Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway

Deliverable 2.1D Project Profile
Revision A

March 2012

MTR Corporation

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Issue and revision record

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1. Basic Information

1.1 Project Title

The title of this project is known as MTR Tsim Sha Tsui Station Carnarvon Road Subway and Entrances Modification Works (hereafter called the "Project").

1.2 Project Description

To improve the appearance of Carnarvon Road entrances D1 and D2 of Tsim Sha Tsui (TST) Station and to provide a more comfortable walking environment nearby, MTR Corporation Limited (the Corporation) proposes to rebuild the entrances D1 and D2 and to construct a new entrance D3 at the basement B2 level of the K11 Art Mall connected to the TST station by a subway. The subway extends from the Entrances D1 and D2 at the middle of the TST Station, running approximately 80m along Carnarvon Road and across the Bristol Avenue to the basement B2 level (at -4.5mPD) of the K11 Art Mall, as shown in **Figure 1.1**.

The tentative overall programme for the Project is from mid 2013 to mid 2015, whereas the tentative schedule involving the open-cut construction works when the traffic impact is most severe is from mid 2013 to the mid of 2015.

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

The Project will involve modification of the two existing entrances of TST Station, construction of the Subway and one integrated entrance to K11. The proposed Subway will be fully air-conditioned and is approximately 3.2m internal width and approximately 80m in total length (i.e. walking distance) with access to K11. The section of the Works from the existing TST station up to the lot boundary of the K11 Art Mall will be gazetted under the Railways Ordinance.

In accordance with Section 9(2)(g) of the Environmental Impact Assessment Ordinance (EIAO)(Cap. 499*)*, the existing MTR TST Station is an exempted designated project since the TST Station had been in operation before the Ordinance came into effect on 1 April 1998. Since the proposed works involves physical alternation to the existing Station and may have potential environmental impacts, it is considered as a project constituting a material change to an exempted designated project under Schedule 2 of the EIAO. The procedures under the EIAO should be followed and an environmental permit is required prior to the commencement of the 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.

1.4 Name of Project Proponent

MTR Corporation Limited
MTR Tower
Telford Plaza
Kowloon Bay
Hong Kong

1.5 Location of the Project

The Project is located in Tsim Sha Tsui district which is an urban area with a mixture of commercial and residential developments. The proposed works lie along Carnarvon Road between Nathan Road and Bristol Avenue where high traffic volume is anticipated. The location and alignment of the subway is shown in **Figure 1.1**. The plan and elevation are shown in **Figure 1.2**. The past land use for the Project site is the existing MTR entrances and the Carnarvon Road.

1.6 Name and Telephone Number of Contact Person(s)

For details of the Project please contact:

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1.7 Proposed Addition, Modification or Alteration

The proposed works are required to construct a new pedestrian subway under Carnarvon Road which extends from the existing MTR Tsim Sha Tsui Station concourse to the basement of the K11 Art Mall, and modify the existing Entrance D1 and Entrance D2 of the station, as shown in **Appendix I**. The new pedestrian subway, together with a dedicated public passageway within the K11 Art Mall and the existing interchange subway along Mody Road and Blenheim Avenue, will provide an alternative route between MTR Tsim Sha Tsui Station and East Tsim Sha Tsui Station. The new pedestrian subway connecting to the existing subway network together with the modified entrances will provide a more direct, convenient, safe and comfortable access for pedestrians and MTR passengers to travel to and from the area of MTR Tsim Sha Tsui Station, as shown in **Figure 1.2**. The proposed works involve the following:

- Construction of:
  - A pedestrian subway of approximately 80 metres in length underneath Carnarvon Road;
  - An underground plant room beneath the western end of the proposed pedestrian subway; and
  - An underground integrated entrance at the interface of the proposed pedestrian subway and basement level B2 of the K11 Art Mall;

- Modification of the existing MTR Tsim Sha Tsui Station Entrance D1 and Entrance D2 at Carnarvon Road;

- Construction of other associated railway facilities including communication facilities and electrical and mechanical plants;

- Reconstruction of affected existing roads including carriageways and footpaths;

- Civil and structural works, electrical works and mechanical works; and

- Ancillary works including associated drainage works, waterworks and landscaping works.

All roads and footpaths will be reinstated back to original conditions. There will not be any permanent alterations, extensions or improvement work to existing roads including Nathan Road and Bristol Avenue under this Project.

Mined tunnelling method will be adopted for the construction of the Subway section underneath the junction of Carnarvon Road and Bristol Avenue. This is to minimize the traffic impact by maintaining a clear junction and hence the traffic flow to Mody Road through Bristol Avenue.

Cut and Cover Excavation will be used for the construction of all other components of the Subway. The construction method mainly comprises excavation for the subway from the existing ground level by stages. Sheet piles and pipe piles, or other types of temporary retaining structures approved by the engineer, are first installed along the proposed subway alignment. Struts and wailings will be installed at each designated level.

Drill and Blast will not be involved in this Project, also there will be no use of explosive during excavation works. Therefore, no risk issue will be addressed.

Not all gazetted areas will have construction works carried out. Construction work areas are clearly shown in **Figure 1.1** and the relevant environmental assessment has been duly undertaken as presented in this Project Profile.

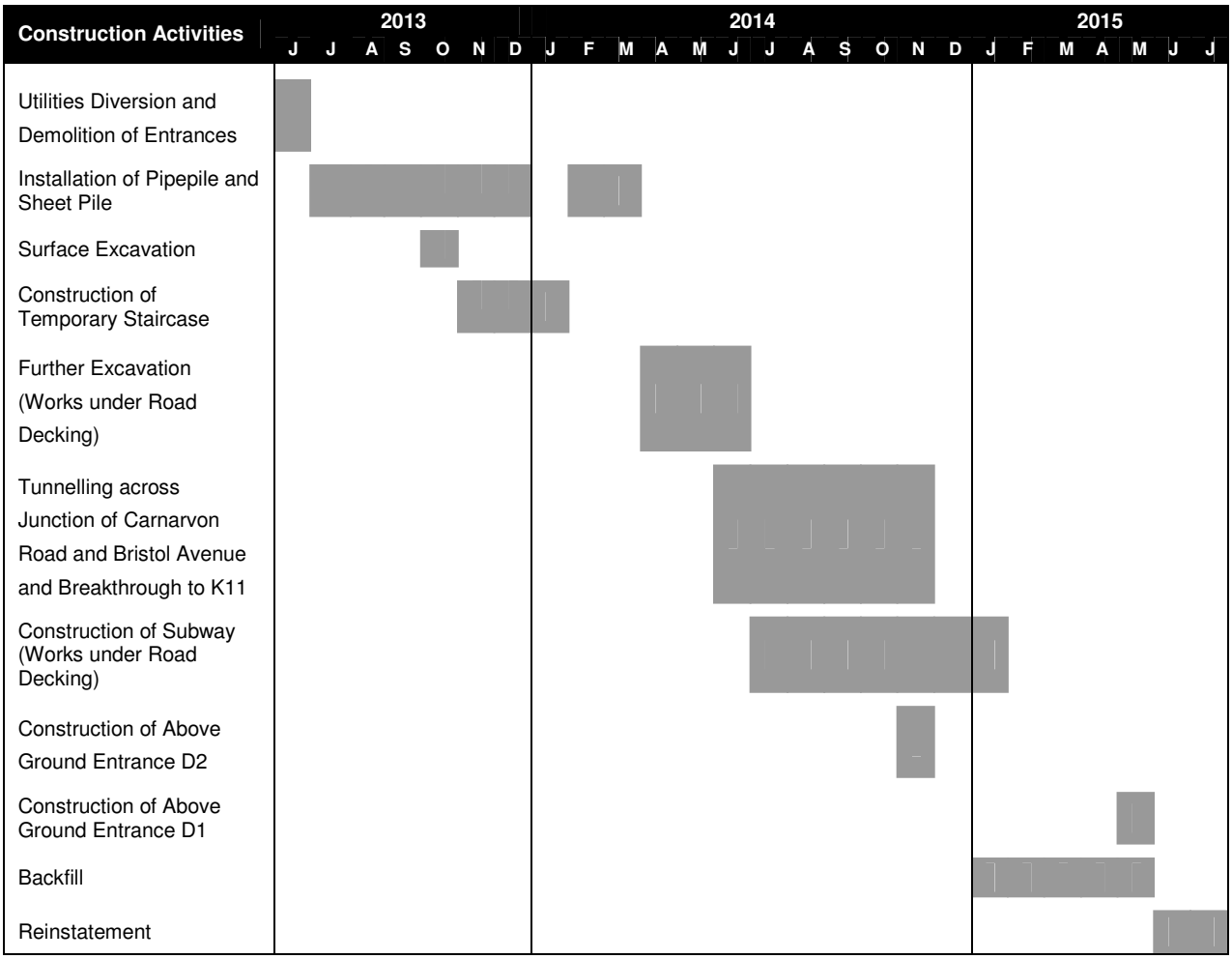
A temporary location at the site underneath the elevated part of Salisbury Road opposite the Hotel Nikko Hong Kong has been identified for the storage of the equipment used during construction, as shown in **Figure 1.3**

1.8 Tentative Project Programme

The Corporation is the Project Proponent with overall responsibility for the planning, design, construction and operation of the Project. Mott MacDonald Hong Kong Limited (MMHK) was commissioned as the engineering and environmental consultant. The proposed works will be implemented by Contractor(s) to be appointed by the Corporation.

The project time-table for finalization of design was in April 2011. The whole contract period, including the procurement of works contract and after-construction statutory inspection, is tentatively scheduled to commence from end of 2012 to mid of 2015. The construction activities for the Subway which comprise utilities diversion, cut and cover excavation, road decking and tunnelling works would take approximately 25 months from June 2013 to June 2015. The tentative construction programme is shown below. The operation of the subway will be in mid 2015.

Based on the tentative construction programme, the proposed Project will be carried out concurrently with the Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway from June 2013 to July 2014, where the construction site will be at nearby Haiphong Road Subway entrance A1. Cumulative environmental impacts from Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway are discussed in Section 2.



Remarks: 1) The decking will be provided to cut-and-cover works site subsequent to the surface excavation works. Duration of decking are around 13 months after surface excavation works.

2) The proposed Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway will be carried out concurrently with this Project from June 2013 to July 2014.

1.9 Public Consultation

The Corporation will undertake public consultation. The Project proposal was already presented to the Traffic and Transport Committee of Yau Tsim Mong District Council. Consultation will be continued throughout the preliminary and detailed design as well as the construction stage.

2. Possible Impact on the Environment

2.1 Major Elements of the Surrounding Environment

The Project is located at Carnarvon Road in Tsim Sha Tsui which has a high volume of road traffic, and the MTR Tsuen Wan Line running tunnels underground. It is surrounded by some commercial buildings and some mixed commercial/residential buildings.

To the north of the Project area, there are two high-rise commercial buildings located on top of a podium at approximately 30m above the ground namely Kincheng Commercial Centre and Lee Kar Building. At the western end of the Subway, there is a high-rise commercial/residential mixed building namely Golden Crown Court which comprises retail shops at street level, commercial shops on the first three levels and residential dwellings from the forth level upwards. At the eastern end of the Subway, there is a residential building namely Friends' House with retail shops at the street level.

To the south of the Project area, there is one high-rise commercial/residential mixed building namely Mirador Mansion which comprises retail shops at street level, commercial shops on the first three levels and residential dwellings from the forth level upwards.

The major noise source in the Project area is dominated by road traffic noise from Nathan Road, Bristol Avenue and Carnarvon Road. The existing ambient air quality is also influenced by emissions from the high volume of road traffic in and near the Project area. Golden Crown Court, Friends' House and Mirador Mansion are identified as the major existing sensitive receivers of this Project. There are no planned sensitive receivers at Carnarvon Road.

2.2 Construction Phase Impacts

2.2.1 Noise

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

The construction works will involve temporary protection and/or diversion of utilities, demolition of existing entrances, construction of Excavation and Lateral Support (ELS) cofferdam, excavation to formation level, tunnelling, construction of the Subway and the underground ancillary structures, and re-construction of the above ground entrances. The Subway will be constructed in two sections simultaneously, with cut and cover excavation adopted in Section 1 and mined tunnelling construction adopted in Section 2, as shown in **Figure 2.1**. Each section will have one set of Powered Mechanical Equipment (PME) for the work activities.

Potential impacts on Noise Sensitive Receivers (NSRs) during the construction stage will arise mainly from PME. The PMEs to be employed in this Project include generators, air compressors, excavators, lorries, mobile cranes, concrete pump trucks, concrete lorry mixers, vibrating hammers, drill rigs, poker, ventilation fans, circular saws, etc. The plant inventories for each construction activity are presented in **Appendix II**, together with the Sound Power Levels (SWLs) for each PME without mitigation measures. Accordingly, the maximum SWLs for each construction activity are calculated and are tabulated in **Table 2.1** below.

Table 2.1: Maximum SWLs for each Construction Activity (Unmitigated Scenario)

Construction Activities	Maximum SWL, dB(A)
Section 1	
Utilities Diversion along Nathan Road	110
Utilities Diversion and Demolition of Entrances	111
Installation of Pipepile and Sheet Pile	110
Surface Excavation	109
Construction of Temporary Staircase	108
Further Excavation (Works under Road Decking)	108
Construction of Subway (Works under Road Decking)	107
Construction of Above Ground Entrance	111
Backfill	109
Reinstatement	110
Section 2	
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	107

In order to evaluate the construction noise impact from the Project on the NSRs in the study area, seven representative NSRs namely, N1a, N1b, N1c, N2a, N2c, N2d and N3 within the scheme boundary and immediately facing the Project site have been selected to assess the construction noise impact with reference to the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM). NSR N2b is identified for the assessment of the fixed plant noise during operation phase. NSRs N1b, N2c and N2d are identified for the assessment of utility diversion construction noise. The eight representative NSRs are tabulated in **Table 2.2** and are shown in **Figure 2.2**.

Table 2.2: Description of Representative Noise Sensitive Receiver

Noise Sensitive Receiver	Description	Use
N1a, N1b and N1c	Golden Crown Court	Commercial/Residential Mixed
N2a, N2b, N2c and N2d	Mirador Mansion	Commercial/Residential Mixed
N3	Friends' House	Mainly Residential

Based on the tentative construction programme, the proposed Project will be carried out concurrently with the Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway. The Project is scheduled to commence in April 2012 for completion by July 2014, and it is envisaged that there would be cumulative construction noise impact from June 2013 to July 2014. All NSRs identified along Nathan Road would experience cumulative noise impacts from this Project, therefore, cumulative noise impact from Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway are also assessed.

The assessment of the cumulative impacts has been based on the best available information during the time of submission. The plants used for assessment of the cumulative impacts from Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway are referenced from Appendix 4.4 and 4.5 of Tsim Sha Tsui Station Northern Subway EIA report (AEIAR-127/2008). It was assumed in the calculation that mitigation measures, including adoption of quieter plant and all noise barriers recommended in the Tsim Sha Tsui Station Northern Subway EIA report would be in effect during its construction. The worst case scenario for construction of the Entrance A1 with the above assumptions was applied for the assessment.

The construction noise at the seven representative NSRs has been assessed in accordance with the methodology specified in the *Technical Memorandum on Noise from Construction Work Other than Percussive Piling* (GW-TM). Detailed assessment calculations are presented in **Appendix III**. Assessment results indicated that all predicted unmitigated noise levels at the representative NSRs would exceed the daytime noise criterion of 75 dB(A) for all construction activities, as shown in **Table 2.3**. Noise mitigation measures are therefore required to reduce the noise to acceptable levels.

Table 2.3: Predicted Noise Levels at Representative NSRs – Unmitigated Scenario

Noise Sensitive Receiver	Predicted Noise Levels during Construction Stage, dB(A)	EIAO-TM Daytime Noise Assessment Criterion, dB(A)
N1a	**79** - **85**	75
N1b	71 - **82**	75
N1c	**76** - **82**	75
N2a[1]	**81** - **87**	75
N2c	**79** - **85**	75
N2d	68 - **84**	75
N3	**76** - **84**	75

Remarks: 1) N2a represents the Mirador Mansion NSR on Carnarvon Road due to its nearest distance to the Project site compare to N2b.

