34	39	3	78		78	78	78	78	78	78	78		78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78		
Construction of Ventilation Shaft	112	34	39	3	76																								76	76	76	76	76	76	76	76	
Backfill and Reinstatement	114	34	39	3	78																																
Total						79	90	90	93	92	90	87	87	92	88	87	88	86	86	86	86	84	89	91	87	84	84	85	85	85	85	82	82	78			
Remarks:																																					
1. Slant distance is adopted for the construction noise assessment																																					
2. Distance correction in dB(A)																																					
3. Facade correction in dB(A)																																					

Appendix III. Drillhole Record



FUGRO
FUGRO
GEOTECHNICAL
SERVICES LTD

JOB REF: 09 0042 03

DATE: 25-Mar-2011

PROJECT:
 Ground Investigation for South Island Line (East)

WORKS ORDER NO: NIL

TITLE:
 Ground Investigation Plan

SCALE: 1:1000

CLIENT: MTRC

FIGURE: 1



FUGRO
GEOTECHNICAL
SERVICES LTD

DRILLHOLE RECORD

HOLE No. **912/SIL/WAC/BH01**

CONTRACT No.: **MTR contract 912**

SHEET: **1** of **7**

PROJECT: **Ground Investigation for South Island Line (East)**

METHOD: **Rotary Drilling**

CO-ORDINATES:

WORKS ORDER No. **N/A**

MACHINE & No.: **FDR-31**

E **835831.89**
 N **815317.87**

DATE from: **11/01/2011** to **26/01/2011**

FLUSHING MEDIUM: **Water**

ORIENTATION: **Vertical**

GROUND LEVEL **+ 3.97** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples			Reduced Level	Depth (m)	Legend	Grade	Description
									No.	Type	Depth					
14/01/2011	SW											3.97	0.00			Grey (7.5YR/6/1), CONCRETE.
1												3.67	0.30			Firm, light yellowish brown (2.5Y/6/4), sandy SILT with some angular fine to medium gravel. (FILL)
2																
3								62 bls				0.97	3.00			Medium dense, dark grey (5YR/4/1), fine to coarse SAND with some angular fine to medium gravel. (FILL)
4								2, 3, 2, 3, 3, 4 N=12				-0.03	4.00			4.00 - 4.40m : Band/pocket of orangish black, slightly gravelly, slightly sandy SILT / CLAY.
5								52 bls				-0.43	4.40			
6								k=6.43E-5m/s				-2.03	6.00			6.00 - 7.00m : Loose
7								2, 1, 1, 1, 1 N=4				-3.03	7.00			Soft, grey (7.5YR/6/1), sandy SILT with occasional angular fine to medium gravel of rock and coal fragments. (FILL)
8	SW 7.50 PW							39 bls				7.45	7.50			
9								k=8.93E-6m/s				8.00	8.10			
10								2, 1, 1, 0, 1, 2 N=4				-5.03	9.00			9.00 - 9.45m : Band/pocket of slightly silty, clayey gravelly SAND with shell fragments.
15/01/2011								34 bls				-5.48	9.45			Soft, light yellowish brown (2.5Y/6/4), sandy clayey SILT. (ALLUVIUM)
16/01/2011												-6.03	10.00			

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- 76mm Vibrocore Sample
- 100mm Vibrocore Sample
- Vibrocore Sub-sample
- SPT Liner Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Pressuremeter Test
- Televiometer Survey
- Packer Test
- Impression Packer Test
- Water Sample
- Standpipe
- Piezometer Tip

LOGGED P. Zhang
 DATE 25/01/2011
 CHECKED A.B-Hollinshead
 DATE 07/02/2011

REMARKS

- An inspection pit was excavated to a depth of 2.80m.
- Falling head permeability test was performed from 5.00m to 6.50m below existing ground level on 15/01/2011.
- Constant head permeability tests were performed from 7.00m to 8.50m, 13.10m to 14.60m and 22.60m to 24.10m below existing ground level on 17/01/2011 to 19/01/2011 respectively.
- A piezometer was installed at 14.50m below ground level on 26/01/2011.
- A standpipe was installed at 8.50m belowground level on 26/01/2011.



FUGRO
GEOTECHNICAL
SERVICES LTD

DRILLHOLE RECORD

HOLE No. **912/SIL/WAC/BH01**

CONTRACT No.: **MTR contract 912**

SHEET: **2** of **7**

PROJECT: **Ground Investigation for South Island Line (East)**

METHOD: **Rotary Drilling**

CO-ORDINATES:

WORKS ORDER No. **N/A**

MACHINE & No.: **FDR-31**

E **835831.89**
 N **815317.87**

DATE from: **11/01/2011** to **26/01/2011**

FLUSHING MEDIUM: **Water**

ORIENTATION: **Vertical**

GROUND LEVEL **+ 3.97** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples			Reduced Level	Depth (m)	Legend	Grade	Description
									No.	Type	Depth					
								1, 2, 2, 2, 2, 2 N=8	21	U76	10.00	-6.03	10.00			As sheet 1 of 7.
11			70	100					22	U100	10.00					
12			70	100					23	U76	11.00	-7.03	11.00			Soft, light yellowish brown (2.5Y/6/4), slightly sandy, clayey SILT. (ALLUVIUM)
13			70	100				1, 0, 1, 0, 1, 1 N=3	24	U76	12.00					
14			70	100				k=2.98E-7m/s	25	U76	12.10					
15			80	100				1, 0, 1, 1, 1, 2 N=5	26	U76	12.20					
16			80	100					27	U76	13.00					
17			80	100				1, 1, 1, 1, 2, 2 N=6	28	U76	14.00					
18			80	100					29	U76	14.10					
19			80	100				2, 2, 3, 4, 6, 7 N=20	30	U76	14.20					
20			80	100					31	U76	15.00	-11.03	15.00	V		Extremely weak, reddish brown (5YR/4/3), completely decomposed medium to coarse grained GRANITE. (Slightly sandy, clayey SILT)
			80	100					32	U76	16.00					
			80	100					33	U76	16.10					
			80	100					34	U76	16.20					
			80	100					35	U76	17.00					
			80	100					36	U76	18.00					
			80	100					37	U76	18.10					
			80	100					38	U76	18.20					
			80	100					39	U76	19.00	-15.03	19.00	V		Extremely weak, yellowish brown (10YR/5/6), completely decomposed medium to coarse grained GRANITE. (Sandy clayey SILT with occasional angular fine gravel)
			80	100							20.00	-16.03	20.00			

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- 76mm Vibrocore Sample
- 100mm Vibrocore Sample
- Vibrocore Sub-sample
- SPT Liner Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Pressuremeter Test
- Televiometer Survey
- Packer Test
- Impression Packer Test
- Water Sample
- Standpipe
- Piezometer Tip

LOGGED P. Zhang
 DATE 25/01/2011
 CHECKED A.B.Hollinshead
 DATE 07/02/2011

REMARKS



**FUGRO
GEOTECHNICAL
SERVICES LTD**

DRILLHOLE RECORD

HOLE No. **912/SIL/WAC/BH01**

CONTRACT No.: **MTR contract 912**

SHEET: **3** of **7**

PROJECT: **Ground Investigation for South Island Line (East)**

METHOD: **Rotary Drilling**

CO-ORDINATES:

WORKS ORDER No. **N/A**

MACHINE & No.: **FDR-31**

E **835831.89**
N **815317.87**

DATE from: **11/01/2011** to **26/01/2011**

FLUSHING MEDIUM: **Water**

ORIENTATION: **Vertical**

GROUND LEVEL **+ 3.97** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples			Reduced Level	Depth (m)	Legend	Grade	Description
									No.	Type	Depth					
21	0.70m at 18:00 2.10m at 08:00							2, 2, 2, 4, 6, 7 N=19	41	U76	20.20	20.00				As sheet 2 of 7.
									42	U100	20.50					
									43	U76	21.00					
22									44	U76	22.00					
								3, 3, 3, 5, 7, 9 N=24	45	U100	22.10					
									46	U100	22.20					
23									47	U76	23.00					
								k=4.21E-7m/s	48	U76	24.00					
24									49	U100	24.10					
								3, 3, 3, 6, 6, 9 N=24	50	U100	24.20					
25	0.60m at 18:00 1.95m at 08:00								51	U76	24.50					
26									52	U76	25.00					
									53	U100	26.00					
27									54	U100	26.10					
	PW 27.00 HW								55	U76	26.20					
28									56	U76	27.00					
									57	U100	28.00					
29									58	U76	28.10					
								7, 11, 12, 13, 17, 20 N=62	59	U76	28.20					
30										U76	29.00	-25.03	29.00		V	Extremely weak, yellowish brown (10YR/5/6), completely decomposed medium grained GRANITE. (Silty fine to coarse SAND with some angular fine gravel)

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- 76mm Vibrocore Sample
- 100mm Vibrocore Sample
- Vibrocore Sub-sample
- SPT Liner Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Pressuremeter Test
- Televiwer Survey
- Packer Test
- Impression Packer Test
- Water Sample
- Standpipe
- Piezometer Tip

LOGGED P. Zhang
DATE 25/01/2011
CHECKED A.B.Hollinshead
DATE 07/02/2011

REMARKS



FUGRO
GEOTECHNICAL
SERVICES LTD

DRILLHOLE RECORD

HOLE No. 912/SIL/WAC/BH01

CONTRACT No.: MTR contract 912

SHEET: 4 of 7

PROJECT: Ground Investigation for South Island Line (East)

METHOD: Rotary Drilling

CO-ORDINATES:

WORKS ORDER No. N/A

MACHINE & No.: FDR-31

E 835831.89
 N 815317.87

DATE from: 11/01/2011 to 26/01/2011

FLUSHING MEDIUM: Water

ORIENTATION: Vertical

GROUND LEVEL + 3.97 mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples		Reduced Level	Depth (m)	Legend	Grade	Description
									No.	Type					
31				100				5, 9, 11, 15, 16, 17 N=59	61, 62		-26.03	30.00		V	As sheet 3 of 7.
32				80				7, 10, 11, 11, 13, 15 N=60	63, 64, 65, 66						
33				100					67						
34				80				8, 11, 14, 15, 20, 23 N=72	68, 69, 70						
35				100					71						
36				80					72, 73						
37				100				10, 12, 15, 20, 21, 23 N=60	74, 75						
38				80					76, 77						
39		0.55m at 18:00 2.10m at 08:00		100				14, 17, 22, 34, 44 / 60mm 100 bls / 210mm	78, 79					IV	Weak, light yellowish brown, highly decomposed medium to coarse grained GRANITE. Recovered as sandy angular fine to coarse gravel.
40				80							-36.03	40.00			

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- 76mm Vibrocure Sample
- 100mm Vibrocure Sample
- Vibrocure Sub-sample
- SPT Liner Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Pressuremeter Test
- Televiometer Survey
- Packer Test
- Impression Packer Test
- Water Sample
- Standpipe
- Piezometer Tip

LOGGED P. Zhang
 DATE 25/01/2011
 CHECKED A.B-Hollinshead
 DATE 07/02/2011

REMARKS



FUGRO
GEOTECHNICAL
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DRILLHOLE RECORD

HOLE No. **912/SIL/WAC/BH01**

CONTRACT No.: **MTR contract 912**

SHEET: **5** of **7**

PROJECT: **Ground Investigation for South Island Line (East)**

METHOD: **Rotary Drilling**

CO-ORDINATES:

