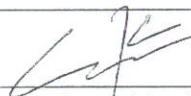
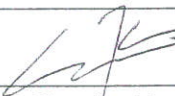


**Prince Edward Station Pedestrian
Subway Extension and Entrance
Modification Works**

Project Profile

[July 2005]


Reviewed by (PM):


Checked by:


Approved by:

Report Version: <u>Final (Revision 6)</u>	Date of Submission: <u>5 July 2005</u>
<p>The information contained in this report is, to the best of our knowledge, correct at the time of printing. The interpretation and recommendations in the report are based on our experience, using reasonable professional skill and judgment, and based upon the information that was available to us. These interpretations and recommendations are not necessarily relevant to any aspect outside the restricted requirements of our brief. This report has been prepared for the sole and specific use of our client and MEMCL accepts no responsibility for its use by others.</p> <p>This report is copyright and may not be reproduced in whole or in part without prior written permission.</p>	

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TABLE OF CONTENTS

Pages

1.	BASIC INFORMATION	1
	Project Title.....	1
	Purpose and Nature of the Project	1
	Name of Project Proponent	1
	Location and Scale of Project.....	1
	Number and Types of Designated Projects to be Covered by the Project Profile.....	2
	Name and Telephone Number of Contact Person(s)	2
2.	OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME	2
	Responsibilities of Parties	2
	Project Time Table.....	2
	Interactions with Other Projects.....	3
3.	MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT	3
4.	POSSIBLE IMPACT ON THE ENVIRONMENT	3
	Air Quality	3
	Construction Noise	3
	Water Quality	4
	Waste Management.....	4
	Land Contamination.....	5
	Operational Phase Impacts	5
5.	ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS.....	6
	Air Quality	6
	Construction Noise	7
	Water Quality	9
	Waste Management.....	9
	Environmental Monitoring and Audit (EM&A) Requirements	10
6.	USE OF PREVIOUSLY APPROVED EIA REPORTS	10
7.	CONCLUSIONS	10

LIST OF TABLES

Table 4.1	Description of Representative Noise Sensitive Receiver	4
Table 4.2	Predicted Noise Levels at Representative NSRs – Unmitigated.....	4
Table 4.3	Noise Assessment for Ventilation Shaft	6
Table 5.1	List of Quieter Plant Adopted.....	7
Table 5.2	Further Mitigation Measures for Different PME	7
Table 5.3	Predicted Noise Levels at NSRs - Mitigated	8

LIST OF DRAWINGS

Drawing No. 1.1	Site Location Plan
PRE/ST/A/002/003	Subway Level
PRE/ST/A/003/003	Ground level
PRE/ST/A/007/003	Emergency Escape Stair and Vent Shafts
PRE/ST/A/004/003	Subway Longitudinal Section A
PRE/ST/A/005/003	Subway Cross Section B
PRE/ST/A/006/003	Subway Cross Section C
Drawing No. 4.1	Location of Noise Sensitive Receivers
Drawing No. 5.1	Conceptual Design of Proposed Mitigation Measures

APPENDICES

Appendix 1	Construction Noise Assessment Report
Appendix 2	Land Contamination Assessment Report
Appendix 3	Preliminary Schedule of Works
Appendix 4	Implementation Schedule

1. BASIC INFORMATION

Project Title

- 1.1 Prince Edward Station Pedestrian Subway Extension and Entrance Modification Works

Purpose and Nature of the Project

- 1.2 A pedestrian subway (the Subway) connecting Pioneer Centre and Entrance B of MTR Corporation Limited's (MTRC) Prince Edward Station (PRE) in Kowloon is proposed (hereinafter called 'the Project').
- 1.3 The purpose of this Project is to enhance the accessibility of the PRE Station by providing MTRC passengers a more direct, convenient and comfortable access to the Station. With this provision in place, the proposed Subway will provide a segregated walkway running along Sai Yeung Choi Street South. MTRC passengers currently accessing the PRE Station from the south could shift to use the Subway instead of the at-grade pavement. This shift would largely minimise the pedestrian-vehicular conflicts for which may occur on the at-grade road, and therefore provide a much safer walking environment to the public.
- 1.4 The general nature of works comprises modification of the existing PRE Station Entrance B2, construction of the Subway and the integrated entrance at Pioneer Centre. The construction period for the Subway is about 24 months with anticipated opening date of the modified entrance and associated new facilities in mid-2008.

Name of Project Proponent

- 1.5 MTR Corporation Limited
MTR Tower
Telford Plaza
Kowloon Bay
Hong Kong

Location and Scale of Project

- 1.6 The proposed project work will be carried out underneath Sai Yeung Choi Street South, crossing Nullah Road to connect to the PRE Station. The location of the Project site is shown in **Drawing No. 1.1**. The Subway will be approximately 160m in walking distance with access to the Basement Level 2 of Pioneer Centre. The internal clear width for the pedestrian within the Subway will be 4.5m, with a floor to ceiling height of 2.75m.
- 1.7 The horizontal alignment of the Subway will pass underneath Sai Yeung Choi Street South, crossing Nullah Road connecting the PRE Station through Entrance B. The general subway arrangement layouts at the subway and ground levels are shown in **Drawing Nos. PRE/ST/A/002/003** and **PRE/ST/A/003/003** respectively. The vertical alignment of the Subway ranges between the levels of +0.911mPD and -6.867mPD. The lowest point is the middle of the Subway. The gradient of the Subway is proposed to be a maximum of 1 in 12. A longitudinal section of the Subway is shown in the **Drawing No. PRE/ST/A/004/003**, whilst 2 cross sections are shown in **Drawing Nos. PRE/ST/A/005/003** and **PRE/ST/A/006/003**.
- 1.8 In order to maintain the allowable maximum gradient of 1 in 12, escalator and staircase will be provided at the northern end to reduce the level difference between the existing MTR subway and the Subway.
- 1.9 The existing Entrance B2 will be temporarily closed, modified and re-opened. Escalator and staircase will be provided for the up and down pedestrian movements at the existing Entrance B2. An integrated entrance will be formed at the southern end of the Subway with connection to the Basement Level 2 of Pioneer Centre. The Basement Level 2 is currently a car parking floor and the future redevelopment will turn it to retail accommodation.

- 1.10 A new dedicated emergency escape stair will also be provided near the junction of Sai Yeung Choi Street South/ Nullah Road. The fresh air and smoke extraction vents are proposed on the top of the new dedicated emergency exit. The details of the vent shafts are shown in **Drawing No. PRE/ST/A/007/003**. The existing Sai Yeung Choi Street South kerb line will be modified and some existing on-street car/motorcycle parking spaces along will be deleted.

- 1.11 The Project is of small scale and construction work will be taken place by cut-and-cover technique.

Number and Types of Designated Projects to be Covered by the Project Profile

- 1.12 In accordance with *Section 9(2)(g)* of the *Environmental Impact Assessment Ordinance (EIAO)* (*Cap. 499*), the captioned Project was an exempted designated project as the Station had been in operation before the Ordinance came into effect on 1 April 1998. Since the proposed works involve physical alternation to the existing Station and may have potential environmental impacts, it is likely considered as a project constituting a material change to an exempted designated project under the *Schedule 2 of the EIAO*. The procedures under the EIAO should be followed and an environmental permit is normally required prior to the commencement of the modification works. Under these circumstances, this Project Profile aims to provide information to show that a Direct Application for an Environmental Permit would be most practical.

Name and Telephone Number of Contact Person(s)

- 1.13 All queries regarding the Project can be addressed to:

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2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

Responsibilities of Parties

- 2.1 MTR Corporation Limited (MTRC) is the Project Proponent with overall responsibility for the planning, design, construction and operation of the Project. Maunsell Environmental Management Consultants Limited (MEMCL) was commissioned by MTRC to be the environmental consultant. The MTRC's Sustainability Development Manager will provide the interface between the environmental and station design teams to ensure appropriate designs, and that construction methods and their mitigation measures are properly identified and included in the construction documentation. The proposed works will be implemented by Contractor(s) to be appointed by MTRC at subsequent stages.

Project Time Table

- 2.2 Construction of the proposed works is scheduled to commence in late 2005, for completion in late 2007. The tentative implementation programme is shown in **Appendix 3**.
- 2.3 Cut and Cover Excavation will be used for the construction of the Subway. The method mainly comprises excavation for the subway construction from the existing ground level by stages. Sheet piles, or other types of temporary retaining structures approved by the engineer, are first installed along the proposed subway alignment. Struts and walings will be installed at each designated level. After installation of the first layer struts/walings, the excavated area will be decked by heavy steels panels at the ground level. As such, the working area can be re-opened to road users as construction proceeds. The subway will be constructed after reaching the final excavation level.

Interactions with Other Projects

- 2.4 There are no other projects likely to interact with this Project.

3. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

- 3.1 The project site is located in an urban area of Prince Edward, with relatively high volume of traffic running through the nearby Nathan Road and Prince Edward Road West. The surrounding landuses are mainly a mixture of commercial and residential buildings, and most of the retail commercial premises are located at the lowest floor(s) of the buildings. Major commercial buildings adjacent to the Project area are found to be the Pioneer Centre and the Cosmopolitan Centre to the west of the subject site, with a petrol filling station just in between. The Mongkok Police Station is located to the north of the site. Height of the residential buildings in the nearby areas is varied ranging widely from 5 floors to 30 floors approximately.
- 3.2 The noise environment in the study area is dominated by road traffic noise from Nathan Road, Prince Edward Road West and some smaller local access roads. High volume of traffic in and near the study area would be the major source of air quality impact to the local area.

4. POSSIBLE IMPACT ON THE ENVIRONMENT

Construction Phase

Air Quality

- 4.1 Potential of air quality impact may occur resulting from surface excavation works taken place in exposed site areas. During the construction stage, dust would be generated from activities such as demolition, excavation, handling of construction materials and truck movement. Gaseous emission is also likely from construction plant's exhausts on site. However, there would be the limited number of plant required for such small scale of the Project and the works would be carried out phase by phase. Most of the works will be carried out underground below the road decking. Hence, adverse impacts on air quality would not be expected. A full implementation of dust suppression measures as stipulated in the *Air Pollution Control (Construction Dust) Regulation* by the Contractor shall also be required in the course of the construction phase. In this regard, adverse dust impact arising from various construction activities would not be anticipated.

Construction Noise

- 4.2 The use of powered mechanical equipment (PME) at various sections of construction activities is likely to generate construction noise on site. In order to evaluate the construction noise impact from the Project on the noise sensitive receivers (NSRs) in the study area, five residential buildings along Sai Yeung Choi Street South have been identified to be the most representative NSRs in the vicinity of the work site with reference to the *Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)*, and are tabulated in **Table 4.1** and depicted in **Drawing No. 4.1**.

Table 4.1 Description of Representative Noise Sensitive Receiver

Noise Sensitive Receiver	Description	Use
N1	236, Sai Yeung Choi Street	Residential
N2	252, Sai Yeung Choi Street	Residential
N3	Cosmopolitan Centre	Residential
N4	Bijou Apartments	Residential
N5	Cheung Ning Mansion	Residential

- 4.3 The construction noise at the representative NSRs has been assessed in accordance with the methodology specified in the *Technical Memorandum on Noise from Construction Work Other than Percussive Piling*. A construction noise assessment report is attached in **Appendix 1**.
- 4.4 Assessment results indicated that all predicted unmitigated noise levels at the representative NSRs should exceed the daytime noise assessment criterion of 75 dB(A) for all construction activities (**Table 4.2**). Noise mitigation measures are therefore required to reduce the noise to assessment level.

Table 4.2 Predicted Noise Levels at Representative NSRs – Unmitigated

NSR I.D.	Predicted Noise Levels during Construction Stage, dB(A)	EIAO-TM Daytime Noise Assessment Criterion, dB(A)
N1	69 – 91	75
N2	72 – 94	75
N3	80 – 92	75
N4	73 – 89	75
N5	80 – 92	75

Water Quality

- 4.5 Potential major sources of water quality impacts may arise from the discharge of construction wastewater and site run-off into storm drains during the construction phase. There is also a concern of accidental wash off of contaminants, such as bituminous oil and diesel oil, from the construction site to the identified nullah underneath the Nullah Road within the site boundary crossing the proposed subway. However, the risk of such accidental spillage would be very small if works are carried out with care and proper implementation of an emergency action plan to the approval of the Engineer.
- 4.6 Mitigation measures would be proposed to control the construction site run-offs for which are regulated under the *Water Pollution Control Ordinance* and its subsidiary regulations and to minimise the chances of introducing sediment and pollutants into the stormwater drainage system. In addition, the Contractor will be also required to follow the *Environmental Protection Department's Professional Persons Environmental Consultative Committee Practice Note ProPECC PN 1/94 'Construction Site Drainage'* in order to ensure that there is no adverse water quality impact induced.

Waste Management

- 4.7 Solid wastes generated from the construction works mainly include excavated materials, construction and demolition material (C&D material), chemical wastes and general refuse. In general, C&D material will form the major portion of waste generated on site which involves mainly inert excavated material. It is estimated that approximately 14,500m³ of excavated materials and concrete debris would be generated as a result of this Project. The quantities of other types of waste arising from the construction phase of the Project should be minimal. Since the excavated materials are mostly inert, about 6,700m³ can be used on site for backfilling. Any surplus excavated material (~7,800m³) will then be delivered to public filling areas available at that time subject to the permission from Civil Engineering and Development Department. The tentative site is the fill bank at Tseung Kwan O Area 137.
- 4.8 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 impacts arising from the construction stage of the Project would be envisaged.

Land Contamination

- 4.9 Due to the proximity of a petrol filling station and its associated underground fuel tanks to the Subway, there is a potential land contamination issue to be addressed. In this regard, a land contamination assessment was conducted in order to investigate the presence of contamination of the Subway area caused by the filling station.
- 4.10 The land contamination investigation included four sampling locations for which were close to the petrol filling station within the proposed Subway boundaries. Soil and groundwater samples were collected and analysed in the laboratory. The testing parameters included total petroleum products (TPH), BTEX (benzene, toluene, ethylbenzene and xylenes) and lead (Pb). According to the results of site investigation, soil and groundwater samples were found within the relevant guidelines for judging contamination required remedial actions. Hence, no adverse impact in relation to land contamination would be anticipated. Details of the land contamination assessment report are presented in **Appendix 2**.

Operational Phase

Operational Phase Impacts

- 4.11 During the operation phase of the Project, as the proposed new subway connecting the Pioneer Centre and Entrance B of Prince Edward Station would be located entirely underground, no adverse impact in respect of air, noise, water and waste management would be expected. As the results of land contamination assessment showed that the Site is not likely to be contaminated by fuel products from the nearby petrol filling station, therefore land contamination would also not be a concern during the operation stage.
- 4.12 Ventilation shafts on the top of the entrance would be the only noise source during operation phase. The vent shafts would only be used during emergency situations for the extraction of smoke and fresh air intake particularly in case of fire. Testing of vent shafts' function during routine maintenance is the only event that contributes to the noise emission (under normal operation, the vent shafts would not be operated). Assessment of the operation noise was carried out and summarised as follow.
- 4.13 The assessment of the operation noise levels at the sensitive receivers due to the noise generated from the ventilation shafts was based on the assessment methodology described in the *Good Practices on Ventilation System Noise Control and Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites (TM)*.
- 4.14 The identified NSR located along Sai Yeung Choi Street South is referred as an urban area and indirectly affected by the influencing factor Prince Edward Road West and Nathan Road. In accordance with the TM, the Acceptable Noise Levels (ANL) would be 65 dB(A) during daytime and evening time (0700 – 2300), and 55 dB(A) during night time (2300 – 0700).
- 4.15 Based on the technical data provided by the engineers, the dominant noise source of the ventilation shafts would be the fan noise passing through the louvers. The sound power levels would be determined by the air volume flow rate (m³/hr) at static pressure (Pa). The openings will be orientated not facing directly to the sensitive receivers and such that no cumulative impact would be counted. **Table 4.3** shows the noise level of testing ventilation shaft.

Table 4.3 Noise Assessment for Ventilation Shaft

Volume Flow rate (m ³ /hr)	9000
Static Pressure (Pa)	7500
Sound Power Level, dB(A)	99
Nearest Distance between the louver and the NSR (m)	13
Equipped with acoustic louvers / silencers*	-10
Predicted Noise Level at NSR, dB(A)	62 (ANL 65dB)
Noise Exceedance	No exceedance during 0700-2300, 7 dB (A) during night time 2300-0700

*10 dB(A) reduction assumed for the use of acoustic louvers and silencers

- 4.16 The noise level predicted at the sensitive receiver would meet the ANL when vent shafts are in operation during routine testing. The ventilation shafts will be equipped with acoustic louvers and silencers for reducing noise emissions. The detail design will incorporate the measures and a 10dB(A) reduction was assumed for the above noise assessment.
- 4.17 The vent shafts would only be used during emergency situations for the extraction of smoke and fresh air intake. Testing of the emergency ventilation systems would be undertaken during normal daytime and evening time (0700-2300) and testing should be avoided after 2300 since there would be predicted noise exceedance of 7 dB(A). With the implementation of the above mitigation measures, no adverse operation noise impact would be anticipated.

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

Air Quality

- 5.1 Although most of the construction works would be carried out underground, relevant dust mitigation measures stipulated in the *Air Pollution Control (Construction Dust) Regulation* should be necessary to be implemented to control fugitive dust emission from the site. With the following listed control measures in place, the dust impacts arising from the construction of the Project would be minimised to an acceptable level.

Construction Dust Control Measures

- Use of regular watering to reduce dust emissions from exposed site surface and unpaved road with complete coverage, particularly during dry weather.
- Use of frequent watering for particularly dusty static construction areas and areas close to air sensitive receivers.
- Provision of vehicle wheel and body washing at the exit points of the site if practical.
- Tarpaulin covering of dusty vehicle when waste is transported from the site.
- Routing of vehicles and positioning of construction plant should be at the maximum possible distance from air sensitive receivers particularly the dwellings.

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

Construction Noise

- 5.2 Noise emissions would be minimised by adopting quieter plant, movable barrier, noise enclosure or acoustic shed and noise insulation fabric throughout the project period.
- 5.3 A list of quieter plant that has been used in the prediction of construction noise is shown in **Table 5.1**. The equipment should be required and adopted in the future construction work in order to meet the relevant noise assessment criteria. The equipment has been developed with reference to the *Modifications to MTRC TST Station Environmental Impact Assessment*, dated May 2001 and the *Environmental Permit (EP-113/2001/C)*. The type of quieter PME adopted in this assessment is not a must that the Contractors have to use specific items of plant for the construction operations. The Contractors are allowed to use other type of quiet PME, which have the same total SWL, to meet their needs.

Table 5.1 List of Quieter Plant Adopted

Quieter Plant	Reference	Sound Power Level, SWL, dB(A)
Lorry	BS C3/59	105
Excavator	BS C8/15	103
Generator	CNP 103	95
Silent Piler Machine	GIKEN*	100
Crane Lorry	BS C3/59	105
Truck	BS C9/39	103
Water Pumps	CNP 281	88
Vibratory Poker	BS C6/20	102
Compactor & Roller	BS C8/30	101

* Reference was made to MTRC Contract C4420 Tsim Sha Tsui Station Modification, Variation of Environmental Permit, Noise assessment of GIKEN silent piler system

- 5.4 To further alleviate the construction noise impacts, use of movable barrier, noise enclosure or acoustic shed should be adopted and are summarised in **Table 5.2**. A typical design barrier with a steel framed 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 is desirable 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 source will be visible from the noise sensitive receiver being protected. Sketches of movable barrier and noise enclosure are illustrated in **Drawing No. 5.1**.