2) **Bold** figure denotes exceedance of relevant noise criteria.

2.2.2 Air Quality

A portion of the Subway would be constructed by tunnelling method where no adverse air quality impact is anticipated. Construction dust will potentially be generated from surface excavation works and backfilling at the remaining Project area. Since the area of open excavation is small, and given the fact that decking will be provided subsequent to the completion of surface excavation works, as shown in **Figure 2.1**, the construction dust generated will be minimal. In addition, there would be a limited number of plants required for such a small scale Project, hence combustion emissions would also be minimal. During the construction period, the Contractor shall follow the requirements and implement dust suppression measures as stipulated in the Air Pollution Control (Construction Dust) Regulation. As such, adverse impacts on air quality would not be expected.

As mentioned in Section 1.8, it is expected that the proposed Project will be carried out concurrently with Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway. Since both Entrance A1 Enhancement Works and the proposed Project are of small scale, and the surface excavation works of both projects will not be undertaken at the same time, the cumulative construction dust generated will be minimal. With implementation of sufficient dust control measures and appropriate dust suppression measures in accordance with the requirements under the Air Pollution Control (Construction Dust) Regulation, potential cumulative dust impacts would be insignificant.

2.2.3 Water Quality

Potential major sources of water quality impacts may arise from the discharge of construction run-off, effluent from dewatering activities as well as implementation of dust suppression measures, and sewage effluent generated by the workforce during the construction phase. The Contractor is required to implement good site practices and appropriate mitigation measures as stipulated in ProPECC Note 1/94 “Construction Site Drainage'” and “Recommended Pollution Control Clauses for Construction Contracts” to

control the construction site discharges. It is therefore anticipated that there will be no adverse water quality impact.

2.2.4 Waste Management

Solid wastes generated from the construction works mainly include excavated materials, construction and demolition (C&D) waste, chemical wastes and general refuse. It is estimated that approximately 12,600m^3 of C&D waste will be generated as a result of construction of this Project. It is anticipated that due to site constraint, reuse of excavated material within the Project is limited. Hence, most if not all of the materials would need to be delivered to and disposed of at public filling areas available at that time subject to the permission from Civil Engineering Development Department (CEDD). The disposal site will be Tseung Kwan O Area 137 Public Fill Bank. However, the Contractor is encouraged to identify other construction projects where the public fill can be used.

The quantities of other types of waste arising such as chemical waste and general refuse from the construction phase of the Project should be minimal. Provided that the wastes generated from the Project are properly handled, stored, recycled as far as possible, and disposed of in accordance with good waste management practices and relevant regulations and requirements under the Waste Disposal Ordinance, no significant waste impact arising from the construction stage of the Project would be envisaged.

2.2.5 Landscape and Visual

No landscape resources are identified within or in the vicinity of the Project area at Carnarvon Road. Therefore, no landscape impact is identified at this site.

Apart from the Project area at Carnarvon Road, a temporary storage area is proposed at Salisbury Road (**Figure 1.3**). This proposed temporary storage area would cover a portion of the existing amenity planting area underneath the elevated Salisbury Road. No trees are located within the affected planting area. The landscape planting includes common ornamental shrubs and ground cover herbs such as *Duranta erecta*, *Canna indica* and *Tradescantia spathacea*. Theses amenity plantings would require temporary removal during the construction stage to allow space for storage purpose, but will be reinstated after the completion of construction works. Taking into account the small area of the temporary storage area, temporary nature and reversibility, no adverse landscape impact is anticipated.

Potential visual impacts during the construction phase would be the temporary views of the construction site, construction plants and equipment perceived by the residents and workers of commercial/residential mixed buildings along the affected section of Carnarvon Road. However the visual quality of existing views is not high due to the disturbance from heavy road traffic and the high level of anthropogenic activities in this Tsim Sha Tsui business district. Taking into account the existing quality of views and the temporary nature of the impact, the visual implication is considered as insubstantial and acceptable.

Users of two hotels, viz Hotel Nikko Hong Kong and Intercontinental Grand Stanford Hong Kong, and the Tsim Sha Tsui East Promenade would experience a slight change of view due to the temporary removal of the amenity planting area and the physical presence of a storage site at Salisbury Road. However the impact is insignificant due to the small size of the proposed storage area and wide alternative view available to these hotel and promenade users. In fact, most of the view of the temporary storage area would be blocked by the deck of the existing elevated Salisbury Road (particularly for users of the two hotels) and the site hoarding during the construction period. The visual implication is thus insignificant.

2.2.6 Ecology

The construction activities at the proposed works area is not expected to have any significant ecological impacts, as the existing land use and setting of the works area is highly urbanised with no natural habitat. Hence, no ecological impact is anticipated.

2.2.7 Cultural Heritage

There is no historical building that could be affected by the proposed works within a 300m boundary of the study area. Therefore, no cultural heritage impact is anticipated.

2.3 Operation Phase Impacts

2.3.1 Noise

The proposed new subway connecting the MTR TST Station and K11 would be entirely underground. Exhaust air duct and two fresh air intakes are mounted at the Entrance D2 as shown in **Figure 2.3**. The exhaust air duct is used for smoke extraction. An assessment of the operation noise level emanating from the fixed plant at the NSRs was carried out in accordance with the Noise Control Ordinance (NCO) and the "Technical Memorandum on Noise from Places other than Domestic Premises, Public Places or Construction Sites" (IND-TM). The shortest horizontal distance of each Noise Sensitive Receiver (NSR) to the proposed ventilation facility is shown in **Table 2.4** below.

Table 2.4 Proposed Openings and Distance to the Noise Sensitive Receivers

Opening ID	Source Location	Direction of Opening	Approximate Shortest Horizontal Distance to NSR (m)		
			N1a	N2b	N3
L1	Opening (Fresh air intake)	South	19	5	27
L2	Opening (Fresh air intake)	North	17	9	25
L3	Opening (Exhaust air duct)	North	11	12	32

Fixed plant noise such as ventilation facility shall comply with the Acceptable Noise Levels (ANLs) specified in the IND-TM. As stipulated in Annex 5 of the EIAO-TM, the noise standard for planning purposes for fixed noise should be either (a) 5 dB(A) below the appropriate Acceptable Noise Level (ANL) or (b) the prevailing background noise levels (For quiet areas with a noise level of 5 dB(A) below the ANL). The ANLs laid down in the IND-TM based on the Area Sensitive Rating (ASR) are tabulated in **Table 2.5** below.

Table 2.5 Acceptable Noise Levels (ANLs)

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

The IND-TM considers a "major road" as an Influencing Factor (IF) when a road has an annual average daily traffic (AADT) flow in excess of 30,000. The NSRs N2a to N2d are located in an urban area at the junction of Nathan Road and Carnarvon Road with an AADT flow of 27,600 according to Annual Traffic Survey 2010 issued by Transport Department. Therefore, the roads adjacent to the NSRs are not considered as an IF.

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

In the absence of any detailed information and noise specification for the proposed fixed plant, the maximum permissible noise emission levels at the ventilation openings have been determined for future detailed design of the fixed plant. Assumptions adopted in this assessment are listed below:

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

If an exceedance of the noise criteria is found for one NSR, the initial SWL of the dominant sources to that NSR would be gradually lowered until the corrected sound pressure level (SPL) at that NSR meets the acceptable level. The process would be repeated for other representative NSRs with exceedance of the noise criteria until all corrected SPLs at the representative NSRs meet the noise criteria.

The results of the fixed plant noise assessment for the ASR of 'B' in accordance with the methodology mentioned above are shown in **Table 2.6** below. Detailed assessment calculations are presented in **Appendix IV.**

Table 2.6 Maximum Allowable Sound Power Levels (SWLs) of Fixed Plant Noise Sources

Source ID	Description	Maximum Allowable SWL, dB(A)	
		Day time and Evening Time	Night Time
L1	Fresh air intake	82	72
L2	Fresh air intake	86	76
L3	Exhaust air duct	86	76

According to the above results, no adverse operation phase residual noise impact are envisaged if the proposed fixed plants are designed to meet the mentioned sound power level with appropriate noise reduction measures in place.

2.3.2 Air Quality and Water Quality

As the subway will be for pedestrian use only, there will be no air pollution emissions during operation of the Project. Hence, no air quality impact during operational phase is expected.

There will be no generation of wastewater during operation of the Project. Therefore, no water quality impact during operational phase is expected.

2.3.3 Waste

There is no generation of wastes arising from the Subway except general refuse from the pedestrian, which will be collected and removed by a waste collector on a daily basis to minimise odour, pest and litter impacts. No adverse waste impact is therefore anticipated.

2.3.4 Landscape and Visual

No landscape resources would be affected by the proposed Project at Carnarvon Road during the operation phase. There are no additional above ground structures arising from the Project. The temporarily affected amenity planting area at Salisbury Road will be reinstated after the completion of construction works. Therefore no adverse landscape impact is anticipated during the operation phase.

The residents and workers of mixed commercial/residential buildings along the affected section of Carnarvon Road would experience a slightly better view due to the new aesthetic design of the two entrances and renewal of other associated infrastructures including the paved road and footpath. Hence no adverse visual impact is anticipated.

After the reinstatement of the temporarily affected amenity planting area at Salisbury Road, there will be no visual impact during the operation phase for the temporary storage area at Salisbury Road.

2.3.5 Ecology

As the existing land use and environmental setting of the works area is highly urbanised with no natural habitat, no ecological impact is anticipated.

2.3.6 Cultural Heritage

There is no historical building that could be affected by the proposed works within a 300m boundary of the study area. Therefore, no cultural heritage impact is anticipated.

3. Description of Mitigation Measures

3.1 Construction Noise

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

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

Use of Quieter Plant

The use of quieter plants so as to minimize the noise emission at source is the most effective measure to reduce the construction noise impacts. A list of plants that are quieter than the standard types given in the GW-TM and that has been used in the assessment of construction noise is shown in **Table 3.1** below.

Table 3.1: List of Quieter Plant

Quieter Plant	Reference	SWL, dB(A)
Crane, mobile	EPD-1158[1]	102
Excavator	EPD-00773[1]	103
Generator (Super Silent Type)	EPD-00668[1]	79
Road Roller	EPD-000222[1]	99

Remarks: 1) Extracted from QPME Inventory

Use of Noise Enclosure and Movable Barrier

To further reduce the construction noise impacts, movable barrier and noise enclosure should be used to impede the noise transmission from the sources to the NSRs. Schematic configurations of the movable barrier and noise enclosure are shown in **Figure 3.1** and **Figure 3.2** respectively. The mitigation measures for various types of PME are tabulated in **Table 3.2** below. In general, movable barrier can achieve a 5 dB(A) reduction for movable PME and 10 dB(A) reduction for stationary PME whereas 15dB(A) reduction for PME with noise enclosure can be achieved. The information is based on the "Preparation of Construction Noise Impact Assessment" under the EIAO Guidance Note No. 9/2010. The Contractor shall be responsible for design of the movable noise barrier and noise enclosure with due consideration given to the size of the PME and the requirement of intercepting the line of sight between the NSRs and PME."

Table 3.2: Mitigation Measures for different PMEs

PME	Proposed Mitigation Measures	Reduction, dB(A)
Air Compressor	Noise Enclosure	15
Generator	Noise Enclosure	15
Bar Bender and Cutter	Movable Barrier	10
Breaker	Movable Barrier	10
Concrete Pump Truck	Movable Barrier	10
Concrete Lorry Mixer	Movable Barrier	10
Drill Rig (Rotary Type)	Movable Barrier	10

PME	Proposed Mitigation Measures	Reduction, dB(A)
Grout Mixer	Movable Barrier	10
Poker	Movable Barrier	10
Silent Piler Machine	Movable Barrier	10
Crane, mobile	Movable Barrier	5
Dump Truck	Movable Barrier	5
Excavator	Movable Barrier	5

A typically designed barrier with a steel frame of vertical / cantilever type would be adopted and located close to the noise generating part of the PME. Barrier material of surface mass in excess of 7kg/m^2 shall be required 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.

Residual Construction Noise Assessment

The maximum SWLs for each construction activity and the residual construction noise at the seven representative NSRs, after implementation of the proposed mitigation measures, has been assessed in accordance with the methodology specified in the GW-TM as shown in **Table 3.3** and **3.4**. The results revealed that the construction noise ranged from 59 to 75 dB(A) during the construction period. The lists of mitigated plant inventory and detailed assessment calculations are presented in **Appendix V** and **VI** respectively.

Table 3.3: Maximum SWLs for each Construction Activity (Mitigated Scenario)

Construction Activities	Maximum SWL, dB(A)
Section 1	
Utilities Diversion along Nathan Road	97
Utilities Diversion and Demolition of Entrances	101
Installation of Pipepile, Sheet Pile and King Posts	98
Surface Excavation	97
Construction of Temporary Staircase	97
Further Excavation (Works under Road Decking)	99
Construction of Subway (Works under Road Decking)	98
Construction of Above Ground Entrance	98
Backfill	98
Reinstatement	100
Section 2	
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	99

Table 3.4: Predicted Noise Levels at Representative NSRs – Mitigated Scenario

Noise Sensitive Receiver	Predicted Noise Levels during Construction Stage, dB(A)	EIAO-TM Daytime Noise Assessment Criterion, dB(A)
N1a	69 – 73	75
N1b	62 – 71	75
N1c	67 – 71	75
N2a[1]	71 – 75	75
N2c	70 – 74	75
N2d	59 – 71	75
N3	66 – 74	75

Remarks: 1) N2a represents the Mirador Mansion NSR on Carnarvon Road due to its nearest distance to the Project site compare to N2b.

General Construction Noise Control Measures

Although no residual noise impact would be generated after the proposed mitigation measures are in place, the Contractor shall adopt general construction noise control measures, as stated below, in order to minimise noise impacts during the construction phase.

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

3.2 Air Quality

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

- Decking will be provided subsequent to the completion of surface excavation works, as shown in **Figure 2.1.** Duration of decking are around 13 months after surface excavation works;
- Regular watering to reduce dust emissions from all exposed site surfaces, particularly during dry weather;
- Frequent watering for particularly dusty construction areas and areas close to air sensitive receivers;
- Cover all excavated or stockpiles of dusty material by impervious sheeting or spraying with water to maintain the entire surface wet;
- Provision of vehicle washing facilities at the exit points of the site; and
- Provision of tarpaulin covering for any dusty materials on a vehicle leaving the site.

3.3 Water Quality

In order to control surface runoff satisfactorily without adverse impact during the construction stage, the Contractor should comply with the Water Pollution Control Ordinance (WPCO) and its subsidiary regulation. The key control measures are as follows:

- The Contractor should design and implement all the relevant mitigation measures and practices specified in the ProPECC PN 1/94 “Construction Site Drainage” and “Recommended Pollution Control Clauses for Construction Contracts” issued by EPD.
- All runoff arising from the construction site should be properly collected and treated to ensure the discharge standards as stipulated in WPCO are met. Silt traps and oil interceptors should be provided to remove the oil, lubricants, grease, silt, grit and debris from the wastewater before being pumped to the public stormwater drainage system. The silt traps and oil interceptors should be cleaned and maintained regularly.
- Any foul effluent should not be discharged into any public sewer and stormwater drain, unless an effluent discharge permit is obtained under the WPCO by the Contractor.
- Site toilet facilities, if needed, should be chemical toilets or should have the foul water effluent directed to a foul sewer.