WORKS ORDER No. **N/A**

MACHINE & No.: **FDR-31**

E **835831.89**
 N **815317.87**

DATE from: **11/01/2011** to **26/01/2011**

FLUSHING MEDIUM: **Water**

ORIENTATION: **Vertical**

GROUND LEVEL **+ 3.97** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples			Reduced Level	Depth (m)	Legend	Grade	Description	
									No.	Type	Depth						
								43, 7 / 5mm, 100 / 50mm 100 bls / 50mm	80 81 82	□ □ □	20.00 23.10 23.28	-38.03	40.00		IV	As sheet 4 of 7.	
41							NI						41.04	-37.13	41.10	II	Strong, pinkish grey, spotted black, slightly decomposed medium to coarse grained GRANITE. Joints are medium spaced, stepped, very narrow, clay infilled (3-5mm), dipping at 57°15' (CORESTONE)
42							0.9						41.54	-37.87	41.84	V	
							NR						42.20	-38.23	42.20	V	41.84 - 42.20m : No recovery, assumed to be completely decomposed GRANITE.
43								12, 17, 22, 25, 30, 23 / 35mm 100 bls / 260mm	83 84 85 86	▨ □ □ □	43.20 43.30 43.40 43.66					V	Extremely weak, yellowish brown (10YR/5/6), completely decomposed medium to coarse grained GRANITE. (Sandy SILT with some angular fine gravel)
44																	
45								12, 20, 23, 30, 47 / 60mm 100 bls / 210mm	87 88 89 90	▨ □ □ □	44.20 45.20 45.30 45.40						
46		0.65m at 18:00 2.20m at 08:00															
47																	
48								13, 27, 38, 51, 11 / 10mm 100 bls / 160mm	91 92 93 94	▨ □ □ □	46.20 47.20 47.30 47.40						
49																	
50								14, 23, 38, 40, 24 / 20mm 100 bls / 170mm	95 96 97 98	▨ □ □ □	48.20 49.20 49.30 49.40					V	Extremely weak, yellowish brown (10YR/5/6), completely decomposed medium to coarse grained GRANITE. (Silty fine to coarse SAND with some angular fine gravel)

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- 76mm Vibrocore Sample
- 100mm Vibrocore Sample
- Vibrocore Sub-sample
- SPT Liner Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Pressuremeter Test
- Televiwer Survey
- Packer Test
- Impression Packer Test
- Water Sample
- Standpipe
- Piezometer Tip

LOGGED P. Zhang
 DATE 25/01/2011
 CHECKED A.B.Hollinshead
 DATE 07/02/2011

REMARKS



FUGRO
GEOTECHNICAL
SERVICES LTD

DRILLHOLE RECORD

HOLE No. **912/SIL/WAC/BH01**

CONTRACT No.: **MTR contract 912**

SHEET: **6** of **7**

PROJECT: **Ground Investigation for South Island Line (East)**

METHOD: **Rotary Drilling**

CO-ORDINATES:

WORKS ORDER No. **N/A**

MACHINE & No.: **FDR-31**

E **835831.89**
 N **815317.87**

DATE from: **11/01/2011** to **26/01/2011**

FLUSHING MEDIUM: **Water**

ORIENTATION: **Vertical**

GROUND LEVEL **+ 3.97** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/end	Water Return %	TCR %	SCR %	R.Q.D %	F.I	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
51				100				16, 27, 35, 55, 10 / 10mm 100 bls / 160mm	99 50.20 100 51.20 101 51.30 102 51.40				V	As sheet 5 of 7.
52				90					103 52.20					
53				90				41, 9 / 5mm, 100 / 60mm 100 bls / 60mm	104 53.20 105 53.30					
54				90					106 54.20					
55		0.65m at 18:00 2.00m at 08:00		90				50 / 40mm, 100 / 30mm 100 bls / 30mm	107 55.20 108 55.30					
56				80	55	49	33		T2101 55.78	-51.81	55.78		III	Moderately strong, light yellowish brown, moderately decomposed medium to coarse grained GRANITE. Joints are closely spaced, stepped, extremely narrow, iron and manganese oxide stained, dipping at 5?15?and 65?75? (CORESTONE)
57				80					T2101 56.52	-52.25	56.52		V	
58				80					T2101 57.20	-52.81	56.78		III	
59				80					109 57.20	-53.23	57.20		IV	56.22 - 56.52m : No recovery, assumed to be completely decomposed GRANITE. 56.78 - 57.20m : No recovery, assumed to be completely decomposed GRANITE. 57.20 - 59.50m : Weak, highly decomposed medium to coarse grained GRANITE. Recovered as sandy angular fine to medium gravel.
60		HW 59.40		0					110 58.20 111 58.30					
				0					T2101 59.40	-55.53	59.50		III	59.70 - 59.95m : Weak, highly decomposed
				0					T2101 59.70	-55.73	59.70		IV	

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- 76mm Vibrocore Sample
- 100mm Vibrocore Sample
- Vibrocore Sub-sample
- SPT Liner Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Pressuremeter Test
- Televiwer Survey
- Packer Test
- Impression Packer Test
- Water Sample
- Standpipe
- Piezometer Tip

LOGGED P. Zhang
 DATE 25/01/2011
 CHECKED A.B.Hollinshead
 DATE 07/02/2011

REMARKS



FUGRO
GEOTECHNICAL
SERVICES LTD

DRILLHOLE RECORD

HOLE No. 912/SIL/WAC/BH01

CONTRACT No.: MTR contract 912

SHEET: 7 of 7

PROJECT: Ground Investigation for South Island Line (East)

METHOD: Rotary Drilling

CO-ORDINATES:

WORKS ORDER No. N/A

MACHINE & No.: FDR-31

E 835831.89
 N 815317.87

DATE from: 11/01/2011 to 26/01/2011

FLUSHING MEDIUM: Water

ORIENTATION: Vertical

GROUND LEVEL + 3.97 mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples		Reduced Level	Depth (m)	Legend	Grade	Description
									No.	Type					
61			80	71	37	31	5.0							III	medium to coarse grained GRANITE. Recovered as sandy angular fine to medium gravel.
														IV	
														V	60.35 - 60.45m : Weak, highly decomposed medium to coarse grained GRANITE.
															60.45 - 60.87m : No recovery, assumed to be completely decomposed GRANITE.
62			80	100	100	100	0.6							II	Strong, pinkish grey, slightly decomposed medium to coarse grained GRANITE.
															Joints are medium to widely, locally very closely to closely spaced, rough planar and stepped, extremely narrow, iron and manganese oxide stained, dipping at 57°15' 30°40' and 65°75'
63			80	100	100	87	0.0							III	62.45 - 62.65m : Moderately strong, moderately decomposed medium to coarse grained GRANITE.
														II	
65			80	100	100	83	6.2							III	64.15 - 64.80m : Moderately strong, moderately decomposed medium to coarse grained GRANITE.
														II	
66			80	100	100	100	0.8								
66															End of investigation hole at 66.05m.
67															
68															
69															
70															

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- 76mm Vibrocore Sample
- 100mm Vibrocore Sample
- Vibrocore Sub-sample
- SPT Liner Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Pressuremeter Test
- Televue Survey
- Packer Test
- Impression Packer Test
- Water Sample
- Standpipe
- Piezometer Tip

LOGGED P. Zhang
 DATE 25/01/2011
 CHECKED A.B.Hollinshead
 DATE 07/02/2011

REMARKS




Appendix IV. Tree Condition Survey

Appendix IV - Tree Survey Schedule

Item	Tree No.	Species		Tree Size			Health	Form	OVT	Amenity Value	Survival Rate after Transplanting	Recommended Treatment
		Scientific Name	Chinese Name	Height (m)	Spread (m)	DBH (m)	(G/F/P)	(G/F/P)	(Y/N)	(H/M/L)	(H/M/L)	
1	TR-01	<i>Cassia surattensis</i>	黃槐	6.00	4.00	120	F	F	N	M	H	To be permanent transplanted
2	TR-02	<i>Ficus microcarpa</i>	細葉榕	4.00	3.00	100	F	F	N	M	H	To be permanent transplanted
3	TR-03	N/A (Tree no. not used)	--	--	--	--	--	--	--	--	--	--
4	TR-04	<i>Aleurites moluccana</i>	石栗	10.00	10.00	530	F	F	N	M	M	To be retained
5	TR-05	<i>Spathodea camoanulata</i>	火焰木	13.00	5.75	450	F	P	N	L	M	To be retained
6	TR-06	<i>Bauhinia blakeana</i>	洋紫荊	8.00	6.50	250	F	F	N	M	M	To be retained
7	TR-07	<i>Bauhinia blakeana</i>	洋紫荊	9.00	6.00	310	F	P	N	L	M	To be retained
8	TR-08	<i>Bauhinia blakeana</i>	洋紫荊	7.00	7.00	210	F	P	N	L	M	To be retained
9	TR-09	<i>Bauhinia blakeana</i>	洋紫荊	9.00	5.50	260	F	P	N	L	M	To be retained
10	TR-10	<i>Bauhinia blakeana</i>	洋紫荊	13.00	6.00	230	F	P	N	L	M	To be retained
11	TR-11	<i>Spathodea camoanulata</i>	火焰木	12.00	5.00	240	F	P	N	L	M	To be retained
12	TR-12	<i>Bauhinia blakeana</i>	洋紫荊	9.00	6.25	210	F	P	N	L	M	To be retained
13	TR-13	<i>Spathodea camoanulata</i>	火焰木	13.00	9.25	420	F	P	N	L	M	To be felled
14	TR-14	<i>Bauhinia blakeana</i>	洋紫荊	11.00	9.25	350	F	F	N	M	M	To be permanent transplanted

Note:

- 1) OVT: Old & Valuable Tree defined by ETWB TCW 29/2004
- 2) G/F/P = Good/Fair/Poor
- 3) Y/N = Yes/No
- 4) H/M/L = High/Medium/Low