Table 5.2 Further Mitigation Measures for Different PME

Equipment	Mitigation Measures Proposed	Reduction, dB(A)
Breaker	Acoustic Shed*	15
Lorry	Movable Barrier*	5
Excavator	Movable Barrier*	5
Generator	Noise Enclosure*	10
Air Compressor	Noise Enclosure*	10

Equipment	Mitigation Measures Proposed	Reduction, dB(A)
Crane Lorry	Movable Barrier*	5
Grouting Machine	Movable Barrier*	5
Truck	Movable Barrier*	5
Concrete Truck	Movable Barrier*	5
Compactor & Roller	Movable Barrier*	5
Vibratory Poker	Movable Barrier*	5

Note: (*) Location of the barrier and acoustic shed subject to temporary traffic management requirement.

5.5 Noise insulating fabric KYOWA#1000 (hereinafter “the Fabric”) would be adopted for the utilities diversion work in Section 1. According to the noise survey report of the Fabric^a, covering the PME with the Fabric, 10dB(A) reduction could be achieved. The Contractor should select different noise insulating fabric with similar function and effectiveness to achieve the noise alleviation. The Fabric had been proposed and used for the hydraulic rig in *Tsim Sha Tsui Station Modification Work* and found that it was practical to use.

5.6 With the implementation of all the above mitigation measures, the predicted noise levels at the representative NSR ranged from 61 – 74 dB(A), which comply with the noise assessment criterion stipulated in EIAO-TM. Detailed sound power levels of PMEs under mitigation measures scenario and noise assessment can be found in **Appendix 1**. The predicted noise levels are summarised in **Table 5.3**.

Table 5.3 Predicted Noise Levels at NSRs - Mitigated

NSR I.D.	Predicted Noise Levels during Construction Stage, dB(A)	EIAO-TM Daytime Noise Assessment Criterion, dB(A)
N1	61 – 73	75
N2	63 – 74	75
N3	67 – 74	75
N4	62 – 73	75
N5	67 – 74	75

5.7 Although no residual noise impact would be generated after the proposed mitigation measures are in place, construction noise control measures, as stated below, should still be incorporated into the contract document for implementation in order to minimise noise impacts during the construction phase.

Construction Noise Control Measures

- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program.
- Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction program.
- Mobile plant, if any, should be sited as far from NSRs as possible.
- Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum.
- Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs.

^a Variation Environmental Permit application No. VEP-107/2003 and Environmental Permit (EP-113/2001/C) for *Modifications to MTRC TST Station Environmental Impact Assessment*

Contingency Planning

- Noise monitoring and site audits should be carried out to check on compliance with the assessment criteria. These are described in **Sections 5.11 and 5.12**. When necessary, action plans stipulated in the EM&A Manual for the '*Modifications to MTRC TST Station Environmental Impact Assessment*' report (see **Section 6**) would be implemented and contingency measures such as the use of noise insulating materials or other quiet plants would be adopted.

Greening of Work Site

- Some works will be carried out on street level in a busy urban area. Noise mitigation measures such as hoardings, barriers and enclosures may be visually intrusive. The design of these features should take into consideration colour schemes that are harmonious with the background so as to minimise visual impacts.

- 5.8 Percussive piling work may be the major source of construction vibration impact. In accordance with the construction programme, no percussive piling will be carried out for the Project, and only sheet piling installation would be carried out. Therefore, no construction vibration impacts would be anticipated.

Water Quality

- 5.9 In order to control surface runoff satisfactorily without adverse impact during demolition and construction, the Contractor shall comply with the *Water Pollution Control Ordinance* (WPCO) and its subsidiary regulation. Relevant control measures are as follows:

Construction Water Quality Impact Measures

- The Contractors should comply with the WPCO and its subsidiary regulation.
- The Contractors should ensure that all runoffs arising from the work site are properly collected and treated, and that the discharge standards as stipulated in WPCO are met. The Contractor is required to provide sedimentation tanks or other treatment facilities to handle the runoffs and wastewater generated.
- Any trade effluent or foul or contaminated water should not be discharged into any public sewer and stormwater drain, unless an effluent discharge permit is obtained under the WPCO.
- Site toilet facilities, if needed, should be chemical toilets or should have the foul water effluent directed to a foul sewer.
- The Contractor should be responsible for the design, construction, operation and maintenance of all the mitigation measures and follow practices noted in the *ProPECC PN 1/94 "Construction Site Drainage"* issued by EPD.

Waste Management

- 5.10 The project is of small scale and that the amount of excavated materials is not expected to be large (see **Section 4.7** on quantity). Due to the small size of the site, extensive stockpiling of wastes on site is unlikely, and that wastes generated on site would be hauled off site soon after. Nevertheless, the proposed works would generate a variety of wastes and good practices for waste management are required. Waste management in the way of avoiding, minimising, reusing and recycling should be adopted to reduce waste generation. For instance, excavated material should be reused on site as far as possible to minimize off-site disposal. Scrap metals or abandoned equipment should be recycled if possible. The following relevant pollution control clauses which help minimise the environmental nuisance to the nearby sensitive receivers shall be included in the future construction contract. The Contractor shall implement the necessary waste management measures.

Construction Waste Management Measures

- The Contractor shall comply with the *Waste Disposal (Chemical Waste) (General) Regulation*, the *Waste Disposal Ordinance* and its subsidiary regulations.
- The Contractor should not permit any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from site onto any adjoining land or allow any waste matter which is not part of the final product from waste processing plants to be deposited anywhere within any site or onto any adjoining land.
- The Contractor should keep waste arisings to a minimum and to ensure that waste is handled, transported and disposed of in a suitable manner.
- The construction waste generated by the Contractor on site shall be transported to the designated EPD facilities. The Contractor shall use 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.
- The following additional control/mitigation measures are recommended to be followed by the Contractor:
 - The Contractor should segregate different types of wastes for storing in different containers to facilitate reuse or recycling of materials and their proper disposal where practical.
 - The Contractor should propose how he will monitor and record waste produced for agreement with MTRC.

Environmental Monitoring and Audit (EM&A) Requirements

- 5.11 Although all construction impacts are short-term effects and no adverse effect would be anticipated on the environment with proposed mitigation measures in place (N.B. A schedule summarises the proposed mitigation measures and responsible parties for implementing the measures during construction stage is attached in **Appendix 4**), MTRC has taken the initiative to implement a monitoring and audit programme during the construction phase to check on the implementation of the control measures.
- 5.12 An EM&A programme is recommended to include the monitoring of construction noise. At least two monitoring stations for noise at sensitive receivers should be included. The programme shall address the aspects of dust, noise, water quality and waste management 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 shall make reference to approved EM&A Manual for '*Modifications to MTRC TST Station Environmental Impact Assessment*'.

6. USE OF PREVIOUSLY APPROVED EIA REPORTS

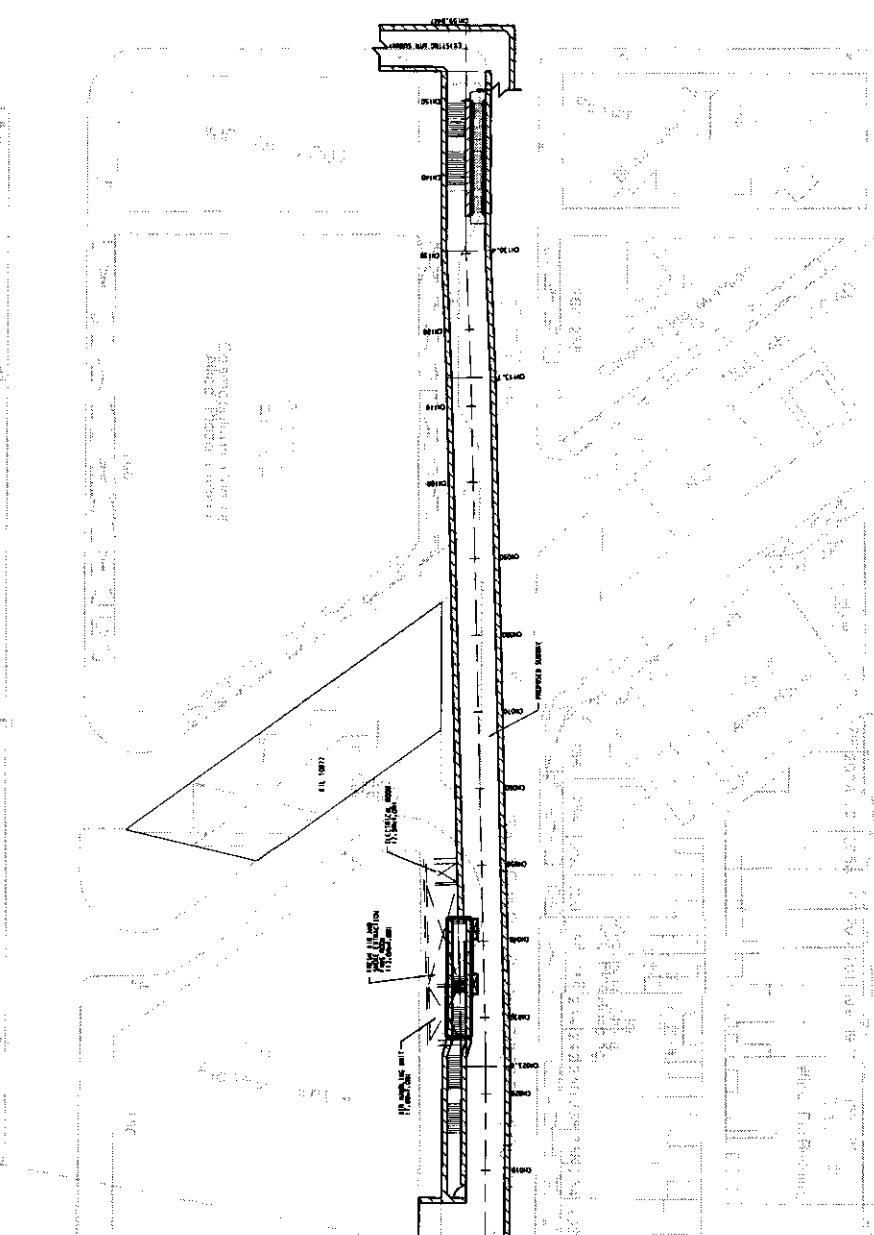
- 6.1 Reference has been made to the '*Modifications to MTRC TST Station Environmental Impact Assessment*', dated May 2001 and the *Environmental Permit* (EP-113/2001/C). Due to the similar type of modification works carried out in the TST MTR Station, sound power levels of some silenced equipment employed in the TST Station modification works have been applied to the construction noise assessment of the Project. In addition to this, details of the monitoring procedures, methodology and action plans as well as complaint handling procedures stipulated in its approved EM&A Manual would also provide a good reference to this Project.

7. CONCLUSIONS

- 7.1 The proposed Subway involves physical alternation to the existing PRE Station. Together with the associated potential environmental impacts, the Subway would be considered as a project constituting a material change to an exempted designated project under the *Schedule 2 of the EIAO*. As such, this Project Profile is submitted under the EIAO which aims to provide sufficient information for direct application for an Environmental Permit.

- 7.2 Potential environmental impacts in terms of air, noise, water, waste management and land contamination associated with this project have been examined. Owing to the small scale of the Project and most of the works be located underground, adverse environmental impacts during both construction and operation phases would not be anticipated if the recommended mitigation measures and site control practices are properly implemented. To ensure compliance and the implementation of control measures, an EM&A programme is recommended.

DRAWINGS



MAUNSELL AECOM
a joint venture
management consultants for

PROPOSED SUBWAY LAYOUT PLAN

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DATE _____

MAY 2005

KYTT

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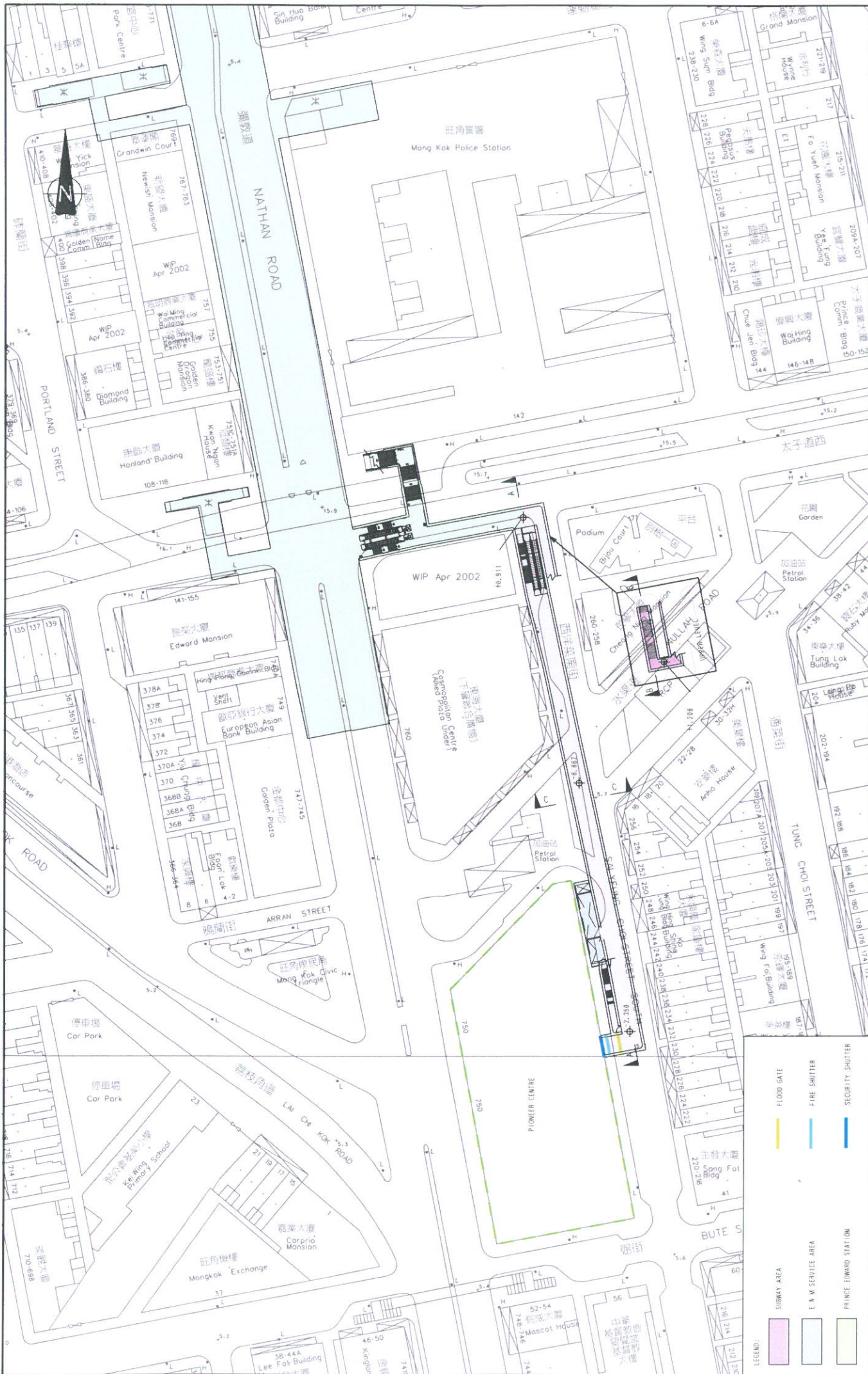


Figure No. PRE/ST/A/002/003

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Date: 11.11.2014

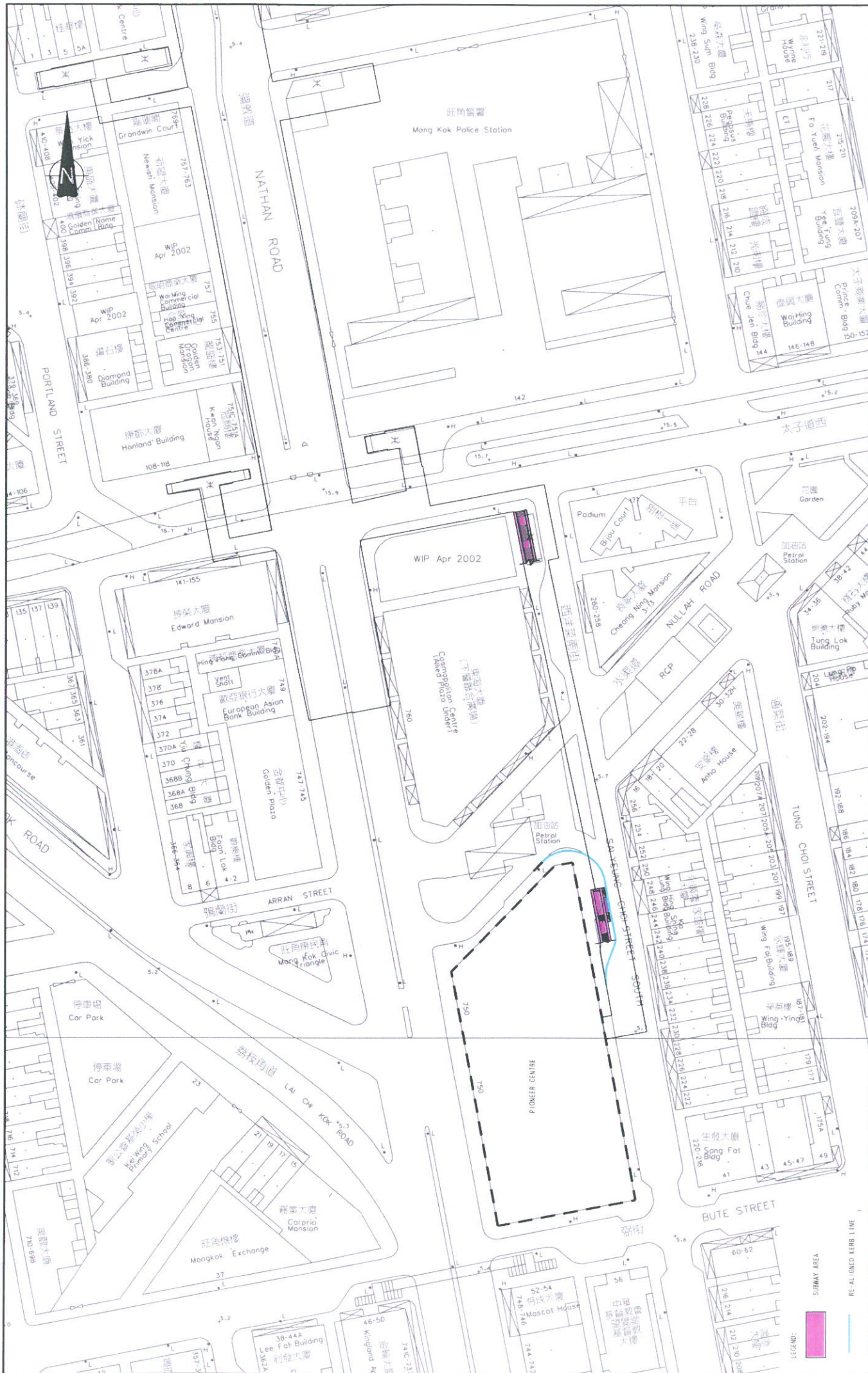
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Project Title: PRINCE EDWARD STATION PEDESTRIAN SUBWAY EXTENSION & ENTRANCE MODIFICATION WORKS

Subway Level

Maunsell WSP
 茂基(亞洲)工程顧問有限公司
 MAUNSELL WSP


Rev.	Description	Approved	Date





MHA HONG KONG LTD.