3.4 Waste Management

Since the Project is of small scale, the amount of C&D material that needs to be hauled off site and disposed of is small. Proper waste management by way of avoiding, minimising, reusing and recycling should be adopted in order to minimise the generation of various wastes and associated environmental impacts during the construction stage. The Contractor shall comply with the Waste Disposal Ordinance

and its subsidiary regulations, and implement the necessary waste management measures. The following control measures are recommended:

- Excavated material should be reused on site as far as possible to minimise off-site disposal. Scrap metals or abandoned equipment should be recycled if possible.
- Waste arising should be kept to a minimum and be handled, transported and disposed of in a suitable manner.
- The Contractor should adopt a trip ticket system for the disposal of C&D materials to any designated public filling facility and/or landfill. Independent audits of the Contractor and resident site staff will be undertaken to ensure that the correct procedures are being followed.
- Chemical waste shall be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes.
- All general refuse should be segregated and stored in enclosed bins or compaction units and waste separation facilities for paper, aluminium cans, plastic bottles etc. should be provided to facilitate reuse or recycling of materials and their proper disposal.

3.5 Landscape and Visual

Although no adverse landscape and visual impacts are anticipated, protection measures to ensure the landscape and visual performance are recommended:

Construction Phase:

- Screening of construction works by hoardings/noise barriers around works area with visually unobtrusive colours

Operation Phase:

- Reinstating the affected amenity planting area at Salisbury Road after the completion of works.

3.6 Ecology and Cultural Heritage

As no ecological and cultural heritage impacts are anticipated, no associated mitigation measure will be required.

3.7 Environmental Monitoring and Audit (EM&A) Requirements

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

An EM&A programme is recommended to include the monitoring of construction noise and dust on a regular basis. A noise monitoring location will be set up at Mirador Mansion and weekly audits will be carried out. A dust monitoring location will be also set up at Mirador Mansion and 24-hr monitoring will be

conducted. The Contractor is required to implement the EM&A plan. The plan addresses all environmental aspects of concern during construction. Site inspection/audit would also be carried out. Details of the monitoring procedures, methodology and action plans as well as the complaint handling procedures have been set out with reference to the approved EM&A plan for the 'Tsim Sha Tsui Station Northern Subway Environmental Impact Assessment'. The EM&A plan is provided in **Appendix VII**.

3.8 Implementation Schedule

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

4. Use of Previously Approved EIA Reports and Project Profiles

Reference has been made to the following previous DIR applications:

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

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

Further references on sound power levels of silenced equipment and details of the monitoring procedures, methodology and action plans as well as complaint handling procedures is drawn from the 'Tsim Sha Tsui Station Northern Subway Environmental Impact Assessment' Register No. AEIAR-127/2008, approved on 31 December 2008 under EIAO Ordinance.

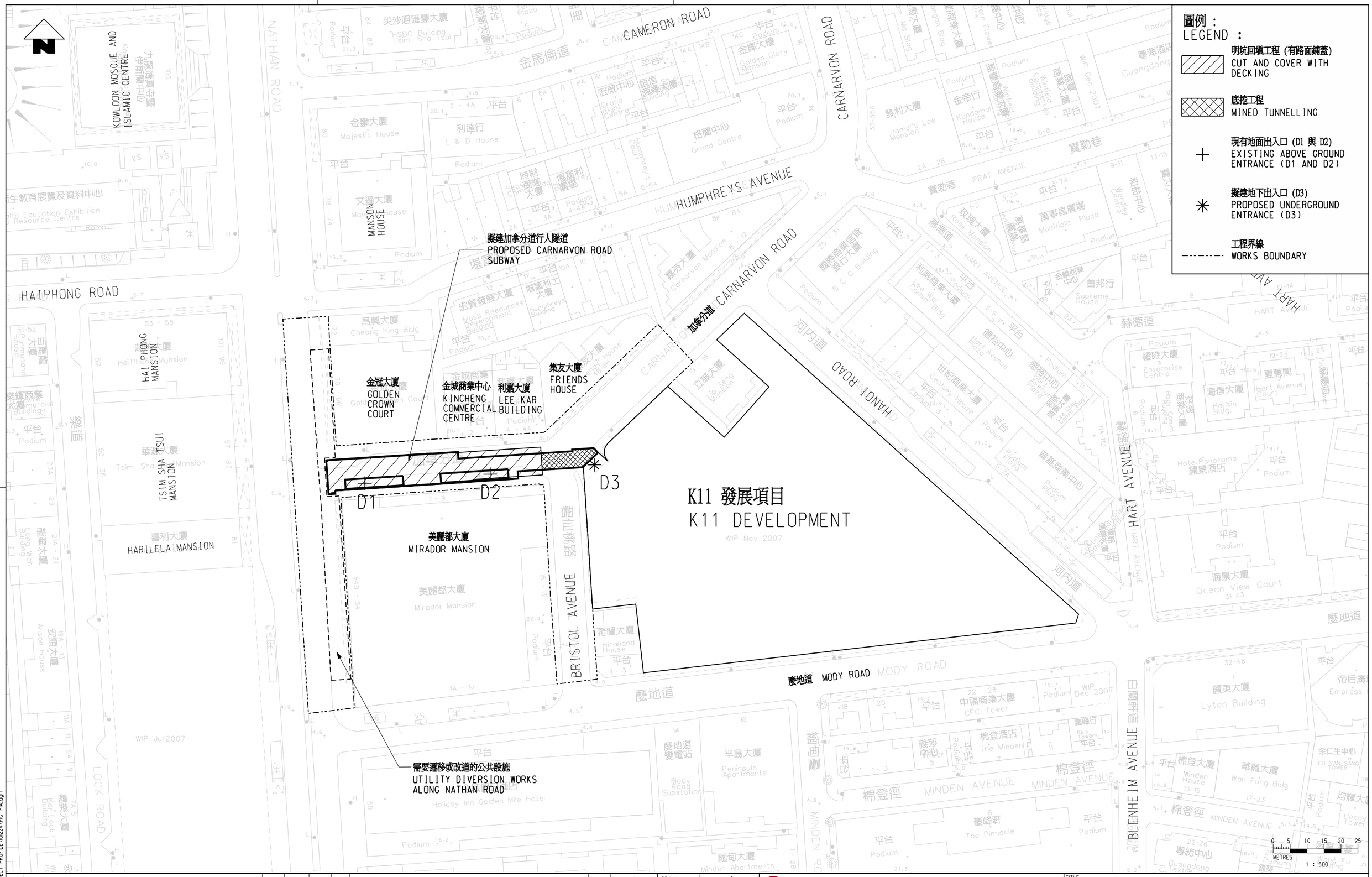
5. Conclusion

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

Potential environmental impacts in terms of air, noise, water, waste management, landscape and visual, ecology and cultural heritage associated with this Project have been examined. Since most of the works for this Project will be undertaken under deck, adverse environmental impacts are not anticipated during the construction stage, given that the recommended mitigation measures and site practices are properly implemented. Operational phase environmental impact is not anticipated for this Project.

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

Figures



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TST STATION CARNARVON ROAD SUBWAY

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CADD REF. FIG 1-1A.dgn

TITLE

CONSULTANCY AGREEMENT NO. NEX/1049
DETAILED DESIGN FOR CARNARVON ROAD SUBWAY
SITE LOCATION PLAN
施工位置圖

SCALE	DRAWING NO.	REV.
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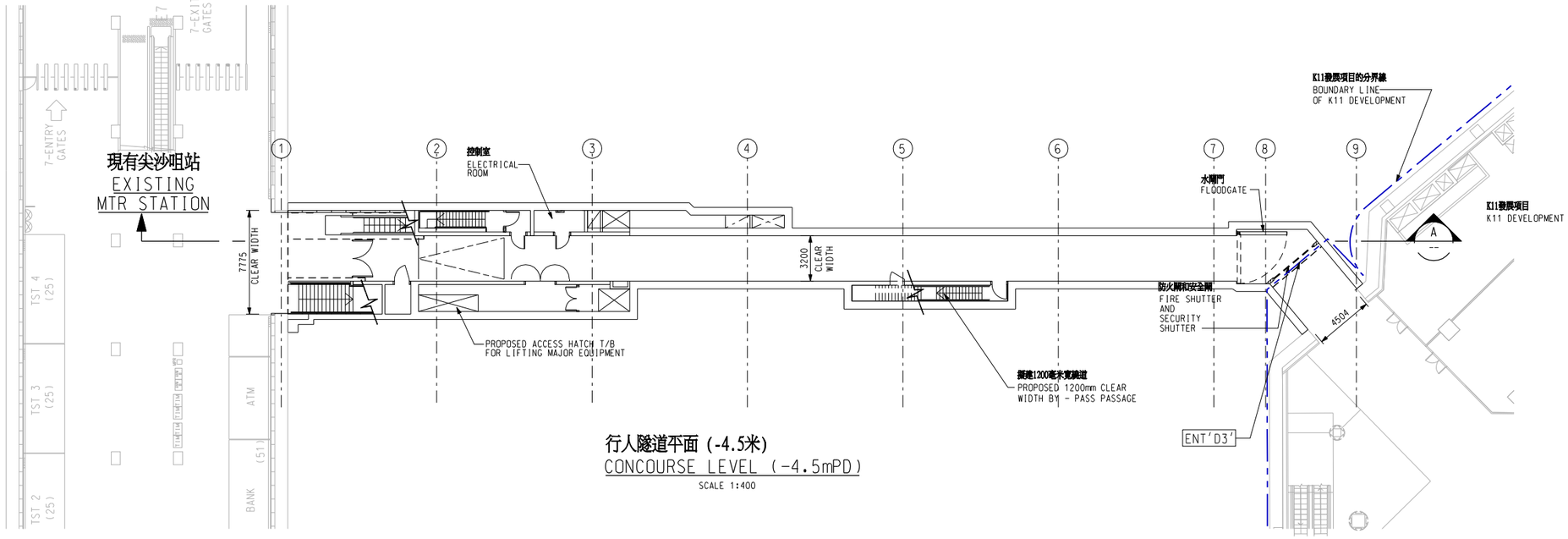
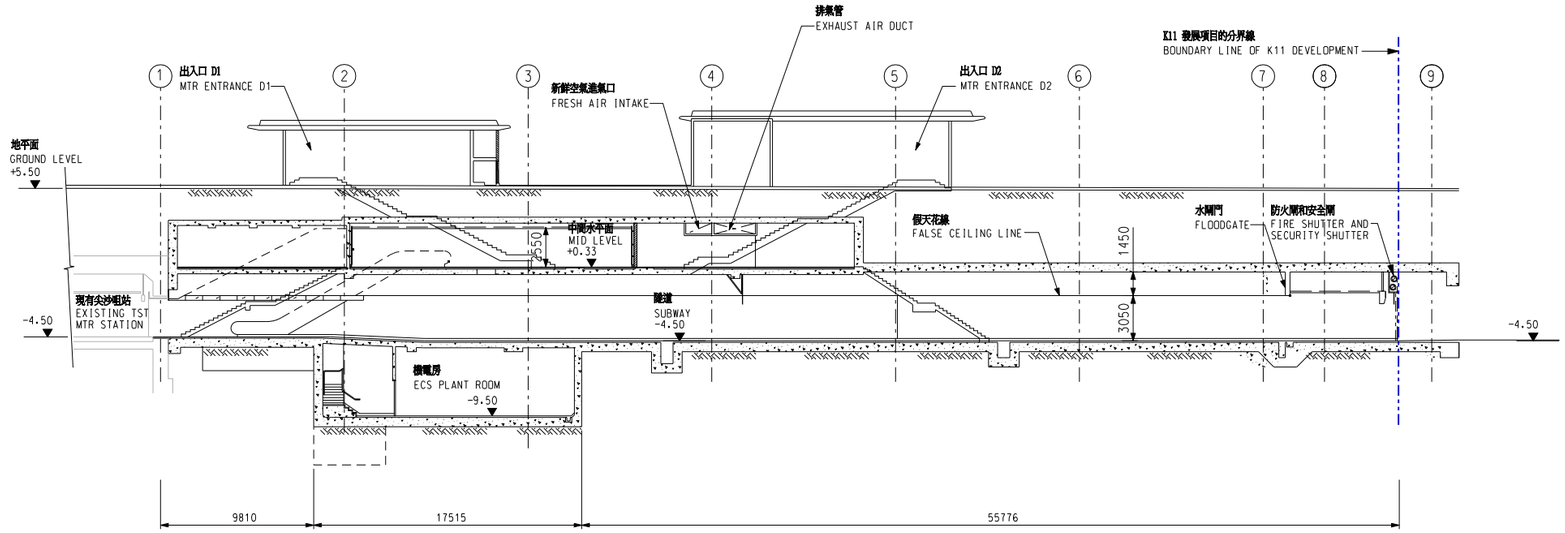


行人隧道平面 (-4.5米)
CONCOURSE LEVEL (-4.5mPD)

SCALE 1:400



立面圖
SECTION A

SCALE 1:400

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METRES
1 : 400

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A	PROJECT PROFILE	HO	--	--

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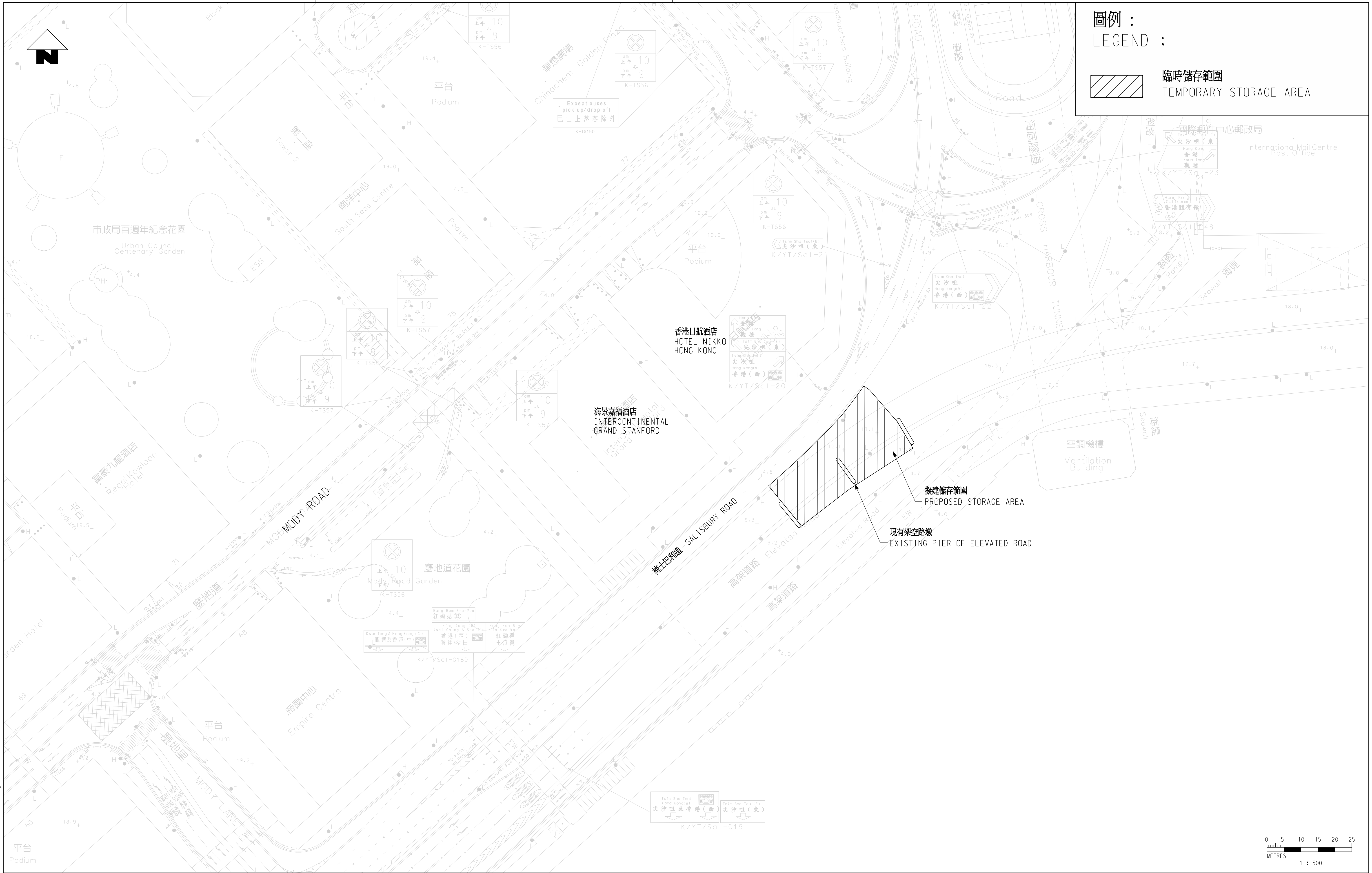
CADD REF. FIG 1-2A.dgn