 <p>TR-01</p>	 <p>TR-02</p>
<p>TR-03 (Tree Number Not Used)</p>	 <p>TR-04</p>



TR-05



TR-06



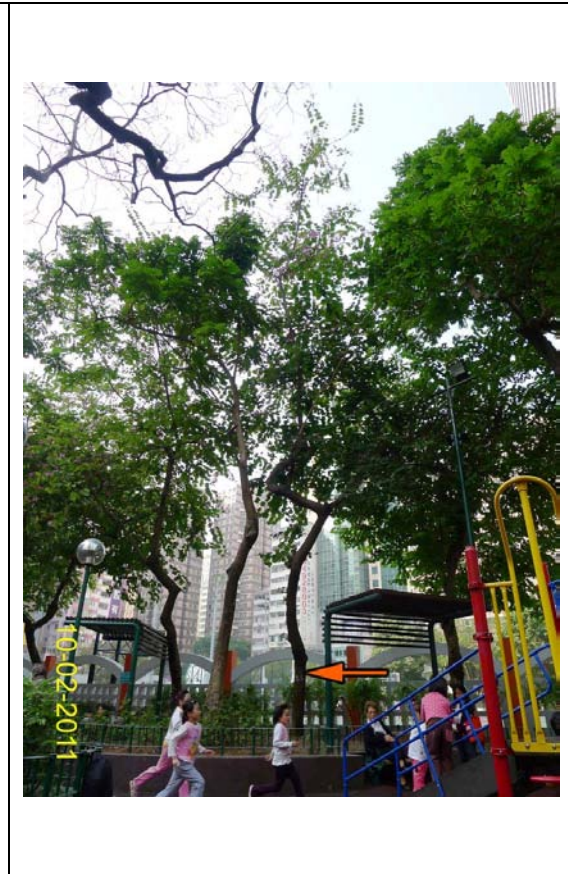
TR-07



TR-08



TR-09




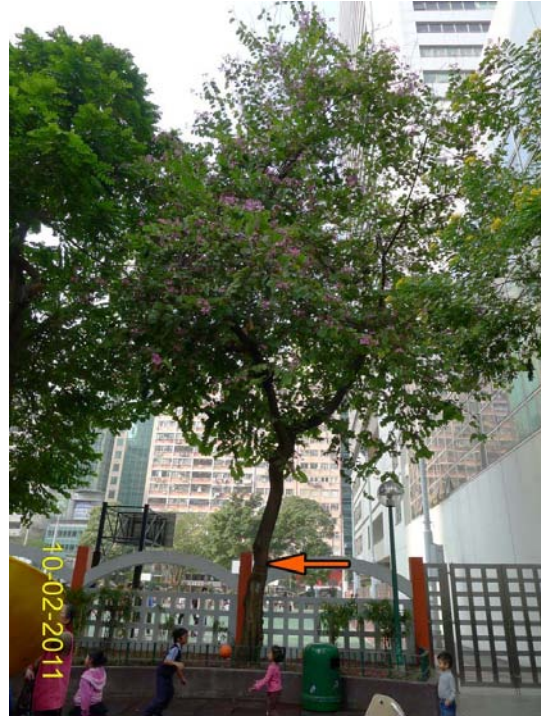
TR-10

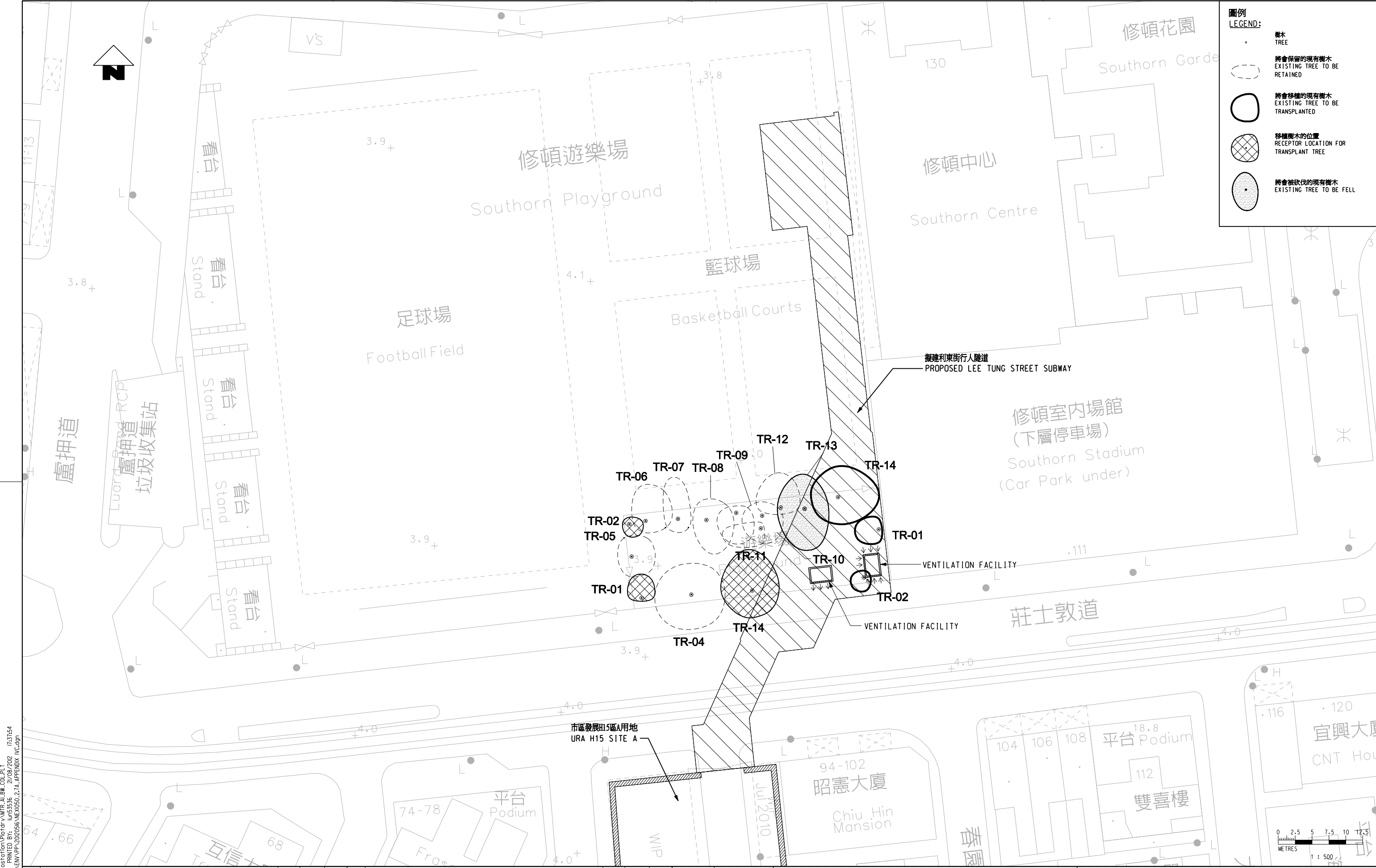


TR-11



TR-12

	
<p>TR-13</p>	<p>TR-14</p>



PLT: D:\ADMIN\micr\ost\ch\1\Btr\y\NTR_AL\BW_C01_PLT
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 FILE NAME: J:\282455\REPORT\ENV\PPA_2009\56\NEX1050_2.7A_APPENDIX_IV.dgn

REV	DESCRIPTION	BY	DATE	APPROVED
C	GENERAL REVISION	HWC	21AUG12	AFK
B	GENERAL REVISION	HWC	16MAY12	AFK
A	PROJECT PROFILE	HWC	12AUG11	AFK

DRAWN	HWC
DESIGNED	BW
CHECKED	BL
APPROVED	AFK
DATE	12MAY2011

MTR

WAC STATION LEE TUNG STREET SUBWAY

ORIGINATOR

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CADD REF. NEX1050_2.7A_APPENDIX_IV.dgn

TITLE	SCALE	DRAWING NO.	REV.
CONSULTANCY AGREEMENT NO. NEX/1050 DETAILED DESIGN FOR LEE TUNG STREET SUBWAY 樹木調查計劃	1:500 (A3)	NEX1050/2.7A/APPENDIX IV	C

Appendix V. Fixed Plant Noise Assessment

Fixed Plant Noise Assessment

Day Time and Evening Time Fixed Plant Noise Assessment

NSR ID	Description	Plant Inventory	Source ID	Source Height (mPD)	SWL, dB(A)	Receiver Height (mPD)	Horizontal Distance (m)	Source - receiver	*Distance (m)	Distance Attenuation dB(A)	Tonality Correction dB(A)	#Screening Correction dB(A)	Facade Correction dB(A)	SPL, $L_{eq(30min)}$, dB(A)	Resultant SPL, $L_{eq(30min)}$, dB(A)	Daytime and Evening Time Noise Criteria, dB(A)
N1	Hennessy Building	Opening of Ventilation Facility (Fresh air intake)	North Elevation (V1a)	2.5	90	10.8	110	-8.3	110	-49	0	0	3	44		
			West Elevation (V1b)	2.5	90	10.8	111	-8.3	111	-49	0	0	3	44		
			South Elevation (V1c)	2.5	88	10.8	113	-8.3	113	-49	0	-10	3	32		
		Opening of Ventilation Facility (Smoke extraction)	South Elevation (V2)	4.0	88	10.8	113	-6.8	113	-49	0	-10	3	32		
N2	Chiu Hin Mansion	Opening of Ventilation Facility (Fresh air intake)	North Elevation (V1a)	2.5	90	10.8	29	-8.3	30	-37	0	-10	3	46		
			West Elevation (V1b)	2.5	90	10.8	27	-8.3	28	-37	0	0	3	56		
			South Elevation (V1c)	2.5	88	10.8	26	-8.3	27	-37	0	0	3	54		
		Opening of Ventilation Facility (Smoke extraction)	South Elevation (V2)	4.0	88	10.8	23	-6.8	24	-36	0	0	3	55		

Note: (*) Shortest horizontal distances have been adopted for Planned NSRs for conservative reason.

(#) While the sources fall within the view angle of the NSR but with no direct line of sight to the opening, a 10 dB(A) attenuation would be applied.

Fixed Plant Noise Assessment

Night Time Fixed Plant Noise Assessment

NSR ID	Description	Plant Inventory	Source ID	Source Height (mPD)	SWL, dB(A)	Receiver Height (mPD)	Horizontal Distance (m)	Source - receiver	*Distance (m)	Distance Attenuation dB(A)	Tonality Correction dB(A)	#Screening Correction dB(A)	Facade Correction dB(A)	SPL, $L_{eq(30min)}$, dB(A)	Resultant SPL, $L_{eq(30min)}$, dB(A)	Night Time Noise Criteria, dB(A)
N1	Hennessy Building	Opening of Ventilation Facility (Fresh air intake)	North Elevation (V1a)	2.5	80	10.8	110	-8.3	110	-49	0	0	3	34	37	50
			West Elevation (V1b)	2.5	80	10.8	111	-8.3	111	-49	0	0	3	34		
			South Elevation (V1c)	2.5	78	10.8	113	-8.3	113	-49	0	-10	3	22		
		Opening of Ventilation Facility (Smoke extraction)	South Elevation (V2)	4.0	78	10.8	113	-6.8	113	-49	0	-10	3	22		
N2	Chiu Hin Mansion	Opening of Ventilation Facility (Fresh air intake)	North Elevation (V1a)	2.5	80	10.8	29	-8.3	30	-37	0	-10	3	36	50	50
			West Elevation (V1b)	2.5	80	10.8	27	-8.3	28	-37	0	0	3	46		
			South Elevation (V1c)	2.5	78	10.8	26	-8.3	27	-37	0	0	3	44		
		Opening of Ventilation Facility (Smoke extraction)	South Elevation (V2)	4.0	78	10.8	23	-6.8	24	-36	0	0	3	45		

Note: (*) Shortest horizontal distances have been adopted for Planned NSRs for conservative reason.

(#) While the sources fall within the view angle of the NSR but with no direct line of sight to the opening, a 10 dB(A) attenuation would be applied.

Appendix VI. Plant Inventory for Various Construction Activities - With Environmental Protection Measures

Appendix VI

Plant Inventory for Various Construction Activities - With Environmental Protection Measures

Consultancy Agreement No. NEX/1050

Lee Tung Street Subway (Section 1)

PME	TM or other reference	No. of PME	SWL, dB(A)/unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Section 1a - Johnston Road Portion							
Activities							
Utilities Diversion							
Air compressor, air flow > 10m ³ /min and <= 30m ³ /min	CNP 002	1	102	100%	Noise Enclosure	15	87
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	40%	Movable Barrier	10	92
Lorry with Crane	BS 5228 Table D.7/101	1	94	20%	Movable Barrier	5	82
Excavator (57kW)	BS 5228 Table D.8/15	1	103	40%	Movable Barrier	5	94
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Lorry (20 t)	BS 5228 Table D.9/19	1	102	20%	Movable Barrier	5	90
						Total	98
Installation of Pipepile, Sheet Pile and King Posts							
Lorry with Crane	BS 5228 Table D.7/101	1	94	20%	Movable Barrier	5	82
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Grout mixer	CNP 105	1	90	100%	Movable Barrier	10	80
Pipe piling rig (0.225 dia) (39 kW)	BS 5228 Table D.4/46	2	102	100%	Movable Barrier	10	95
Silent Piler Machine	GIKEN **	1	94	100%	Movable Barrier	10	84
						Total	96
Open Excavation							
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	50%	Movable Barrier	10	93
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Movable Barrier	5	90
						Total	95
Further Excavation (Works under Road Decking)							
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	50%	#Underground Work	20	83
Lorry with Crane	BS 5228 Table D.7/101	2	94	15%	Movable Barrier	5	84
Excavator (57kW)	BS 5228 Table D.8/15	2	103	100%	#Underground Work	20	86
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	#Underground Work	20	75
Dump truck (50t)	BS 5228 Table D.9/39	1	103	15%	Movable Barrier	5	90
Water pump (petrol)	CNP 282	2	103	100%	#Underground Work	20	86
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	95
Construction of Subway (Works under Road Decking)							
Air compressor, air flow > 10m ³ /min and <= 30m ³ /min	CNP 002	1	102	100%	#Underground Work	20	82
Saw, circular, wood (660mm blade)	BS 5228 Table D.7/78	1	106	50%	#Underground Work	20	83
Concrete lorry mixer (6m ³)	BS 5228 Table D.6/33	1	96	30%	Movable Barrier	5	86
Concrete pump (100kW)	BS 5228 Table D.6/36	1	106	50%	#Underground Work	20	83
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	#Underground Work	20	75
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	93
Backfill and Reinstatement							
Concrete lorry mixer (6m ³)	BS 5228 Table D.6/33	1	96	30%	Movable Barrier	5	86
Excavator (57kW)	BS 5228 Table D.8/15	1	103	50%	Movable Barrier	5	95
Poker, vibratory, hand-held	BS 5228 Table D.6/40	1	98	20%	Movable Barrier	10	81
Road roller	BS 5228 Table D.8/30	1	101	15%	Movable Barrier	5	88
Dump truck (50t)	BS 5228 Table D.9/39	1	103	15%	Movable Barrier	5	90
						Total	97
						MAXIMUM amongst the Activities	98