PROJECT TITLE: PRINCE EDWARD STATION PEDESTRIAN SUBWAY EXTENSION & ENTRANCE MODIFICATION WORKS



Maunsell WSP

Drawing Title:		Project Title:	
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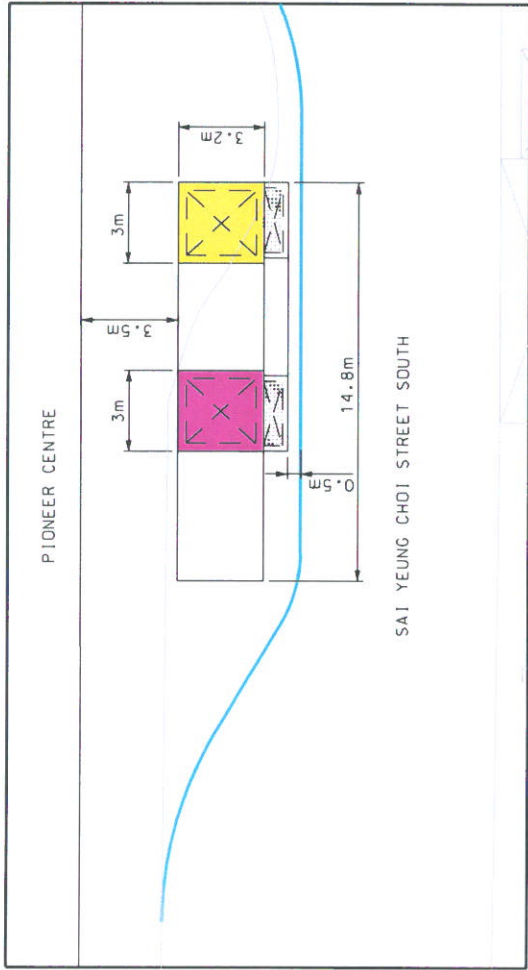
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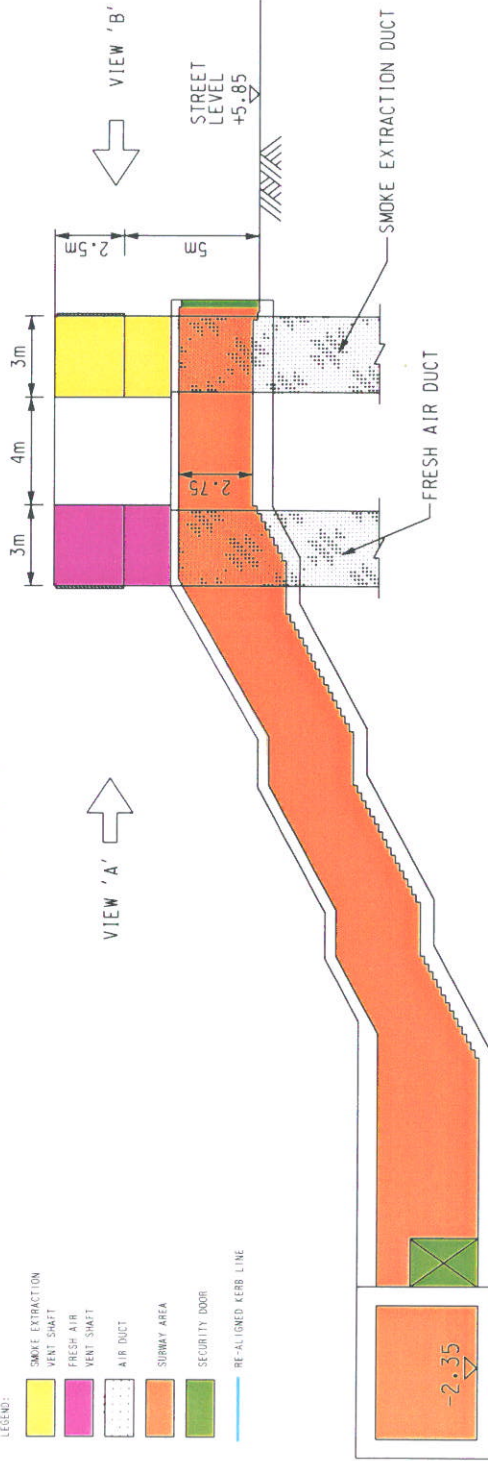
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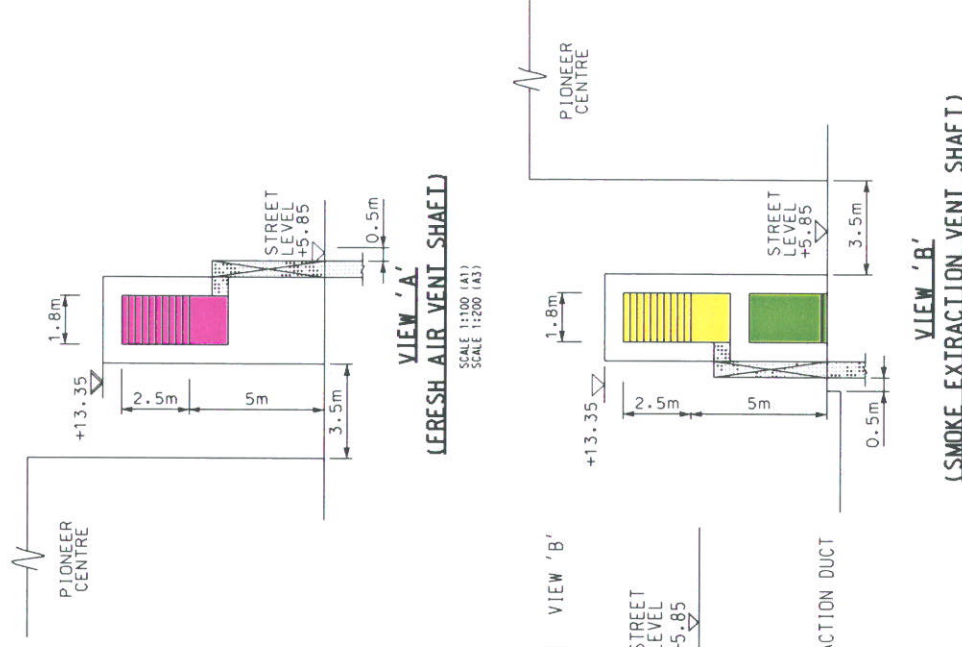


LAYOUT PLAN
SCALE 1:100 (A1)
SCALE 1:200 (A3)

- LEGEND:
- SMOKE EXTRACTION VENT SHAFT
 - FRESH AIR VENT SHAFT
 - AIR DUCT
 - SUBWAY AREA
 - SECURITY DOOR
 - RE-ALIGNED KERB LINE



LONGITUDINAL SECTION
SCALE 1:100 (A1)
SCALE 1:200 (A3)



VIEW 'A'
(FRESH AIR VENT SHAFT)
SCALE 1:100 (A1)
SCALE 1:200 (A3)

VIEW 'B'
(SMOKE EXTRACTION VENT SHAFT)
SCALE 1:100 (A1)
SCALE 1:200 (A3)

No.	Description	Approved	Date
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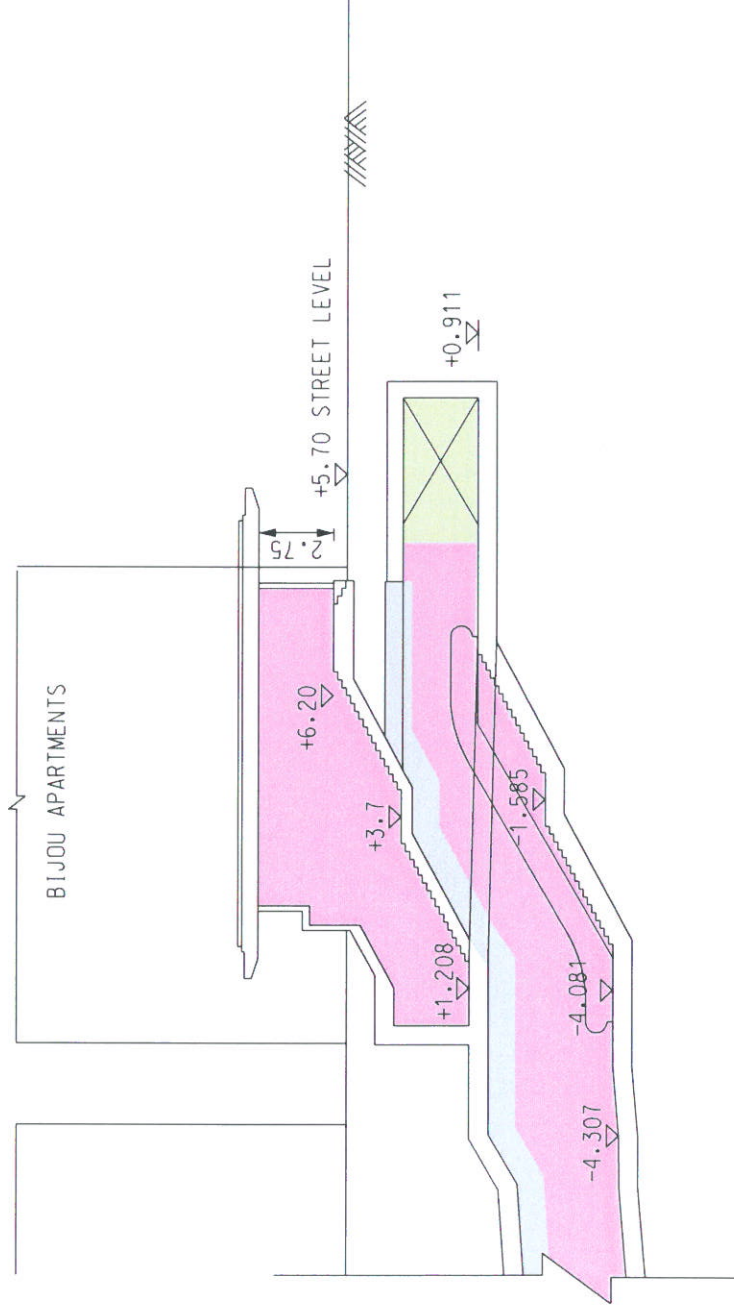
Maunsell
茂盛亞洲工程顧問有限公司
WSP

Project Title:
PRINCE EDWARD STATION
PEDESTRIAN SUBWAY
EXTENSION & ENTRANCE
MODIFICATION WORKS

Drawing Title:
EMERGENCY ESCAPE STAIR
AND VENT SHAFTS

Figure No.	PRE/ST/A/007/003
Design No.	CAC
Drawn By	WFP
Date	MAR. 2014

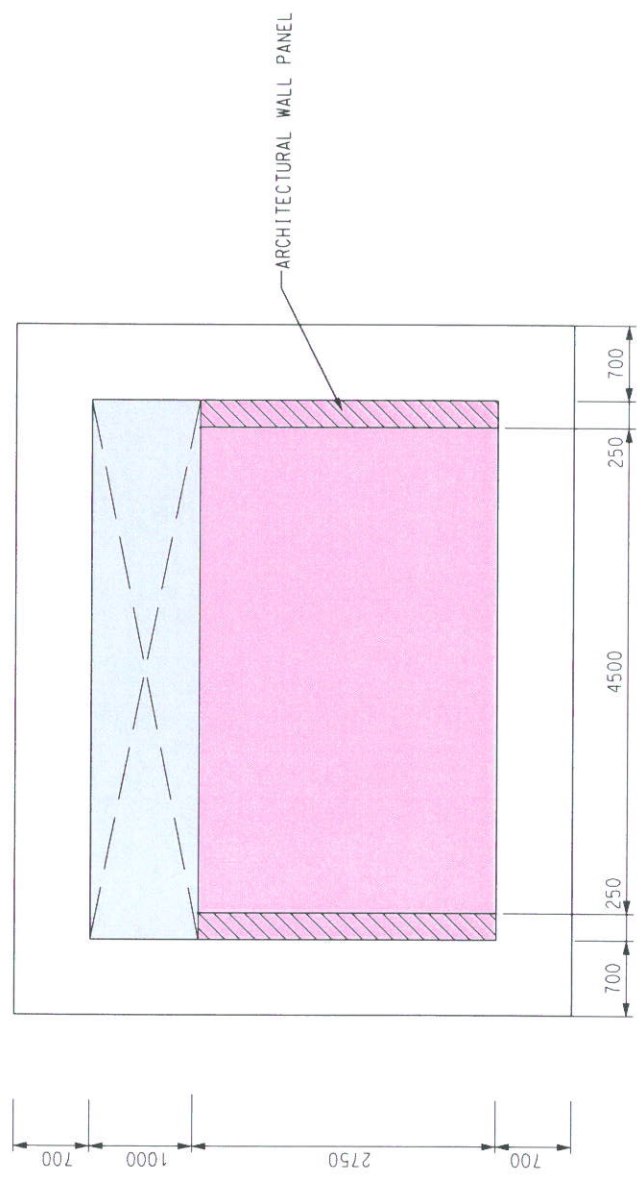
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LEGEND:

- SUBWAY AREA
- E & M SERVICE AREA
- PRINCE EDWARD STATION

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LEGEND:

SUBWAY AREA

E & M SERVICE AREA

No.	Description	Approved	Date



Project Title:

PRINCE EDWARD STATION
PEDESTRIAN SUBWAY
EXTENSION & ENTRANCE
MODIFICATION WORKS

Drawing Title:

SUBWAY CROSS SECTION C

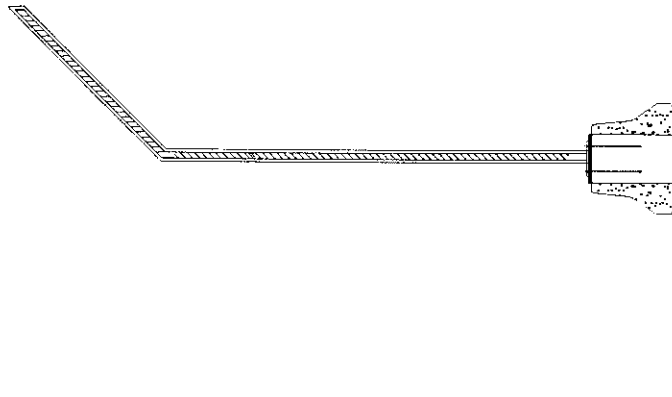
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Checked By:	WSP	Rev.:	001
Rev. 01: 20/07/04 - 01/08/04 (WSP/003-01)			





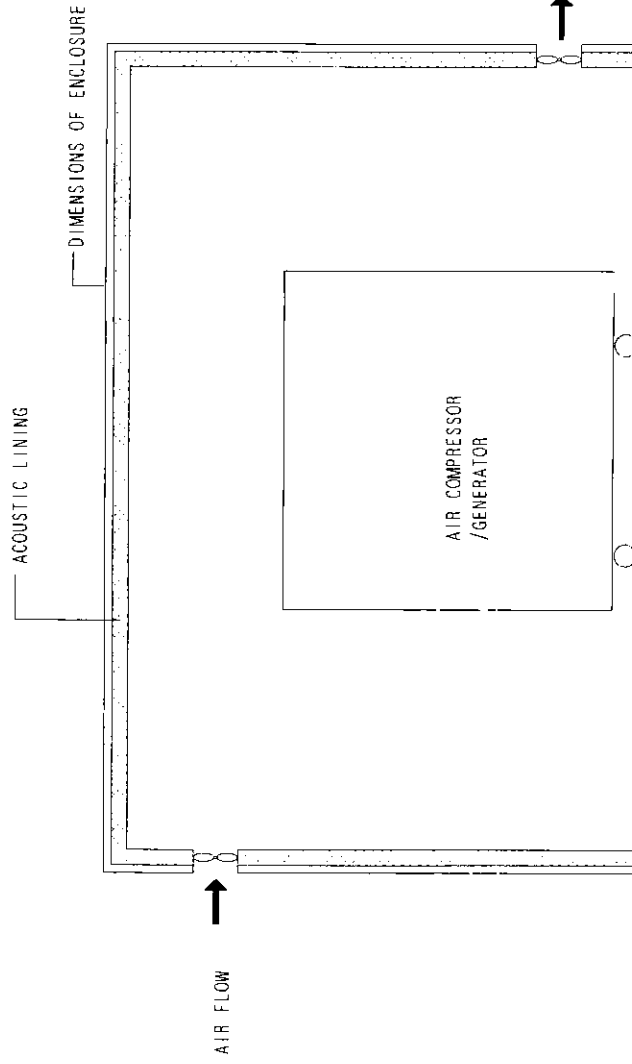
↑ NOISE SENSITIVE RECEIVER

FILE NO: /P03603/DRAWING/REPORT/MAY2005/NSR.DGN



MOVABLE BARRIER

* LOCATION OF BARRIER SUBJECT TO
TEMPORARY TRAFFIC MANAGEMENT REQUIREMENT



NOISE ENCLOSURE

* FOR SMALL PLANT ONLY AND DRAWING NOT TO SCALE

MAUNSELL **AFCOM**

Publicis Environment
Management Corporation Ltd

PRINCE EDWARD STATION PEDESTRIAN SUBWAY
EXTENSION & ENTRANCE MODIFICATION WORKS

CONCEPTUAL DESIGN OF PROPOSED MITIGATION MEASURES

SCALE
CHECK
JOB NO.

N.T.S.
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APPENDIX 1

Construction Noise Assessment Report

TABLE OF CONTENTS

	Page
1 Executive Summary	1
2 Introduction	2
Background	2
Interfacing Project	2
Scope of the Study	2
3 Legislation and Standard	2
4 Assessment Methodology	3
5 Noise Assessment	5
Noise Sensitive Receivers	5
Potential Noise Impact	5
Mitigation Measures	6
Selection of Quiet Plant	6
Use of Movable Barrier or Acoustic Shed	7
Use of Acoustic Enclosure made by Acoustic Material	7
Good Site Practice	8
6. Conclusions.....	8

LIST OF TABLES

Table 4.1	Powered Mechanical Equipment (PME) List and Estimated Duration	3
Table 5.1	Details of Representative NSRs	5
Table 5.2	Predicted Noise Levels at NSRs - Unmitigated	6
Table 5.3	List of Quieter Plant Adopted.....	6
Table 5.4	Further Mitigation Measures for different PME.....	7
Table 5.5	Predicted Noise Levels at NSRs - Mitigated	8

LIST OF DRAWINGS

Drawing No. 1	Proposed Subway Layout Plan
Drawing No. 2	Location of Noise Sensitive Receivers
Drawing No. 3	Conceptual Design of Proposed Mitigation Measures

APPENDICES

Appendix 5.1	Plant Inventory for Various Construction Activities – Unmitigated Scenario
Appendix 5.2	Sample Calculation of Construction Noise Assessment at Representative NSR – Unmitigated Scenario
Appendix 5.3	Plant Inventory for Various Construction Activities – Mitigated Scenario
Appendix 5.4	Sample Calculation of Construction Noise Assessment at Representative NSR – Mitigated Scenario

1 EXECUTIVE SUMMARY

- 1.1 A pedestrian subway connecting Pioneer Centre and Entrance B of Mass Transit Railway Corporation Limited's Prince Edward Station is proposed in order to provide passengers a more direct, convenient and comfortable access to the Station. This would involve construction of the Subway, modification of the existing Prince Edward Station Entrance B2 and construction of the integrated entrance at Pioneer Centre.
- 1.2 This Construction Noise Assessment report evaluated the daytime construction noise impact arising from the proposed construction works. The predicted noise levels at selected noise sensitive receivers ranged from 69 – 94 dB(A). Mitigation measures include the use of quiet plants, use of movable noise barrier, noise enclosure or acoustic shed and noise insulation fabric. With these measures in place, noise impacts from the construction works were found to comply with the 75 dB(A) noise assessment criterion at the selected noise sensitive receivers.

