

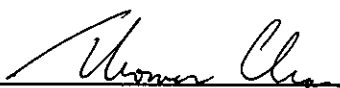
MTR Corporation Limited

South Island Line (East)

Updated Environmental Monitoring & Audit Manual

January 2012

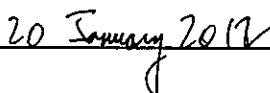
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MTR Corporation Limited

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Introduction

This Updated Environmental Monitoring & Audit (EM&A) Manual outlines the noise monitoring programme proposed for the SIL(E) and is prepared in accordance with the requirements of the SIL(E) Environmental Permit (EP) Condition 2.8.

As EIA Report indicated that residual noise impact is predicted during the construction phase at Wong Chuk Hang Depot, Wong Chuk Hang Nullah, Entrance A of Lei Tung Station and South Horizons, the mitigation measures stated in the EIA Report are recommended to be implemented in order to reduce the noise impact to the nearby Noise Sensitive Receivers (NSRs). The monitoring programme should be carried out by the Environmental Team (ET).

Commissioning test should be conducted by the ET in order to verify the compliance of the operational airborne noise levels in accordance with the EIA Report/ NCO criterion.

The implementation schedule of the recommended noise mitigation measures is presented in Section 14 of the EIA Report. The monitoring requirements and methodology for monitoring of noise impacts are provided below.

Construction Noise Impact

Airborne Noise

Monitoring Requirements

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

Supplementary information for statistical results such as L_{10} and L_{90} may also be obtained for reference. A sample data record sheet is shown in **Appendix A** for reference. The ET may develop project specific data record sheet to suit this EM&A programme.

Monitoring Equipment

As refer 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.

Monitoring Locations

Five noise monitoring locations (refer to **Figures 1 to 2**) are proposed and summarised in **Table 1**.

Noise monitoring location, CN3, has been updated to Shun Fung Building (SFB) as access cannot be obtained to either roof or podium of Yen Ching Building (YCB). The updated monitoring location, CN3, is in fact closer to the works area of LET Station Entrance A. Similarly, noise monitoring location, CN4, has been updated to South Horizons Phase IV – Block 25 Dover Court (SOH8) as no suitable location can be identified at South Horizons Phase III – Block 20 Mei Cheung Court (SOH5) for the set up of the monitoring station.

The status and locations of noise sensitive receivers may change after issuing this manual. If such cases exist, the ET should propose updated monitoring locations and seek agreement from EPD.

Table 1: Construction Noise Monitoring Stations

ID	ID adopted in EIA	Description	Works Area
CN1 ^{^a}	CPS	San Wui Commercial Society of HK Chan Pak Sha School (Educational Institution)	Wong Chuk Hang Depot
CN2 ^{^b}	HSS2	Holy Spirit Seminary (Education Institution)	Viaduct section along Wong Chuk Hang Nullah (west of Wong Chuk Hang Depot)
CN3 ^{*,#}	SFB	Shun Fung Building (Residential)	LET Station Entrance A
CN4 ^{*,^c}	SOH8	South Horizons Phase IV – Block 25 Dover Court (Residential)	SOH Station
CN5 ^{*,#}	TWGH1	TWGHs Jockey Club Rehabilitation Complex Block A (Convalescent Home)	Viaduct section along Wong Chuk Hang Nullah (west of Wong Chuk Hang Depot)

* Locations updated due to site access problem or as per the agreement with the premises landlord

No residual noise impact predicted in the EIA

^{^a} Communication was made to Chan Pak Sha School for the proposed ITR

^{^b} Communication was made to Holy Spirit Seminary for the proposed ITR

^{^c} The use of ITR is considered not necessary based on the Construction Noise Mitigation Measures Plan. However, as an additional mitigation measures, communication was made to the relevant flats of South Horizons who have been identified as eligible for the proposed ITR with reference to the noise assessment results in the EIA.

When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria if possible:

- at locations close to the major site activities which are likely to have noise impacts;
- close to the noise sensitive receivers (any domestic premises, temporary housing accommodation, educational institution, place of public worship, should be considered as a noise sensitive receiver); and
- for monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

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.

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 EPD to agree on an appropriate set of data to be used as a baseline reference.

Impact Monitoring

With the implementation of the noise mitigation measures, the residual construction noise impacts are predicted to be reduced or no worse than that in the EIA according to the Construction Noise Mitigation Measures Plans submitted under EP Condition 2.9. An indicative programme showing the periods with predicted construction air-borne noise residual impacts is shown in Appendix B. The noise mitigation measures including the use of quieter plant, temporary / movable noise barriers, noise enclosure / acoustic shed, silencers, noise insulating fabric will be implemented to minimize the noise impact. The provision of Indirect Technical Remedies (ITR) is also considered at the discretion of the Corporation to compensate for the remaining residual noise impacts. ITR would generally require the consideration to upgrade the glazing if necessary for the noise sensitive facades exposed to excessive residual noise impact. The provision of air-conditioning would also be considered for those affected dwellings. Consideration will be given to make reference to the previous approved EIA of WIL for the eligibility criteria proposed for qualifying NSRs for ITR which would be dependent on the severity of the residual noise impact and duration of exceedance after implementing all practical direct mitigation measures. Details for the provision of the ITR have been presented in the Construction Noise Mitigation Measures Plans as per EP Condition 2.9.