** Reference was made to VEP Application No. VEP-072/2002 for Modifications to MTRC TST Station

Appendix VI

Plant Inventory for Various Construction Activities - With Environmental Protection Measures

Consultancy Agreement No. NEX/1050

Lee Tung Street Subway (Section 1)

PME	TM or other reference	No. of PME	SWL, dB(A)/unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Section 1b - Johnston Road Portion							
Activities							
Utilities Diversion							
Air compressor, air flow > 10m ³ /min and <= 30m ³ /min	CNP 002	1	102	100%	Noise Enclosure	15	87
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	40%	Movable Barrier	10	92
Lorry with Crane	BS 5228 Table D.7/101	1	94	20%	Movable Barrier	5	82
Excavator (57kW)	BS 5228 Table D.8/15	1	103	40%	Movable Barrier	5	94
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Lorry (20 t)	BS 5228 Table D.9/19	1	102	20%	Movable Barrier	5	90
						Total	98
Installation of Pipepile, Sheet Pile and King Posts							
Lorry with Crane	BS 5228 Table D.7/101	1	94	20%	Movable Barrier	5	82
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Silent Piler Machine	GIKEN **	1	94	100%	Movable Barrier	10	84
						Total	87
Open Excavation							
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	50%	Movable Barrier	10	93
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Movable Barrier	5	90
						Total	95
Further Excavation							
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	50%	Noise Enclosure	15	88
Lorry with Crane	BS 5228 Table D.7/101	1	94	15%	Movable Barrier	5	81
Excavator (57kW)	BS 5228 Table D.8/15	1	103	100%	Noise Enclosure	15	88
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Dump truck (50t)	BS 5228 Table D.9/39	1	103	15%	Movable Barrier	5	90
Water pump (petrol)	CNP 282	1	103	100%	Noise Enclosure	15	88
Ventilation fan	CNP 241	1	108	100%	Silencer	15	93
						Total	97
Construction of Subway							
Air compressor, air flow > 10m ³ /min and <= 30m ³ /min	CNP 002	1	102	100%	Noise Enclosure	15	87
Concrete lorry mixer (6m ³)	BS 5228 Table D.6/33	1	96	30%	Movable Barrier	5	86
Concrete pump (100kW)	BS 5228 Table D.6/36	1	106	50%	Noise Enclosure	15	88
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Ventilation fan	CNP 241	2	108	100%	Silencer	15	96
						Total	97
Backfill and Reinstatement							
Concrete lorry mixer (6m ³)	BS 5228 Table D.6/33	1	96	30%	Movable Barrier	5	86
Excavator (57kW)	BS 5228 Table D.8/15	1	103	50%	Noise Enclosure	15	85
Poker, vibratory, hand-held	BS 5228 Table D.6/40	1	98	20%	Noise Enclosure	15	76
Road roller	BS 5228 Table D.8/30	1	101	15%	Movable Barrier	5	88
Dump truck (50t)	BS 5228 Table D.9/39	1	103	15%	Movable Barrier	5	90
						Total	94
						MAXIMUM amongst the Activities	98

** Reference was made to VEP Application No. VEP-072/2002 for Modifications to MTRC TST Station

Appendix VI

Plant Inventory for Various Construction Activities - With Environmental Protection Measures

Consultancy Agreement No. NEX/1050

Lee Tung Street Subway (Section 1)

PME	TM or other reference	No. of PME	SWL, dB(A)/unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Section 1c - Johnston Road Portion							
Activities							
Utilities Diversion							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	Noise Enclosure	15	87
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	40%	Movable Barrier	10	92
Lorry with Crane	BS 5228 Table D.7/101	1	94	20%	Movable Barrier	5	82
Excavator (57kW)	BS 5228 Table D.8/15	1	103	40%	Movable Barrier	5	94
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Lorry (20 t)	BS 5228 Table D.9/19	1	102	20%	Movable Barrier	5	90
						Total	98
Installation of Pipepile, Sheet Pile and King Posts							
Lorry with Crane	BS 5228 Table D.7/101	1	94	20%	Movable Barrier	5	82
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Silent Piler Machine	GIKEN **	1	94	100%	Movable Barrier	10	84
						Total	87
Open Excavation							
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	50%	Movable Barrier	10	93
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Movable Barrier	5	90
						Total	95
Further Excavation (Works under Road Decking)							
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	50%	#Underground Work	20	83
Lorry with Crane	BS 5228 Table D.7/101	1	94	15%	Movable Barrier	5	81
Excavator (57kW)	BS 5228 Table D.8/15	1	103	100%	#Underground Work	20	83
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	#Underground Work	20	75
Dump truck (50t)	BS 5228 Table D.9/39	1	103	15%	Movable Barrier	5	90
Water pump (petrol)	CNP 282	1	103	100%	#Underground Work	20	83
Ventilation fan	CNP 241	1	108	100%	#Underground Work	20	88
						Total	94
Construction of Subway (Works under Road Decking)							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	#Underground Work	20	82
Concrete lorry mixer (6m3)	BS 5228 Table D.6/33	1	96	30%	Movable Barrier	5	86
Concrete pump (100kW)	BS 5228 Table D.6/36	1	106	50%	#Underground Work	20	83
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	#Underground Work	20	75
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	93
Backfill and Reinstatement							
Concrete lorry mixer (6m3)	BS 5228 Table D.6/33	1	96	30%	Movable Barrier	5	86
Excavator (57kW)	BS 5228 Table D.8/15	1	103	50%	Movable Barrier	5	95
Poker, vibratory, hand-held	BS 5228 Table D.6/40	1	98	20%	Movable Barrier	10	81
Road roller	BS 5228 Table D.8/30	1	101	15%	Movable Barrier	5	88
Dump truck (50t)	BS 5228 Table D.9/39	1	103	15%	Movable Barrier	5	90
						Total	97
						MAXIMUM amongst the Activities	98

** Reference was made to VEP Application No. VEP-072/2002 for Modifications to MTRC TST Station

Appendix VI

Plant Inventory for Various Construction Activities - With Environmental Protection Measures

Consultancy Agreement No. NEX/1050

Lee Tung Street Subway (Section 1)

PME	TM or other reference	No. of PME	SWL, dB(A)/unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Section 2 - LCSD Playground Portion							
Activities							
Utilities Diversion							
Air compressor, air flow > 10m ³ /min and <= 30m ³ /min	CNP 002	1	102	100%	Noise Enclosure	15	87
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	50%	Movable Barrier	10	93
Lorry with Crane	BS 5228 Table D.7/101	1	94	30%	Movable Barrier	5	84
Excavator (57kW)	BS 5228 Table D.8/15	1	103	50%	Movable Barrier	5	95
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Lorry (20 t)	BS 5228 Table D.9/19	1	102	30%	Movable Barrier	5	92
						Total	99
Installation of Pipepile, Sheet Pile and King Posts							
Lorry with Crane	BS 5228 Table D.7/101	1	94	20%	Movable Barrier	5	82
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Grout mixer	CNP 105	1	90	100%	Movable Barrier	10	80
Pipe piling rig (0.225 dia) (39 kW)	BS 5228 Table D.4/46	1	102	100%	Movable Barrier	10	92
Silent Piler Machine	GIKEN **	1	94	100%	Movable Barrier	10	84
						Total	93
Open Excavation							
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	50%	Movable Barrier	10	93
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Dump truck (50t)	BS 5228 Table D.9/39	1	103	20%	Movable Barrier	5	91
						Total	95
Further Excavation							
Breaker, excavator mounted (hydraulic), 52kW	BS 5228 Table D.8/12	1	106	50%	Movable Barrier	10	93
Lorry with Crane	BS 5228 Table D.7/101	2	94	15%	Movable Barrier	5	84
Excavator (57kW)	BS 5228 Table D.8/15	2	103	100%	Movable Barrier	5	101
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Dump truck (50t)	BS 5228 Table D.9/39	1	103	15%	Movable Barrier	5	90
Water pump (petrol)	CNP 282	2	103	100%	Movable Barrier	10	96
Ventilation fan	CNP 241	2	108	100%	Silencer	15	96
						Total	104
Construction of Subway							
Air compressor, air flow > 10m ³ /min and <= 30m ³ /min	CNP 002	1	102	100%	Noise Enclosure	15	87
Saw, circular, wood (660mm blade)	BS 5228 Table D.7/78	1	106	50%	Movable Barrier	10	93
Concrete lorry mixer (6m ³)	BS 5228 Table D.6/33	1	96	30%	Movable Barrier	5	86
Concrete pump (100kW)	BS 5228 Table D.6/36	1	106	50%	Movable Barrier	10	93
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Ventilation fan	CNP 241	2	108	100%	Silencer	15	96
						Total	100
Construction of Ventilation Shaft							
Saw, circular, wood (660mm blade)	BS 5228 Table D.7/78	1	106	50%	Movable Barrier	10	93
Concrete lorry mixer (6m ³)	BS 5228 Table D.6/33	1	96	30%	Movable Barrier	5	86
Concrete pump (100kW)	BS 5228 Table D.6/36	1	106	30%	Movable Barrier	10	91
Lorry with Crane	BS 5228 Table D.7/101	1	94	30%	Movable Barrier	5	84
Generator, super silenced, 70 dB(A) at 7 m	CNP 103	1	95	100%	Noise Enclosure	15	80
Poker, vibratory, hand-held	BS 5228 Table D.6/40	1	98	20%	Movable Barrier	10	81
						Total	96
Backfill and Reinstatement							
Concrete lorry mixer (6m ³)	BS 5228 Table D.6/33	1	96	30%	Movable Barrier	5	86
Excavator (57kW)	BS 5228 Table D.8/15	1	103	50%	Movable Barrier	5	95
Poker, vibratory, hand-held	BS 5228 Table D.6/40	1	98	20%	Movable Barrier	10	81
Road roller	BS 5228 Table D.8/30	1	101	15%	Movable Barrier	5	88
Dump truck (50t)	BS 5228 Table D.9/39	1	103	15%	Movable Barrier	5	90
						Total	97
						MAXIMUM amongst the Activities	104

** Reference was made to VEP Application No. VEP-072/2002 for Modifications to MTRC TST Station

Appendix VII. Construction Noise Assessment for Representative NSRs - With Environmental Protection Measures

Appendix VII

Construction Noise Assessment for Representative NSR - With Environmental Protection Measures

Consultancy Agreement No. NEX/1050

Lee Tung Street Subway

Noise Sensitive Receiver						2013												2014												2015									
N1 - Hennessy Building						04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08					
SWL	Dist.(m) ¹	DC ²	FC ³	CNL																																			
Section 1a - Johnston Road Portion																																							
Utilities Diversion	98	117	49	3	51		51	51						51		51																							
Installation of Pipepile, Sheet Pile and King Posts	96	117	49	3	49				49	49					49		49																						
Open Excavation	95	117	49	3	48						48	48	48	48				48																					
Further Excavation (Works under Road Decking)	95	117	49	3	49													49	49	49																			
Construction of Subway (Works under Road Decking)	93	117	49	3	47															47	47																		
Backfill and Reinstatement	97	117	49	3	51																	51	51																
Section 1b - Johnston Road Portion																																							
Utilities Diversion	98	133	50	3	50				50	50																													
Installation of Pipepile, Sheet Pile and King Posts	87	133	50	3	40				40	40																													
Open Excavation	95	133	50	3	47								47																										
Further Excavation (Full enclosure provided at this mucking out area)	97	133	50	3	50								50								50																		
Construction of Subway (Full enclosure provided at this mucking out area)	97	133	50	3	50																	50																	
Backfill and Reinstatement	94	133	50	3	46																		46																
Section 1c - Johnston Road Portion																																							
Utilities Diversion	98	137	51	3	50		50	50																															
Installation of Pipepile, Sheet Pile and King Posts	87	137	51	3	39				39																														
Open Excavation	95	137	51	3	47				47																														
Further Excavation (Works under Road Decking)	94	137	51	3	46								46																										
Construction of Subway (Works under Road Decking)	93	137	51	3	45								45																										
Backfill and Reinstatement	97	137	51	3	49																		49																
Section 2 - LCSD Playground Portion																																							
Utilities Diversion	99	57	43	3	59	59	59	59	59																														
Installation of Pipepile, Sheet Pile and King Posts	93	57	43	3	53	53	53	53	53	53	53	53																											
Open Excavation	95	57	43	3	55	55	55	55	55	55	55	55																											
Further Excavation	104	57	43	3	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64			
Construction of Subway	100	57	43	3	59																																		
Construction of Ventilation Shaft	96	57	43	3	56																																		
Backfill and Reinstatement	97	57	43	3	57																																		
Total						59	66	67	67	66	66	66	66	66	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65		
Remarks:																																							
1. Slant distance is adopted for the construction noise assessment																																							
2. Distance correction in dB(A)																																							
3. Facade correction in dB(A)																																							