2 INTRODUCTION

Background

- 2.1 A pedestrian subway (the Subway) connecting pioneer Centre and Entrance B of Mass Transit Railway Corporation Limited's (MTRC) Prince Edward Station (PRE) is proposed (hereinafter called "the Project").
- 2.2 The purpose of this Project is to enhance the accessibility of the PRE Station by providing MTRC passengers a more direct, convenient and comfortable access to the Station. With this provision in place, the proposed Subway will provide a segregated walkway running along Sai Yeung Choi Street South. MTRC passengers currently accessing the PRE Station from the south could shift to use the Subway instead of the at-grade pavement. This shift would largely minimise the pedestrian-vehicular conflicts, which may occur on the at-grade road and therefore provide a much safer walking environment to the public. The location of the Project site is shown in **Drawing No. 1**.
- 2.3 The general nature of works comprise construction of the Subway, the modified existing PRE Station Entrance B2 and the integrated entrance at Pioneer Centre.

Interfacing Project

- 2.4 There are no other projects likely to interact with this proposed Project.

Scope of the Study

- 2.5 The scope of this Construction Noise Assessment Report is as follows:
- Identify the noise sensitive receivers (NSRs) close to the Project site.
 - Identify and evaluate the noise impact during the construction phase of the Project.
 - Propose mitigation measures to mitigate noise levels to an assessment level in accordance with the noise assessment criterion set out in the *Noise Control Ordinance* (NCO) and the *Environmental Impact Assessment Ordinance* (EIAO).

3 LEGISLATION AND STANDARD

- 3.1 Although the *Noise Control Ordinance* (NCO) does not provide for the control of construction activities during normal working hours (0700-1900 Monday to Saturday, excluding Public Holidays), a noise assessment criterion of L_{eq} (30 min) 75dB(A) for residential dwellings is stipulated in the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM). This criterion is adopted in this study in order to protect NSRs from unacceptable noise exposure.
- 3.2 There are two further subsidiary regulations: *Noise Control (Hand Held Percussive Breakers) Regulations* and *Noise Control (Air Compressors) Regulations* controlling the noise from hand held breakers and air compressors which require compliance with the relevant noise emission standards and the fixing of noise emission labels to the plants (i.e. maximum permissible sound power levels of 114 dB(A) for hand held percussive breakers and 104 dB(A) for air compressors).

4 ASSESSMENT METHODOLOGY

- 4.1 The calculation of noise levels at the noise sensitive receivers due to the powered mechanical equipment was based on the assessment methodology described in the *Technical Memorandum on Noise from Construction Work other than Percussive Piling* (GW-TM) and *Technical Memorandum on Noise from Construction Work in Designated Area* (DA-TM).
- 4.2 Based on the current engineering practice of other similar MTR Station construction work such as Mong Kok Station and Tsim Sha Tsui Station, assumptions were made on which type of powered mechanical equipment (PME) to be used in this Project, the number of PME required and the percentage on-time of the PME.
- 4.3 Basically, the construction works are classified into few sections. The duration and the proposed plant inventory are tabulated in **Table 4.1**. The construction work would be conducted during daytime (0700 – 1900 hours) only and would not be scheduled during restricted hours or on public holidays and Sundays. In any case the future contractor intends to carry out construction work during restricted hours, the contractor shall apply for a construction noise permit subject to the approval by the Director of Environmental Protection.

Table 4.1 Powered Mechanical Equipment (PME) List and Estimated Duration

Section	Activities	Duration	PME	Nos. of Units	% on-time
All Sections Preparation Works	Utilities Diversion	Oct 05 – May 06 (8 months)	Breaker	2	50
			Lorry	1	30
			Excavator	1	50
			Generator	2	100
			Air Compressor	1	100
			Silent Piler Machine	1	100
			Crane Lorry	1	30
Section 1 Open Excavation from Ch000 to Ch067 and Plant Rooms	Installation of Sheet Pile	Jan 06 – Mar 06 (3 months)	Silent Piler Machine	1	100
			Generator	1	100
			Grouting Machine	2	100
			Crane Lorry	1	25
	Surface Excavation before Road Decking	Apr 06 (1 month)	Excavator	2	70
			Breaker	1	50
			Generator	1	100
			Truck	2	30
	Further Excavation (Works Under Road Decking)	May 06 – Jun 06 (2 months)	Excavator	2	100
			Breaker	1	100
			Generator	1	100
			Crane Lorry	1	30
			Truck	4	30
			Water Pumps	4	100
			Ventilation Fans	4	100
	Construction of Subway (Works Under Road Decking)	Jul 06 – Nov 06 (5 months)	Concrete Pump	1	100
			Concrete Truck	1	30
			Ventilation Fans	2	100
			Generator	1	100
			Vibratory Poker	2	100
Section 2 Open Excavation from Ch067 to Ch096	Installation of Sheet Pile	Sept 06 – Oct 06 (2 months)	Silent Piler Machine	1	100
			Generator	1	100
			Grouting Machine	2	100
			Crane Lorry	1	25

Section	Activities	Duration	PME	Nos. of Units	% on-time
	Surface Excavation before Road Decking	Nov 06 (1 month)	Excavator	2	70
			Breaker	1	50
			Generator	1	100
			Truck	2	30
	Further Excavation (Works Under Road Decking)	Dec 06 (1 month)	Excavator	2	100
			Breaker	1	100
			Generator	1	100
			Crane Lorry	1	30
			Truck	4	30
			Water Pumps	4	100
			Ventilation Fans	4	100
	Construction of Subway (Works Under Road Decking)	Jan 07 – Apr 07 (4 months)	Concrete Pump	1	100
			Concrete Truck	1	30
			Ventilation Fans	2	100
			Generator	1	100
			Vibratory Poker	2	100
Section 3 Open Excavation from Ch096 to Ch130	Installation of Sheet Pile	May 06 – Jul 06 (3 months)	Silent Piler Machine	1	100
			Generator	1	100
			Grouting Machine	2	100
			Crane Lorry	1	25
	Surface Excavation before Road Decking	Aug 06 (1 month)	Excavator	2	70
			Breaker	1	50
			Generator	1	100
			Truck	2	30
	Further Excavation (Works Under Road Decking)	Sept 06 – Oct 06 (2 months)	Excavator	2	100
			Breaker	1	100
			Generator	1	100
			Crane Lorry	1	30
			Truck	4	30
			Water Pumps	4	100
			Ventilation Fans	4	100
	Construction of Subway (Works Under Road Decking)	Nov 06 – Mar 07 (5 months)	Concrete Pump	1	100
			Concrete Truck	1	30
			Ventilation Fans	2	100
			Generator	1	100
			Vibratory Poker	2	100
Section 4 Excavation from Ch130 to Ch159.8	Installation of Sheet Pile	May 07 (1 month)	Silent Piler	1	100
			Generator	1	100
			Grouting Machine	2	100
			Crane Lorry	1	30
	Surface Excavation and Demolish Existing Entrance B2 Structure before Road Decking	Jun 07 (1 month)	Excavator	2	70
			Breaker	2	50
			Generator	1	100
			Truck	2	30
	Further Excavation (Works Under Road Decking)	Jul 07 (1 month)	Excavator	2	100
			Breaker	1	100
			Generator	1	100
			Crane Lorry	1	30
			Truck	2	30
			Water Pumps	4	100
			Ventilation Fans	2	100

Section	Activities	Duration	PME	Nos. of Units	% on-time
	Construction of Subway (Works Under Road Decking)	Aug 07 – Oct 07 (3 months)	Concrete Pump	1	100
			Concrete Truck	1	30
			Ventilation Fans	2	100
			Generator	1	100
			Vibratory Poker	2	100
All Sections Final Stage	Backfill and Reinstatement	Oct 06 – Oct 07 (13 months)	Lorry	1	30
			Excavator	1	50
			Compactor & Roller	1	50
			Concrete Truck	1	30
			Vibratory Poker	1	20
			Dump Truck	1	20

5 NOISE ASSESSMENT

Noise Sensitive Receivers

- 5.1 The existing noise climate around the proposed works area is dominated by road noise from Nathan Road, Prince Edward Road West and some smaller access roads.
- 5.2 The area surrounding the Project's site is made up of mixed commercial and residential buildings. NSRs defined by EIAO-TM and the NCO were identified in this study. The construction noise impacts at the worst affected representative NSRs have been considered. The residential buildings along Sai Yeung Choi Street South have been identified to be the most representative NSRs and the locations are shown in **Drawing No. 2**. They were assumed to have no central air conditioning system and with a direct line of sight to the ground level of the proposed works. A brief description of the representative NSRs is shown in **Table 5.1**.

Table 5.1 Details of Representative NSRs

NSR I.D.	Description	Nearest Horizontal Distance between NSR and Site Boundary (m)	EIAO-TM Daytime Noise Assessment Criterion, dB(A)
N1	236, Sai Yeung Choi Street	6.5	75
N2	252, Sai Yeung Choi Street	7.5	75
N3	Cosmopolitan Centre	4	75
N4	Bijou Apartments	3	75
N5	Cheung Ning Mansion	9	75

Potential Noise Impact

- 5.3 The underground works will be covered by a deck after excavation, and the road section above the underground works will be restored for normal road traffic. By making reference to BS5228: Part 1: 1997 Annex B – B.2 Machinery enclosure design, a sheet material mass of 10kg/m² is assumed and this structure cover would provide 25 dB(A) noise insulation.
- 5.4 Based on the proposed plant inventory described in Section 4, the unmitigated sound power level (SWL) of each activity was predicted and shown in **Appendix 5.1**. Details of the calculation are shown in **Appendix 5.2**. The unmitigated cumulative noise levels at representative NSRs were then predicted and summarised in the **Table 5.2**.

Table 5.2 Predicted Noise Levels at NSRs - Unmitigated

NSR I.D.	Predicted Noise Levels, dB(A)	EIAO-TM Daytime Noise Assessment Criterion, dB(A)
N1	69 – 91	75
N2	72 – 94	75
N3	80 – 92	75
N4	73 – 89	75
N5	80 – 92	75

- 5.5 The predicted construction noise assessment results indicated that noise level at the representative NSR ranged from 69 dB(A) to 94 dB(A) for the no mitigation scenario. Mitigation measures are required and proposed to alleviate the exceeded noise levels in the next section.

Mitigation Measures

- 5.6 In order to reduce potential noise nuisance, the following mitigation measures are proposed:

- Selection of quiet plant and working methods
- Use of movable barrier, noise enclosure or acoustic shed for small PME (such as hand held breaker, generator, compressor and concrete pump)
- Use of acoustic enclosure made by acoustic material

Selection of Quiet Plant

- 5.7 The Contractor may be able to obtain particular models of plant that are quieter than the standard types given in GW-TM. The benefits achievable in this way will depend on the details of the Contractor's chosen methods of working. The type of quieter PME adopted in this assessment is not a must that the Contractors have to use specific items of plant for the construction operations. The Contractors are allowed to use other type of quiet PME, which have the same total SWL, to meet their needs.
- 5.8 A list of quieter plant that may be adopted is shown in the following **Table 5.3**.

Table 5.3 List of Quieter Plant Adopted

Quieter Plant	Reference	SWL, dB(A)
Lorry	BS C3/59	105
Excavator	BS C8/15	103
Generator	CNP 103	95
Silent Pile Machine	GIKEN*	100
Crane Lorry	BS C3/59	105
Truck	BS C9/39	103
Water Pumps	CNP 281	88
Vibratory Poker	BS C6/20	102
Compactor & Roller	BS C8/30	101

* Reference was made to MTRC Contract C4420 Tsim Sha Tsui Station Modification, Variation of Environmental Permit, Noise assessment of GIKEN silent piler system

Use of Movable Barrier or Acoustic Shed

- 5.9 Considering different noise sources of different equipment, further mitigation measures by using movable barrier, noise enclosure or acoustic shed are proposed as shown in **Table 5.4**.

Table 5.4 Further Mitigation Measures for different PME

Equipment	Mitigation Measures Proposed	Reduction, dB(A)
Breaker	Acoustic Shed*	15
Lorry	Movable Barrier*	5
Excavator	Movable Barrier*	5
Generator	Noise Enclosure*	10
Air Compressor	Noise Enclosure*	10
Crane Lorry	Movable Barrier*	5
Grouting Machine	Movable Barrier*	5
Truck	Movable Barrier*	5
Concrete Truck	Movable Barrier*	5
Compactor & Roller	Movable Barrier*	5
Vibratory Poker	Movable Barrier*	5

Note: (*) Location of the barrier and acoustic shed subject to temporary traffic management requirement.

- 5.10 A typical design barrier with a steel framed 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/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 greater than 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. The conceptual designs of the movable noise barrier and noise enclosure are shown in **Drawing No. 3**.

Use of Acoustic Enclosure made by Acoustic Material

- 5.11 Noise insulating fabric KYOWA#1000 (hereinafter "the Fabric") would be adopted for the utilities diversion work in Section 1. According to the noise ¹survey report of the Fabric¹, covering the PME with the Fabric, 10dB(A) reduction would be achieved. The Contractor would select different noise insulating fabric with similar function and effectiveness to achieve the noise alleviation. The Fabric had been proposed and used for the hydraulic rig in Tsim Sha Tsui Station Modification Work and found that it was practical to use.
- 5.12 With the implementation of all the above mitigation measures, the predicted noise levels at the representative NSR ranged from 61 to 74 dB(A), which comply with the noise assessment criterion stipulated in EIAO-TM. The mitigated sound power level (SWL) of each activity was predicted and details of calculation are shown in **Appendices 5.3 and 5.4** respectively. The predicted noise levels are summarised in **Table 5.5**.

¹ Variation Environmental Permit application No. VEP-107/2003 and Environmental Permit (EP-113/2001/C) for *Modifications to MTRC TST Station Environmental Impact Assessment*.

Table 5.5 Predicted Noise Levels at NSRs - Mitigated

NSR I.D.	Predicted Noise Levels, dB(A)	EIAO-TM Daytime Noise Assessment Criterion, dB(A)
N1	61 – 73	75
N2	63 – 74	75
N3	67 – 74	75
N4	62 – 73	75
N5	67 – 74	75

- 5.13 However, before implementing any mitigation measures, the contractor shall demonstrate compliance and seek for the approval of the Engineer.

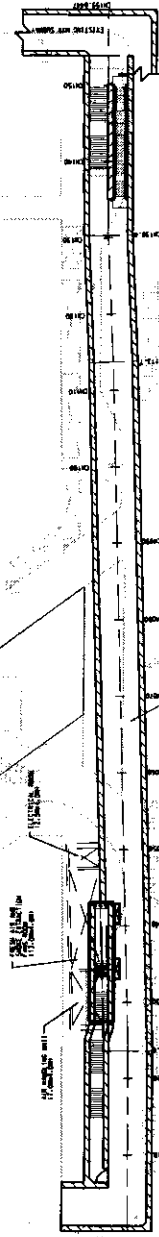
Good Site Practice

- 5.14 Besides the above mitigation measures, the contractors are required to adopt the following practices on site to reduce noise nuisance:
- Check the on-site equipment plant regularly to maintain the plant in good conditions. The contractor should keep record check on the performance of the plant regularly. In addition, contractor should pay notice on any abnormal sound coming from the plant;
 - Silencers or mufflers on construction equipment should be utilized and properly maintained during construction;
 - Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or throttled down to a minimum; and
 - Plant known to emit noise strongly in one direction, should, where practicable, be orientated so that the noise is directed away from nearby NSRs.

6. CONCLUSIONS

- 6.1 The proposed subway connection project has the potential to cause adverse construction noise impacts during daytime if no control measure is in place. Potential construction noise impact on the representative noise sensitive receivers (NSRs) could range from 69 dB(A) to 94 dB(A).
- 6.2 Mitigation measures included the use of quiet plant, use of movable noise barrier, noise enclosure or acoustic shed and noise insulation fabric in order to alleviate the noise impact to the assessment level. With the adoption of the mitigation measures, noise impacts from construction works were found to comply with the 75 dB(A) noise assessment criterion at selected sensitive receivers.