TITLE

CONSULTANCY AGREEMENT NO. NEX/1049
DETAILED DESIGN FOR CARNARVON ROAD SUBWAY
SUBWAY PLAN AND ELEVATION
行人隧道平面及立面圖

SCALE	DRAWING NO.	REV.
1:400 (A3)	FIGURE 圖 1.2	A



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DATE	--

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CADD REF. FIG 1-3A.dgn

TITLE

CONSULTANCY AGREEMENT NO. NEX/1049
DETAILED DESIGN FOR CARNARVON ROAD SUBWAY
TEMPORARY STORAGE AREA
臨時儲存範圍

SCALE 1:500 (A1)

DRAWING NO. FIGURE 圖 1.3

REV. A

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MODELNAME: Default PRINTED BY: ho57494 06/01/2012 14:47:34
FILENAME: J:\272199-K8\PROJECT PROFILE\20110707\FIG 1-3A.dgn

圖例：
LEGEND：

明挖回填工程 (有路面鋪蓋)
CUT AND COVER WITH DECKING

底挖工程
MINED TUNNELLING

尖沙咀站北行人隧道項目A1出入口改善工程界線
(其他工程項目)
ENTRANCE A1 ENHANCEMENT WORKS BOUNDARY UNDER TSIM SHA TSUI STATION NORTHERN SUBWAY (WORKS BY OTHERS)

尖沙咀站北行人隧道項目A1出入口改善工程
(明坑回填) (其他工程項目)
ENTRANCE A1 ENHANCEMENT WORKS - CUT AND COVER EXCAVATION UNDER TSIM SHA TSUI STATION NORTHERN SUBWAY (WORKS BY OTHERS)

第一部份
SECTION 1

第二部份
SECTION 2

需要遷移或改道的公共設施
UTILITY DIVERSION WORKS ALONG NATHAN ROAD

K11 發展項目
K11 DEVELOPMENT
WIP Nov 2007

金冠大廈 GOLDEN CROWN COURT
金城商業中心 KINCHENG COMMERCIAL CENTRE
利嘉大廈 LEE KAR BUILDING
集友大廈 FRIENDS HOUSE
美麗都大廈 MIRADOR MANSION
海富樓 HAI PHONG MANSION
華源大廈 TSIM SHA TSUI MANSION
喜利大廈 HARILELA MANSION
文遜大廈 MANSON HOUSE

CAMERON ROAD 金馬倫道
NATHAN ROAD
CARNARVON ROAD
HUMPHREYS AVENUE 堪富利士道
HAIPHONG ROAD
HART AVENUE 赫德道
HANOI ROAD 河內道
加拿分道
BRISTOL AVENUE
MODY ROAD 麼地道
MINDEN AVENUE 棉登徑
BLENHEIM AVENUE 藍塘道
LOCK ROAD
PRAT AVENUE 寶勒巷

WIP Jul 2007

0 5 10 15 20 25
METRES
1 : 500

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CADD REF. FIG 2-1A.dgn

TITLE
CONSULTANCY AGREEMENT NO. NEX/1049
DETAILED DESIGN FOR CARNARVON ROAD SUBWAY
LAYOUT PLAN FOR CONSTRUCTION NOISE ASSESSMENT
施工噪音評估平面圖

SCALE 1:500 (A1)
DRAWING NO. FIGURE 圖 2.1
REV. A

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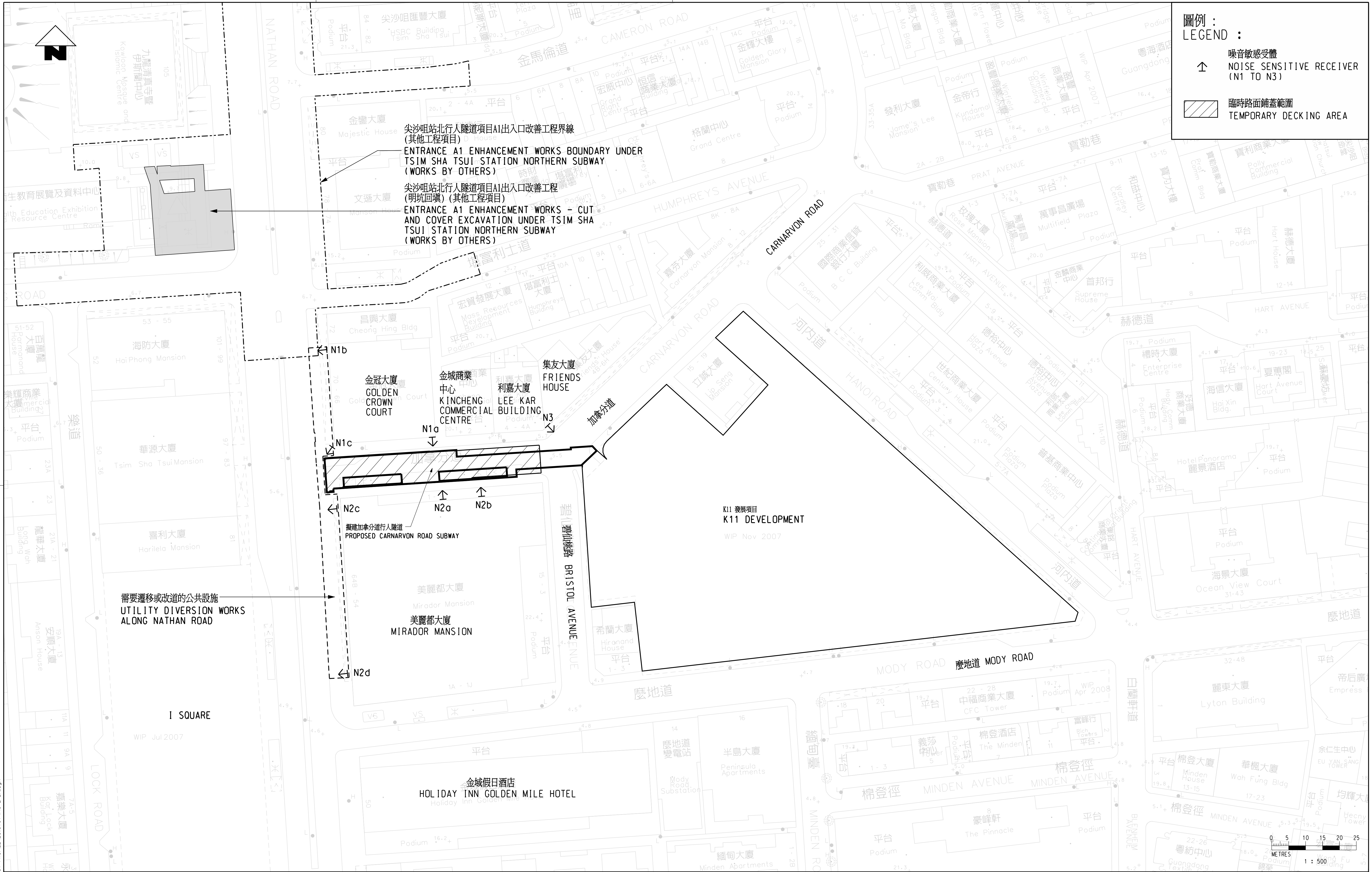

圖例：
LEGEND：
噪音敏感受體
NOISE SENSITIVE RECEIVER (N1 TO N3)
臨時路面鋪蓋範圍
TEMPORARY DECKING AREA
N
尖沙咀站北行人隧道項目A1出入口改善工程界線 (其他工程項目)
ENTRANCE A1 ENHANCEMENT WORKS BOUNDARY UNDER TSIM SHA TSUI STATION NORTHERN SUBWAY (WORKS BY OTHERS)
尖沙咀站北行人隧道項目A1出入口改善工程 (明坑回填) (其他工程項目)
ENTRANCE A1 ENHANCEMENT WORKS - CUT AND COVER EXCAVATION UNDER TSIM SHA TSUI STATION NORTHERN SUBWAY (WORKS BY OTHERS)
NATHAN ROAD
CAMERON ROAD
金馬倫道
HUMPHREYS AVENUE
CARNARVON ROAD
加拿分道
N1b
金冠大廈 GOLDEN CROWN COURT
金城商業中心 KINCHENG COMMERCIAL CENTRE
利嘉大廈 LEE KAR BUILDING
集友大廈 FRIENDS HOUSE
N3
N1a
N1c
N2c
N2a
N2b
N2d
擬建加拿分道行人隧道
PROPOSED CARNARVON ROAD SUBWAY
碧仙桃路 BRISTOL AVENUE
K11 發展項目
K11 DEVELOPMENT
需要遷移或改道的公共設施
UTILITY DIVERSION WORKS ALONG NATHAN ROAD
美麗都大廈
MIRADOR MANSION
I SQUARE
麼地道 MODY ROAD
金域假日酒店
HOLIDAY INN GOLDEN MILE HOTEL
河內道
HANOI ROAD
MINDEN AVENUE
0 5 10 15 20 25
METRES
1 : 500

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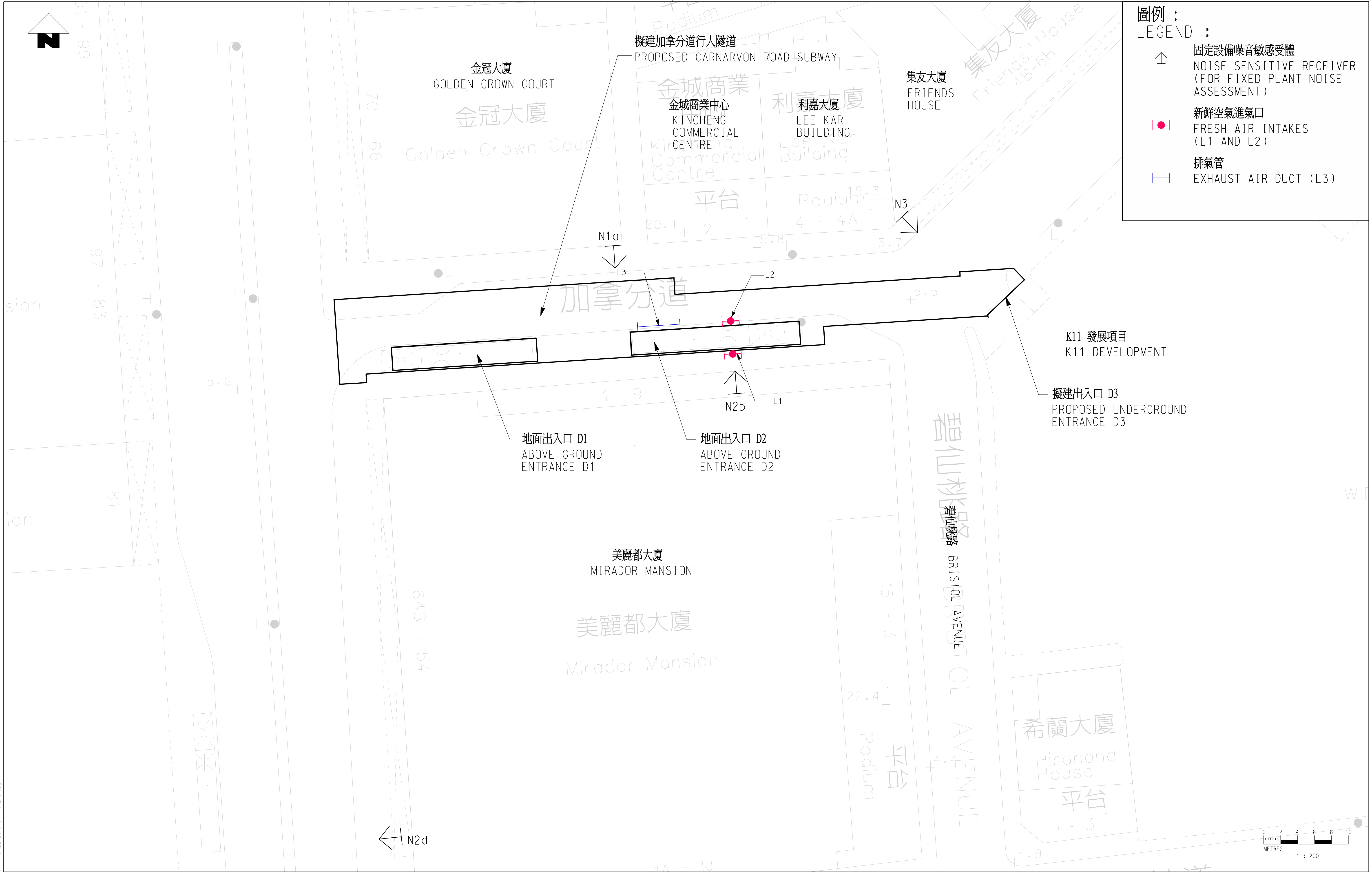
CADD REF.: FIG 2-2A.dgn

TITLE

CONSULTANCY AGREEMENT NO. NEX/1049
DETAILED DESIGN FOR CARNARVON ROAD SUBWAY
LOCATIONS OF NOISE SENSITIVE RECEIVERS
噪音敏感受體位置圖

SCALE: 1:500 (A1)
DRAWING NO.: FIGURE 圖 2.2
REV.: A



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CADD REF. FIG 2-3A.dgn

TITLE

CONSULTANCY AGREEMENT NO. NEX/1049
DETAILED DESIGN FOR CARNARVON ROAD SUBWAY
LOCATIONS OF FRESH AIR INTAKE AND EXHAUST AIR DUCT AT ENTRANCE D2
出入口 D2 新鮮空氣進口及排氣口位置

SCALE 1:200 (A1)
DRAWING NO. FIGURE 圖 2.3
REV. A

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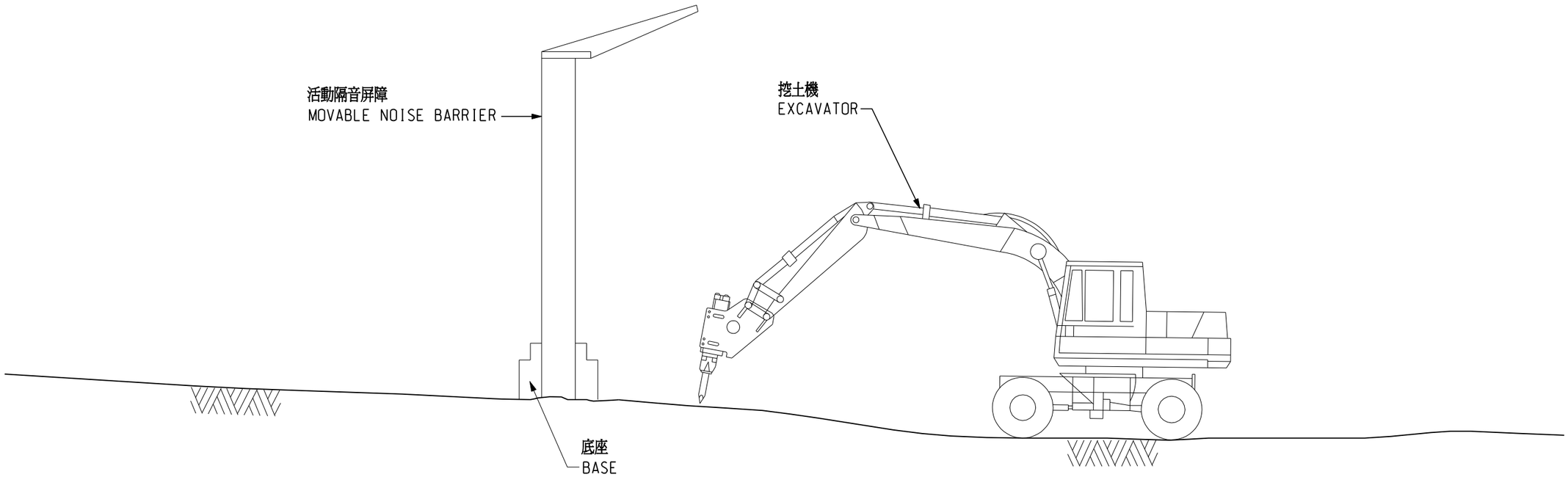

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CADD REF. FIG 3-1A.dgn

TITLE

CONSULTANCY AGREEMENT NO. NEX/1049
DETAILED DESIGN FOR CARNARVON ROAD SUBWAY
SCHEMATIC CONFIGURATION OF MOVABLE NOISE BARRIER
活動隔音屏障結構圖

SCALE N.T.S.