Appendix VII
Construction Noise Assessment for Representative NSR - With Environmental Protection Measures

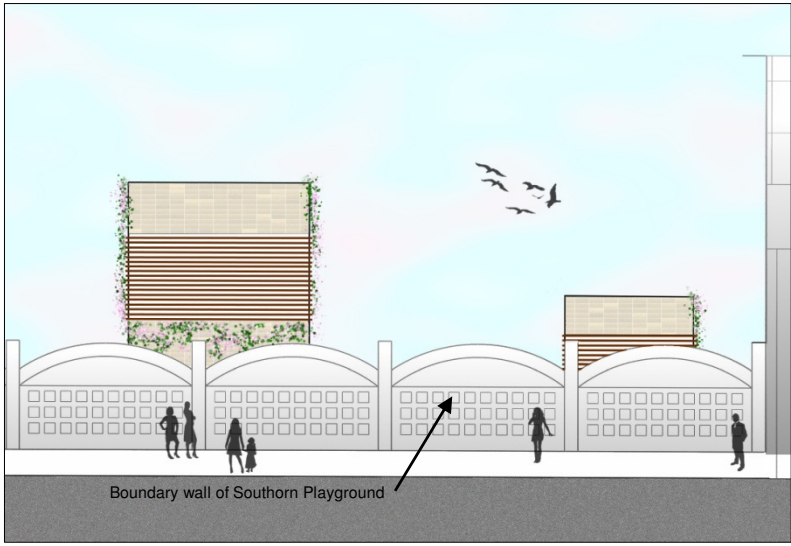
Consultancy Agreement No. NEX/1050
Lee Tung Street Subway

Noise Sensitive Receiver	SWL	Dist.(m) ¹	DC ²	FC ³	CNL	2013												2014												2015							
						04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08			
N2 -Chiu Hin Mansion																																					
Section 1a - Johnston Road Portion																																					
Utilities Diversion	98	17	33	3	68		68	68																													
Installation of Pipepile, Sheet Pile and King Posts	96	17	33	3	66				66	66																											
Open Excavation	95	17	33	3	65																																
Further Excavation (Works under Road Decking)	95	17	33	3	66																																
Construction of Subway (Works under Road Decking)	93	17	33	3	64																																
Backfill and Reinstatement	97	17	33	3	67																																
Section 1b - Johnston Road Portion																																					
Utilities Diversion	98	15	32	3	69																																
Installation of Pipepile, Sheet Pile and King Posts	87	15	32	3	59																																
Open Excavation	95	15	32	3	66																																
Further Excavation (Full enclosure provided at this mucking out area)	97	15	32	3	68																																
Construction of Subway (Full enclosure provided at this mucking out area)	97	15	32	3	69																																
Backfill and Reinstatement	94	15	32	3	65																																
Section 1c - Johnston Road Portion																																					
Utilities Diversion	98	15	32	3	69																																
Installation of Pipepile, Sheet Pile and King Posts	87	15	32	3	59																																
Open Excavation	95	15	32	3	66																																
Further Excavation (Works under Road Decking)	94	15	32	3	65																																
Construction of Subway (Works under Road Decking)	93	15	32	3	65																																
Backfill and Reinstatement	97	15	32	3	69																																
Section 2 - LCSD Playground Portion																																					
Utilities Diversion	99	34	39	3	63	63	63	63	63																												
Installation of Pipepile, Sheet Pile and King Posts	93	34	39	3	58	58	58	58	58	58	58	58	58																								
Open Excavation	95	34	39	3	60	60	60	60	60	60	60	60	60																								
Further Excavation	104	34	39	3	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68								
Construction of Subway	100	34	39	3	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64								
Construction of Ventilation Shaft	96	34	39	3	60																																
Backfill and Reinstatement	97	34	39	3	61																																
					Total	63	74	74	75	74	71	71	71	75	71	72	71	71	71	71	71	71	70	73	75	72	69	69	70	70	70	71	67	67	61		
Remarks:																																					
1. Slant distance is adopted for the construction noise assessment																																					
2. Distance correction in dB(A)																																					
3. Facade correction in dB(A)																																					

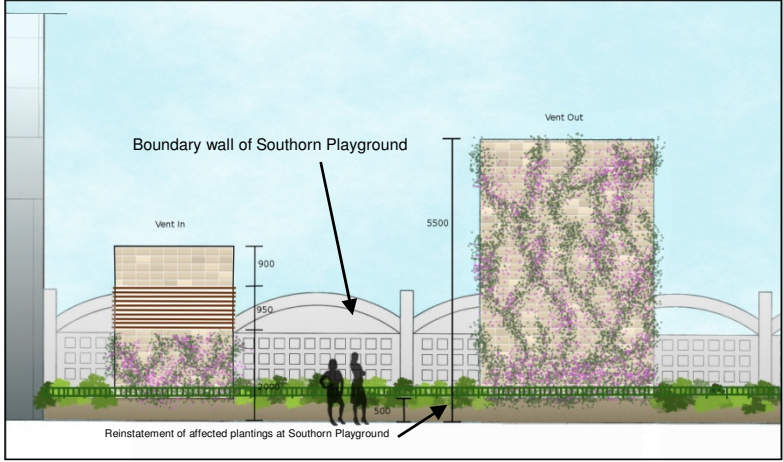
Appendix VIII. Landscape Screening Measures



Plan View of Ventilation Shaft



Elevation View A from Johnston Road



Elevation View B from Southern Playground

Appendix VIII – Landscape Screening Measure

Appendix IX. Environmental Monitoring and Audit Plan

Appendix IX - Environmental Monitoring and Audit Plan

1. Introduction

1.1 Purpose of EM&A Plan

According to EPD's EM&A Guidelines for Development Projects in Hong Kong, an EM&A plan is required for projects which have a potential of causing construction noise impacts to the sensitive receivers close to the proposed work areas if the recommended mitigation measures are not properly implemented.

1.2 Project Background

It is indicated that noise impact is predicted during the construction phase at Hennessy Building and Chiu Hin Mansion, hence the mitigation measures stated in this Report are recommended to be implemented in order to reduce the noise impact to the nearby NSRs. The monitoring programme should be carried out by the ET.

The recommended noise mitigation measures are presented in Section 5 of the Project Profile (PP). The monitoring requirements and methodology for monitoring of noise impacts are provided below.

1.3 Project Organisation

An organisation consisting of Engineer's Representative (ER), Contractor, Independent Environmental Checker (IEC), and Environmental Team (ET) should be formed to take the responsibilities of the environmental protection matters. MTRC should appoint the IEC and establish the ET for compliance with the EP requirements. The responsibilities of respective parties are detailed in the following:

The Engineer or the Engineer's Representative (ER)

The ER is responsible for overseeing the construction works and for ensuring that the works are undertaken by the Contractor in accordance with the specification and contract requirements. The duties and responsibilities of the ER with respect to EM&A are:

- Monitor the Contractor's compliance with Contract Specifications, including the effective implementation and operation of the environmental mitigation measures;
- Inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- Participate in site inspections undertaken by the ET; and
- Co-operate with the ET in providing all the necessary information and assistance for completion of the complaint investigation works.

Independent Environmental Checker (IEC)

The IEC should advise the ET and ER on environmental issues related to the project. The IEC should audit from an independent viewpoint on the environmental performance during the construction of the project. The IEC should be a person who has relevant professional qualifications in environmental control and at least 7 years experience in EM&A and environmental management. The duties and responsibilities of the IEC are:

- Review and audit in an independent, objective and professional manner in all aspects of the EM&A programme;

- Validate and confirm the accuracy of monitoring results, appropriateness of monitoring equipment, monitoring locations with reference to the locations of the nearby sensitive receivers, and monitoring procedures;
- Carry out random sample check and audit on monitoring data and sampling procedures, etc;
- Conduct random site inspection;
- Review the effectiveness of environmental mitigation measures and project environmental performance;
- On an as-need basis, verify and certify the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plans and submissions under the environmental permit. Where necessary, the IEC should agree in consultation with the ET and the Contractor least impact alternative;
- Check complaint cases and the effectiveness of corrective measures;
- Verify EM&A report certified by the ET Leader; and
- Feedback audit results to ER/ET according to the Event/Action Plan.

The Environmental Team (ET)

The ET should conduct the EM&A programme and ensure the Contractor's compliance with the project's environmental performance requirements during construction. The ET should plan, organise and manage the implementation of the EM&A programme and ensure that the EM&A works are undertaken to the required standard.

The ET should be led and managed by the ET Leader. The ET Leader should have relevant professional qualifications in environmental control and possess at least 7 years experience in EM&A. The ET Leader should be responsible for the implementation of the EM&A programmes in accordance with the EM&A requirements. The duties and responsibilities of the ET include:

- Sampling, analysis and statistical evaluation of monitoring parameters;
- Environmental site surveillance;
- Inspection and audit of compliance with environmental protection, and pollution prevention and control regulations;
- Assess the effectiveness of the environmental mitigation measures implemented;
- Monitor compliance with the environmental protection clauses/specifications in the Contract;
- Review construction programme and comment as necessary;
- Review work methodologies which may affect the extent of environmental impact during the construction phase and comment as necessary;
- Complaint investigation, evaluation and identification of corrective measures;
- Liaison with the IEC on all environmental performance matters, and timely submission of all relevant EM&A proforma for IEC's approval; and
- Advice to the Contractor on environmental improvement, awareness and enhancement matters, etc.

The Contractor

The Contractor should report to the ER. The duties and responsibilities of the Contractor are:

- Comply with the relevant contract conditions and specifications on environmental protection
- Participate in the site inspections undertaken by the ET;
- Provide assistance to ET to carry out monitoring;
- Provide requested information to the ET in the event of any exceedance in the environmental criteria (Action/Limit levels);
- Submit proposals on mitigation measures in case of exceedance of Action and Limit levels in accordance with the Event/Action Plans; and

- Cooperate with the ET in providing all the necessary information and assistance for completion of the complaint investigation works. If mitigation measures are required following the investigation, the Contractor should promptly carry out these measures.

2. Construction Noise Impact

2.1 Monitoring Requirements

The construction noise level should be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq(30 \text{ minutes})}$ should be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays.

2.2 Monitoring Equipment

With reference to the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level metres in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications should be used for carrying out the noise monitoring. The calibration of the sound level meters and their respective calibrators should be carried out in accordance with the manufacturer's requirements.

Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding 5 ms^{-1} or wind with gusts exceeding 10 ms^{-1} .

The ET is responsible for the provision and maintenance of the monitoring equipment. The ET should ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation should be clearly labelled.

2.3 Monitoring Locations

The noise monitoring location will be set up at Hennessy Building and Chiu Hin Mansion.

The monitoring station should normally be at a point 1m from the exterior of the sensitive receivers building facade and be at a position 1.2m above the ground. If there is a problem with access to the normal monitoring position, an alternative nearby position may be chosen, and a correction to the measurements should be made. For reference, a correction of +3dB(A) should be made to the free field measurements. The ET should agree with the EPD on the correction adopted.

2.4 Baseline Monitoring

The ET should carry out baseline noise monitoring prior to the commencement of the construction works. There should not be any construction activities in the vicinity of the stations during the baseline monitoring.

Baseline noise monitoring for the A-weighted levels LA_{eq} , LA_{10} and LA_{90} should be carried out daily for a period of at least two weeks at a minimum logging interval of 30 minutes between 0700 and 1900.

In exceptional case, when insufficient baseline monitoring data or questionable results are obtained, the ET should liaise with the Contractor to agree on an appropriate set of data to be used as a baseline reference.