Monitoring of $LA_{eq, 30min}$ noise levels should be carried out at the agreed monitoring locations once every week continuously throughout the entire construction period during normal construction working hour (0700-1900 Monday to Saturday) in accordance with the methodology in the TM. This has taken into account that each construction stage would last for at least several weeks and significant fluctuation of construction noise levels is considered unlikely for each construction stage.

Taking into account the residual impact predicted at the NSRs and the current provision of the ITR as presented in Table 1, additional monitoring in term of continuous monitoring of $LA_{eq, 30min}$ noise levels should be conducted at monitoring station CN4 during normal construction working hour (0700-1900 Monday to Saturday) throughout the construction period with the residual impact predicted at the corresponding NSR (SOH8) as presented in the Construction Noise Mitigation Measures Plan.

The noise monitoring results should be placed in a dedicated website, which should be set up within one month after the commencement of construction of the Project, within a period of two working days after the relevant noise monitoring data are collected or become available.

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 carrying out during restricted hours is controlled by Construction Noise Permit (CNP) under the NCO.

In case of non-compliance with the construction noise criteria or the measured noise levels exceed the updated noise prediction in the construction noise mitigation measures plan, more frequent monitoring as specified in the Event and Action Plan in **Table 3** 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.

Event and Action Plan

The Action and Limit (AL) Levels for construction noise are defined in **Table 2**. Should non-compliance of the criteria occurs, action in accordance with the Event and Action Plan in **Table 3**, should be carried out.

Table 2 : 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

(#)Updated prediction of noise levels as contained in the construction noise mitigation measures plan

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

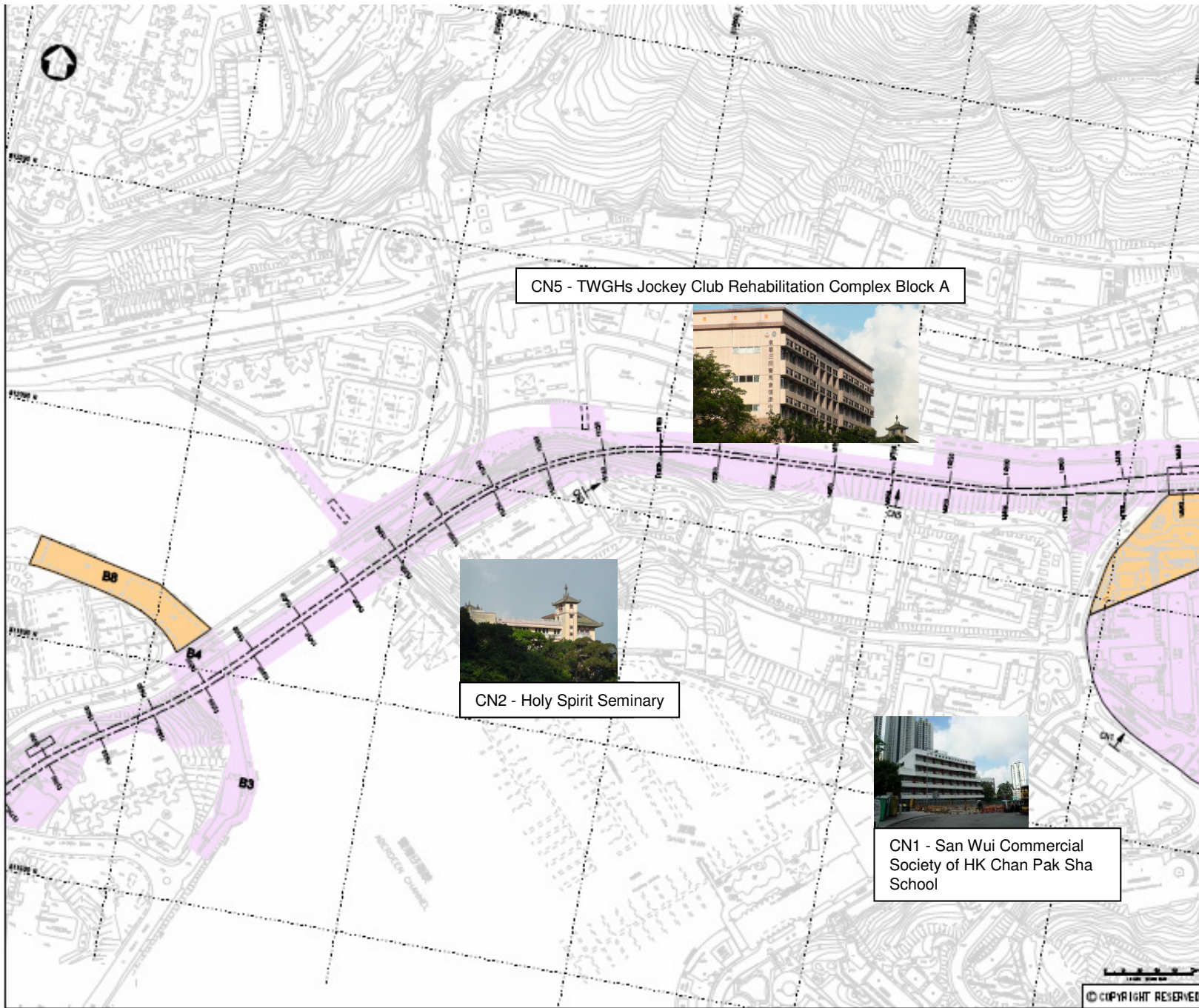
To account for cases in which ambient noise levels, as identified by baseline monitoring, approach or exceed the stipulated Limit Levels prior to the commencement of construction, a Maximum Acceptable Impact Level, which incorporates the baseline noise levels and the identified construction noise Limit Level, may be defined and agreed with EPD. The amended level will be greater than 75 dB(A) and will represent the maximum acceptable noise level at a specific monitoring station. Correction factors for the effects of acoustic screening and/or architectural features of NSRs may also be applied as specified in the TM.