DRAWING NO. FIGURE 圖 3.1

REV. A

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MODELNAME: Default PRINTED BY: no57494 02/12/2011 16:17:10
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進氣
AIR FLOW

機動設備
PME

出氣
AIR FLOW

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CADD REF. FIG 3-2A.dgn

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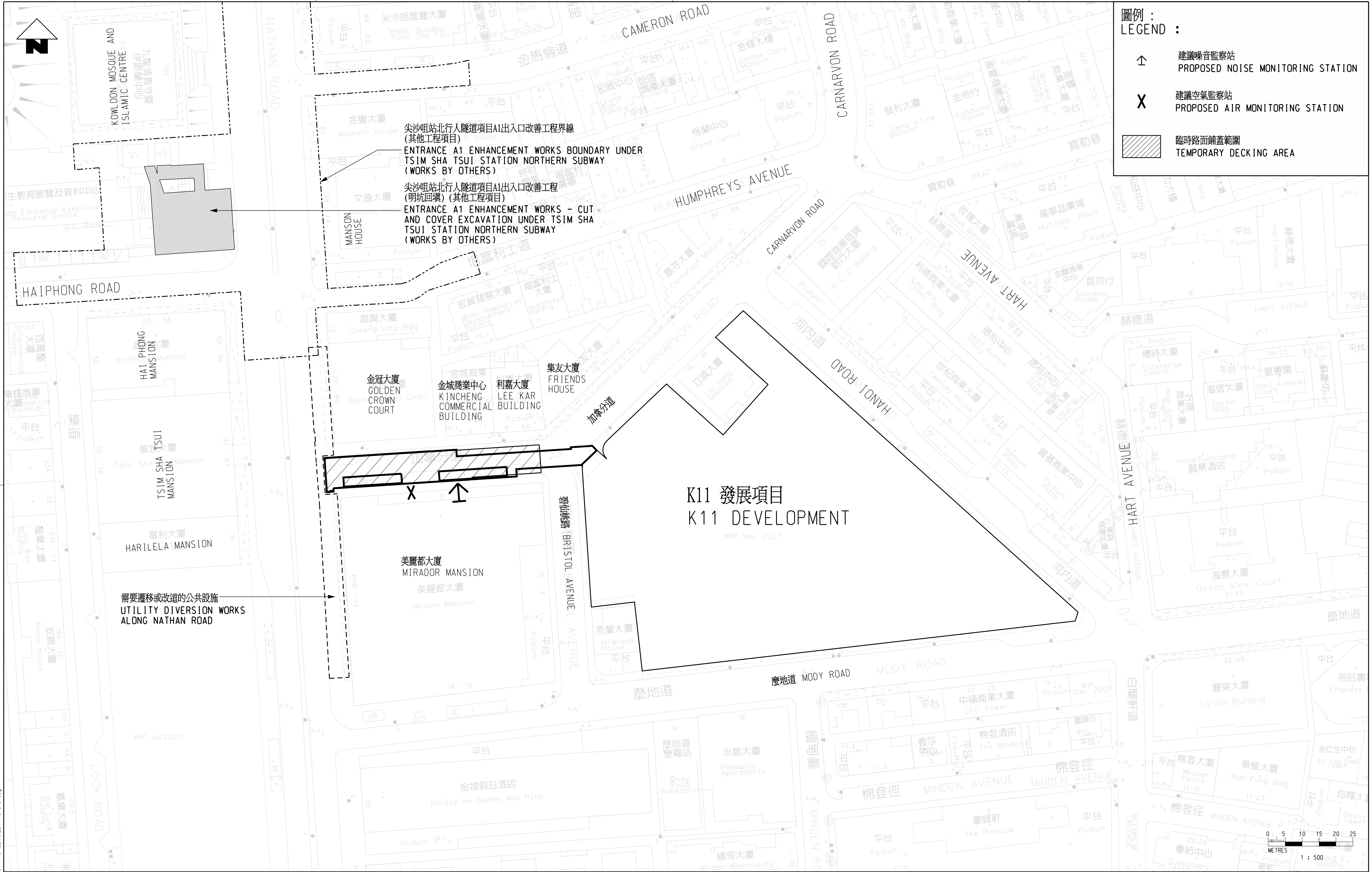
CONSULTANCY AGREEMENT NO. NEX/1049
DETAILED DESIGN FOR CARNARVON ROAD SUBWAY
SCHEMATIC CONFIGURATION OF FULL NOISE ENCLOSURE FOR PME
機動設備隔音罩結構圖

SCALE	DRAWING NO.	REV.
N.T.S.	FIGURE 圖 3.2	A



圖例 :
LEGEND :
建議噪音監察站
PROPOSED NOISE MONITORING STATION
X
建議空氣監察站
PROPOSED AIR MONITORING STATION
臨時路面鋪蓋範圍
TEMPORARY DECKING AREA
尖沙咀站北行人隧道項目A1出入口改善工程界線
(其他工程項目)
ENTRANCE A1 ENHANCEMENT WORKS BOUNDARY UNDER
TSIM SHA TSUI STATION NORTHERN SUBWAY
(WORKS BY OTHERS)
尖沙咀站北行人隧道項目A1出入口改善工程
(明坑回填) (其他工程項目)
ENTRANCE A1 ENHANCEMENT WORKS - CUT
AND COVER EXCAVATION UNDER TSIM SHA
TSUI STATION NORTHERN SUBWAY
(WORKS BY OTHERS)
需要遷移或改道的公共設施
UTILITY DIVERSION WORKS
ALONG NATHAN ROAD
K11 發展項目
K11 DEVELOPMENT
KOWLOON MOSQUE AND ISLAMIC CENTRE
HAIPHONG ROAD
CAMERON ROAD
CARNARVON ROAD
HUMPHREYS AVENUE
HART AVENUE
HANOI ROAD
BRISTOL AVENUE
MODY ROAD
NATHAN ROAD
金冠大廈
GOLDEN CROWN COURT
金城商業中心
KINCHENG COMMERCIAL BUILDING
利嘉大廈
LEE KAR BUILDING
集友大廈
FRIENDS HOUSE
美麗都大廈
MIRADOR MANSION
HAI PHONG MANSION
TSIM SHA TSUI MANSION
HARILELA MANSION
MANSON HOUSE
0 5 10 15 20 25
METRES
1 : 500

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In associated with Ivanho Architect Ltd, ERM Hong Kong Ltd

CADD REF. FIG 3-3A.dgn

TITLE

CONSULTANCY AGREEMENT NO. NEX/1049
DETAILED DESIGN FOR CARNARVON ROAD SUBWAY
AIR AND NOISE MONITORING LOCATIONS
空氣及噪音監察站位置圖

SCALE 1:500 (A1)

DRAWING NO. FIGURE 圖 3.3

REV. A

PLOT DRV: C:\MTRC_A3_BW_COL.plt PRINTED BY: ho57494 08/02/12 14:48:02
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Appendix I. Future MTR Tsim Sha Tsui Station Entrance D1 and D2

Appendix I

Future MTR Tsim Sha Tsui Station Entrance D1 and D2

Future MTR Tsim Sha Tsui Station Entrance D1

Future MTR Tsim Sha Tsui Station Entrance D2

Appendix II. Plant Inventory for Various Construction Activity (Unmitigated Scenario)

Appendix II
Plant Inventory for Various Construction Activities - Unmitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

PME	TM or other reference	No. of PME	SWL, dB(A)/ unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Carnarvon Road (Section 1)							
Activities							
Utilities Diversion along Nathan Road*							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	80%	-	0	101
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	40%	-	0	108
Breaker, hand-held, mass > 10kg and < 20kg	CNP 024	1	108	30%	-	0	103
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	80%	-	0	99
						Total	**110**
Utilities Diversion and Demolition of Entrances (##Case 1: Use of Excavator)*							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	80%	-	0	101
Lorry with crane	[1]	1	112	30%	-	0	107
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	40%	-	0	108
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	80%	-	0	99
Lorry (<38t)	[1]	1	105	30%	-	0	100
						Total	**111**
Utilities Diversion and Demolition of Entrances (##Case 2: Use of Breaker)*							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	80%	-	0	101
Lorry with crane	[1]	1	112	30%	-	0	107
Breaker, hand-held, mass > 10kg and < 20kg	CNP 024	1	108	30%	-	0	103
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	80%	-	0	99
Lorry (<38t)	[1]	1	105	30%	-	0	100
						Total	**110**
Installation of Pipepile and Sheet Pile							
Lorry with crane	[1]	1	112	30%	-	0	107
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	100%	-	0	100
Grout mixer	[1]	1	90	100%	-	0	90
Drill rig, rotary type (diesel)	[1]	1	110	50%	-	0	107
Silent Piler Machine	GIKEN **	1	94	100%	-	0	94
						Total	**110**
Surface Excavation							
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	40%	-	0	108
Dump truck	[1]	1	105	30%	-	0	100
						Total	**109**
Construction of Temporary Staircase							
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	30%	-	0	104
Poker, vibratory, hand-held (electric)	[1]	1	102	30%	-	0	97
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	100%	-	0	100
						Total	**108**
Further Excavation (Works under Road Decking)							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	#Underground Work	20	91
Lorry with crane	[1]	1	112	30%	-	0	107
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	100%	#Underground Work	20	92
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	100%	#Underground Work	20	80
Dump truck	[1]	1	105	30%	-	0	100
Water pump (petrol)	CNP 282	2	103	100%	#Underground Work	20	86
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	**108**
Construction of Subway (Works under Road Decking)							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	#Underground Work	20	82
Saw, circular, wood	CNP 201	1	108	50%	#Underground Work	20	85
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	30%	-	0	104
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	100%	#Underground Work	20	80
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	**107**
Construction of Above Ground Entrance							
Saw, circular, wood	CNP 201	1	108	30%	-	0	103
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	30%	-	0	104
Lorry with crane	[1]	1	112	30%	-	0	107
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	50%	-	0	97
						Total	**111**
Backfill							
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	50%	-	0	109
Dump truck	[1]	1	105	30%	-	0	100
						Total	**109**
Reinstatement							
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Poker, vibratory, hand-held	CNP 170	1	113	30%	-	0	108
Road roller	CNP 185	1	108	30%	-	0	103
						Total	**110**

Remark:

* Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.

Since either excavator or breaker will be used for the ultilites diversion works along Carnarvon Road and demolition of entrances, the two plants will not be overlapped, therefore, as calculated above, the highest total SWL is used for assessment.

[1] Extracted from EPD document namely, "Sound Power Levels of Other Commonly Used PME" http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf

\# Reference was made to Tsim Sha Tsui Station Northern Subway Environmental Impact Assessment.

Appendix II
Plant Inventory for Various Construction Activities - Unmitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

PME	TM or other reference	No. of PME	SWL, dB(A)/ unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Carnarvon Road (Section 2)							
Activities							
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	#Underground Work	20	82
Saw, circular, wood	CNP 201	1	108	50%	#Underground Work	20	85
Concrete lorry mixer	CNP 044	1	109	30%	-	0	104
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	30%	-	0	104
Drill rig, rotary type (diesel)	[1]	1	110	100%	#Underground Work	20	90
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	80%	#Underground Work	20	91
Generator, silenced, 75 dB(A) at 7 m	CNP 102	1	100	100%	#Underground Work	20	80
Grout mixer	[1]	1	90	70%	-	0	88
Ventilation fan	CNP 241	1	108	100%	#Underground Work	20	88
						Total	**107**

Remark:
[1] Extracted from EPD document namely, "Sound Power Levels of Other Commonly Used PME"
http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf
Reference was made to Tsim Sha Tsui Station Northern Subway Environmental Impact Assessment.

Appendix III. Construction Noise Assessment for Representative NSRs (Unmitigated Scenario)

Appendix III
Construction Noise Assessment for Representative NSR - Unmitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014												2015						
N1a - Golden Crown Court	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion and Demolition of Entrances	111	14	31	3	83	83																									
Installation of Pipepile and Sheet Pile	110	14	31	3	82		82	82	82	82	82	82		82	82																
Surface Excavation	109	14	31	3	81					81																					
Construction of Temporary Staircase	108	14	31	3	80						80	80	80																		
Further Excavation (Works under Road Decking)	108	14	31	3	80											80	80	80													
Construction of Subway (Works under Road Decking)	107	14	31	3	79														79	79	79	79	79	79	79						
Construction of Above Ground Entrance	111	14	31	3	83																		83						83		
Backfill	109	14	31	3	81																				81	81	81	81	81		
Reinstatement	110	14	31	3	82																									82	82
Section 2																															
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	107	37	39	3	71													71	71	71	71	71	71								
					Total	83	82	82	82	85	84	84	80	82	82	80	80	80	80	80	80	80	84	79	83	81	81	81	85	82	82

Remarks:
1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)

Appendix III
Construction Noise Assessment for Representative NSR - Unmitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014												2015						
N1b - Golden Crown Court	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion along Nathan Road[4]	110	13	31	3	82	82																									
Utilities Diversion and Demolition of Entrances[4]	111	35	39	3	75																										
Installation of Pipepile and Sheet Pile	110	35	39	3	74		74	74	74	74	74	74		74	74																
Surface Excavation	109	35	39	3	73					73																					
Construction of Temporary Staircase	108	35	39	3	72						72	72	72																		
Further Excavation (Works under Road Decking)	108	35	39	3	72											72	72	72													
Construction of Subway (Works under Road Decking)	107	35	39	3	71														71	71	71	71	71	71	71						
Construction of Above Ground Entrance	111	35	39	3	75																		75						75		
Backfill	109	35	39	3	73																				73	73	73	73	73		
Reinstatement	110	35	39	3	74																									74	74
Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway																															
Enhancement Works at Entrance A1[5]	107	53	42	3	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68												
					Total	82	75	75	75	77	77	77	73	75	75	73	73	73	73	71	71	71	76	71	75	73	73	73	77	74	74

Remarks:

1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)
4. Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.
5. Reference was made to Appendix 4.4 and 4.5 of Tsim Sha Tsui Station Northern Subway EIA report (AEIAR-127/2008).

Appendix III
Construction Noise Assessment for Representative NSR - Unmitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014												2015						
N1c - Golden Crown Court	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion along Nathan Road[4]	110	20	34	3	79																										
Utilities Diversion and Demolition of Entrances[4]	111	20	34	3	80	80																									
Installation of Pipepile and Sheet Pile	110	20	34	3	79		79	79	79	79	79	79		79	79																
Surface Excavation	109	20	34	3	78					78																					
Construction of Temporary Staircase	108	20	34	3	77						77	77	77																		
Further Excavation (Works under Road Decking)	108	20	34	3	77											77	77	77													
Construction of Subway (Works under Road Decking)	107	20	34	3	76														76	76	76	76	76	76	76						
Construction of Above Ground Entrance	111	20	34	3	80																		80						80		
Backfill	109	20	34	3	78																				78	78	78	78	78		
Reinstatement	110	20	34	3	79																									79	79
Section 2																															
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	107	64	44	3	66													66	66	66	66	66	66								
Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway																															
Enhancement Works at Entrance A1[5]	107	74	45	3	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65												
					Total	81	80	80	80	82	81	81	77	80	80	77	77	77	77	76	76	76	81	76	80	78	78	78	82	79	79

Remarks:
1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)
4. Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.
5. Reference was made to Appendix 4.4 and 4.5 of Tsim Sha Tsui Station Northern Subway EIA report (AEIAR-127/2008).