2.5 Impact Monitoring

During normal construction working hour (0700-1900 Monday to Saturday), monitoring of $LA_{eq, 30min}$ noise levels should be carried out at the agreed monitoring locations once every week in accordance with the methodology in the TM.

Other noise sources such as road traffic may make a significant contribution to the overall noise environment. Therefore, the results of noise monitoring activities would take into account such influencing factors, which may not be presented during the baseline monitoring period.

General construction work carried out during restricted hours is controlled by Construction Noise Permit (CNP) under the NCO.

In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Event and Action Plan in **Table 1.2** should be carried out. This additional monitoring should be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

2.6 Event and Action Plan

The Action and Limit (AL) Levels for construction noise are defined in **Table 2.1**. Should non-compliance of the criteria occurs, action in accordance with the Event and Action Plan in **Table 2.2**, should be carried out.

Table 2.1 : Typical Action and Limit Levels for Construction Noise

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one valid documented complaint is received.	75* dB(A)

Note: *70 dB(A) for schools and 65 dB(A) during school examination periods.

If works are to be carried out during restricted hours, the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be followed.

Table 2.2: Event and Action Plan for Construction Noise

Event	Action			
	ET	IEC	ER	Contractor
Action Level	<ol style="list-style-type: none"> 1. Notify IEC and Contractor. 2. Carry out investigation. 3. Report the results of investigation to the IEC and Contractor. 4. Discuss with the Contractor and formulate remedial measures 5. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 1. Review the analyzed result submitted by ET. 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly. 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IEC 2. Implement noise mitigation proposals
Limit Level	<ol style="list-style-type: none"> 1. Notify IEC, ER, EPD and Contractor, and 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET and Contractor on the 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedances 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further

Event	Action			
	ET	IEC	ER	Contractor
	follow other actions 2. Identify source 3. Repeat measurement to confirm findings 4. Increase monitoring frequency 5. Check Contractor's working procedures to determine possible mitigation to be implemented 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD, ER informed of the results 8. If exceedance stops, cease additional monitoring	potential remedial actions 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ET accordingly 3. Supervise the implementation of remedial measures	2. Notify Contractor 3. Require Contractor to propose remedial measures 4. Ensure remedial measures are properly implemented 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	exceedance 2. Submit proposals for remedial actions to IEC within 3 working days of notifications 3. Implement the agreed proposals 4. Revise and resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated

2.7 Construction Noise Mitigation Measures

To minimize the noise emissions during construction phase, appropriate mitigation measures and good site practices are recommended to be implemented. The proposed mitigation measures are summarized below:

- Use quieter plants and working methods;
- Use of movable noise barrier;
- Use of noise enclosure;
- Use of silencer; and
- Implementation of general construction noise control measures.

3. Construction Air Impact

3.1 Monitoring Requirement

Monitoring and audit of the Total Suspended Particulate (TSP) levels should be carried out by the ET to ensure that any deterioration in air quality could be readily detected and timely actions taken to rectify the situation.

1-hour or 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The TSP levels can be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B or be measured by direct reading methods which are capable of producing comparable results to that of the high volume sampling method.

All relevant data including temperature, pressure, wind speed and direction, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and

weight of the filter paper, other local atmospheric factors affecting or affected by site conditions and work progress of the concerned site, etc. should be recorded in detail. A sample data record sheet is shown below. The ET may develop project specific data record sheet to suit this EM&A programme.

3.2 Monitoring Equipment

The ET is responsible for provision of the monitoring equipment. The ET should provide a sufficient number of high volume sampler (HVS) and/or direct reading dust meters with appropriate calibration available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The HVSs should be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment should be clearly labelled.

Calibration of dust monitoring equipment should be conducted as specified by the manufacturer. The calibration data should be properly documented for future reference. All the data should be converted into standard temperature and pressure condition.

HVS in compliance with the following specifications should be used for carrying out the 24-hour TSP monitoring:

- 0.6 – 1.7 m³/min (20 – 60 standard cubic feet per minute) adjustable flow range;
- Equipped with a timing/control device for 24 hours operation;
- Installed with elapsed-time meter with +/- 5 minutes accuracy for 24 hours operation;
- Capable of providing a minimum exposed area of 406cm² (63 in²);
- Flow control accuracy: +/- 2.5% deviation over 24-hour sampling period;
- Incorporated with an electronic mass flow rate controller or other equivalent devices;
- Equipped with a flow recorder for continuous monitoring;
- Provided with a peaked roof inlet;
- Incorporated with manometer;
- Able to hold and seal the filter paper to the sampler housing at horizontal position;
- Easy to change the filter, and
- Capable of operating continuously for 24-hour period.

Calibration of dust monitoring equipment should be conducted as specified by the manufacturer. Initial calibration of the dust monitoring equipment should be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard should be traceable to the internationally recognized primary standard and be calibrated annually. The calibration data should be properly documented for future reference. All data should be converted into standard temperature and pressure condition.

The ET should obtain representative wind data near the dust monitoring locations for reference.

3.3 Laboratory Measurement / Analysis

Filter paper should be labelled before sampling. It should be a clean filter paper with no pinholes, and should be conditioned in a humidity-controlled chamber for over 24-hour and be pre-weighed before use for the sampling.

After sampling, the filter paper loaded with dust should be kept in a clean and tight sealed bag. The filter paper should then be returned to the laboratory for reconditioning in the humidity-controlled chamber followed by accurate weighing by an electronic balance. The balance should be regularly calibrated against a traceable standard.

All the collected samples should be kept in a good condition for 6 months before disposal.

3.4 Monitoring Locations

The air monitoring location will be set up at Chiu Hin Mansion.

When alternative monitoring locations are proposed, approval from the ER and agreement from the IEC is required. The following criteria, as far as practicable, should be followed:

- at the project area boundary or such locations close to the major dust emission source;
- close to the sensitive receivers;
- proper position/sitting and orientation of the monitoring equipment; and
- take into account the prevailing meteorological conditions.

When positioning the samplers, the following points should be noted:

- a horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;
- no two samples should be placed less than 2m apart;
- the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler where possible;
- a minimum of 2m of separation from walls, parapets and penthouses is required for rooftops samplers;
- a minimum of 2m of separation from any supporting structure, measured horizontally is required;
- no furnace or incinerator flue or building vent is nearby;
- airflow around the sampler is unrestricted;
- the sampler is more than 20m from the dripline;
- any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;
- permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the samplers.

3.5 Baseline Monitoring

Baseline monitoring should be carried out to determine the ambient 1-hour and 24-hour TSP levels at the monitoring locations prior to the commencement of the Project work. During the baseline monitoring, there should not be any construction or dust generation activities in the vicinity of the monitoring stations. The baseline monitoring will provide data for the determination of the appropriate Action levels with the Limit levels set against statutory or otherwise agreed limits.

Baseline monitoring should be carried out at each designated monitoring location for a continuous period of at least 14 days prior to the commissioning of the construction works to obtain daily 24-hour TSP samples. 1-hour sampling should also be done at least 3 times per day. Baseline monitoring should be carried out under typical weather conditions. General metrological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources should also be recorded throughout the baseline monitoring period.

In case the baseline monitoring cannot be carried out at the designated monitoring location during the baseline monitoring period, the ET should carry out the monitoring at an alternative location that can effectively represent the baseline conditions at the impact monitoring location. The alternative baseline monitoring location should be approved by the ER and agreed with IEC.

In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET should liaise with IEC and EPD to agree on an appropriate set of data to be used as a baseline reference.

If the ET considers that significant changes in the ambient conditions have arisen, a repeat of the baseline monitoring may be carried out to update the baseline levels. The monitoring should be at times when the Contractor's activities are not generating dust. The revised baseline levels and air quality criteria should be agreed with IEC and EPD.

3.6 Impact Monitoring

The ET is responsible for impact monitoring during the course of the Works. For regular impact monitoring, 24-hour TSP monitoring should be in the sampling frequency of at least once every week.

In case of non-compliance with the air quality criteria, a more frequent monitoring exercise adopting 1-hr TSP monitoring undertaken when the highest dust impact occurs, as specified in the Event and Action Plan in **Table 3.2**, should be conducted within 24 hours after the result is obtained. This additional monitoring should be continued until the excessive dust emission or the deterioration in air quality is rectified.

3.7 Event and Action Plan

The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET should compare the impact monitoring results with air quality criteria set up for 24-hour TSP level. **Table 3.1** shows the air quality criteria, namely Action and Limit (AL) Levels to be used. Should non-compliance of the air quality criteria occur, actions in accordance with the Event and Action Plan in **Table 3.2** should be carried out.

Table 3.1 : Typical Action and Limit Levels for Air Quality

Parameters	Action	Limit
24-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 200 \mu\text{g}/\text{m}^3$, Action level = (130% of baseline level + Limit level)/2 For baseline level $> 200 \mu\text{g}/\text{m}^3$, Action level = Limit level	260
1-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$, Action level = (130% of baseline level + Limit level)/2 For baseline level $> 384 \mu\text{g}/\text{m}^3$, Action level = Limit Level	500

Table 3.2: Event and Action Plan for Air Quality

Event	Action Contractor			
	ET	IEC	ER	
Action Level				
Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source; 2. If valid, inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method. 	<ol style="list-style-type: none"> 1. Notify Contractor 	<ol style="list-style-type: none"> 1. Rectify any unacceptable practice; 2. Amend working methods if appropriate
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Identify source; 2. Inform IEC and EPD; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency to daily; 5. Discuss with IEC and Contractor on remedial action required; 6. If exceedance continues, arrange meeting with IEC and ER; 7. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervisor implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measure properly implemented. 	<ol style="list-style-type: none"> 1. Submit proposals for remedial action to IEC within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.
Limit Level				
Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source; 2. Inform ER and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and the Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.

Event	Action Contractor			
	ET	IEC	ER	
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Notify IEC, ER, Contractor and EPD; 2. Identify sources; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ET accordingly. 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consultation with IEC, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

3.8 Mitigation Measure of Air Quality

Although most of the construction works would be carried out underground, appropriate dust mitigation measures stipulated in the Air Pollution Control (Construction Dust) Regulation should be implemented to control fugitive dust emission. The following key dust suppression measures are recommended:

- Regular watering of all exposed site surfaces to reduce dust emissions, particularly during dry weather;
- Frequent watering of particularly dusty construction areas and areas close to air sensitive receivers;
- Covering of stockpile of excavated dusty materials, if any, with impervious sheeting or spraying with water to maintain the entire surface wet;
- Provision of vehicle washing facilities at the entry and exit points of site;
- Tarpaulin covering of any dusty materials being transported to and from site by vehicle;
- Positioning of construction plant at the maximum practicable distance from air sensitive receivers; and

- Due to the small size of the works sites and lack of space for stockpiling, excavated materials should be hauled off-site almost immediately. However, in the event of any stockpiled excavated materials, they should be covered with tarpaulin and be removed off-site as soon as practicable to avoid any dust nuisance arising.

4. Landscape and Visual

4.1 Audit Requirement

The Project Profile has recommended landscape and visual mitigation measures to be undertaken during construction and operational phases of the project.

The proposed mitigation measures of landscape and visual impacts are summarised in the Implementation Schedule in **Appendix X**. The proposed landscape and visual mitigation measures should be incorporated in the detailed landscape and engineering design. All measures undertaken by Contractor during the construction phase should be audited by the ET to ensure compliance with the recommended mitigation measures in the Project Profile. Site Inspection should be undertaken at least once every two weeks throughout the construction period.

5. Environmental Audit

5.1 Site Inspection

Site inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They should be undertaken routinely by the ET to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. With well defined pollution control and mitigation specifications and a well established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

The ET is responsible for formulating the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspection works. The ET should in consultation with the IEC, prepare a procedure for site inspection, deficiency and action reporting requirement; and submit to the Contractor for agreement.

Regular site inspections at least once a week should be led by the ET. The areas of inspection should not be limited to the pollution control and mitigation measures within the site; the environmental situation outside the site area which is likely to be affected, directly or indirectly by the site activities should be reviewed. The ET makes reference to the following information in conducting the inspection:

- EM&A recommendations on environmental protection and pollution control mitigation measures;
- Works progress and programme;
- Individual works methodology proposals (which should include proposal on associated pollution control measures);
- Contract specifications on environmental protection
- Relevant environmental protection and pollution control laws; and
- Previous site inspection results.