Table 3: Event and Action Plan for Construction Noise

Event	Action			
	ET	IEC	ER	Contractor
Action Level	<ol style="list-style-type: none"> Undertake investigation to establish validity of exceedance. Undertake measurement to establish validity of complaint. Identify source(s) of complaint. If valid, notify IEC, ER and Contractor and follow other actions Discuss jointly with the ER and Contractor and formulate remedial measures Increase monitoring frequency if necessary to check mitigation effectiveness 	<ol style="list-style-type: none"> Review the proposed remedial measures by the Contractor and advise the ET accordingly 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance Notify Contractor Require Contractor to propose remedial measures for the analysed noise problem Ensure remedial measures are properly implemented 	<ol style="list-style-type: none"> Submit noise mitigation proposals to ER with copy to ET Implement noise mitigation proposals

Event	ET	IEC	ER	Action Contractor
Limit Level	<ol style="list-style-type: none"> 1. Identify source 2. Repeat measurement to confirm findings 3. If valid, notify IEC, ER, and Contractor and follow other actions 4. Increase monitoring frequency if necessary 5. Check Contractor's working procedures to determine possible mitigation to be implemented 6. Discuss jointly with the ER and Contractor and formulate remedial measures 7. Assess effectiveness of Contractor's remedial actions and keep IEC, and ER informed of the results 8. If exceedance stops, cease additional monitoring 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET and Contractor on the potential remedial actions 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ET accordingly 	<ol style="list-style-type: none"> 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. Assess the efficiency of remedial actions and keep the Contractor informed. 6. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to ER with copy to ET 3. Implement the agreed proposals 4. Liaise with ER to optimize the effectiveness of the agreed mitigation. 5. Revise and resubmit proposals if problem still not under control 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated

Figures
Location of Construction Noise Monitoring Stations



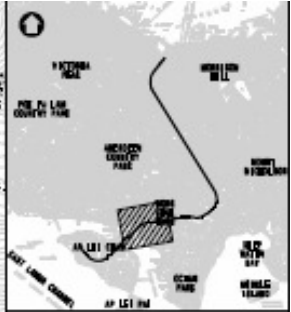
CN5 - TWGHs Jockey Club Rehabilitation Complex Block A



CN2 - Holy Spirit Seminary



CN1 - San Wui Commercial Society of HK Chan Pak Sha School



- KEY PLAN**
- LEGEND:**
- NOISE MONITORING STATIONS
 - PROPOSED NOISE ABATEMENT MEASURES (N1, N2, N3, N4, N5)
 - PROPOSED HIGH AND MEDIUM LEVELS



SOUTH ISLAND LINE (EAST)