Drawings



PRINCE EDWARD STATION PEDESTRIAN SUBWAY
EXTENSION & ENTRANCE MODIFICATION WORKS

DATE
MAY 2005

SCALE
A4 1:1000

CHECK
KYTT

DRAWN
WLMT

JOB NO.
P03603

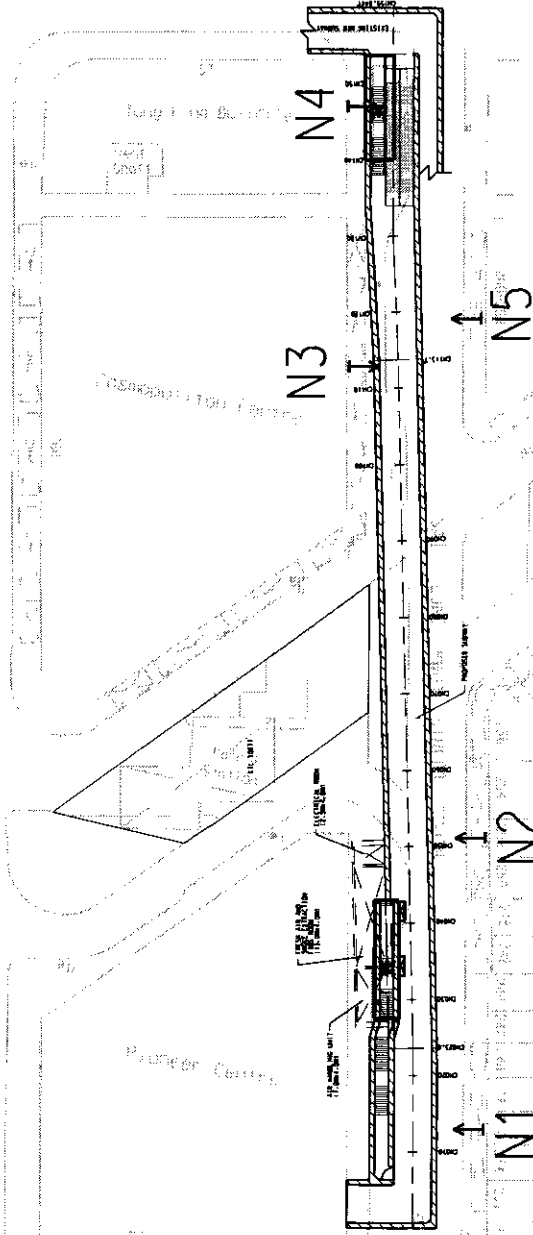
DRAWING NO.
1

REV
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MAUNSELL | AECOM

MAUNSELL ENVIRONMENTAL
MANAGEMENT CONSULTANTS LTD

PROPOSED SUBWAY LAYOUT PLAN



LEGEND:
↑ NOISE SENSITIVE RECEIVER
N1

PRINCE EDWARD STATION PEDESTRIAN SUBWAY
EXTENSION & ENTRANCE MODIFICATION WORKS

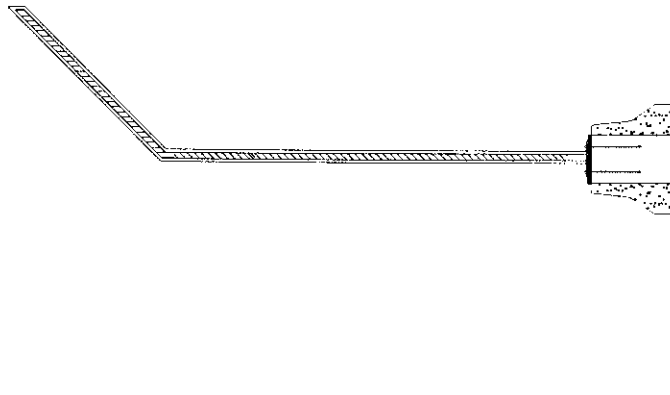
LOCATION OF NOISE SENSITIVE RECEIVERS

SCALE	A4 1:1000
CHECK	KYTT
JOB NO.	P03603

DATE	MAY 2005
DRAWN	WLMT
DRAWING NO.	2
REV	—

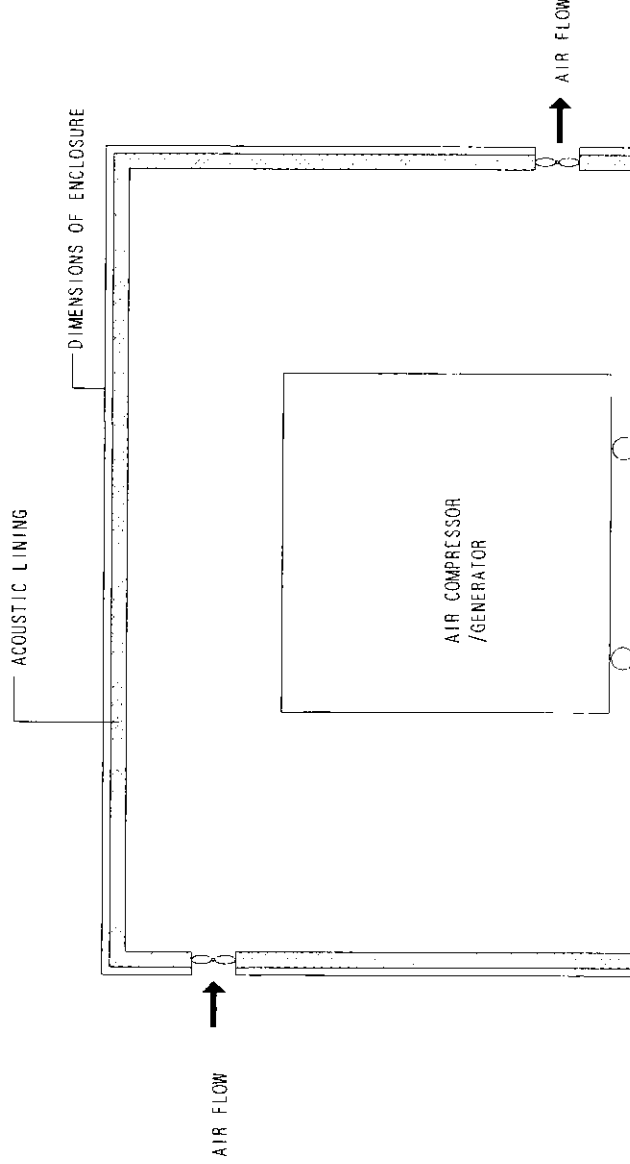
MAUNSELL | AECOM

Maunsell Environmental
Management Consultants Ltd



MOVABLE BARRIER

* LOCATION OF BARRIER SUBJECT TO
TEMPORARY TRAFFIC MANAGEMENT REQUIREMENT



NOISE ENCLOSURE

* FOR SMALL PLANT ONLY AND DRAWING NOT TO SCALE

MAUNSELL | **AECOM**

Maunsell Environmental
Management Consultants Ltd

PRINCE EDWARD STATION PEDESTRIAN SUBWAY
EXTENSION & ENTRANCE MODIFICATION WORKS

CONCEPTUAL DESIGN OF PROPOSED MITIGATION MEASURES

SCALE
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JOB No.

N. T. S.
KYTT

P03603

DATE
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MAY 2005
WLMT

DRAWING No.

3

REV

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Appendix 5.1
Plant Inventory for Various Construction
Activities – Unmitigated Scenario

Appendix 5.1

Plant Inventory for Various Construction Activities - Unmitigated Scenario

Prince Edward Station Pedestrian Subway Extension and Entrance Modification Works

Powered Mechanical Equipment (PME)	TM Ref/ other Ref.	No. of Items	SWL/item dB(A)	% on-time	Mitigation measures	Reduction dB(A)	SWL dB(A)
All Section - Preparation Works							
Utilities Diversion							
Breaker	CNP026	2	114	50%	-	0	114
Lorry	CNP141	1	112	30%	-	0	107
Excavator	CNP081	1	112	50%	-	0	109
Generator	CNP102	2	100	100%	-	0	103
Air Compressor	CNP002	1	102	100%	-	0	102
Silent Piler Machine	GIKEN*	1	100	100%	-	0	100
Crane Lorry	CNP141	1	112	30%	-	0	107
						Total	117
Section 1 - Open Excavation from Ch000 to Ch067 and Plant Rooms							
Installation of Sheet Pile							
Silent Piler Machine	GIKEN*	1	100	100%	-	0	100
Generator	CNP102	1	100	100%	-	0	100
Grouting Machine	CNP105	2	90	100%	-	0	93
Crane Lorry	CNP141	1	112	25%	-	0	106
						Total	108
Surface Excavation before Road Decking							
Excavator	CNP081	2	112	70%	-	0	113
Breaker	CNP026	1	114	50%	-	0	111
Generator	CNP102	1	100	100%	-	0	100
Truck	CNP067	2	117	30%	-	0	115
						Total	118
Further Excavation (Works Under Road Decking)							
Excavator	CNP081	2	112	100%	#Underground Work	25	90
Breaker	CNP026	1	114	100%	#Underground Work	25	89
Generator	CNP102	1	100	100%	#Underground Work	25	75
Crane Lorry	CNP141	1	112	30%	-	0	107
Truck	CNP067	4	117	30%	-	0	118
Water Pumps	CNP282	4	103	100%	#Underground Work	25	84
Ventilation Fans	CNP241	4	108	100%	#Underground Work	25	89
						Total	118
Construction of Subway (Works Under Road Decking)							
Concrete Pump	CNP047	1	109	100%	#Underground Work	25	84
Concrete Truck	C6/23	1	100	30%	-	0	95
Ventilation Fans	CNP241	2	108	100%	#Underground Work	25	86
Generator	CNP102	1	100	100%	#Underground Work	25	75
Vibratory Poker	CNP170	2	113	100%	#Underground Work	25	91
						Total	97

Section 2 - Open Excavation from Ch067 to Ch096							
Installation of Sheet Pile							
Silent Piler Machine	GIKEN*	1	100	100%	-	0	100
Generator	CNP102	1	100	100%	-	0	100
Grouting Machine	CNP105	2	90	100%	-	0	93
Crane Lorry	CNP141	1	112	25%	-	0	106
						Total	108
Surface Excavation before Road Decking							
Excavator	CNP081	2	112	70%	-	0	113
Breaker	CNP026	1	114	50%	-	0	111
Generator	CNP102	1	100	100%	-	0	100
Truck	CNP067	2	117	30%	-	0	115
						Total	118
Further Excavation (Works Under Road Decking)							
Excavator	CNP081	2	112	100%	#Underground Work	25	90
Breaker	CNP026	1	114	100%	#Underground Work	25	89
Generator	CNP102	1	100	100%	#Underground Work	25	75
Crane Lorry	CNP141	1	112	30%	-	0	107
Truck	CNP067	4	117	30%	-	0	118
Water Pumps	CNP282	4	103	100%	#Underground Work	25	84
Ventilation Fans	CNP241	4	108	100%	#Underground Work	25	89
						Total	118
Construction of Subway (Works Under Road Decking)							
Concrete Pump	CNP047	1	109	100%	#Underground Work	25	84
Concrete Truck	C6/23	1	100	30%	-	0	95
Ventilation Fans	CNP241	2	108	100%	#Underground Work	25	86
Generator	CNP102	1	100	100%	#Underground Work	25	75
Vibratory Poker	CNP170	2	113	100%	#Underground Work	25	91
						Total	97
Section 3 - Open Excavation from Ch096 to Ch0130							
Installation of Sheet Pile							
Silent Piler Machine	GIKEN*	1	100	100%	-	0	100
Generator	CNP102	1	100	100%	-	0	100
Grouting Machine	CNP105	2	90	100%	-	0	93
Crane Lorry	CNP141	1	112	25%	-	0	106
						Total	108
Surface Excavation before Road Decking							
Excavator	CNP081	2	112	70%	-	0	113
Breaker	CNP026	1	114	50%	-	0	111
Generator	CNP102	1	100	100%	-	0	100
Truck	CNP067	2	117	30%	-	0	115
						Total	118
Further Excavation (Works Under Road Decking)							
Excavator	CNP081	2	112	100%	#Underground Work	25	90
Breaker	CNP026	1	114	100%	#Underground Work	25	89
Generator	CNP102	1	100	100%	#Underground Work	25	75
Crane Lorry	CNP141	1	112	30%	-	0	107
Truck	CNP067	4	117	30%	-	0	118
Water Pumps	CNP282	4	103	100%	#Underground Work	25	84
Ventilation Fans	CNP241	4	108	100%	#Underground Work	25	89
						Total	118
Construction of Subway (Works Under Road Decking)							
Concrete Pump	CNP047	1	109	100%	#Underground Work	25	84
Concrete Truck	C6/23	1	100	30%	-	0	95
Ventilation Fans	CNP241	2	108	100%	#Underground Work	25	86
Generator	CNP102	1	100	100%	#Underground Work	25	75
Vibratory Poker	CNP170	2	113	100%	#Underground Work	25	91
						Total	97

Section 4 - Excavation from Ch130.4 to Ch159.8							
Installation of Sheet Pile							
Silent Piler	GIKEN*	1	100	100%	-	0	100
Generator	CNP102	1	100	100%	-	0	100
Grouting Machine	CNP105	2	90	100%	-	0	93
Crane Lorry	CNP141	1	112	30%	-	0	107
						Total	108
Surface Excavation and Demolish Existing Entrance B2 Structure before Road Decking							
Excavator	CNP081	2	112	70%	-	0	113
Breaker	CNP026	2	114	50%	-	0	114
Generator	CNP102	1	100	100%	-	0	100
Truck	CNP067	2	117	30%	-	0	115
						Total	119
Further Excavation (Works Under Road Decking)							
Excavator	CNP081	2	112	100%	#Underground Work	25	90
Breaker	CNP026	1	114	100%	#Underground Work	25	89
Generator	CNP102	1	100	100%	#Underground Work	25	75
Crane Lorry	CNP141	1	112	30%	-	0	107
Truck	CNP067	2	117	30%	-	0	115
Water Pumps	CNP282	4	103	100%	#Underground Work	25	84
Ventilation Fans	CNP241	2	108	100%	#Underground Work	25	86
						Total	115
Construction of Subway (Works Under Road Decking)							
Concrete Pump	CNP047	1	109	100%	#Underground Work	25	84
Concrete Truck	C6/23	1	100	30%	-	0	95
Ventilation Fans	CNP241	2	108	100%	#Underground Work	25	86
Generator	CNP102	1	100	100%	#Underground Work	25	75
Vibratory Poker	CNP170	2	113	100%	#Underground Work	25	91
						Total	97
All Sections - Final Stage							
Backfill and Reinstatement							
Lorry	CNP141	1	112	30%	-	0	107
Excavator	CNP081	1	112	50%	-	0	109
Compactor & Roller	CNP185	1	108	50%	-	0	105
Concrete Truck	C6/23	1	100	30%	-	0	95
Vibratory Poker	CNP170	1	113	20%	-	0	106
Truck	CNP067	1	117	20%	-	0	110
						Total	115

Note:

Table contains estimated plant and operating durations

25 dB(A) noise reduction is assumed for underground works (Ref. BS 5228: Part 1: 1997)

GIKEN** - Reference was made to MTRC Contract C4420 Tsim Sha Tsui Station Modification,

Variation of Environmental Permit, Noise assessment of GIKEN silent piler system

Appendix 5.2
Sample Calculation of Construction Noise
Assessment at Representative NSR –
Unmitigated Scenario

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Appendix 5.3
Plant Inventory for Various Construction
Activities – Mitigated Scenario

Appendix 5.3

Plant Inventory for Various Construction Activities - Mitigated Scenario

Prince Edward Station Pedestrian Subway Extension and Entrance Modification Works

Powered Mechanical Equipment (PME)		TM Ref/ other Ref.	No. of Items	No. of Items	SWL/item dB(A)	% on-time	Mitigation measures	Reduction dB(A)	SWL dB(A)	SWL dB(A)
All Section - Preparation Works										
Utilities Diversion			Case 1 ^[3]	Case 2 ^[3]					Case 1 ^[3]	Case 2 ^[1]
Breaker		CNP026	2	0	114	50%	Acoustic Shed	15	99	--
Lorry ^[2]	[1]	C3/59	0	0	105	30%	Movable Barrier	5	--	--
Excavator	[1]	C8/15	0	1	103	50%	Movable Barrier	5	--	--
Generator	[1]	CNP103	1	1	95	100%	Noise Enclosure	10	85	85
Air Compressor	[1]	CNP002	0	1	102	100%	Noise Enclosure	10	--	--
Silent Piler Machine		GIKEN**	0	1	100.8	100%	KYOWA#1000*	10	--	91
Crane Lorry	[1]	C3/59	0	1	105	30%	Movable Barrier	5	--	95
								Total	99	100
									Max SWL for Case 1 / Case 2	
									100	
Section 1 - Open Excavation from Ch000 to Ch067 and Plant Rooms										
Installation of Sheet Pile										
Silent Piler Machine		GIKEN**	1	100.8	100%	-	0	101		
Generator	[1]	CNP103	1	95	100%	Noise Enclosure	10	85		
Grouting Machine		CNP105	2	90	100%	Movable Barrier	5	88		
Crane Lorry	[1]	C3/59	1	105	25%	Movable Barrier	5	94		
								Total	102	
Surface Excavation before Road Decking										
Excavator	[1]	C8/15	2	103	70%	Movable Barrier	5	99		
Breaker		CNP026	1	114	50%	Acoustic Shed	15	96		
Generator	[1]	CNP103	1	95	100%	Noise Enclosure	10	85		
Truck	[1]	C9/39	2	103	30%	Movable Barrier	5	96		
								Total	102	
Further Excavation (Works Under Road Decking)										
Excavator	[1]	C8/15	2	103	100%	#Underground Work	25	81		
Breaker		CNP026	1	114	100%	#Underground Work	25	89		
Generator	[1]	CNP103	1	95	100%	#Underground Work	25	70		
Crane Lorry	[1]	C3/59	1	105	30%	Movable Barrier	5	95		
Truck	[1]	C9/39	4	103	30%	Movable Barrier	5	99		
Water Pumps	[1]	CNP281	4	88	100%	#Underground Work	25	69		
Ventilation Fans		CNP241	4	108	100%	#Underground Work	25	89		
								Total	101	
Construction of Subway (Works Under Road Decking)										
Concrete Pump		CNP047	1	109	100%	#Underground Work	25	84		
Concrete Truck		C6/23	1	100	30%	Movable Barrier	5	90		
Ventilation Fans		CNP241	2	108	100%	#Underground Work	25	86		
Generator	[1]	CNP103	1	95	100%	#Underground Work	25	70		
Vibratory Poker	[1]	C6/20	2	102	100%	#Underground Work	25	80		
								Total	92	

Section 2 - Open Excavation from Ch067 to Ch096

Installation of Sheet Pile

Silent Piler Machine		GIKEN**	1	100.8	100%	-	0	101
Generator	[1]	CNP103	1	95	100%	Noise Enclosure	10	85
Grouting Machine		CNP105	2	90	100%	Movable Barrier	5	88
Crane Lorry	[1]	C3/59	1	105	25%	Movable Barrier	5	94
Total								102

Surface Excavation before Road Decking

Excavator	[1]	C8/15	2	103	70%	Movable Barrier	5	99
Breaker		CNP026	1	114	50%	Acoustic Shed	15	96
Generator	[1]	CNP103	1	95	100%	Noise Enclosure	10	85
Truck	[1]	C9/39	2	103	30%	Movable Barrier	5	96
Total								102

Further Excavation (Works Under Road Decking)

Excavator	[1]	C8/15	2	103	100%	#Underground Work	25	81
Breaker		CNP026	1	114	100%	#Underground Work	25	89
Generator	[1]	CNP103	1	95	100%	#Underground Work	25	70
Crane Lorry	[1]	C3/59	1	105	30%	Movable Barrier	5	95
Truck	[1]	C9/39	4	103	30%	Movable Barrier	5	99
Water Pumps	[1]	CNP281	4	88	100%	#Underground Work	25	69
Ventilation Fans		CNP241	4	108	100%	#Underground Work	25	89
Total								101

Construction of Subway (Works Under Road Decking)

Concrete Pump		CNP047	1	109	100%	#Underground Work	25	84
Concrete Truck		C6/23	1	100	30%	Movable Barrier	5	90
Ventilation Fans		CNP241	2	108	100%	#Underground Work	25	86
Generator	[1]	CNP103	1	95	100%	#Underground Work	25	70
Vibratory Poker	[1]	C6/20	2	102	100%	#Underground Work	25	80
Total								92

Section 3 - Open Excavation from Ch096 to Ch0130

Installation of Sheet Pile

Silent Piler Machine		GIKEN**	1	100.8	100%	KYOWA#1000*	10	91
Generator	[1]	CNP103	1	95	100%	Noise Enclosure	10	85
Grouting Machine		CNP105	2	90	100%	Movable Barrier	5	88
Crane Lorry	[1]	C3/59	1	105	25%	Movable Barrier	5	94
Total								97

Surface Excavation before Road Decking

									Case 1 ^[3]	Case 2 ^[3]
Excavator	[1]	C8/15	2	0	103	70%	Movable Barrier	5	99	--
Breaker		CNP026	0	1	114	50%	Acoustic Shed	15	--	96
Generator	[1]	CNP103	0	1	95	100%	Noise Enclosure	10	--	85
Truck	[1]	C9/39	0	2	103	30%	Movable Barrier	5	--	96
Total									99	99
Max SWL for Case 1 / Case 2									99	

Further Excavation (Works Under Road Decking)