The Contractor should update the ET with all relevant information on the construction contract necessary for him to carry out the site inspections. Inspection results and associated recommendations for improvements to the environmental protection and pollution control works should be passed to the IEC, ER and the Contractor, for reference and for taking immediate action. The Contractor should follow the procedures and time-frame as stipulated in the environmental site inspection, deficiency and action reporting system formulated by the ET to report on any remedial measures subsequent to the site inspections.

Ad hoc site inspections should be carried out by the ET and / or IEC if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

5.2 Compliance with Legal and Contractual Requirement

There are environmental protection and pollution control laws in Hong Kong, which the construction activities should comply with.

In order to comply with the contractual requirements, all works method statements submitted by the Contractor to the ER for approval should be sent to the ET for vetting, to see whether sufficient environmental protection and pollution control measures have been included.

The ET should also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented.

The Contractor should regularly copy relevant documents to the ET so that the checking work can be carried out. The document should at least include the updated Work Progress Reports, the updated Works Programme, the application letters for different licence/permits under the environmental protection laws, and all valid licences/permits. The site diary should also be available for the ET's inspection upon his request.

After reviewing the document, the ET should advise the ER and the Contractor of any non-compliance with the legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET's review concludes that the current status on license/permit application and any environmental protection and pollution control preparation works may not cope with the works programme or may result in potential violation of environmental protection and pollution control requirements by the works, the ET will advise the Contractor and the ER accordingly.

Upon receipt of the advice, the Contractor should undertake immediate actions to rectify the situation. The ET should follow up to ensure that appropriate action has been taken by the Contractor such that the environmental protection and pollution control requirements are fulfilled.

5.3 Environmental Complaints

Complaints should be referred to the ET for action. The ET should undertake the following procedures upon receipt of any valid complaint:

- Investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;
- Log complaint and date of receipt onto the complaint database and inform the ER and IEC if valid;

- Identify mitigation measures if a complaint is valid and due to the works of the Project;
- Advise the Contractor if mitigation measures are required;
- Review the Contractor's response to identified mitigation measures, and the updated situation;
- Undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;
- If the complaint is referred by EPD, keep EPD informed on the status of the complaint investigation and follow-up action and report to EPD upon completion of the investigation; and
- Report the investigation results and the subsequent actions to the complainant (If the source of complaint is identified through EPD, the results should be reported within the time frame assigned by EPD);
- Record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

During the complaint investigation work, the Contractor and ER should cooperate with the ET in providing all necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor should promptly carry out the mitigation. The ER should ensure that the measures have been carried out by the Contractor. A flow chart of complaint response procedure is enclosed in this EM&A plan.

6. Reporting Requirement

6.1 Introduction

The reporting requirements of EM&A are based upon a paper-documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the IEC, the ER and EPD (for construction phase), and with the Environmental Consultant and EPD (for operation phase). This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach.

For construction phase of EM&A, the types of reports that the ET should prepare and submit include baseline monitoring report, monthly EM&A report, quarterly EM&A summary report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final review EM&A reports shall be submitted to the Director of Environmental Protection. The exact details of the frequency, distribution and time frame for submission shall be agreed with the IEC, the ER and EPD prior to commencement of works

6.2 Baseline Monitoring Report

The ET should prepare and submit to EPD a Baseline Environmental Monitoring Report two weeks prior to the commencement of construction or otherwise as specified by EPD. The baseline monitoring report shall include at least the following:

- (i) Executive summary;
- (ii) Brief project background information;
- (iii) Drawings showing locations of the baseline monitoring stations;
- (iv) An updated construction programme with milestones of environmental protection/mitigation activities annotated;

- (v) Monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology;
 - name of laboratory and types of equipment used and calibration dates;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency and duration;
 - QA/QC results and detection limits.
- (v) Details of influencing factors, including:
 - major activities, if any, being carried out on the site during the period;
 - weather conditions during the period;
 - other factors which might affect the results.
- (vi) Determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data. The analysis should conclude if there is any significant difference between control and impact stations for the parameters monitored;
- (vii) Revisions for inclusion in the EM&A Manual; and
- (viii) Comments and conclusions.

6.3 Monthly EM&A Reports

The results and findings of all construction phase EM&A work required in the Manual should be recorded in the monthly EM&A reports prepared by the ET. The EM&A report should be endorsed by IEC and submitted within 10 working days from the end of each reporting period, with the first report due one month after construction commences. Copies of each monthly EM&A report should be submitted to the Contractor, IEC, ER and EPD.

6.4 First Monthly EM&A Report

The first monthly EM&A report shall include at least but not be limited to the following:

- (i) Executive summary:
 - breaches of Action and Limit levels;
 - complaint log;
 - notifications of any summons and status of prosecutions;
 - reporting changes; and
 - future key issues.
- (ii) Basic project information:
 - project organisation including key personnel contact names and telephone numbers;
 - construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
 - management structure; and
 - works undertaken during the month.
- (iii) Environmental status:
 - works undertaken during the month with illustrations (such as location of works, daily dredging/filling rates, percentage fines in the fill material used); and
 - drawing showing the project area, any key environmental sensitive receivers and the locations of the monitoring and control stations.

- (iv) A brief summary of EM&A requirements:
 - all monitoring parameters;
 - environmental quality performance limits (Action and Limit levels);
 - event-Action Plans;
 - environmental mitigation measures; and
 - environmental requirements in contract documents.

- (v) Monitoring results:
 - monitoring methodology;
 - name of laboratory and types of equipment used and calibration dates;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency and duration;
 - weather conditions during the period;
 - graphical plots of monitored parameters in the month annotated;
 - the major activities being carried out on site during the period;
 - weather conditions that may affect the results; and
 - any factors which might affect the monitoring results.
 - .QA/QC results and detection limits.

- (vi) Report on non-compliance, complaints, notifications of summons and successful prosecutions:
 - record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - record of complaints received, including locations and nature of complaints, investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - description of actions taken in the event of non-compliance and deficiency reporting, and follow-up actions related to earlier non-compliance.

- (vii) Others
 - an account of the future key issues as reviewed from the works programme and work method statements; and
 - advice on the solid and liquid waste management status during the month.

6.5 Subsequent Monthly EM&A Reports

Subsequent monthly EM&A reports should include the following:

- (i) Executive summary
 - breaches of Action and Limit levels;
 - complaint log;
 - notifications of any summons and successful prosecutions;
 - report changes; and
 - future key issues.

- (ii) Environmental status:
 - construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;

- works undertaken during month with illustration including key personnel contact names and telephone numbers; and
 - drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
- (iii) Implementation status:
- advice on the status of compliance with the Environmental Permit (EP), submission status under the EP, implementation status of environmental protection and pollution control / mitigation measures, as recommended in the PP
- (iv) Monitoring results
- monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency and duration;
 - weather conditions during the period;
 - graphical plots of the monitored parameters in the month annotated;
 - the major activities being carried out on site during the period;
 - weather conditions that may affect the results;
 - any factors which might affect the monitoring results;
 - QA/QC results and detection limits.
- (v) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - Record of all complaints received, including locations and nature of complaints, investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - Record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - Review of reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - A description of the actions taken in the event of non-compliance and deficiency, and follow-up actions related to earlier non-compliance
- (vi) Others
- an account of the future key issues as reviewed from the works programme and work method statements; and
 - advice on the solid and liquid waste management.

6.6 Quarterly EM&A Reports

A quarterly EM&A report should be produced and should contain at least the following information. In addition, the first quarterly summary report should also confirm if the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

- (i) Executive summary;
- (ii) Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of works undertaken during the quarter;

- (iii) A brief summary of EM&A requirements including:
 - monitoring parameters
 - environmental quality performance limits (Action and Limit levels)
 - environmental mitigation measures, as recommended in the PP
- (iv) advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the PP, summarised in the updated implementation schedule;
- (v) Drawings showing the project area, environmental sensitive receivers and the locations of the monitoring and control stations;
- (vi) Graphical plots of the monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated:
 - the major activities being carried out on site during the period
 - weather conditions during the period
 - any other factors which might affect the monitoring results
- (vii) Advice on the solid and liquid waste management status during the quarter including waste generation and disposal records;
- (viii) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- (ix) A brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures;
- (x) A summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance;
- (xi) A summary of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- (xii) A summary record of notifications of summons and successful prosecution for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;
- (xiii) Comments on the effectiveness and efficiency of the mitigation measures); recommendations on any improvement in the EM&A programme and conclusions for the quarter; and
- (xiv) Proponents' contacts and any hotline telephone number for the public to make enquiries.

6.7 Final EM&A Review Report

The EM&A program could be terminated on the following basis:

- (i) completion of construction activities and insignificant environmental impacts of the remaining outstanding construction works;

- (ii) trends analysis to demonstrate the narrow down of monitoring exceedances due to construction activities and the return of ambient environmental conditions in comparison with baseline data; and
- (iii) no environmental complaints and prosecution involved.

The proposed termination may need to be consulted with the related local community and the proposal should be endorsed by the IEC, ER and the project proponent prior to final approval from the Director of Environmental Protection.

The final EM&A report should include, inter alia, the following information:

- (i) Executive summary;
- (ii) Basic project information including a synopsis of the project organisation, programme, contracts of key management, and synopsis of work undertaken during the entire construction period;
- (iii) Brief summary of EM&A requirements including:
 - monitoring parameters
 - environmental quality performance limits (Action and Limit levels)
 - environmental mitigation measures, as recommended in the PP.
- (iv) Advice on the implementation status of the environmental protection and pollution control/mitigation measures, as recommended in the PP, summarised in the updated implementation status;
- (v) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (vi) Graphical plots of the trends of monitored parameters over the construction period for representative monitoring stations annotated against:
 - the major activities being carried out on site during the period
 - weather conditions during the period
 - any other factors which might affect the monitoring results
 - the return of ambient environmental conditions in comparison with baseline data
- (vii) Compare and contrast the EM&A data with the PP predictions and annotate with explanation for any discrepancies;
- (viii) Provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;
- (ix) Advice on the solid and liquid waste management status;
- (x) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- (xi) A brief account of the reasons for and the implications of the non-compliance including a review of pollution sources and working procedures as appropriate;
- (xii) A summary description of the actions taken in the event of the non-compliance and any follow-up procedures related to earlier non-compliance;

- (xii) A summary record of all complaints received, liaison and consultation undertaken, actions and follow-up procedures taken;
- (xiii) Review the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);
- (ixx) A summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;
- (xx) A review of the effectiveness of the mitigation measures; and
- (xxi) A conclusion to state the return of ambient and/or the predicted scenario.

6.8 Data Keeping

All site document such as monitoring field records, laboratory analysis records, site inspection forms, calibration certifications, etc. are required to be included in the EM&A reporting documents. However, any such document should be well kept by the ET and be ready for inspection upon request. Soft copies of all documents and data should be kept for at least six months following completion of the construction phase EM&A.

6.9 Interim Notifications of Environmental Quality Limit Exceedances

For construction phase EM&A, with reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET should immediately notify the IEC, the ER and EPD, as appropriate. The notification should be followed up with advice to EPD on results of investigation, proposed action and success of the action taken, with any necessary follow-up proposals.