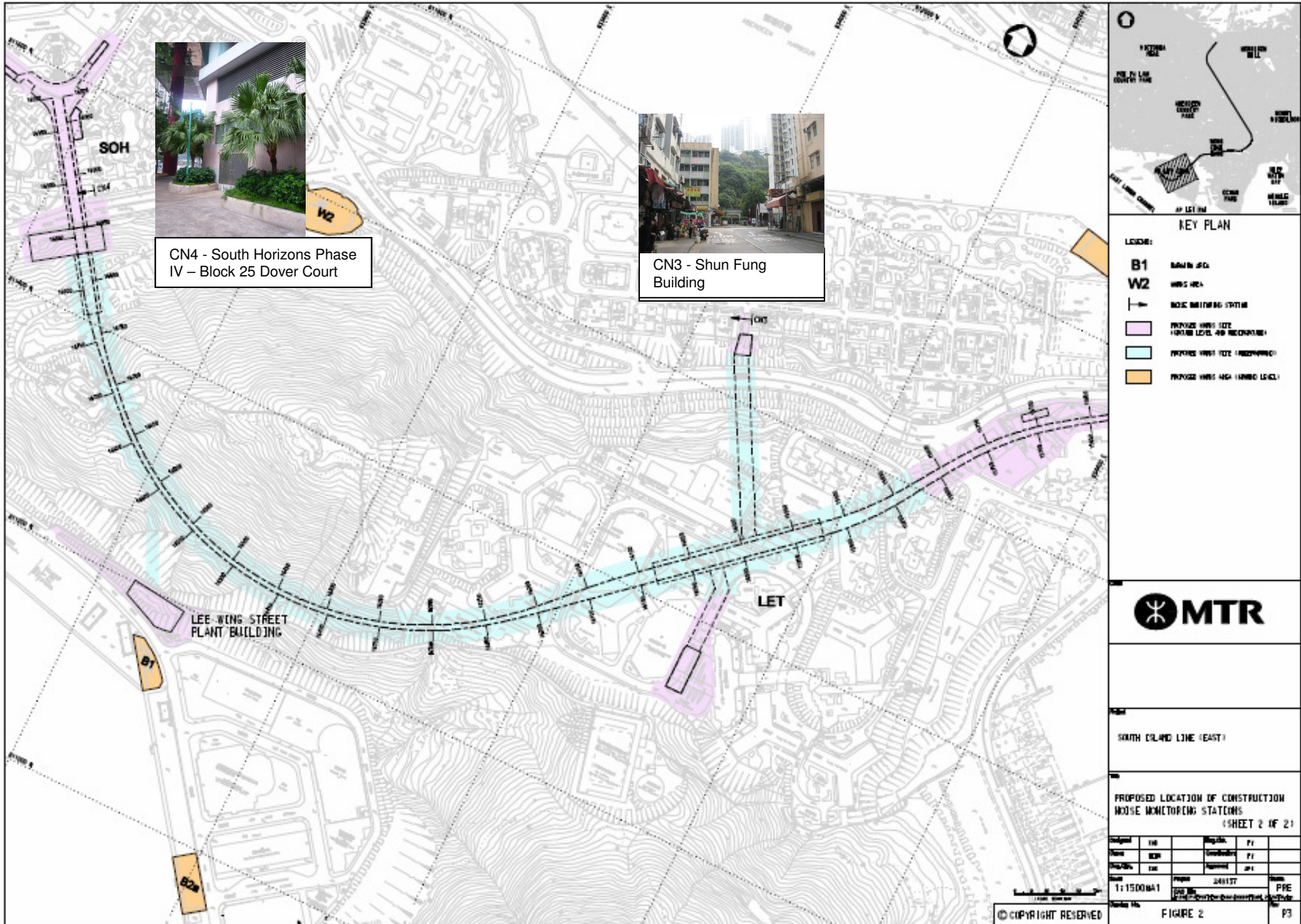
PROPOSED LOCATION OF CONSTRUCTION NOISE MONITORING STATIONS
(SHEET 1 OF 2)

Designed	YH	Checked	PF
Drawn	SCM	Reviewed	PF
Checked	EM	Approved	JYF

Scale: 1:15000A1
 Drawing No.
 Date:
 Project:
 PPE

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FIGURE 1



CN4 - South Horizons Phase IV - Block 25 Dover Court



CN3 - Shun Fung Building



KEY PLAN

- LEGEND:
- B1** BUILDING FOOTPRINT
 - W2** WALLS
 - NOISE MONITORING STATION
 - PROPOSED NOISE MONITORING STATION (LEVEL 4 AND BELOW)
 - PROPOSED NOISE MONITORING STATION (LEVEL 5 AND ABOVE)
 - PROPOSED NOISE MONITORING STATION (LEVEL 6 AND ABOVE)



SOUTH ISLAND LINE (EAST)

PROPOSED LOCATION OF CONSTRUCTION NOISE MONITORING STATIONS (SHEET 2 OF 2)

Station	NO	Location	PI
1	1		
2	2		
3	3		
4	4		
5	5		
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FIGURE 2 P3

Appendix A

Sample Noise Monitoring Data Recording Sheet

Noise Monitoring Field Record Sheet

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

Name

Date

Record by:

Appendix B
Indicative Programme showing the Periods with
Construction Air-borne Noise Residual Impacts