Appendix III
Construction Noise Assessment for Representative NSR - Unmitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014												2015						
N2a - Mirador Mansion	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion and Demolition of Entrances	111	12	29	3	85	85																									
Installation of Pipepile and Sheet Pile	110	12	29	3	84		84	84	84	84	84	84		84	84																
Surface Excavation	109	12	29	3	83					83																					
Construction of Temporary Staircase	108	12	29	3	82						82	82	82																		
Further Excavation (Works under Road Decking)	108	12	29	3	82											82	82	82													
Construction of Subway (Works under Road Decking)	107	12	29	3	81														81	81	81	81	81	81	81						
Construction of Above Ground Entrance	111	12	29	3	85																		85						85		
Backfill	109	12	29	3	83																				83	83	83	83	83		
Reinstatement	110	12	29	3	84																									84	84
Section 2																															
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	107	35	39	3	71													71	71	71	71	71	71								
					Total	85	84	84	84	87	86	86	82	84	84	82	82	82	81	81	81	81	86	81	85	83	83	83	87	84	84

Remarks:
1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)

Appendix III
Construction Noise Assessment for Representative NSR - Unmitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014												2015						
N2c - Mirador Mansion	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion along Nathan Road[4]	110	11	29	3	84																										
Utilities Diversion and Demolition of Entrances[4]	111	14	31	3	83	83																									
Installation of Pipepile and Sheet Pile	110	14	31	3	82		82	82	82	82	82	82		82	82																
Surface Excavation	109	14	31	3	81					81																					
Construction of Temporary Staircase	108	14	31	3	80						80	80	80																		
Further Excavation (Works under Road Decking)	108	14	31	3	80											80	80	80													
Construction of Subway (Works under Road Decking)	107	14	31	3	79														79	79	79	79	79	79	79						
Construction of Above Ground Entrance	111	14	31	3	83																		83						83		
Backfill	109	14	31	3	81																				81	81	81	81	81		
Reinstatement	110	14	31	3	82																									82	82
Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway																															
Enhancement Works at Entrance A1[5]	107	93	47	3	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63												
					Total	84	82	82	82	85	84	84	80	82	82	80	80	80	79	79	79	79	84	79	83	81	81	81	85	82	82

Remarks:

1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)
4. Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.
5. Reference was made to Appendix 4.4 and 4.5 of Tsim Sha Tsui Station Northern Subway EIA report (AEIAR-127/2008).

Appendix III
Construction Noise Assessment for Representative NSR - Unmitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014												2015						
N2d - Mirador Mansion	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion along Nathan Road[4]	110	11	29	3	84	84																									
Utilities Diversion and Demolition of Entrances[4]	111	51	42	3	72																										
Installation of Pipepile and Sheet Pile	110	51	42	3	71		71	71	71	71	71	71		71	71																
Surface Excavation	109	51	42	3	70					70																					
Construction of Temporary Staircase	108	51	42	3	69						69	69	69																		
Further Excavation (Works under Road Decking)	108	51	42	3	69											69	69	69													
Construction of Subway (Works under Road Decking)	107	51	42	3	68														68	68	68	68	68	68	68						
Construction of Above Ground Entrance	111	51	42	3	72																		72						72		
Backfill	109	51	42	3	70																				70	70	70	70	70		
Reinstatement	110	51	42	3	71																									71	71
Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway																															
Enhancement Works at Entrance A1[5]	107	132	50	3	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60												
					Total	84	72	72	72	74	74	74	69	72	72	69	69	69	69	68	68	68	73	68	72	70	70	70	74	71	71

Remarks:

1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)
4. Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.
5. Reference was made to Appendix 4.4 and 4.5 of Tsim Sha Tsui Station Northern Subway EIA report (AEIAR-127/2008).

Appendix III
Construction Noise Assessment for Representative NSR - Unmitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014											2015						
N3 - Friends' House	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion and Demolition of Entrances	111	21	34	3	80	80																								
Installation of Pipepile and Sheet Pile	110	21	34	3	79		79	79	79	79	79	79		79	79															
Surface Excavation	109	21	34	3	78					78																				
Construction of Temporary Staircase	108	21	34	3	77						77	77	77																	
Further Excavation (Works under Road Decking)	108	21	34	3	77											77	77	77												
Construction of Subway (Works under Road Decking)	107	21	34	3	76														76	76	76	76	76	76	76						
Construction of Above Ground Entrance	111	21	34	3	80																		80						80		
Backfill	109	21	34	3	78																				78	78	78	78	78		
Reinstatement	110	21	34	3	79																									79	79
Section 2																															
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	107	11	29	3	81													81	81	81	81	81	81								
					Total	80	79	79	79	82	81	81	77	79	79	77	77	83	82	82	82	82	84	76	80	78	78	78	82	79	79

Remarks:
1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)

Appendix IV. Fixed Plant Noise Assessment

Fixed Plant Noise Assessment (Day time and Evening Time)

NSR ID	Description	Plant Inventory	Source ID	Source Height (mPD)	SWL, dB(A)	Receiver Height (mPD)	Horizontal Distance (m)	Slant Distance (m)	Distance Attenuation dB(A)	Tonality Correction dB(A)	#Screening Correction dB(A)	Facade Correction dB(A)	SPL, $L_{eq(30min)}$, dB(A)	Resultant SPL, $L_{eq(30min)}$, dB(A)	Noise Criteria, dB(A) (Day time and Evening Time)
N1a	Golden Crown Court (Commercial/Residential Mixed)	Louver of TST Station	L1	9.3	82	18.1	19	21	-35	0	-10	3	40		
			L2	9.3	86	18.1	17	19	-34	0	0	3	55		
			L3	9.3	86	18.1	11	14	-31	0	0	3	58	60	60
N2b	Mirador Mansion (Commercial/Residential Mixed)	Louver of TST Station	L1	9.3	82	15.3	5	8	-26	0	0	3	59		
			L2	9.3	86	15.3	9	11	-29	0	-10	3	50		
			L3	9.3	86	15.3	12	14	-31	0	-10	3	48	60	60
N3	Friends' House (Mainly Residential)	Louver of TST Station	L1	9.3	82	12.5	27	27	-37	0	-10	3	38		
			L2	9.3	86	12.5	25	25	-36	0	0	3	53		
			L3	9.3	86	12.5	32	32	-38	0	0	3	51	55	60

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

Fixed Plant Noise Assessment (Night Time)

NSR ID	Description	Plant Inventory	Source ID	Source Height (mPD)	SWL, dB(A)	Receiver Height (mPD)	Horizontal Distance (m)	Slant Distance (m)	Distance Attenuation dB(A)	Tonality Correction dB(A)	#Screening Correction dB(A)	Facade Correction dB(A)	SPL, $L_{eq(30min)}$, dB(A)	Resultant SPL, $L_{eq(30min)}$, dB(A)	Noise Criteria, dB(A) (Night Time)
N1a	Golden Crown Court (Commercial/Residential Mixed)	Louver of TST Station	L1	9.3	72	18.1	19	21	-35	0	-10	3	30		
			L2	9.3	76	18.1	17	19	-34	0	0	3	45		
			L3	9.3	76	18.1	11	14	-31	0	0	3	48	50	50
N2b	Mirador Mansion (Commercial/Residential Mixed)	Louver of TST Station	L1	9.3	72	15.3	5	8	-26	0	0	3	49		
			L2	9.3	76	15.3	9	11	-29	0	-10	3	40		
			L3	9.3	76	15.3	12	14	-31	0	-10	3	38	50	50
N3	Friends' House (Mainly Residential)	Louver of TST Station	L1	9.3	72	12.5	27	27	-37	0	-10	3	28		
			L2	9.3	76	12.5	25	25	-36	0	0	3	43		
			L3	9.3	76	12.5	32	32	-38	0	0	3	41	45	50

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

Appendix V. Plant Inventory for Various Construction Activities (Mitigated Scenario)

Appendix V
Plant Inventory for Various Construction Activities - Mitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

PME	TM or other reference	No. of PME	SWL, dB(A)/ unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Carnarvon Road (Section 1)							
Activities							
Utilities Diversion along Nathan Road*							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	80%	Noise Enclosure	15	86
Excavator, wheeled/tracked	EPD 00773	1	103	40%	Movable Barrier	5	94
Breaker, hand-held, mass > 10kg and < 20kg	CNP 024	1	108	30%	Movable Barrier	10	93
Generator	EPD 00668	1	79	80%	Noise Enclosure	15	63
						Total	**97**
Utilities Diversion and Demolition of Entrances (##Case 1: Use of Excavator)*							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	80%	Noise Enclosure	15	86
Crane, mobile	EPD 1158	1	102	30%	Movable Barrier	5	92
Excavator, wheeled/tracked	EPD 00773	1	103	40%	Movable Barrier	5	94
Generator	EPD 00668	1	79	80%	Noise Enclosure	15	63
Lorry (<38t)	[1]	1	105	30%	-	0	100
						Total	**101**
Utilities Diversion and Demolition of Entrances (##Case 2: Use of Breaker)*							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	80%	Noise Enclosure	15	86
Crane, mobile	EPD 1158	1	102	30%	Movable Barrier	5	92
Breaker, hand-held, mass > 10kg and < 20kg	CNP 024	1	108	30%	Movable Barrier	10	93
Generator	EPD 00668	1	79	80%	Noise Enclosure	15	63
Lorry (<38t)	[1]	1	105	30%	-	0	100
						Total	**101**
Installation of Pipepile and Sheet Pile							
Crane, mobile	EPD 1158	1	102	30%	Movable Barrier	5	92
Generator	EPD 00668	1	79	100%	Noise Enclosure	15	64
Grout mixer	[1]	1	90	100%	Movable Barrier	10	80
Drill rig, rotary type (diesel)	[1]	1	110	50%	Movable Barrier	10	97
Silent Piler Machine	GIKEN **	1	94	100%	Movable Barrier	10	84
						Total	**98**
Surface Excavation							
Excavator, wheeled/tracked	EPD 00773	1	103	40%	Movable Barrier	5	94
Dump truck	[1]	1	105	30%	Movable Barrier	5	95
						Total	**97**
Construction of Temporary Staircase							
Concrete lorry mixer	CNP 044	1	109	30%	Movable Barrier	10	94
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	30%	Movable Barrier	10	94
Poker, vibratory, hand-held (electric)	[1]	1	102	30%	Movable Barrier	10	87
Generator	EPD 00668	1	79	100%	Noise Enclosure	15	64
						Total	**97**
Further Excavation (Works under Road Decking)							
Breaker, hand-held, mass > 35kg	CNP 026	1	114	50%	#Underground Work	20	91
Crane, mobile	EPD 1158	1	102	30%	Movable Barrier	5	92
Excavator, wheeled/tracked	EPD 00773	1	103	100%	#Underground Work	20	83
Generator	EPD 00668	1	79	100%	#Underground Work	20	59
Dump truck	[1]	1	105	30%	Movable Barrier	5	95
Water pump (petrol)	CNP 282	2	103	100%	#Underground Work	20	86
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	**99**
Construction of Subway (Works under Road Decking)							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	#Underground Work	20	82
Saw, circular, wood	CNP 201	1	108	50%	#Underground Work	20	85
Concrete lorry mixer	CNP 044	1	109	30%	Movable Barrier	10	94
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	30%	Movable Barrier	10	94
Generator	EPD 00668	1	79	100%	#Underground Work	20	59
Ventilation fan	CNP 241	2	108	100%	#Underground Work	20	91
						Total	**98**
Construction of Above Ground Entrance							
Bar bender and cutter (electric)	CNP 021	1	90	30%	Movable Barrier	10	75
Concrete lorry mixer	CNP 044	1	109	30%	Movable Barrier	10	94
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	30%	Movable Barrier	10	94
Crane, mobile	EPD 1158	1	102	30%	Movable Barrier	5	92
Generator	EPD 00668	1	79	50%	Noise Enclosure	15	61
						Total	**98**
Backfill							
Excavator, wheeled/tracked	EPD 00773	1	103	50%	Movable Barrier	5	95
Dump truck	[1]	1	105	30%	Movable Barrier	5	95
						Total	**98**
Reinstatement							
Concrete lorry mixer	CNP 044	1	109	30%	Movable Barrier	10	94
Poker, vibratory, hand-held	CNP 170	1	113	30%	Movable Barrier	10	98
Road Roller	EPD 00222	1	99	30%	-	0	94
						Total	**100**

Remark:

* Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.

Since either excavator or breaker will be used for the ultilites diversion works along Carnarvon Road and demolition of entrances, the two plants will not be overlapped, therefore, as calculated above, the total SWL for both cases is 101 dB(A).

[1] Extracted from EPD document namely, "Sound Power Levels of Other Commonly Used PME" http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf

** Reference was made to quiet plant for sheet piling work (Giken silent piler system) from the Tsim Sha Tsui Station Northern Subway EIA report, Appendix 4.4.

\# Reference was made to Tsim Sha Tsui Station Northern Subway Environmental Impact Assessment.

Appendix V
Plant Inventory for Various Construction Activities - Mitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

PME	TM or other reference	No. of PME	SWL, dB(A)/ unit	% on time	Mitigation measures	Reduction dB(A)	Total SWL, dB(A)
Carnarvon Road (Section 2)							
Activities							
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11							
Air compressor, air flow > 10m3/min and <= 30m3/min	CNP 002	1	102	100%	#Underground Work	20	82
Saw, circular, wood	CNP 201	1	108	50%	#Underground Work	20	85
Concrete lorry mixer	CNP 044	1	109	30%	Movable Barrier	10	94
Concrete pump, stationary/ lorry mounted	CNP 047	1	109	30%	Movable Barrier	10	94
Drill rig, rotary type (diesel)	[1]	1	110	100%	#Underground Work	20	90
Excavator, wheeled/tracked	EPD 00773	1	103	80%	#Underground Work	20	82
Generator	EPD 00668	1	79	100%	#Underground Work	20	59
Grout mixer	[1]	1	90	70%	Movable Barrier	10	78
Ventilation fan	CNP 241	1	108	100%	#Underground Work	20	88
						Total	**99**

Remark:
[1] Extracted from EPD document namely, "Sound Power Levels of Other Commonly Used PME"
http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf
Reference was made to Tsim Sha Tsui Station Northern Subway Environmental Impact Assessment.

Appendix VI. Construction Noise Assessment for Representative NSRs (Mitigated Scenario)

Appendix VI
Construction Noise Assessment for Representative NSR - Mitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014											2015						
N1a - Golden Crown Court	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion and Demolition of Entrances	101	14	31	3	73	73																								
Installation of Pipepile and Sheet Pile	98	14	31	3	70		70	70	70	70	70	70		70	70															
Surface Excavation	97	14	31	3	69					69																					
Construction of Temporary Staircase	97	14	31	3	69						69	69	69																		
Further Excavation (Works under Road Decking)	99	14	31	3	71											71	71	71													
Construction of Subway (Works under Road Decking)	98	14	31	3	70														70	70	70	70	70	70	70						
Construction of Above Ground Entrance	98	14	31	3	70																		70						70		
Backfill	98	14	31	3	70																				70	70	70	70	70		
Reinstatement	100	14	31	3	72																									72	72
Section 2																															
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	99	37	39	3	63													63	63	63	63	63	63								
					Total	73	70	70	70	73	73	73	69	70	70	71	71	71	71	71	71	71	73	70	73	70	70	70	73	72	72

Remarks:
1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)

Appendix VI
Construction Noise Assessment for Representative NSR - Mitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014												2015						
N1b - Golden Crown Court	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion along Nathan Road[4]	97	13	31	3	69	69																									
Utilities Diversion and Demolition of Entrances[4]	101	35	39	3	65																										
Installation of Pipepile and Sheet Pile	98	35	39	3	62		62	62	62	62	62	62		62	62																
Surface Excavation	97	35	39	3	61					61																					
Construction of Temporary Staircase	97	35	39	3	61						61	61	61																		
Further Excavation (Works under Road Decking)	99	35	39	3	63											63	63	63													
Construction of Subway (Works under Road Decking)	98	35	39	3	62														62	62	62	62	62	62	62						
Construction of Above Ground Entrance	98	35	39	3	62																		62						62		
Backfill	98	35	39	3	62																				62	62	62	62	62		
Reinstatement	100	35	39	3	64																									64	64
Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway																															
Enhancement Works at Entrance A1[5]	107	53	42	3	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68												
					Total	71	69	69	69	69	69	69	68	69	69	69	69	69	69	62	62	62	65	62	65	62	62	62	65	64	64

Remarks:

1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)
4. Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.
5. Reference was made to Appendix 4.4 and 4.5 of Tsim Sha Tsui Station Northern Subway EIA report (AEIAR-127/2008).