Excavator	[1]	C8/15	2	103	100%	#Underground Work	25	81
Breaker		CNP026	1	114	100%	#Underground Work	25	89
Generator	[1]	CNP103	1	95	100%	#Underground Work	25	70
Crane Lorry	[1]	C3/59	1	105	30%	Movable Barrier	5	95
Truck ^[4]	[1]	C9/39	2	103	30%	Movable Barrier	5	96
Water Pumps	[1]	CNP281	4	88	100%	#Underground Work	25	69
Ventilation Fans		CNP241	4	108	100%	#Underground Work	25	89
Total								99

Construction of Subway (Works Under Road Decking)

Concrete Pump		CNP047	1	109	100%	#Underground Work	25	84
Concrete Truck		C6/23	1	100	30%	Movable Barrier	5	90
Ventilation Fans		CNP241	2	108	100%	#Underground Work	25	86
Generator	[1]	CNP103	1	95	100%	#Underground Work	25	70
Vibratory Poker	[1]	C6/20	2	102	100%	#Underground Work	25	80
Total								92

Section 4 - Excavation from Ch130.4 to Ch159.8

Installation of Sheet Pile

Silent Piler		GIKEN**	1	100.8	100%	-	0	101
Generator	[1]	CNP103	1	95	100%	Noise Enclosure	10	85
Grouting Machine		CNP105	2	90	100%	Movable Barrier	5	88
Crane Lorry	[1]	C3/59	1	105	30%	Movable Barrier	5	95
Total								102

Surface Excavation and Demolish Existing Entrance B2 Structure before Road Decking

Excavator	[1]	C8/15	2	103	70%	Movable Barrier	5	99
Breaker		CNP026	2	114	50%	Acoustic Shed	15	99
Generator	[1]	CNP103	1	95	100%	Noise Enclosure	10	85
Truck	[1]	C9/39	2	103	30%	Movable Barrier	5	96
Total								103

Further Excavation (Works Under Road Decking)

Excavator	[1]	C8/15	2	103	100%	#Underground Work	25	81
Breaker		CNP026	1	114	100%	#Underground Work	25	89
Generator	[1]	CNP103	1	95	100%	#Underground Work	25	70
Crane Lorry	[1]	C3/59	1	105	30%	Movable Barrier	5	95
Truck	[1]	C9/39	2	103	30%	Movable Barrier	5	96
Water Pumps	[1]	CNP281	4	88	100%	#Underground Work	25	69
Ventilation Fans		CNP241	2	108	100%	#Underground Work	25	86
Total								99

Construction of Subway (Works Under Road Decking)

Concrete Pump		CNP047	1	109	100%	#Underground Work	25	84
Concrete Truck		C6/23	1	100	30%	Movable Barrier	5	90
Ventilation Fans		CNP241	2	108	100%	#Underground Work	25	86
Generator	[1]	CNP103	1	95	100%	#Underground Work	25	70
Vibratory Poker	[1]	C6/20	2	102	100%	#Underground Work	25	80
Total								92

All Sections - Final Stage

Backfill and Reinstatement

Lorry	[1]	C3/59	1	105	30%	Movable Barrier	5	95
Excavator	[1]	C8/15	1	103	50%	Movable Barrier	5	95
Compactor & Roller	[1]	C8/30	1	101	50%	Movable Barrier	5	93
Concrete Truck		C6/23	1	100	30%	Movable Barrier	5	90
Vibratory Poker	[1]	C6/20	1	102	20%	Movable Barrier	5	90
Truck	[1]	C9/29	1	105	30%	Movable Barrier	5	95
Total								101

Note:

Table contains estimated plant and operating durations

25 dB(A) noise reduction is assumed for underground works (Ref. BS 5228: Part 1: 1997)

[1] Use of Quite PME

[2] Lorry would not operate at the same time with other PME during utilities diversion

[3] Construction activities for Case 1 and Case 2 would not operate at the same time

[4] Maximum 2 trucks would be operated at the same time during the section 3 surface excavation

KYOWA#1000* - Reference was made to Variation of Environmental Permit application No. VEP-107/2003 and

Environmental Permit (EP-113/2001/C), the fabric KYOWA#1000 could achieve about 20dB(A) reduction on the noise level

GIKEN** - Reference was made to MTRC Contract C4420 Tsim Sha Tsui Station Modification.

Variation of Environmental Permit, Noise assessment of GIKEN silent piler system.

Appendix 5.4
Sample Calculation of Construction Noise
Assessment at Representative NSR – Mitigated
Scenario

[illegible]

[illegible]

[illegible]

[illegible]

APPENDIX 2

Land Contamination Assessment Report

TABLE OF CONTENTS

Page

1.	INTRODUCTION	1
	Background	1
	Objectives	1
2.	ASSESSMENT CRITERIA.....	1
	Cleanup Action Criteria for Soil and Groundwater	1
	Risk-based Assessment for Groundwater	2
3.	ASSESSMENT METHODOLOGY	2
	Fieldwork	2
	Groundwater Sampling.....	3
	Equipment Decontamination	3
4.	ANALYTICAL RESULTS AND INTERPRETATION.....	3
	Fieldwork	3
	Laboratory Analytical Results.....	3
5.	CONCLUSIONS	4

List of Tables

Table 2.1	Dutch ABC Values for Soil and Groundwater Contamination	1
Table 3.1	Depth of Soil Sampling at Proposed Sampling Locations	2
Table 4.1	Summary of Depths for Groundwater Sampling	4

List of Drawing

Drawing No. 1 As-built Sampling Locations For Land Contamination Investigation

Annexes

Annex A	Site Boring Log
Annex B	Laboratory Report
Annex C	Calculation of Relative Percent Difference (RPD)

1. INTRODUCTION

Background

- 1.1 Due to the proximity to a petrol filling station with underground fuel tanks to the Subway area, potential leakage of the underground tank and/ or underground pipes, if occurred, would lead to fuel contamination of the subject site. In this regard, land contamination assessment is proposed in order to investigate the presence of contamination within the Subway site.
- 1.2 Four sampling locations, which are close to the petrol filling station within the Subway area, including BH1, BH4, BH7 and TP9, were selected for land contamination site investigation (SI). The sampling locations are indicated in **Drawing No. 1**.

Objectives

- 1.3 The objectives of this Land Contamination Assessment are (i) to investigate by sampling of soil and groundwater, (ii) to present the findings of the site investigation (including fieldwork and chemical analysis) and (iii) to assess the potential contamination based on the findings of the site investigation. If contamination is confirmed, appropriate remedial actions are proposed to handle/treat the contaminated soil/groundwater within the Subway area.

2. ASSESSMENT CRITERIA

Cleanup Action Criteria for Soil and Groundwater

- 2.1 The EPD's *Practice Note for Professional Persons, Contaminated Land Assessment and Remediation* (ProPECC Note PN 3/94) was used in setting the soil contamination criteria. The Practice Note makes reference to criteria developed in the Netherlands (Dutch 'ABC' Levels), which are most comprehensive and widely used for contaminated site assessment. The preliminary screening approach adopted in this study was based on this Dutch criteria which consist of 3 levels of guidelines, namely A, B, and C, which generally indicate the follows:
- 'A' level implies unpolluted;
 - 'B' level implies potential pollution present that requires further investigation or remediation; and
 - 'C' level implies pollution which requires remediation.
- 2.2 Since the potential contaminants are from fuel products, parameters including total petroleum products (TPH), BTEX (benzene, toluene, ethylbenzene and xylenes) and lead (Pb) were selected for laboratory testing. Relevant soil and groundwater Dutch 'ABC' levels for the testing parameters are presented in **Table 2.1**.

Table 2.1 Dutch ABC Values for Soil and Groundwater Contamination

Parameter	Soil (mg/kg)			Groundwater (µg/L)		
	Dutch A	Dutch B	Dutch C	Dutch A	Dutch B	Dutch C
Total Petroleum Hydrocarbons (TPH) (using mineral oil)	100	1000	5000	20	200	600
<BTEX>						
Benzene	0.01	0.5	5	0.2	1	5
Toluene	0.05	3	30	0.5	15	50
Ethylbenzene	0.05	5	50	0.5	20	60
Xylenes	0.05	5	50	0.5	20	60
<Heavy Metal>						
Lead (Pb)	50	150	600	20	50	200

Risk-based Assessment for Groundwater

- 2.3 The Dutch 'ABC' criteria were established based on the assumption that groundwater is used as potable water. However, it is not so appropriate to be applied directly in Hong Kong where groundwater is not for potable use. Hence, the Dutch B levels would be only for screening out the chemicals-of-concern (COCs) for risk assessment and are not for assessing groundwater contamination in Hong Kong. A risk-based assessment would be carried out for contaminants with the concentration exceeding the Dutch B level to evaluate the risks posed to the sensitive receptors.
- 2.4 The risk-based assessment that has been adopted in USEPA takes into account concentrations of individual contaminants in groundwater, the anticipated most sensitive human receptor and the potential exposure pathways. For each parameter, the source concentration is the maximum concentration of that parameter found in the groundwater samples irrespective of their locations.
- 2.5 Exceedance of the risk-based criteria would be qualified in two tiers. Firstly, the Total Pathway Hazard Index that is the sum of contaminant hazard quotients exceeds one (i.e. USEPA recommended hazard index). Secondly the largest contaminant concentration exceeds the corresponding Risk Based Screening Level (RBSL) that is derived from the recognised oral reference dose. For carcinogens, the first is the Total Carcinogenic Risk that is the sum of contaminant carcinogenic risk exceeds 1×10^{-6} (i.e. USEPA lifetime cancer risk level). The second is the largest carcinogenic contaminant concentration exceeds the corresponding RBSL that is derived from the recognised carcinogenic oral slope factor. It should be noted that risk assessment could only be undertaken for those chemicals that have a recognised oral slope factor or oral reference dose.

3. ASSESSMENT METHODOLOGY

Fieldwork

- 3.1 Soil sampling was conducted at boreholes BH1, BH4 and BH7 by means of dry rotary drilling and at the trial pit TP9 by manual excavation. Soil samples were collected from the boreholes using split-spoon sampler and from the trial pit using hand auger. The depth of sampling is detailed in **Table 3.1**.

Table 3.1 Depth of Soil Sampling at Proposed Sampling Locations

Borehole	1 st Soil Sample	2 nd Soil Sample	3 rd Soil Sample	Additional Sample(s)
BH1, BH4, BH7 & TP9	0.5m below prevailing ground level	1.5m below prevailing ground level	2.5m below prevailing ground level	Each meter thereafter and/ or lastly that one meter immediately below the saturated zone

- 3.2 It should be noted that the actual sampling depths were adjusted slightly according to specific site conditions and subsurface strata conditions.
- 3.3 For boreholes BH1, BH4 and BH7 after the sampler had been driven to the desired depth by rotary drill, the sampler was removed from the borehole, detached from the drive rods, and placed on a worktable. The sampler tip and waste barrel were then removed, allowing the split spoon to be separated and the sample rings to be removed. Sample rings were separated using a clean sample knife. The exposed ends of the rings were quickly packed and stored.
- 3.4 Thickness of free product layer (if present) was measured at the borehole and trial pit by an interface probe where groundwater was encountered. However, no observable layer of free product was observed at all sampling locations.

- 3.5 Each sample container was uniquely labelled and stored in chilled condition (around 4°C) prior to shipment to laboratory. Chain-of custody protocol was operated as a part of QA/QC procedure. A filled chain-of-custody (COC) was attached to the bottom of the cover of a sample container and samples were delivered to laboratory within 24 hours of the samples being collected and analysed within 2 days of delivery.
- 3.6 All soil samples were tested for TPH, BTEX and lead.

Groundwater Sampling

- 3.7 Upon completion of soil sampling at the proposed sampling locations, one groundwater sample was collected at each sampling well with a Teflon/stainless steel bailer or a pump where encountered.
- 3.8 Between samples, all equipment used was thoroughly decontaminated with laboratory-grade detergent followed by deionised water.
- 3.9 Each sample container was uniquely labelled and stored in chilled condition (about 4°C) prior to shipment to laboratory. Chain-of-custody protocol was followed as part of QA/QC procedures. Samples were delivered to laboratory within 24 hours of the samples being collected and analysed within 2 days of delivery.
- 3.10 All groundwater samples were tested for TPH, BTEX and lead.

Equipment Decontamination

- 3.11 Equipment in contact with the ground was thoroughly decontaminated between each excavation, drilling and sampling event to minimise the potential for cross contamination. The equipment was decontaminated by steam cleaning/ high-pressure hot water jet, then washed by phosphate-free detergent and finally rinsed by distilled/deionized water.

4. ANALYTICAL RESULTS AND INTERPRETATION

Fieldwork

- 4.1 The land contamination investigation of the Project was undertaken by a contractor of Kowloon Development Company Limited under the supervision of MEMCL staff. Soil boring logs are shown in **Annex 1**.

Laboratory Analytical Results

Soil

- 4.2 A total of 19 soil samples (including one duplicate sample) were collected from 4 locations for laboratory analysis. Among these collected soil samples, no sample was found with contamination of TPH, BTEX and lead exceeding the Dutch B levels. The laboratory report is given in **Annex 2**.

Groundwater

- 4.3 As groundwater was encountered at all boreholes, a total of 5 groundwater samples (including one duplicate sample) were thus collected from the sampling wells with a Teflon bailer for the laboratory analysis. **Table 4.1** shows the locations and the corresponding depths for groundwater sampling.

Table 4.1 Summary of Depths for Groundwater Sampling

Sampling Location	Measured Groundwater Level (meter below ground)	Depths for Taking Groundwater Samples (meter below ground)
BH1	2.05	4.0
BH4	2.06	4.5
BH7	1.67	5.0
TP9	3.19	4.5

- 4.4 The analytical results showed that no exceedances of Dutch B levels for TPH, BTEX, and lead were found in all groundwater samples. The preliminary laboratory report is attached in **Annex 2**.

QA/QC Sampling

- 4.5 QA/QC sampling was conducted during site investigation of the Project, including one set of trip blank and field blank for full suite analysis and one duplicate for soil and groundwater sample for full suite analysis.
- 4.6 In associated with the QA/QC sampling exercise, acceptable quality control/quality assurance procedures were achieved since the QA/QC sample results of the field blank and trip blank all showed below the respective detection limits. In order to verify that the precision of the duplicate analyse is within acceptable limit, the relative percent difference (RPD) of the duplicate samples were determined. The calculation, as presented in **Annex 3**, showed that the RPDs are 0% for groundwater samples since all parameters were undetected for both primary sample and the duplicate groundwater sample. For the soil samples, RPDs lie from 0% to about 64% which implies for quality acceptance.

5. CONCLUSIONS

- 5.1 According to the results of site investigation, no exceedances of Dutch B levels were found at the 19 soil samples and 4 groundwater samples (including two duplicate samples) collected from locations BH1, BH4, BH7 and TP9. Potential land contamination due to the underground fuel tanks of the nearby petrol filling station is not expected in the Subway area. Hence, there are no special requirements for handling of soil and groundwater. Remediation for soil and groundwater would not be required for the Subway site.

Drawing



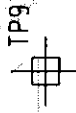
PETROL
FILLING STATION



BH1



BH4

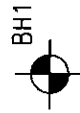


TP9

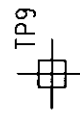


BH7

LEGEND:



BH1 BOREHOLE FOR LAND
CONTAMINATION INVESTIGATION



TP9 TRIAL PIT FOR LAND
CONTAMINATION INVESTIGATION

MAUNSELL | AECOM

AS-BUILT & PRELIMINARY
DRAWING FOR LAND CONTAMINATION INVESTIGATION

PRINCE EDWARD STATION PEDESTRIAN SUBWAY
EXTENSION & ENTRANCE MODIFICATION WORKS

AS-BUILT SAMPLING LOCATIONS FOR LAND CONTAMINATION INVESTIGATION

SCALE
CHECK
JOB NO.

A4 1:1000
KYTT
P03603

DATE
DRAWN

MAY 2005
WLMT

DRAWING NO.


1

REV

—

Annex 1

Site Boring Log

	VIBRO (H.K.) LTD. SITE INVESTIGATION DEPARTMENT				DRILLHOLE No. BH 1
	DRILLHOLE RECORD				SHEET 1 OF 3
PROJECT	Proposed Subway Connection between Pioneer Centre and MTR Prince Edward Station				
METHOD	Rotary	CO-ORDINATES	E 835474.89	CONTRACT No.	J200421e
MACHINE & No.	BM45		N 820439.63	DATE	18/05/2004 to 24/05/2004
FLUSHING MEDIUM	Nil, Water used below 2.90m	GROUND LEVEL	+ 5.65 mPD	ORIENTATION	Vertical

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Return %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I. / Test	Depths	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
15/05/2004	SW											+5.65	0.00			Pinkish brown and pink, silty fine to coarse SAND with some angular fine gravel. (FILL)
											A	+5.15	0.50		V	Extremely weak, reddish brown and pink, completely decomposed medium grained GRANITE. (Very silty fine to coarse SAND with occasional angular fine gravel)
											B					
											C					
											D	+3.65	2.00		V	Extremely weak, reddish brown and pink, completely decomposed medium to coarse grained GRANITE. (Sandy SILT with occasional angular fine gravel)
											1					
											2					
20/05/2004	SW	2.05m at 13:00									3					
21/05/2004	FW	1.95m at 06:00	50	100							4					
											5					
											6					
											7	+0.05	5.60		V	Extremely weak, pinkish brown and brown, mottled white and pink, completely decomposed medium to coarse grained GRANITE. (Very silty fine to coarse SAND with some angular fine gravel)
											8					
											9					
											10					
											11					
											12					
											13					
											14					
											15					
											16	-3.15	8.60		V	Extremely weak, grayish brown and brown, mottled white and pink, completely decomposed medium to coarse grained GRANITE. (Silty fine to coarse SAND with much angular fine gravel)
											17					
											18					
21/05/2004		1.30m at 13:00										-4.35	10.00			
22/05/2004																


• Small disturbed sample
 ▬ Large disturbed sample
 ▬ SPT liner sample
 ▬ U64 undisturbed sample
 ▬ U76 undisturbed sample
 ▬ U100 undisturbed sample
 ▬ Mazier sample
 ▬ Piston sample
 ▬ Environmental Sample

▲ Water sample
 ▬ Piezometer tip
 ▬ Standpipe tip
 ▬ Standard penetration test
 ▬ Pressuremeter test
 ▬ Water absorption test or Permeability test
 ▬ Sonic televiewer test
 ▬ Impression packer test
 ▬ In-situ vane shear test

LOGGED	T. C. Yip
DATE	28/05/2004
CHECKED	G. Whatmore
DATE	28/05/2004

REMARKS

1. An inspection pit was excavated by hand to 2.00m.
2. Two Nos. environmental samples were taken at 0.50m, 1.50m, 1.90m, 2.50m and 2.90m.
3. An environmental monitoring well was installed on 17/05/2004 to 4.00m for 3 days, after 3 days a water sample was taken at 4.00m.
4. A constant head permeability test was carried out from 8.00m to 9.50m
5. A piezometer was installed to 13.00m.