Sample Environmental Monitoring Data Recording Sheet

Noise Monitoring Field Record Sheet

Monitoring Location							
Details of Location							
Date of Monitoring							
Measurement Start Time (hh:mm)							
Measurement Time Length (min.)							
Weather Conditions	Fine / Sunny / Cloudy / Rainy						
Wind Speed (m/s)							
Noise Meter Model/Identification							
Calibrator Model/Identification							
Calibration Before Measurement (dB(A))							
Calibration After Measurement (dB(A))							
Measurement Result	5min	5min	5min	5min	5min	5min	30min
L ₉₀ (dB(A))							
L ₁₀ (dB(A))							
L _{eq} (dB(A))							
Major Construction Noise Source(s) During Monitoring							
Other Noise Source(s) During Monitoring							
Remarks							

Name & Designation

Signature

Date

Record by:

Checked by:

**Sample template for the interim notifications of
Environmental Quality Limits Exceedances**

Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

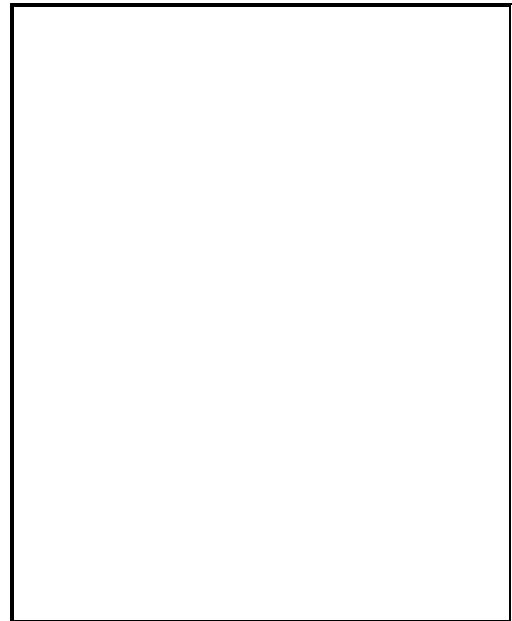
Location Plan

Prepared by:

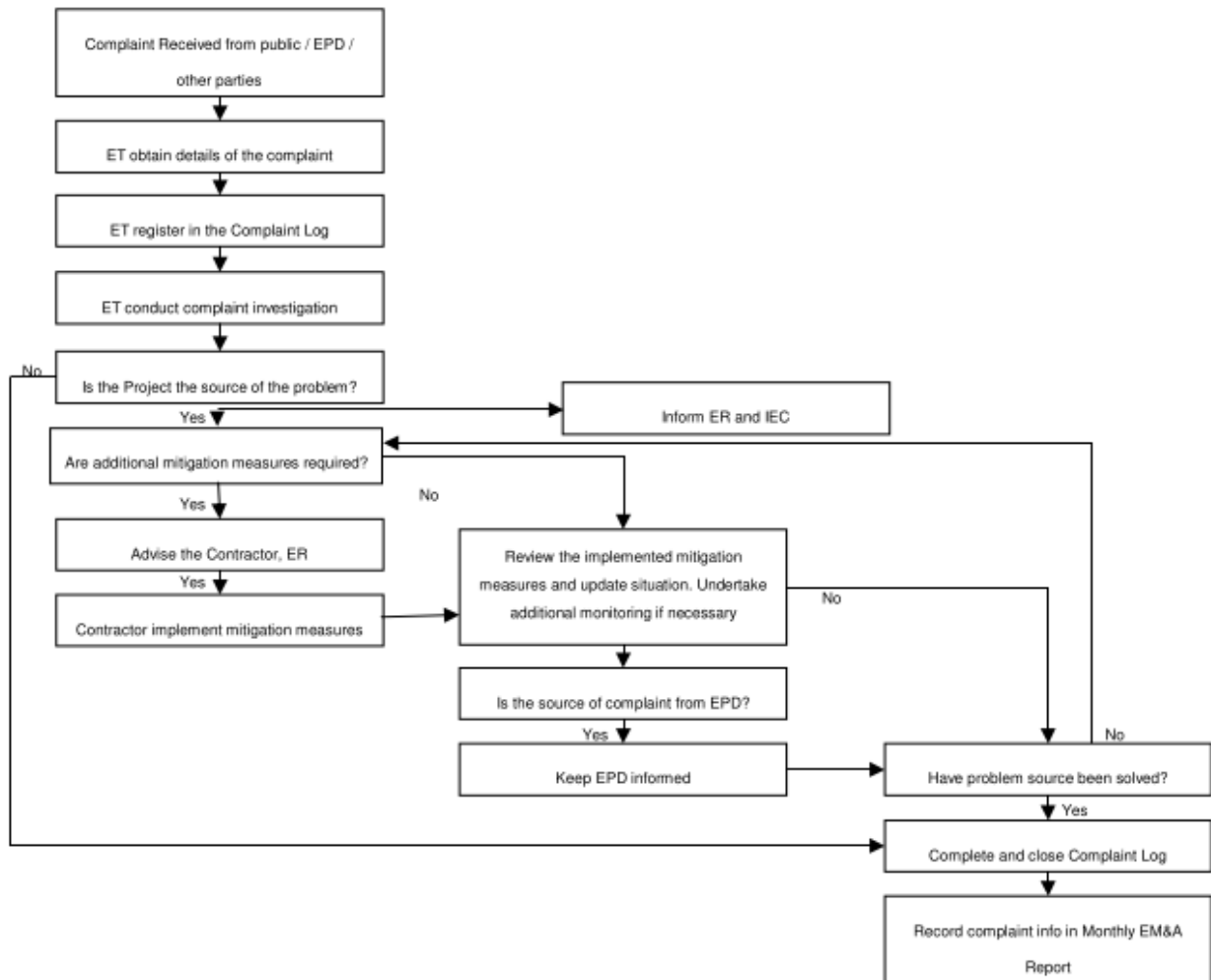
Designation:

Signature:

Date:



Complaint Response Procedure



Appendix X. Implementation Schedule

Appendix X - Implementation Schedule

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	Noise Impact					
S.5.1.1	Use of quieter plant	To minimise construction noise emissions	Contractor	Work site	Construction Stage	ProPECC PN2/93 and Noise Control Ordinance
S.5.1.1	Use of noise enclosure and movable barrier <ul style="list-style-type: none"> • movable barrier can achieve a 5 dB(A) reduction for movable PME and 10 dB(A) reduction for stationary PME; • noise enclosure can achieve 15dB(A) reduction for PME; • noise enclosure is proposed to be built after open excavation in order to minimize the noise impact due to further excavation work and construction of subway. The enclosure should either be provided with acoustic door for access purpose which should be kept closed during the construction works or should be designed with no direct line of sight from the open side to the NSRs; • A typical design barrier with a steel frame of vertical / cantilever type would be adopted and located close to the noise generating part of PME; • Barrier material of surface mass in excess of 7kg/m² shall be required to achieve the maximum screening effect (and minimum 10kg/m² for noise enclosure); • The length of barrier should generally be at least five times greater than its height and the minimum height of a barrier should be such that no part of the noise 	To minimize construction noise emissions	Contractor	Work site	Construction Stage	ProPECC PN2/93, Noise Control Ordinance and EIAO Guidance Note NO. 9/2010

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	source will be visible from the noise sensitive receiver being protected.					
S.5.1.1	<p>General Construction Noise Control Measures</p> <ul style="list-style-type: none"> • The Code of Practice on Good Management Practice to Prevent Violation of the Noise Control Ordinance (Chapter 400) (for Construction Industry) published by EPD shall be adopted; • The statutory and non-statutory requirements and guidelines shall be complied with; • Approval for the method of working, equipment and noise mitigation measures intended to be used at the site shall be granted from the Project Engineer before commencing any work; • Working methods to minimize the noise impact on the surrounding NSRs shall be formulated and executed, and the implementation of these methods shall be monitored by experienced personnel with suitable training; • Noisy equipment and noisy activities shall be located as far away from the NSRs as is practical; • Unused equipment shall be turned off; • PME should be kept to a minimum and the parallel use of noisy equipment / machinery should be avoided; • All plant and equipment shall be maintained regularly; and • Material stockpiles and other structures shall be effectively utilized as noise barriers, whenever practicable. 	To minimize construction noise emissions	Contractor	Work site	Construction Stage	ProPECC PN2/93 and Noise Control Ordinance

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	Air Quality Impact					
S.5.1.2	<p>Construction Dust Control Measures</p> <ul style="list-style-type: none"> • Regular watering to reduce dust emissions from all exposed site surface, particularly during dry weather; • Frequent watering for particularly dusty construction areas and areas close to air sensitive receivers; • Covering of stockpile of excavated dusty materials, if any, with impervious sheeting or spraying with water to maintain the entire surface wet; • Provision of vehicle washing facilities at the entry and exit points of site; and • Tarpaulin covering of any dusty materials being transported to and from site by vehicle; • Positioning of construction plant at maximum practicable distance from air sensitive receivers; and • Due to the small size of the works sites and lack of space for stockpiling, excavated materials should be hauled off-site almost immediately. However, in the event of any stockpiled excavated materials, they should be covered with tarpaulin and be removed off-site as soon as practicable to avoid any dust nuisance arising. 	To minimise the dust impacts arising from the construction works	Contractor	Work site	Construction Stage	Air Pollution Control (Construction Dust) Regulation
	Water Quality Impact					
S.5.1.3	<p>Construction Water Quality Impact Measures</p> <ul style="list-style-type: none"> • Collection of wastewater into a sedimentation tank for treatment before discharge into the public drainage system; • Provision of silt trap and oil interceptor to remove the 	To reduce water quality impact induced by the construction work	Contractor	Work Site	Construction Stage	ProPECC PN1/94; Water Pollution Control Ordinance

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	<p>oil, lubricants, grease, silt, grit and debris from the wastewater prior to discharge to the public stormwater system. The silt traps and oil interceptors should be cleaned and maintained regularly;</p> <ul style="list-style-type: none"> • Installation of wheel washing facilities to minimise muddy runoff; • Regular maintenance and inspection of drainage systems and erosion control and silt removal facilities; • Management and monitoring of sewage treatment facilities (if any); • Any foul effluent should not be discharged into any public sewer and stormwater drain, unless an effluent discharge permit is obtained under the WPCO by the Contractor; • Coverage of stockpiles of C&D materials (if any) during rainstorms; and • Site toilet facilities, if needed, should be chemical toilets or should have the sewage discharge directed to a foul sewer. 					
	Waste Management					
S.5.1.4	<p>Construction Waste Management Measures</p> <ul style="list-style-type: none"> • Scrap metals or abandoned equipment should be recycled if possible; • Waste arising should be kept to a minimum and be handled, transported and disposed of in a suitable manner; • The Contractor should adopt a trip ticket system for the disposal of C&D materials to any designated 	To adopt waste management measures in the way of avoiding, minimising, reusing and recycling so as to reduce waste generation	Contractor	Work Site	Construction Stage	Waste Disposal Ordinance (Cap. 354); Waste Disposal (Chemical Waste) (General) Regulation; DEVB TCW No. 6/2010;

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	<p>public filling facility and/or landfill. Independent audits of the Contractor and resident site staff will be undertaken to ensure that the correct procedures are being followed;</p> <ul style="list-style-type: none"> • Chemical waste shall be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes; and • All general refuse should be segregated and stored in enclosed bins or compaction units and waste separation facilities for paper, aluminium cans, plastic bottles etc. should be provided to facilitate reuse or recycling of materials and their proper disposal. 					ETWB TCW No. 19/2005.
	Landscape and Visual Impact					
S.5.1.5	<p>Landscape and Visual Measures</p> <ul style="list-style-type: none"> • Clear demarcation of works area to prevent damages to existing trees in close proximity; • Protection of all trees planned to be retained onsite; • Preserving all affected trees by transplanting where practical. Tree transplanting application and tree removal application shall be submitted for approval in accordance with ETWB TCW 3/2006; and • Screening of construction works by hoardings/noise barriers around Works area in visually unobtrusive colours. 	To reduce landscape and visual impact by construction works.	Contractor	Work Site and nearby playground	Construction Stage	EIAO; ETWB TCW No. 3/2006.
S.5.1.5	<ul style="list-style-type: none"> • Reinstating the playground after the completion of works; • Using appropriate (visually unobtrusive and non-reflective) building materials and colours in built 	To prevent loss of planter after construction; to minimise potential	Contractor	Work Site and nearby playground	Operation Stage	ETWB TCW No. 2/2004

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	<p>structures; and</p> <ul style="list-style-type: none"> Greening of vertical walls of ventilation blocks with climbers. The proposed treatment is illustrated in Appendix VIII. Climbing plant species of <i>Parthenocissus dalzielii</i>, <i>Hedera helix</i> and <i>Bauhinia glauca</i> are recommended for their high amenity and low maintenance requirements. 	<p>landscape and visual impacts.</p>				