Appendix VI
Construction Noise Assessment for Representative NSR - Mitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013								2014											2015						
N1c - Golden Crown Court	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion along Nathan Road[4]	97	20	34	3	66																										
Utilities Diversion and Demolition of Entrances[4]	101	20	34	3	70	70																									
Installation of Pipepile and Sheet Pile	98	20	34	3	67		67	67	67	67	67	67		67	67																
Surface Excavation	97	20	34	3	66					66																					
Construction of Temporary Staircase	97	20	34	3	66						66	66	66																		
Further Excavation (Works under Road Decking)	99	20	34	3	68											68	68	68													
Construction of Subway (Works under Road Decking)	98	20	34	3	67														67	67	67	67	67	67	67						
Construction of Above Ground Entrance	98	20	34	3	67																		67						67		
Backfill	98	20	34	3	67																				67	67	67	67	67		
Reinstatement	100	20	34	3	69																									69	69
Section 2																															
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	99	64	44	3	58													58	58	58	58	58	58								
Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway																															
Enhancement Works at Entrance A1[5]	107	74	45	3	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65												
					Total	71	69	69	69	71	71	71	68	69	69	69	69	70	69	68	68	68	70	67	70	67	67	67	70	69	69

Remarks:
1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)
4. Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.
5. Reference was made to Appendix 4.4 and 4.5 of Tsim Sha Tsui Station Northern Subway EIA report (AEIAR-127/2008).

Appendix VI
Construction Noise Assessment for Representative NSR - Mitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014											2015						
N2a - Mirador Mansion	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion and Demolition of Entrances	101	12	29	3	75	75																								
Installation of Pipepile and Sheet Pile	98	12	29	3	72		72	72	72	72	72	72		72	72															
Surface Excavation	97	12	29	3	71					71																				
Construction of Temporary Staircase	97	12	29	3	71						71	71	71																	
Further Excavation (Works under Road Decking)	99	12	29	3	73											73	73	73												
Construction of Subway (Works under Road Decking)	98	12	29	3	72														72	72	72	72	72	72	72						
Construction of Above Ground Entrance	98	12	29	3	72																		72						72		
Backfill	98	12	29	3	72																				72	72	72	72	72		
Reinstatement	100	12	29	3	74																									74	74
Section 2																															
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	99	35	39	3	63													63	63	63	63	63	63								
					Total	75	72	72	72	75	75	75	71	72	72	73	73	73	73	73	73	73	75	72	75	72	72	72	75	74	74

Remarks:
1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)

Appendix VI
Construction Noise Assessment for Representative NSR - Mitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014											2015						
N2c - Mirador Mansion	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion along Nathan Road[4]	97	11	29	3	71																										
Utilities Diversion and Demolition of Entrances[4]	101	14	31	3	73	73																									
Installation of Pipepile and Sheet Pile	98	14	31	3	70		70	70	70	70	70	70		70	70																
Surface Excavation	97	14	31	3	69					69																					
Construction of Temporary Staircase	97	14	31	3	69						69	69	69																		
Further Excavation (Works under Road Decking)	99	14	31	3	71											71	71	71													
Construction of Subway (Works under Road Decking)	98	14	31	3	70														70	70	70	70	70	70	70						
Construction of Above Ground Entrance	98	14	31	3	70																		70						70		
Backfill	98	14	31	3	70																				70	70	70	70	70		
Reinstatement	100	14	31	3	72																									72	72
Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway																															
Enhancement Works at Entrance A1[5]	107	93	47	3	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63												
					Total	74	71	71	71	73	73	73	70	71	71	71	71	71	71	70	70	70	73	70	73	70	70	70	73	72	72

Remarks:

1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)
4. Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.
5. Reference was made to Appendix 4.4 and 4.5 of Tsim Sha Tsui Station Northern Subway EIA report (AEIAR-127/2008).

Appendix VI
Construction Noise Assessment for Representative NSR - Mitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014												2015						
N2d - Mirador Mansion	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion along Nathan Road[4]	97	11	29	3	71	71																									
Utilities Diversion and Demolition of Entrances[4]	101	51	42	3	62																										
Installation of Pipepile and Sheet Pile	98	51	42	3	59		59	59	59	59	59	59		59	59																
Surface Excavation	97	51	42	3	58					58																					
Construction of Temporary Staircase	97	51	42	3	58						58	58	58																		
Further Excavation (Works under Road Decking)	99	51	42	3	60											60	60	60													
Construction of Subway (Works under Road Decking)	98	51	42	3	59														59	59	59	59	59	59	59						
Construction of Above Ground Entrance	98	51	42	3	59																		59						59		
Backfill	98	51	42	3	59																				59	59	59	59	59		
Reinstatement	100	51	42	3	61																									61	61
Entrance A1 Enhancement Works under Tsim Sha Tsui Station Northern Subway																															
Enhancement Works at Entrance A1[5]	107	132	50	3	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60												
					Total	71	62	62	62	64	64	64	62	62	62	63	63	63	62	59	59	59	62	59	62	59	59	59	62	61	61

Remarks:

1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)
4. Since the ultilites diversion works along Nathan Road and Carnarvon Road will not be overlapped, therefore, the worst case scenerio (highest sound power level to the nearest NSR) is assumed for the construction noise assessment in the first month.
5. Reference was made to Appendix 4.4 and 4.5 of Tsim Sha Tsui Station Northern Subway EIA report (AEIAR-127/2008).

Appendix VI
Construction Noise Assessment for Representative NSR - Mitigated Scenario

Consultancy Agreement No. NEX/1049 Tsim Sha Tsui Station Carnarvon Road Subway Project Profile

Noise Sensitive Receiver						2013							2014											2015						
N3 - Friends' House	**SWL**	**Dist.(m)[1]**	**DC[2]**	**FC[3]**	**CNL**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Section 1																															
Utilities Diversion and Demolition of Entrances	101	21	34	3	70	70																								
Installation of Pipepile and Sheet Pile	98	21	34	3	67		67	67	67	67	67	67		67	67															
Surface Excavation	97	21	34	3	66					66																				
Construction of Temporary Staircase	97	21	34	3	66						66	66	66																	
Further Excavation (Works under Road Decking)	99	21	34	3	68											68	68	68												
Construction of Subway (Works under Road Decking)	98	21	34	3	67														67	67	67	67	67	67	67						
Construction of Above Ground Entrance	98	21	34	3	67																		67						67		
Backfill	98	21	34	3	67																				67	67	67	67	67		
Reinstatement	100	21	34	3	69																									69	69
Section 2																															
Tunnelling across Junction of Carnarvon Road and Bristol Avenue and Breakthrough to K11	99	11	29	3	73													73	73	73	73	73	73								
					Total	70	67	67	67	70	70	70	66	67	67	68	68	74	74	74	74	74	74	67	70	67	67	67	70	69	69

Remarks:
1. Slant distance is adopted for the construction noise assessment
2. Distance correction in dB(A)
3. Facade correction in dB(A)

Appendix VII. Environmental Monitoring and Audit Plan

Appendix VII

Environmental Monitoring and Audit Plan

1. Introduction

1.1 Purpose of EM&A Plan

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

1.2 Project Background

It is indicated that noise impact is predicted during the construction phase at Golden Crown Court, Mirador Mansion and Friends' House, hence the mitigation measures stated in this Report are recommended to be implemented in order to reduce the noise impact to the nearby NSRs. The monitoring programme should be carried out by the ET.

The recommended noise mitigation measures are presented in Section 3 of the Project Profile (PP). The monitoring requirements and methodology for monitoring of noise impacts are provided below.

Although no adverse air quality impact is anticipated in this Project, 24-hour monitoring of air quality is recommended to be conducted during construction phase. The monitoring requirement and methodology for 24-hour air quality monitoring are provided below.

1.3 Project Organisation

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

<u>The Engineer or the Engineer's Representative (ER)</u>

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

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

Independent Environmental Checker (IEC)

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

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

The Environmental Team (ET)

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

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

- Sampling, analysis and statistical evaluation of monitoring parameters;
- Environmental site surveillance;
- Inspection and audit of compliance with environmental protection, and pollution prevention and control regulations;

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

The Contractor

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

- Comply with the relevant contract conditions and specifications on environmental protection
- Participate in the site inspections undertaken by the ET;
- Provide assistance to ET to carry out monitoring;
- Provide requested information to the ET in the event of any exceedance in the environmental criteria (Action/Limit levels);
- Submit proposals on mitigation measures in case of exceedance of Action and Limit levels in accordance with the Event/Action Plans; and
- Cooperate with the ET in providing all the necessary information and assistance for completion of the complaint investigation works. If mitigation measures are required following the investigation, the Contractor should promptly carry out these measures.

2. Construction Noise Impact

2.1 Monitoring Requirements

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

2.2 Monitoring Equipment

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

respective calibrators should be carried out in accordance with the manufacturer's requirements.

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

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

2.3 Monitoring Locations

The noise monitoring location will be set up at Mirador Mansion (Refer to **Figures 3.3**).

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

2.4 Baseline Monitoring

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

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

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

2.5 Impact Monitoring

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

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

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

In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Event and Action Plan in **Table 1.2** should be carried out. This additional

monitoring should be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

2.6 Event and Action Plan

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

Table 2.1 : Typical Action and Limit Levels for Construction Noise

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

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

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

Table 2.2: Event and Action Plan for Construction Noise

Event	ET	IEC	ER	Action Contractor
Action Level	1. Notify IEC and Contractor. 2. Carry out investigation. 3. Report the results of investigation to the IEC and Contractor. 4. Discuss with the Contractor and formulate remedial measures 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the analyzed result submitted by ET. 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly. 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of exceedance 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented.	1. Submit noise mitigation proposals to IEC 2. Implement noise mitigation proposals
Limit Level	1. Notify IEC, ER, EPD and Contractor, and follow other actions 2. Identify source 3. Repeat measurement to confirm findings 4. Increase monitoring frequency 5. Check Contractor's working procedures to determine possible mitigation to be implemented 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD,	1. Discuss amongst ER, ET and Contractor on the potential remedial actions 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ET accordingly 3. Supervise the implementation of remedial measures	1. Confirm receipt of notification of exceedances 2. Notify Contractor 3. Require Contractor to propose remedial measures 4. Ensure remedial measures are properly implemented 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IEC within 3 working days of notifications 3. Implement the agreed proposals 4. Revise and resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated

Event	ET	IEC	ER	Action Contractor
	ER informed of the results 8. If exceedance stops, cease additional monitoring		abated.	

2.7 Construction Noise Mitigation Measures

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

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

3. Construction Air Impact

3.1 Monitoring Requirement

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

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

All relevant data including temperature, pressure, wind speed and direction, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, other local atmospheric factors affecting or affected by site conditions and work progress of the concerned site, etc. should be recorded in detail. A sample data record sheet is shown below. The ET may develop project specific data record sheet to suit this EM&A programme.

3.2 Monitoring Equipment

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

flow controller and be calibrated against a traceable standard at regular intervals. All the equipment should be clearly labelled.

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

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

- 0.6 – 1.7 m^3/min (20 – 60 standard cubic feet per minute) adjustable flow range;
- Equipped with a timing/control device for 24 hours operation;
- Installed with elapsed-time meter with +/- 5 minutes accuracy for 24 hours operation;
- Capable of providing a minimum exposed area of 406cm^2 (63 in^2);
- Flow control accuracy: +/- 2.5% deviation over 24-hour sampling period;
- Incorporated with an electronic mass flow rate controller or other equivalent devices;
- Equipped with a flow recorder for continues monitoring;
- Provided with a peaked roof inlet;
- Incorporated with manometer;
- Able to hold and seal the filter paper to the sampler housing at horizontal position;
- Easy to change the filter, and
- Capable of operating continuously for 24-hour period.

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

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

3.3 Laboratory Measurement / Analysis

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

After sampling, the filter paper loaded with dust should be kept in a clean and tight sealed bag. The filter paper should then be returned to the laboratory for reconditioning in the

humidity-controlled chamber followed by accurate weighing by an electronic balance. The balance should be regularly calibrated against a traceable standard.

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

3.4 Monitoring Locations

The air monitoring location will be set up at Mirador Mansion (Refer to **Figure 3.3**).

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

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

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

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

3.5 Baseline Monitoring

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

Baseline monitoring should be carried out at each designated monitoring location for a continuous period of at least 14 days prior to the commissioning of the construction works to

obtain daily 24-hour TSP samples. 1-hour sampling should also be done at least 3 times per day. Baseline monitoring should be carried out under typical weather conditions. General metrological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources should also be recorded throughout the baseline monitoring period.

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

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

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

3.6 Impact Monitoring

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

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

3.7 Event and Action Plan

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

Table 3.1 : Typical Action and Limit Levels for Air Quality

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

Table 3.2: Event and Action Plan for Air Quality

Event	ET	IEC	ER	Action Contractor
Action Level				
Exceedance for one sample	1. Identify source; 2. If valid, inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method.	1. Notify Contractor	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate
Exceedance for two or more consecutive samples	1. Identify source; 2. Inform IEC and EPD; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency to daily; 5. Discuss with IEC and Contractor on remedial action required; 6. If exceedance continues, arrange meeting with IEC and ER; 7. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervisor implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measure properly implemented.	1. Submit proposals for remedial action to IEC within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.
Limit Level				
Exceedance for one sample	1. Identify source; 2. Inform ER and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and the Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
Exceedance for two or more consecutive samples	1. Notify IEC, ER, Contractor and EPD; 2. Identify sources; 3. Repeat measurement to confirm findings; 4. Increase monitoring	1. Discuss amongst ER, ET and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consultation with IEC, agree with the Contractor on	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of

Event	ET	IEC	ER	Action Contractor
	frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring.	necessary to assure their effectiveness and advise the ET accordingly. 3. Supervise the implementation of remedial measures.	the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

3.8 Mitigation Measure of Air Quality

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

- Decking over the excavation areas at the Entrance D1 and D2;
- Regular watering to reduce dust emissions from all exposed site surface, particularly during dry weather;
- Frequent watering for particularly dusty construction areas and areas close to air sensitive receivers;
- Cover all excavated or stockpiles of dusty material by impervious sheeting or spraying with water to maintain the entire surface wet;
- Provision of vehicle washing facilities at the exit points of the site; and
- Provision of tarpaulin covering for any dusty materials on a vehicle leaving the site.

4. Environmental Audit

4.1 Site Inspection

Site inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They should be undertaken routinely by the ET to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. With well defined

pollution control and mitigation specifications and a well established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

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

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

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

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

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

4.2 Compliance with Legal and Contractual Requirement

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

In order to comply with the contractual requirements, all works method statements submitted by the Contractor to the ER for approval should be sent to the ET for vetting, to see whether sufficient environmental protection and pollution control measures have been included. The implementation schedule of mitigation measures is summarized in **Appendix VII**.