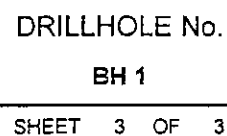
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	DRILLHOLE RECORD				SHEET 2 OF 3
PROJECT	Proposed Subway Connection between Pioneer Centre and MTR Prince Edward Station				
METHOD	Rotary	CO-ORDINATES	E 835474.89	CONTRACT No.	J200421e
MACHINE & No.	BM45		N 820439.63	DATE	18/05/2004 to 24/05/2004
FLUSHING MEDIUM	Nil, Water used below 2.90m	GROUND LEVEL	+ 5.65 mPD	ORIENTATION	Vertical

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I. / Test Depth	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
	1.94m at 08:00								12,13,16,20 N=61	No. Type Depth	-4.35	10.00		V	See sheet 1 of 3
1.1			50	77						18 20	10.30 10.40				
1.2								11.50	8,10 12,14,28,39 N=93	21 22	11.45 11.50				
1.3			50	100						23 24	11.90 12.00				
1.4								13.00		25 26	13.05 13.10				
1.5			50	90				13.10	12,23 35,58,77 100/45mm (270/270mm)	27 28	13.47 13.80				
1.6								14.15		29	14.00	-8.40 -14.05		III	
1.7	PW 14.51		50	94	0	0	> 20	14.35	NI	T2IOI	14.15	-8.50 -14.15		IV	
1.8								14.51			14.51	-8.88 -14.51		III	Moderately strong, pinkish grey and pinkish brown, dappled brown, moderately decomposed medium to coarse grained GRANITE. Joints are very closely spaced to closely spaced, rough planar and rough stepped, extremely narrow to very narrow, limonite stained, kaolin infilled (1 mm) and manganese stained, dipping 40° to 50°, 50° to 60° and 70° to 80°. From 14.15m to 14.51m : Weak to moderately weak, highly decomposed GRANITE.
1.9			50	100	84	80		2.3		T2IOI					
2.0											15.99				
2.1			50	100	78	64		16.65		T2IOI	-10.95 -16.60	16.60		IV	From 16.60m to 16.83m : Weak to moderately weak, highly decomposed GRANITE.
2.2	2.70m at 18:00						8.9	17.10			-11.18 -16.83	16.83		III	From 16.83m to 17.20m : Subvertical joint.
2.3	22/05/2004 24/05/2004						4.8	17.31			-11.68 -17.31	17.31		IV/III	From 17.31m to 17.55m : Weak to moderately strong, highly to moderately decomposed GRANITE.
2.4	1.99m at 08:00		50	100	25	22	> 20	17.75		T2IOI	-11.90 -17.55	17.55		III	
2.5											-12.10 -17.75	17.75		II	Strong, pinkish grey, slightly decomposed medium grained GRANITE. Joints are very closely spaced to closely spaced, locally medium spaced, rough planar and rough stepped, extremely narrow, clean, locally manganese and limonite stained, dipping 40° to 50°, 50° to 60° and 70° to 80°.
2.6			50	100	55	43		18.50		T2IOI					
2.7							2.2	18.95							
2.8							6.7				19.37				
2.9			50							T2IOI		-14.35 -20.00			


- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U64 undisturbed sample
- U76 undisturbed sample
- U100 undisturbed sample
- Mazier sample
- Piston sample
- Environmental Sample
- Water sample
- Piezometer tip
- Standpipe tip
- Standard penetration test
- Pressuremeter test
- Water absorption test or Permeability test
- Sonic televiewer test
- Impression packer test
- In-situ vane shear test



LOGGED	T. C. Yip
DATE	28/05/2004
CHECKED	G. Whatmore
DATE	28/05/2004










REMARKS












Drilling Progress		Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I. / Test Depths	Tests	Samples		Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
											No.	Type	Depth				
				100	92	67			20.00			T2IOI	-14.35	20.00	+	II	See sheet 2 of 3
			50					2.7				T2IOI		20.78	+		
									21.10						+		
			50	100	100	73		3.4	21.36			T2IOI			+		
									21.65						+		
								7.7						22.17	+		
									22.30						+		
			50	100	100	93		2.2				T2IOI			+		
	24/05/2004	23.20	1.28m at 13:00										-17.55	23.20	+		End of Investigation Hole at 23.20m.

	VIBRO (H.K.) LTD. SITE INVESTIGATION DEPARTMENT				DRILLHOLE No. BH 4
	DRILLHOLE RECORD				SHEET 1 OF 3
PROJECT	Proposed Subway Connection between Pioneer Centre and MTR Prince Edward Station				
METHOD	Rotary	CO-ORDINATES	E 835470.80	CONTRACT No.	J200421e
MACHINE & No.	BM45		N 820463.98	DATE	11/05/2004 to 13/05/2004
FLUSHING MEDIUM	Nil, Water used below 4.50m	GROUND LEVEL	+ 5.92 mPD	ORIENTATION	Vertical

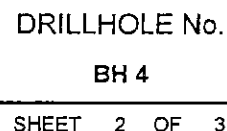
Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index F.I. / Test Depths	Tests	Samples No. Type Depth	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description	
11/05/2004	SW								A E*E 0.45 0.50	+5.42	0.50			Dark grey and greyish brown, silty fine to coarse SAND with much angular to subangular fine to coarse gravel. (FILL)	
								B E*E 0.95						Pinkish brown, silty fine to coarse SAND with some angular fine to medium gravel. (FILL)	
								C E*E 1.45 1.50							
								D E*E 1.95	+3.92	2.00				Firm, greyish brown, sandy SILT with some angular fine gravel. (FILL)	
									1 E*E 2.45 2.50						
									2 E*E 3.45 3.50						
									3 E*E 4.45 4.50						
			50	95					4	+0.92	5.00		V	Extremely weak, pinkish grey, dappled brown, completely decomposed medium grained GRANITE. (Very silty fine to coarse SAND with some angular fine gravel)	
	SW 5.55 PW						6.10 12.5 7.7 18.20 N=52	5 6	6.05 6.10						
			50	95				7 8	6.50 6.60	-1.08	7.00			V	Extremely weak, pinkish grey, dappled brown, completely decomposed medium to coarse grained GRANITE. (Silty fine to coarse SAND with some angular fine gravel)
							7.50 7.70 8.10 18.25 35.50 N=128	9 10	7.65 7.70						
									11 12						
			50	100					13 14						
11/05/2004		2.65m at 13:00							15 16						
12/05/2004		2.57m at 08:00								-4.08	10.00				

 Small disturbed sample
 Large disturbed sample
 SPT liner sample
 U64 undisturbed sample
 U76 undisturbed sample
 U100 undisturbed sample
 Mazier sample
 Piston sample
 Environmental Sample

 Water sample
 Piezometer tip
 Standpipe tip
 Standard penetration test
 Pressuremeter test
 Water absorption test or Permeability test
 Sonic televiwer test
 Impression packer test
 In-situ vane shear test

LOGGED	T. C. Yip
DATE	15/05/2004
CHECKED	G. Whatmore
DATE	15/05/2004

REMARKS
 1. An inspection pit was excavated by hand to 2.00m.
 2. Two Nos. environmental samples were taken at 0.50m, 1.50m, 2.50m, 3.50m and 4.50m.
 3. An environmental monitoring well was installed on 07/05/2004 to 4.50m for 3 days. After 3 days a water sample was taken at 4.50m. The well was then removed and the Drillhole continued.
 4. Falling head permeability tests were carried out from 7.50m to 9.00m.



Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I. / Test Depths	Tests	Samples		Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
										No.	Type					
			50	80						17	18	-4.08	10.00		V	See sheet 1 of 3
								10.90	8, 10 15, 20, 23, 42 N=100	19	20					
			50	100						21	22					
								12.50	6, 11 15, 18, 25, 40 N=98	23	24					
			50	100						25	26					
								14.10	15, 30 40, 65, 89, 95 N=289	27	28					
			50	95						29	30					
		0.30m at 15.84						15.70	18, 100/65mm (100/65mm)							
12/05/2004	PW	16.00						16.00				-10.08	16.00		IV/III	Moderately strong to strong, pinkish grey, dappled brown, moderately to slightly decomposed medium to coarse grained GRANITE.
13/05/2004	HW	2.56m at 08:00						15.20		T21OI		-16.43	16.35		III/II	Joints are closely spaced to medium spaced, locally very closely spaced, rough planar and rough stepped, extremely narrow to very narrow, manganese stained, limonite stained and clean, dipping 10° to 20°, 20° to 30° and 50° to 60°. From 16.00m to 16.35m : Weak to moderately weak, highly to moderately decomposed GRANITE.
	HW	16.57						16.80								
			50	100	88	82		17.16		T21OI						
								18.03				-12.11	18.03		IV/III	From 18.03m to 18.20m : Weak to moderately weak, highly to moderately decomposed GRANITE.
								18.27				-12.28	18.20		III/II	
			50	100	68	44		19.03		T21OI		-12.68	18.60		IV/II	From 18.60m to 19.00m : Weak to moderately weak, highly to moderately decomposed GRANITE.
								19.22				-13.08	19.00		III/II	
								19.32								
								19.60		T21OI		-13.59	19.51		IV/III	From 19.51m to 19.90m : Weak to moderately weak, highly to moderately decomposed GRANITE.
			50									-13.88	19.90			

Small disturbed sample

Large disturbed sample

SPT liner sample

U84 undisturbed sample

U76 undisturbed sample

U100 undisturbed sample

Mazier sample

Piston sample

Environmental Sample

Water sample

Piezometer tip

Standpipe tip

Standard penetration test

Pressuremeter test

Water absorption test or Permeability test

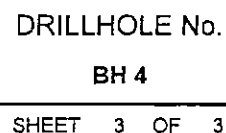
Sonic televiewer test

Impression packer test

In-situ vane shear test

LOGGED	T. C. Yip
DATE	15/05/2004
CHECKED	G. Whatmore
DATE	15/05/2004

REMARKS




PROJECT	Proposed Subway Connection between Pioneer Centre and MTR Prince Edward Station				
METHOD	Rotary	CO-ORDINATES	E 835470.80	CONTRACT No.	J200421e
MACHINE & No.	BM45		N 820463.98	DATE	11/05/2004 to 13/05/2004
FLUSHING MEDIUM	Nil, Water used below 4.50m	GROUND LEVEL	+ 5.92 mPD	ORIENTATION	Vertical

	Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I./ Test Depths	Tests	Samples No. Type Depth	Reduced Level (mPD) -14.08	Depth (m) 20.00	Legend	Grade	Description
21				50	100	96	96	2.7			T2IOI ↓ 20.93			+ + + + +	IH/I	Moderately strong to strong, pinkish grey, moderately to slightly decomposed medium to coarse grained GRANITE. Joints are closely spaced to medium spaced, rough planar and rough stepped, extremely narrow to very narrow, clean and limonite stained, dipping 30° to 40°, 40° to 50° and 50° to 60°. From 20.10m to 20.90m : With some voids sized up to 5mm x 5mm.
22				50	100	81	46	2.5	10.0 21.10 21.40		T2IOI ↓ 21.80	-16.25	22.17	+ + + + +		
23				50	100	100	100	2.4	8.1 22.17		T2IOI ↓ 23.83			+ + + + +	II	Strong, pinkish grey, slightly decomposed medium to coarse grained GRANITE. Joints are closely spaced to medium spaced, locally widely spaced, rough planar and rough stepped, extremely narrow, clean, manganese stained and limonite stained, dipping 10° to 20°, 40° to 50° and 50° to 60°.
24				50	100	95	83	4.4	24.20		T2IOI ↓ 25.27			+ + + + +		
25				50	100	83	69	9.4	25.06 25.48 25.80		T2IOI ↓ 26.25	-20.33	26.25	+ + + + +		
26	13/05/2004	2.80m at 18:00						2.2								End of Investigation Hole at 26.25m.
27																
28																
29																
30																

- Small disturbed sample ▲ Water sample
- Large disturbed sample □ Piezometer tip
- SPT liner sample ■ Standpipe tip
- U54 undisturbed sample Standard penetration test
- U76 undisturbed sample Pressuremeter test
- U100 undisturbed sample Water absorption test or Permeability test
- Mazier sample ⌋ Sonic televiewer test
- Piston sample ∩ Impression packer test
- Environmental Sample ▽ In-situ vane shear test

LOGGED	T. C. Yip	REMARKS
DATE	15/05/2004	
CHECKED	G. Whatmore	
DATE	15/05/2004	

		VIBRO (H.K.) LTD. SITE INVESTIGATION DEPARTMENT			DRILLHOLE No. BH 7
		DRILLHOLE RECORD			SHEET 1 OF 4
PROJECT	Proposed Subway Connection between Pioneer Centre and MTR Prince Edward Station				
METHOD	Rotary	CO-ORDINATES	E 835466.32	CONTRACT No.	J200421e
MACHINE & No.	BM48		N 820501.34	DATE	07/05/2004 to 17/05/2004
FLUSHING MEDIUM	Nil, Water used below 4.50m	GROUND LEVEL	+ 5.75 mPD	ORIENTATION	Vertical

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I. / Test Depths	Tests	Samples		Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
										No.	Type					
07/05/2004	SW									A	E E	6.45 0.50	+5.75 0.50			Brownish grey, angular to subangular fine to coarse GRAVEL with occasional subangular cobbles. (FILL)
										B	E E	0.95				Pinkish brown, silty fine to coarse SAND with some angular fine gravel. (FILL)
										C	E E	1.45 1.50				
										D	E E	1.95	+3.75 2.00			Firm, greyish brown, dappled pink, sandy SILT with some angular fine gravel. (FILL)
										1	E E	2.45 2.50				
										2	E E	3.45 3.50				
										3	E E	4.45 4.50				
07/05/2004 11/05/2004	3.31m at 18:00 2.83m at 08:00									4	E E	4.90 5.00	+0.75 5.00			Extremely weak, pinkish brown and pink, completely decomposed medium grained GRANITE. (Very silty fine to coarse SAND with some angular fine gravel)
	SW 6.10 PW									5	E E	6.05 6.10				
										6	E E	6.50 6.60				
										7	E E	6.50 6.60				
										8	E E	7.55				
										9	E E	8.10 8.20	-2.45 8.20			Extremely weak, pinkish brown and pink, dappled brown, completely decomposed medium grained GRANITE. (Very silty fine to coarse SAND with some angular fine gravel)
11/05/2004 12/05/2004	0.87m at 18:00 2.86m at 08:00									10	E E	8.10 8.20				
										11	E E	8.25 9.30				
										12	E E	8.25 9.30				
										13	E E	8.70 9.80	-4.25 10.00			
										14	E E					
										15	E E					


Small disturbed sample
 Large disturbed sample
 SPT liner sample
 U54 undisturbed sample
 U76 undisturbed sample
 U100 undisturbed sample
 Mazier sample
 Piston sample
 Environmental Sample

Water sample
 Piezometer tip
 Standpipe tip
 Standard penetration test
 Pressuremeter test
 Water absorption test or Permeability test
 Sonic televiewer test
 Impression packer test
 In-situ vane shear test

LOGGED	T. C. Yip
DATE	19/05/2004
CHECKED	G. Whatmore
DATE	21/05/2004

REMARKS

- An inspection pit was excavated by hand to 2.00m.
- Two Nos. environmental samples were taken at 0.50m, 1.50m, 2.50m, 3.50m and 4.50m.
- An environmental monitoring well was installed on 07/05/2004 to 4.90m for 3 days, after 3 days a water sample was taken at 4.90m.
- Two falling head permeability tests were carried out from 9.00m to 10.50m.

	VIBRO (H.K.) LTD. SITE INVESTIGATION DEPARTMENT				DRILLHOLE No. BH 7
	DRILLHOLE RECORD				SHEET 2 OF 4
PROJECT	Proposed Subway Connection between Pioneer Centre and MTR Prince Edward Station				
METHOD	Rotary	CO-ORDINATES	E 835466.32	CONTRACT No.	J200421e
MACHINE & No.	BM48		N 820501.34	DATE	07/05/2004 to 17/05/2004
FLUSHING MEDIUM	Nil, Water used below 4.50m	GROUND LEVEL	+ 5.75 mPD	ORIENTATION	Vertical

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Return %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I. / Test Depth	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
										No. Type Depth	-4.25	10.00			
12/05/2004 13/05/2004	2.87m at 18:00 2.87m at 08:00		0	100				10.50		16 10.85 17 10.90				V	See sheet 1 of 4
								10.90	11.16 28.39, 51.86 N=204	18 11.30 19 11.40					
			0	100				12.50	10.19 26.38, 45.73 N=162	20 12.45 21 12.50					
								12.90		22 12.60 23 13.00					
			0	100				14.10	15.23 27.33, 35.51 N=146	24 14.05 25 14.10					
	PW 14.80 HW							14.50		26 14.50 27 14.60					
			0	100				15.70	17.33 48.61, 85.100/55 (294/260mm)	28 15.65 29 15.70					
								16.20		30 16.08 31 16.20	-10.45	16.20		V/V	Extremely weak to very weak, pinkish brown and pink, dappled brown, completely to highly decomposed medium grained GRANITE. (Slightly silty fine to coarse SAND with much angular to subangular fine to medium gravel)
			0	88				17.30	43.100/45mm (100/45mm)	32 17.25 33 17.37					
								17.80		34 17.80					
13/05/2004 14/05/2004	0.37m at 18:00 2.76m at 08:00		0	94				18.90	63.100/35mm (100/35mm)	35 18.80 36 18.96					
								19.40		37 19.40					
			0	93				20.00			-14.25	20.00			
• Small disturbed sample ▬ Large disturbed sample ▬ SPT liner sample ▬ U64 undisturbed sample ▬ U76 undisturbed sample ▬ U100 undisturbed sample ▬ Mazier sample ▬ Piston sample ▬ Environmental Sample										LOGGED	T. C. Yip	REMARKS			
▲ Water sample □ Piezometer tip ▬ Standpipe tip ▬ Standard penetration test ▬ Pressuremeter test ▬ Water absorption test or Permeability test ▬ Sonic televiewer test ▬ Impression packer test ▬ In-situ vane shear test										DATE	19/05/2004				
										CHECKED	G. Whatmore				
										DATE	21/05/2004				



















		VIBRO (H.K.) LTD. SITE INVESTIGATION DEPARTMENT				DRILLHOLE No. BH 7					
		DRILLHOLE RECORD				SHEET 3 OF 4					
PROJECT		Proposed Subway Connection between Pioneer Centre and MTR Prince Edward Station									
METHOD		Rotary		CO-ORDINATES		E 835466.32		CONTRACT No.		J200421e	
MACHINE & No.		BM48				N 820501.34		DATE		07/05/2004 to 17/05/2004	
FLUSHING MEDIUM		Nil, Water used below 4.50m		GROUND LEVEL		+ 5.75 mPD		ORIENTATION		Vertical	

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I. / Test Depths	Tests	Samples		Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
										No.	Type					
												-14.25	20.00		V/V	See sheet 2 of 4
										38	20.15					
										39	20.50					
										40	21.00	-15.38	21.14		IV	
											21.09	-15.45	21.20		III	
											21.14	-15.95	21.70		IV	Weak to moderately weak, greyish pink and brown, mottled white, highly decomposed medium grained GRANITE. Joints are very closely spaced to closely spaced, locally medium spaced, rough planar, very narrow to narrow, manganese stained and limonite stained, dipping 20° to 30°, 40° to 50° and 50° to 60°. From 21.20m to 21.70m : Moderately strong, moderately decomposed GRANITE.
											22.25					
											22.85					
											23.05					
											23.15					
											23.73					
											24.85					
											25.13					
											25.77					
											26.15					
											27.48					
											28.06	-22.31	28.06		IV/III	From 28.06m to 28.50m : Weak to moderately strong, highly to moderately decomposed GRANITE.
											28.50	-22.75	28.50		III/II	
											28.85	-23.05	28.80		IV	Weak to moderately weak, pinkish grey, dappled green, highly decomposed medium grained GRANITE. Joints are very closely spaced to closely spaced, rough planar and rough undulating, very narrow to narrow, clean and kaolin infilled (1 mm), dipping 20° to 30° and 40° to 50°. From 29.50m to 30.00m : Subvertical joint.
											29.20					
											29.50					
											30.00					