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

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

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

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

4.3 Environmental Complaints

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

- Investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;
- Log complaint and date of receipt onto the complaint database and inform the ER and IEC if valid;
- Identify mitigation measures if a compliant is valid and due to the works of the Project;
- Advise the Contractor if mitigation measures are required;
- Review the Contractor's response to identified mitigation measures, and the updated situation;
- Undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;
- If the complaint is referred by EPD, keep EPD informed on the status of the complaint investigation and follow-up action and report to EPD upon completion of the investigation; and
- Report the investigation results and the subsequent actions to the complainant (If the source of complaint is identified through EPD, the results should be reported within the time frame assigned by EPD);

- Record the compliant, investigation, the subsequent actions and the results in the monthly EM&A reports.

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

5. Reporting Requirement

5.1 Introduction

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

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

5.2 Baseline Monitoring Report

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

(i) Executive summary;

(ii) Brief project background information;

(iii) Drawings showing locations of the baseline monitoring stations;

(iv) An updated construction programme with milestones of environmental protection/mitigation activities annotated;

(v) Monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology;
- name of laboratory and types of equipment used and calibration dates;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency and duration;
- QA/QC results and detection limits.

(v) Details of influencing factors, including:

- major activities, if any, being carried out on the site during the period;
- weather conditions during the period;
- other factors which might affect the results.

(vi) Determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data. The analysis should conclude if there is any significant difference between control and impact stations for the parameters monitored;

(vii) Revisions for inclusion in the EM&A Manual; and

(viii) Comments and conclusions.

5.3 Monthly EM&A Reports

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

5.4 First Monthly EM&A Report

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

(i) Executive summary:

- breaches of Action and Limit levels;
- complaint log;
- notifications of any summons and status of prosecutions;
- reporting changes; and
- future key issues.

(ii) Basic project information:

- project organisation including key personnel contact names and telephone numbers;
- construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
- management structure; and
- works undertaken during the month.

(iii) Environmental status:

- works undertaken during the month with illustrations (such as location of works, daily dredging/filling rates, percentage fines in the fill material used); and
- drawing showing the project area, any key environmental sensitive receivers and the locations of the monitoring and control stations.

(iv) A brief summary of EM&A requirements:

- all monitoring parameters;
- environmental quality performance limits (Action and Limit levels);
- event-Action Plans;
- environmental mitigation measures; and
- environmental requirements in contract documents.

(v) Monitoring results:

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

(vi) Report on non-compliance, complaints, notifications of summons and successful prosecutions:

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

(vii) Others

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

5.5 Subsequent Monthly EM&A Reports

Subsequent monthly EM&A reports should include the following:

(i) Executive summary

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

(ii) Environmental status:

- construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
- works undertaken during month with illustration including key personnel contact names and telephone numbers; and
- drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(iii) Implementation status:

- advice on the status of compliance with the Environmental Permit (EP), submission status under the EP, implementation status of environmental protection and pollution control / mitigation measures, as recommended in the PP

(iv) Monitoring results

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

(v) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:

- Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- Record of all complaints received, including locations and nature of complaints, investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- Record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- Review of reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and

- A description of the actions taken in the event of non-compliance and deficiency, and follow-up actions related to earlier non-compliance

(vi) Others

- an account of the future key issues as reviewed from the works programme and work method statements; and
- advice on the solid and liquid waste management.

5.6 Quarterly EM&A Reports

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

(i) Executive summary;

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

(iii) A brief summary of EM&A requirements including:

- monitoring parameters
- environmental quality performance limits (Action and Limit levels)
- environmental mitigation measures, as recommended in the PP

(iv) advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the PP, summarised in the updated implementation schedule;

(v) Drawings showing the project area, environmental sensitive receivers and the locations of the monitoring and control stations;

(vi) Graphical plots of the monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated:

- the major activities being carried out on site during the period
- weather conditions during the period
- any other factors which might affect the monitoring results

(vii) Advice on the solid and liquid waste management status during the quarter including waste generation and disposal records;

(viii) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

(ix) A brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures;

(x) A summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance;

(xi) A summary of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

(xii) A summary record of notifications of summons and successful prosecution for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;

(xiii) Comments on the effectiveness and efficiency of the mitigation measures); recommendations on any improvement in the EM&A programme and conclusions for the quarter; and

(xiii) Proponents' contacts and any hotline telephone number for the public to make enquiries.

5.7 Final EM&A Review Report

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

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

(ii) trends analysis to demonstrate the narrow down of monitoring exceedances due to construction activities and the return of ambient environmental conditions in comparison with baseline data; and

(iii) no environmental complaints and prosecution involved.

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

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

(i) Executive summary;

(ii) Basic project information including a synopsis of the project organisation, programme, contracts of key management, and synopsis of work undertaken during the entire construction period;

(iii) Brief summary of EM&A requirements including:

- monitoring parameters
- environmental quality performance limits (Action and Limit levels)
- environmental mitigation measures, as recommended in the PP.

(iv) Advice on the implementation status of the environmental protection and pollution control/mitigation measures, as recommended in the PP, summarised in the updated implementation status;

(v) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

(vi) Graphical plots of the trends of monitored parameters over the construction period for representative monitoring stations annotated against;

- the major activities being carried out on site during the period
- weather conditions during the period
- any other factors which might affect the monitoring results
- the return of ambient environmental conditions in comparison with baseline data

(vii) Compare and contrast the EM&A data with the PP predictions and annotate with explanation for any discrepancies;

(viii) Provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;

(ix) Advice on the solid and liquid waste management status;

(x) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

(xi) A brief account of the reasons for and the implications of the non-compliance including a review of pollution sources and working procedures as appropriate;

(xii) A summary description of the actions taken in the event of the non-compliance and any follow-up procedures related to earlier non-compliance;

(xii) A summary record of all complaints received, liaison and consultation undertaken, actions and follow-up procedures taken;

(xiii) Review the monitoring methodology adopted and with the benfit of hindsight, comment on its effectiveness (including cost effectiveness);

(ixx) A summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;

(xx) A review of the effectiveness of the mitigation measures; and

(xxi) A conclusion to state the return of ambient and/or the predicted scenario.

5.8 Data Keeping

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

5.9 Interim Notifications of Environmental Quality Limit Exceedances

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

Sample Environmental Monitoring Data Recording Sheet

Noise Monitoring Field Record Sheet

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

	Name & Designation	Signature	Date
Record by:	_____	_____	_____
Checked by:	_____	_____	_____

Data Sheet for 24-hr TSP Monitoring

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (hour)	
	Stop (hour)	
Total Sampling Time (min.)		
Weather Conditions		Fine / Sunny / Cloudy / Rainy
Site Conditions		
Initial Flow Rate, Qsi	Pi (hpa)	
	Ti (^{o}C)	
	Hi (cfm)	
	Qsi (Std. m^3)	
Final Flow Rate, Qsf	Pf (hpa)	
	Tf (^{o}C)	
	Hf (cfm)	
	Qsf (Std. m^3)	
Average Flow Rate (Std.m^3)		
Total Volume (Std.m^3)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final wt. of Filter (g)		
Measured TSP Level (µg/m^3)		
Observations / Remarks		

	Name & Designation	Signature	Date
Record by:	_____	_____	_____
Checked by:	_____	_____	_____

Sample template for the interim notifications of Environmental Quality Limits Exceedances

Incident Report on Action Level or Limit Level Non-compliance

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

Location Plan

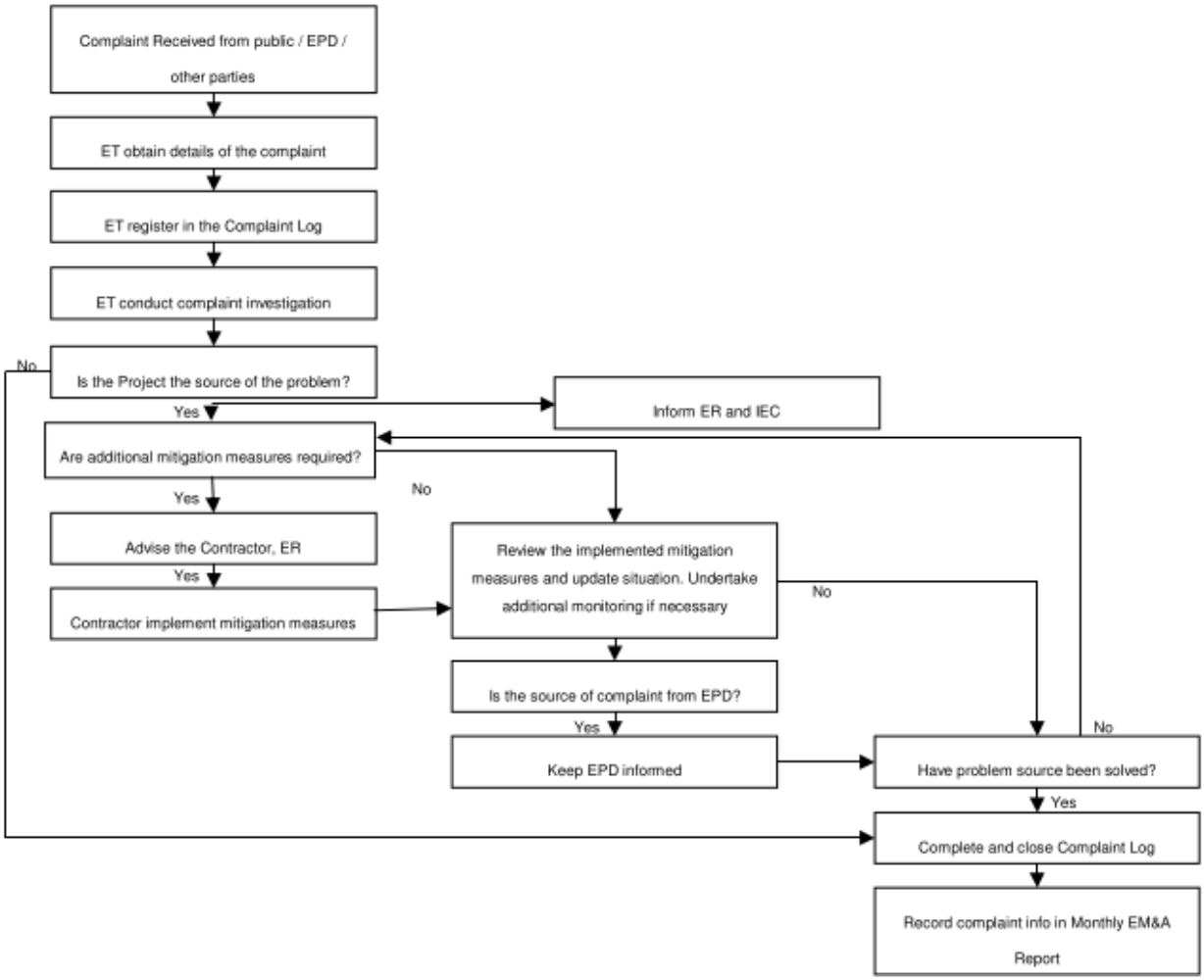
Prepared by:

Designation:

Signature:

Date:

Complaint Response Procedure



Appendix VIII. Implementation Schedule

Appendix VIII

Implementation Schedule

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	Noise Impact					
S.3.1	Use of quieter plant	To minimise construction noise emissions	Contractor	Work site	Construction Stage	ProPECC PN2/93 and Noise Control Ordinance
S.3.1	Use of noise enclosure and movable barrier • movable barrier can achieve a 5 dB(A) reduction for movable PME and 10 dB(A) reduction for stationary PME; • noise enclosure can achieve 15dB(A) reduction for PME; • A typical design barrier with a steel frame of vertical / cantilever type would be adopted and located close to the noise generating part of PME; • Barrier material of surface mass in excess of 7kg/m^2 shall be required 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.	To minimize construction noise emissions	Contractor	Work site	Construction Stage	ProPECC PN2/93, Noise Control Ordinance and EIAO Guidance Note NO. 9/2010
S.3.1	General Construction Noise Control Measures • The Code of Practice on Good Management Practice	To minimize construction noise	Contractor	Work site	Construction Stage	ProPECC PN2/93 and Noise Control

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	to Prevent Violation of the Noise Control Ordinance (Chapter 400) (for Construction Industry) published by EPD shall be adopted; • The statutory and non-statutory requirements and guidelines shall be complied with; • Approval for the method of working, equipment and noise mitigation measures intended to be used at the site shall be granted from the Project Engineer before commencing any work; • Working methods to minimize the noise impact on the surrounding NSRs shall be formulated and executed, and the implementation of these methods shall be monitored by experienced personnel with suitable training; • Noisy equipment and noisy activities shall be located as far away from the NSRs as is practical; • Unused equipment shall be turned off; • PME should be kept to a minimum and the parallel use of noisy equipment / machinery should be avoided; • All plant and equipment shall be maintained regularly; and • Material stockpiles and other structures shall be effectively utilized as noise barriers, whenever practicable.	emissions				Ordinance
	Air Quality Impact					
S.3.2	Construction Dust Control Measures • Decking will be provided subsequent to the completion of surface excavation works. The duration	To minimise the dust impacts arising from the	Contractor	Work site	Construction Stage	Air Pollution Control (Construction

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	of decking is around 13 months after surface excavation works; • Regular watering to reduce dust emissions from all exposed site surface, particularly during dry weather; • Frequent watering for particularly dusty construction areas and areas close to air sensitive receivers; • Cover all excavated or stockpile of dusty material by impervious sheeting or spraying with water to maintain the entire surface wet; • Provision of vehicle washing facilities at the exit points of the site; and • Provision of tarpaulin covering of any dusty materials on a vehicle leaving the site.	construction works				Dust) Regulation
	Water Quality Impact					
S.3.3	Construction Water Quality Impact Measures • The Contractor should design and implement all the mitigation measures and practices specified in the ProPECC PN 1/94 "Construction Site Drainage" and "Recommended Pollution Control Clauses for Construction Contracts" issued by EPD. • All runoffs arising from the construction site should be properly collected and treated to ensure the discharge standards as stipulated in WPCO are met. Silt trap and oil interceptor should be provided to remove the oil, lubricants, grease, silt, grit and debris from the wastewater before being pumped to the public stormwater drainage system. The silt traps and oil interceptors should be cleaned and maintained regularly.	To reduce water quality impact induced by the construction work	Contractor	Work Site	Construction Stage	ProPECC PN1/94; Water Pollution Control Ordinance

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	• Any foul effluent should not be discharged into any public sewer and stormwater drain, unless an effluent discharge permit is obtained under the WPCO by the Contractor. • Site toilet facilities, if needed, should be chemical toilets or should have the foul water effluent directed to a foul sewer.					
	Waste Management					
S.3.4	Construction Waste Management Measures • Excavated material should be reused on site as far as possible to minimise off-site disposal. Scrap metals or abandoned equipment should be recycled if possible. • Waste arising should be kept to a minimum and be handled, transported and disposed of in a suitable manner. • The Contractor should adopt a trip ticket system for the disposal of C&D materials to any designated public filling facility and/or landfill. Independent audits of the Contractor and resident site staff will be undertaken to ensure that the correct procedures are being followed. • Chemical waste shall be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. • All general refuse should be segregated and stored in enclosed bins or compaction units and waste separation facilities for paper, aluminium cans, plastic bottles etc. should be provided to facilitate reuse or	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; ETWB TCW No. 31/2004; ETWB TCW No. 19/2005.

Project Profile Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Parties	Location of the measure	When to implement the measure	Relevant requirements or standards for the measure to achieve
	recycling of materials and their proper disposal.					
	Landscape and Visual Impact					
S.3.5	Landscape and Visual Measures • Screening of construction works by hoardings/noise barriers around works area with visually unobtrusive colours	To reduce visual impact by construction works.	Contractor	Temporary Storage Area at Salisbury Road	Construction Stage	EIAO
S.3.5	• Reinstating the affected amenity planting area at Salisbury Road after the completion of works	To prevent loss of planter after construction	Contractor	Temporary Storage Area at Salisbury Road	Operation Stage	ETWB TCW No. 2/2004