<ul style="list-style-type: none"> ● Small disturbed sample ■ Large disturbed sample □ SPT liner sample ▨ U64 undisturbed sample ▩ U76 undisturbed sample ■ U100 undisturbed sample ▨ Mazier sample ▩ Piston sample ▨ Environmental Sample 	<ul style="list-style-type: none"> ▲ Water sample □ Piezometer tip ■ Standpipe tip — Standard penetration test — Pressuremeter test — Water absorption test or Permeability test — Sonic televiewer test — Impression packer test — In-situ vane shear test 	LOGGED T. C. Yip DATE 19/05/2004 CHECKED G. Whatmore DATE 21/05/2004	REMARKS
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PROJECT	Proposed Subway Connection between Pioneer Centre and MTR Prince Edward Station				
METHOD	Rotary	CO-ORDINATES	E 835466.32	CONTRACT No.	J200421e
MACHINE & No.	BM48		N 820501.34	DATE	07/05/2004 to 17/05/2004
FLUSHING MEDIUM	Nil, Water used below 4.50m	GROUND LEVEL	+ 5.75 mPD	ORIENTATION	Vertical

	Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index F.I./Test Depths	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
										No. Type Depth	-24.25	30.00			
				84	44	27		30.25 NI NR 30.44 30.64		T2IOI	-24.69	30.44	+	IV	See sheet 3 of 4
				0	90	40	20	8.3 31.24		— 30.74 T2IOI — 31.24	-24.89 -25.55	30.64 31.30	++ +++	V/VV IV	From 30.44m to 30.64m : No recovery, inferring completely to highly decomposed GRANITE.
				0	100	83	80	4.2 32.20		— 31.64 T2IOI — 31.64	-26.40 -26.75	32.15 32.50	+++ ++++	III IV/III	Moderately weak to moderately strong, greyish pink, mottled white, moderately decomposed medium grained GRANITE. Joints are closely spaced to medium spaced, rough planar, extremely narrow to very narrow, clean and kaolin infilled (1 mm), dipping 50° to 60° and 60° to 70°. From 32.15m to 32.50m : Weak to moderately strong, highly to moderately decomposed GRANITE.
				0	97	66	46	> 20 4.0 32.75 33.00		T2IOI — 32.82	-27.30	32.50 33.05	+ ++++	II/III	
		3.63m at 12:00		0	100	42	0	7.0		T2IOI — 33.88			+++		Moderately strong to strong, greyish pink, moderately to slightly decomposed medium to coarse grained GRANITE. Joints are closely spaced to medium spaced, locally very closely spaced, rough planar and rough stepped, extremely narrow to very narrow, clean, kaolin infilled (1 mm) and occasional chlorite coated, dipping 40° to 50°, 50° to 60° and 60° to 70°. From 33.25m to 33.60m : Slickensided undulating joint dipping 60° to 70°.
		3.01m at 08:00		0	100	87	56	3.3 6.0 34.80		T2IOI — 34.60			+++		
				0	100	80	59	4.2 8.4 35.60		— 35.46 T2IOI — 35.46			+++		
				0	100	65	58	2.7 36.35 36.60		T2IOI — 36.88			+++		
				0	100	87	78	5.4		— 37.53 T2IOI — 37.53			+++		
				0	100	94	73	1.8 37.90		T2IOI — 38.53	-33.18	38.93	+++		
		3.71m at 14:40													End of Investigation Hole at 38.93m.

 Small disturbed sample  Large disturbed sample  SPT liner sample  U64 undisturbed sample  U76 undisturbed sample  U100 undisturbed sample  Mazier sample  Piston sample  Environmental Sample	 Water sample  Piezometer tip  Standpipe tip  Standard penetration test  Pressuremeter test  Water absorption test or Permeability test  Sonic televiewer test  Impression packer test  In-situ vane shear test	LOGGED DATE CHECKED DATE	T. C. Yip 19/05/2004 G. Whatmore 21/05/2004	REMARKS
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VIBRO (H.K.) LTD.

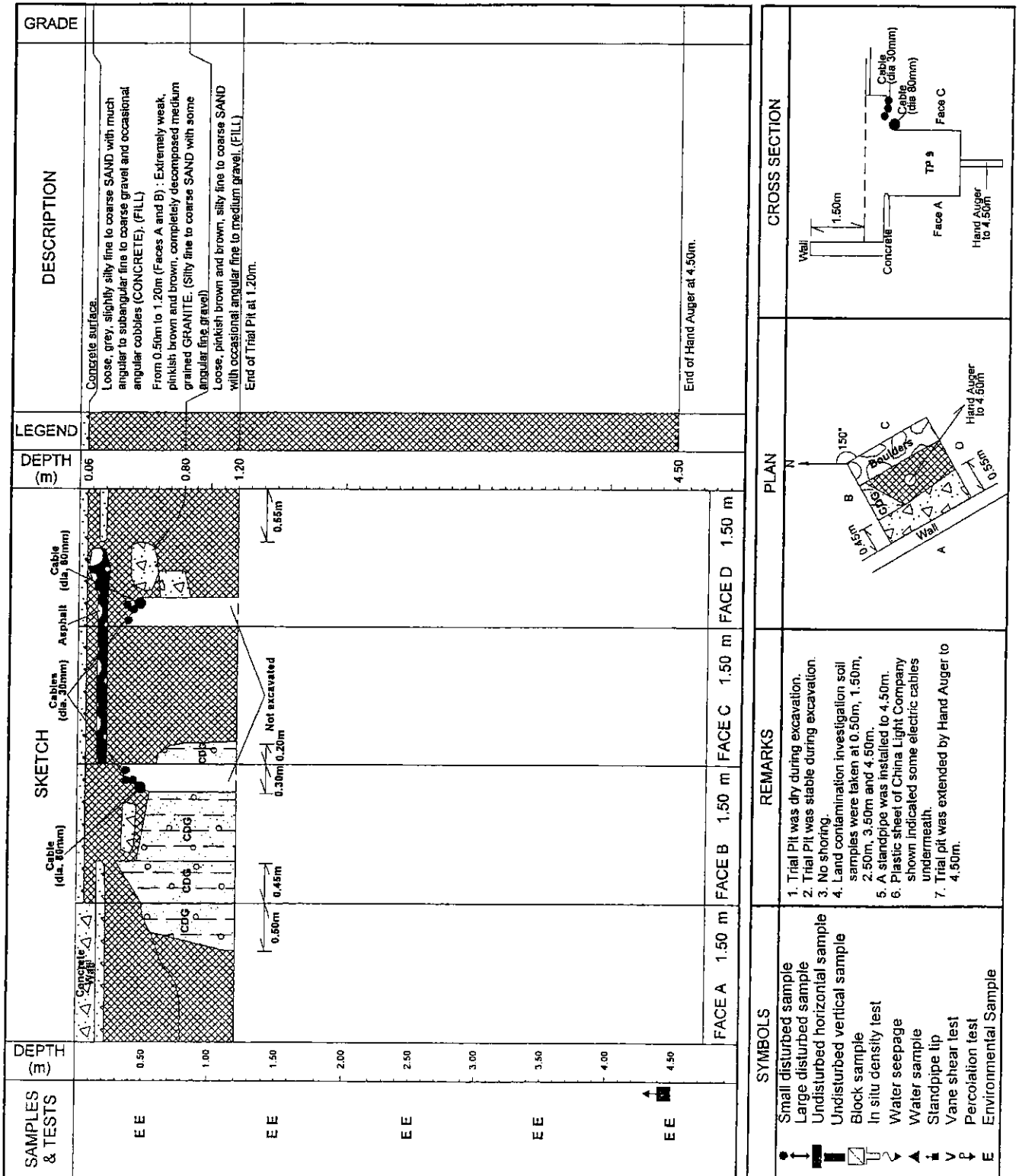
SITE INVESTIGATION DEPARTMENT

TRIAL PIT RECORD

TRIAL PIT No.:
TP 9

SHEET 1 OF 1

PROJECT	Proposed Subway Connection between Pioneer Centre and MTR Prince Edward Station				
STARTED ON	17/05/2004	CO-ORDINATES	E 835468.06	CONTRACT No.	J200421e
COMPLETED ON	25/05/2004		N 820481.17	LOGGED BY	T. C. Yip
				DATE	25/05/2004
BACKFILLED ON	25/05/2004	GROUND LEVEL	+ 5.89 mPD	CHECKED BY	G. Whatmore
				DATE	28/05/2004



Annex 2

Laboratory Report



Lam Environmental Services
Test Specialists & Environmental Analysts

SUMMARY REPORT

Project: Prince Edward Station Pedestrian Subway Extension and Entrance Modification Works

Client: Vibro (HK) Ltd.

Address: G/F, Shop 11 and 1/F

2 Landale Street,

Wanchai, Hong Kong

Contract No.: NA

Lab. Job No.: J321

Matrix: Soil

Laboratory Sample ID	Sample Reference			Metals		Total Petroleum Hydrocarbons					BTEX			
	Drillhole No.	Depth (m)		Lead	C6-C9	C10-C14	C15-C28	C29-C36	Benzene	Toluene	Ethyl benzene	m,p-Xylenes	o-Xylene	
		From	To											
Reporting Limits														
12895/1	BH-4	0.50	NA	68	<2	<50	<100	100	0.2	0.2	0.2	0.4	0.2	
12895/4	BH-4	1.50	NA	25	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12895/7	BH-4	2.50	NA	12	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12895/10	BH-4	3.50	NA	35	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12895/13	BH-4	4.50	NA	13	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12895/16	BH-7	0.50	NA	30	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12895/19	BH-7	1.50	NA	12	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12895/22	BH-7	2.50	NA	48	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12895/25	BH-7	3.50	NA	17	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12895/28	BH-7	4.50	NA	16	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12895/31	QC Sample	NA	NA	31	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12941/1	BH-1	0.5	NA	17	<2	<50	<100	<100	<0.2	0.3	<0.2	<0.4	<0.2	
12941/4	BH-1	1.5	NA	11	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12941/7	BH-1	2.50	NA	11	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12941/10	BH-1	1.90	NA	20	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12941/16	TP9	0.50	NA	60	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12941/19	TP9	1.50	NA	12	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12941/22	TP9	2.50	NA	6	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	
12941/25	TP9	3.50	NA	12	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	

Note: The duplicate sample indicated 'QC Sample' was taken during the sampling of BH-7



Lam Environmental Services
Test Specialists & Environmental Analysts

SUMMARY REPORT

Project: Prince Edward Station Pedestrian Subway Extension and Entrance Modification Works
Client: Vibro (HK) Ltd.
Address: G/F, Shop 11 and 1/F
2 Landale Street,
Wanchai, Hong Kong
Contract No.: NA
Lab. Job No.: J321
Matrix: Groundwater

Laboratory Sample ID	Sample Reference			Metals		Total Petroleum Hydrocarbons	BTEX				
	Drillhole	Depth (m)		Lead	Benzene		Toluene	Ethyl benzene	m,p-Xylenes	o-Xylene	
		No.	From								To
			Reporting Limits	1	ug/L						
12902/1	BH-7		NA	NA	<1	<200	2	2	2	4	2
12902/4	BH-4		NA	NA	<1	<200	<2	<2	<2	<4	<2
12902/7	QA/QC		NA	NA	<1	<200	<2	<2	<2	<4	<2
12958/1	BH1		3.93m	NA	<1	<200	<2	<2	<2	<4	<2
12958/4	TP9		3.15m	NA	<1	<200	<2	<2	<2	<4	<2
12958/7	BH1 Field Blank		NA	NA	<1	<200	<2	<2	<2	<4	<2
12958/10	BH1 Trip Blank		NA	NA	<1	<200	<2	<2	<2	<4	<2

Note: The duplicate sample indicated 'QA/QC' was taken during the sampling of BH-1

Annex 3

Calculation of Relative Percent
Difference (RPD)

Calculation of Relative Percent Difference (RPD) of Soil Samples

Testing Parameters	Metal (mg/kg)	TPH (mg/kg)				BTEX (mg/kg)				
	Lead	C6-C9	C10-C14	C15-C28	C29-C36	Benzene	Toluene	Ethylbenzene	m,p-Xylenes	o-Xylene
Primary Sample (BH-7-4.5m)	16	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2
Duplicate Sample (QC Sample)	31	<2	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2
RPD = (Primary - Duplicate)/Mean of Results *100%	-63.8%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Calculation of Relative Percent Difference (RPD) of Groundwater Samples

Testing Parameters	Metal (ug/L)	TPH(ug/L)	BTEX (ug/L)				
	Lead	C29-C36	Benzene	Toluene	Ethylbenzene	m,p-Xylenes	o-Xylene
Primary Sample (BH-1)	<1	<200	<2	<2	<2	<4	<2
Duplicate Sample (QA/QC Sample)	<1	<200	<2	<2	<2	<4	<2
RPD = (Primary - Duplicate)/Mean of Results *100%	0%	0%	0%	0%	0%	0%	0%

APPENDIX 3

Preliminary Schedule of Works

Prince Edward Station Pedestrian Subway Extension and Entrance Modification Works

Preliminary Schedule of Works

Section	Activities	Time		Duration (Months)	2005			2006												2007									
		Start	End		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
All Sections	Preparation Works	Oct-05	May-06	8																									
Section 1	Open Excavation from Ch000 to Ch067 and Plant Room	Jan-06	Nov-06	11																									
Section 2	Open Excavation from Ch067 to Ch096	Sep-06	Apr-07	8																									
Section 3	Open Excavation from Ch096 to Ch130	May-06	Mar-07	11																									
Section 4	Excavation from Ch130.4 to Ch159.8 (Demolish Existing B2 Entrance)	May-07	Oct-07	6																									
All Sections	Final Stage - Backfill and Reinstatement	Oct-06	Oct-07	13																									

APPENDIX 4

Implementation Schedule

IMPLEMENTATION SCHEDULE OF THE PROPOSED MITIGATION MEASURES

Project profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to implement the measure ?	Location of the measure	When to implement the measure ?	What requirements or standards for the measure to achieve ?
S 5.1.1	Construction Dust Control Measures <ul style="list-style-type: none"> • Use of regular watering to reduce dust emissions from exposed site surface and unpaved road, with complete coverage, particularly during dry weather. • Use of frequent watering for particularly dusty static construction areas and areas close to air sensitive receivers. • Provision of vehicle wheel and body washing at the exit points of the site if practical. • Tarpaulin covering of dusty vehicle when waste is transported from the site. • Routing of vehicles and positioning of construction plant should be at the maximum possible distance from air sensitive receivers particularly the dwellings. • Due to the small size of the site and the lack of space for stockpiling, excavated materials should be hauled off site almost immediately. However, should there be stockpiled excavated materials, they should be covered with tarpaulin, and should 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
S 5.2.2	<ul style="list-style-type: none"> • Use of quiet plant 	To minimise 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 Measure & Main Concerns to address	Who to implement the measure ?	Location of the measure	When to implement the measure ?	What requirements or standards for the measure to achieve ?
S 5.2.3	<ul style="list-style-type: none"> Use of movable barrier, noise enclosure or acoustic shed 	To minimise construction noise emissions	Contractor	Work Site	Construction Stage	ProPECC PN2/93 and Noise Control Ordinance
S 5.2.4	<ul style="list-style-type: none"> Use of noise insulating fabric KYOWA#1000 (hereinafter "the Fabric") for the utilities diversion work in Section 1. The Contractor should select different noise insulating fabric with similar function and effectiveness to achieve the noise alleviation. 	To minimise construction noise emissions	Contractor	Work Site	Construction Stage	ProPECC PN2/93 and Noise Control Ordinance
S 5.2.6	<p><i>Construction Noise Control Measures</i></p> <ul style="list-style-type: none"> Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program. Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction program. Mobile plant, if any, should be sited as far from NSRs as possible. Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs. 	To minimise construction noise emissions	Contractor	Work Site	Construction Stage	ProPECC PN2/93 and Noise Control Ordinance
S 5.2.6	<p><i>Contingency Planning</i></p> <ul style="list-style-type: none"> Noise monitoring and site audits should be 	To monitor the construction noise emissions	Contractor	Work Site	Construction Stage	-

Project profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to implement the measure ?	Location of the measure	When to implement the measure ?	What requirements or standards for the measure to achieve ?
	carried out to check on compliance with the assessment criteria.					
S 5.2.6	<i>Greening of Work Site</i> <ul style="list-style-type: none"> The design of hoardings, barriers and enclosures should take into consideration colour schemes that are harmonious with the background so as to minimise visual impacts. 	To minimise visual impacts due to the noise mitigation measures	Contractor	Work Site	Construction Stage	-
S 5.2.7	<ul style="list-style-type: none"> No percussive piling will be carried out for the Project, and only sheet piling installation would be carried out. 	To alleviate noise from piling and construction vibration impact	Contractor	Work Site	Construction Stage	-
S 5.3.1	<i>Construction Water Quality Impact Measures</i> <ul style="list-style-type: none"> The Contractors should comply with the WPCO and its subsidiary regulation. The Contractors should ensure that all runoffs arising from the work site are properly collected and treated, and that the discharge standards as stipulated in WPCO are met. The Contractor is required to provide sedimentation tanks or other treatment facilities to handle the runoffs and wastewater generated. Any trade effluent or foul or contaminated water should not be discharged into any public sewer and stormwater drain, unless an effluent discharge permit is obtained under the WPCO. 	To reduce water quality impact induced by the construction work	Contractor	Work Site	Construction Stage	ProPECC PN 1/94; WPCO

Project profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to implement the measure ?	Location of the measure	When to implement the measure ?	What requirements or standards for the measure to achieve ?
	<ul style="list-style-type: none"> Site toilet facilities, if needed, should be chemical toilets or should have the foul water effluent directed to a foul sewer. The Contractor should be responsible for the design, construction, operation and maintenance of all the mitigation measures and follow practices noted in the ProPECC PN 1/94 "Construction Site Drainage" issued by EPD. 					
S 5.4.1	<p><i>Construction Waste Management Measures</i></p> <ul style="list-style-type: none"> The Contractor shall comply with the Waste Disposal (Chemical Waste) (General) Regulation, the Waste Disposal Ordinance and its subsidiary regulations. The Contractor should not permit any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from site onto any adjoining land or allow any waste matter which is not part of the final product from waste processing plants to be deposited anywhere within any site or onto any adjoining land. The Contractor should keep waste arisings to a minimum and to ensure that waste is handled, transported and disposed of in a suitable manner. The construction waste generated by the Contractor on site shall be transported to the designated EPD facilities. The Contractor shall use a trip ticket system for the disposal of C&D materials to any designated public 	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.54); Waste Disposal (Chemical Waste) (General) Regulation; WBTC No.21/2002; ETWB TCW No. 15/2003

Project profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to implement the measure ?	Location of the measure	When to implement the measure ?	What requirements or standards for the measure to achieve ?
	<p>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"> The following additional control/mitigation measures are recommended to be followed by the Contractor: <ul style="list-style-type: none"> The Contractor should segregate different types of wastes for storing in different containers to facilitate reuse or recycling of materials and their proper disposal where practical. The Contractor should propose how he will monitor and record waste produced for agreement with MTRC. 					